ISSN 1023-9030
IUCN Otter Spec. Group Bull. 21 (1)/2004

IUCN

OTTER SPECIALIST GROUP

BULLETIN

Volume 21 (1) April 2004

Stiftung bedrohte Tierwelt
Zoologische Gesellschaft
Frankfurt Zoological Society

Columbus ZOO
and Aquarium

ISSN 1023-9030
IUCN Otter Spec. Group Bull. 21 (1)/2004

CONTENT

IUCN
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IUCN OTTER SPECIALIST GROUP BULLETIN

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Coordinator-NL: Hans van den Berg
Printer: Van Gils, Wageningen, The Netherlands

The IUCN Otter Specialist Group Bulletin is indexed on the following databases:
BIOSIS, Zoological Record.

Front page: *Pteronura brasiliensis*- © Nicole Duplaix

Bank account:

Austria:	Bank Austria	IBAN AT57 1200 0007 5033 3981 BIC BKAUATWW
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NOTE FROM THE EDITOR

I apologise that this issue has been delayed, although this seems to be becoming a habit. Everytime I try to finish it in time and everytime there are many reasons why I could not manage it. So, one of the excuses for this issue is that I wanted to wait for the IX th Otter Colloquium, as I assumed that there would be a lot of things to report afterwards. The biggest problem in the final stage of finishing, however, was that our e-mail server had problems, with more than 1000 spam mails per minute coming in. This resulted in everything being blocked for three weeks.

Frostburg was a great experience for all of us as far as I can tell and definitely for me personally. It was a great pleasure to meet so many of you again, or even for the first time. I came to Frostburg still hesitating as to whether I should go on with the Bulletin. To be honest I was tired and bored with many aspects of the work but, even at the airport in Baltimore, there was such a nice atmosphere amongst those present that I started to change my mind. I offered to the group to go on with editing the IUCN OSG Bulletin and this was accepted. For me, the biggest problem with the last issue was fundraising and a solution was offered to this. Thanks to the generous offer of Dusty Lombardi, Chair of the Otter Species Survival Plan (SSP) of the American Zoo and Aquarium Association (AZA), an annual contribution is to be provided and, together with your individual contributions, the financial question seems to be solved.

Frostburg was a perfect conference with a high number of excellent scientific contributions, as well as a lot of new ideas (childrens contest, art auction) that should become a standard part of our meetings. Thanks go from all of those who attended to Lisa and Tom and their whole team for making these days unforgettable! Lisa, many thanks for organising a dentist within 1 hour on a Saturday morning! Rafting was an experience in itself, with some even trying to swim through the rapids. In addition to the scientific contributions we had great discussions in the local bar, and sometimes even later in rooms of the guesthouse or in the gardens of locals, with the police slowly driving along at 4.30 am without disturbing the “scientific meeting”.

We learnt, on the last evening, that one otter had been kidnapped out of a room and we were all in great fear over what had happened to this lovely little animal. Meanwhile, it turned out that it was a courageous animal that had decided to travel around the world before finally settling in Sweden. For those who do not understand anything now there is more information about this very suspicious event at the end of this Bulletin.

In addition, I really want to thank Kevin Roche, Rachel Kuhn, Jessica Groenendijk, Eduardo Carillo-Rubio, Hans van den Berg, Els Hoogsteede-Veens, Erwin Hellegering, and all the reviewers for their continuing contributions to the IUCN OSG Bulletin.

Finally, many thanks go to Jim Conroy, Andreas Kranz, Wayne Melquist, Chris Mason, Gera Pál, Claus Reuther, Kevin Roche, and Dave Rowe-Rowe, all of whom provided information on recent publications.

IUCN/SSC OSG GROUP

FROM THE CHAIRMAN'S DESK- JULY 2004

Whilst writing this I am still inspired by the impressions resulting from the IXth International Otter Colloquium held in Frostburg, Maryland/USA, on June 4 -11th. More than 150 participants, from nearly 40 countries, attended this most important meeting of the 'otter family', which takes place only each third year. They all agreed, when I summarised the course of the programme and the results of the conference in my closing lecture, that it was "one of, if not the, best otter colloquium we ever had". This was due in large part to the perfect organisation, which was a result of the tremendous preparation work and enthusiasm of Tom and Lisa Serfass and their team. As I said in Frostburg, they all did a perfect job. This is also true as regards the climate of friendship and cooperation, which usually marks meetings of the otter people, and which this time was increased by the amazing social events prepared and hosted by the organising team. Last, but not least, and maybe most importantly, this positive resumé is based on the fact that for the first time we had contributions from all continents and for all otter species. Not only aws the quantity of the presentations surprising but also their quality and the variety of aspects covered. We all hope that the proceedings of this colloquium will be published soon to ensure that this tremendous source of information will be available and usable for all people involved in otter research and conservation.

As always, the closing session of the colloquium was dedicated to the presentation and discussion of recommendations, providing guidelines for our work over the period until the next colloquium. At the moment, these recommendations are under revision by the participants and the Continental Coordinators of the Otter Specialist Group (OSG) and they will be published in the next issue of our Bulletin. Again, they will cover a wide variety of topics and, my hope is, that they will be realised to a similar degree as was summarised in the evaluation process for the recommendations of the VIIIth Otter Colloquium in Valdivia/Chile 2001.

This has reminded me to announce an important change regarding the Continental Coordinator for Latin America. Gonzalo Medina, who has been responsible for this part of the work of the OSG since 1993, informed me prior to the Frostburg meeting that, because of changes in his professional position, he wants to retire from the position as Coordinator. I want to take this opportunity to thank Gonzalo for his commitment over more than a decade of work for the OSG. Over this period, otter research and conservation has made remarkable progress in South America, and all of us who had the pleasure of joining the Otter Colloquium in Valdivia, which was organised by Gonzalo, will always remember this event, and especially the fascinating observations of Marine otters during the excursion. In Frostburg, the (numerous!) participants and members of the OSG from Latin America unanimously elected Frank Hajek from Peru as the new Continental Coordinator. I am very happy that Frank agreed to take on this responsibility. I am sure that he will transfer the activities and success he is well known for, regarding his work on the Giant otter, to the other Latin American otter species.

A second personal decision from Frostburg also makes me really happy. Arno Gutleb, who has been acting as the editor of our Bulletin for a decade, has agreed to continue in this position! Everybody who has ever been involved in editing a publication (especially a periodical one) will agree that this is not an easy task (and those who havn't should be warned about becoming involved in this business of dealing with different authors and reviewers, with printers, with deadlines – and with human egos). Therefore, I want to thank Arno, as well as Kevin Roche, Alvaro Soutullo, Lionel Lafontaine, and Eduardo Carillo-Rubio, who have been doing the correction and translation work so that we have French and Spanish abstracts, for their efforts in making the Bulletin the important tool of information which it has become. Arno's decision was supported by the fact that Dusty Lombardi, the Chair of the Otter Species Survival Plan (SSP) of the American Zoo and Aquarium Association (AZA), announced that this group will provide funds for the printing and mailing costs of our Bulletin. This will take a heavy burden off Arno's shoulders and I want to thank the members of the Otter SSP once again for this decision.

Another amazing experience from Frostburg is related to the colloquium itself. It appears that this event is starting to become mature. For the first time we had an official application from an external institution to host this event. Thanks to the efforts of our Korean colleague Sungyong Han, an official delegation from Hwa-Cheon County in the Gangwon Province of South Korea has presented a formal invitation to hold the next International Otter Colloquium for the first time in Asia. With great pleasure this invitation has been accepted by the OSG and so our next worldwide meeting of the 'otter family' will take place in Hwa-Cheon, Korea in 2007.

Hankensbüttel, July 2004

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VIEWPOINT

WHY PHILOSOPHERS SHOULD BE INTERESTED IN OTTERS, AND WHY OTTERS SHOULD BE INTERESTED IN PHILOSOPHY

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Abstract: In this article the reintroduction of otters in the Netherlands is discussed in the light of the debate in academic philosphy between ecocentric and biocentric philosophy. The ethical judgement of both ecocentric and biocentric philosophers on reintroduction are extracted and reviewed. The debate described in this article shows the ethical difficulties of the reintroduction of otters in the Netherlands and of reintroductions in general.

In 1988, the otter was declared extinct in the Netherlands. It was driven to extinction by road killing, drowning in fishermen's nets, habitat destruction and poor water quality. Thanks to support from the government, and a generous company, a reintroduction programme was started and, in July 2002, seven otters from different parts of Europe were released into "De Weerribben". Later that year, eight more otters followed suit. In June 2004, the birth of the first new Dutch-born otter was confirmed and five further otters were released in "De Wieden". However, four otters died from the anaesthetics used shortly after they were caught and before they could be released, and four otters were killed by traffic after they had been released. The habitat was claimed to have improved, the water quality was improved, hunting was long forbidden and fishermen were subsidised to give their nets a required otter escape route, but the risk of traffic accidents obviously still existed. It was calculated that 40 otters were needed for a healthy population, so the reintroduction programme will provide for that need. More otters will, therefore, be bred or captured to be released in Holland. This will of course draw the attention of biologists and nature enthusiasts, but why should it interest philosophers (apart from the fact that philosophers can be biologists/nature enthusiasts as well)?

In the early 1980's, a conflict arose in environmental philosophy. An article by J. Baird Callicott (BAIRD CALLICOTT, 1989, first published 1980) in Environmental Ethics led to furious reactions/applause by philosophers. Up to that time, environmental ethics had two flavours: anthropocentrism and biocentrism. Anthropocentrism defended the care for the environment on the basis of the rights or interests of people and their future generations. Biocentrism defended the same on the basis of the rights or interests of all life forms or all sentient animals. Baird Callicott interpreted the work of Aldo Leopold, writer and nature conservationist in the first half of the 20th century, as a defence for nature conservation on the basis of the land itself, with all its life forms included - he called this ecocentrism. Baird Callicott concluded that Leopold's descriptions of the land were very close to what had become known in ecology as an ecosystem. Because the land as a whole was of higher hierarchical order, other life forms were, as parts of the whole, were inferior to the land as a whole.

Baird Callicott criticised "Animal Liberation", Peter Singer's bio-centric standard work (SINGER, 1990, first published in 1975). A literal liberation of all animals, according to Baird Callicott (deliberately misinterpreting Singer), would result in an environmental catastrophe, as millions of released farm animals would destabilise the natural equilibrium. He went even further when saying; "if, for some reason, a deer population would reach numbers that would endanger some plant species, the deer should be culled". This earned his philosophy the title 'environmental fascism' by Tom Regan (REGAN, 1983) in his biocentric work "The Case for Animal Rights". According to Regan, the need to over-rule the rights of individuals for the well being of the land as a whole is a consequence of Leopold's ideas; those individuals can be humans as well. Baird Callicott replied that Regan was practising rhetoric, but added that Leopold never intended humans to be potential victims of culling. Ecocentrics were quick to point out that, if Regan wanted to defend all animals' rights, he was in a dilemma when a wolf meets a sheep. Since one wolf eats many sheep, wolves will have to be killed to save the lives of all the sheep.

Rhetoric aside, the big question in the debate is 'what is really of moral value'? Is it the land as a whole, as the ecocentric philosopher's claim, or the individuals within the ecosystem, as the bio-centric philosophers' claim?

This debate in environmental philosophy is reflected in the case of the reintroduction of otters. It would not be wrong to assume that individual otters were not gaining anything in the reintroduction programme. The ones caught in the wild surely suffered, some did not even survive. However, the land as a whole is said to improve with the arrival of the otter. Besides that, it's a success for the nature conservationists' efforts in the Netherlands, which will give them credit to do more good things for the environment and nature. A smart otter, however, will be very interested to know how his treatment is justified.

Nature is good, according to eco-centric philosophers. Nature should therefore be protected. In the words of Aldo Leopold, "A thing is right when it tends to preserve the stability, integrity and beauty of a biotic community, it is wrong when it tends otherwise". To most eco-centric philosophers this means that individual animals and plants are only good in so far as they contribute to the wellbeing of the biotic community. Plants and animals in themselves do not have any rights whatsoever. The Dutch philosopher Achterberg (ACHTERBERG, 1986) noted that Leopold's rule is not exclusively formulated, so individual animals can have their own value as well. However, most eco-centric philosophers will not take individual life forms into account; the goal is preservation of the whole. Ecocentrism is intrinsically holistic; the community as a whole has moral value. The science of ecology shows that Nature should be viewed as a whole. Though this science is mechanistic, heavy emphasis is put on the interrelatedness of plants, animals, water and the soil. One animal or plant cannot function properly without the other parts of the land. All life-forms are interdependent, and ecologists invoke the analogy with the machine to clarify their thoughts regarding the ecosystem. For an eco-centric philosopher, it is very easy to defend the reintroduction of otters in the Netherlands.

Since otters were around for a long time before they were driven to extinction, they clearly belong there. They are, in other words, part of the biotic community and, with their disappearance, the ecosystem was harmed. The reintroduction of otters heals, as it were, the ecosystem. The suffering of the individual otters is irrelevant. The eco-centric philosophers, sensitive to the interests or rights of individual animals, will have to decide whether the improvement of the ecosystem counterbalances the negative effects on individual otters.

Among Ecocentrics there is a debate on why the land as a whole is of moral importance. According to Baird Callicott, with the discoveries in ecology of the interrelatedness of ourselves with the land we will see the land as our community. A feeling of respect and love towards the land will arise and we will treat the land likewise. The Scottish philosopher David Hume thought that reason did not motivate moral behaviour but, according to him, moral behaviour is rooted in our emotions. Baird Callicott subscribes to this and argues that Darwin proved this theory. Darwin noticed that members of a tribe couldn't care less about the death of a fellow human being, but gave their lives for a fellow tribe member. Darwin thought the usage of speech gave mankind a sense of unity among its members, which resulted in moral behaviour towards each fellow man. Baird Callicott believes ecology will open our moral feelings towards Nature. It is important to note that the source of value is in mankind and not in his surroundings. According to Baird-Callicott, one sees an object, perceives it as beautiful, and projects this feeling upon the object. So the object doesn't have value in itself. Rolston III (ROLSTON, III 1988) disagrees with Baird Callicott here. He claims that objects have value in themselves. According to him, all that is needed for value is already in the object itself. The characteristics of Nature (harmony, balance and stability) are good in themselves and, therefore, so is Nature, as it necessarily has these characteristics, i.e. it is beautiful and good in itself.

I suspect the smart otter will not be convinced. Ecology has changed. The ecology of the Ecocentrics is the ecology of Eugene Odum (ODUM, 1971), whose ideas of a mature ecosystem first inspired the Ecocentrics. However, these mature ecosystems are not to be found in reality. Rolston III could once claim that most ecologists agreed that an ecosystem is a real natural unit, a level of organisation above its individual members. A few years later, ecologist Daniel Botkin (BOTKIN, 1990) declared that scientists now know that these views (an ecosystem as a highly structured, ordered, and regulated, steady-state ecological system) are wrong. Even Rolston III admitted that his philosophy would be hard to defend if people like Botkin were right (he referred to Gleason at that time, but Botkin and Gleason have similar ideas). Our smart otter may also point out that, if there is one species damaging the natural environment, it is mankind, and that there are a lot of people around, too many maybe. Then he might recall the deer population that should be culled according to Baird Callicott. Should the Dutch not have been decimated to save the otter from extinction in the late 80's? Baird Callicott claimed Leopold's ethics (meaning his own) were never meant to result in genocide. But that is not very reassuring, at least for humans. Maybe being human gives rise to special rights, so they can be excluded from decimating acts?

This escape route, however, was blocked by bio-centric philosophy before Baird Callicott could go that way (he still did, but that is not important here). Bio-centric philosophy usually starts with wondering what the ground is for moral conduct. Why should we be nice to other human beings? Different answers can be given. Humans can suffer and therefore have interests (Peter Singer) or humans can not only suffer, but also have preferences, plans, a sense of autonomy, they are a subject of a life (Tom Regan). They end up with a criterion that it is not simply about being human, but a list of other characteristics that, in their views, give an individual moral status, i.e. one cannot act morally without taking into account the interests of this individual. Regan and Singer conclude that being human cannot be a reason for having moral status, but their criteria (capacity to suffer, being subject of a life) are. Favouring a human who is in every aspect inferior, according to their criteria, over a non-human animal is plain species-ism. Discarding membership of the human species as a ground for moral status has radical consequences. Basically, vegetarianism is obliged and modern factory farming should be abandoned.

This will suit our smart otter. No more hunters, competing fishermen, a lot of effort to prevent road kills. But before he dives into the water for a nice juicy fish, he might be tapped on the shoulder by a biocentric philosopher explaining that fish have a right to live as well. Even for our smart otter it is getting too complex, for a while. He realises that if the ultimate goal is to maximise happiness, his existence, being a predator, may be hazardous to that goal. Should all predators be exterminated according to bio-centric philosophers? Ecocentric philosophers would like to make us believe so. The biocentric philosopher Sapontzis agrees (see BAIRD CALLICOTT 1989), predation should be prevented as much as possible. Peter Singer denies there is a problem, because the result of exterminating predation may be catastrophic, and hence it is not worth risking. However, if the consequences were known and not that bad, he would have to agree with Sapontzis.

Despite this counterintuitive point, for a predator at least, the rights of individuals are much better founded than the rights of ecosystems, if the rights of ecosystems exist at all. However, on the basis of the rights of individuals, it may also be possible to defend the reintroduction of otters. Maybe a lot of people will be a lot happier now otters are around. Maybe there is also a positive influence on individual animals as well. It remains to be seen, however, if these profits counterbalance the negative effects on some individual otters.

Acknowledgements - I thank Arno Gutleb for giving me the opportunity to bring the ethical debate behind the introduction of otters to your attention. Roger Eaton was so kind as to review this article and help me improve my English. However, any errors that might have ended up in the final version are entirely my fault.

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RÉSUMÉ

POURQUOI LES PHILOSOPHES DEVRAIENT S'INTERESSER AUX LOUTRES ET LES LOUTRES AUX PHILOSOPHES

Dans cet article, la réintroduction de la loutre dans les Pays-Bas alimente le débat opposant philosophie écocentrique et philosophie biocentrique. Des morceaux choisis du jugement éthique porté sur la réintroduction par les philosophes adeptes de la pensée écocentrique et ceux soutenant la pensée biocentrique, sont ici passés en revue. La discussion présentée dans cet article montre les difficultés d'ordre éthique soulevées par la réintroduction de la loutre dans les Pays-Bas et par le principe de réintroduction en général.

RESUMEN

En este artículo la reintroducción de nutrias en los Países Bajos es discutida en el contexto del debate en la filosofía académica entre las filosofías ecocéntrico y biocéntrico. El juzgamiento ético de tanto ecocéntrico como biocéntrico filósofos sobre reintroducción es extractado y revisado. El debate descrito en este articulo muestra las dificultades éticas de la reintroducción de nutrias en los Países Bajos y de reintroducciones en general.

ARTICLE

NEOTROPICAL RIVER OTTER MICRO-HABITAT PREFERENCE IN WEST-CENTRAL CHIHUAHUA, MEXICO

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(received 24th June 2004, accepted 13th August 2004)

ABSTRACT: We characterised habitat selected by the Neotropical otter (*Lontra longicaudis*) in the Río San Pedro, located in the central portion of the State of Chihuahua in Northern Mexico. We monitored a 30 km stretch of the river for over two years and compared micro-site habitat characteristics at 21 used and 25 random sites. Characteristics of habitat preferred by the otter included pools that averaged ≥0.8 m deep, >14.6 m wide, ≥64% under-story vegetation cover, and rock talus/vegetation cover within 4.8 m.

INTRODUCTION

The Neotropical river otter (*Lontra longicaudis*) is currently listed as "Data Deficient" in the IUCN Red List of Threatened Species. This is because relatively little research effort has been devoted to the study of distribution and abundance of the species throughout its range, and detailed habitat and ecology information is lacking (MEDINA, 1999). In Mexico, the species is listed as endangered (SEMARNAT, 2002), and in the northern states it is estimated that populations are declining due to habitat deterioration (LIST et al., 1999). This represents a serious concern as, in the northernmost part of the distribution range of *L. longicaudis* (LARIVIÈRE, 1999), populations were never considered abundant (LEOPOLD, 1959). However, habitat preference studies, that assess the behavior of the animal and how they use their habitat, are essential as this information can be used to better comprehend the distribution, abundance, and needs of the species (see MORRISON et al., 1998). In order to describe *L. longicaudis* micro-habitat preference, we set out to: (1) characterise both used and available habitat; and (2) compare micro-habitat use in relation to availability.

STUDY AREA

Our study area was located in the west-central part of Chihuahua State in Northern Mexico. The San Pedro River is a mid-order perennial stream and the areas adjacent to the river are relatively undisturbed by humans. The topography is rugged and characterised by steep canyons with elevations ranging from 1 650 to 1 935 m. The mean annual temperature ranges from 15°C to 18°C and mean annual precipitation averages 500 mm. The riparian vegetation was dominated by an over-story of cottonwood (*Populus* spp.) and willow (*Salix* spp.) trees, whilst the surrounding highlands were covered by grasslands (*Bouteloua* spp.) and oak (*Quercus* spp.) woodlands. Livestock grazing is the main land use in the region, and fishing is practiced on a subsistence level by local communities.

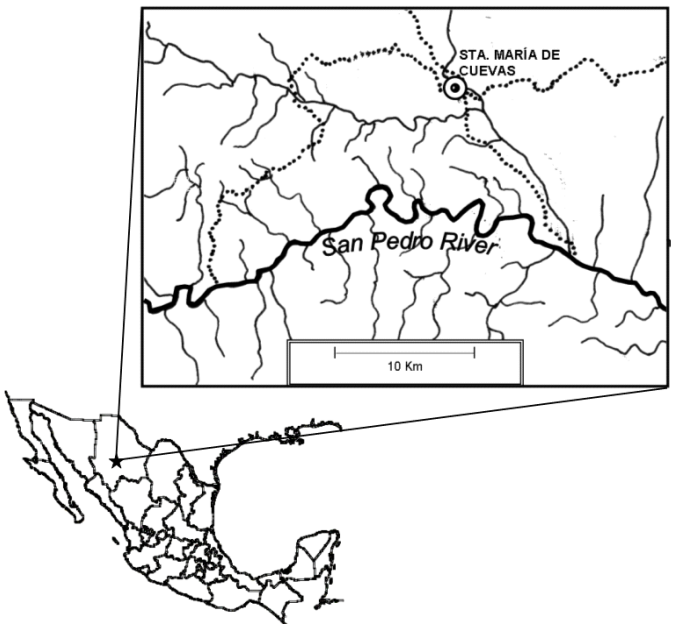

Figure 1. Map of the otter habitat use study area in the San Pedro River of west-central Chihuahua, Mexico.

METHODS

We surveyed a 30 km stretch of the river for *L. longicaudis* sightings and use signs, such as spraints and latrines (SPÍNOLA and VAUGHAN, 1995; DUBUC et al., 1990; NEWMAN and GRIFFIN, 1994; MELQUIST and HORNOCKER, 1983, 1979). We then monitored used sites from June 1999 to October 2001 to investigate and describe habitat use patterns (CARRILLO-RUBIO, 2002).

Locations of otter signs were used as the centre of our sampling sites. We measured the rock diameter where the sign was found, stream depth adjacent to the rock, and distance to the waterline (SPÍNOLA and VAUGHAN, 1995); average stream depth and width (GORDON et al., 1992); percent of under-story (≥1 m), mid-story (1.0-1.5 m), and over-story (≥1.5 m) vegetation using the step-point intercept method (HAYS et al., 1981); as well as distance to the riverbank, talus/rock, and vegetation cover.

We randomly established sampling sites to assess available habitat characteristics (SPÍNOLA and VAUGHAN, 1995; STAUFFER and PETERSON, 1985a,b). Mean values and confidence intervals (C.I.) (HAYNES, 1982) were estimated to simplify our data, and the value of α=0.10 was established for all our calculations in order to reduce the probability of Type I error (STEIDL et al., 1997). We tested for micro-habitat characteristic differences between the used and random sites using the t test (HAYNES, 1982).

To analyse habitat selection by the otter, all sites were classified into five pool categories using a pool rating system based on vegetation cover, average stream depth, and average stream width (HAMILTON and BERGERSEN, 1984 cited by CUPLIN, 1986). The Chi-square test (HAYNES, 1982; MARCUM and LOFTSGAARDEN, 1980) was performed in order to determine if each pool category was used in proportion to its availability. Finally, we determined otter preference for each pool category by obtaining a C.I. (97%) using the Bonferroni approach (MARCUM and LOFTSGAARDEN, 1980).

RESULTS

Differences between used (n=21) and random sites (n=25) were significant (P<0.10; Table 1). Habitat used by otters provided abundant and diverse escape cover when compared with random sites. The used sites were located in areas where large pools with average depths of 0.8 to 1.0 m (90% C.I.) and rock/talus cover within 4.8 to 8.1 m (90% C.I.) were present (Figure 2). Under-story vegetation cover in the used areas was abundant, ranging from 46 to 75 % (90% C.I.) and undisturbed by cattle grazing. Areas where under-story vegetation cover was severely affected by grazing were not used by otters.

Figure 2. Deep pool and latrine (bottom centre) used by otters. Photo: E. Carrillo-Rubio

Pool categories A and B were the deeper sections of the river with the most abundant riverbank vegetation cover. Otters showed a preference (97% C.I.) for pool categories A and B, using each more than in proportion availability (Table 2). Pool category C, however, was used in proportion to its availability, whilst categories D and E were avoided.

Table 1. Habitat characteristics of habitat used by the neotropical otter compared with random sites in the San Pedro River, Chihuahua, Mexico

	Used sites (n=21)		Random sites (n=25)		
Variable	Mean	Range (90%)	Mean	Range	t test
Holt characterisation (m)					
Holt diameter	2.6	1.5 – 3.8	0.8	0.6 – 1.0	< 0.10
Stream depth near holt	0.9	0.87 – 1.1	0.5	0.4 – 0.6	< 0.10
Distance to waterline	0.8	0.4 – 1.1	0.3	0.2 – 0.5	< 0.10
Stream characterisation (m)					
Average depth	0.9	0.8 – 1.0	0.4	0.4 – 0.5	< 0.10
Average width	16.1	14.6 – 17.6	13.6	11.8 – 15.4	< 0.10
Cover (m)					
Distance to riverbank	4.0	2.6 – 5.5	5.2	4.0 – 6.3	-1.052
Distance to talus/rock	6.5	4.8 – 8.1	19.4	16.7 – 22.0	< 0.10
Distance to vegetation	8.8	6.0 – 9.9	8.9	7.3 – 10.5	-0.583
Vegetation cover (%)					
Under-story < 1m	69.5	64.0 – 75.0	39.5	28.0 – 50.0	< 0.10
Mid-story ≥ 1 m	44.0	36.0 – 52.0	38	30.0 – 47.0	0.844
Over-story ≥ 1.5 m	36.5	27.0 – 47.0	56	45.0 – 67.0	< 0.10

Table 2. Analysis of micro-habitat selection by otters in the San Pedro River, Chihuahua, Mexico

Pool Category	Use (%.)	Availability (%)	Bonferroni Interval		Preference
A	47	1	-0.6	-0.3	+
B	33	28	-0.53	-0.06	+
C	9.5	20	-0.12	0.32	=
D	9.5	47	0.11	0.26	-
E	0	28	0.08	0.48	-

+ Preferred habitat (used more than in proportion to its availability).
- Avoided habitat (used less than in proportion to its availability).
= Habitat used in proportion to its availability.

DISCUSSION

As reported elsewhere (e.g. SPINOLA and VAUGHAN, 1995), used sites by Neotropical otters (i.e. latrines, nests, rolling areas, holts, feeding sites) were located adjacent to, or within, large, deep pools that provided adequate escape cover. Our findings were also consistent with those reported for *L. canadensis* by MELQUIST and HORNOCKER (1983), and SPOWART and SAMSON (1986). We presume that the greater availability and diversity of prey species of fish expected to be found in deep pools (CUPLIN, 1986) is an important factor related to the otter's consistent use of these particular habitat components, as noted also by MELQUIST and HORNOCKER (1983) for *L. canadensis*. No information regarding the availability of prey species for *L. longicaudis* was available for comparison with the pool characteristics identified in this study.

Rock/talus cover adjacent to the riverbank was a characteristic of all the sites used. Talus cover is known to provide stable, year-long protection for reproduction and shelter for various wildlife species (COOPERRIDER, 1986). And the use of natural cavities, instead of excavating dens, is known to be common in *L. canadensis* (TESKY, 1993; and MELQUIST and HORNOCKER, 1983). However, we know of no previous information that has been published that analyses the relationship between this specific terrestrial feature and Neotropical otter presence.

MANAGEMENT IMPLICATIONS

Our results indicate that Neotropical otters preferred areas with specific habitat features that are dependant on isolation from human activities and healthy riparian vegetation structure. The presence of cattle discourages otter presence, and grazing destroys otter habitat through trampling and vegetation removal, which ultimately disrupts the regeneration process of plant species, including trees and shrubs. Even though we did not measure this variable directly, we were able to notice that during drought years and the low-water season, large pools become popular fishing spots and harassment, and sometimes death, of otters is common. Plans for *in-situ* conservation of river otters need to consider habitat connectivity and seclusion from human activities in order to provide suitable habitat, and provide educational outreach to local communities that depend on fishing for sustenance in order to reduce conflicts with otters.

ACKNOWLEDGEMENTS - We would like to thank CONACyT, Sonia Nájera and the Mexican Affairs Office of the U.S. National Park Service for their support to carry out this project. Assistance provided by A. Loya and the Loya Family is always appreciated.

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RÉSUMÉ

PREFERENCE EN MATIERE DE MICRO-HABITAT, AFFICHEE PAR LA LOUTRE A LONGUE QUEUE DANS LE CENTRE-OUEST DU CHIHUAHUA, AU MEXIQUE

Nous avons déterminé les caractéristiques de l'habitat sélectionné par la loutre à longue queue (*Lontra longicaudis*) dans le Rio San Pedro, situé dans le centre de l'état de Chihuahua, dans le nord du Mexique. Nous avons prospecté 30 km de rives durant plus de deux ans et comparé les caractéristiques du micro-habitat pour 21 sites utilisés et 25 sites choisis au hasard. La loutre affiche une préférence pour les sites comportant des points d'eau de ≥0,8 m de profondeur et >14,6 m de large, un couvert végétal herbacé de ≥64%, et un couvert rocailleux/végétal à moins de 4,8 m.

RESUMEN

Se caracterizó el hábitat seleccionado por la nutria de río neotropical (*Lontra longicaudis*) en el Río San Pedro, ubicado en la porción central del Estado de Chihuahua, en el Norte de Mexico. Monitoreamos por mas de dos años un tramo de 30 km de río y comparamos características del hábitat entre 21 sitios con uso y 25 seleccionados aleatoriamente. Las características del hábitat preferido por la nutria incluyen tinajas grandes con promedios de ≥0.8 m de profundidad, ≥14.6 m de ancho, cobertura herbácea-arbustiva ≥64%, y distancia de 4.8 m del agua a taludes rocosos y vegetación.

REPORT

CAPTIVE REPRODUCTION OF THE NEOTROPICAL OTTER IN THE SANTA FE ZOOLOGICAL PARK IN MEDELLIN, COLOMBIA

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(received 13th June 2004, accepted 24th August 2004)

Abstract: Knowledge regarding reproduction of *Lontra longicaudis* is lacking. We present the first experience of Neotropical river otters born in captivity in Colombia. Of three parturitions registered, only one was successful. The gestation period for *L. longicaudis* was estimated at 86 days, with no evidence of delayed implantation. This kind of pregnancy can be classified as short and variable. We recommend further research efforts regarding behaviour and reproduction of Neotropical otters in captivity.

INTRODUCTION

Protection and conservation of threatened species is a world-wide priority, however, it is necessary to know the basic aspects of the species' biology, and how it interacts with the ecosystem, in order to make conservation decisions. The study of diet and reproduction probably requires the most research effort since these aspects are essential as regards survival of populations.

The Neotropical otter *Lontra longicaudis* has a range that extends from Mexico to Uruguay, Paraguay, and northern Argentina (LARIVIÈRE, 1999). In general, *L. longicaudis* has been poorly studied, though a number of studies on diet have been reported (GALLO, 1997; QUADROS and MONTEIRO-FILHO, 2001). At present, little is known about the reproductive biology of *L. longicaudis*. This is due in part to the fact that *L. longicaudis* are not commonly observed in the wild. Captive otters provide an opportunity to increase knowledge of the biology of the species, including reproduction. CUBAS et al. (1993) and BLACHER (1994) in Brazil, and JACOME and PARERA (1995) in Argentina, reported on otter reproduction in captivity. BLACHER (1994) provided details from three litters produced by the same female during an eleven-month period in the Curitiba Zoological Park in Paraná. There are, however, no published records regarding reproduction of otters in Colombia, either in the wild or in captivity. In this short notice we report on the first litter born in captivity at the Santa Fé Zoological Park in Medellín, Colombia.

RESULTS

Two otters (a female (3 years old) and a male (4 to 5 months old)) were caught in the municipality of Caucasia (7º 59' N and 75º 12' W), in the northern section of the department of Antioquía, and were brought to the Santa Fé Zoological Park; arriving on November 1994 and 16 March 1996, respectively.

The couple were observed mating in the water and, so far, three parturitions have been registered, though only one was successful. On all three occasions the female was isolated from the male. On 10 April 1999, the couple mated and, on July 4 of the same year, two young were born but died soon afterwards. We believe the mother accidentally trampled the young. The ultimate cause of death may have been a result of rejection by the mother or the small size of the enclosures. Since that time, the enclosure has been expanded and access to water has been provided for the otters.

On April first 2002, the first otter successfully born in captivity in Colombia was produced (though no mating was registered). On 4 May 2002, this individual was moved to Santa Cruz Zoo in the city of Santa Fé de Bogotá for the purpose of breeding the species there.

On 19 August 2002, a mating was registered in Santa Fé Zoological Park, and on 12 November of that same year an otter was born. Two days later, the young otter was missing. We believe the mother ate the young otter.

DISCUSSION

The gestation period of *L. longicaudis* was 86 days. This differs from results published by BERTONATTI and PARERA (1994, cited by LARIVIÈRE, 1999) and PARERA (2002), who report periods of 57 days and 60 to 70 days respectively. One explanation for this discrepancy is that it is possible that undetected later copulation resulted in pregnancy. However, the gestation period could also differ from one region to another within the species' distribution range.

Despite the small number of copulation instances registered, retarded implantation did not occur. This coincides with the results of BLACHER (1994) and JACOME and PARERA (1995). AMSTISLAVSKY and TERNOVSKAYA (2000) studied mustelid reproduction in the Northern Hemisphere and reported three kinds of pregnancies: (1) a constant short-term gestation period; (2) a long gestation period (7 to 10 months), in which the development of the embryo includes an obligatory diapause during the blastocyst stage; and (3) a short-term and variable period. According to the information available, *L. longicaudis* appears to belong to the third pregnancy class, i.e. the gestation period is short and variable.

Predation on conspecifics has been reported as one of the most common causes of death for captive *Pteronura brasiliensis* (CARTER and ROSAS, 1997). It is possible that cannibalism occurs in *L. longicaudis*, but there is not sufficient information at this point to support this. Additional research effort is required to better comprehend the behaviour and reproduction of captive *L. longicaudis*.

ACKNOWLEDGEMENTS - We would like to acknowledge Helen Waldemarin, Fernando Trujillo, and Carlos Delgado for their input. We are most grateful to Eduardo Carrillo-Rubio, who translated this manuscript from Spanish into English. We also thank the staff at the Santa Fé Zoological Park for their assistance.

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RÉSUMÉ

REPRODUCTION DE LA LOUTRE A LONGUE QUEUE EN CAPTIVITE, AU PARC ZOOLOGIQUE DE SANTA FE A MEDELLIN, EN COLOMBIE

Les connaissances relatives à la reproduction de *Lontra longicaudis* font défaut. Nous présentons ici le premiers cas de reproduction de loutre à longue queue en captivité, en Colombie. Sur trois parturitions, une seule a été un succès. La période de gestation de *L. longicaudis* est estimée à 86 jours, apparemment sans implantation différée. Ce type de gestation peut être considéré comme étant court et variable. Nous préconisons des recherches supplémentaires sur le comportement et la reproduction de la loutre à longue queue en captivité.

RESUMEN

REPRODUCCIÓN EN CAUTIVERIO DE LA NUTRIA NEOTROPICAL EN EL PARQUE ZOOLÓGICO SANTA FÉ EN MEDELLÍN, COLOMBIA

Es poco el conocimiento que se tiene sobre los aspectos reproductivos de *Lontra longicaudis*. Presentamos el primer registro para Colombia sobre un nacimiento en cautiverio de nutria neotropical. De tres nacimientos registrados, sólo uno fue exitoso. Se estimó el período de gestación de *L. longicaudis* en 86 días, sin evidencia de implantación retardada. El tipo de preñez de la especie podría ser de gestación corta y variable. Se recomienda adelantar estudios en cautiverio sobre comportamiento y reproducción de la nutria neotropical.

REPORT

THE EURASIAN OTTER IN THE SOUTH CAUCASUS

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(received 22nd April 2004, accepted 24th August 2004)

Abstract: Seven species of Mustelidae are to be found in the south Caucasus (Armenia, Azerbaijan and Georgia): *Lutra lutra*, *Martes martes*, *Martes foina*, *Meles meles*, *Mustela vison*, *Mustela nivalis* and *Vormela peregusna*. The rarest of these species are the Eurasian otter (*Lutra lutra*) and the marbled polecat (*Vormela peregusna*). The Eurasian otter, one of most endangered species of the south caucasian fauna, is still suffering under the influence of poaching, habitat loss, disturbance and pollution. No fundamental research has been undertaken on otters in any of the south Caucasian countries and, therefore, data provided in the literature are scarce. Further, no DNA analysis has been undertaken in this part of the world and, therefore, the actual number of subspecies is not clear.

INTRODUCTION

Seven species of Mustelidae are to be found in the south Caucasus (Armenia, Azerbaijan and Georgia): *Lutra lutra, Martes martes, Martes foina, Meles meles, Mustela vison, Mustela nivalis* and *Vormela peregusna* (GEORGIAN BIODIVERSITY COUNTRY STUDY REPORT, 1996*)*. The rarest of these species are the Eurasian otter (*Lutra lutra*) and the marbled polecat (*Vormela peregusna*). No fundamental research has been undertaken on this family in any of the south Caucasian countries and, therefore, data provided in the literature is scarce.

Situation in the 20th century

The earliest data from the south Caucasus on these two species appears at the beginning of the 20th century. DINIK (1914) and SATUNIN (1915) mention that some species, i.e. *Martes martes, Martes foina, Meles meles* were common, but that the Eurasian otter and marbled polecat were sparsely distributed.

Trapping and commercial catching of otters in the south Caucasus started in 1925, with numbers caught for commercial purposes reaching 4 000 individuals per year by the 1930s. At that time, Georgia had the largest population and, hence, most furs were obtained from the Georgian population (WERESHAGIN, 1959). More then 5 000 furs were obtained annualy in the Soviet Union as of the 1960s, with production of fur increasing by 20-30% every five years. At that time, the otter population was estimated at 20.000 individuals (GAPTNER et al., 1967). At the beginning of the 1980s, the otter population was estimated at around 6.000 individuals in the Caucasus, and 12.000 in Russia (RED DATA BOOK OF THE USSR, 1982; GADJIEV and RAXMATULINA, 2000). Of the 6.000 individuals estimated for the whole of the south Caucasus, 4.500 were believed to be in Georgia whereas, in Azerbaijan, the otter population was considered to be around 1.200 individuals by the end of 1980s (GADJIEV and RAXMATULINA, 2000). These otter populations had declined rapidly due to over-exploitation and, hence, commercial catching stopped as a result (GAPTNAR, 1967). Further, ROZHNOV and TUMANOV (1994) estimated the population in the CIS Russian Federation as approximately 60.000 individuals, with 25.000 individuals in the European part of Russia. However, there appears to have been a decline in all these regions of around 13% over a five-year period (CONROY and CHANIN, 2002).

According to the RED DATA BOOK OF THE USSR (1982), the otter was common throughout the country from the dry sub-tropics to the mountainous steppes, within an altitudinal range of 550-2100 metres above sea level. Present numbers, however, are not clear. In Azerbaijan, the otter was widespread throughout the country, except in the high mountainous regions. The otter was considered to be widespread throughout Georgia in the past, occurring on almost every river and lake up to an altitude of 2800m (DINNIK**,** 1914; SATUNIN, 1915; RED DATA BOOK OF GEORGIA, 1982; GEORGIAN BIODIVERSITY COUNTRY STUDY REPORT, 1996). According to the extant (though limited) literature, the otter population, though not abundant, was stable (JANASHVILI, 1963). By the end of the 1980s, the Georgian population had become fragmented (KOKHODZE, 1991) and accurate figures on present numbers are not known. Unfortunately, no research on the mustelidae has been undertaken in Armenia or Azerbaijan for the last 20 years.

NACRES undertook the project 'WILDLIFE REGIONAL STUDY IN THE CAUCASUS' in 1999 and, according to the results of this project, and scientific information provided by experts from Georgia, Azerbaijan and Armenia, the otter should now be considered as 'Critically Endangered' under the IUCN Red List criteria (WILDLIFE DATA BANK OF THE CAUCASUS, 2002).

Preliminary population assessment studies carried out by NACRES in different parts of Georgia have shown that the Eurasian otter is now the most endangered mustelid species in the country. It is believed that the otter has already disappeared from many areas, or has formed isolated sub-populations (GORGADZE, 2001). According to the previous information provided, it can therefore be assumed that the otter is now endangered throughout the south Caucasus. It is important, therefore, that studies on the otter's current status, ecology and biology take place throughout the region and a scientific basis is prepared for its conservation.

TAXONOMY

No DNA analysis on has been undertaken on the Eurasian otter in the Caucasus region, therefore, the actual number of possible subspecies is not clear. The most detailed data were provided by GAPTNAR (1967), but they are not based on DNA sampling (Table 1). According to the same literature source, the south Caucasian population was isolated from that in the north Caucasus.

NACRES members collected museum samples for DNA analysis during 2001-2003 but, due to poor quality, no credible information could be obtained and additional samples are necessary for further research. In addition, no captive animals are available for sampling.

Table 1. Data provided by Gaptnar (1967) on believed sub-species of otter to be found in the Caucasus

Common name	Scientific	Synonyms	Distribution
Boreal otter	*Lutra lutra lutra* Linnaeus, 1758	vulgaris, baicalensis, amurensis, kamtschatica, steinegeri	Whole former Soviet Union teritory exept the south and north caucasus
Caucasian otter	*Lutra lutra meridionalis* Ognev, 1931		The south and north caucasus
Central asian otter	*Lutra lutra seistanica* Birula, 1912	oxiama	Central asia

PRESENT LEGISLATION

The Eurasian otter is included in the Georgian Red Data Book and is classified as 'critically endangered'; its tracking is illegal (RED DATA BOOK OF GEORGIA, 1982). The Convention on International Trade in Endangered Species of Wild fauna and flora (CITES) lists the Eurasian otter in Appendix I (most endangered species). However, of the Caucasian countries, only Georgia and Azerbaijan had ratified the convention by 1994. The species is also included in the AZERBAIJAN RED DATA BOOK (1999) and hunting is prohibited. The Eurasian otter is not, however, included in the Armenian Red Data Book, though hunting has been illegal since 1960. None of the three south Caucasian countries has signed the Berne Convention of the Council of Europe, which gives Lutra lutra and its habitats the highest protection level.

THREATS TO OTTERS IN THE SOUTH CAUCASUS

Hunting and poaching

Despite abolishing the bounty system in Georgia, furs of recently killed animals are still often seen on the black market. These animals are usually the victims of fishery operations and are killed through illegal methods. Fishermen see otters as their competitors, resulting in their persecution and death on every convenient occasion. Otters are also often illegally trapped for the fur trade.

Habitat loss and disturbance

Unsustainable use of forest resources has increased dramatically over the last decade. In Georgia, loss of riparian forest habitat has occurred throughout the otter's range and has resulted in the loss of living space for numerous other animal species as well.

Over-exploitation of lakes and rivers

Drainage of wetlands was common in Soviet times. Riverbeds were frequently altered, increasing the levels of disturbance along riverbanks. In Georgia, a vivid example of this is the Javakhety wetlands (south-central part of the country), where nearly 60 lakes of varying size is to be found. There was a large-scale experimental draining programme on the major lakes in the 1960s, which heavily modified the coastline through draining and urbanisation.

Pollution

Water pollution is a serious problem. Those rivers that flow near or through cities are seriously polluted with different industrial wastes.

In addition, illegal fishing pollutes both rivers and lakes. Poachers empty bags of poisons into some rivers. These dissolve slowly and shortly afterwards the rivers are full of dead fish. This results in either the total disappearance of fish in a stretch, or they do not spawn in the area any more.

CONCLUSIONS AND RECOMMENDATIONS

The escalation of human impacts on the otter population has caused serious demage to south caucasian biodiversity (especially wildlife) over the last several decades. The Eurasian otter, one of most endangered species of the south caucasian fauna, is still suffering under the influence of poaching, habitat loss, disturbance and pollution. No fundamental research has been undertaken on otters in any of the south Caucasian countries and, therefore, data provided in the literature are scarce. Further, no DNA analysis has been undertaken in this part of the world and, therefore, the actual number of subspecies is not clear.

It is believed that the otter has already disappeared from many areas, or remain as isolated sub-populations and conservation and management activities, therefore, should be implemented immediately.

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RÉSUMÉ

LA LOUTRE EURASIATIQUE DANS LE SUD DU CAUCASE

Sept espèces de mustélidés sont présentes dans le Sud du Caucase (Arménie, Azerbaïdjan et Georgie) : *Lutra lutra, Martes martes, Martes foina, Meles meles, Mustela vison, Mustela nivalis* et *Vormela peregusna*. La loutre d'Europe (*Lutra lutra*) et le putois marbré (*Vormela peregusna*) sont les plus rares d'entre elles. La loutre d'Europe, l'une des espèces les plus menacées de la faune sud caucasienne, est toujours victime du braconnage, de la destruction de son habitat, du dérangement et de la pollution. La loutre n'a fait l'objet d'aucun travail de recherche fondamentale dans les pays du sud du Caucase et de ce fait, les données présentes dans la littérature sont rares. Par ailleurs, aucune analyse d'ADN n'a été réalisée dans cette partie du monde et c'est pourquoi le nombre actuel de sous-espèces est incertain.

RESUMEN

Siete especies de mustélidos están presentes en el sur del Cáucaso (Armenia, Azerbaijan y Georgia): *Lutra lutra*, *Martes martes*, *Martes foina*, *Meles meles*, *Mustela vison*, *Mustela nivalis* y *Vormela peregusna*. De éstas, las especies más raras son la nutria euroasiática (*L. lutra*) y el turón kaspeado (*V. peregusna*). La nutria, una de las especies de fauna más amenazadas en el Cáucaso sur, continúa siendo afectada por la cacería furtiva, la pérdida de hábitat, los disturbios, y la contaminación. Ningún estudio fundamental acerca de nutrias se ha realizado en estos países, y por lo tanto, la información disponible es escasa. Adicionalmente, ningún estudio de ADN se ha realizado en esta parte del mundo, por lo que el número de subespecies presentes no es muy claro.

REPORT

THE NEOTROPICAL OTTER *Lontra longicaudis* FEEDING HABITS IN A MARINE COASTAL AREA, SOUTHERN BRAZIL

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(received 26h May 2004, accepted 24th July 2004)

Abstract: The feeding habits of *Lontra longicaudis* have been studied in several areas in South America. In Brazil, the studies are concentrated on the species' feeding habits in fresh water ecosystems. Different authors reported the use of marine waters by *L. longicaudis*, although fresh water ecosystems were found to be the main environment providing food for this species. In the Environmental Protection Area of Anhatomirim in Southern Brazil, the marine environment proved to be the main feeding habitat for *L. longicaudis*. Fish and crustaceans are the main prey groups. Four fish families were identified and the Scianidae represents 85% of the prey. Intensive use of the coastal areas and lack of knowledge on the otters' use of these environments can compromise its conservation in Santa Catarina coastal habitats.

The Neotropical otter *Lontra longicaudis* (OLFERS, 1818) has a large distribution in Latin America, occurring in Central and South America and has its austral limit in northern Argentina (CHEHEBAR, 1990). Studies on the Neotropical otters' diet remain fragmented and generally have been carried out in fresh water ecosystems (OLÍMPIO, 1992; BLACHER and SOLDATELLI, 1996; HELDER and ANDRADE, 1997; PARDINI, 1998; UTRERAS et al., 1998; SPINOLA and VAUGHAN, 1998; QUADROS and MONTEIRO-FILHO, 2001). In Brazil, although there are records of the species' occurrence in coastal marine areas (BLACHER, 1987; SCHMIDT, et al., 2000; ALARCON and SIMÕES-LOPES, 2003), it is a general belief that the sea is a displacement area for the Neotropical otter, which concentrates its feeding habits mostly in fresh water environments.

Despite recent efforts to evaluate the conservation status of this species (WALDEMARIN et al., 1998; MEDINA-VOGEL, 1998) and the methodologies for standardising research on its distribution in Brazil (H. Waldemarin, pers. comm.), the Neotropical otter remains in the category of "data deficient" on the Red List of Threatened Species (IUCN, 2003), and in the category of "threatened by extinction", on the Tropical Database on Species (BDT, 2003). The species is considered "near threatened" on the Brazilian List of Threatened Species (IBAMA, 2004).

The aim of the present document is to report on a study of the Neotropical otters' feeding habits in a coastal marine area in Southern Brazil.

This study was carried out in the Environmental Protection Area of Anhatomirim (APA), located in Governador Celso Ramos district, Santa Catarina, southern Brazil. (Fig.1). The APA has a total area of 4,750ha, from which 3,080ha are part of the Northern Bay of the Santa Catarina Island. The costal zone is characterized by rocky coasts, sandy beaches, and small protected bays. The Northern Bay of the Santa Catarina Island has a high deposition of organic matter, and its average depth is approximately 6 to 8 meters, reaching up to 10 meters in the deepest sites.

The climate of the region is mesothermic humid, without a defined dry season. The temperature varies between 12-14 °C in the winter and 24-26 °C in the summer. The rain is abundant and well distributed throughout the year, with a more humid period in the summer and a dryer period during the winter. The annual average rainfall is 1,467 mm.

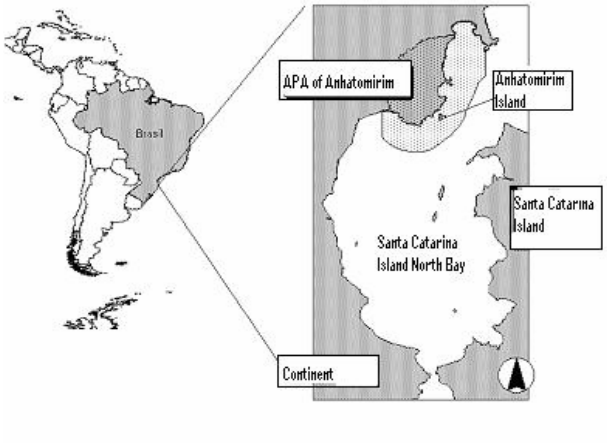

Figure 1. Geographical localization of the Environmental Protection Area (APA) of Anhatomirim, Southern Brazil

In order to study the diet of the otters, spraint analysis was the method selected. Samples of otters' spraints were collected between May and July of 2000, and in April of 2001, in an area of 11 km along the APA coastal zone. Each spraint sample was collected and stored in paper bags. In the laboratory the samples were dried at 200ºC and the prey contents remaining in the

samples were separated per taxonomic class. The otoliths and other remains were identified by specialists from the Federal University of Santa Catarina, and by comparison with a reference collection of aquatic organisms.

The samples were analyzed according to the relative frequency of occurrence [Ni/Nf X 100] and percentage of occurrence [Ni/ni X 100]; where Ni corresponds to the number of occurrences of a particular prey item, Nf to the total number of spraints analysed, and Ni to the number of occurrences of all items. To complement the description based on the presence/absence of items, two other methodologies were utilized, the area (point method) and the mass (weight) of the spraints samples. Each sample was spread on a paper of 10cm² area (corresponding to 100%), and the food remains found were separated and weighed.

A total of 476 spraints were collected, and 129 were analysed according the relative frequency of occurrence and percentage of occurrence, while 59 according to the mass (area) and weight methods.

The prey remains found in the samples contained scales, otoliths and fish spines, mammalian bones, teeth and fur, exoskeleton of insects, crabs and clams. According to the analysis of the samples, the fish and crustaceans are the main food source for the Neotropical otter in the APA marine coastal zone, constituting 67% and 28% of its diet, respectively, according to the percentage of occurrence (Table1). Mammals, molluscs, and insects were the less numerous taxonomic groups. Fish was also a predominant group according to the relative frequency of occurrence, being present in 83.7% of the samples analysed.

Table 1. Food items identified in *L. longicaudis* spraint samples

Taxonomic Groups	Ni	FOi (%)	POi (%)
Fish	108	83,7	67
Crustaceans	46	35,6	28
Mammals	4	3	2,5
Molluscs	2	1,5	1,2
Insects	1	0,78	0,6

Ni = Number of occurrence; FOi = Frequency of occurrence; POi = Percentage of occurrence

The results obtained from the mass and area methods coincide with the results from the frequency and percentage of occurrence, confirming the dominance of fish and crustaceans as the otters' main prey items. Fish is represented on average 87% of area and 5.4g of weight per sample, followed by the crustaceans with 51.6% area and 1.6g. Insects were not analyzed by this method (Table 2).

Table 2. Average, maximum and minimum weight and area of *L. longicaudis* food items for 69 spraint samples

Taxonomic Groups	Area (%)			Weight (g)		
	minimum	average	maximum	minimum	average	maximum
Fish	0,02	87,23	100	0,02	5,4	15
Crustaceans	0,02	51,6	100	0,02	1,6	5,32
Mammals	0,50	3,2	5	0,05	0,13	0,10
Molluscs	0,25	0,36	0.50	0,11	0,1	0,15

Among the 112 otolith remains found, 82 were identified as belonging to 10 different fish species, distributed in four families (Table 3). The *Scianidae* family represented 85% of the identified otoliths, and *Stellifer rastifer* was the most frequent species (52%), followed by *Micropogonias furnieri* (14 %). Other species differed little in their relative percentages and are less representative in these samples.

Table 3. Fish species identified in *L. longicaudis* spraint samples (n=129)

Family	Species	n of otoliths
Scianidae	*Stelifer rastifer*	42
	Micropogonias furnieri	12
	Paralonchurus brasiliensis	8
	Larimus breviceps	4
	Umbrina coroide	2
	Cynoscion jamaicensis	2
Serranidae	*Diplectrum radial*	4
	Diplectrum formosum	2
Carangidae	*Chloroscombus crysurus*	4
Gadidae	*Genidens genidens*	2

The Portunidae represented 30% of the crustaceans' remains in the spraint samples and it was the only family identified in this group. The clams present in the spraints were very small (> 1.0 cm), and were not considered as otters' prey. However, through interviews with two local inhabitants, there is testimony of cases where otters were observed eating mussels next to aquaculture areas in the bay. Remains of sea oyster *Crassostrea rizophorae* were found inside one of the otters' burrows, apparently in frequent use.

Among the mammalian remains, *Rattus sp.* was the only species identified. Amphibians, reptiles and birds were not present in the samples, and the insects were present in only one sample and could not be identified.

In APA, marine fish and crustaceans together constitute 95% of the Neotropical otter diet according to the percentage of occurrence. Nevertheless this otter species inhabits freshwater (rivers) and terrestrial environments (ALARCON and SIMÕES-LOPES, 2003), these constitute less important environments for feeding, as fresh water preys were not identified in the spraints in the APA region.

The otters' practice of attacking the fishnets was confirmed by local fishermen, through interviews conducted during the study. This activity was mentioned as it disrupted the fishermen's productivity. According to them, the otters attack the fishnets which are placed close to the rocky coasts in low depths, damaging the nets, mostly eating the body of fish, and leaving the remaining head behind.

The feeding habits of *L. longicaudis* in the coastal marine environment presented similar patterns when compared to the species' diet in freshwater ecosystems. In APA, the fish constitute the dominant prey group, reaching similar indices (83.7% Tab. 1) to those of other studies carried out with the same species in rivers, lagoons, and a dam in South America (CARVALHO, 1990; BLACHER and SOLDATELLI, 1996; HELDER and ANDRADE, 1997; PARDINI, 1998; QUADROS and MONTEIRO-FILHO, 2001; GORI et al., 2003).

The crustaceans are commonly cited as the second main prey group for *L. longicaudis* (HELDER and ANDRADE, 1997; PARDINI, 1998; QUADROS and MONTEIRO-FILHO, 2001), with some exceptions, where it can appear as the dominant group (OLIMPIO, 1992; SPINOLA and VAUGHAN, 1998) or absent (KASPER et al., 2004). According to KASPER et al. (2004), the absence of crustacean in otters' spraints in a river system in southern Brazil is related to the low index of crustaceans' occurrence in the area. In APA the crustaceans represent the second most frequent taxonomic group (35%), reaching an average of 51% of area in the spraints. The high percentage of crustaceans in the samples, as a result from using the area (point) method, could be explained due to the size of the exoskeleton remains found in the spraints.

Other prey groups such as amphibians, clams, mammals, and insects appeared in low frequency in APA, matching the results of other studies carried out in freshwater environments (OLIMPIO, 1992; HELDER and ANDRADE, 1997; PARDINI, 1998; QUADROS and MONTEIRO-FILHO, 2001). Although remnants of birds were absent in the spraint samples, two local inhabitants confirmed their observations of an otter attacking a rail (*Aramides sp.*) nest in a mangrove area.

The abundance of specific fish species or family as prey items in spraints of Neotropical otters has been reported elsewhere (HELDER and ANDRADE, 1997; PARDINI, 1998; QUADROS and MONTEIRO-FILHO, 2001; GORI et al., 2003; KASPER et al., 2004).

PARDINI (1998), GORI et al. (2003) and KASPER et al. (2004) carried out seasonal studies on the diet of L. *longicaudis* and the prey availability. The authors identified a richness of species amongst the otters' prey up to 7, having suggested that the preys' ability to escape as the main factor influencing the prey selection by the otters. In the present study, *Stellifer rastifer* appears as the main prey species, followed by *Micropogonias furniere*. Both species belong to the Scianidae family, and are considered of high commercial importance in this area (AGUIAR et al., 1994). *Stellifer rastifer* is more abundant in the winter and spring seasons (RIBEIRO et al., 1999), while *Micropogonias furniere* is abundant only in the winter (AGUIAR et al., 1994). According to MARTINS-JURAS et al. (1987), in CLEZAR et al. (1998) species of the *Scianidae* family are known to rely on estuarine waters for their reproduction and growth. The Northern Bay of the Santa Catarina Island is characterized by calm waters and receives a large amount of streams and rivers' water.

In accordance with the data found for the two aforementioned fish species, it is reasonable to assume that their predominance in the diet of *L. longicaudis* is associated with the fishes' seasonality, as well as sedentary habits. On the other hand, to have a more complete set of results, it is necessary to develop further research on the otters' feeding habits during the other seasons, and also it is necessary to evaluate the prey's availability in the locality.

The patterns of use of the marine habitat by *L. longicaudis* in Santa Catarina are still not very well understood. The definition of coastal areas where the species are present would appear crucial to their conservation. Knowledge on the otters' diet in marine ecosystems and the factors affecting their prey, including the impacts caused by the fishing activities and intensive exploration of the coastal zones in Santa Catarina could be gained through further studies in these clearly defined areas.

Acknowledgments - We thanks to Helen F. Waldemarin and Carlos H. Salvador by their help and suggestions on the manuscript, and Adriana Diaz-Triana and Paul Whitty for the English revision.

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RÉSUMÉ

Les habitudes alimentaires de la loutre à longue queue ont été étudiées dans plusieurs régions d'Amérique du Sud

Au Brésil, les études réalisées se concentrent sur le régime alimentaire en eau douce. Différents auteurs relatent l'utilisation du milieu marin par *L. longicaudis*, bien que l'espèce obtienne ses ressources trophiques essentiellement du milieu dulçaquicole. Dans l'aire protégée d'Anhatomirim, au sud du Brésil, le milieu marin s'avère être le principal lieu de prospection alimentaire de *L. longicaudis*. Elle y consomme majoritairement des poissons et des crustacés. Quatre familles de poissons ont été identifiées, dont les *Scianidae*, qui représentent 85% des proies. Une exploitation intensive de la zone côtière, ainsi qu'un manque de connaissances sur l'utilisation de l'environnement marin par la loutre peuvent compromettre le maintien de l'espèce sur la côte de Santa Catarina.

REPORT

NEW INFORMATION ABOUT THE BEHAVIOR OF *Lontra longicaudis* (CARNIVORA: MUSTELIDAE) BY RADIO-TELEMETRY

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(received 30th June 2004, accepted 19th August 2004)

Abstract: During the development of a study about a community of carnivorous mammals, an otter was captured and equiped with a radio transmitter in an area of mangrove in the south coast of the State of São Paulo, southeast of Brazil. This study verified that: 1 - the animal used at least three burrows without communication between them. 2 – the most used burrow was at a distance of 2,6 km from the capture place; 3 - this individual usually moved between two islands that were separated by an estuary whose medium width was of approximately 1 km; 4 – it spent a long period on a small island of approximately 0,06 Km^2 where a muddy substratum prevailed, not allowing the construction of a burrow. In spite of the little time that the otter stayed with the radio-transmitter, the data obtained are of relevant importance as they show an unknown activity pattern, besides showing in a short period some patterns of burrow use. Even though the otter removed its radio-collar, it didn't cause any damage to the individual and it allowed the registration of behaviour patterns that had not been described before. Based upon the radio-transmitter as adapted, new perspectives open up for the effective study of this species, increasing the possibilities of obtaining data about activity patterns and home range for *Lontra longicaudis*.

INTRODUCTION

During the development of a study about a community of carnivorous mammals in the area of the south coast of the State of São Paulo, southeast of Brazil (of 25°00' to 25°04' S and 47°54' to 47°56' W), (Figure 1), a male otter (1,23 m and 10,00 kg) was captured in a live-trap (Figure 2). The capture happened on September 12th 2003 in an area of mangroves 100 m from Jacó River and 300 m from Trapandé Bay. The use of collars as a form of adapting the radio-transmitter is not the most appropriate for mustelids, due to its lanky body, funneled neck and head, and short ears, so we adapted the radio-transmitter on two collars so that it hindered the withdrawl of the equipment by the animal (Figure 3). Aiming at verifing the efficiency of the adaptation, we were careful to keep it in observation until the following day. Approximately 24 hours after the capture, the male didn't seem to be bothered by the radio-transmitter, it had already fed itself and was taking care of its fur as usual and, therefore, it was released. Apparently the equipment was well tied to the otter and it didn't disturb the animal while it walked, swam or fed. For a period of 35 days the otter was monitored, allowing us to verify that: 1 - the animal used at least three burrows without communication between them; 2 – the most used burrow was at a distance of 2,6 km from the capture place; 3 - this individual usually moved between Cananéia Island and Comprida Island, which are separated by an estuary whose medium width is of approximately 1 km; 4 – twice, it spent a long period, between 07:00am and 02:00pm, and between 8:00pm and 11:00pm, on a small island of approximately 0,06 Km^2 (Pai Mato Island) where a muddy substrate prevails, not allowing the construction of a burrow.

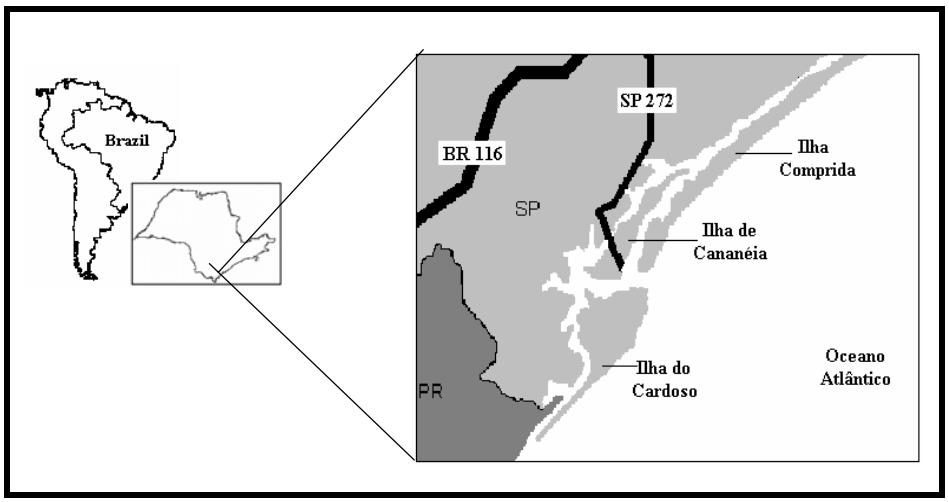

Figure 1. Location of the study area, south coast of the State of São Paulo, Brazil.

After this period, the signal emitted by the transmitter stopped varying; leading us to suppose that the otter was dead or it had removed the equipment with the transmitter. For about 5 days the signal was traced and finally the radio-transmitter was found in perfect condition inside a burrow on the coast of the estuary on a nearby island (Comprida Island). The hypothesis that the otter had removed its own collar is based on the fact that did not find signs of blood or struggle at the place or on the collar and it was still closed, excluding the possibility that the animal had been predated upon or that hunters had removed the collar.

This hypothesis was confirmed 12 days after the radio-transmitter had been found when the male was seen feeding itself peacefully at 07:20 pm on the beach 300 m far from the burrow where we found the transmitter. Identification was possible due to the fact that we had shaved a small part of its side at the moment of capture to identify it in case it removed the collar.

Figure 2. *Lontra longicaudis* captured in a live trap. Foto: Eduardo Nakano C. Oliviera

Figure 3. *Lontra longicaudis* with the radio-transmitter adaptated on two colars. Foto: Ana Carolina Atem

In spite of the little time that the otter stayed with the radio-transmitter, the data obtained are of relevant importance because they show an unknown activity pattern; besides showing, over a short period, some pattern of use of burrows.

Among the 13 recognised species of otters, *L. longicaudis* is one of the less studied, being considered 'vulnerable' in Brazil due to a lack of knowledge (FOSTER-TURLEY, 1990). Until recently, knowledge about the ecology and behavior of this species were based on studies about diet and use of shelters in different ecosystems (BLACHER, 1987, 1991; GALLO, 1991; PARERA, 1993, SOLDATELI and BLACHER, 1996; PARDINI, 1998; PARDINI and TRAJANO, 1999; WALDEMARIN and COLARES, 2000; CASTRO-REVELO and ZAPATA-RÍOS, 2001; QUADROS and MONTEIRO-FILHO, 2000, 2002; CEZARE et al. 2002) and the activity patterns were extrapolated from studies accomplished with the European otter *Lutra lutra* and with the North American otter *Lontra canadensis*.

However, even if the otter had removed its radio-collar, it didn't cause any damage to the individual and it allowed the registration of behaviour patterns that had not been described. Based upon the adapted radio-transmitter used, new perspectives open up for the effective study of this species, thereby increasing the possibilities of obtaining data about activity patterns and home range for *L. longicaudis*.

Acknowledgement – to Instituto de Pesquisas Cananéia, IPeC, Fudação O Boticário de Proteção à Natureza and The Nature Conservancy do Brasil for all the support; to Luciana Nakano C. de Oliveira for the revision of the paper; to Fernando, Ana Carolina and Cintia for helping in the capture process; to Rafael Xavier for helping in the monitoring the otter; to Centro Nacional de Pesquisas para Conservação de Predadores Naturais CENAP/IBAMA for the permissions for catching carnivores (licence # 044/03.

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RÉSUMÉ

NOUVELLES DONNEES SUR LE COMPORTEMENT DE *LONTRA LONGICAUDIS* (*CARNIVORA* : *MUSTELIDAE*) OBTENUES PAR RADIO-PISTAGE

Une loutre a été capturée et équipée d'un émetteur-radio, au cours d'une étude sur la population de mammifères carnivores de la région de mangroves de la côte sud de l'état de Sao Paulo, situé au sud-est du Brésil. Cette étude a permis de vérifier que : 1 - la loutre a utilisé au moins trois terriers qui ne communiquaient pas entre eux. 2 - le terrier le plus utilisé se situait à une distance de 2,6 km du lieu de capture. 3 - cet individu se déplaçait habituellement entre deux îles, séparées par un estuaire ayant une largueur de 1 km. 4 – il a passé une longue période sur une petite île de 0,06 km², où le substrat essentiellement boueux ne permet pas le creusement d'un terrier. Malgré le fait que la loutre n'ait porté l'émetteur que pendant une courte période, les données obtenues se révèlent être d'un grand intérêt, car elles montrent un cycle d'activité encore inconnu, en plus de mettre en évidence la stratégie d'occupation des terriers sur une courte durée. Bien que la loutre ait retiré son collier émetteur, celui-ci n'a causé aucun dommage à l'animal et a révélé un schéma comportemental encore non décrit. Ainsi, le collier émetteur que nous avons adapté à la loutre et les observations effectuées ouvrent de nouvelles perspectives pour l'étude de *Lontra longicaudis* et augmente les possibilités d'obtenir des informations sur l'activité et la répartition de l'espèce.

RESUMEN

Durante la realización de un estudio mastozoológico, una nutria fue capturada y equipada con un radio-transmisor en un área de manglares el la costa sur del Estado de São Paulo, en el sureste de Brasil. Este estudio permitió verificar que: 1) el animal utilizó al menos tres madrigueras sin comunicación entre ellas; 2) las madrigueras mas utilizadas estaban a una distancia de 2.6 km del sitio de captura; 3) el individuo monitoreado generalmente se movilizaba entre dos islas que están separadas por un estuario cuyo ancho promedio es de aproximadamente 1 km; y 4) el animal pasó un largo periodo de tiempo en una pequeña isla con superficie aproximada de 0,06 km^2 con sustrato lodoso que no permite la construcción de madrigueras. A pasar del corto tiempo de monitoreo del animal radio-equipado, los datos obtenidos son relevantes porque muestran un patrón de actividad poco conocido, y además, se pudo documentar el uso de varias madrigueras. No obstante que la nutria se liberó del radio-collar en poco tiempo, aparentemente el animal no sufrió daño. Esto permitió registrar patrones de comportamiento que no habían sido descritos previamente. Los datos obtenidos a partir del radio-collar adaptado, brindan nuevas perspectivas para el estudio de los patrones de actividad y ámbito hogareño de *Lontra longicaudis*.

REPORT

SCATS AND GLUE - A CHEAP AND ACCURATE METHOD FOR MAPPING AFRICAN CLAWLESS OTTER *AONYX CAPENSIS* (SCHINZ, 1821) TERRITORIES IN RIVERINE HABITATS

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(received 11th July 2004, accepted 16th August 2004)

ABSTRACT: Accurate mapping of otter territories has hitherto been done by means of telemetry. However, the widespread use of telemetry has curtailed the study of otter territorial behaviour in resource-poor countries, particularly in Africa. Researchers in Africa generally do not have the resources to invest in telemetry equipment and tracking vehicles and aircraft. The implanting of transmitters in otters is a highly invasive procedure that requires a high standard of veterinary/ animal handling skills and the risks are high. African clawless otters forage in family groups and these animals share a clan terrintory along a stretch of coastline or riverine habitat. This territory is regularly marked by deposition of spraints, mostly on rocks and other prominent features on the riverbanks. In the course of this experiment, the artificial transfer of scats from known *A.capensis* holts into neighbouring family territories was found to elicit a prompt response from the resident family group. When the process is repeated in both directions, i.e. scats from territory A into territory B and vice versa, it gave a highly accurate estimate of territorial boundaries and when repeated over time can give an indication of seasonal variation in territorial behaviour.

INTRODUCTION

Accurate mapping of otter territories has hitherto been undertaken to a high level of accuracy by means of telemetry. However, the development and widespread use of telemetry has curtailed the study of otter territorial behaviour in resource-poor countries, particularly in Africa. Researchers and students in Africa generally do not have the resources to invest in telemetry equipment and tracking vehicles and aircraft. Even where resources are available for equipment, the implanting of transmitters is a highly invasive procedure that requires a high standard of veterinary/animal handling skills and the animal's welfare can easily be compromised during and after the procedure.

African clawless otters are known to forage in family groups consisting of a mother and pups (KINGDON, 1997) occasionally joined by other related adults, and these animals share a clan territory along a stretch of coastline or riverine habitat. This territory is regularly marked by deposition of spraints, mostly on rocks and other prominent features on the riverbanks. In the course of this experiment, the artificial transfer of scats from known *A. capensis* holts into neighbouring family territories has been found to elicit a prompt response from the resident family group. When the process is repeated in both directions, i.e. scats from territory A into territory B and vice versa, it can give a highly accurate estimate of territorial boundaries and, when repeated over time, can give an indication of seasonal variation in territorial behaviour. This proposed non-invasive method could greatly reduce the cost of studying otter territorial behaviour while eliminating the need for animal handling.

STUDY AREA

This study was carried out in the Ewaso Ng'iro River, Central Kenya, between 37' N0268749, UTM 0028824 and 37' N0262640, UTM0059070. The Ewaso Ng'iro river flows northwards through the Laikipia Plateau (alt. 1800m) with tributaries flowing from the foot of Mt. Kenya in the south and the Aberdare highlands in the south west. The river terminates in the Lorian swamp in north eastern Kenya.

MATERIALS AND METHODS

The following materials are required for this territorial survey technique:

a) Global Positioning System (GPS) set
b) Cyanoacrylate glue
c) Waterproof permanent marker
d) Measuring tape (50m or 100m)
e) Fresh otter scat (<48 hrs old) from a known source territory

African clawless otters are large animals (av. 20kg) and, in the Ewaso Ng'iro River, they forage on relatively small prey such as crabs (ave. wt. 11g) and crayfish (av. wt. 25g). Availability of food, therefore, is the most important factor in the location and size of territories in this area. Territories in the Lower Ewaso Ng'iro were all found to include small water reservoirs, which were constructed by livestock ranchers in the area. These reservoirs provided refuges for crayfish during the dry season when low water levels exposed the crayfish to increased predation by terrestrial predators.

Otter territories were established around these reservoirs and so spraints for the purposes of this experiment were taken from holts at the reservoirs.

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We placed spraints on rocks along the river at 100-meter intervals and these were moved another 100 meters every 24 hours. At every point, the spraint was placed on a rock and secured with a small amount of glue. Cyanoacrylate ('super glue' brand) was used because it dried quickly and produced no discernible odour after 15 seconds. The glue was to prevent the experimental spraint from being blown off by the wind or washed off by rain. We also made a small blue mark on the spraint to facilitate positive identification of the spraint the following day. Within the initial territory, the experimental spraint does not elicit any response from the resident otters. However, when the spraint reaches another territory, the resident otters respond by removing it and replacing it with a fresh one. We then take the fresh spraint and repeat the process in the opposite direction until a similar response is elicited from the original group. We then took the GPS position of a point midway between the two response points and that is taken to be the end of the territory.

DISCUSSION

This method is still new and it is recommended that it only be used for the study of *A. capensis* populations in riverine habitats at the present time. More experimentation has to be undertaken in order to gauge its applicability to the study of other otter species. Even within the species there may be differences in the territorial behaviour of non-riverine populations, e.g. those living in lakes and marine habitats. Territories in riverine habitats are easily defined due to their linear nature, but they may not be as definite where we have open water such as lakes and oceans. The decline in numbers of otters around the world has been a cause of considerable concern (DAVIS, 1971, MACDONALD et al., 1978) more so because few estimates of otter densities and standardised estimation methods are available. This is a potentially useful method for estimating the density of *A. capensis*, which is unknown throughout much of its range. It is a particularly important technique because lack of resources is one of the two serious impediments to research on African otters. The other is the difficulty in locating and trapping them. Another important measure that could be obtained from this method is the productivity of otter habitats. *A. capensis* territories vary in size from 3 - 20 km (KINGDON, 1997). This may be determined by the availability of food, the results of the current study showing that some territories are as small as 0.6 km.

Telemetry would still be required, particularly to cover for seasonal variation in territorial behaviour. The two methods (telemetry and scats and glue) could be complementary as the 'scats and glue' technique could be a useful guide as to where the limited resources available could be best spent on telemetry.

Acknowledgements - I would like to acknowledge the support of my project sponsors; Columbus Zoo, Lincoln Park Zoo, Mpala Wildlife Foundation, and the Whitley Laing Foundation. For scientific advice on experimental design, my supervisors Dr. Penninah Aloo-Obudho and Prof. Romanus Okelo of Kenyatta University. Finally my field assistants Hussein Mohamed and Sadat Abdi for their tireless work in the field.

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RÉSUMÉ

EPREINTES ET COLLE – UN MOYEN PRECIS ET BON MARCHE POUR DELIMITER LES TERRITOIRES DE LOUTRES A JOUES BLANCHES DU CAP *AONYX CAPENSIS* (SCHINZ, 1821) EN HABITAT RIVULAIRE

Jusqu'à présent, la localisation précise d'un territoire de loutre a été possible grâce à la télémétrie. Cependant la standardisation de cette méthode a été un frein à l'étude du comportement territorial de la loutre dans les pays en voie de développement, particulièrement en Afrique. En Afrique, les chercheurs n'ont généralement pas la possibilité d'investir dans l'équipement, les véhicules et les moyens aériens nécessaires pour le suivi des animaux par radio-pistage. L'implantation d'émetteur est une procédure lourde et risquée, qui requiert un personnel hautement qualifié pour la manipulation des animaux et le suivi vétérinaire. Les loutres à joues blanches recherchent leur nourriture en groupes familiaux. Les membres d'un même clan se partagent un territoire qui se situe le long d'une portion de côte ou de rivière. Ce territoire est régulièrement marqué par le dépôt d'épreintes sur des pierres ou d'autres points marquants situés sur les rives. Au cours de cette expérience, des crottes d'*A. capensis* de sites connus ont été placés sur les territoires des familles voisines, ce qui a provoqué une prompte réponse du groupe familial résident. Lorsque la procédure est répétée dans les deux directions, c'est à dire lorsque des épreintes sont déposées du territoire A vers le territoire B et vice versa, cela permet d'obtenir une estimation très précise des limites du territoire de chaque groupe. Cette expérience répétée dans le temps, donne des indications sur les variations saisonnières de l'occupation du territoire.

RESUMEN

Actualmente, la delimitación exacta de los territorios de las nutrias se ha hecho por medio de radio-telemetría. Sin embargo, la aplicación de esta tecnología en países en vías de desarrollo ha sido muy limitada, particularmente en el continente africano. Los investigadores en África generalmente no cuentan con los recursos necesarios para invertir en equipo de radio-telemetría y medios de transporte aéreo y terrestre. Por otra parte, la implantación quirúrgica de transmisores en nutrias es un procedimiento altamente invasivo que requiere de un alto nivel de entrenamiento en técnicas veterinarias, mientras que el riesgo para los individuos es alto. La nutria desgarrada forrajea en grupos familiares, y éstos comparten territorios entre sí, los cuales se extienden a lo largo de las riveras de los ríos y las costas marítimas. Estos territorios son delimitados por medio de la deposición de heces en rocas y otros sustratos prominentes encontrados sobre los márgenes de los ríos. Durante la realización del presente experimento, se transfirieron artificialmente heces de los territorios conocidos de *A. capensis* a territorios vecinos para documentar la respuesta de los grupos residentes. Cuando el proceso se repitió en ambos sentidos, es decir, cuando las heces del territorio A se colocaron en el territorio B y viceversa, se obtuvo una estimación de los límites territoriales. La repetición periódica puede proporcionar información acerca de las variaciones estacionales y el comportamiento territorial de la especie.

REPORT

GIANT OTTER PROJECT IN PERU
FIELD TRIP AND ACTIVITY REPORT – 2003

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The project "Status, habitat, behaviour, and conservation of Giant Otters in Peru" of the Frankfurt Zoological Society - Help for Threatened Wildlife (FZS) is now in its 15th year and progress has been reported continually in the IUCN Otter Specialist Group Bulletin (SCHENCK and STAIB, 1992, 1995a, 1995b; SCHENCK et al. 1997, 1999; STAIB and SCHENCK, 1994; GROENENDIJK et al., 2000, 2001; GROENENDIJK and HAJEK, 2002, 2003). The giant otter (*Pteronura brasiliensis*) was uplisted from 'vulnerable' to 'endangered' by IUCN in 2000 with habitat destruction in South America currently posing the greatest threat to the species. Activities in Peru have been geared toward developing a national integrated conservation strategy, incorporating research and monitoring, environmental education, management of human activities in giant otter habitats, capacitation and awareness-raising, networking, and the creation of a distribution database and mapping facility.

Manu Biosphere Reserve population census

As in 2002, only one population census was carried out in Manu National Park in 2003, between 23.09.03 and 30.10.03. We investigated 19 oxbow lakes and also entered the Pinquen River. Due to reliable, recent reports of the presence of potentially hostile voluntarily isolated groups of people on the upper Manu River, we decided not to continue upriver of the community of Tayakome. Thus the census could not include the territory of 1 of the giant otter groups (Pirana/Upper Manu Group) censused since 1990.

The total number of different giant otter individuals encountered was at least 69 (56, or 81%, were successfully filmed and identified); the highest encountered in the history of the Project. This included 4 solitaries with the remainder being members of 11 groups. The largest group numbered 10 animals, and average group size was 5.9. The total number of litters was 9 and the total number of cubs was at least 16; average litter size was therefore 1.8 cubs. The total time of direct observation was approximately 58 hours, almost half of which was spent on Cocha Salvador. Of the 130 different neck markings filmed since the beginning of 1999, the sex is definitely known of 40 individuals, that is, 31%.

A top priority for 2004 is the detailed analysis of demographic data gathered over the last 5 years, incorporating also data collected by the previous project leaders during the 1990-1996 period.

Small river research: Palma Real and Patuyacu

The Palma Real research was concluded during 2003 with a final two visits to the field, the first between 10.03.03 and 30.03.03 (when water levels were the highest yet seen), and the second between 16.11.03 and 25.11.03 (the rainy season had not yet started and water levels were very low). For a map of the area, please refer to OSGB Vol. 19(1) April 2002.

Results of Survey 1

Patuyacu

A solitary was sighted on two different days, but on neither occasion was the animal identified. A third sighting was of two individuals. On the 29th of March, a group of 3 individuals was observed two of which were those seen the previous day, Suerte (born in 2000) and Leche (a solitary in 2002). The third animal was Timida, who we suspect is the breeding female of the group, and who was first seen in April 2001. It seems that Leche has replaced the male Patu. A total of 14 campsites were found on the Patuyacu, of which only three were fresh. Two fresh dens and two old dens were also encountered; at one of the old dens what appeared to be a Neotropical otter (*Lontra longicaudis*) track was found in the entrance, as well as Neotropical otter spraint, containing fur and animal (non-fish) bones. A few days later, a Neotropical otter was seen nearby and the log directly underneath the den was wet, indicating that he had again visited it. Neither species seemed to be using the den itself (which had a campsite and was therefore occupied at one time by giant otters). Single Neotropical otters were seen a total of 5 times.

Palma Real

Giant otters were not observed, despite the fact that 3 of the 8 campsites encountered were fresh. Only one old den was found, while single Neotropical otters were sighted twice.

Palma Real Grande

Giant otters were also not seen on the Palma Real Grande, although 2 of the 5 campsites, and the one den found, were fresh.

Results of Survey 2

Patuyacu

An unknown solitary giant otter was observed and filmed. A total of 6 dens, of which 5 were fresh (one of which was old two days earlier), and 13 campsites (3 fresh) were recorded. A Neotropical otter was sighted once.

Palma Real

On the 20th of November, there were 7 sightings of a group of 3 individuals as they moved downriver. They were identified as Onyx (first seen in August 2000) and Honguito (female and first seen in April 2002), plus a juvenile. The previous day, a different group also of three animals, was observed, including Real (first seen in Sept. 1998) and Aguja (first seen in September 2001 together with Real). A total of 19 campsites (13 fresh), and 9 dens (5 fresh) were encountered.

Palma Real Grande

Giant otters were observed a total of 3 times. The first sighting was of at least two individuals swimming upriver. About 150m further up, three animals were seen. On the 21st of November, three individuals were again observed (probably the same group as that seen a few days earlier), one of which was a cub. One animal was identified as Charlie, a male otter first seen as a solitary on the upper Patuyacu in April 2001. In April 2002 he was again observed as a solitary. A total of 5 campsites (4 fresh), and 3 dens of which only one was fresh, were also recorded. Neotropical otters were observed on 3 occasions (all single individuals) between the Palma Real Grande and the Palma Real.

Discussion

We believe that the group comprising Leche, Timida and Suerte was the only one inhabiting the whole of the Patuyacu tributary in March 2003, with one or more solitaries also present. A second group was simultaneously occupying the middle reaches of the Palma Real Grande, but was not identified. There was also clear evidence of a third group on the upper Palma Real in the area that we consider being the territory of Real's group; however, the otters were not seen. Unusually, no sign of giant otter presence was encountered on the middle Palma Real, in the territory of Onyx and Honguito; we assume they were far up Quebrada Aguaje.

In November 2003, we were finally able to film two members of a group of three on the Palma Real Grande, one of which we know as Charlie, a male seen on the Patuyacu in 2001 and 2002. He was in the company of another adult and a cub, which leads us to believe that he has established a permanent territory on the whole of the Palma Real Grande, extending roughly up to the mouth with the Patuyacu.

Only old sign was recorded on the upper Patuyacu, but there was much fresh activity in the middle and lower reaches; however, only an unidentified solitary was observed.

Fresh signs of giant otter presence were encountered throughout the length of the Palma Real, with Real, Aguja and a sub-adult occupying the upper reaches, while Onyx, Honguito and a cub were occupying the middle Palma Real.

Sandoval Control and Interpretation Centre

Since the beginning of the year 2003, the Project focused on developing and implementing an Interpretation Centre located at the Sandoval Control Post where local people from Puerto Maldonado, children participating in the FZS Sandoval Environmental Education Programme, and national and international tourists, enter to visit the lake. This centre was developed not only as a powerful educational tool, but also as an additional attraction away from the lake, decreasing the amount of time spent there by visitors and consequently reducing the pressure put on the giant otter habitat. Approximately 30 bilingual installations (Spanish and English) were designed and organised according to five main themes. The design and construction process involved a large team of local artists and businesses, as well as the park wardens. The Centre was inaugurated on July 21st with about 70 persons, representing local institutions, authorities, NGOs, professionals and residents, participating in the event.

Heath population census

More than a decade after the area was first visited by the Project, biologist Raphael Notin and team carried out a giant otter population census in the Heath watershed in August 2003, exploring 37 lakes and 3 streams over a period of one month. The Heath River forms the natural boundary between Bahuaja Sonene National Park of Peru and Madidi National Park of Bolivia. WCS-Bolivia facilitated the obtaining of a permit from the Bolivian authorities to investigate the oxbow lakes on the Bolivian bank of the river, and a Madidi gamewarden participated throughout the census. Raphael encountered a total of 42 different giant otters (7 groups and one transient). Clearly, this is a very important population for both Peru and Bolivia and demonstrates the significance of continued bi-national collaboration towards the conservation of the transfrontier Madidi and Bahuaja Sonene National Parks.

Distribution survey in the Department of Ucayali

Between August and December 2003, a study of the distribution of the giant otter in the department of Ucayali, central Peruvian Amazon was carried out, not only with the aim of elaborating upon existing, scarce information on distribution of the species in the area but also to test standardised field survey technique guidelines proposed in "Surveying and Monitoring Distribution and Population Trends of the Giant Otter – Guidelines for a standardisation of survey methods" (Groenendijk et al., in prep.) These included quadrant size (30'x30' or 15'x15' lat./long.), number of survey sites per quadrant, site survey distance, and criteria for site selection. The study was carried out by Ecuadorian biologist, Geovanna Lasso.

A total of 12 rivers were investigated, along which 9 squares of 30'x30' and 25 quadrants of 15'x15' were surveyed, one site per 15'x15' quadrant (a 15'x15' quadrant is roughly equivalent to 25x25km, whereas a 30'x30' quadrant is comparable to 50x50 km; a 30'x30' square is made up of four 15'x15' quadrants). In each site (whether rivers or lakes), it was attempted to

cover a standard survey distance of 30 km. On rivers, both banks were surveyed while on lakes the entire perimeter was explored in the majority of cases.

Nine of the 15'x15' quadrants (4 of the 30'x30' squares) were identified as positive for the presence of giant otters, based on direct as well as indirect signs (a square is declared positive even if only one of its four quadrants is found to be positive in the field). Of the 25 sites surveyed (rivers and lakes), in every case it proved to be impossible to cover the full survey distance, due to low water level, obstacles in the water course, personal danger (posed by armed loggers, fishermen, miners, etc.), or because the total perimeter did not amount to the full distance (on lakes). In all positive survey sites (n = 9), the stop-at-first-sign survey distance was less than 12 km. Of the 51 signs recorded, only 4 were direct sightings of individuals while just fewer than 60% of indirect signs were campsites, the remainder being dens. Ten of the 25 surveyed sites were selected on the basis of interviews with local people, 80% of which proved to be positive. The remaining 15 sites were chosen using maps and only 1 was positive when surveyed.

After analysing the data collected, this study suggests the following distribution survey guidelines: 1 - One site per 15'x15' quadrant should be surveyed and a minimum of two of the four quadrants should be surveyed in a 30'x30' square; 2 - A stop-at-first-sign approach should be adopted during surveys, i.e. halting the survey of a site at the first sign (direct or indirect) that without question indicates the presence of giant otters; 3 - The standard site survey distance could be halved to 15 km without affecting the probability of encountering giant otter sign, but this would need to be tested in other habitats and at different otter densities; 4 - Survey sites should be selected as much as possible on the basis of reliable information provided by local people through rapid interviews or questionnaires.

Second giant otter field survey techniques standardisation course

Between the 17th and 26th of June, giant otter specialists from Venezuela, Suriname, Guyana, Brazil, and Ecuador participated in the second 12-day Giant Otter Survey Methodology and Habitat Management Standardisation field course/workshop (see photograph). The meeting was held in the Bahuaja Sonene National Park and Tambopata Reserved Zone, Madre de Dios, south-eastern Peru.

The course began with a field trip of 6 days to the Palma Real and Patuyacu Rivers, in search of signs and sightings of giant otters. Two giant otters were briefly encountered on the first day on the Palma Real Grande. Over the following days, we visited Lakes Cococha and Tres Chimbadas, where monitoring of the resident groups of giant otters and the management of tourism was discussed, together with the guides of the two lodges. In Cococha, eight individuals (including two cubs) were observed swimming and hunting on the opposite shore; later they approached to within a few metres from our fixed observation point, a hide, before heading off. On Tres Chimbadas, we accompanied Rainforest Expeditions guides and tourists on the established lake circuit. We had the opportunity to witness and discuss the importance of guide–tourist interaction in conveying a conservation/education message. We were also able to observe 5 otters of the Tres Chimbadas group.

Photo: Travelling up the Palma Real river to the study area during the Giant Otter Survey Methodology and Habitat Management Standardisation field course/workshop

In parallel with the field visit, discussions and workshops were held to determine the terminology, and parameters for correct identification of indirect signs, to be used as part of a standard survey methodology for the species. Preliminary points for the establishment of a continental distribution survey strategy were also discussed, but it was recognised and proposed that a meeting be organised in December to deal with this issue in depth (see below).

Friends of the Giant Otter Bulletin

Two issues of the Friends of the Giant Otter Bulletin were produced and distributed in April and August 2003. More than

350 people currently receive the Spanish version and an additional 75 receive the English copy (compared to 230 and 61 persons respectively in 2002, 181 and 56 persons respectively in 2001, and 80 and 25 respectively in 2000).

Pantanal workshop

Between the 10th and 13th of December 2003, a workshop was held at the Centro de Conservação do Pantanal, Fazenda Sete, in the Brazilian Pantanal, to further the development of a range-wide giant otter distribution survey strategy. The event was organised by Sociedade Civil Mamirauá and the IUCN/SSC Otter Specialist Group with support from the Wildlife Conservation Society and Fundação Brasileira para o Desenvolvimento Sustentável. Fourteen otter specialists participated.

A first set of guidelines was established for a strategy for carrying out giant otter distribution surveys in a standardised format, thereby generating reliable and comparable data. Moreover, data obtained through future standardised giant otter field surveys will contribute to a user-friendly GIS database being created by Aktion Fischotterschutz, Germany. It is hoped this database will facilitate the estimation and evaluation of future variations in the distribution and population status of the species, and thus help to lay the foundation for long-term giant otter conservation programmes across national boundaries.

Acknowledgements – We are grateful to the Frankfurt Zoological Society-Help for Threatened Wildlife (FZS) for their financial support. We would like to thank INRENA, especially the staff and gamewardens of the Manu Biosphere Reserve, the Bahuaja-Sonene National Park and the Tambopata National Reserves, for their co-operation. Sincere thanks are also due to WCS-Bolivia, and to GELM, a Peruvian NGO, for help with financing the Sandoval Interpretation Centre. And finally, our Peruvian field assistants were invaluable, as always.

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REPORT

CHANGE OF PARTNERS IN A GIANT OTTER ALPHA COUPLE

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(received 11th August 2004, accepted 18th August 2004)

ABSTRACT: Very few data are available on the social behaviour of giant otter (*Pteronura brasiliensis*). In this note I report a change of partners in a giant otter alpha couple observed in the Xixuau Reserve in Roraima, Brazil. The male of the breeding pair disappeared and was replaced by another adult male, previously sighted within the group's territory. The calf of the original alpha couple survived the whole transition and was adopted by the new adult male; the group remained stable in its new form and one year later the couple had a litter of two cubs. For each individual, the frequency of alarm behaviour was recorded and the results show an adjustment of the alpha female to the different behaviour of the two partners.

INTRODUCTION

A population of giant otters (*Pteronura brasiliensis*) in the Xixuau Reserve in Roraima, Brazil, was studied from October 2000 to March 2003 in order to gather biological and ecological data. Five resident groups were followed during the study. According to the literature, a group of giant otters consists of a reproductive pair (alpha couple) and one or two litters (DUPLAIX, 1980; STAIB, 1995; CARTER and ROSAS 1997; ROSAS and de MATTOS, 2003). A change of partners occurred in one of the main study groups (M group) that had been observed for three consecutive dry seasons: (1) from October 2000 to March 2001, (2) from November 2001 to May 2002, (3) from October 2002 to March 2003.

STUDY AREA

The Xixuau Reserve (0º48.023'S, 61º33.476'W; altitude 30m a.s.l.) is located 500 km north-west of Manaus and consists mainly of primary tropical forest crossed by a black water river (River Jauperi) and many creeks. During the flood season, the water level usually rises up to 12m, flooding wide portions of the forest and sandy beaches along the watercourses. The area is virtually uninhabited, with a human population density of 0.04 persons per km^2.

METHODS

Daily surveys were conducted during the dry season by canoe to monitor an area of approximately 60 km^2. Riverbanks and lakes were patrolled searching for indirect signs, such as campsites, tracks or dens, and the positions recorded by GPS. The resident groups were followed at a distance of 10-100 meters and filmed by a camcorder, the individuals recognised by their throat markings. Observations from shelters were achieved in the proximity of the dens at dawn and sunset, when the behaviour of the individuals was recorded using the ad libitum sampling where no specific constraints are put on what is recorded or when and the observer write down anything that seems relevant or interesting at the time.

COMPOSITION CHANGE

Between October 2000 and March 2003, the M group was sighted 99 times, with a total of over 71 hours of observation (Figure 1). When first seen, the group was composed of an alpha couple (named Eme and Moro) that gave birth to a cub (Dago) two months later. This composition (1:1:1) lasted up to March 2001. From January 2001, a solitary otter was sighted within the group's territory, once leaving a single untrampled scat on a latrine in use by the M group. The neck pattern of the newcomer was recorded and he was named Kappa. From the beginning of the second dry season, November 2001, the father Moro was no longer sighted and had been replaced by Kappa. The group remained stable in its new form and was observed in the same home range until May 2002. In October 2002, the new couple (Eme and Kappa) had a litter of two cubs (Juan and Zoe) and maintained this composition (1:1:3) until the end of the fieldwork.

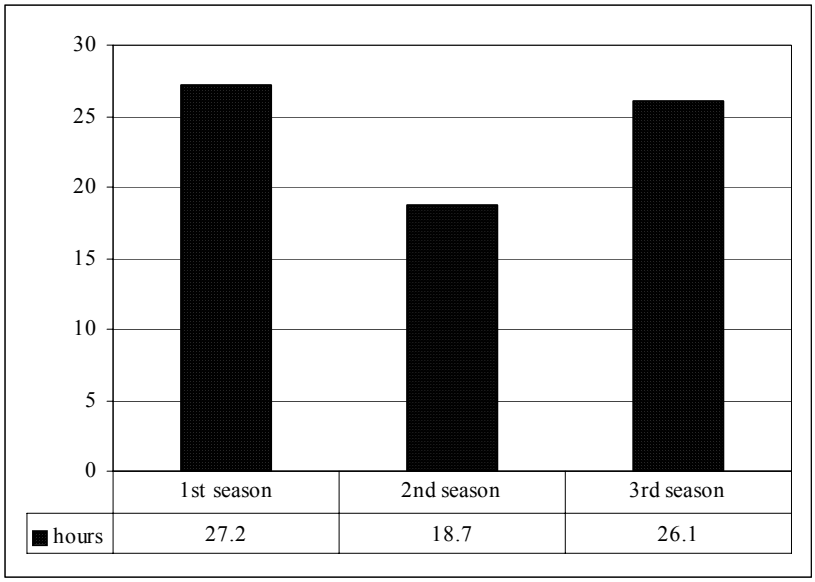

Figure 1. Observations of the M group (in hours) achieved during three consecutive dry seasons: 1st season, Eme with Moro and Dago; 2nd season, Eme with Kappa and Dago; 3rd season, Eme with Kappa, Dago, Juan and Zoe. (Eme=female, Moro=first male, Kappa=second male, Dago, Juan, Zoe=cubs)

BEHAVIOURAL CHANGES OF THE ALPHA FEMALE

During the first season of the study, when Eme had Moro as her partner, she used to play a dominant role, taking the front line when an intruder (i.e. the human observer) was sighted (Figure 2). Out of 37 sightings, the typical alarm behaviour (snorting, periscoping, charging) was recorded 19 times, 10 of which were performed by Eme alone (52,7%), 2 by Moro alone (10,5%), 1 by the two adults together (5,3%) and 6 by Eme in front and Moro behind (31,5%). During the second season, after the partner change, Eme tended to stay back, leaving the leadership role to Kappa. Out of 37 sightings, 31 alarms were recorded, 6 performed by Eme alone (19,4%), 5 by Kappa alone (16,1%), 6 by the two adults together (19,4%), 2 by Eme in front and Kappa behind (6,5%), and 12 by Kappa in front and Eme behind (38,7%). During the third season, after the new litter, Eme continued to show the same tendency. Out of 25 sightings, 17 alarms were recorded, 1 performed by Eme alone (5,9%), 4 by Kappa alone (23,4%), 2 by the two adults together (11,8%), 1 by Eme in front and Kappa behind (5,9%) and 9 by Kappa in front and Eme behind (53%).

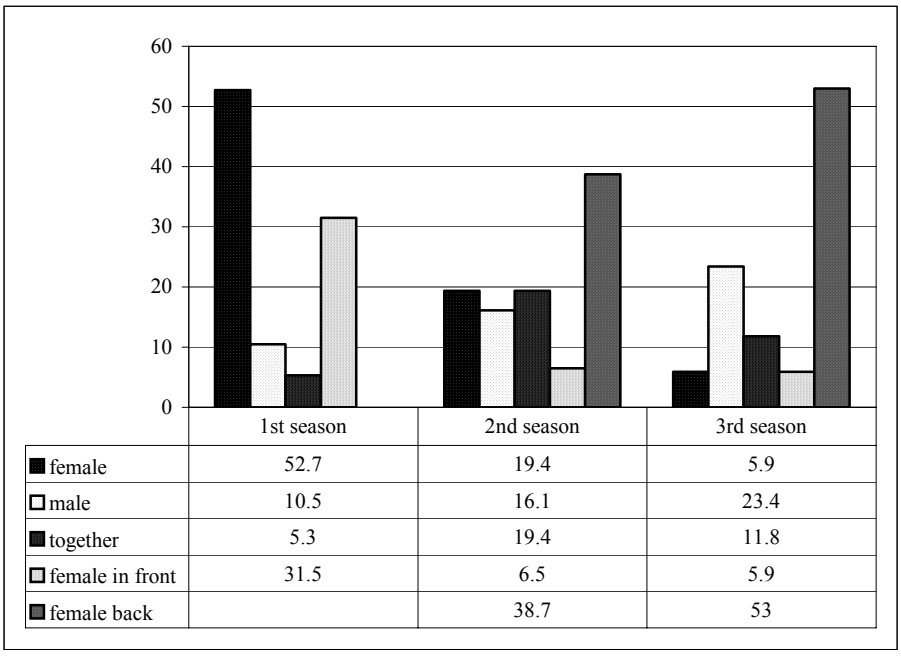

Figure 2. Percentage frequency of alarm behaviour shown by Eme, Moro and Kappa during three consecutive dry seasons: 1st season, Eme with Moro and Dago; 2nd season, Eme with Kappa and Dago; 3rd season, Eme with Kappa, Dago, Juan and Zoe. (Eme=female, Moro=first male, Kappa=second male, Dago, Juan, Zoe=cubs)

DISCUSSION

Changes in alpha couple composition of giant otter groups has never been recorded in the literature. In the present study, the alpha male disappeared and was replaced by another adult male. As the change of partner occurred in the rainy season, when field observation was not possible, it was not ascertained if the former male died or moved elsewhere or if the takeover was pacific or determined by fights. The killing of the immature infants or juveniles by conspecifics other than parents occurs in a variety of animal taxa, from invertebrates to vertebrates (EBENSPERGER, 1998). Among giant otters, however, only one case

has been documented so far, where an adult male entered the den of a different group and cannibalised a cub (MOURAO and CARVALHO, 2001). Kappa adopted Moro's cub (Dago) and bred with the female only one year later. When Kappa was first seen within the group's territory Dago was about one month old, but when the complete transition occurred Dago's exact age was not known, though it is possible that the cub's age may have played a role in its survival. Clearly, more studies are needed to clarify whether infanticide or adoption is usual among giant otters.

Defence seems to be cooperative in giant otter groups (CARTER and ROSAS, 1997). According to DUPLAIX (1980), the role of charging the intruders is usually undertaken by adult males, whereas STAIB (1995) reports two cases of alpha females guarding the group. The change reported in Eme's behaviour seems to be an adjustment to the different behaviour of the two partners, the second male (Kappa) being more aggressive than the first (Moro). The task of taking the front line during alarm behaviour might depend on several factors, not only sex but also age, experience, character of an individual, as well as group composition. Among many mammals, the frequency and intensity of maternal aggression towards intruders increases during late gestation and lactation (EBENSPERGER, 1998). During the present study, the female Eme did not demonstrate any increase in aggressiveness after the birth of the second litter.

Acknowledgements - I am in debt to the Associação Amazonia (Manaus, Brazil), GEV (Modena, Italy) and Canon for logistic and financial support. Special thanks are due to the native guides Carlos Alberto Nascimento e Alexandre Soares for their important help during the fieldwork. I also thank Fernando Rosas, Giuseppe M. Carpaneto and Gália E. de Mattos who provided critical and insightful comments on the text and data analysis.

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RÉSUMÉ

CHANGEMENT DE PARTENAIRES AU SEIN D'UN COUPLE ALPHA DE LOUTRES GEANTES

Il existe peu de données sur le comportement social de la loutre géante (*Pteronura brasiliensis*). Dans cette note, je reporte le cas d'un changement de partenaires au sein d'un couple alpha de loutres géantes, observé dans la réserve de Xixuau à Roraima, au Brésil. Le mâle du couple reproducteur disparut et fut remplacé par un autre mâle adulte, aperçu au préalable sur le territoire du groupe. Le jeune du couple alpha d'origine survécut à la transition et fut adopté par le nouveau mâle. Le groupe ainsi reformé resta stable et un an plus tard, le couple eut une portée de deux jeunes. La fréquence des réactions d'alarme fut relevé pour chaque individu et les résultats montrent que la femelle modifie son comportement en fonction de celui de son partenaire.

RESUMEN

CAMBIO EN LA COMPOSICIN DE UNA PAREJA REPRODUCTIVA DE NUTRIA GIGANTE

Muy pocos datos est n disponibles sobre los hbitos sociales de la nutria gigante (*Pteronura brasiliensis*). En esta nota se informa de un cambio en la composici n de una pareja reproductiva (alpha) observado en la Reserva Xixuau en Roraima, Brasil. El macho de la pareja alpha desapareci y fue remplazado por otro macho adulto, avistado previamente en el territorio del grupo. La cria de la pareja original sobrevivi la transici n y fue aceptada por el nuevo macho adulto; el grupo permaneci estable en su nueva forma y un a o ms tarde la pareja tuvo una camada de dos cachorros. La frecuencia de reacci n de alarma fue grabada en cada individuo y los resultados muestran una adaptacin de la hembra alpha a los diferentes comportamientos de los dos compa eros.

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Sincerely yours,

Arno Gutleb - on behalf of the editors

(Robert Dulfer, Jan Nel, Jim Conroy, Arno Gutleb)

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Koichi Kaji and Takashi Saitoh (Secretary General)
Tomoko Takahashi (Secretary)

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I am looking for examples of studies where introduced prey (non native species) has become a main component in the diet of otters? I know of the American crayfish introductions to Portugal and Spain. Does anyone else know of any previous studies elsewhere in Europe?
Grateful for any help.
Thanks
Dominic McCafferty (Univ. of Glasgow, Scotland).
D McCafferty [dmccaffe@educ.gla.ac.uk]