NOTE FROM THE EDITOR

Unfortunately the release of the 13th issue of the IUCN Otter Specialist Group Bulletin is somewhat later than usual. The delay is a result of the move of the University of Veterinary Medicine to its new place. It was quite a hard job to organize the move and to restart everything. Please note the new address which is given on page 1. The next issue will hopefully be send out around end of December.

In this issue there are four reviewed articles and another three are already in the state of review. I would like to thank all reviewers for their fruitful comments on the manuscripts. The new system seems to be accepted much better than I hoped. Articles will be fully reviewed by at least two reviewers. Reports will be published without a review system as we had it the last years.

For their help in editing and printing of this issue I would like to mention Barbara Gutleb-Rainer, Hans van den Berg (Wageningen) and Els Hoogsteede-Veens (GRAFISCH SERVICE CENTRUM VAN GILS, Wageningen). Without their efforts the Bulletin could not be published in its present form. The foto on the front cover was provided by Juan Pablo Gallo (Argentina).

Fotos for the front cover are welcome and will be send back on request. Name of authors will be mentioned on page 1.

ARTICLE

ASPECTS OF PREYING BEHAVIOUR OF SMOOTH-COATED OTTERS *Lutrogale Perspicillata* FROM SOUTHEAST ASIA

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ABSTRACT

Some observations on the preying behaviour of *Lutrogale perspicillata* like group hunting, or interactions with other species are presented.

Keywords: otter, *Lutrogale perspicillata*, commensalism, preying behaviour, group hunting

MALAYSIA

On 4 November 1993, we (BvH, BO) visited Kuala Selangor Nature Park, Peninsular Malaysia, a 240 ha conservation area in former mangrove forest managed by the Malaysian Nature Society. About 17.30h just before sunset, we observed from the hide at the small lake a group of eight Smooth-coated otters *Lutrogale perspicillata* foraging in the creek. The otter party cooperated very efficiently in chasing their prey. Two egrets, a heron and a kingfisher associated with the otter group. The birds benefited from the smaller fish chased ashore. Once the Great egret attempted to steal prey from an otter.

Kuala Selangor (approx. 3°21' N, 101°17' E) is a system of artificial and natural creeks and lakes created in 1987-1989 in logged-over mangrove forest for conservation, environmental education, recreation and tourism. At low tide strips of mud are exposed along the banks between the water edge and the vegetation. Arriving just after a rainshower, the sky was overcast during the observation, but visibility was excellent. We used 10*25 binoculars and spent about 12 or 15 minutes observing the animals

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from a distance of 30-60 m foraging over a distance of about 80 m, until the otters disappeared around a bend in the creek. It was an incidental event while on a recreational excursion.

Coordinated Group Feeding

Repeatedly the otter party spread out in a single, slightly V- shaped line, pointing in the direction of movement and nearly as wide as the creek. The largest individuals occupied the middle section. In this formation the otters undulated wildly through the creek, causing panic-stricken fish to jump out of the water a few metres ahead. After two or three minutes, the otter at the point of the pack dived and disappeared, only to surface seconds later with a fish for about one-third in its muzzle. Instantaneously, the whole pack followed that example, a while later surfacing one after the other, many with a fish in the snout. The otters then moved ashore and consumed the fish on the muddy part of the bank. The otters tossed the fish up a little and swallowed it head-first in one piece. Prey handling on the creek's bank took no more than 10 seconds. We did not observe defaecation. Soon the otters started with a plunge and spread out again for the next sortie sweeping the width of the creek.

Association with Other Species

Commotion caused by the otter pack attracted a Great egret *Casmerodius albus* and two Intermediate egrets *Egretta intermedia* (both Ardeidae, Aves). When the otters appeared, the birds approached the hunting pack from some 25-40 m away, where they were standing or erect (bird behavioural terminology after HANCOCK and KUSHLAN (1984). The Great egret advanced first and moved almost simultaneously with the otters. The birds then followed the otters along the bank of the creek, running, hopping and charging after defenseless fish that had jumped on the exposed mud. In this manner the Great egret obtained at least two fishes. Once it attempted half-heartedly to steal a prey being handled by an otter, but without success. A Grey heron *Ardea cinerea* (Ardeidae) only reacted once when the otter group passed its position. Also a Stork-billed kingfisher *Pelargopsis capensis* (Alcedinidae) landed repeatedly on the mud to pick up disturbed crabs or possibly smaller stranded fish. All but the Grey heron, which were inattentive to the frenzy caused along the banks, followed the otters.

INDONESIA

Another instance of bird-otter interaction was observed on 26 February 1994 on the north coast of West Java, Indonesia, at about 1,500 m inland from the actual seashore, close to the eastern bank of the Ciasem River (6°14' S, 107°42' E).

While we (RM, IRL) were surveying abandoned brackish water fishponds (tambak) for otter signs within a young mangrove plantation managed by the state-owned enterprise Perum Perhutani, four Smooth-coated otters were observed playing in a canal-shaped fishpond. As there was evidence of fresh spraints on the surrounding dike, we presume preceding hunting though we did not directly witness foraging. A single Collared kingfisher *Halcyon chloris* (Alcedinidae) perched on a branch about 1.5 m above the otter group. While the otters were playing in the fishpond (width 4 m, depth 0.5 m), the kingfisher always kept its head turned to the group, seemingly attentive. From a first observation distance of approximately 80 m the four otters approached to a final distance of about four metres, with the kingfisher following for half the stretch. Alternately hovering and perching, the Collared kingfisher was always attentive and oriented towards the otters, never more than two metres behind the group. The observation of the Smooth-coated otters lasted 20 minutes. After some ten minutes of interaction with the otters, the kingfisher lost interest, probably because of lack of further otter hunting, and flew away without any vocalization.

DISCUSSION

Group feeding by otters has been reported (Bartels, 1934; 1937; Sody, 1940; Procter, 1963; Furuya, 1976; Chitampalli, 1978; Duplaix, 1980) and the ability of group hunting of *L. perspicillata* is used by Indian fishermen since centuries to drive fish into their nets (Gudger, 1927). But we do not know of any example of coordinated group feeding behaviour within otters, and only few cases of association between otters and other species have been published.

Interaction between kingfishers and otters was reported from South Africa (Boshoff, 1978), Surinam (Duplaix, 1980) and Thailand (Kruuk et al., 1993). In two cases kingfishers were reportedly in constant attendance with the otters (Boshoff, 1978; Kruuk et al., 1993), and once a kingfisher scavenged on fish scales left over from an otter's meal (Duplaix, 1980). Footprints, latrines with new and old spraints, and a holt proved the frequent use of the Javan site by *L. perspicillata*. Local forest rangers confirmed observations of the otter throughout the year. Hence a certain familiarity of *H. chloris* and possibly other bird species may be assumed, which may lead, possibly through learning, to a commensalism-like bird-otter interaction.

Although associations between egrets and other species, notably grazing cattle, are well known (e.g. Hancock and Kushlan, 1984), none are reported for the Great or Intermediate egret. We assume that the Intermediate egrets are attracted when seeing the flapping fish on the banks. The immediate reaction of the Great egret suggests the bird was familiar with the situation, directly associated the otter movements with potential food, and recognize the subsequent feeding opportunity.

In general, (smaller) animals that live (or are actively cooperating) in groups may benefit from group vigilance and collective defense (against predators). Grouping may help minimizing a predator's effect on the group, e.g., through compact clustering or confusing the attacker (Hamilton, 1971; selfish herd). However, such defences are unlikely explanations for the otters' behaviour: hardly any predators can harm otters in Malaysia and Indonesia (Melisch, 1995). Benefits in improved food source exploitation seem more likely explanations. Gittleman (1989), discussing advantages in food exploitation of carnivore group living, mentions improved chances of finding and catching prey, increasing diversity and size of prey and the successful competing for food (e.g., with scavengers). Furthermore, he refers to possible information exchange, teaching and learning, and more generally, to reproductive access to members of the other sex.

We assume that by spreading out nearly as wide as the creek, the otters may have swept the water body and concentrated prey in front of them. Wildly undulating through the water may have served to confuse and exhaust the prey. Together, these effects increase the otters' chances to locate and catch prey. Note that prey exploits grouping as a method to confuse predators, particularly in open habitat (Hamilton, 1971; Terborgh, 1990). Ironically, in this case a predator has used group hunting to confuse prey.

Advantage to the associating egrets and kingfishers is obvious: increased access to food. Besides, according to Lubis (1995) and Melisch (*in prep.*) there is no evidence of bird remains in otters' spraints from West Java, and South-east Asia, respectively. It is tempting to see a form of commensalism in these and other reported feeding associations between otters and birds for shallow waters, but that judgement should wait for more field observations to confirm present anecdotal indications.

ACKNOWLEDGEMENTS - *Bas and Bernard thank Roland Melisch, who pointed out that documented observations on cooperation between otters and association with other species are scarce, and therefore coerced them to put their observations to the fore. Roland and Reza are grateful to Bapak Karting and Bapak Suriadi from Perum Perhutani RPH Ciasem, who helped to discover the Javan observation site. The Javan observations were incidental during the joint PHPA/AWB Otter Project.*

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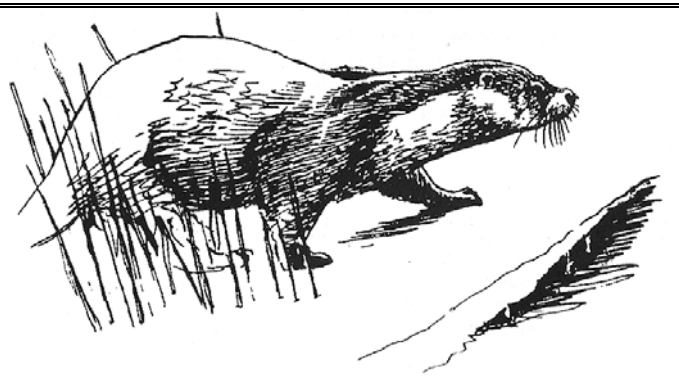

ARTICLE

NEW HOST RECORDS OF TICKS (ACARINA; IXODIDAE) PARASITIZING THE RIVER OTTER (*Lutra canadensis*)

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(Received February 28th, 1996, accepted June 14th, 1996)

ABSTRACT
The occurrence of *Ixodes cookei* and *Amblyomma americanum* constitute new host records for *Lutra canadensis* and the subfamily Lutrinae.

Keywords: *Lutra canadensis*, ticks, ixododae

INTRODUCTION

Present-day Arkansas has been known for its infestations of ticks since the early 1800's. Early naturalist Thomas Nuttall (1821, p. 151) wrote in 1819 in Arkansas territory near the Red River that the woods "were now disgustingly infested with ticks..." Lancaster (1973) did the only intensive study of the ticks inhabiting Arkansas mammals and birds. Although Lancaster reported on 35 species of native and naturalized mammals, he omitted the river otter (*Lutra canadensis*). This semi-aquatic mustelid has one of the largest distributions of any North American mammal (Anderson, 1977), yet few specimens have been collected. Most of the specimens that have been received by researchers were previously skinned and could not be examined for ectoparasites (Chanin, 1985). No study has been done determining the occurrence of ticks on an adequate sample of indigenous river otters. The literature of the ticks and other ectoparasites of the other members of the subfamily Lutrinae is modest and is in obscure publications. The purpose of the present study is: 1) to determine the occurrence of ticks and other ectoparasites on Arkansas river otters, 2) to summarize the literature on the occurrence of ticks and other ectoparasites on otters (subfamily: Lutrinae), and 3) to compare the tick assemblage of otters to other mustelids plus other furbearing mammals which occur in Arkansas wetlands.

MATERIALS AND METHODS

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A total of 24 river otters was obtained from fur buyers and trappers in Arkansas (trapped in December, January, February, March, April, and June). Specimen donators were requested to put their otter specimens in a plastic bag after trapping and to freeze them. The author thawed them and brushed the pelt in both directions (i.e. with the grain of the fur and against) onto a light-colored piece of paper or plastic bag in order to dislodge ectoparasites. Small recesses and other likely areas (e.g. pinnae, muzzle, groin, and axilla) were examined carefully for the presence of ectoparasites. All ectoparasites were collected and preserved in 70% ethyl alcohol. Numbers of each ectoparasite species per otter, location of ectoparasites on host, sex of ectoparasite, and collection locality, host sex, and collection date of host were recorded. Specimens were identified with the aid of keys by Cooley and Kohls (1945) and Lancaster (1973).

RESULTS

The pelage of 24 unskinned otter specimens yielded a total of 10 ticks from 5 otters. No other macro- or micro-ectoparasites were found. Small mites may have easily been overlooked. Two species of ticks were represented; the Lone star tick (*Amblyomma americanum*) and the hard tick (*Ixodes cookei*). Table 1 lists the collection data.

Ticks occurred on both male and female otters collected in January, February, and April in areas such as the pinnae, muzzle, lip, and groin where the pelage is less dense and skin is more highly vascularized. Ticks came from river otters captured in the West Gulf Coastal Plain and the Ouachita Mountain Natural Divisions, areas in Arkansas that have the highest density of otters (Polechla, 1987). No suitable specimens from the Mississippi Alluvial Plain, Ozark Mountain, and Crowley's Ridge Natural Divisions were available for inspection.

DISCUSSION

These occurrences of *Ixodes cookei* and *Amblyomma americanum* constitute new host records for *Lutra canadensis* and the subfamily Lutrinae. Prior to this study only seven species of ectoparasites have been identified from otters (Table 2). Most authors (Stephens, 1957; Johnson et al., 1967; Harris, 1968; Kenyon, 1969) have regarded ectoparasites to be very rare due to the otters' aquatic behavior. However, the lustrous guard hairs and wool hairs are very dense (Peterson, 1914) and create a dead air space that effectively keeps the base of the pelage and skin dry (Tarasoff, 1972, 1974). This provides a suitable microhabitat for ticks, mites, a fleas, and marine sucking lice. When otters periodically surface for a breath of air, the parasitic arthropods are given an opportunity for gaseous exchange. Two factors may explain the low infestation rate

usually found on otters. Otters in their vigilant grooming may rid themselves of many ectoparasites.

Some of the ticks found on otters have been found on other mustelids and wetland furbearing mammals. *Ixodes cookei* has been found on other furbearing mammals species occurring in wetlands with river otters (e.g. raccoons (*Procyon lotor*) and opossums (*Didelphis virginiana*) and other mustelids (e.g. badgers (*Taxidea taxus*), long-tailed weasels (*Mustela frenata*), spotted skunks (*Spilogale putorius*), and striped skunks (*Mephitis mephitis*) (Lowery, 1974; Mumford and Whitaker, 1982; Rabinowitz, 1983). *Ixodes hexagonus* has been reported from the long-tailed weasels, minks (*Mustela vison*), and striped skunks (Lowery, 1974). *Amblyomma americanum* is very common in Arkansas and has been found on 16 native and domestic mammals (Lancaster, 1973) including the mustelid, the striped skunk (Lancaster, 1973; Lowery, 1974). Nuttall (1821, p. 130) wrote that after he had taken a collecting trip that he "picked off my skin and clothes more than 50 ticks (*Acarus sangisugas*) which are here more abundant and trouble some than in any part of America which I have been yet." The old specific name, *Acarus sangisugas* is synonymous with *Amblyomma americanum.*

Otters may contract ticks by making contact with conspecifics, other mammals, infested substrate, vegetation, and bedding materials. Prime sites for transfer of ticks to otters would be along wildlife trails, otter rolling sites, or beaver lodges. Otters may be important in transporting ticks across large rivers and other bodies of water.

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Table 1. Collection data of ectoparasites from river otters (*Lutra canadensis*) from Arkansas

Taxa	No. of Specimens	Tick Sex*	RML No.†	Location of Ticks on Host	PJP No§	Host Sex	Collection Location	Collection Date	Method of Capture
Amblyomma americanum	1	M	117912	Pinnae	1263	M	Ouachita R., 8 mi. W. Vick, sec. 21, R10W, T16S, Bradley Co., Arkansas	5 April 1983	330 Conibear Trap
"	1	N	117912	Muzzle	"	"	"	"	"
"	1	M	117913	Lip	"	"	"	"	"
"	1	F	117913	Lip	"	"	"	"	"
"	2	N	117914	Groin	1274	"	1 mi. S. +15 mi. E. Waldo NW 1/4 sec. 22, R21W, T16S, Columbia Co., Arkansas	9 February 1983	Road Kill
Ixodes cookei	2	F	117911	Unknown	1303	"	Black Branch, 150 yds. Upstream of Deceiper Creek, 9.5 mi. E + 3 mi. N. Gurdon SW 1/4 of SW 1/4 of sec. 8, R18W, T9S, Clark Co., Arkansas	28 January – 3 February 1984	330 Conibear Trap
Unknown Ixodidae	1	U		Unknown	1390	F	Poteau River, Waldron, SW 1/4, sec. 17, R29W, T3N, Scott Co., Arkansas	18 January 1984	"
"	1	U		Pinnae	1243	F	Unspecifed Location, Arkansas	January 1983	Leg Hold Trap

* N = Nymph, U = Unidentified Sex, M = Male, F = Female
† RML No = Rocky Mountains Laboratory Number
§ PJP No = Paul J. Polechla Number

Table 2. Previously published accounts of otter (sub-family Lutrinae) ectoparasite species reported at various localities

Taxonomic Groups	Locality	Author (Data)
Class:Arachnidaie		
Order: Acarina		
Family: Listrophoridae - mites		
Lutracarus canadensis	Southeastern Alaska	Fain & Yunker (1980)
Lynxacarus mustelae	Southeastern Alaska	Fain & Yunker (1980)
Family: Halarachnidae – marine water mites		
*Halarachne miraungae**	Amchitka Is., Alaska	Kenyon (1965)
Family: Ixodiae – hard ticks		
Ixodes uriae	Humboldt County, CA	Eley (1977)
Ixodes hexagonus **	Louisiana	Lowery (1974)
Unidentified taxa †	Africa	Harris (1968)
Unidentified taxa §	British Isles	Stephens (1957)
Unidentified taxa ††	Veracruz, Mexico	Hall & Dalquest (1967)
Class: Insecta		
Order: Anoplura		
Family: Echinophthiriidae – Marine sucking lice		
Latagophthirus rauschi	Coos Co., Oregon	Kim & Emerson (1974)
Order: Siponaptera		
Family: Vermipsyllidae – carnovire fleas		
Chaetopsylla floridensis	Katlian Bay, Alaska	Hass et al (1978)

* These mites were reported on the sea otter (*Enhydra lutris*)

† This unidentified tick was reported on the African clawless otter (*Aonyx capensis halios*)

§ These unidentified ticks were reported on the Eurasian Otter (*Lutra lutra*). All other ectoparasites were reported on Lutra canadensis.

†† This unidentified "large black tick" was reported on the Neotropical otter (*Lutra longicaudis*)

** Keirans & Clifford (1978) synonomized *I. hexagonus* with *I. cookei*

ARTICLE

SERUM ALBUMIN OF THE OTTER (*Lutra Lutra* L., 1758) AN ELECTROPHORETIC STUDY

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ABSTRACT
Electrophoretic techniques were used to characterize otter serum albumin in respect to isoelectric point, molecular mass and mobility in the electric field. Comparison with the homologous protein of other carnivores shows great similarities between the investigated members of this zoological class and marked differences to most other mammals.[·]

Key words: otter, carnivores, serum albumin, electrophoresis

INTRODUCTION

During the last years the otter (*Lutra lutra*) and its environment have become one of the major objects of our research (Gutleb et al., 1993; Gutleb, 1994). There was little information on otter proteins, comprising only some electrophoretic data in regard to polymorphisms (Guenther et al., 1981; Scheil and Guenther, 1985) and acute phase protein levels (Duffy et al., 1994). Therefore, we started a study on a larger number of otter serum/blood samples (mainly collected from animals found dead) in order to improve knowledge on otter serum proteins, to establish an electrophoretic map of the "normal" serum protein pattern and to determine the effects of sample history (Miller et al., 1995b).

Another subject of our interest has been the study of different serum albumins and the comparison of their properties (Miller and Gemeiner, 1993). 12 species have been investigated, whereof cat and dog albumins gave markedly different patterns. Thus, comparison with albumin of the otter, belonging to the same zoological class, seemed of particular interest.

[·] Abbreviations: PAGE = polyacrylamide gelelectrophoresis; pI = isoelectric point; SDS = sodium dodecylsulfate

MATERIALS AND METHODS

Samples

Otter samples were either collected as sera from healthy individuals or as serum/blood samples from freshly found dead animals (mainly after traffic accidents), of Danish, Hungarian, and Austrian origin. For comparison, serum samples from healthy cats and dogs as well as commercially available human serum albumin (Behring) were used.

Electrophoretic Methods

The following physicochemical characteristics of otter serum albumin were determined electrophoretically:

1) The mobility, using routine electrophoresis on cellulose acetate membranes or native polyacrylamide gel electrophoresis (PAGE).
2) The isoelectric point, i.e. the pH where the overall net charge of the protein is zero, by performing isoelectric focusing in polyacrylamide gels. Depending on the presence/absence of urea and reducing agents, the protein is either in its folded or in its unfolded status; accordingly, the isoelectric point for either the native or the denatured protein may be evaluated.
3) The molecular mass, determined by PAGE in the presence of sodium dodecyl sulfate (SDS).

Methods have been described in detail in Miller and Gemeiner (1993).

RESULTS AND DISCUSSION

Albumin is the major plasma protein, important as a transport molecule (for fatty acids, bilirubin, hormones, drugs, ions, etc.), in colloid osmotic regulation, and as easily accessible protein reserve. There are only few general investigations on animal serum albumins, although major disorders are known in humans (Andersson, 1979). In a previous study we have investigated the electrophoretic properties of albumins of 12 different species (human, horse, cow, pig, goat, sheep, cat, dog, rabbit, mouse, rat, chicken; Miller and Gemeiner, 1993). Especially dog and cat albumin showed markedly different behaviour: they had a higher mobility in the electric field, a higher molecular mass and a more acidic isoelectric point. Preliminary findings suggested similar properties for otters. The results of further, more detailed experiments are summarized in table 1, comparing the data also with human serum albumin (the species which is characterized best):

1) In routine electrophoresis, otter albumin is faster than most of the other albumins, including dog, but markedly slower than cat. Column 2 of table 1 gives mobilities in the cellulose acetate membrane system; the trend in native PAGE is similar, but not so pronounced. For easier comparison, the mobility of human serum albumin has been set to 1.00 and those of the other species recalculated on this basis.
2) Isoelectric point: Due to its microheterogeneity, albumin focuses not at a single pH, but produces a series of bands in a limited pH-range. This range is much more acidic for cat and dog than for human, otter albumin can hardly be distinguished from cat albumin. Fig. 1 shows patterns determined under native conditions. Under denaturing conditions, isoelectric points of albumins are usually higher: the three carnivores give similar pH-ranges of 5.0-5.2, whereas pH 5.4-5.8 was determined for human serum albumin.
3) The molecular masses of the three carnivore albumins are higher than those of all other species we have already investigated. Otter albumin turned out to be the largest molecule of the three (fig. 2a). An interesting fact was noticed when investigating some degraded blood samples from dead animals which had not been found/collected immediately. These specimens showed a markedly smaller albumin (only 62 kDa, see fig. 2b), most likely due to cleavage. Similar effects could be generated in vitro by limited enzymatic digestion of the intact "normal" molecule (e.g. with trypsin).

On the basis of these findings we were interested to test also samples from other carnivores, as we supposed these albumin properties to be "carnivore-specific". Specimens could be obtained from mink (*Mustela vison*), fox (*Vulpes vulpes*), wolf (*Canis lupus*), and polar bear (*Ursus maritimus*). Indeed, wolf samples were very similar to the dog. Also mink, fox, and polar bear showed patterns comparable to the already investigated carnivores, but with properties "intermediate" between cat and dog (data not shown).

Table 1: Electrophoretic properties of different serum albumins

Species	Mobility†	Molecular mass [kDa]	Isoelectric point (native molecule)
human	1.00	66	4.7-4.95
otter	1.08	73	4.6-4.7
cat	1.13	70	4.6-4.7
dog	1.04	71	4.5-4.65

† mobility on cellulose acetate membranes

Until now there is no substantial explanation for this different behaviour of the carnivore albumins. Purification, fingerprinting (i.e. comparison among proteolytic or chemical digests) and/or sequence analysis would be necessary to get information on the primary structure of the respective protein. There are no data on protein fragmentation and no complete sequence data yet, not even on cat and dog albumin. Data on total protein hydrolysis of cat albumin show that it contains more acidic amino acids than human serum albumin (Dandeu et al., 1991). Similarly, protein structure and folding is only known for the human homologue (He and Carter, 1992). More information on albumin properties would be valuable also for zoologists, as this protein has been suggested to serve as an evolutionary clock and as a marker for the relationship of species (Sarich, 1969).

CONCLUSIONS

Otter serum albumin shows properties similar to both, dog and cat albumin. It has the same isoelectric point range as cat serum albumin, but it differs slightly in molecular mass and mobility from the feline and canine homologue. All carnivore albumins investigated showed properties quite similar to each other and markedly different to most of the other species. Thus, electrophoresis can be applied as a useful tool for species identification/differentiation, to monitor the protection of endangered species and to detect offences against it (as already shown in Miller et al., 1995a). Further investigation on protein structure should be undertaken to reveal the molecular basis for the differences noticed in electrophoretic behaviour.

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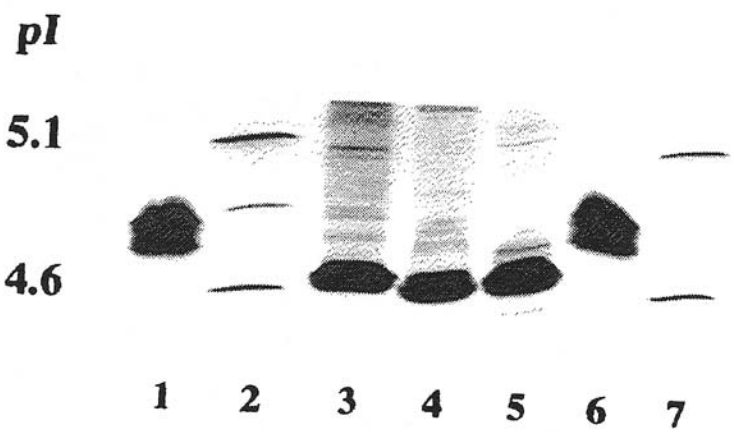
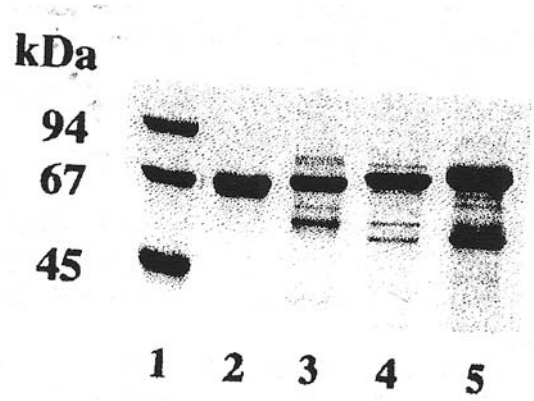


Figure 1. Isoelectric focusing without denaturing additives; T = 3.5 %, C = 2.7 % (piperazine diacrylamide as crosslinker), Coomassie staining.
Standard (lanes 2 and 7): equal amounts of amyloglucosidase (pI 3.6), trypsin inhibitor (pI 4.6), ß-lactoglobulin A (pI 5.1) and carbonic anhydrase II (pI 5.9).
Human serum albumin in lanes 1 and 6; serum samples: otter (3), dog (4), and cat (5).

2a



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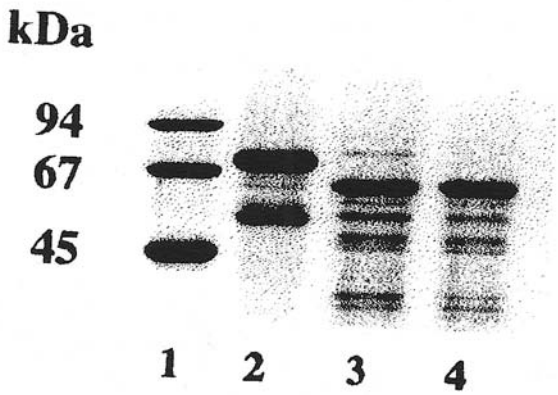

Figure 2: SDS-PAGE in a gradient gel with 10 - 15 % T, 2.6 % C (stacking gel 5 % T, 2.6 % C), Coomassie staining.
Standard (lane 1): LMW (Pharmacia), containing: phosphorylase B (94 kDa), bovine serum albumin (67 kDa), ovalbumin (45 kDa), carbonic anhydrase (30 kDa), trypsin inhibitor (20.1 kDa), and *-lactalbumin (14.4 kDa).
Samples:
a) human serum albumin (2); cat (3), dog (4), otter (5) serum
b) three different otter sera: in lane 2 normal pattern, in lanes 3 and 4 older otter samples which show degraded albumins.

ARTICLE

SOME ASPECTS OF THE FEEDING ECOLOGY OF OTTERS (*Lutra lutra*) IN TURKEY

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ABSTRACT

Food of otters *Lutra lutra* was studied by the analysis of 100 spraints collected in Turkey in summer 1994. The aim of the study was to show whether or not there is an impact of otters on local domestic animals and on game species or not. Fish (mostly *Anguilla anguilla* and *Leuciscus sp*.) were the most important prey items (55,7 %). Additionally the study showed that otters were feeding on marine fish. Other important prey categories were amphibians (up to 51,9 %), crustaceans (4,8 %), reptiles (up to 9,1 %) and birds (2,4 %). The study showed that there is no reason for condemning the otter as a pest for domestic animals and game species.

Keywords: Lutra lutra, feeding ecology, domestic animals, Turkey

INTRODUCTION

During an otter survey on the west coast of Turkey and its hinterland freshwater rivers in summer 1994, A. Kranz, N. Ziegler and M. Weiss collected about 100 otter spraints (Fig. 1). These spraints were analyzed to determine the impact of otters on local fish, domestic animals and game species. The results of this study should help to resolve the conflict between otter conservationists and local otter poachers (Kranz, 1994). This is one of the first studies on otters in Turkey, where little is known about the status of the species (Mason and Macdonald 1986).

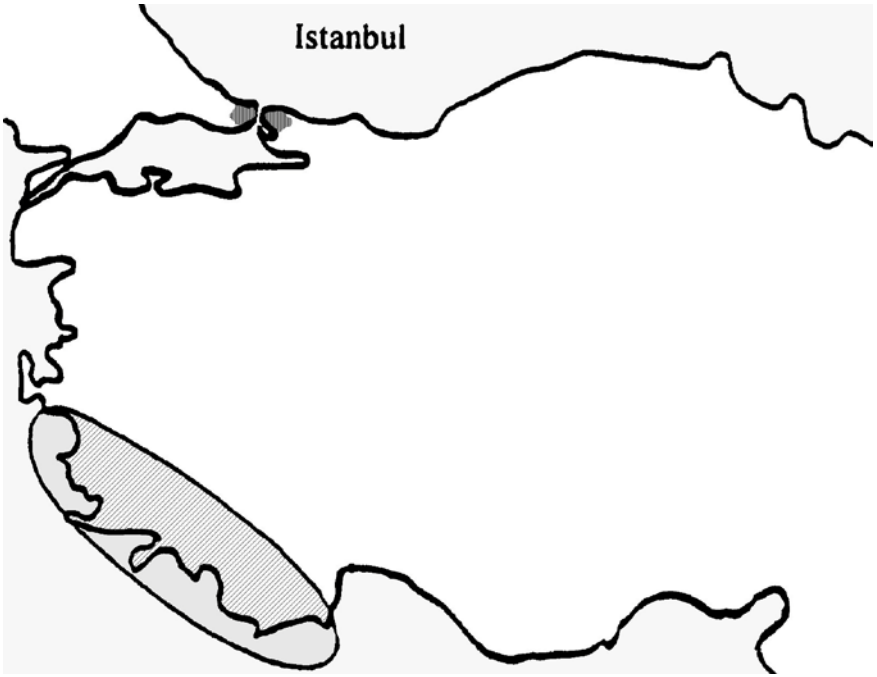

Figure 1. Study area in Turkey

METHODS

The 100 dryed otter spraints were soaked for 48 hours in detergent water and washed through a 0,8 mm strainer. The remaining bones, scales and feathers were analyzed with a binocular (6x-50x) and determined with support of reference collections and drawings taken from literature (Brohm, in prep.; Conroy et al., 1993; Engelmann, 1986). Size of the most important fish species in the otter diet was estimated by measuring the vertebrae lengths (Conroy et al., 1993; Wise, 1980). The results were shown as relative frequencies of occurrence, i. e. the frequency of a prey category is presented as a percentage of all prey occurrences (Erlinge, 1967; Conroy et al., 1993; Hansen and Jacobsen, 1992). The spraints of four different sample areas were evaluated separately. The spraints of the other study sites formed together the fifth sample.

RESULTS

Table 1: Food of otters in Turkey (results are shown as relative frequencies of occurrence);
N= number of spraints; n= number of occurrences; total number of spraints = 100

Turkey 1994	Hisaronu N = 15		Kizil De N = 15		Gelibolu N = 15		Akcarpinar N = 21		Rest N = 34	
Prey Categories	**n**	**Rel. Freq. %**	**n**	**Rel. Freq. %**	**n**	**Rel. Freq. %**	**n**	**Rel. Freq. %**	**n**	**Rel. Freq. %**
Trout (*Salmo trutta*)	1	3.7	1	3.7	0	0	1	2.4	0	0
Perch (*Perca fluviatialis*)	1	3.7	0	0	0	0	2	4.7	4	8.2
Perch, not def.	0	0	0	0	0	0	0	0	1	2
Eel (*Anguilla Anguilla*)	10	3.7	3	11.1	0	0	4	9.5	9	18.4
Chub (*Leuciscus* sp.)	8	29.6	2	7.4	9	4.1	0	0	4	8.2
Cyprinids, not def.	1	3.7	2	7.4	2	9.1	0	0	7	14.2
***Mugil* sp.**	0	0	0	0	0	0	2	4.7	0	0
Roccus labrax	0	0	0	0	0	0	4	9.5	0	0
Other sea fish	0	0	0	0	0	0	14	33.3	0	0
Fish, Total	21	77.7	8	29.6	11	50.1	28	66.7	25	51
Amphibians	6	22.3	14	51.9	4	18.2	8	19	16	32.7
Birds	0	0	2	7.4	0	0	1	2.4	1	2
Crustaceans	0	0	0	0	3	13.6	4	9.5	1	2
Reptiles	0	0	0	0	2	9.1	0	0	4	8.2
Insects	0	0	2	7.4	1	4.5	1	2.4	2	4.1
Molluscs	0	0	1	3.7	0	0	0	0	0	0
Plants	0	0	0	0	1	4.5	0	0	0	0
Total	27	100	27	100	22	100	100	100	49	100

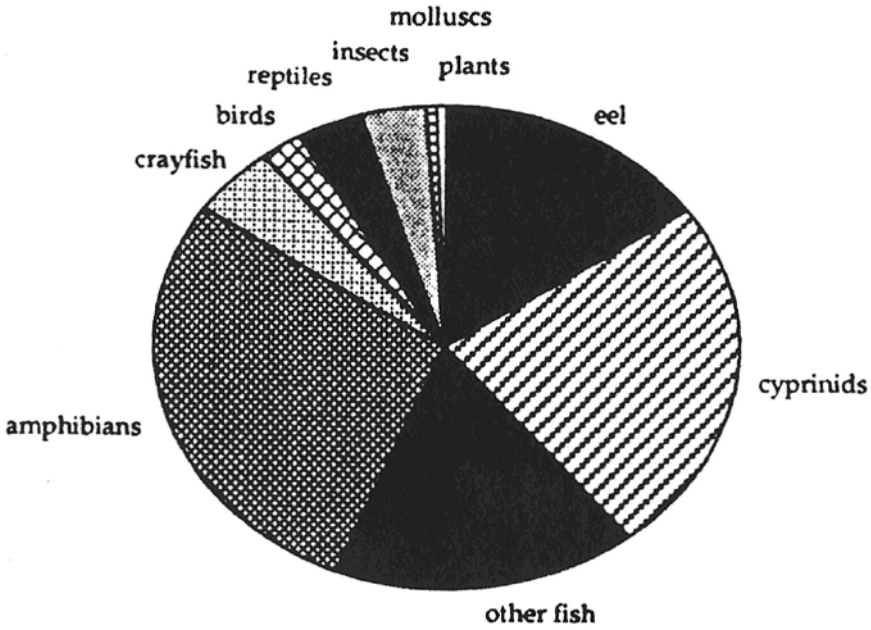

Figure 2: Relative frequencies of occurence of the different otter prey categories in Turkey

In 100 analysed spraints 167 feeding remains belonging to 16 prey categories were identified (see Tab. 1). Fish (55.7%) and amphibians (28.7%) were the most important prey categories (Fig. 2). At the first study site (Hisaronu, n = 15) most of the diet was *Anguilla anguilla* (37%), *Leuciscus sp.* (29.6%) and amphibians (22.3%). Apart from the low occurrences of trout, perch and cyprinids were found in the spraints. This site provided the highest portion of fish of the whole study area (77.7%). On the River Kizil De amphibians were the dominant prey (51,1%). Other prey included birds (7.4%), insects (7.4%) and molluscs (3.7%). The fish species with the highest occurrence were again eel (11.1%) and chub (7.4%). The total portion of fish was 29.6%, the lowest in the whole study. On the River Gelibolu the total fish portion was 50% (mostly small juvenile chubs 41%). The rest of the prey were amphibians (18.2%), crayfish (13.6%), reptiles (9.1%) and insects (4.5%). Gelibolu was the only study site with no eel. In one spraint large undigested plants were found. Akcarpinar was the only study site (close to the sea) where the presence of sea-fish (47.5%; 9.5% of them were *Mugil sp.* and 4.7% *Roccus labrax*) was recorded. The other 33.3% were other unidentified sea-fish (probably one or two different species). Freshwater fish such as eel (9.5%), perch

(4.7%) and trout (2.4%) were found in this site. Apart from fish, amphibians (19%), birds (2.4%), crayfish (9.5%) and insects were found in the spraints. The total number of prey categories (10) was the highest of all five sites. In the remaining spraint samples amphibians (32.7%), reptiles (8.2%), birds (2%), crayfish (2%) and insects (mostly large waterbeetles, 4.1%) were found. Eel (18.4%), chub (8.2%), trout (8.2%) and unidentified cyprinids (14.2%) formed a total fish portion of 51%.

In total the lengths of 55 fishes eaten by otters were calculated (Fig. 3). Eel had a mean length of 29,3 cm (range 9 to 45 cm). Most chub were less than 10 cm (the biggest being about 25 cm long).

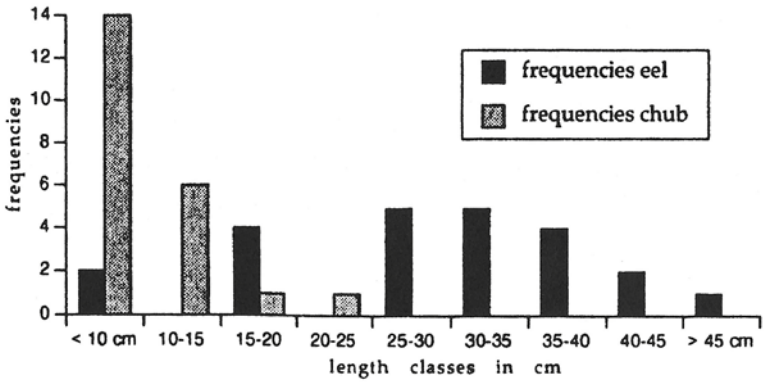

Figure 3: Length frequency distribution of 23 eel (*Anguilla anguilla*) and 22 chubs (*Leuciscus* sp.) eaten by otters in south-west Turkey.

DISCUSSION

Allthough the numbers of spraints were relatively low the results of this study are similar to those of other studies in the Mediteranean area (Adrian and Delibes, 1987; Arcá and Prigioni, 1987; Fasano, 1991; Prigioni et al., 1986; Macdonald and Mason, 1982). The portion of fish (55.7%) is much lower than that found in study areas in Central and Northern Europe (Erlinge, 1967; Knollseisen, 1995; Kruuk and Moorhouse, 1990). In Turkey the occurrence of fish in the diet of otters was lower than in Italy (Arcá and Prigioni, 1987; Fasano, 1991) but as high as in Albania (Prigioni et al., 1986) and in Greece (Macdonald and Mason, 1982). Amphibians (up to 51.9%), crustaceans (up to 13.6%) and reptiles (up to 9.1%) were other important prey categories. Eel was the most frequently eaten fish

species by the otter. This is probably due to the way of life of the eel which makes it an easy prey for otters. Like in Southern Italy (Fasano, 1991) most eel found in otter spraints were about 30 cm long. The large number of juvenile cyprinids (mostly *Leuciscus sp.*) in the diet has also been observed in Central Europe (Knollseisen, 1995; Roche and Hofmann, pers. comm.). At the Akcarpinar otters fed on marine fish but it is not clear wether the otter caught them in the sea (in 1994 otter occurrences on the coast of Turkey were found; Kranz, pers. comm.) or in the freshwater (both species identified in the spraints can be recorded regularly even in the freshwater; Muus and Dahlström 1990). Another explanation is that otters fed on marine fish thrown away by local fishermen at the study site (spraints were found in a little harbour where local fishermen cleaned their nets after turning from the sea; Ziegler, pers. commun.). These results are one of the firsts to indicate otters feeding in the Mediteranean Sea (Table 2). Otters can be found frequently in marine environments in Northern Europe (e. g. Kruuk and Moorhouse, 1990) but only rarely in Southern Europe (e. g. singular observations in Italy; Fasano, pers. comm.; Greece, Gutleb, pers. comm). The analysis of the 100 spraints from freshwater habitats in Turkey did not show any evidence for condemning the otter as a pest for local fish or domestic galinaceous birds. The single bird occurrences found in the otter spraints were small juvenile song-bird. From the large number of small cyprinids in the otter diet it is not allowed to infer directly on a impact of otters on juvenile fish stock; other influences on small fish like sudden floods or drying of ditches or river stretches are maybe much more catastrophic for juvenile fish than the feeding of otters. Only the connection of otter predation and abiotic influences can become problematic for fish populations (e.g. otters entering in small almost dry ponds or ditches). For further information on the impact of otters upon their prey or upon domestic animals a more detailed study would be necessary.

Table 2: Otter diet in the Mediteranean area in comparison to the results of the current study: number of spraints (N) and relative frequencies of occurrence (Prigioni et al., 1981; Macdonald and Mason, 1982; Arcá and Prigioni, 1983; Fasano 1994; Adrian and Delibes, 1985) (Spain* = two different study sites)

Study area	N	fish	amphibians	reptiles	crustaceans	birds	insects
Albania	33	50.0	22.4	6.9	10.3	0.0	10.3
Greece	80	54.9	20.9	0.0	0.0	6.6	9.9
Central Italy	?	74.2	5.0	13.6	?	?	?
Southern Italy	172	76.5	17.2	2.0	0.0	2.3	0.0
Spain*	334	67.2	12.4	3.1	0.0	0.2	15.0
Spain*	264	37.8	7.2	0.3	31.5	0.3	21.9
Turkey	100	55.7	28.7	3.6	4.8	2.4	3.6

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REPORT

DISTRIBUTION OF THE NEOTROPICAL RIVER OTTER (*Lutra longicaudis annectens* Major, 1897) IN THE RIO YAQUI, SONORA, MEXICO

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Abstract: Until now, there have only been four records of otters from Sonora state, Mexico. This study reports on a survey of the Rio Yaqui for otters and bald eagles. 42 locations with otters were found, and direct observations made, as well as finding latrines, footprints etc. The otters are mainly piscivorous unlike the crustacean eaters in other parts of Mexico. Otter abundance was calculated at 0.34 otters per km.

INTRODUCTION

There are few published records of river otters from the northeastern watershed of the Sierra Madre Occidental of Mexico. Of these only four records are from the State of Sonora. One record is from Río Mulatos a Río Yaqui affluent (Roth and Cockrum, 1976). Another one is from from Bajo (lower) Río Yaqui, where Brown et al. (1982) observed river otters, downriver of the confluence of Río Chico. They suggest that this species could be found in Arizona, due that Río Yaqui affluents extend to the north. The other two records are from Río Mayo (Cockrum, 1964, Roth and Cockrum, 1976) (Fig. 1). These scattered observations indicate a low effort of observation for river otters, although other researchers (i.e. fish and birds) have done an extensive effort in several parts of the river and have reported few signs of river otters.

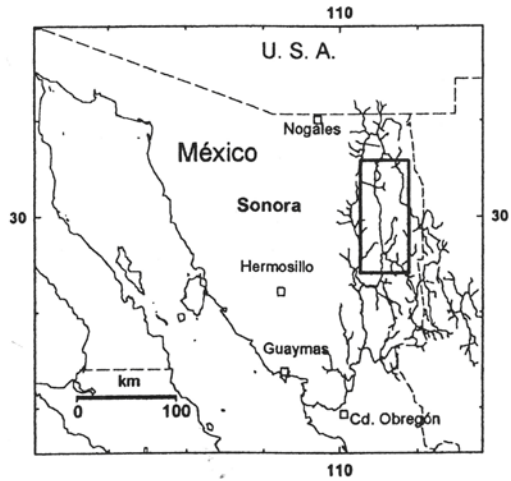

Figure 1. Río Bavispe-Yaqui Basin in the State of Sonora, northern Mexico. The box indicates the surveyed area.

It is important to know the actual distribution and the status of river otter populations in the watershed of the Sierra Madre Occidental. Of particular relevance is the Río Yaqui-Bavispe watershed, which starts in the American southwest (southeast Arizona) and reach the Gulf of California, close to Ciudad Obregón (see Fig. 1). The knowledge of this species distribution willgive insight on its status and to confirm the hypothesis of Gallo (1989) in which he stated that "the flow of the water to the south acts as a geographic barrier for the northern distribution of this neotropical species of river otters".

An expedition to survey the status of the Neotropical river otters and bald eagles (*Haliaeetus leucocephalus*) in the Río Yaqui, was conducted from 1-7 May 1995

STUDY AREA

The Río Yaqui-Bavispe basin which carries the 70% of the river water in the State of Sonora is the most important in Northwestern Mexico. It is situated between 27° and 31° N, and from 108° to 111° W, and occupies around the 30% of the State area (Fig. 1). A large portion originates in the western watershed of the Sierra Madre Occidental in the southwestern portion of the State of Chihuahua. The northern portion originates in the southeastern corner of Arizona. The basin has an extension of approximately 73,000 km² with a total length of 740 km. Three large dams control its flow: La Angostura Reservoir in the northern portion

over the Río Bavispe, El Novillo Reservoir in the mid-Yaqui, and Oviachic Reservoir to the south, near to Ciudad Obregón (Hendrickson et al., 1981, Bojórquez et al., 1985).

METHODS

Survey methodology consisted in canoeing a large portion of the river (135 km), this helped to perform a detailed and quieter search for river otter presence. Specific areas like affluents and small creeks and, large, secluded and shadowed pools were searched by walking on the river banks, looking for tracks, dens, foraging sites and other indirect evidence of the river otter presence. This has been successfully in other rivers where this species was preferentially found in secluded areas (Gallo, 1989). Tracks were followed to find the dens, foraging sites, scent marking sites and latrines. In the best case direct observations of individuals of the species were obtained.

Interviews with ranchers and fishermen were conducted to know certain aspects of the distribution of the species along the river. This helped evaluate the actual use of the species, if they were hunted locally or if they are used as an extra income by selling their fur. Visits to the local tanneries were done to obtain a major number of records and possible some specimens (skulls, skeletons and furs) of this species.

To characterize the diet and the preferential prey of river otters, the scats and rests of specimens in foraging sites were collected and analyzed following Greer (1955), Sheldon and Toll (1964) and Gallo (1989).

The habitats occupied by river otters were described: riparian vegetation, geologic features and hydrologic characteristics (perennial and temporal/ or intermittent flow). Water temperature averaged 22°C. The river gradient averages 1.3 m/ km, from Granados to Panga (see Fig. 1), a drop of about 200 m.

RESULTS AND DISCUSSION

The population of river otters in the Río Yaqui is abundant in several isolated non-perturbed areas, were there is no fishing or water extraction for farming, and cattle growing is the main human activity. They were more scarce in perturbed areas by farming, urban and industrial uses (mining). Illegal hunting still exists, but due to this species crepuscular-nocturnal activities, they are difficult to hunt. In general terms their status is of little perturbation with abundant populations in areas of difficult access were few human activities takes place.

As many as 42 new sites with evidence of Neotropical river otters were found in a stretch of 135 km of river, two of them were direct observations of otters (a young otter resting in a large sandbar and a larger otter that jumped from a ledge to a deep pool when we approached with the canoe). The rest were of indirect evidence and consisted of latrines, footprints, rests of foraging and dens (Fig. 2).

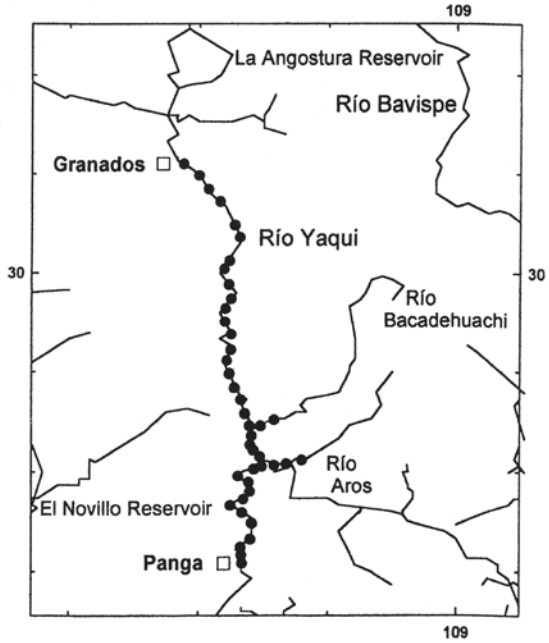

Figure 2. Records of Neotropical river otters in the surveyed area.

A gross analysis of the diet indicates that they prey mainly on fish; four species (90 %) were dominant: the Channel catfish, *Ictalurus punctatus* (introduced), the yellow catfish, *Ameiurus melas* (introduced), the black bass, *Micropterus salmoides* (introduced), the flathead catfish, *Pylodictis olivaris* (introduced), and the Tilapia, *Tilapia* sp. (introduced), a small portion (5%) of the diet was composed by native fishes, mainly Yaqui catfish, *Ictalurus pricei*, and Yaqui sardine, *Notropis formosus*. Small fish scales, feathers, fur and remains of frogs and insects were also found, forming the residual 5%. It is important to note that the majority of the diet is composed by introduced fish, which probably have influenced positively the growth of the river otter population. This diet is mainly piscivorous compared to other areas of Mexico were the diet is composed mainly by crustaceans (84.2%) (Gallo, 1989).

Preferential areas for den building were found in rocky shores, inside deep throughs, or in areas of dense vegetation along small creeks.

By using the following index, the abundance of otters was calculated: No. of otters/ km = No. of scats in the area/ (average rate of defecation); the index is then divided by the total km surveyed. The average rate of defecation was found to be 3 per day, after observing the number of scats produced by two captive adult female otters in the Manuel Alvarez del Toro Zoo in Tuxtla Gutiérrez, State of Chiapas. Then: No. of otters = 139 scats counted/ (3) = 46.3/ 135 km. Giving an abundance of 0.34 otters/ km.

These results show a similar abundance than in other areas of México, where an abundance of 0.45 otters/ km have been reported for the Laguna de Catemaco, State of Veracruz (Ruíz, personal communication).

ACKNOWLEGDEMENTS *- This work was possible thanks to the invitation of S. Anderson from the Nature Conservancy, Tucson, Arizona to visit the Río Yaqui. Thanks to P. Warren, R. Mesta from U.S. Fish and Wildlife Services and the participants of the expedition, D. Gori and S. Wilson, Judy and Jim. Thanks to H. Medina from CIDESON who drove the treacherous dirt roads of Sierra Madre Occidental.*

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REPORT

MONITORING THE DISTRIBUTION AND STATUS OF SOUTHERN RIVER OTTER (*Lutra provocax*) IN NAHUEL HUAPI NATIONAL PARK, ARGENTINA

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Abstract: The large basin of Nahuel National Park contains a stable and viable population of Neotropical otters. One threat is the potential isolation of the population. Suggestions are made to combat this and preserve the otters.

The Southern River Otter or huillín has a very restricted natural distribution (a narrow fringe in the south of Argentina and Chile).

Between February and May 1995 we made a sign-survey of this species in Nahuel Huapi National Park, in the northern portion of the Patagonian Andes of Argentina. Twelve years after the first survey (1982/83, Fig 1), our aim was to monitor the distributional and relative abundance status of this important population, and in particular to evaluate its response to some changes which occured in its habitat in the last decade. Over a total of 216 sites visited, we found otter signs in 78 (36.11%) (28% in 1982/83). Similarly to the first survey, all the positive sites are in the Limay River basin, where they are 45,08% of the total (39,44% in 1982/83).
The general pattern of distribution has not changed (Fig 2)

We found signs of introduced North-American mink (*Mustela vison*) in 126 sites (58.33%) in all basins. Since the first survey mink (which were at that time restricted to the southernmost portion of the park) occupied the whole park, but we did not find any evidence of a negative impact upon distribution and abundance of huillin.

This survey confirmed one of the main conclusions of the first one: the large basin which includes Nahuel Huapi National Park is a key place for the conservation of this species in the National Park, and due to its large size it seems to hold a viable population.

These preliminary results indicate that this population is in a stable and satisfactory conservation status, at least within the time framework of the last decade.

One potential threat is the probable isolation of the population. This aspect, difficult and costly to evaluate, will have to be addressed in the future.

We make some recommendations:

- Maintain the abundant mature plant cover in the shorelines.
- Maintain the abundant mature plant cover on the shorelines.
- Maintain the present existance of numerous areas without or with very slight human disturbance.
- Maintain the natural condition of the large Nahuel Huapi-Limay basin in the National Park.
- Rejecting projects such as a proposed dam in Limay River.
- Continue with regular monitoring at intervalls between 5 and 8 years, and evaluate the feasibility or reintroducing huillines in Lanin National Park.

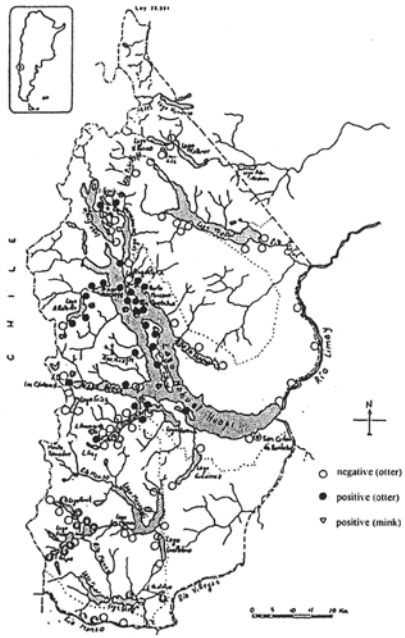

Figure 1. Southern river otter and mink distribution in Nahuel Huapi National Park, Argentina, in 1983

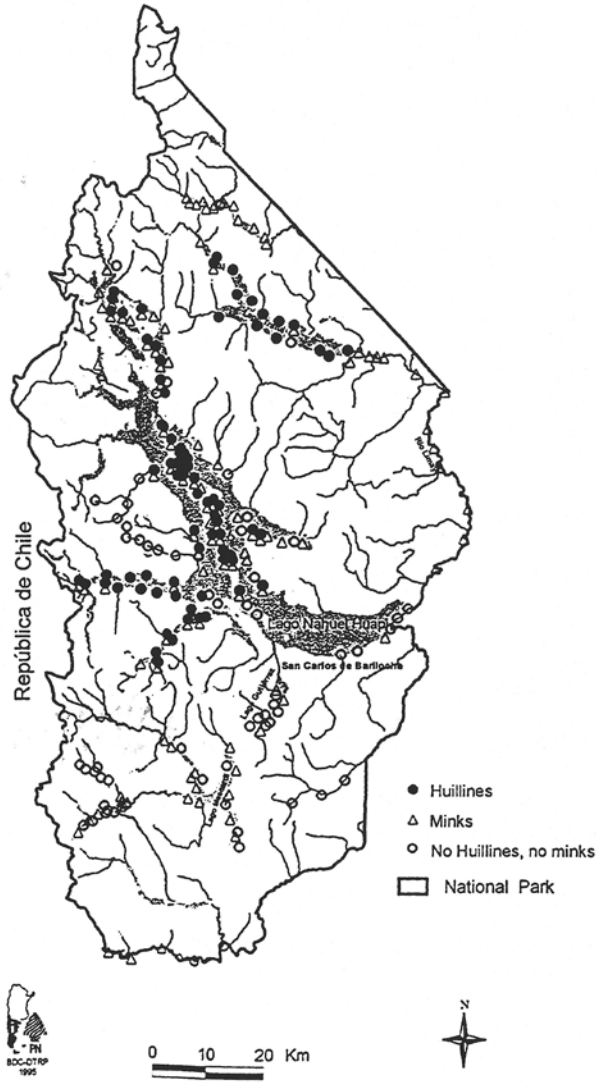

Figure 2: Southern river otter and mink distribution in Nahuel Huapi National Park, Argentina, in 1995

R E P O R T

GIANT OTTERS (*Pteronura brasiliensis*) - UPDATE

Christof SCHENCK and Elke STAIB

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South Americans giant otters are one of the most endangered otter species world wide. Nevertheless they had been rarely studied. Hopefully 1996 will be an extraordinary year for this amazonian flagship species: It seemed that interest in the "river wolves" is increasing. Besides film projects and public relation campaigns several research projects are planned or started recently. We will give the address of the project leaders in order to stimulate communication among each other. Any additional information is welcome, the following list might not be complete.

Peru

A: The long-term research and conservation project from the Frankfurt Zoological Society is going on in its 6th year including annual monitoring of the Manu National Park population, field data analysis and realization of the conservation program in Peru. A new leaflet for identification of the two neotropical otter species in the rainforest has been published in Spanish, a colouring booklet for children is being prepared and a observation tower for tourists will be established in the following months.
Christof Schenck/Elke Staib; Frankfurt Zoological Society; Alfred-Brehm-Platz 16; 60316 Frankfurt/Germany, Tel.: ++49/69/439349, Fax: (0)69/439348.

B: "The plight of the giant otter", Msc. Project (Behavioural ecology, habitat associations and distribution in Lake Cococha and Katicocha/Tambopata)
Saffra Kelley, Manchester Metropolitan University, 12 Westminster Ave., Whalley Range, Manchester, M16 OAN / Great Britain.

C: Expedition to the Rio de las Piedras (preliminary survey of giant otter occurrence)
Jessica Groenendijk, Tesselschadestraat 3-1, 1054 ET, Amsterdam, The Netherlands, Tel.: 0031 20 61 82 6993

Suriname
Evaluation and development of a conservation plan for a rainforest area in West Suriname (Kaburi-Creek - where N. Duplaix did her famous preliminary work on giant otters)
Dr. Paul Bühler / Oro Verde, Brandhof 15, 74417 Gschwend, Germany, Tel.: 0049/7972-481

Colombia
Status, behaviour and autecology of the giant otter in the river Miriti-Parana, Colombian Amazon.
Beltran S., Diaz J., Foundation Omacha, Cra 5a No. 5-50, Apto. 406, A.A. 13011, Bogota/Colombia, Tel.: 337 0915

Ecuador
A: Distribution and ecology of giant otters in the Yasuni National Park. Msc. project
Victor Uteras, Ignacio Araya, Casilla 17 17 51, Quito Ecuador, Tel./Fax: 0053 2 430903
B: Yacu Pacha, Dr. Lorenzo von Fersen, Am Tiergarten 30, 90480 Nürnberg / Germany, Fax: 0049 911 546365

ZOOS

Germany
A: Underwater communication in giant otters (Hagenbecks Tierpark, Hamburg).
Massoud Yasseri, Christof Schenck, Elke Staib
Zoologisches Institut, Martin-Luther-King-Platz 3, 20416 Hamburg, Germany, Tel.: 0049 040 4123 3942, Fax: ++/4123 3937
B: New captive breeding program Hagenbecks Tierpark / Zoo Duisburg

USA
Giant otters (two males from Hagenbeck) will be held in the Philadelphia Zoo and a public relation campaign has been started:
Zoological Society of Philadelphia, 3400 West Girard Avenue, Philadelphia, PA 19104-1196, USA

REPORT

MANAGEMENT PLAN FOR THE OTTER (*Lutra lutra*) IN DENMARK

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[2] *National Environmental Research Institute, Department of Landscape Ecology, Grenåvej 12 DK-8410 Rønde, Denmark*

Abstract: In spite of the total protection of otter since 1967, a survey in 1986 showed that there were only few hundred animals left. Recent surveys of otter distribution indicate that the population has stabilized and in some core areas even increased in number. The Danish Ministry of Environment and Energy has developed an Otter Management Plan to gain the necessary knowledge and to establish comprehensive guidelines for the protection and consolidation of the Danish otter population and its habitats. This is summarized in this paper.

BACKGROUND

The European Otter (*Lutra lutra*) is one of the most endangered mammals in Denmark. In spite of a total protection of the species since 1967 a survey in 1986 showed that there were only few hundred animals left. Since then, the public authorities and protection agencies have intensified the efforts to save the Danish otter population.

There are positive indications of a successful enhancement of living conditions for otters in Denmark. Recent surveys of the distribution of the otter indicates that the population has stabilised and in some core areas even increased in number.

MANAGEMENT PLAN

It is, however, necessary to continue the intensive work which has been initiated to support the otter population. Therefore, The Danish Ministry of Environment and Energy has developed an Otter Management Plan. The purpose of the plan is to gain the necessary knowledge and to establish comprehensive guidelines for the protection and consolidation of the Danish otter population and its habitats. Furthermore, the plan is an integral part of the strategy for maintaining the biological diversity in Denmark.

SURVEYS AND RESEARCH

The game bag statistics show that up to 1960, otters were bagged all over the country. Today the distribution of the otter is monitored by systematic field surveys. These show that the geographical occurrence is primarily limited to Mid- and Northwest Jutland. Veterinary investigations of dead otters show that health status of the population is generally good with a low contamination of toxic compounds.

THREATS

The most predominant causes of manintroduced mortality of the otter are drowning in eeltraps and traffic deaths. Consequently, barriers in eel traps are now required by country-wide regulations in fresh water areas and in certain salt water areas; in addition fauna passages have been established at a number of road systems. Disturbances from the intensified recreative use of the wetlands areas may be an additional factor to the distribution of the otter.

AREAS OF INTEREST TO THE OTTER

Pursuant to the EU-Habitat Directive on conservation of natural habitats and of wild fauna and flora, a coordinated European ecological network of Special Areas of Conservation shall be established for among other things the conservation of the European Otter.

Based on the national proposals for Special Areas of Conservation, the plan points out so called Areas of Interest to the Otter (Fig. 1). The areas of interest include all Special Areas of Conservation proposed. Furthermore, areas particularly relevanfor the establishment of a connected ecological network of habitats and corridors for migration of otters, are included.

ACTION PLANS

The National Forest and Nature Agency propose that the counties in question work out specific action plans for each area of interest or includes an action plan as an integrated part of the total planning for the areas. An action plan may include, among other things, nature restoration and reserves for otters and a surveillance programme. Furthermore the Agency recommends meetings with the counties in order to exchange experience from the protection work.

MONITORING

The development of the otter population is followed by a national monitoring programme - on a five year interval - with a country-wide mapping of the distribution of otters. The national monitoring together with data gathered by the counties will show the effects of the protection efforts.

Figure 1. Areas of interest for the otter (*Lutra lutra*) in Denmark

REINTRODUCTION

The National Forest and Nature Agency has worked out a programme for orphans and injured otters including nursing and reintroduction of the animals. Reintroduction will take place in border areas with a low population density so that the animals contribute to a natural recolonisation in the distribution area.

REVISION OF THE MANAGEMENT PLAN

It is proposed to review and revise the plan every five years. It will be appropriate to revise the plan in the year 2001, shortly after a new national otter survey.

The management plan, 48 pages in all, is written in Danish with an English summary and English subtitles in figures and tables. For special interested conservationist copies of the plan can be requested by letters or fax (+45 75272514) from the first author.

REPORT

HISTORICAL AND CURRENT SITUATION OF THE OTTER (*Lutra lutra*) AND ITS HABITAT IN THE REGION OF THE HOHE TAUERN NATIONAL PARK - ANALYSIS OF THE SITUATION AND SUGGESTIONS FOR IMPROVEMENTS

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(Received 20th February 1996, accepted 23th May 1996)

Abstract: The Hohe Tauern in the Austrian Alps has lost its larger vertebrates; bearded vultures and ibex have been successfully reintroduced, and now otters are potential candidates. A survey was carried out to determine the past, present and future of both otters and otter habitat in this area. Low otter numbers (and hence weak immigration) from contiguous regions and poor otter habitat means reintroduction has been rejected in favour of habitat improvement to support natural recolonization as conditions become favourable.

The area of the Hohe Tauern mountains is a region in the Austrian Alps, which is still left largely in its natural state. It encompasses the Hohe Tauern National Park and includes parts of the federal states of Tyrol, Salzburg and Carinthia (Fig. 1). But even in this remote area, some of the larger vertebrates were extirpated by man, among them the otter. Today the question is being considered of whether to enable these former inhabitants to return, and furthermore, how this could be done. As re-introductions of bearded vulture (*Gypaetus barbatus*) and ibex (*Capra ibex*) have been very successful, discussions about the otter as a potential candidate have arisen.

Figure 1: Sketch of Austria with the study area

Therefore a study was carried out to answer questions about the past, present and future of the otter and its habitat in the Hohe Tauern region. To determine the current distribution of otters within the study area, 242 bridges (Fig. 2) and their surrounding banks were searched for indirect signs on three occasions (April/May, August, November 1994).

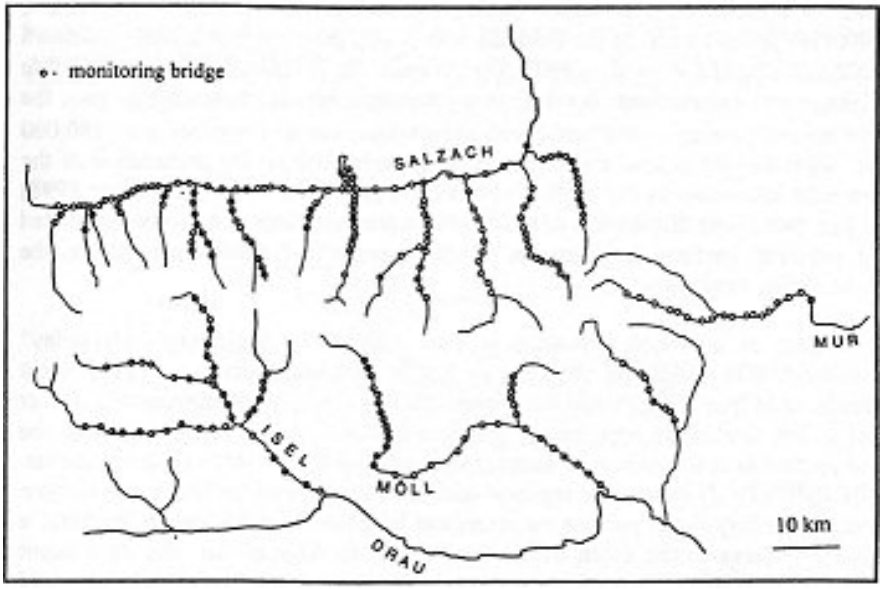

Figure 2: River systems of the study area with the monitoring bridges

By checking old hunting records, historical data and sending out more than 2000 questionnaires and questioning local and skilled people, a detailed inquiry on the historical and present state of the otter was conducted.
A second topic of this survey was the assessment of habitat in the region. For this purpose, the historical development of rivers up until today was researched, and an evaluation of the current situation was carried out in order to estimate the suitability of the region as an otter habitat and develop suggestions for improvement.

As old hunting records confirm, a surprisingly large number of otters must have lived in this alpine region. Up to the end of the previous century, dozens of otters had been killed every year, an undertaking which was boosted by offering rewards. This partly intensive hunting probably weakened the population, and until the thirties, the occurrences of otters diminished. The disappearance of the otter intensified in the fifties and sixties, although the otter was fully protected against persecution. The main reasons for the disappearance were most likely the far-

reaching changes to rivers as a result of engineering, large-scale drainages of wetland and lastly and most damagingly, the extensive hydroelectrical exploitation of rivers and streams. Typically for alpine regions, all human influence had been concentrated upon the valleys around the rivers, whereas the unspoilt mountain streams were too poor in fish to support an otter.
In addition, in the Tyrolean and Carinthian parts of the region, heavy flood disasters in the sixties were perhaps responsible for the extinction of the last remaining otters. Since the seventies, otters have hardly ever been seen in the Hohe Tauern region.
At present, no permanent otter population can be found in the study area, but obviously single animals stay in the region occasionally. The fact that the natural recovery of a population has not yet happened can be explained on the one hand by a weak immigration from the surroundings which hold no or few otters, and on the other hand by the limited suitability of the area as an otter habitat. Generally speaking, the Hohe Tauern region in its present state is only partly suitable for otters. Most areas which seem superficially appropriate with respect to river morphology, bank side and hinterland have in fact been largely devaluated as a consequence of hydroelectrical usage: storage power stations leave large stretches of riverbed without water for months, while surges and huge fluctuations of water levels occur every now and then.

For these reasons, the plan to re-introduce European otters was rejected, since the success of such an operation would seem remote on the grounds of the state of the habitat. As a natural recolonialization from the south and east might be taking place, it is simpler and more useful to support this as far as possible. Top priority must definitely be the improvement of the habitat. Rivers should be granted more space and natural dynamics at least in some parts, river banks should be left more to themselves, and especially the effects of hydroelectrical exploitation must be reduced. Then existing and immigrating otters would find better conditions, and chances for a natural re-colonization would arise.

The complete survey is published in German in:
Jahrl, J. (1995). Historische und aktuelle Situation des Fischotters *(Lutra lutra)* und seines Lebensraumes in der Nationalparkregion Hohe Tauern - Situationsanalyse und Maßnahmenvorschläge. *Mitteilungen des Hauses der Natur,* **12***:* 29-77
Copies are available from the author.

REPORT

SOME COMMENTS ON THE OTTER (*Lutra Lutra*) IN IRAN

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2) University of Veterinary Medicine Vienna, Institute of Medical Chemistry, Josef-Baumann-Gasse 1, A-1210 Vienna, Austria

Abstract: Little is known about otters in Iran. OF the existing publications based on hunting data, one considres otters are only in the northeast and a nature reserve on the Afghanistan border, and the other considers that otters are widespread throughout all but the central desert and fringes of the Persian Gulf. Smooth coated otters may also be present, which hunters may not distinguish from Eurasian otters. A forthcoming set of expeditions should clarify the position.

Like for a lot of other mammal species (for example brown bear, Servheen, 1990) the present status of the Eurasian otter (*Lutra lutra*) in Iran is fairly unknown (Foster-Turley et al., 1990). The "Verein für Wildtierforschung - Wildlife Management International Service" is organizing scientific excursions to Iran, the 16th biggest country in the world with tremendous natural resources from 180.000 km² forested area to arid and semiarid ecosystems. During the preparation of the two next excursions to the south (February 1997) and the north (September 1998) of Iran data of the distribution of mammals became available and will be completed by personal contacts to scientists in the country and field work during the forthcoming excursions.

According to the book "Hunting in Iran - from the beginning until today" (Tajbakhsh, 1995) the otter can be found "in most rivers and lakes of most provinces of Iran" (Fig.1). It is not proved that this very general statement is correct due to the size of the area, but in principle it should give a realistic view to the distribution in connection with hunting statistics and the presence of river systems. Ishunin (1977) gave some regional data of otter presence in North and Eastern Iran. According to his publication otters can be found in the Hamoon Wetland, a Nature Reserve in the south of the border area to Afghanistan, and its effluent rivers Farah-Rud and Rud-e-Helmand. In the North otters can be found in clear and small rivers in the mountain range Koppe-Dagh, the border area to Turkmenistan and its main river to the Caspian See Rud-e-Atrak. In the Alburz

mountain the otter is known to occur in the river Tadjan in the south of the town Sari but should be more common due to the presence of many rivers.

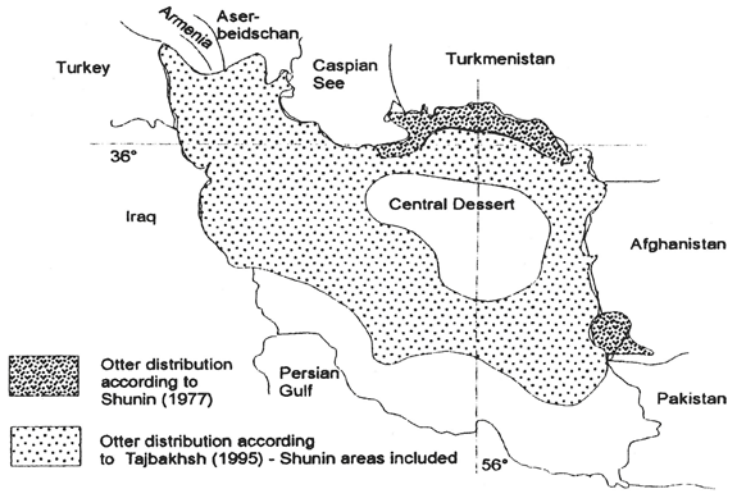

Figure 1: Distribution of *Lutra lutra* in Iran (Ishunin, 1977; Tajbakhsh, 1995)

There seems to be a possibility for the existence of unknown populations of the smooth coated otter (*Lutra perspicillata*) in Iran, as this species is known to be fairly common in Pakistan and to occur in Iraq (Foster-Turley et al., 1990). Local hunters might have problems to distinguish between the Eurasian otter and the smooth coated otter. It is hoped that the two forthcoming excursions will lead to more information on the status and distribution of otter species in Iran.

ACKNOWLEDGMENTS *- We are very grateful to Dr. Saiid Mohammadi and Dr. Hedayat Tajbakhsh from the Museum of Natural Traditions and Wild Life of Iran for the good cooperation. Dr. Jevgeni Shergalin provided the publication of Ishunin (1977).*

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PROCEEDINGS OF SECOND ITALIAN SYMPOSIUM ON CARNIVORES

Biology and Conservation of Mustelids

Mustelids can be considered as key species to outline strategies for the conservation of habitats. This Symposium contributes to fill the knowledge gaps about these carnivores which are very often neglected within environmental management plans.
The Symposium makes the point on the current knowledge of mustelids and gives indications for a correct management of the species and their habitats. Particular attention is addressed to the otter, a very representative species of riverine habitat which is particularly endangered in Italy.
The Symposium is divided in two sessions: the first one mainly includes communications on the behavioural ecology of small mustelids, the second one is devoted to the Otter and in particular to the research in captivity which aims to collect useful information for field studies. For this species the methods to assess habitat suitability and the problems linked to its reintroduction are also discussed.

CONTENTS

FASANO, R. & MAGLIO, G. - Otter (*Lutra lutra*) presence in Lattari mountains (Campania Region, Southern Italy)
VOGT, P. - The European Breeding Program (EEP) for *Lutra lutra*: its chances and problems
PRIGIONI, C. - Guidelines for the feasibility study of reintroduction of the otter *Lutra lutra* in Italy: the Project of the Ticino Valley (North-Western Italy)
OTTINO, P., PRIGIONI, C. & VIGNA TAGLIANTI, A. - Habitat suitability for the otter (*Lutra lutra*) of some rivers of Abruzzo Region (Central Italy)
FUMAGALLI, R., PRIGIONI, C. & CARUGATI C. - Behavioural ecology of captive otters *Lutra lutra* in the Breeding Centre of the Natural Park of Ticino Valley (Piemonte Region, Northern Italy)
POLOTTI, P., PRIGIONI C. & FUMAGALLI R. - Preliminary data on the ontogeny of some behavioural activities of captive otter cubs
FERRARIO, E, PRIGIONI, C. & FUMAGALLI R. - Feeding tests on captive otters *Lutra lutra*
GNOLI, C. & PRIGIONI, C. - Preliminary study on the acoustic communication of captive otters (*Lutra lutra*)
PRIGIONI, C., FUMAGALLI, R., SCHIRRU, L. & CARUGATI, C. - Sprainting activity of captive otters: its relationship with breeding cycle and number of animals

Copies of the Proceeding are available:
Claudio Prigioni - Dipartimento di Biologia Animale - Università di Pavia - Piazza Botta 9 - 27100 Pavia - Italia.

PROCEEDINGS VI. INTERNATIONAL OTTER COLLOQUIUM, PIETERMARITZBURG 1993
Reuther, C., Rowe-Rowe, D. (Eds.): *Habitat* 11: 1 - 140.

60 scientists and experts in nature conservation representing 22 countries met from 6 to 10 September in Pietermaritzburg, South Africa to discuss and exchange their experiences and research results at the VI. International Otter Colloquium. .....The theme selected for the Sixth Colloquium was “Otter conservation is not just about otters”. So the contributions centred around this theme, covering distribution and status, conservation of species and habitats, conservation education and public awareness, socio-economic issues, biology and behaviour, captive breeding, genetics, mortality and pollution. .....(from the back-cover).
For further information contact:
Claus Reuther, Aktion Fischotterschutz, Sudendorfer Allee 1, D-29386 Hankensbüttel, Germany

NEWSLETTER OF THE OTTER SPECIALIST GROUP (ASIAN SECTION)

The 4th issue of this newsletter (12 pages) was recently published. Articles cover different aspects of otters in Thailand, Nepal and India, Indonesia, Malaysia, Japan and Korea.
For further information please contact:
Padma K. de Silva, Department of Zoology, University of Peradenyia, Peradenyia, Sri Lanka. Fax.: +94-8-88779

Wwf Forschungsberichte

In this publication serie of WWF Austria the third issue on the otter *Lutra lutra* is now published. Aspects covered are status of the otter in Styria, the problem of otters at fish-farms, and pollution of otters with PCBs. All articles are in German with an English summary.
The three reports on the otter published by WWF Austria are sold for the price of 30US$ + postage.
For further information please contact:
Hannes Seehofer, WWF Österreich, Ottakringerstr. 116, A-1160 Wien, Austria

PROCEEDINGS KOREAN-JAPAN OTTER SYMPOSIUM 1995

In this booklet (70 pages) contributions on topics like “Present status of wildlife conservation milieu in Japan”, “Present status of wildlife conservation milieu in Korea”, “History of river otters in Japan”, “Decline of the Japanese otter and its conservation in Kochi Prefecture”, “The status of otters and otter research in peninsular Malaysia”, “Conservation and management of the river otter in North America”, Deterioration of otter habitats in Korea during past ten years: comparison with Japan´s case”, “Freshwater fishes as food items of otters”, “Coastal organochlorine pollution in Korea”, “Taxonomic position of the Japanese river otter *Lutra nippon*”, “Close-to-nature river improvement method considering the coexistence with wild living species” and “Otter conservation in Indonesia” are included.
For further information please contact:
Hiroshi Sasaki, Chikushi Jogakuen Junior College, 2-12-1. Ishizaka, Dazaifu, Fukuoka 818-01, Japan.

CALL FOR INFORMATION

Any information regarding European otter (*Lutra lutra)* breeding programs, especially in Eastern Europe, is requested by Saskia Schiereck. As a third year student in Wildlife Management at the Van Hall Institute in Leeuwarden, The Netherlands, she is working on a report on possibilities and problems of reintroduction of the European otter in the Netherlands.
Please send any relevant information to:
Saskia Schiereck, Van Brakelplein 29A, 9726 HD Groningen, The Netherlands.

CONGRESS ANNOUNCEMENT

The Ecosystem Conservation Society - Japan is delighted to announce that

“THE 2ND INTERNATIONAL SYMPOSIUM ON COEXISTANCE OF LARGE CARNIVORES WITH MAN”

will be held between November 19 and 23 in Saitama, Japan.
For further information please contact:
#305 Ando Building,
2-11-9 Ikebukuro,
Toshima-Ku,
Tokyo 171, Japan
Tel.: +81-3-5951-0244
Fax.: +81-3-5951-2974

LAST MINUTE NOTES

ZOO ANIMAL BEHAVIOUR AND WELFARE

A Summer School, 15. - 26. July 1996, Edinburgh Zoo

Designed for all those involved in the management and husbandry of captive animal populations, whether these be in zoos, safari parks, wildlife centres or rear-and-release schemes, ZOO ANIMAL BEHAVIOUR AND WELFARE will update participants with the latest scientific theory in the areas of behaviour and welfare, showing how this theory can be practically implemented back home in the participant´s place of work.

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Abden House
1 Marchhall Crescent
Edinburgh EH 165 HP
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Tel.: 0131-650-3475; Fax.: 0131-650-3474

OTTER WATCHING IN IRELAND

Come for a day Otterwatching in Clew Bay, County Mayo, on the West Coast of Ireland. Clew Bay Island shores are hoe for An Madra Uisce, the Water Dor, or European Otter *Lutra lutra*. Join naturalist Shay Fennely for a relaxing walk and learn how to watch for otters. Unlike otters in rivers the coastal otter can often be seen in daylight providing a rare opportunity to watch wild otters. Support otter conservation efforts by coming otterwatching and helping to discover more about otters in Clew Bay, County Mayo. Cost per fieldtrip is £ 15 per person.
For further details contact:
Island Otterwatch, Claggan, Kilmeena Westport, County Mayo, Ireland
Tel.: ++353-98-41048

yaqu pacha e.V.

Gesellschaft zum Schutz wasserlebender Säugetierearten Südamerikas
The organisation tries to help organisations in South America to develop and implement protection plans for aquatic mammals like the giant otter (*Pteronura brasiliensis*), the amazonas dolphin (*Inia geoffrensis*) and the manati (*Trichechus inunguis*). Stefan Wiessmeyer produced a serie of bracelets like tropical fish, dolphins, sharks and turtles. All models may be obtained in gold (585), silver (925) or silver (925) gilded. Prices are between 200 and 380 DM for the gold version and 85 up to 135 DM for the silver models. 10% of the money will be given as a gift to yaqu pacha.
For further information please contact:
Stefan Wiessmeyer, Münchener Str. 4, D-82131 Gauting, Germany
Fax.: +49-89-8505764