NOTE FROM THE EDITOR

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Dear Friends and Colleagues!

It has been quite a while since we had a second issue and during the last three years we did not have enough material to open a second edition. I hope that the fact of a second issue shows that you appreciate the new form of the electronic version and that finally this has been accepted within the "otter world". As you have seen we had a few abstracts in local languages in two articles of issue 25/1. While this will not be a regular service I am ready to include such abstracts once provided as pdf's where it seems appropriate!

While Lesley and I do our best to get your manuscripts reviewed and published as soon as possible this cannot be done if not a number of reviewers would assist us. Thanks a lot to Hermann Ansorge, Michael Belanger, Mia Bisther, Sim Broekhuizen, Paul Chanin, Will Duckworth, Daniel Gallant, Petra Hajkova, Syed Hussain, Anna Loy, Wayne Melquist, Annette Olsson, Paul Polechla, Hiroshi Sasaki, Heike Weber, and Grace Yoxon who performed reviews during the last months.

I am completely depending on the help of some persons that provide the French and Spanish abstracts of all articles and I want to express my sincere thanks to Pablo García Díaz, Nicole Duplaix, Frédéric Giraud, Rachel Kuhn, Gerard Schmidt, and Daniel Scognamillo who translated abstracts during the last months.

Thanks to Sim Broekhuizen, Pablo Garcia Diaz Andreas Kranz, Roland Melisch, Juan Pablo Gallo Reynoso, and Marcelo Rheingantz, who sent us pdf's of their article for the members-only library! We appreciate also the references that were sent to us either physically or as a link to the webpage improving the usefulness of the website.

The IUCN Otter Specialist Group Bulletin is meanwhile indexed in the Directory of Open Access Journals and you can find your articles at:
http://www.doaj.org/doaj?func=findJournals&hybrid=&query=otter

Looking forward to receive your manuscripts for issue 25/2.

With regards,

Arno

O S G G R O U P M E M B E R S N E W S

New Members of OSG

Thus far this year, we have welcomed 20 new members to the OSG: you can read more about them in the Members-Only pages.

New members during the duration of this issue:

Aad Aadrean: I am an undergraduate student of Biology Department in Andalas University, West Sumatra, Indonesia. I do my research about otter for my thesis. My research topic is "tracks and signs of otter in rice field, Padang Pariaman district, West Sumatra". It is a preliminary study on otter, thus it opens great opportunity for me to continue it in the future after finishing my bachelor degree. Furthermore, I have just received small grant from abroad organization to conduct this study.

Martín Buschiazzo: I have been researching the husbandry of *Lontra longicaudis* in zoos in Uruguay, and making recommendations for improvements where needed. I intend to evaluate the population status of this species in the east of Uruguay, and discover whether *Pteronura brasiliensis* is present. I also want ro work with rural communities and politicians to raise awareness of the otter.

Juan Carlos Botello Castillo: I have worked on the biology, ecology and behaviour of the Giant Otter, *Pteronura brasiliansis*, for many years

John Crooks: Captive Animal (non-avian) Manager for the Slimbridge site of the Wildfowl and Wetlands Trust, United Kingdom. At present the new exhibit is being developed and plans to hold a pair of otters either Eurasian or North American river, in addition to beavers, assorted aquatic mammals.

I have previously also worked with *Aonyx cinereus* (including hand-rearing, and keeping large family groups), *Lutra lutra* (incliding rehabilitation for release), *Lontra canadensis*, and caring for *Pteronura brasiliensis* during quarantine.

Jiska van Dijk: To date, I have mainly worked with wolverines in Norway, but am now taking over Thrine Heggberget's otter work following her retirement. I intend to extend the project on dead otter registration/collection toward a nationwide monitoring system, and investigate otter population trends in specific situations e.g. around fish farms, hydroelectric schemes and presence of American Mink.

David Hamilton: I have many years of zoo experience in the USA with *Lontra canadensis*, and kept the studbook for them for several years; I am now Population Manager for *L. canadensis* for the AZA Otter SSP. I am involved with the Rochester Institute of Technology River Otter Project, trying to assess the status of the reintroduced population in local watersheds. I am interested in improving captive husbandry techniques, captive population management, field techniques and reintroduction assessment.

Zuzana Kadlecikova: I am a Slovak Ph.D. student of the South-Bohemian University in Ceske Budejovice in the Czech Republic. I am in the third year of my study and otters were subject also of my diploma thesis in the Comenius University in Bratislava, Slovakia. The subject of my dissertation thesis is a quantification of damages caused by Eurasian otters in fishponds.Recently I prepared (in consultation with other Slovak specialists) a national report for the European Otter Workshop in Slovenia.

Brock McMillan: I have been working in ecology for many years, concentrating on population and community ecology of mammals and birds, wildlife habitat associations, behavioral ecology of mammals, and wildlife conservation. I have taught at several US universities, and am currently Associate Professor, Department of Plant and Wildlife Sciences, Brigham Young University (BYU)

Laurent Mercier: I am currently engaged in monitoring the otter population in Brittany following hte IUCN protocol, building artificialholts and training people in surveying for otters using otter sign, and diet analysis.

Daphne Neville: I have worked for many years as an otter presenter, with hand-reared otters, spreading the conservation message to agricultural shows, schools etc. I also work with the BBC Natural History Unit on otter-related programs.

Vic Simpson: I am a veterinary pathologist and a naturalist. My principal interest is in performing post mortem examinations on free-living wildlife in order to establish the causes of disease or mortality. I started studying otters in 1988 and have written a number of scientific papers and reports about them.

Antje Weber: I have worked on otters for many years, on otter population dynamics and ecology, and the impact of road traffic on otter mortality and mitigation of accidents.

REPORT

DISTRIBUTION OF THE EURASIAN OTTER (*Lutra lutra*) IN THE REPUBLIC OF MACEDONIA IN 2007

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(received 13th July 2008, accepted 29th October 2008)

Abstract: The distribution survey of Eurasian Otter (*Lutra lutra* L.) in the Republic of Macedonia was carried out in spring 2007 by searching for otter signs. During the survey 36 sites, spaced out over the whole territory of the country, were controlled. Totally 70% of points surveyed were positive and the majority of the country appears occupied by otter. Two bigger areas show low or no otter occurrence: the upper part of the Crna River catchment seems to be unoccupied by otter and the catchment of the Strumica River shows low site occupancy. The gaps in the occurrence of otter are probably connected with pollution – industrial (the Kriva Lakavica River) and agricultural (the Crna River, the Strumica River). Nothing can be said about population trends, because there are no historical data available.

Keywords: Eurasian otter, distribution, survey, Macedonia, Balkan

INTRODUCTION

Until 1991 the territory of the Republic of Macedonia was part of Yugoslavia and otter was assumed as widespread there (Foster-Turley et al., 1990). However, the atlas of Mammals in Europe (Mitchell-Jones et al., 1999) shows a gap in distribution respectively knowledge just in the area of the Republic of Macedonia. In 2002 Micevski and in 2003 Petkovski published a few records of otter presence in Macedonia (Figure 3). Up to now, no systematic survey was carried out. Our investigation summarises records from a trip throughout the country in spring 2007. They cast some light on the situation of otters in that country and may be useful for future surveys and conservation efforts. Moreover due to the central position of Macedonia in the Balkan Peninsula and its hydrographical properties (see below) the otter population there may play important role in connecting the Balkan populations.

STUDY AREA

The Republic of Macedonia is located in the central part of Balkan Peninsula (Figure 1), it covers about 26 000 km^2 and holds about 2,000.000 people (79 persons per km^2), a figure comparable with the population density e.g. in Austria. The west and the east of the country are mountainous whereas the rest are lowlands. The River Vardar has a catchment area, which covers about 80% of the country. It drains to the Aegean Sea in Greece. The River Cerni Drim holds 13% of the catchment areas of Macedonia. It drains from the Šara-Pindus mountain range (highest peak of 2748 m) to the Adriatic Sea in Albania. The River Strumica (catchment area 7%) is located in the south east of the country and rains to the Aegean Sea. Apart from these rivers, there are three big natural lakes (Ohrid (348 km^2), Prespa (285 km^2) and Dojran (43 km^2) and several reservoirs which might serve as otter habitat.

Figure 1: The location of the Republic of Macedonia within Europe.

METHOD

The survey was carried out in spring 2007 by searching for indirect signs of otters (tracks, spraints). Signs were searched in chosen points distributed through the country so that all main river basins were covered. The survey was conducted within the whole territory of Macedonia (Figure 2). However the density of checked points was not very high and they were not evenly distributed. Thus for example data from the downstream part of the River Crni Drim catchment are missing. Preferably points were located under bridges and no additional stretch of bank was checked. However in some areas no bridges were available, therefore approximately 600 m long stretches of bank of a water body were surveyed instead a single point. Only presence or absence of any otter sign (track or spraint) were recorded. The site was considered as a "positive" when at least a single otter sign was found and "negative when no otter sign was found.

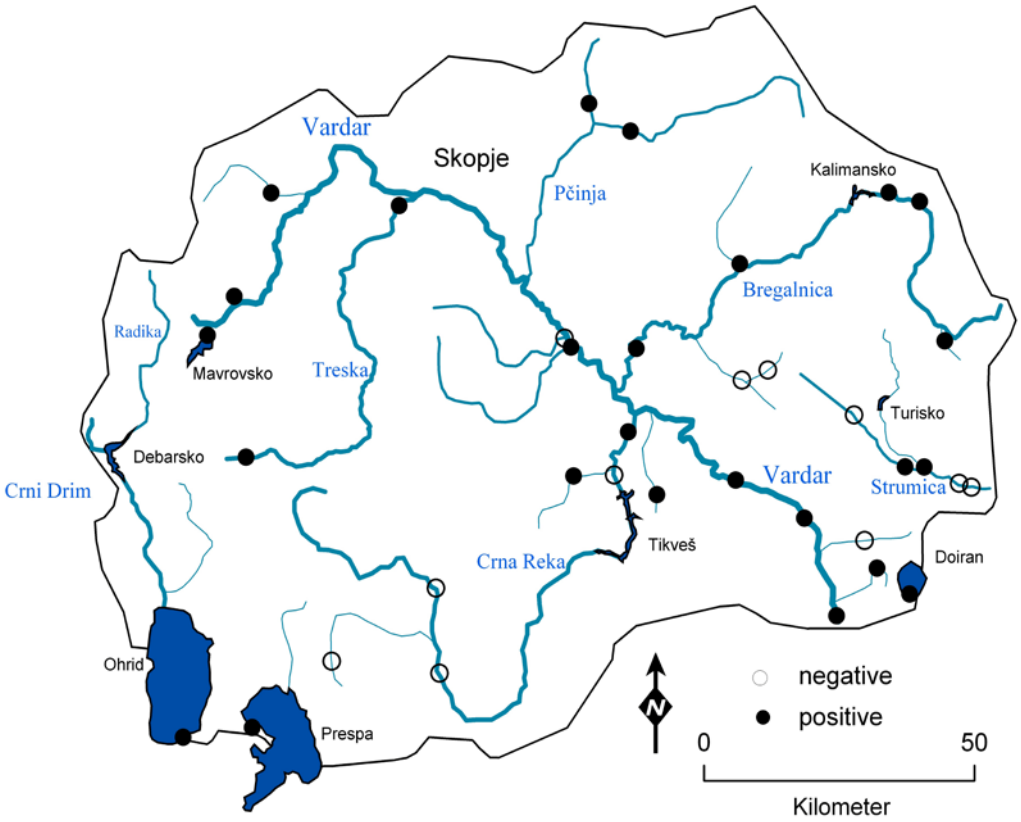

Figure 2. Result of the present otter survey in the Republic of Macedonia with marked records of otter presence or absence; yellow circle = otter positive in 2007; red circle = otter negative in 2007.

Totally 36 sites were controlled for presence of otter signs during the survey (Table 1). In total 28 suitable bridges, four rivers' stretches and four places located along the coast of large lakes were surveyed.

RESULTS

Totally 70% sites were positive and the otter occupies the vast majority of the territory of Macedonia surveyed (Figure 2, Table 1). Most of the surveyed sites were positive in the River Vardar valley (83%, n=12 points), and the sites on the main tributaries the Bregalnica River (67%, n=6), the Pčinja River (100%, n=2) and the

Treska River (100%, n=2) too. Also all three sites checked on main lakes in the Macedonia (Ohrid, Prespa, Dojran) were positive.
However two important areas have showed no or low otter site occupancy. The first area is situated in upper part of the Crna River catchment and it seems to be unoccupied by otter. However only three points were checked in a relatively big area, thus the presence of otter cannot be excluded. Low occurrence of otters has been recorded also in the catchment of the Strumica River, the possible connection to rivers in Bulgaria. Both areas are intensively used for agricultural purposes and heavy pollution of the rivers by intensive farming can explain this fact. Indeed these parts of the rivers are considered as waters that may be used in their natural condition only for irrigation purposes and, after applying common processing methods (conditioning) with industries that do not need waters of drinking quality (class III) or as waters that may be used for other purposes only after appropriate conditioning (class IV) (State of Environment Report, Republic of Macedonia 2000). Another small area unoccupied by otter was found on the Kriva Lakavica River, which is obviously connected with heavy industrial pollution of the stream from a nearby copper mine.

DISCUSSION

Otters are currently occupying most of the country, however in the south and southeast there are areas with low or no otter population.
Due to the lack of information from previous years it is not possible to infer an otter population trend in Macedonia. According to Foster-Turley (1990) otter was widespread in the former Yugoslavia. However the distribution map of Mitchell-Jones et al. (1999) shows a big gap in the knowledge of distribution just in the area of the Republic of Macedonia. In the distributional review for otter in former Yugoslavia done by Liles and Jenkins (1984) no record of otter presence for the Republic of Macedonia was mentioned. Such gap could result from no otter population or no survey. All published records summarized by Micevski (2002) and Kryštufek and Petkovski (2003) come from the areas where otters was also recorded by the present survey.
Based on the available data it is also difficult to infer about the relationship of otter population in Macedonia and in neighboring countries. There is a lack of recent information about distribution and trend of otter population not only in Macedonia, but in the whole Balkan Peninsula and older distribution data often come from different sources (surveys, questionnaires). Otters were proved as a common species in Albania, Bulgaria, Greece and former Yugoslavia, but no new publications on the species from this area could be found (summary in Ruiz-Olmo, 2007).
During a survey in Albania (Prigioni et al., 1986) otters were widespread in much of the country (55% of points were positive), and presumably healthy populations were localised in rivers and marshes in the north-west and in the south. However the authors did not survey the upper part of the River Drim catchment coming from Macedonia.
In the 1980s, western Greece was stated to hold a good otter population (Gaethlich, 1988) and otters were also widespread in the east of the country (Macdonald and Mason, 1985). A decade ago up to 72% of sites were found positive in the area of Prespa Lakes on the Greece side (Urban, 1998). However, in the middle north of Greece in Axios (Vardar) and Aliakmon catchments, the area adjacent to Macedonia, otters were scarce (Macdonald and Mason, 1985).

Table 1. Overview of point checked for presence of otter signs during the survey.

Point	UTM square	Date	Bridge/ stretch	Water body	Description	Otter sign presence
1	34TEM3		Stretch	Pčinja River	Upstream of Vojnik	Pos
2	34TEM3		Stretch	Kriva River	Close to Dimonce	Pos
3	34TEM4	27.5.2007	Stretch	Bregalnica River	Downstream of Creška	Pos
4	34TDL4	29.5.2007	Stretch	Ohrid Lake	Sveti Naum	Pos
5	34TDL4	29.5.2007	Stretch	Prespa Lake	Stenje	Pos
6	34TEL2	30.5.2007	Bridge	Šemnica River	Kažani	Neg
7	34TEL2	30.5.2007	Bridge	Crna River	Road Bitola-Novaci	Neg
8	34TEL1	30.5.2007	Bridge	Crna River	Road 106	Neg
9	34TEL3	30.5.2007	Bridge	Raec Stream	Upstream of Raec	Pos
10	34TEL3	30.5.2007	Bridge	Crna River	Vozarci	Neg
11	34TEL3	30.5.2007	Bridge	*Tributary of Vardar*	Upstream of Vataša	Pos
12	34TEL3	31.5.2007	Bridge	Crna River	Rosoman: Road 108	Pos
13	34TFL1	31.5.2007	Bridge	Bošavica River	Demir Kapija: road 103	Pos
14	34TFL1	31.5.2007	Bridge	Vardar River	Davidovo	Pos
15	34TFL1	31.5.2007	Bridge	Anska River	Road 604	Neg
16	34TFL1	1.6.2007	Stretch	Dojran Lake	Stari Dojran	Pos
17	34TFL1	1.6.2007	Bridge	*Tributary of Vardar*	Crničani: road 111	Pos
18	34TFL1	1.6.2007	Bridge	Vardar River	Gevgelija: road 111	Pos
19	34TFL3	2.6.2007	Bridge	Strumica River	Mokrino	Neg
20	34TFL3	2.6.2007	Bridge	Strumica River	Smolari	Neg
21	34TFL3	2.6.2007	Bridge	*Tributary of Strumica*	Turnovo: road M6	Pos
22	34TFL1	2.6.2007	Bridge	Strumica River	Bosilovo: road M6	Pos
23	34TFL1	2.6.2007	Bridge	Strumica River	Zleovo	Neg
24	34TFM2	2.6.2007	Bridge	Kriva Lakavica River	Goračino: road 107	Neg
25	34TFM2	2.6.2007	Bridge	*Tributary of Kriva Lakavica*	Topolnica: road M6	Neg
26	34TFM4	3.6.2007	Bridge	*Tributary of Bregalnica*	Ratevo: road 523	Pos
27	34TFM2	3.6.2007	Bridge	Bregalnica River	Delčevo	Pos
28	34TFM1	3.6.2007	Bridge	Bregalnica River	Bigla: road M5	Pos
29	34TFM2	3.6.2007	Bridge	Zletovska River	Ularci: road M5	Pos
30	34TEM4	4.6.2007	Bridge	Babuna River	Veles: road 103	Pos
31	34TEM4	4.6.2007	Stretch	Topolka River	Veles: road 103	Neg
32	34TEM2	4.6.2007	Bridge	Treska River	Glumovo	Pos
33	34TDM4	4.6.2007	Bridge	Vardar River	Gostivar: E65	Pos
34	34TDM4	4.6.2007	Stretch	Mavrov Lake	Leunovo	Pos
35	34TDL3	4.6.2007	Bridge	Treska River	Kičevo: road 416	Pos
36	34TDM4	4.6.2007	Bridge	Tetovska stream	Tetovo: road E65	Pos

In the eastern part of Bulgaria in the Struma river catchment, which is the adjacent part to Macedonia, the otter population was believed to be low or no population was recorded (Spiridonov and Spassov, 1989). This could correspond with many negative points in the Strumica River in Macedonia, which belongs to Struma river catchment. A recent survey of the otter population was done only in the middle south and southeast of Bulgaria (Georgiev 2005).

In the early 1990s, the otter population in Serbia was considered stable and otters probably occurred throughout the whole country (Paunovic and Milenkovic, 1996). However the data from areas just adjacent to Macedonia are missing. In addition, it should be kept in mind by the end of the 1990s, Serbia was in war and many factories including oil refineries were destroyed and may have caused severe water pollution with serious impacts on otters.

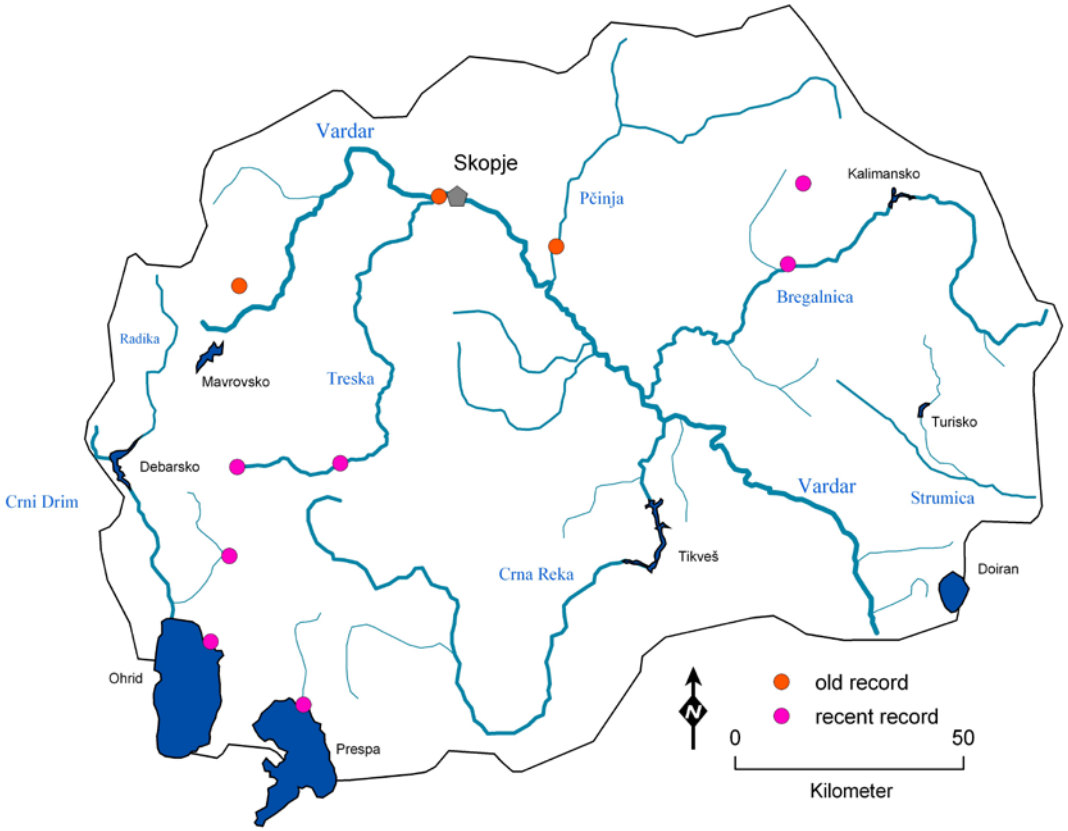

Figure 3. Summary of published records of occurrence of Eurasian otter in Macedonia; orange circle = old records (1949 up to 1990) of otter presence; pink circle = recent records (since 1990); according to Kryštufek and Petkovski 2003 and Micevski 2002.

It is clear that otter population in Macedonia has good connection to otters in Albania, part of Greece and probably Serbia. Moreover the Macedonian population can be seen as good source population for re-colonizing the lower parts of river Vardar (Axios) showing in Greece low occupancy. The most critical situation is in the east of the country, where the population on both side of the border (Macedonia, Bulgaria) is low and further decrease can lead to a fragmentation with the Bulgarian population.

Acknowledgement - We thank to Dilian Georgiev for providing us information on otter in Bulgaria and to Andreas Kranz for his valuable comments on a draft of the manuscript.

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RESUME:
RÉPARTITION DE LA LOUTRE (*Lutra lutra*) EN RÉPUBLIQUE DE MACÉDOINE EN 2007

L'enquête sur la distribution de la Loutre (*Lutra lutra* L.) en République de Macédoine a été menée au printemps 2007 grâce à la recherche de ses indices de présence. Durant l'enquête, 36 sites répartis sur l'ensemble du territoire ont été contrôlés. Au total, 70% des sites se sont avérés positifs et la majorité du pays semble occupé par la l'espèce. Deux zones importantes montrent peu ou aucun indice d'occurrence : la partie amont du bassin hydrographique de la rivière Crna paraît inoccupée et le bassin de la Strumica comporte de très rares sites occupés. Les barrières à la présence de la Loutre sont probablement dues à la pollution d'origine industrielle sur la rivière Kriva Lakavica et agricole sur les rivières Crna et Strumica. Au final, aucune tendance d'évolution de la population peut être avancée puisque aucune donnée historique n'est disponible.

RESUMEN:
DISTRIBUCIÓN DE LA NUTRIA DE RÍO EUROASIÁTICA (*Lutra lutra*) EN LA REPÚBLICA DE MACEDONIA EN EL AÑO 2007

El relevamiento de la distribución de la nutria de río euroasiática (*Lutra lutra*) en la República de Macedonia se realizó durante la primavera del año 2007 mediante la búsqueda de signos que indicaran la presencia de esta especie. Durante el relevamiento 36 sitios, espaciados en todo el territorio del país fueron relevados. Un 70 % del total de sitios relavados fueron positivos, indicando que la mayoría del país parecería estar ocupado por nutria de río. Dos áreas extensas muestran baja o no indicación de presencia de nutrias de río, la parte superior de la cuenca del Río Crna parece estar deshabitada, y la cuenca del Río Strumica muestra pocos sitios ocupados. La ausencia de nutria de río en estas áreas probablemente está conectada con polución industrial (en el Río Kriva Lakavica) y agricultura (Río Crna, Río Strumica). Nada puede decirse con respecto a las tendencias poblacionales porque no hay datos hitóricos disponibles.

SHORT NOTE

IUCN/SSC Otter Specialist Group: Otters in Captivity Task Force (OCT) – SUPPORTING QUALITY CAPTIVE OTTER CARE WORLDWIDE –

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OCT Chair
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(received 19th November 2008, accepted 25th November 2008)

Work on creating the Otters in Captivity Task Force was begun in earnest in 2007 after OSG chair Jim Conroy reiterated Claus Reuther's earlier request that the OSG look at how we could best interface with our colleagues working with otters in captive settings. I am pleased to report that this task force, known as OCT, has made some valuable progress in establishing our goals, identifying objectives, meeting some targets, and solidifying positive working relationships with otter professionals worldwide.
The OCT identified promoting worldwide communication between individuals working with otters in captivity and all other settings as the group's mission (Appendix B). The goal of our mission is to reinforce or create strong lines of communication and cooperation between all professionals working with otter species. To accomplish this we established several objectives and have begun work in several target areas.

Membership - Because facilitating communication, cooperation, research, and quality care is central to the OCT our objective is to create a truly international working group. At this time the core task force consists of eleven members representing zoos and conservation organizations from the U.S., Europe, and Australia. The OCT has an impressive international group of professionals serving as advisors, sub-group chairs, and sub-group members. We would like to include additional zoo representatives from South and Central America, Mexico, Asia, and Africa. The OCT also is looking for any field biologists interested in assisting with our mission. If you have zoo contacts or are interested in promoting quality care of captive otters and cooperative research please contact Jan Reed-Smith at lontracat@live.com. Appendix A lists OCT members, advisors, and subgroups.

Communication – As a result of OCT outreach efforts the first broad-based international captive survey is being conducted on diets fed Asian small-clawed otters. This project was developed and coordinated by Jackie Moody and others at the Marwell Zoo (England) to survey EAZA (European Association of Zoos and Aquaria) member facilities, but with the assistance of OCT it was expanded to include ARAZPA (Australasian Regional Association of Zoos and Aquaria), and AZA (Association of Zoos and Aquariums) institutions. This international effort should contribute greatly to our understanding of nutritional issues associated with this

species in captive settings. The international and regional studbook keepers for this species are both members of the OCT and we look forward to working with them to facilitate future international efforts they undertake.

Working sub-groups – The core OCT group identified a gap in the availability of quality husbandry knowledge, particularly easily accessible short documents that contain information on critical elements of captive care for each species. Because we did not want to duplicate work done by the many excellent professional zoo and aquarium organizations we first contacted these groups to obtain existing husbandry documents. Next we established small working groups tasked with creating short, 10 to 15 page documents covering critical issues, which are easier to share and translate into range country languages. The first of these, Asian small-clawed otter has been completed. One of our advisors, Scott Roberton who works in East Asia has volunteered to find translators for this document. We greatly appreciate Scott's help with this and ask anyone who may be able to help with translation to contact the OCT. At this time we have sub-groups working on giant, North American, Eurasian, and African spotted-necked otter documents targeted for completion in early 2009. Additionally we have the veterinary group led by Heike Weber, nutrition group led by Katrin Ruff, and a rehabilitation group consisting of three professionals known for their success at releasing orphaned otters back to the wild. The documents produced by the veterinary and nutrition groups will cover general information applicable to all otter species and be available on the Otter Specialist Group website along with the species care documents. The rehabilitation document will not be posted on the website but will be made available to OSG members and qualified professionals by contacting lontracat@live.com.

The future – We have several ideas we are working on for the future. These include creating a short document covering the basics of husbandry training. This will focus on training animals to willing enter crates for weighing or movement to veterinary facilities eliminating stress on the animals and staff. Additionally, we are exploring creative ways we can interface with the world's zoo organizations to promote cooperative research and the banking of tissue/blood samples for genetic work, etc. Other areas we are exploring are the creation of an online database of photos illustrating what good otter enclosures should look like, healthy captive otters, enrichment ideas, denning boxes, etc., and coordinating an international otter keeper workshop at the next International Otter Colloquium.
As communication is a key element of the OCT we invite all otter researchers to consider revitalizing the research database created several years ago by the OSG. This would provide us an excellent source of information to share with our captive institutional partners who may be interested in supporting field research and allow us to monitor ongoing projects that may match with captive institutions' conservation targets. In the latter case the OCT can then notify the researcher of potential funding opportunities they can pursue. Finally, we will continue adding to the library of husbandry and captive care resources already placed on the OSG website (library – Captive Task Force). For this effort I would like to thank Lesley Wright for her dedication and invaluable help.

In closing I encourage anyone interested in the work of the OCT to please contact me.

Appendix A

Members
Jan Reed-Smith, Chair (N. A. river otter - captive & spotted-necked otter – field); Lesley Wright (Asian small-clawed otter), Sheila Sykes-Gatz (giant otter), Heinrich Krueger (Eurasian otter), Carol Heap (Eurasian, Asian small-clawed, giant otter), Dr. Aleš Toman (Eurasian otter), Heike Weber (Eurasian otter, veterinarian), Lionel Lafontaine (Eurasian otter), Katrin Ruff (Eurasian otter, nutritionist), Lindell Andrews (Australasia Regional studbook keeper, Asian small-clawed otter), Grace Yoxon (Eurasian otter, rehabilitation, IOSF), Sarah Duncan (International studbook keeper, Asian small-clawed otter).

Advisors
Helen Bateman (reproductive physiology), Scott Roberton (field biologist, Asia), Nicole Duplaix (OSG Vice Chair, field biologist, giant otter), Helen Waldemarin (field biologist, South America), Stewart Muir (*EAZA Small Carnivore* TAG, Chair*)*, Dusty Lombardi (AZA Otter SSP, Chair), Claudia Wilson (AZA Otter SSP, Vice Chair), Sarah Duncan (International Studbook Keeper, Asian small-clawed otter), Heike Weber, DVM (EAZA Vet Advisor for *L. lutra* EEP),
George Kollias, DVM, PhD (Cornell University School of Veterinary Medicine, Seneca Park Zoo), Helénè Jacques, DVM (Eurasian otter, African otters – field), Gustavo González, Sr., DVM (La Jungla Zoo), Christine Osmann, DVM (Zoo Dortmund, giant otter), Astrid Günther-Weigl, DVM (Leibniz Institute for Zoo- and Wildlife Research (IZW) Research Group – otter vaccination speciality), Katrin Ruff , PhD, (Ökologische Bildungsstätte Oberfranken Naturschutzzentrum Wasserschloß Mitwitz e.V. – Nutrition), Mike Maslanka, MS,(Smithsonian Institution - nutrition), Geraldine Nicasio, PhD (ZOO 911, medical and nutrition consultants), Juan Sabalones, (Maryland Zoo - Water treatment and water systems), Tanya Thibodeaux, (rehabilitator), Melanie Haire,(rehabilitator and vet technician).

Sub-groups
<u>African spotted-necked otter</u> - Nerissa Foland, San Diego Zoo; Danyelle Benza, Phoenix Zoo; Ryan Sear, Omaha's Henry Doorly Zoo; Stephanie Cantabene, Monterey Bay Aquarium

<u>Asian small-clawed otter</u> - Carol Heap, Chestnut Centre; Lesley Wright, OSG; Lindell Andrews, ARAZPA, ASC regional studbook keeper and species coordinator; Sarah Duncan, AZA, ASC International studbook keeper

<u>Giant otter</u> - Sheila Sykes-Gatz , Dortmund Zoo

<u>N.A. river otter</u> - Meredith Owens, North Carolina Aquarium @ Pine Knoll Shores; Scott Shelley, Columbus Zoo and Aquarium; Victor Alm, Oakland Zoo; Brian Helton, Sedgwick County Zoo

<u>Nutrition</u> - Katrin Ruff , PhD; Mike Maslanka, MS; Geraldine Nicasio, PhD

<u>Health Care</u> - Heike Weber, DVM; George Kollias, DVM, PhD; Helénè Jacques, DVM; Gustavo González, DVM; Christine Osmann, DVM, Astrid Günther-Weigl, DVM

Rehabilitation Group - Grace Yoxon, IOSF; Melanie Haire, Zoo Atlanta; Tanya Thibodeaux, ARC Animal Rehabilitation
Appendix B

Photo: Asian small-clawed cubs
Courtesy of Zoo Atlanta

Photo: Spotted-necked otter
Courtesy of Jan Reed-Smith (RINP project)

IUCN/SSC Otter Specialist Group: Otters in Captivity Task Force (OCT)
– Supporting quality captive otter care worldwide -

OCT Mission Statement:
The IUCN/SSC Otter Specialist Group's Otters in Captivity Task Force (OCT) promotes worldwide communication between individuals working with otters in captivity and all other settings.

For captive biologists:
All institutions holding otters should support in-situ and ex-situ conservation efforts for these charismatic species. Providing financial and or technical support for these efforts is crucial as is the proper captive care of these species. The OCT recommends that all captive facilities work together to further improved care and sound breeding/contraceptive management of the world's captive otter populations, including the development of, use of, and distribution of best care practices via husbandry manuals based on captive and field study experience. We support and encourage efforts being made to advance all of these goals by professional organizations such as the African Association of Zoos and Aquaria, Australasian Association of Zoos and Aquaria, Canadian Association of Zoos and Aquariums, European Association of Zoos and Aquariums, Association of Zoos and Aquariums, and many others. Copies of current husbandry manuals are available at the OCT website,
http://www.otterspecialistgroup.org/Library.html.

For field biologists
The OCT encourages all in-situ researchers to become involved in some capacity with the zoos/aquariums working with otters in their range countries. This can take many forms including; offering technical advice regarding behaviour or habitat requirements, offering to do informative talks for employees or zoo/aquarium members, or providing informative materials for use in fund raising.

For additional information please contact: Jan Reed-Smith, Chair –
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RESUME

GROUPE LOUTRE DE L'UICN/SSC : GROUPE DE TRAVAIL SUR LES LOUTRES CAPTIVES (OCT)

Créé en 2007, le Groupe de travail sur les loutres captives (OCT) de l'UICN est une interface nouvelle entre conservateurs de loutres *in situ* et *ex situ* sur le constat d'un déficit d'échanges entre biologistes de terrain et biologistes oeuvrant en captivité. L'OCT est constitué de plusieurs sous groupes de travail à la fois pour chaque espèce mais aussi pour les thèmes suivants: soins vétérinaires, alimentation et réhabilitation.
La communication entre ces divers partenaires ainsi que leur entière coopération permet d'établir des documents de synthèse sur base d'expériences et de compétences partagées. Ainsi, un premier travail sur la nutrition d'*Aonyx cinereus* vient de paraître et d'autres devraient rapidement suivre début 2009.
Les sujets à aborder ne manquent pas: entraînement médical, établissement d'une banque de données de tissus et de sang en vue d'analyses génétiques, base de donnée photographique. Si vous souhaitez participer à l'OCT ou si vous désirez obtenir de plus amples informations, contactez Jan Reed-Smith sur lontracat@live.com

RESUMEN

UICN/CSE GRUPO DE ESPECIALISTAS EN NUTRIA DE RÍO: GRUPO DE TRABAJO PARA LA NUTRIA DE RÍO EN CAUTIVERIO (OCT POR SUS SIGLAS EN INGLES)
- EN SOPORTE DE LA CALIDAD DEL CUIDADO EN CAUTIVERIO DE LA NUTRIA DE RIO EN EL MUNDO -

Las Tareas relacionadas con la creación del Grupo de Trabajo para la Nutria de Río en Cautiverio comenzaron en el año 2007 luego de que el director del Grupo de Especialistas en Nutria de Río (OSG por sus siglas en inglés) Jim Conroy reiterara un pedido previo de Claus Reuther solicitando que la OSG encontrara formas de interactuar con colegas trabajando con nutria de río en condiciones de cautiverio. Es mi placer anunciar que este grupo de trabajo, conocido como OCT –por sus siglas en inglés- ha hecho avances importantes en el establecimiento de nuestros propósitos, ha identificado objetivos, completado algunos de ellos, y ha solidificado una relación positiva de trabajo con profesionales del área alrededor del mundo.
El OCT identificó como su misión el promover alrededor del mundo la comunicación entre individuos trabajando con nutria de río en cautiverio y en otras condiciones (Apéndice B). El propósito de nuestra misión es reforzar o crear lazos fuertes de comunicación y cooperación entre todos los profesionales trabajando con diferentes especies de nutria de río. Para alcanzar este propósito, hemos establecido varios objetivos y hemos comenzado a trabajar en varias áreas de interés.

R E P O R T

POTENTIAL CONFLICT BETWEEN FISHERMEN AND GIANT OTTERS (*Pteronura brasiliensis*) IN RESPONSE TO DECLINING STOCKS OF AROWANA FISH (*Osteoglossum bicirrhosum*) IN NORTHEASTERN PERU

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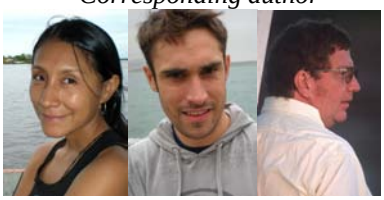

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Abstract: Giant otter (*Pteronura brasiliensis*) populations are increasing in many parts of Peruvian Amazon, and are coming into contact with people more regularly. Giant otters are piscivores and fishermen often see them as potential competitors for fish stocks. We report on giant otter-fisherman conflict on the River Yanayacu. During informal discussions, we found that fishermen considered the giant otter a competitor for fish, and one of their main concerns was for the fisheries of arowana (*Osteoglossum bicirrhosum*). This fishery, for young arowanas for sale to the ornamental fish trade, is very important for the communities in the Pacaya-Samiria National Reserve, and fishermen believe that stocks of this species are declining. Although arowana can be preyed upon by giant otter, smaller fish are preferred and there is no evidence for giant otters impacting on populations of this species. We identify a need for more research into giant otter populations, arowana populations, the exploitation of arowana, and the diet of giant otters in northeastern Peru, to support conservation initiatives aimed at changing the perception of giant otters as competitors for fish.

KEYWORDS: fishing, trade, conflict, arahuana, conservation

Giant otters (*Pteronura brasiliensis*) are increasing in number in many parts of their range and are returning to many areas where they have not been seen for many years (Recharte, 2007; Van Dame et al., 2001; Hajek and Groenendijk, 2006). This is bringing the giant otter into contact with people. While otters are not generally hunted (Recharte, 2007), their predominantly piscivore diet (Duplaix, 1980; Laidler 1984; Carter and Rosas, 1997; Gonzáles, 1997; Carrasquilla, 2002; Velasco, 2004; Staib, 2005) may bring them into conflict with fishermen. Fishing is an important subsistence and commercial activity in most parts of the giant otters range, and giant otter-fisherman conflict has been considered in Colombia by Gómez and Jorgenson (1999) and Velasco (2004), and in Brazil by Calvimontes and Marmontel (2006) and Zucco and Tomas (2004). Gómez and Jorgenson (1999) concluded that although there

is overlap in the diet of giant otters and the fish taken by fishermen, giant otters have little effect on fisheries in Colombia. Giant otter-fisherman conflict has not yet been evaluated in northeastern Peru, where extremely low populations of giant otter have meant that the issue has not been important. As giant otter populations increase and repopulate rivers near human habitation, conflict may be inevitable. This paper describes a possible conflict between fishermen harvesting ornamental arowana fish (*Osteoglossum bicirrhosum*) and giant otters observed on the Yanayacu River in the Pacaya-Samiria National Reserve (PSNR), where giant otter populations have increased between censuses by Schenck *et al*. (1996) and Isola (2000).

The Yanayacu River is 158km long and 40m wide, and joins the Marañon River about 30km upstream from the city of Nauta. The area is composed of white-water várzea forests that flood between November and May each year, leaving only high areas of ground exposed. We visited two communities on the Yanayacu. The Community of Arequipa near the mouth had 57 inhabitants in 15 families, and the community of Yarina on the middle section of the river had 118 inhabitants in 25 families. Fishing for subsistence and sale in markets, including fishing for various species of ornamental fish, is overseen by a management group; '*Organización Social de Pescadores y Pescadores Artesanales*' (OSPPA UPC Yarina). This management group is assisted by biologists from 'Pro Naturaleza', a Peruvian NGO. Some small-group tourism is also conducted in the area.

Fishermen on the Yanayacu have noted the expansion of the ranges of giant otters and are concerned about increasing competition with otters for fish. During separate informal discussions, seven fishermen expressed concern that the giant otters were competing with them for fish, and thought that the otters were reducing fish populations. Five fishermen said they believed that giant otters predated arowana fish, and were impacting on numbers of these fish. Community members said that the collection of arowana fry for sale to the ornamental fish trade was very important for them economically, and was one of the main sources of income for many families. The harvest of the young of this fish is managed by community groups in the area. However, one community member claimed that their harvest of this species had fallen from around 15,000 fry to 2,000 in recent years and thought that the increase in numbers of giant otters was one of the main factors in the reduction in size of recent harvests of arowana fry. One interviewee requested verification that the giant otters were indeed feeding on arowana from biologists, and said that a solution is necessary because the arowana fishery is of such economic importance to the communities.

Arowana are large fish growing up to 1m in length (Goulding, 1980). The male arowana broods 180-210 eggs in its mouth after spawning, and keeps the young in its mouth for several weeks after hatching (Goulding, 1980). Fishermen catch the male fish at this stage and remove the young for sale (Moreau and Coomes, 2006; Figure 1). Harvesting practices vary in different fishing grounds. In many areas the parent fish is killed in the process of harvesting the young, while on some rivers, especially within the Pacaya-Samiria National Reserve, brooding adults are released alive after the young are collected (Figure 2). This is a result of participation by local communities in projects that aim to sustainably harvest the fish (Moreau and Coomes, 2006; Durand and McCaffrey, 1999). Moreau and Coomes (2006) highlighted the importance of the trade in Arowana to the economy of Iquitos in northeastern Peru. Just over one million juvenile arowanas were legally exported in 2001 for a value of 559,615 USD. The species was the most commercially important to the Peruvian Amazon aquarium trade, representing 42% of the total export value (Moreau and Coomes, 2006). At a community level, Moreau and Coomes (2006) and Kvist et al.,

(2001) demonstrated that the arowana fishery was of considerable importance to local people, with earnings from arowana making up 20.7% of the mean household income in some communities.

Figure 1. Arowana fry being removed from an adult male, Rio Yanayacu, Pacaya Samiria National Park, Peru. Photograph: Mark Bowler

Figure 2. Adult male arowana being released after removal of fry, Rio Yanayacu. Pacaya-Samiria National Park, Peru. Photograph: Mark Bowler

There have been no extensive studies on the diet of the giant otter in northeastern Peru, but the diet of giant otters has been recorded in several other sites where arowana do not occur (e.g Schenck, 1999; Staib, 2005). Although the diet in Madre de Dios consists mainly of fish ranging from 10cm to 30cm in size, larger fish are sometimes taken (Schenck, 1999; Staib, 2005). Gómez (1999), Roopsind (2002) and Recharte (2007) recorded arowana in diet of giant otters in Colombia, Suriname and northeastern Peru respectively, but smaller fish species were generally preferred. We therefore believe that the impact of giant otters on arowana populations is likely to be negligible, and suspect that overexploitation of Arowana for the aquarium trade is more likely to be the cause if stocks of this species have declined. Arowana are large and slow to mature, and fecundity is very low (Goulding, 1980). This makes the species vulnerable to overexploitation when fishing by humans is intensive (Moreau and Coomes, 2006). The related Asian arowana (*Scleropages formosus*) was listed on Appendix I of CITES in 1975 as a result of over collection for the aquarium trade.

Our discussions on the Yanayacu suggest that otters may be blamed for falling stocks of arowana, even though there is no evidence for such a relationship. A perceived increase in giant otter populations on the Yanayacu River has coincided with a decline in the numbers of arowana harvested by some households. Considering the importance of the arowana fisheries to the people in the Pacaya-Samiria National Reserve, it is conceivable that communities may take action to protect their fisheries from the perceived threat by shooting giant otters. Better understanding of giant otter populations, arowana populations, the exploitation of arowana, and the diet of giant otters in northeastern Peru are required. A dialog with communities and fisherman is also needed to determine how attitudes to giant otters might affect their conservation. Communities on the Yanayacu River have shown a willingness to work with

biologists and may accept a scientific assessment of the giant otter's impact on the arowana fishery.

ACKNOWLEDGEMENTS - We thank The LA Zoo and Wildlife Conservation Society (WCS-Peru) who provided the financial support for the research. We also thank Pro Naturaleza, the comunities Yarina and Arequipa, Pablo Puertas (WCS-Perú), Javier Noriega Murrieta (NGO Pro Naturaleza) and Javier del Aguila (INRENA). Special thanks to our field assistants Arbildo Uraco (ORMARENA Yarina) and Orlando Laiche (OSPPA UPC Yarina).

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RESUME

RISQUE DE CONFLIT ENTRE LES PÊCHEURS ET LES LOUTRES GEANTES (*Pteronura brasiliensis*) EN RAISON DE LA REREFACTION DES RESERVES EN POISSONS AROWANA (*Osteoglossum bicirrhosum*) DANS LE NORD-EST DU PEROU

Les populations de loutres géantes (*Pteronura brasiliensis*) se développent dans de nombreuses régions d'Amazonie péruvienne et entrent de plus en plus en contact avec les populations humaines. Les loutres géantes sont piscivores et les pêcheurs voient en elles des concurrentes. Nous avons étudié les conflits entre pêcheurs et loutres géantes sur la rivière Yanayacu. Au cours de discussions informelles, nous avons réalisé que les pêcheurs considèrent la loutre géante comme un concurrent pour les poissons et en particulier pour la pêche d'arowanas (*Osteoglossum bicirrhosum*). La pêche de jeunes arowanas vendus sur le marché des poissons ornementaux est très importante pour les communautés de la Réserve Nationale de Pacaya-Samiria, et les pêcheurs pensent que les ressources de cette espèce sont en déclin. Bien que les loutres géantes puissent chasser des arowanas, elles préfèrent des poissons plus petits, et il n'existe aucune preuve d'un impact quelconque des loutres géante sur cette espèce. De plus amples recherches sur les populations de loutres géantes et d'arowanas, sur l'exploitation d'arowanas et le régime alimentaire des loutres géantes dans le nord-est du Pérou sont nécessaires pour soutenir les initiatives de conservation visant à ne plus considérer les loutres géantes comme des concurrentes.

RESUMEN

CONFLICTO ENTRE LOS PESCADORES Y LAS POBLACIONES DE LOBOS DE RIO (*Pteronura brasiliensis*) EN RESPUESTA A LA REDUCCIÓN DE STOCKS DE AROWANA (*Osteoglossum bicirrhosum*) EN EL NORESTE DE PERÚ.

Los lobos de rio (*Pteronura brasiliensis*) han aumentado en muchos lugares de la Amazonia peruana, y están entrando en contacto con la gente más frecuentemente. Esta especie es piscívora y los pescadores a menudo los ven como una competencia por los peces. En este trabajo, nosotros reportamos el conflicto de lobo de rio-pescadores en el rio Yanayacu. Durante entrevistas realizadas en el área de manejo, encontramos que los pescadores consideran a los lobos de rio como un competidor por los peces, y principalmente arahuana (*Osteoglossum bicirrhosum*). El comercio de alevinos de arahuana como pez ornamental es muy importante para las comunidades en la Reserva Nacional Pacaya-Samiria, los pescadores dicen que la población de arahuana está disminuyendo durante los últimos años. Aunque la arahuana está incluida en la dieta de lobo de rio, se observo que tiene preferencia por peces más pequeños y no hay evidencia que el lobo de rio esta impactando de forma negativa en las poblaciones de esas especies. Nosotros identificamos una necesidad de información acerca de las poblaciones de lobo de rio, poblaciones de arahuana, explotación de arahuana, dieta de lobo de rio en el noreste de Perú y los cambios de percepción de los pescadores hacia el lobo de rio como competidores por los peces para mantener las iniciativas de conservación.

R E P O R T

MORTALITY OF THE MARINE OTTER (*Lontra felina*) IN SOUTHERN PERU

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Abstract: The marine otter (*Lontra felina*) is a threatened species in Peru. Relevant data about mortality, causes of death and density of marine otter from the fishermen villages of Morro Sama and Vila-vila, located in the southern coast of Peru are reported. The main causes of death in otters were related to interaction with the local people and fishing activities. Deaths occurred mainly during winter and spring months and were more frequent in Vila-vila. The density of otters in the study area decreased between 2006 and 2008.

INTRODUCTION

The marine otter (*Lontra felina*) is an endangered species living along the coast of Perú, Chile and far south of Argentina. The species is classified as "threatened" by IUCN (Medina-Vogel, 2004) and the Peruvian government (Ministerio de Agricultura, 2004). In Peru, the species is restricted to Central Peru and Humboldtian ecoregions (Sullivan and Bustamante, 1999). The marine otter is protected in Peru only within the Reserva Nacional de Paracas, on the central coast. In addition, some coastal land owned of the Company *Proabonos S.A.* serves as haven for marine otters in Peru. In the remaining areas, marine otters are threatened by accidental capture by local fishery activity. In southern Peru marine otters are caught in demersal gillnets. Marine otters are also killed intentionally because of conflicts with fish and prawn fishermen (Chehebar, 1990).

Historically, marine otters were abundant in Paracas and Morro Sama in Peru (Brack-Egg, 1978), but more recently, the population of marine otters between Lima and Tacna was estimated to be 690 individuals (Apaza et al., 2004), while the southern coast of Peru has a local population of 88 individuals (Alfaro and Mangel, 2008). The largest population on a local level is located in Morro Sama with 8 individuals (Apaza et al., 2002). Along with Vila-vila, this is the southernmost site inhabited by *L. felina* in Peru. Here the otters live in artificial dens in docks and harbours.

The marine otter is a species with isolated distribution of small populations caused by habitat fragmentation and loss of habitat (Medina-Vogel et al., 2008). In these cases there is an increased risk of extinction by loss of heterozygosity, inbreeding and the evolutionary consequences of erosion of genetic variation (Soulé and Simberloff, 1986).

Studies on density and the causes of mortality in marine otters could be used in the estimation of population viability and to predict the effects of human impacts on the

species (Laidre et al., 2001; Redford and Richter, 1999). We report on the density and the frequency and cause of mortality, in marine otters in Morro Sama and Vila-vila, in southern Peru.

MATERIALS AND METHODS

Study Area

The study area comprises the fishing villages of Morro Sama (17°59' S 70°50' W) and Vila-vila (18°07' S 70°40' W) located in the department of Tacna, southern Peru. The port of Morro Sama was established in 1998 and has a population of two hundred fishermen. Vila-vila was recognized as a fishing village in 1970 by Peruvian government and has a current population of 350 fishermen. Morro Sama has one wave breaker and two docks and Vila-vila has one dock and two wave breakers. Small-scale fishing is the predominant activity.

Methods

Between January 2006 and November 2008, the density of otters and the number of deaths were recorded along with the causes of mortality. Information on mortality and causes of death were collected by direct observation with the use of binoculars (taking photographs when possible) and using interviews with local fishermen and workers of government agencies. During interviews, the site, number of dead otters and evidence of the report (as photo, fur or other witness) were recorded. The causes of death were classified as: entangled, poisoned, killed by dogs, and confined accidentally in boats and unknown.

Densities were estimates at both sites by conducting 2-3 censuses per month. Otters were counted by direct observation with binoculars (8x40) whilst walking a distance of 1km along the breakwater, docks and rocky seashore, following the recommendations of Medina-Vogel (2006). The duration of surveys was four hours. Observations took place during the morning (8-12 h.) or the afternoon (12-16h).

The site was divided into four areas: rocky beaches, breakwaters, sea near the docks and docks. Each area was scanned for 1 hour. In the case of observations of groups only the observation with the highest number of individuals was counted in each survey. The observation stopped when the sighted group disappeared. Altogether 51 surveys were conducted on each site. The density was estimated by calculating the mean of maximum individuals counted/km during a year for each site.

RESULTS

The mean annual observation of death otters was 5 otters in Morro Sama and Vila-vila. But the number of deaths is greater in Vila-vila. The results show a higher quantity of otters stranded, compared to otters entangled and trapped accidentally in boats (Table 1).

According to regional government workers in Vila-vila, the use of rat poison caused the death of three otters, when the harbour was cleaned from rats. Another case was a casualty caused by a dog in Morro Sama, when a pit-bull dog killed a young male otter near a den (Fig. 1).

The density estimation of otters indicates a population decreasing in Vila-vila and Morro Sama since 2006 until now (Table 2). The mean density decreased in Morro Sama from 8 otters/km in 2006 to 4 otters/km in 2008. In Vila-vila the density decreased from 6 otters/km in 2006 to 3 otters/km in 2006.

Table 1: Deaths of Marine otters in Southern Peru

Locality	Date	Cause of death	Evidence
1. Vila-vila	February 2006	Entangled	Photo
2. Vila-vila	August 2006	Confined in boat	Witness
3. Vila-vila	September 2006	Poisoned	Sample of fur
4. Vila-vila	September 2006	Poisoned	Sample of fur
5. Vila-vila	September 2006	Poisoned	Witness
6. Morro Sama	October 2006	Entangled	Witness
7. Morro Sama	November 2006	Confined in boat	Witness
8. Morro Sama	July 2007	Unknown/stranded	Witness
9. Vila-vila	October 2007	Unknown/stranded	Sample of fur
10. Vila-vila	November 2007	Unknown/stranded	Witness
11. Vila-vila	May 2008	Unknown/stranded	Witness
12. Morro Sama	June 2008	Unknown/stranded	Witness
13. Vila-vila	July 2008	Unknown/stranded	Witness
14. Morro Sama	August 2008	Killed by dog	Photo
15. Morro Sama	October 2008	Entangled	Sample of fur

DISCUSION

Deaths of marine otters by predators and disease were not studied in this work. Predators mentioned in the literature (Larivière, 1998) as *Orcinus orca* and sharks are not common near the shore in the study zone.

The cause of mortality of stranded otters is unknown. However it is likely related to the interaction with local fishing activities, since fishermen chase otters with boats. This is a common problem on the Peruvian coast and is mentioned by Valqui (2004) in their study on the interaction of marine otters with boats owners in Pucusana port, on the central coast of Peru.

Deaths of Marine otters were more frequent during winter and spring months (86%). In these months the Dolphin fish (*Coryphaena hippurus* Linnaeus 1758) and Jumbo squid (*Dosidicus gigas* D´Orbigny 1835) fisheries decreased their activity in southern Peru and many fishermen have no work. This situation could increase the human pressure on the coastal marine resources during these months. Otters can become entangled and drown in a type of gillnet called a “cortina”, with a mesh size of 3.8 cm and 14.5 cm (Fig. 2). Fishermen mention that these nets are employed to catch small quantities of fish such as: *Sciaena deliciosa, Sciaena gilberti* and *Cheilodactylus variegatus.* Recently Caceres (2008) encountered the presence of otholites of *Cheilodactylus variegatus* in 5.4% of spraint samples of *L. felina* from Vila-vila. Therefore competition for resources occurs between otters and people.

The density of otters in Morro Sama and Vila-vila declined by 50% between 2006 and 2008. Overall the current density in the study area is high when compared with densities recorded by other authors on the northern coast of Chile and central-south coast of Perú (Cabello, 1977; Ebensperger and Castilla, 1991; Apaza et al., 2004; Alfaro and Mangel, 2008) (Table 2). On the other hand, densities of marine otters in central and south Chile are higher than those recorded in this study (Castilla, 1982; Medina-Vogel, 1995; Medina-Vogel, 2006). Following to Van Horne (1983) this indicates that sites with greater densities of marine otters represent zones with better habitat quality for this species.

Fig. 1. Otter killed by dog in Morro Sama. August 2008.

Fig. 2. Death otter entangled in Vila-vila. February 2006

Table 2. Comparisons of densities of Marine otter in Peru and Chile

Locality	Density of marine otter (ind./mm)	Author
Central and southern coast of Perú*	0.53	Apaza et al., 2004
Coast of south Perú	1.6	Alfaro et al., 2008
Morro Sama and Vila-vila	3-4	This work
Punta Lobos (I Region), Chile	1.5	Castilla, 1982
Isla Pan de Azucar (III Región), Chile	2.7-4.4	Ebensperger and Castilla, 1991
Los Molles (IV Region), Chile	2.5	Castilla, 1982
Curiñanco (X Region), Chile	8.3	Medina-Vogel, 1995
Between Punta Bonifacio and Punta Chungungo, southern Chile	8.3	Medina-Vogel et al., 2006
Isla de Chiloé (X Region), Chile	10.0	Cabello, 1978

*Calculated using range of study and estimated population for this range.

CONCLUSIONS

Many deaths of marine otters in the villages of Morro Sama and Vila-vila occur as results of interaction with local people and small-scale fisheries. More deaths were recorded in the village of Vila-vila than in Morro Sama, perhaps due the differences in population densities between the areas. The density of marine otters in Vila-vila is lower than in Morro Sama, perhaps due the higher levels of disturbance by humans in the form of tourism, shellfish harvesting and fishing. Morro Sama exhibits a greater estimated density of marine otters in comparisons with other localities of Perú and northern Chile.

The possibility of the establishment of a marine protected area in Morro Sama should be considered. This is of high importance because of the still relative high density of marine otters and the overall threats for the species. Regulations on the use of “cortina” gillnets limiting their employment near the caves and dens inhabited by marine otters could reduce mortality of this Threatened/Endangered species, and prove to be a simple and effective conservation measure. Assuming the detection of den sites could be assured and the restrictions enforced.

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RESUME

LA MORTALITÉ DE LA LOUTRE MARINE DANS LE SUD DU PEROU

La loutre marine (*Lontra felina*) est une espèce menacée au Pérou. Les données relatives à la mortalité, les causes de décès ainsi que la densité de loutres marines dans les villages de pêcheurs de Morra Sama et Vila-vila situés sur la côte sud du Pérou sont rapportées. Il en résulte que la principale cause de mortalité est due aux interactions avec la population locale et la pêche. La plupart des décès se produisent au cours des mois d'hiver et du printemps et sont plus importants a Vila-vila. Enfin, la densité de loutres dans la zone étudiée a baissé entre 2006 et 2008.

RESUMEN

MORTALIDAD DE LA NUTRIA MARINA (*Lontra felina*) EN EL SUR DEL PERÚ

El chungungo (*Lontra felina*) es una especie en peligro en el Perú. El presente trabajo reporta información relevante sobre mortalidad, causas de muerte y densidad del chungungo en las caletas de Morro sama y Vila-vila, localizadas en las costas del sur de Perú. Los resultados indican que las principales causas de muerte son: interacción con la población local y con la pesca artesanal. Las muertes de nutrias ocurren principalmente durante el invierno y primavera y son mayores en caleta Vila-vila. Por ultimo, la densidad de nutrias en la zona ha disminuido en el área de estudio entre los años 2006 y 2008.

S H O R T N O T E

PREDATION OR SCAVENGING OF GIANT OTTER (*Pteronura brasiliensis*) CUBS BY LIZARDS?

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Abstract: Despite the fact that several species have been mentioned as being giant otter predators, there is no direct evidence of most of them actually preying on *P. brasiliensis*. In this study we report for the first time a lizard (*Tupinambis teguixin*), commonly known as a tegu, either preying or scavenging on a giant otter cub. We also present some interactions of free-ranging giant otters with other potential predators, showing that their interactions are not always negative.

Keywords: *Pteronura brasiliensis*, Amazon, *Tupinambis teguixin*, tegu

Natural predators of giant otters mentioned in the literature include the jaguar (*Panthera onca*), the puma (*Puma concolor*), the black caiman (*Melanosuchus niger*), the spectacled caiman (*Caiman yacare*), the anaconda (*Eunectes murinus*) and the white-lipped peccary (*Tayasssu pecari*) (Duplaix, 1980; Carter and Rosas, 1997). According to Schenck (1999), unattended giant otter cubs of a few weeks old can also be predated by ocelots (*Felis pardalis*), margays (*Felis wiedii*), jaguarondis (*Herpailurus yaguarondi*), American harpy eagles (*Harpia harpyja*), crested eagles (*Morphnus guianensis*), South American bushmasters (*Lachesis muta*), common lanceheads (*Bothrops atrox*) and collared peccaries (*Tayassu tajacu*). However, apart from a report of Brecht-Munn (1988) of black caimans attacking giant otters, there is no direct evidence reported in the literature of the other potential predators actually preying on *P. brasiliensis* while scavenging on dead bodies of any species is a common process.

During a seven-year project on giant otter biology and ecology developed in Balbina hydroelectric lake (01º55'17.3"S; 59º29'09.7"W) in the Central Brazilian Amazon, we reported only once an encounter of four adult giant otters and an adult black caiman of about 4.5 meters long. The otters were swimming upriver when they

found the black caiman partially submerged close to the river edge. The caiman tried to catch the otters, but they were very quick and managed to avoid its jaws. The giant otters then started teasing the caiman. While one otter approached the caiman from behind, the other three were swimming very close in front of it. The giant otters were acting as if it were a game. The caiman jumped toward the otters once or twice before giving up and left the water. Nevertheless, it was clear that the caiman was only trying to send the giant otters away, and not definitely acting as a predator at that moment.

On another occasion, also in Balbina hydroelectric lake, we found three newborn giant otter cubs screaming very loudly in the water, completely by themselves. They had probably rolled out of the den where they were born and fallen into the water. The three babies, still with the umbilical cord, were drowning and were barely able to keep their heads out of the water. We rescued the cubs, put them on the riverbank above the entrance of their den to dry in the sunshine, and crossed the river to the other bank before waiting to see if their family group would approach and take care of them. A few minutes later, however, we heard and observed two black caracara falcons (*Daptrius ater*) flying and crying above the young cubs. The caracaras were flying lower and lower in a threatening manner so we returned to make a hole on the bank just above the den and slipped the cubs into it to the interior of the den. Later on, the same day, the family group arrived and moved the cubs to another den. Despite the fact that the falcons did not actually attack the cubs due to our interference, it was quite clear that such young giant otter cubs are easy prey for those birds.

Cannibalism may be regarded as an extreme case of predation, and has been documented for *Pteronura brasiliensis* in the Brazilian Pantanal (Mourão and Carvalho, 2001). Agonistic behavior between different giant otter groups may, sometimes, result in the death of individuals and in these cases not only cubs, but also adults can be the victims (Schweizer, 1992; Rosas and de Mattos, 2003).

As has already been said, despite all the potential predators, there is very little direct evidence of predation on giant otters. In this paper, however, we report an unexpected case of a lizard preying on a giant otter cub, observed during a regular field trip to monitor giant otter groups and their dens in Balbina hydroelectric lake. In August 2008, during two consecutive days, an adult giant otter was seen inside a den throughout the day. Although the otter was unintentionally driven away by our nearby presence, there was always an adult otter in that den again the next day. It is well known that at least a portion if not all territory is patrolled by the giant otters each day starting shortly after dawn (Duplaix, 1980). Therefore, according to Rosas et al. (in press) the presence of an adult giant otter in the den during the day can be attributed to parental or alloparental care. However, despite spending long hours and days close to that den, not a single cub squeak was heard. Judging by the amount of new feces, tracks, humidity and trampled vegetation observed in front of the den, it was clear that the rest of the group had already left the burrow earlier in the morning. This situation was recorded during two consecutive days. Apart from the presence of an adult in the den, there were also more frequent giant otter movements in the water throughout that area than usual. As recommended by Rosas (2003), some branches were left close to the den's entrance in order to help decide if the den was in fact being used. On the third day, when we arrived in front of the same den again at 06h15am, we observed that it was still in use and all the branches placed the previous afternoon had been removed.

At 07h30am a giant otter was observed in the water, swimming towards the den without noticing our presence on the other edge of the river, where we were hidden

among the trees of the flooded forest. This otter, however, did not climb the riverbank and after a few minutes left the area. At 11h10am a giant otter was seen in the water again, in front of the den, looking at it, but once again disappeared a few minutes later. Two hours later a giant otter was observed in the water swimming towards the same den again. When this otter started to get out of the water, it was surprised by something on the riverbank in front of the den and jumped back into the water. The otter's frightened reaction was caused by a lizard, which was leaving the den carrying a giant otter cub crosswise in its mouth. The lizard, identified as *Tupinambis teguixin*, commonly known as a tegu, was about 80cm long and started eating the giant otter cub. We crossed the river to get closer and record the event better, and the lizard left the cub on the riverbank and disappeared into the forest above the giant otter den. The cub was a male giant otter in the beginning of decomposition. Its fur was already gone, the tongue was extremely swollen and the tail had already been eaten by the lizard (Fig. 1). Despite the cub's decomposition, it was possible to observe that the eyes were still closed (Fig. 1). The animal's total length was 27cm (without the tail) and the total weight was 330g. Judging by the length and weight of other giant otter cubs mentioned in the literature (McTurk and Spelman, 2005), this was probably a newborn animal, not more than two weeks old.

Figure 1. The 27cm-long male giant otter cub, which was being eaten by a tegu lizard in Balbina hydroelectric lake. Note that the tail of the cub had already been eaten by the lizard. Photo: F. Rosas.

It is quite probable that the persistent presence of an adult giant otter seen during the two days before the lizard brought out the dead cub from the den was the mother or a baby-sitter, who was uncertain of the cub's death. Despite the high temperatures of the Amazon, the state of decomposition of the cub was not extremely advanced and the cub probably died no more than three days before we started monitoring the den.

Despite reptiles having been mentioned as potential predators of giant otters (Duplaix, 1980; Schenck, 1999) or even as prey items of some other otter species (e.g. Rossi-Santos, 2007, reported a Neotropical otter *Lontra longicaudis* preying on a lizard *Tupinambis meriannae* in southern Brazil), this is the first record of a lizard either preying or scavenging on a giant otter cub. It is not clear whether the lizard only entered the den to take the cub because it was already dead, or if lizards can prey on live giant otter cubs as well if they are left unattended. Trying to solve this

question is important for the ecology of giant otters and their potential predators but also important in understanding lizard food habits.

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RESUME

DES LÉZARDS AGISSANT EN PRÉDATEURS OU CHAROGNARDS SUR DES LOUTRONS DE LOUTRES GÉANTES (*Pteronura brasiliensis*)?

Bien que plusieurs espèces soient mentionnées comme des prédatrices de loutres géantes, aucune d'entre elles n'a jamais été observée entrain d'attaquer *Pteronura brasiliensis.* Dans cette étude nous relatons pour la première fois un lézard (*Tupinambis teguixin*), plus communément appelé tégu commun, agissant en prédateur ou charognard sur des loutrons de loutre géantes. Nous présentons également quelques interactions entre des loutres géantes vagabondes et d'autres prédateurs potentiels démontrant que leurs interactions ne sont pas toujours négatives.

RESUMEN

PREDACIÓN O NECROFAGIA DE CRÍAS DE NUTRIA GIGANTE (*Pteronura brasiliensis)* POR LAGARTOS?

Se han mencionado algunas especies como posibles predadores de nutrias gigantes. Sin embargo, para la mayoría de ellas hasta el momento no existe evidencia directa de su actividad como predadores de *P. brasiliensis*. En este estudio, se reporta por primera vez al lagarto *Tupinambis teguixin,* comunmente conocido como ¨tegu¨, predando crías de nutria gigante. También se presentan algunas interacciones entre nutrias gigantes silvestres y otros predadores potenciales, mostrando que sus interacciones no siempre son negativas.

S H O R T C O M M U N I C A T I O N

PREDATION OF INVASIVE SPECIES CHINESE MITTEN CRAB (*Eriocheir sinensis*) BY EURASIAN OTTER (*Lutra lutra*) IN THE DRÖMLING NATURE RESERVE, SAXONY-ANHALT, GERMANY

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Based on a request of the IUCN Otter Specialist Group and a lot of information about predation of crabs by different otter species, the importance of accidental observation for puzzle of nutrition shall be featured.

During a preliminary study at the Midland Canal in January 2007 in the Drömling Nature Reserve (Figure 1, Figure 2), 27 sprainting sites were found along 1 km of the bank which with 74 spraints of Eurasian otters (*Lutra lutra*) containing remains of Chinese mitten crabs (*Eriocheir sinensis*).

Figure 1. Location of study area

These crabs (Fig. 2) were first brought to middle and north European coastal waters in the ballast of international shipping in 1930. Starting from the North Sea, the larvae migrate up the rivers and grow to be adults in about five years. Later, the crabs migrate back into brackish water in order to breed.

Figure 2. Chinese mitten crab (*Eriocheir sinensis*), ventral view

The Midland Canal is a European waterway, which connects the rivers Elbe and Weser (Figure 3). Several locks separate the canal from the rivers, difficult for crabs to spread past. Somehow, they found their way into the canal and reached the study area. The Drömling Nature Reserve is a cultivated wetland. Containing a large number of ditches and a lot of small bodies of water, this area is covered by the Habitats Directive, having European importance for amphibians, migrating birds, Eurasian otters and European Beavers (*Castor fiber albicus*). It is more than 150km from the coast. In winter 2007/08, an efficiency review of otter conservation measures was carried out on a 30 km length of the Midland Canal in the Drömling Nature Reserve for the "Wasserstrassen – Neubauamt Helmstedt" (Neubauamt Helmstedt Waterways Board).

It is assumed that only one or two individual otters have developed suitable hunting strategy and are able to eat the big crabs (total diameter of approximately 30 cm including legs and pincers, the carapace having a diameter of approximately 8 cm). The crabs show fast reactions and are able to defend themselves with long legs and pincers.

During the study, we specifically looked for otter spraints with remains of crabs because in January 2007, 10 spraints containing crab had already been found (Figure 4). Crab remains formed 5% to 70% per spraint in three of those samples, but were as high as 95 -100% in the remaining 7 spraints (within the ten analysed samples).

Figure 3. The area studied on the Midland Canal in the Drömling Nature Reserve

Figure 4. Spraint with remnants of crabs

In winter 2008/09, no further evidence has been found despite the focused search. It is conceivable that the "successful crab hunter" isn't here anymore, or the population of crabs is fluctuating. In autumn and winter 2005, crabs were founded in high numbers in many ditches and pre-flooders near the Midland Canal, but numbers now seem to be very low. One reason could be the predation on the crabs by carnivores and omnivores like the red fox (*Vulpes vulpes*), racoon dog (*Nyctereutes procyonoides*) or wild boar (*Sus scrofa*). Whether and how these species are able to catch crabs remains unanswered. Anglers are also known to kill the crabs and leave them on land so that otters and other animals could scavenge on them.

Generally this phenomenon opens a lot of questions and needs further attention.

RESUME

PRÉDATION DU CRABE INVASIF CHINOIS (*Eriocheir sinensis*) PAR LA LOUTRE EURASIENNE (*Lutra lutra*) DANS LA RÉSERVE NATURELLE DE DRÖMLING, SAXE-ANHALT, ALLEMAGNE

Des observations préliminaires confirmées au cours de cette étude montrent que des restes de crabes chinois (*Eriocheir sinensis*) ont été découverts dans les épreintes de loutres eurasiennes (*Lutra lutra*) en 2007; nous présentons et discutons le fait qu'aucune trace de crabes chinois n'ait été découverte lors d'études menées récemment sur des épreintes de loutres.

RESUMEN

PREDACION DE ESPECIES INVASIVAS DE CANGREGO CHINO DE LA MANOPLA (*Eriocheir sinensis*), POR NUTRIA EURASIATICA (*Lutra lutra*), EN LA RESERVA NATURAL DE DRÖMLING, SAXONY-ANHALT, GERMANY.

Observaciones que datan de 2007 de residuos de cangrejo chino de la manopla (*Eriocheir sinensis*) en las heces de nutria eurasiatica (*Lutra lutra*) es contrastada y discutida con mas recientes observaciones donde no se encuentran rastros de cangrejo en las heces de nutria.

A R T I C L E

SEASONAL VARIATION IN LATRINE SITE VISITATION AND SCENT MARKING BY NEARCTIC RIVER OTTERS (*Lontra canadensis*)

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Abstract: We combined analyses of visitation (using remote cameras) and scent marking (using traditional sign surveys) to provide a comprehensive assessment of the mechanisms underlying variation in river otter scent marking at latrine sites and to verify that river otter scent marking varies seasonally in Pennsylvania and Maryland. We observed seasonal peaks in total scent marking in the fall (September) and in the spring (March) similar to those previously reported. Group sizes of river otters visiting latrines were higher in the fall than any other season and anal sac secretions were documented only from February through mid-June. We attribute the fall peak in scent marking to family groups traveling together to latrine sites and the spring peak in scent marking to communication during the breeding season. Based on seasonal variation in the periodicity of river otter visits and seasonal variation in the intensity of scent marking, we suggest spring and fall as the most efficient seasons during which river otters could be detected using their scent marks.

Keywords: latrine, *Lontra canadensis*, remote cameras, scent marking, seasonal variation, sign surveys.
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INTRODUCTION

Nearctic river otters (*Lontra canadensis*) were extirpated from much of their native range through unregulated harvest and habitat degradation by the early 1900s (Melquist and Dronkert, 1987; Lariviere and Walton, 1998). Efforts to restore river otter populations have included reintroduction or supplementation efforts in 21 states and Alberta, Canada (Melquist et al., 2003). The resulting populations are now

established or expanding into much of the area from which river otters were extirpated (Melquist et al., 2003), creating the need for effective methods of monitoring these populations.

The secretive nature of river otters combined with ethical (Bekoff and Jamieson, 1996) and logistical considerations (i.e. relatively high cost) often limits monitoring efforts to indirect detection methods (Swimley et al., 1998). Sign surveys (i.e. visually scanning riparian areas for otter sign) have been a common method of detecting otters in North America (river otter; Mowbray et al., 1976; Melquist and Hornocker, 1979; Dubuc et al., 1990; Swimley et al., 1998; Mills, 2004) and Europe (Eurasian otter *Lutra lutra*; Jenkins and Burrows, 1980; Conroy and French, 1987; Macdonald and Mason, 1987; Kruuk et al., 1989; Delibes et al., 1991; Ruiz-Olmo and Gosálbez, 1997). River otters scent mark by depositing scat, urine, and glandular secretions at conspicuous riparian locations called latrine sites (Melquist and Hornocker, 1983; Newman and Griffin, 1994; Swimley, 1996; Swimley et al., 1998), which are thought to focus opportunities for intraspecific communication through olfaction (Melquist and Hornocker, 1983). Latrine sites, areas where river otters scent mark, are the most common and easily identified field sign of river otters and are characterized by the presence of scats, anal sac secretions, and a diagnostic, fishy odor (Mowbray et al., 1976; Swimley et al., 1998).

Seasonal variation in scent marking intensity has been reported previously for river otters, with peaks in spring (March-April) and fall (September-November) in Pennsylvania (Serfass, 1994; Mills, 2004; Stevens, 2005). Although the function of scent marking may not be the same in other species, seasonality also has been documented in the scent marking of Eurasian otters generally with a peak in winter and a low in summer (Gorman et al., 1978; Mason and Macdonald, 1986; Macdonald and Mason, 1987; Kruuk, 1992; Jahrl, 1995; Ruiz-Olmo and Gosálbez, 1997). Identifying seasons during which otters are more likely to scent mark may help improve the efficiency of monitoring efforts. Peaks in scent marking intensity have been attributed to communication of breeding condition (Eurasian otter - Gorman et al., 1978; river otter - Mills, 2004; Stevens, 2005), emergence of cubs (Eurasian otter - Macdonald and Mason, 1987; Conroy and French, 1987; Jahrl, 1995; river otter - Olson et al., 2005), signaling the use of resources (Kruuk, 1992), intra-group male communication (Eurasian otter - Durbin, 1989; river otter - Rostain et al., 2004; Ben-David et al., 2005), and male-female communication relating to reproductive condition (Eurasian otter - Gorman et al., 1978; river otter - Mills, 2004). However, the parameters underlying seasonal variation in river otter scent marking behavior are still poorly understood complicating efforts to develop efficient population monitoring techniques that use latrine sites.

Our objective was to quantify parameters associated with river otter visits to latrine sites. We were particularly interested in using remote cameras to assess variation in group sizes, times of visitation within and among seasons and temporal variation of visitation concurrently with an assessment of scent marking variation at individual latrine sites. By combining the analysis of visitation and scent marking at individual latrine sites, we provide a more comprehensive assessment of river otter scent marking behavior than has been attempted previously for wild populations.

STUDY AREA

Our study areas were located in 2 drainages, Tionesta Creek and the Youghiogheny River, both of which support populations of river otters established

through reintroductions (Mills, 2004). Tionesta Creek is located in northwestern Pennsylvania and flows generally west through the Allegheny National Forest. Tionesta Creek enters the Allegheny River at the borough of Tionesta, Forest County, approximately 85 km from its headwaters in Elk (South Branch) and McKean Counties (East Branch; Swimley, 1996). We monitored 3 latrine sites within a 13-km section along the southern bank of Tionesta Creek (41º35'N, 78º15'W), between the bridge at Kelletville and 2 km upstream of the bridge at Mayburg.

The Youghiogheny River originates in West Virginia, flows north through Garrett County, Maryland, and converges with the Monongahela River south of Pittsburgh, Pennsylvania. In Maryland, we monitored 1 latrine site along the western bank of the Youghiogheny River, situated about 1 km upstream from the bridge at the town of Sang Run (39º34'N, 79º25'W). In Pennsylvania, we monitored 4 latrine sites in a 13-km section along the southwestern bank of the Youghiogheny River in Ohiopyle State Park (39º50'N, 79º26'W), Fayette County, between the town of Ohiopyle and the mouth of Ramcat Run. The study areas are proximate to roads and accessible to humans, and, as such, could be considered typical of rural Pennsylvania and Maryland (Fig. 1).

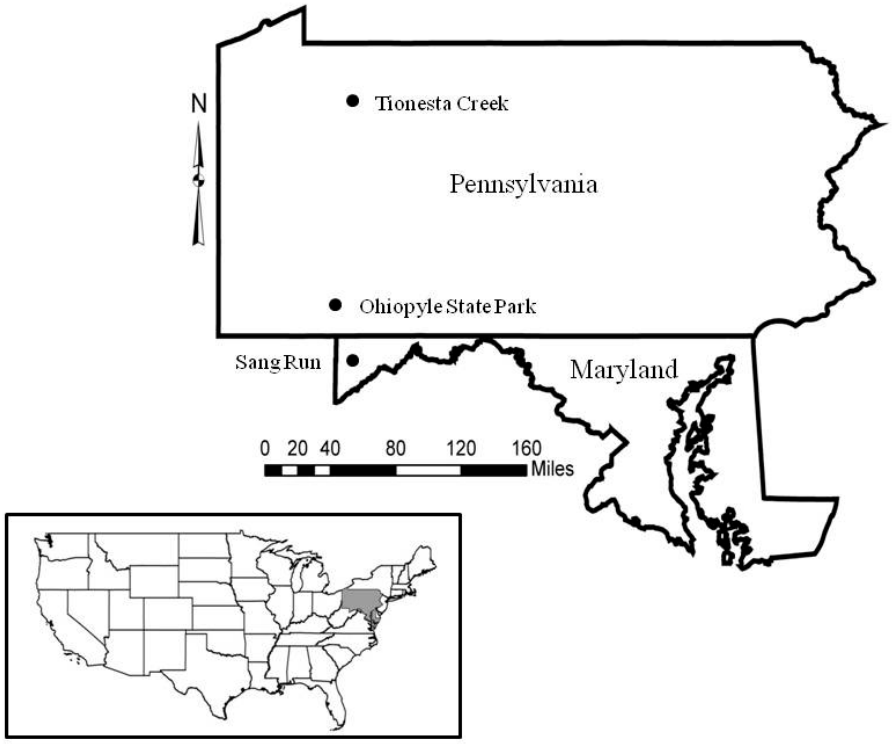

Figure 1. Location of the 3 study areas in Pennsylvania and Maryland, USA

METHODS

From 1 August 2004 through 31 August 2005, we used TrailMaster® video (TM-700V) and still (TM-500 and 550) cameras (Goodson and Associates, Lenexa, Kansas, U.S.A.) and Reconyx Silent Image™ digital cameras (Reconyx, La Crosse, Wisconsin, U.S.A.) to detect river otters visiting latrines. The cameras took a picture or recorded video when infrared sensors were "triggered" by an animal's heat and motion. An animal would continue to trigger a camera as long as it moved in front of the sensor. Therefore, we programmed the delay and sensitivity settings of each

camera system to conserve film, tape, or memory, but also to remain sensitive enough to enhance the likelihood that each river otter visit was recorded. When triggered, TrailMaster® still cameras were programmed to take a picture at a maximum rate of once per minute; Reconyx Silent Image™ cameras were programmed to record an image at a maximum rate of once every 10 sec; and TrailMaster® video cameras were set to record for 3 min, and to continue recording as long as the animal continued to re-trigger the sensor. We adopted sensitivity and delay settings for the TrailMaster® systems from Stevens (2005). We assumed that the detection of river otters was equally efficient among camera systems.

Active latrine sites were selected for monitoring during sign surveys for river otters conducted in the study areas immediately before our investigation (see Mills, 2004; Stevens, 2005). Remote cameras were checked at least bi-weekly to monitor performance, download events (TrailMaster®) or images (Reconyx™) and, if necessary, replace film or digital videotape (TrailMaster®). The latrine site, date, time, and group size of each river-otter-detection was recorded during our review of the images and videos. River otter scent marks—categorized as scats, anal sac secretions, and scats with associated anal sac secretions (secretions exuded with scat) were counted at the latrine site each time cameras were checked and were crushed by foot to eliminate recounting. Although all scent marks potentially facilitate communication among river otters, we restricted our definition to those scent marks readily detectable by the researcher in all seasons: scats and anal sac secretions.

Camera systems were in constant deployment throughout the study period. However, mechanical or human errors (see Stevens, 2005) often resulted in camera malfunctions. Therefore, we quantified functional latrine-nights (i.e. at least 1 camera was operating properly) at each latrine site by month to facilitate comparisons among latrine sites. The term "latrine-night" was used instead of camera-night because some latrines were monitored with 2 cameras. We used 2 temporal categories for comparisons: months and seasons. Seasons were defined as: spring (March, April, and May), summer (June, July, and August), fall (September, October, and November), and winter (December, January, and February). To define a "visit" by an otter or group of otters to a latrine site, we assigned 30 min as the time period after which camera detection was independent based on our observations of the average time river otters spent at latrines and to follow previous work by Stevens (2005). Thus, all detections separated by $\leq$30 min at a latrine site were classified as 1 visit. The largest number of individuals observed during a visit was assigned as that visit's group size.

Scent marking. Variation in intensity of river otter scent marking was analyzed by tabulating the numbers of scats, anal sac secretions, and scats with associated anal sac secretions by month. We used Wiens' Heterogeneity Index (Wiens, 1974) to evaluate the relative contributions of each latrine site in comparison with the total scent marks in each month and season. Higher index numbers denoted greater variation in the number of scent marks among latrine sites. Also, the number of scent marks per latrine visit was calculated by month as the sum of scent marks divided by the sum of visits in each month.

Visitation and group size. We evaluated monthly variation in the number of visits, weighted by the proportion of functional latrine-nights, using a Friedman ANOVA (Zar, 1999; STATISTICA 2004). We used Kruskal-Wallis ANOVA to determine if the median group size of river otters visiting latrine sites differed among months (Zar, 1999; STATISTICA 2004). Multiple comparisons were conducted post-hoc to evaluate pairwise differences in the ranks between months. Also, we calculated the relative frequency of visits by each group size (1, 2, and$\geq$3) within seasons.

We categorized time of visit as nocturnal, diurnal, or crepuscular. The crepuscular period was defined in all seasons as 30 min before to 30 min after both sunrise and sunset. The average daylight internal for each season was used to define the boundaries of each time category within seasons and was calculated as the average lengths of the daylight periods from the 15th day of each month in that season (http://aom.giss.nasa.gov/). We calculated the length of the nocturnal period by subtracting the average daylight hours and the 2 crepuscular hours from 24. We tabulated visits occurring in nocturnal, diurnal, and crepuscular periods by group size (1, 2, and ≥3) and season (spring, summer, fall, and winter) across the study period. We then evaluated proportional differences in the frequencies of visitation among time categories, group sizes, seasons, and the interactions of these variables using log-linear analyses (STATISTICA, 2004). Separately, we constructed a forage model (Williams and Marshall, 1938), based on selection indices (Krebs, 1998), using the proportion of 24 hr each time category comprised to determine if river otters selected nocturnal, diurnal, or crepuscular periods to visit latrine sites in each season. Data from time categories were pooled across study areas for this analysis.

Periodicity. We counted the number of daylight periods between consecutive visits to each latrine site to construct a metric called periodicity of visits; and defined it as 0 (i.e. 3 visits on the same night was 2 zeros), 1, 2, 3, etc., within seasons. The number of days from the first day in the season to the first visit as well as the number of days from the last visit to the last day of the season were included in the calculations. To characterize seasonal variation in the periodicity of visits, we calculated the average number of days between visits within each season. To assess if the frequency distribution of periodicity differed among seasons, the number of days between visits was categorized as 0, 1, 2, 3, 4, 5, 6, and ≥7 days and the resulting frequency distributions were evaluated for independence among seasons using chi-square analyses. To assess the intensity of visitation within 24 hr periods, we calculated the average number of visits for days with ≥1 visit within seasons.

RESULTS

Latrine sites were monitored for 3,127 latrine-nights. The cameras yielded 2,698 functional latrine-nights, with 429 latrine-nights lost due to camera malfunction or human error. One or more river otters were detected 500 times in 327 observed visits to latrine sites. The number of river otter detections per functional latrine-night across the study period was 0.185.

Scent marking. We documented 561 scats, 28 anal sac secretions, and 21 scats with anal sac secretions over the study period. Two peaks were observed in the number of scent marks at latrine sites: September 2004 and March 2005 (Fig. 2). Total scent marking during the March 2005 peak (n=106) was approximately 7 and 15 times greater, respectively, than during the 2 periods with the lowest levels of marking [December 2004 (n=16) and August 2005 (n=7)]. Anal sac secretions (separately or with scat) were detected only during the period February through mid-June 2005 (Fig. 2). Wiens' Heterogeneity Index ranged from 1.21 to 5.71 across months and was negatively correlated with the total number of scent marks per month, although this relationship was not significant (r=-.282, P>0.05). Seasonally, heterogeneity was higher in summer (4.23) than in fall (2.62), winter (2.71), and spring (2.21). Peaks in the total number of scent marks per visit occurred in August 2004 and July 2005 (Fig. 3).

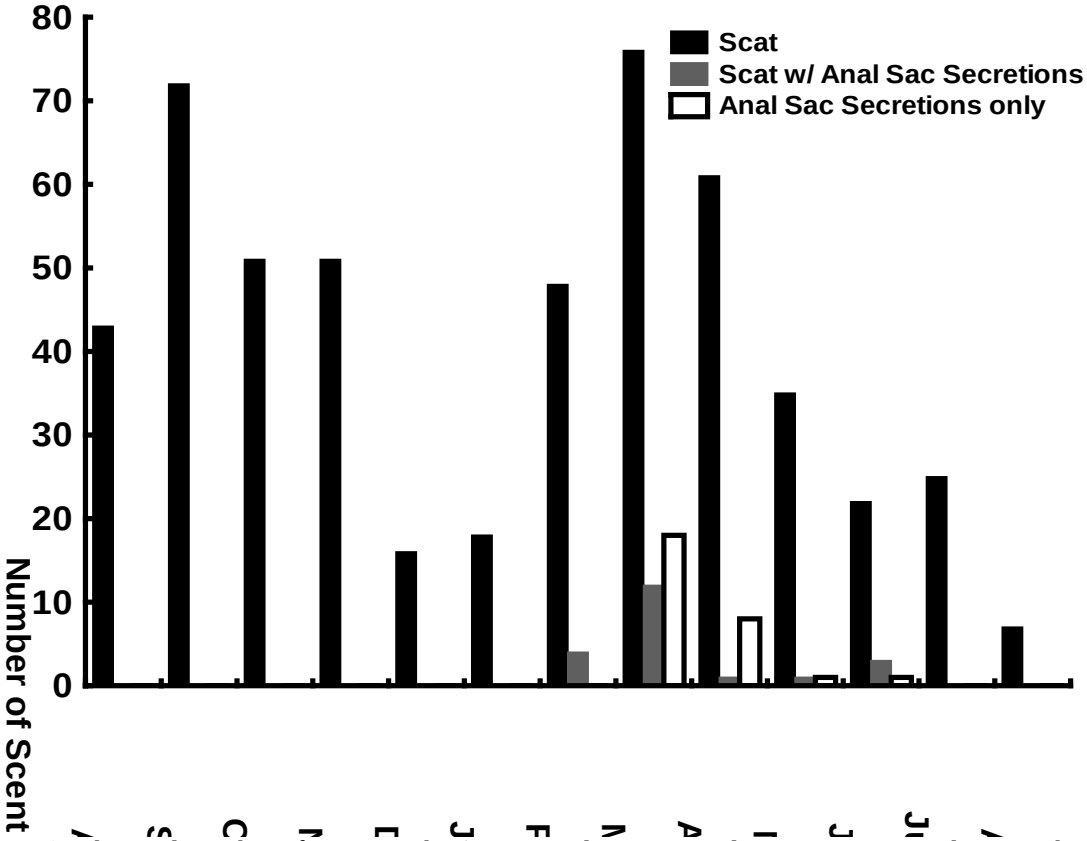

Figure 2. The total number of scent marks (categorized as scat, anal sac secretions, and scat with associated anal sac secretion) at 8 latrine sites monitored in Pennsylvania and Maryland from August 2004 through August 2005.

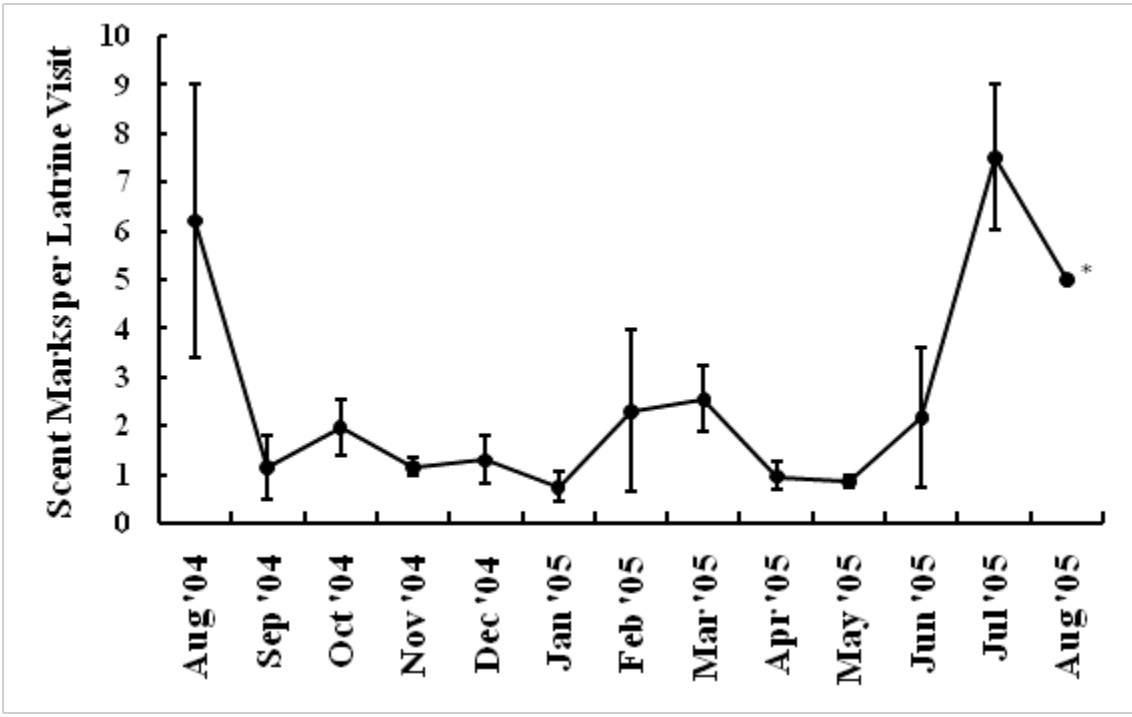

Figure 3. Mean (± SE) scent marks per latrine site visit by month pooled for 8 latrine sites in Pennsylvania and Maryland monitored with remote cameras and traditional sign surveys from August 2004 through August 2005. Lines connecting the months are provided only to aid in interpretation. Only one visit was recorded in August 2005 (*).

Visitation and group size. The number of visits based on functional latrine-nights differed by month ($P<0.001$), with a peak evident in March and April 2005. However, there was no fall peak in the number of visits to correspond with the documented fall peak in scent marking (Fig. 4). River otter group size ranged from 1 to 7 and the median group size varied by month ($P<0.001$, Fig. 5). Median group size in November 2004 was significantly higher than that of January 2005 ($P<0.05$), February 2005 ($P<0.001$), March 2005 ($P<0.001$), and April 2005 ($P<0.05$) and median group size in December 2004 was higher than that of March 2005 ($P<0.05$, Fig. 4). Groups of 2 river otters visited latrines most frequently in spring (17%, 26/154), despite most spring visits being by singles (71%, 110/154). Most latrine visits in the fall were by groups of ≥3 river otters (54%, 29/54) whereas most visits in the winter were by single otters (73%, 74/101), although groups ≥3 also were prevalent (21%, 21/101).

River otters visited latrine sites at night (n=231, 70.64%) 4 times more often than during the day (n=54, 16.51%) and 5 times more often than during crepuscular periods (n=42, 12.85%). The highest seasonal frequency of diurnal visits occurred in winter (n=21, 20.79%). Over 45% of all recorded latrine visits were single otters at night (n=148).

The most parsimonious log-linear model included the term "time of visit" and the interaction term "season × group size" (maximum likelihood $\chi^2 = 19.830$, df = 19, P=0.405). This model indicates that time of visit did not differ among seasons or group sizes and that group size varied proportionally among seasons. Based on our forage model analysis, river otters selectively visited during nocturnal periods in spring and selectively visited during nocturnal and crepuscular periods in summer, fall, and winter (Table 1). Diurnal periods were never selected (Table 1).

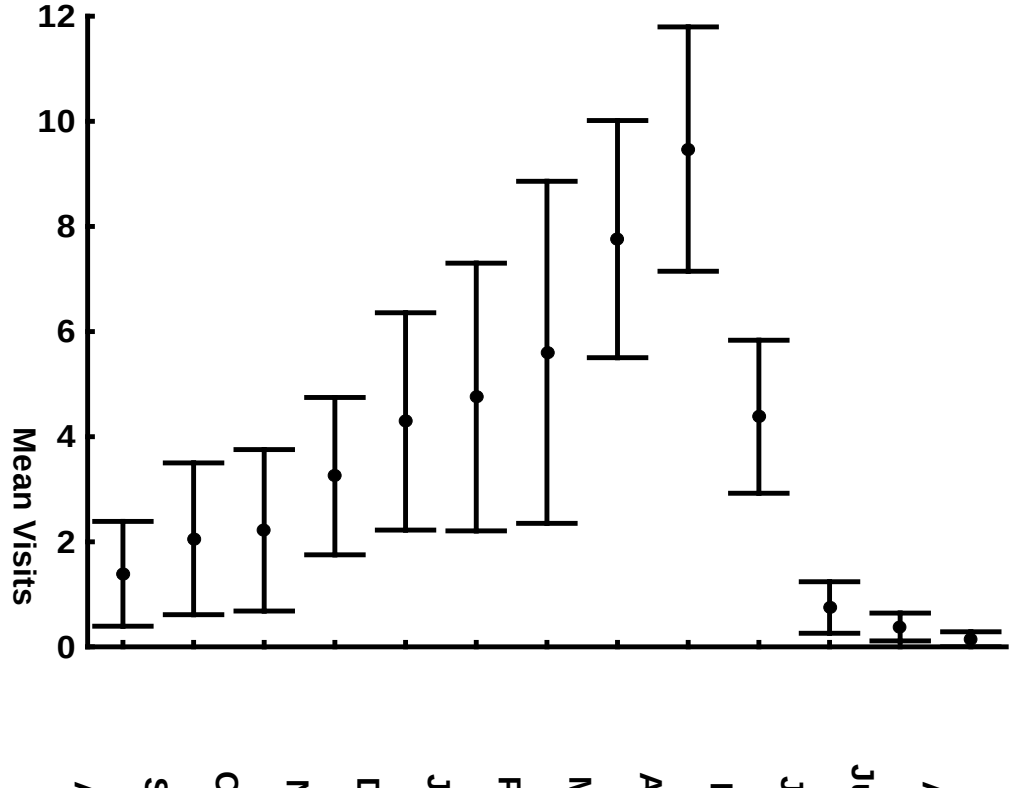

Figure 4. The monthly mean (± SE) number of river otter visits weighted by functional latrine-nights at 8 latrine sites monitored with remote cameras in Pennsylvania and Maryland. Latrine sites were monitored from August 2004 through August 2005.

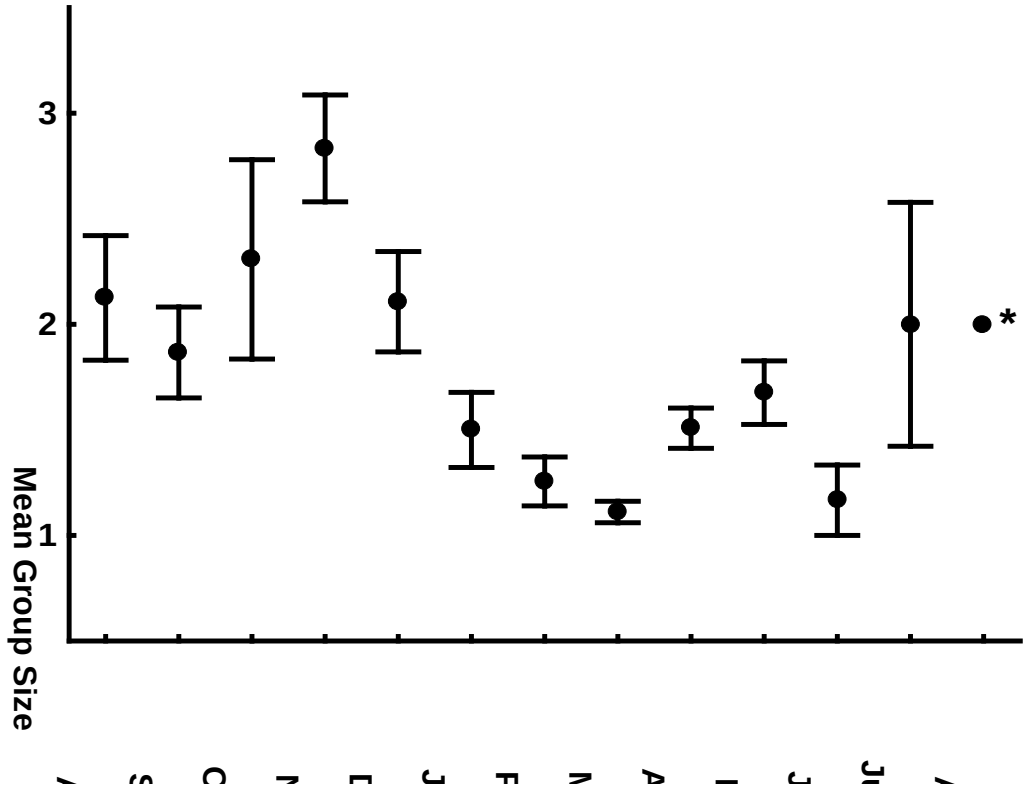

Figure 5. Mean (± SE) monthly group size of river otters visiting 8 latrine sites monitored with remote cameras in Pennsylvania and Maryland from August 2004 through August 2005. Only one visit was recorded in August 2005 (*).

Table 1. Time of visit selection indices for spring, summer, fall, and winter for river otters visiting 8 latrine sites monitored with remote cameras from August 2004 through August 2005 in Pennsylvania and Maryland. Significant selection indices are denoted by (*). Standardized selection indices indicated selection when B_i > (1/number of categories), or 0.333 in this case (bolded)

Season	Time Category	Proportion Available (p_i)	No. of river otter visits (u_i)	Proportion of visits in category (o_i)	Selection Index (w_i)	Standardized selection index[a] (B_i)
Spring	Night	0.3542	114	0.740	2.090*	**0.600**
	Day	0.5625	26	0.169	0.300	0.086
	Crepuscular	0.0833	14	0.091	1.091	0.313
	Total	1.00	154	1.00	3.48	1.00
Summer	Night	0.4921	12	0.667	1.355	**0.361**
	Day	0.4246	3	0.167	0.393	0.105
	Crepuscular	0.0833	3	0.167	2.001	**0.534**
	Total	1.00	18	1.00	3.75	1.00
Fall	Night	0.5454	41	0.759	1.392*	**0.388**
	Day	0.3713	4	0.074	0.199	0.056
	Crepuscular	0.0833	9	0.167	2.001*	**0.557**
	Total	1.00	54	1.00	3.59	1.00
Winter	Night	0.4238	64	0.634	1.495*	**0.392**
	Day	0.4929	21	0.208	0.422	0.110
	Crepuscular	0.0833	16	0.158	1.902*	**0.498**
	Total	1.00	101	1.00	3.82	1.00

Periodicity. The average number of days between visits during spring (mean±SE; 4.571±0.702) was lower than that observed during winter (6.60±1.367), fall (11.65±3.173), and summer (31.28±6.852). The frequency distributions of periodicity did not differ among seasons ($\chi^2_{0.05, 14}$=19.882, P>0.05), although summer could not be included in the analysis because of low sample size. The average number of visits for days with visit was higher in fall (1.54 ± 0.16) than in spring (1.34±0.05), summer (1.27±0.15), and winter (1.48±0.12).

DISCUSSION

We are aware of no other study concomitantly examining aspects of latrine site visitation and scent marking by river otters. Rostain et al. (2004) and Mills (2004) examined scent marking whereas Stevens and Serfass (2008) and Ben-David et al. (2005) analyzed visitation to latrines. Although the number of latrine sites we monitored was small, our study supports previous work suggesting that river otter scent marking varies seasonally in Pennsylvania and Maryland. We observed seasonal peaks in total scent marking in fall (September) and spring (March) similar to those previously reported in Pennsylvania and Maryland (Serfass, 1994; Mills, 2004; Stevens, 2005; Stevens and Serfass, 2008).

The fall and spring peaks in scent marking correspond with 2 distinct periods in the natural history of river otters: mobility of young-of-the-year juveniles and the breeding season, respectively. The fall peak in scent marking has been hypothesized to result from the highest seasonal density of marking individuals as juvenile river otters begin traveling to latrine sites with their mothers (Mills, 2004). Olson et al. (2005) supported this "traveling family" hypothesis with photographs of juveniles and an adult visiting latrine sites in the late summer and fall. A positive feedback loop (i.e. scent marking by an individual triggering scent marking by other individuals) was cited as a possible mechanism by which larger group sizes consequently resulted in more scent marks at a latrine site (Melquist and Hornocker, 1983; Olson et al., 2005). The presence of cubs also has been cited as a possible mechanism for increased scent marking observed in Europe (Macdonald and Mason, 1987; Conroy and French, 1987; Jahrl, 1995). Our results are consistent with the "traveling family" hypothesis for the fall peak in scent marking. Average group size visiting latrine sites was higher in the fall than at any other time of the year, and, despite relatively low visitation rates, the number of scent marks per month in the fall was nearly that occurring in the spring. Therefore, family groups traveling to latrine sites likely deposited more scent marks per visit resulting in the observed fall peak in scent marking.

The spring peak in scent marking, and the only period in which we encountered anal sac secretions (February–mid-June), slightly precedes and overlaps what is thought to be the breeding season for river otters in Pennsylvania and Maryland (Hamilton and Eadie, 1964; Mowbray et al., 1979; Melquist et al., 2003). Mills (2004) hypothesized that the spring peak in scent marking, and particularly anal sac secretions, serve some purpose during the breeding season. However, the actual function of anal sac secretions is unknown. The difficulty in ascribing a function to the secretions is two-fold. First, few authors have documented the occurrence or frequency of anal sac secretions during scent mark surveys. The only detailed information on this topic comes from a comprehensive study of 2 captive Eurasian otters where both sexes marked with anal sac secretions in apparent synchrony with the female's estrus cycle (Gorman et al., 1978). There have been descriptions of anal sac secretions occurring in the context of anger or fright (see Liers, 1951; Melquist

and Hornocker, 1983) and starvation (Carss and Parkinson, 1996) but nothing comparable to the Eurasian otter study has been published for river otters. Second, identifying the gender or age of the individual depositing a secretion was not possible with remote cameras. River otters were not sufficiently sexually dimorphic to differentiate genders from photographs and any disparity in length between adults and juveniles was distinguishable only from late summer through early fall. Even if individual identities could be determined from photographs, images of river otters depositing anal sac secretions were rarely obtained during our study.

Reports from radiotelemetry studies describe the generally nocturnal habits of river otters (Larson, 1983; Melquist and Hornocker, 1983; Melquist et al., 2003). Diurnal activity has been reported to increase during winter (Melquist and Hornocker, 1983; Melquist et al., 2003), in areas with little human disturbance (Melquist and Hornocker, 1983), or in restricted areas around resting sites (Larson, 1983; Woolington, 1984; Melquist et al., 2003). Our study confirms that river otters visit latrine sites most often at night; diurnal visits, although uncommon, were proportionally most frequent during winter. However, based on our forage model analysis, river otters also selectively visited during crepuscular periods in fall, winter, and spring. Crepuscular activity recently has been revealed for Eurasian otters by means of novel, in-stream infrared sensors (Garcia de Leaniz et al., 2006).

CONCLUSIONS

Identifying patterns of temporal and spatial variability in scent marking should allow researchers and managers to more efficiently conduct surveys for river otter scent marks (Kranz, 1996). Much of the research in this area has been conducted on Eurasian otter populations (see Hutchings and White, 2000; Ruiz-Olmo et al., 2001), whereas little work on the variability of scent marking in river otter populations has been reported previously. We documented substantial seasonal differences in the average number of days between visits suggesting that the effectiveness of scent mark surveys also might vary by season. Intuitively, detecting river otter presence using latrine sites would be more efficient as the intensity of visitation increases. Stevens (2005) advocated spring scent mark surveys as the most effective because visitation was highest during that season. We also documented the highest rates of visitation in the spring along with the lowest heterogeneity in scent marking among latrine sites in the spring. Although river otters visited less often and exhibited greater heterogeneity in scent marking among latrine sites in the fall than in the spring, they visited in larger groups that deposited more scent marks per visit in the fall than in the spring. Also, when river otters visited, the intensity of visitation within 24 hr was higher in the fall than during any other season. Thus, as Mills (2004) suggested, fall scent mark surveys also may be an effective means of detecting river otter presence.

Our results are ambiguous as to the efficacy of winter scent mark surveys. Both visitation and heterogeneity of scent marking in winter were intermediate to spring and fall values. However, the frequency of scent marks during winter was lower than in spring and fall. Although we did not include other forms of sign (i.e. tracks or slides in snow) in our study, aerial surveys after snowfalls have been used to efficiently document the distribution of river otters in southern Minnesota, U.S.A. (Erb and Deperno, 2001). However, Gallant et al. (2007) discovered a poor relationship between the number of latrine sites used and the number of river otters detected using winter sign surveys in New Brunswick, Canada. Alternatively, snow-tracking surveys have proven successful in Finland (Sulkava and Liukko, 2007).

Regardless, these methods require reliable snowfall and consistent snow cover (Erb and Deperno, 2001), conditions not occurring throughout the range of river otters. Finally, because of the high average number of days between visits and high heterogeneity in scent marking among latrine sites, our data suggests that scent mark surveys during the summer should be avoided.

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RESUME

Variation Saisonnière Dans L'utilisation Des Latrines Et Du Marquage Par Les Loutres De Rivière (*Lontra canadensis*)

Nous avons combiné l'étude de l'utilisation des sites (à l'aide de caméras à distance) et du marquage (à l'aide des indices habituels) pour mettre en évidence de manière claire les mécanismes qui sont à la base de la variation du marquage dans les latrines de la loutre de rivière et pour vérifier que le marquage chez cette loutre varie de manière saisonnière en Pennsylvanie et dans le Maryland. Nous avons observé des pics saisonniers de marquage en automne (septembre) et au printemps (mars) identiques à ceux déjà rapportés. La taille des groupes de loutres de rivière utilisant les latrines étaient plus importante en automne qu'en toute autre saison et les sécrétions des glandes anales n'ont été mises en évidence que de février à la mi-juin. Nous pensons que le pic automnal de marquage est le fait de groupes familiaux se déplaçant ensemble vers les latrines et que le pic de marquage printanier est dû à la communication au cours de la période de reproduction. Partant de la variation saisonnière dans la périodicité de l'utilisation des sites et de la variation saisonnière dans l'intensité du marquage, nous suggérons que le printemps et l'automne sont les deux saisons au cours desquelles les loutres de rivière peuvent être repérées par le biais de leur marquage.

RESUMEN

VARIACIÓN ESTACIONAL EN VISITAS A SITIOS DE DEPOSICIÓN Y MARCAS DE OLOR EN NUTRIAS (*Lontra canadensis*) DE RIO CERCANAS AL ARTICO

Con el objeto de proveer una explicación de los mecanismos que articulan la variación en las marcas de olor hechas por las nutrias de rio en los lugares de deposición, se utilizó el análisis de visitas (utilizando camaras remotas), así como el análisis de las marcas de olor (utilizando analizadores de rastro tradicionales). Igualmente se pretendía verificar que las marcas de olor tienen variación estacional en Pennsylvania y Maryland.

Picos estacionales fueron observados en el otoño (septiembre) y en primavera (marzo) lo cual concuerda con lo reportado previamente. El tamaño de los grupos de nutrias de rio fue mayor en el otoño comparado con cualquier otra estación; sin embargo, secreciones de los sacos anales fueron documentadas solamente entre Febrero y la mitad de Junio. Se le atribuye el pico de otoño a grupos familiares de nutrias viajando juntos a los lugares de deposición, mientras que el pico de primavera se le atribuye a la comunicación durante el período de apareamiento. Basados en la variación estacional de la periodicidad de las visitas de las nutrias de rio, así como la variación estacional en la intensidad de las marcas de olor, se sugieren las estacones de primavera y otoño como las más eficientes para la detección por sus marcas de olor de las nutrias de río.

C O N G R E S S A N N O U N C E M E N T S

ENVIRONMENTAL IMPACT ASSESSMENT AND OTTER WORKSHOP

March 7-9 2009

Cottbus, Germany

The main outputs of this workshop will be the production of a series of standards that are considered necessary to be able to determine the impacts of developments on otter populations and the success of mitigation/compensation measures deriving from those. Once formulated, these will become the official Otter Specialist Group Guidelines, and will be distributed to relevant authorities and project planers in all EU member states and other countries in Europe.
Registration is current open at the website:
http://www.alkawildlife.eu/page.php?mx=29_eia-&-otter-workshop-2009&lx=en&ft=&us=
The event is organised by ALKA WILDLIFE o.p.s., Landesumweltamt Brandenburg, University of Cottbus
For more information, please contact eia.otter@alkawildlife.eu

TAGUNG OTTER UND FISHEREI
(Otters and Fisheries Workshop)

June 25-26 2009

Wasserschloß Mitwitz, Bavaria, Germany

Sehr geehrte Damen und Herren,
Die Ökologische Bildungsstätte Oberfranken läd Sie herzlich zur Tagung "Otter & Fischerei Management von Wildtieren in den Frankenwald ein. Die Tagung wird vom 25.-26.06.2009 im Wasserschloß Mitwitz stattfinden.Wir würden uns sehr freuen, Sie begrüßen zu dürfen!
Ihre Anmeldung per email (an diese Andresse) sollte bitte folgende Angaben enthalten: Name, Institution, Adresse, Telefonnummer, email.
Die Teilnehmerzahl ist auf 90 begrenzt. Die Annahme erfolgt nach dem Eingangsdatum der Anmeldung, innerhalb einer Woche erhalten Sie von uns Bescheid.
Für Fragen und Anregungen stehen wir Ihnen gerne zur Verfügung!
Mit den besten Ottergrüßen,
ihr Tagungsteam

The Workshop will take place from 25.-26.06.2009 in Bavaria in the "Wasserschloß Mitwitz".
Various aspects of the otter - human conflict arising around fishery such as compensation, estimation of damages, different fencing systems etc. will be discussed.
Deadline for registration: 15.06.2009
Registration Fee 50,- Euro payable cash at the registration desk

For further information please contact Katrin.Ruff@oekologische-bildungsstaette.de, giving your name, institution, address, telephone number and email address:

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V I R T U A L O T T E R S

NEPAL OTTER PROJECT

http://www.ottersnepal.org./

Facts, news and updates from the Otter Research and Conservation Project in Nepal, plus some fantastic pictures of otters. This website is run by OSG member, Gandhiv Kafle.

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C A L L F O R I N F O R M A T I O N

Distance travelled by otters from river banks in Tanzania

I am studying the potential impact of hunting on clawless otters in southern Tanzania and trying to evaluate whether harvesting is sustainable. To do this I am trying to calculate a buffer along the rivers where otters are found. Not being able to verify quickly how far from the river bank an otter can go, I was wondering if I could ask your advice on this matter. Do you know how far otters can go from river banks? Many thanks in advance and I look forward to hearing from you.

Best wishes,

Daniela De Luca (ddeluca@wcs.org)