NOTE FROM THE EDITOR

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Dear Friends, Colleagues and Otter Enthusiasts!

Let me start the new issue and the New Year by wishing you all the best for 2011. Looking back on 2010 I have to say that sadly enough this year started with a tragedy, as did already 2011. The otter community has lost two young scientists and conservationists under very tragic circumstances within only 12 months. May I thank all of you who expressed their feelings to the family and friends of these two young women. Yes, we are into otters but we are also all one big family and as the group is still within reasonable sizes contacts are close and people passing are strongly missed.

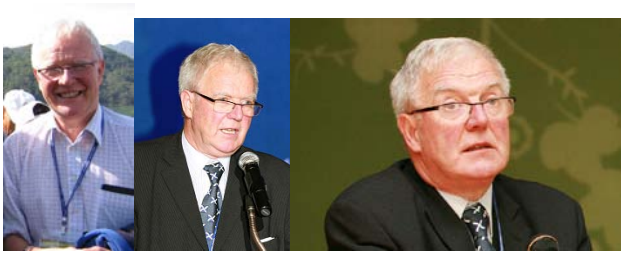
The good news is that the website for the XIth IUCN Otter Colloquium is online again and that the conference will be held in Pavia (Lombardy Region), Italy, from the 30th August to the 4th of September 2011. Please have all a look, try to arrange your travel funds, and submit your abstracts in due time. I am sure we all look forward to Italy, to good science, to good wine and food, and definitely also to meet old friends again.

We have not received any information regarding the pending decision by Thompson ISI on whether an Impact Factor will be assigned to the IUCN OSG Bull. We are under evaluation and I will inform all readers as soon as a decision will be made public. However, I can say that the IUCN OSG Bull. will very likely be soon incorporated into Scopus, the online indexing data base, which means that the peer-reviewed articles in the IUCN OSG Bull. will also account for your h-factor. Those of you working in an academic setting know how important the h-factor can be for a career and a tenured position. I see this as recognition for the quality of the articles submitted and the excellent work of the reviewers.

I cannot close my page without thanking Lesley for all her efforts to cope with this increasing flow of manuscripts, her patience with mixed up versions, performing an additional language check where necessary, finding last inconsistencies and all her work behind the scenes. Her quality control is an asset for the IUCN OSG Bull.

OBITUARY

James William Hendry "Jim" Conroy (1943 - 2011)



The world of otters has lost one of its staunchest supporters: Jim Conroy, the Chair of the Otter Specialist Group, died on March 22nd after a brave battle with cancer.

On graduating in 1966 at Aberdeen University, Jim Conroy joined British Antarctic Survey (BAS) where he undertook three tours of duty to the Antarctic. Actually only few people were aware that he had also worked in the Antarctic for 11 years studying sea birds and avoiding inquisitive leopard seals. After the years with BAS where he gained experience in both science and management he joined the Institute of Terrestrial Ecology [(ITE) - now the Centre for Ecology & Hydrology [CEH]).

Initially based at Monks Wood, he moved to Banchory, Scotland in 1980 where he began his involvement with the oil industry, which is how he became involved with otter research. His initial research on otters began in Shetland and led to more oil-orientated work with the development of contingency plans for Post Oil Spill Wildlife Rehabilitation. He gained practical experience in this being scientific advisor in the "*Braer*" oil spill. He also acted as advisor to the International Tanker Owners Pollution Federation Ltd (ITOPF), and advised them on the potential threat of the "*San Jorge*" spill on the seals of Islos de Lobos in the River Plate.

Between 1997 and 1999, he was responsible for developing the biological monitoring programme to determine the effects of the oil pipeline ruptures in northern Russia (Komi Republic). Until 2001, was Convenor of the Centre of Hydrology & Ecology Oil Network.

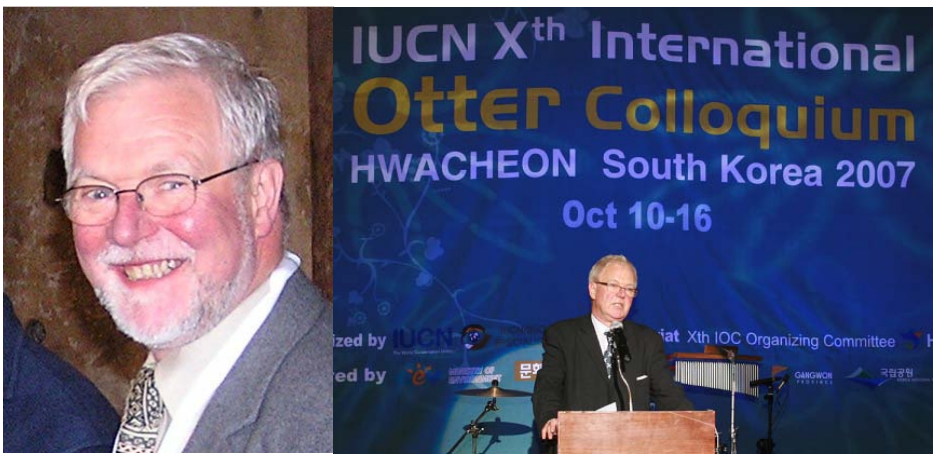
His interest in otters spread far beyond Scotland. His research projects on the species included work on pollutants, monitoring, population structure,

breeding, status, and other studies. with the International Otter Survival Fund, where he served as Scientific Advisor. Jim organized two international conferences on the Eurasian otter. In addition to the publication of over 100 papers, reports and articles on otters, Jim also edited the Proceedings of three major otter conferences.

Jim joined the Otter Specialist Group (OSG) around 1990 and became its Chair in 2005. He was delighted to expand his vision from the European otter to encompass all otter species and to plan for their conservation and survival. Jim was always willing to champion any prospective otter student or researcher.

Jim will be remembered for his enthusiasm, his keen wit and his tireless efforts behalf of otters. He will be missed!

Jim, presenting his gift to the Mayor of Hwacheon, South Korea during the opening ceremony of the Xth International Otter Colloquium.



Yes, this is the official side of Jim as we all remember him. However, personally I want to take the chance to mention a few more details, most of them of personal nature. If you would have asked me how long I knew Jim, my spontaneous answer would have been – “20 years”. When I checked it actually it were five years less, but somehow I knew Jim “forever”. We spent a very nice evening in Vienna at the “Fischerbräu”, with locally brewed beer back in January 1996 and ever since then we had lots of contacts. Jim helped me, and I know about several others from different countries, to get my “alpine” or whatever “local” English right for some papers. Jim and I once drove the way from Aberdeen to Skye, and he explained me Scottish geology, nature and history (including inside information on Whisky). I also had the honour in the last years to be one of the inner circle of “otter friends” with whom he shared his thoughts and whom he sometimes asked for backup of his ideas. It was in these years as chairman of the IUCN OSG that he saw how challenging the “human dimensions” aspect of the position were, and came to better understand and appreciate Claus Reuther (and some of the reasons behind Claus’s decision making). I had the real privilege to visit Jim and his family in early March this year and keep lots of good memories of these hours in Jims family, the hospitality of Ann and the tremendous open heartedness of his son Alasdair. I am thankful for these moments.

Arno

OBITUARY

Dorothea August (1975 - 2011)

Conservationists are deeply saddened by the sudden passing away of Dorothea August on 11 January 2011. Her tragic and unexpected death at the age of 35 following complications after a viral infection is a big shock for everyone who knew her and who had the joy to collaborate with her.

In 2004 Dorothea graduated as an engineer in land-use planning, landscape conservation, nature protection and environmental development from the University Hannover, Germany, focusing on the conservation status of the European Mink in her dissertation. Already before her studies and still afterwards she was a keen supporter of European mink and Eurasian otter conservation, with an emphasis on wetlands in the Danube Delta and also elsewhere in Eastern and South-eastern Europe.

As of early 2005 Dorothea worked for the Ramsar Secretariat to provide assistance and advice to countries in Europe. Participants to Ramsar COP9 in Uganda may remember her as a particularly helpful soul at the CoP. In 2006, she organized the successful planning meeting for the Carpathian Wetland Initiative for Ramsar. In 2007 Dorothea started to work for WWF Germany's Freshwater Department as River Basin and Water Resources Management Officer. There she worked on a number of innovative projects across Europe, focussing on sustainable wetland and resources management, water stress mitigation and spatial planning, always keeping an eye on threat mitigation and supporting habitat needs for Eurasian otters.

From her office in Frankfurt she managed a regional conservation project portfolio overseeing WWF Germany's investment in Madagascar and in the Mara river basin in East Africa. Dorothea always conducted her work in a very professional and holistic way, involving state actors as well as the local communities, the non-government sector and the scientific community. We will always remember Dorothea as a very dedicated, friendly, generous and enthusiastic person. Besides her work as a conservationist, she was committed to many other projects, including the provision of key support as founding member and liaison person to France

for the '*Youth for Dora*' association within the memorial foundation for the survivors of a WW2 concentration camp close to her home town, and her family's horticulture business.

Dorothea will be sorely missed by her family, friends and colleagues and all those who knew her.

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REPORT

PREDATION BY NEOTROPICAL OTTERS (*Lontra longicaudis*) ON TURTLES IN BELIZE

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Abstract: We report observations of turtle (*Dermatemys mawii* and *Trachemys venusta*) predation by *Lontra longicaudis* at Cox Lagoon, Belize. On 10 June 1994, we observed an otter swimming with a juvenile *D. mawii* in its jaws. During a subsequent search (25 June and 5 July 1994) we found 35 *D. mawii* shells or partially eaten carcasses, and a single, partially eaten adult *T. venusta* that had apparently been killed by otters. Based on the size of these turtles, juvenile and subadult *D. mawii* seem most vulnerable to otter predation. Because otter predation of *D. mawii* appears rare in Belize, and most reproductively mature *D. mawii* are probably too large to be caught and killed by foraging otters, we do not consider predation by *L. longicaudis* to be a serious threat to populations of this critically endangered turtle.

Keywords: Cheloniaphagy, *Dermatemys mawii*, diet, endangered species, foraging behaviour, *Trachemys venusta.*

The neotropical otter (*Lontra longicaudis*) ranges from northwestern Mexico, south to Uruguay, Paraguay, and northern Argentina (Larivière, 1999), but many aspects of its natural history, including diet remain poorly studied (Pardini, 1998; Spínola and Vaughan, 1995). Neotropical otters are considered opportunistic predators (Helder and de Andrade, 1997; but see Pardini, 1998), and the diet consists

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largely of fish and crustaceans, although mollusks, insects, amphibians, reptiles, birds, and small mammals are also consumed (Alarcon and Simões-Lopes, 2004; Carvalho-Junior et al., 2010; Colares and Waldemarin, 2000; Gallo, 1986; Helder and de Andrade, 1997; Larivière, 1999; MacDonald and Mason, 1992; Pardini, 1998; Passamani and Camargo, 1995; Spínola and Vaughan, 1995). Here we report observations of predation by *L. longicaudis* on Central American river turtles (*Dermatemys mawii*) and a neotropical slider (*Trachemys venusta*) at Cox Lagoon in Belize, Central America.

Cox Lagoon (17°29′N; 88°31′W) is a freshwater wetland in the Belize River drainage, approximately 45 km west of Belize City (Figure 1). The lagoon, a 5 km extension of Cox Creek, is surrounded by swamp forest and open marsh (Hunt et al., 1994; Platt, 1996). Water depth varies depending on season, ranging from <1m during the dry season (December-May) to >3 m in the wet season (June-November). Cox Lagoon is described in greater detail elsewhere (Hunt et al., 1994; Platt, 1996).

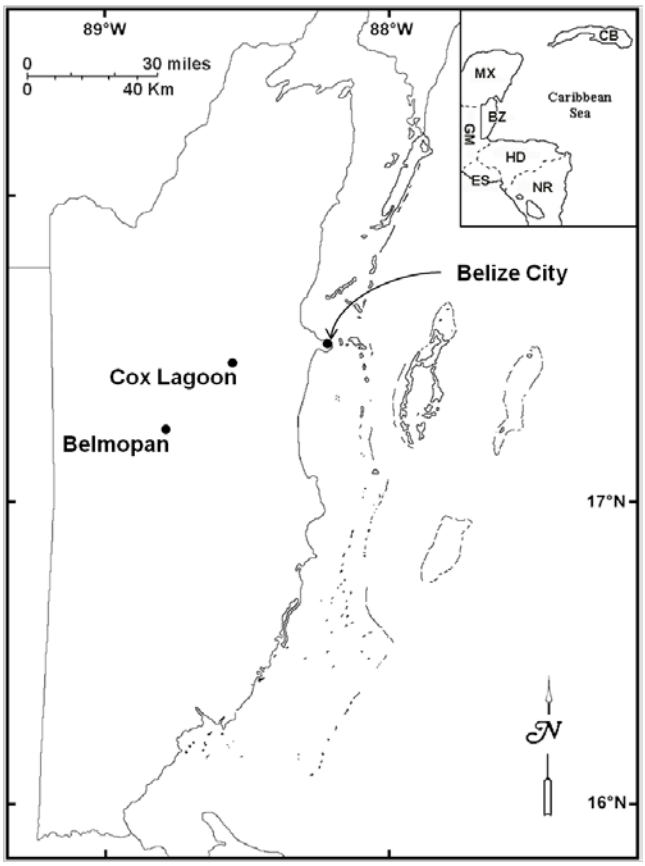

Figure 1. Map of Belize showing approximate location of Cox Lagoon.

On 10 June 1994 (18h06min), while paddling a canoe along the shoreline of Cox Lagoon we observed an otter enter the water holding a juvenile *D. mawii* in its jaws. Upon our approach, the otter swam a short distance before submerging with the turtle still gripped in its jaws. Subsequent to this observation we found shells or partially eaten carcasses of 35 *D. mawii* while searching (25 June and 5 July 1994) for Morelet's crocodile (*Crocodylus moreletii*) nests at Cox Lagoon (Platt, 1996; Platt et al., 2008). The turtle remains were found both on the bank and in adjacent shallow water. Freshly killed turtles (n = 4) were typically missing the head, one or more limbs, and often the tail; older, empty shells (n = 31) exhibited scratch and bite marks on the plastron and carapace. The mean (±1SD) straight-line carapace length (CL;

measured with tree calipers) of these shells was 263 ± 50 mm (range = 100 to 347 mm). Male and female *D. mawii* become sexually mature at carapace lengths of 328 and 342 mm, respectively (Polisar, 1996); therefore, the size of the shells we recovered suggests that otters were consuming primarily large juveniles and subadults (Figure 2). We were unable to determine the sex of the predated *D. mawii* because males and females can only be distinguished by relative tail length and head coloration (Ernst and Barbour, 1989). In addition to *D. mawii* remains, we found the partially eaten carcass of an adult female *T. venusta* (CL = 290 mm) in the same area.

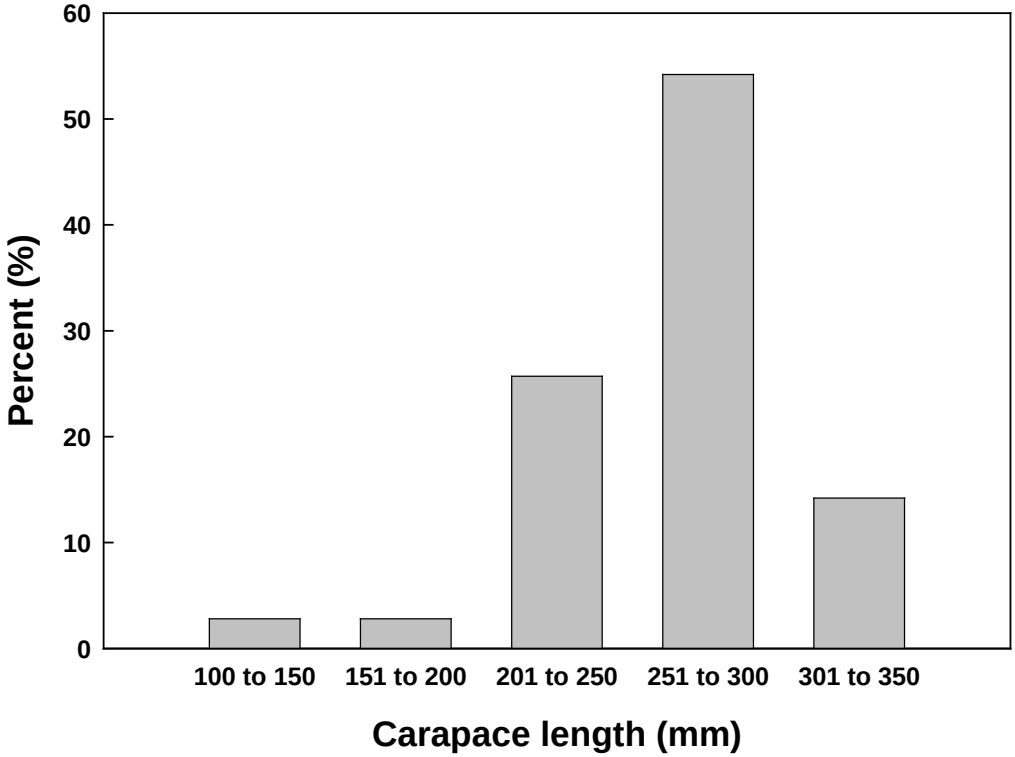

Figure 2. Size distribution of *Dermatemys mawii* (*n* = 35) killed by *Lontra longicaudis* at Cox Lagoon, Belize.

Several lines of evidence strongly suggest predation of these turtles by *L. longicaudis*. First, otter tracks and spraints were common along the shoreline, and fresh otter tracks were associated with two carcasses and two shells. Second, the bite marks and missing appendages that we noted among *D. mawii* remains are consistent with other reports of otter predation on turtles. When feeding on turtles, otters typically consume the head, legs, and often the entrails, while leaving the shell intact (Brooks et al., 1991; Lanszki et al., 2006; Liers, 1951; Ligon and Reasor, 2007; Noordhuis, 2002; Park, 1971; Stophlet, 1947). Other potential turtle predators known to occur at Cox Lagoon include jaguars (*Panthera onca*), *Crocodylus moreletii*, and raccoons (*Procyon lotor*). Jaguars break open the carapace and remove the body (Emmons, 1989), and crocodilians first crush and then swallow the pulverized carcass (McIlhenny, 1935); in contrast to otters, neither predator leaves behind intact shells after feeding on turtles. Raccoons kill and consume turtles in a manner similar to otters, but generally capture turtles on land, with nesting females being particularly vulnerable (Zeveloff, 2002). Because *D. mawii* are highly aquatic and even nest underwater (Polisar, 1996), raccoon predation of these turtles is undoubtedly rare.

Our observations constitute the first specific report of predation by *L. longicaudis* on *D. mawii* and *T. venusta*, although a general account by Alvarez del Toro et al. (1979) states that *D. mawii* "sometimes falls prey to otters" (presumably *L. longicaudis*). Moreover, to our knowledge, turtles have not been previously reported in any dietary study of *L. longicaudis*. While otter predation of turtles is unusual even when turtles are abundant in otter habitat (Toweill and Tabor, 1982), episodic attacks on several species have been reported (Ultsch, 2006), although factors affecting this behaviour remain poorly understood (Lanszki et al., 2006). Otters (*Lontra canadensis* and *Lutra lutra*) occasionally prey on lethargic, over-wintering turtles (Brooks et al., 1991; Lanszki et al., 2006; Liers, 1951; Park, 1971; Ultsch, 2006), but predation on active turtles during warmer months also occurs (Crane and Parnell, 2010; Ligon and Reasor, 2007; Stophlet, 1947). Lanszki et al. (2006) suggested that otters prey on turtles when the availability of their preferred food (fish and frogs) is limited. Because turtle carcasses contain higher levels of crude protein than fish or frogs, and fat content is similar to frogs, cheloniaphagy can yield significant nutritional rewards to otters (Lanszki et al., 2006).

It remains unclear to what extent predation by *L. longicaudis* affects populations of *D. mawii*, which is classified as Critically Endangered on the IUCN Red List (IUCN, 2009) due to continuing over-exploitation for meat and eggs (Polisar, 1994). Turtles are long-lived organisms characterized by a unique suite of coevolved life history traits that include low survivorship of eggs, hatchlings, and juveniles, delayed sexual maturity, and high survivorship among subadults and adults (Congdon et al., 1993). Consequently, turtle populations are demographically sensitive to any increase in mortality among the larger size classes, especially reproductive adults (Brooks et al., 1991; Congdon et al., 1993). Given the depressed status of *D. mawii* populations throughout Belize (Moll, 1986; Polisar, 1997; Rainwater et al., 2010), otter predation is a potential concern in the conservation of this endangered turtle. That said, it should be noted that predation of *D. mawii* seems largely confined to juveniles and subadults; demographically important reproductively mature adults (CL to 650 mm; Ernst and Barbour, 1989) are probably too large to be caught and killed by foraging otters. Moreover, predation of *D. mawii* by *L. longicaudis* appears to be extremely rare; during fieldwork from 1992 to 1998 in wetlands throughout Belize (Platt et al., 2008; Platt and Thorbjarnarson, 2000), Cox Lagoon was the only site where we found evidence of otters consuming turtles. Spraints collected elsewhere in Belize suggest that *L. longicaudis* consumes primarily fish and crustaceans (Platt and Rainwater, unpubl. data) as reported in other dietary studies. For these reasons we do not regard otter predation as a serious conservation threat to *D. mawii* populations.

Acknowledgements – Support for SGP was provided by the Wildlife Conservation Society. TRR was supported by Texas Tech University and an ARCS Foundation (Lubbock, Texas Chapter) scholarship. Additional support was generously provided by Richard and Carol Foster, Monkey Bay Wildlife Sanctuary, Cheers Restaurant, and Robert Noonan (Gold Button Ranch). The field assistance of Lewis Medlock, Travis Crabtree, and Steve Lawson was most appreciated. Research permits were issued by Raphael Manzanero and Emile Cano of the Conservation Division, Forest Department, Belmopan, Belize. Comments from Lewis Medlock improved an early draft of this manuscript. We thank Helene Volkoff, Rick Villareal, and an anonymous reviewer for translation of our abstract into French and Spanish.

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RÉSUMÉ

PREDATION DES LOUTRES NEOTROPICALES (*Lontra longicaudis*) SUR LES TORTUES A BELIZE

Nous rapportons ici des observations sur la prédation de tortues (*Dermatemys mawii* et *Trachemys venusta*) par *Lutra longicaudis* à Cox Lgon, Belize. Le 10 juin 1994, nous avons observé une loutre qui nageait en tenant une *D. mawii* juvenile entre ses machoires. Au cours des recherches qui ont suivi (25 juin et 5 juillet 1994), nous avons trouvé 35 carapaces ou carcasses partiellement mangées de *D. mawii* ainsi qu'un seul adulte de *T. venusta* partiellement mangé et apparemment attaqué par des loutres. Vu la taille de ces tortues, il semble que les juveniles et subadultes de *D. mawii* sont les plus vulnérables à la prédation par les loutres. Etant donné que la prédation sur *D. mawii* semble rare à Belize et que la plupart des individus *D. mawii* sexuellement matures sont probablement trop grands pour etre attrapés et tués par des loutres, nous estimons que la prédation par *L. longicaudus* ne représente pas une menace sérieuse pour la population de cette espèce de tortue en danger critique d'extinction.

RESUMEN

DEPREDACIÓN DE TORTUGAS POR NUTRIAS NEOTROPICALES (*Lontra longicaudis*) EN BELICE

Reportamos observaciones de depredación de tortugas (*Dermatemys mawii* y *Trachemys venusta*) por *Lontra longicaudis* en la Laguna Cox, Belice. El 10 de Junio de 1994 observamos una nutria nadando, con un individuo juvenil de *D. mawii* en sus mandíbulas. Durante búsquedas subsecuentes (25 de Junio y 5 de Julio de 1994) encontramos 35 conchas o cadáveres parcialmente consumidos de *D. mawii* y un adulto parcialmente comido de *T. venusta*, que aparentemente habían sido matados por nutrias. De acuerdo al tamaño de estas tortugas, los juveniles y subadultos de *D. mawii* parecen ser los más vulnerables a la depredación por las nutrias. Debido a que la depredación de *D mawii* por nutrias es rara en Belice, y a que la mayoría de los individuos reproductivamente maduros de *D. mawii* son, probablemente, demasiado grandes para ser atrapados y matados por las nutrias, no consideramos que la depredación por *L. longicaudis* constituya una amenaza grave para esta tortuga, que se encuentra en peligro crítico.

R E P O R T

A REVIEW OF VIOLENT OR FATAL OTTER ATTACKS

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ABSTRACT: In general, the public view of otters is often described as playful, curious and that they are not known for aggressive towards humans. As well, otter attacks seem to be under reported both in the anecdotal reports or scientific publications. In light of recent otter attacks in Florida, we reviewed all evidence of otter attacks on humans for any geographical and temporal relationships from the earliest (1875) to the most recent (Dec 2010). There was a total 39 anecdotal articles and 4 scientific publications found dealing with violent human-otter interaction (bites, attacks, deaths). The majority of attacks dealt with the North American otter (*Lontra canadensis* - 77%) and geographically occurred most often in Florida (38%). The greatest number of attacks occurred from 1990 to 2009 (51%). Within the 39 documented anecdotal reports of otter attacks, rabies was confirmed in 24 to 66% of the cases. Otters are known to be very territorial in nature and in North America, have had increases in population numbers. In certain areas where otters occur naturally (Florida), there has been a huge surge of human expansion, which has encroached upon the otter's natural habitat. This encroachment into the otter's habitat may be one reason for the recent increases of otter attacks upon humans.

Keywords: Interactions, humans, bites, geographical, temporal

INTRODUCTION

To the public, otters are often thought of in non-threatening terms. Words such as 'cute, playful, and intelligent' are often used to describe most species of otters (Figure 1) (Chapman and Feldhamer, 1982). The video "Otters holding hands" shown on YouTube had over 15 million views and was featured worldwide. However, what is largely forgotten is that otters are indeed wild animals and are capable of attack for numerous reasons.

In general, animal attacks go largely are unreported. Goldstein (1992) estimated that bite wounds made up ~1% of all American emergency room visits, and that ~80% of all bite wounds were minor enough that their victims did not obtain medical treatment. Additionally, the majority of animal attacks were from domestic animals,

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making it unsurprising that few studies have investigated the incidence of wild animal attacks (Freer, 2004).

Figure 1. River otter (*Lontra canadensis*)

Otters can be found worldwide, except in Australia and Antarctica (Potter et al., 2007). After a decline in numbers, otters are now experiencing a stable or growing population (Baitchman and Kollias, 2000; Kimber and Kollias, 2000; Potter et al., 2007). In light of increased populations as well as recent otter attacks in Florida, this paper will review violent human-otter interactions for geographical or temporal effects.

METHODOLOGY

Various sources of information were scanned to obtain any references in regards to otter-human interactions that resulted in some type of attack such as biting, clawing, chasing, etc. The following sources were examined for any information dealing with otter-human interactions:

1) To locate anecdotal articles, an internet search was performed using the terms “otter attack or bite” on Google.com’s news archives. No time line limitations were imposed on the search. Repeat articles on the same attack were ignored or noted and combined into one “case”. Attacks on domestic animals (dogs) were included if they were with and defended by the owner.

2) Websites of various specialized otter groups such as the International Union for the Conservation of Nature (Otter Specialist Group), Friends of the Otter and International Otter Survival Fund were also viewed for any data or information dealing with otter-human interactions.

3) A literature review was performed using PubMed and Ontario Scholar's Portal. The search terms "otter attack or bite", "human-otter interaction", and "otter and aggression" were used.

4) Archives of Master or PhD theses such as Library and Archives Canada website (www.collectionscanada.gc.ca) or the British Library Thesis Service (http://ethos.bl.uk) were searched for any references to otters, humans, attacks, bites, etc.

RESULTS

Anecdotal

A total of 39 instances of wild otter attacks were found in news articles (Table 1) with almost all of these involving the river otter (*Lontra canadensis*). Within these cases, the number of victims for each otter interaction ranged from 1 to 12 individuals. The age of victims ranged from an infant to a 96-year-old. Injuries ranged from a nip on the finger to deep gashes with some requiring as many as 200 stitches. Rabies was confirmed in 24 to 66% of the cases.

Incidents of otter attacks were found as far back as 1875, however only four cases were pre-1980's. News articles were found only from Canada and the United States and the majority of attacks (38.5%) took place in the state of Florida. From 1980 to 1989, 2 of the 3 (66 %) otter attacks occurred within Florida. From 1990 to 1999, 13 attacks took place worldwide with 6 (46%) occurring within Florida. From 2000 to 2009, 17 attacks took place worldwide with 5 (29%) within Florida. As of December 20, 2010, only 2 attacks had taken place within that year with both occurring in Florida.

Most anecdotal attacks usually deal with wild river otters and a human who was either swimming in a pond or lake or walking along river. In some cases, the attacks commenced with a wild river otter attacking a pet (usually a dog or dogs) with the owners being attacked as they try to defend their pets. In a rare case, an elderly 96-year-old man was attacked while walking in his neighborhood, which had a lake nearby. During this attack, the otter also managed to bite 2 other individuals who had come to assist the man.

Scientific

There were a total of 4 publications found in the scientific literature (Table 2). Potter et al. (2007) published the results of a single wild otter attacking a family of 4 while they were swimming in a river. They were medically treated for numerous bites and scratches and released. In 2010, Zelepsky and Harrison published the results of a survey on bite protocols in American zoos where the river otter was mentioned (no specific details described) as the species involved in biting visitors or staff members. There were 2 papers that mentioned attacks outside of North America. In India, an attack by Smooth Indian otters (*Lutra perspicillata*) upon a fisherman was mentioned in a field study. The fisherman had trapped a cub in his net and a group of otters gathered and attacked with the result that he died from scratches and bites (Nagulu, 1992). The other attack reported by McTurk and Spelman (2005) was located in South America and dealt with a wild giant otter (*Pteronura brasiliensis*) seriously injuring a young woman (no details given).

Table 1. Anecdotal reports of otter attacks (time and geographical locations)

Time	n of cases	Locations	Rabies (% of cases)
Pre-1980 (1875 – 1979)	4	2 Ontario 1 Alabama 1 Washington	1 Ontario (25%)
1980-1989	3	2 Florida 1 Vermont	2 Florida (66%)
1990 – 1999	13	6 Florida 1 each in California, Iowa, Montana, New Hampshire, Oregon, Virginia, Washington	5 Florida 1 Virginia (46%)
2000 – 2009	17	5 Florida 3 British Columbia 2 California 1 each in Georgia, Massachusetts, Montana, New Hampshire, New York, Virginia, Wisconsin	2 Florida 1 Massachusetts 1 New York (24%)
2010	2	2 Florida	1 Florida (50%)
TOTALS	**39**	**15** in Florida	**14 (36%)**

Table 2. Summary of scientific publications reporting otter attacks (n of people involved and geographical location)

Time	n of people involved	Locations
1985- 2002	1 (attack)	Guyana, South America
1992	1 (death)	Tungabhadra, India
2004	1 report (3 individuals)	California
2002-2007	Unknown	from various U.S. Zoos

DISCUSSION

Animal attacks take place worldwide with the majority of victims never seeking any medical attention (Griego et al., 1995). Therefore, it is not unexpected that since 1875, there have been only 39 news articles and 4 scientific studies published that focused on otter attacks suggesting that there seems to be a lack of research in this area of animal bites or attacks on humans. Looking at the topic of otter attacks geographically the vast majority of cases reported in this paper have occurred within North America (Canada and the United States) and thus may be due to under reporting from other countries of these attacks.

Aggression in otters has been documented towards humans and other species as well. When accompanied by pups, female otters tend to avoid male otters, but display aggressive behavior and may fight when confronted (Chapman and Feldhamer, 1982; Shannon, 1989; Kruuk, 2006). Protection of the pups is necessary, as infanticide has been documented (Simpson and Coxon, 2000; Mourão and Carvalho, 2001). Territoriality was suggested as a reason for attacks in a number of newspaper articles, as well as the attack upon a human as reported by Potter et al. (2007).

After suffering from population decline, otters have been at the center of several reintroduction efforts (Baitchman and Kollias, 2000). This has led to an increasing or stabilization of otter populations in the majority of American states and most

Canadian provinces (except for Prince Edward Island) (Kimber and Kollias, 2000). At the same time, human populations in several of the above mentioned regions have been rising dramatically. This can lead to the encroachment of humans onto otter territory, which may offer one possible reason for increased attacks. This may be particularly important in Florida where human populations have grown 16% from 2000 to 2009, compared to the average increase of only 9.1% for the United States in general (Florida QuickFacts, 2010). This may be one possible reason why the majority of attacks found in this paper have occurred in Florida.

In general otters avoid areas of human activity (Potter et al., 2007). However when they do come in contact with humans, the result is not always violent. If left alone, even when living in close proximity to humans, otters have shown indifference to people (Shannon, 1989; Lacomba et al., 2001). Encroachment of human populations into otter territory, as well as the preferred avoidance of humans, should be taken into consideration for future studies on otter habitat requirements, reintroduction programs of otters and any closer human-otter interactions.

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RÉSUMÉ

BILAN DES ATTAQUES VIOLENTES ET MORTELLES DE LOUTRES

En général, les loutres sont souvent décrites comme joueuses ou curieuses de la part du public mais ne sont pas réputées pour être agressives envers l'homme. En outre, les attaques de loutres semblent être sous-évaluées à la fois dans les rapports d'anecdotes ou les publications scientifiques. Suite aux récentes attaques de loutres en Floride, nous avons compilé toutes les preuves d'attaques sur l'homme et analysé les variations spatio-temporelles de la plus ancienne (1875) à la plus récente (décembre 2010). Nous avons découvert 39 anecdotes et 4 publications scientifiques traitant d'interactions violentes entre homme et loutre (morsures, attaques, décès). La majorité des attaques est attribuée à la Loutre du Canada (*Lontra canadensis* - 77%) qui surviennent le plus souvent en Floride (38%). Le plus grand nombre d'attaques s'est produit entre 1990 et 2009 (51%). Pour les 39 anecdotes documentées, 24 cas de rage ont été confirmés. Les loutres sont connues pour être très territoriales et en Amérique du Nord leurs populations ont augmenté en effectifs. Dans certaines régions où les loutres sont naturellement présentes (Floride), l'expansion humaine peut être importante et galopante empiétant ainsi sur l'habitat naturel des loutres. Cette intrusion dans l'habitat de l'animal peut être une des raisons de l'augmentation récente des attaques sur l'homme dans cette région.

RESUMEN

REVISIÓN DE ATAQUES VIOLENTOS O FATALES CAUSADOS POR NUTRIAS

En general, en la vision del público sobre las nutrias, ellas son comunmente descritas como jugetonas, curiosas pero no son conocidas como agresivas hacia los humanos. Entre tanto, ataques causados por nutrias parecieran no ser documentados ni mediante reportes anecdóticos, ni en la literatura científica. En vista de recientes ataques causados por nutrias en Florida, hemos revisado la evidencia sobre estos ataques sobre humanos, incluyento el más antiguo documentado (1875) hasta el más reciente (Dec 2010), en busca de alguna relación geográfica o temporal. Un total de 39 reportes anecdóticos y cuatro artículos científicos fueron encontrados en relación a interacciones violentas entre humanos y nutrias (mordidas, ataques o decesos). La mayoría de los ataques se encontraron en relacion con la Nutria de Norte América (*Lontra canadensis* - 77%) y geograficamente occurieron principalmente en Florida (38%). El mayór número de ataques ocurrieron desde 1990 hasta 2009 (51%). De entre los 39 reportes anecdóticos documentados, rabia fue confirmada en 24 y hasta 36% de los casos. Las nutrias son conocidas por ser the naturaleza territorial y en Norte América, la población se ha incrementado. En ciertas áreas donde las nutrias ocurren naturalmente (Florida), ha habido una oleada de expansión humana la cual ha incursionado dentro del habitat natural de la nutria. Esta invasión puede ser una de las razones para el incremento del ataque de nutrias sobre humanos en Florida en años recientes.

S H O R T N O T E

THE USE OF ARTIFICIAL LAKES ON GOLF COURSES AS FEEDING AREAS BY THE OTTER (*Lutra lutra*) IN SOUTHERN SPAIN

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ABSTRACT: During the spring and summer of 2010 evidence was found that otters were using artificial lakes on golf courses in southern Spain as feeding areas. The remains of carp and turtles eaten by the otters were found. The presence of these otters may be influences by distances to and connections with natural habitats of the species. The use of these lakes as a potential feeding area is occurring at a time when there is a great deal of environmental stress in the Mediterranean region.

Keywords: golf courses, Mediterranean habitats, environmental stress, feeding areas, feeding remnants, Eurasian otter

The Eurasian otter *Lutra lutra* (Linnaeus, 1758) is found in a wide variety of aquatic ecosystems from the saltwater of the coastal regions to high altitude of mountain regions (Ruiz-Olmo, 2007). Although lotic freshwater rivers and the pools of other natural aquatic ecosystems are their usual natural habitat, otters have been found in other human-dominated environments. These habitats, which are seemingly less suitable, range from canals and irrigation ditches (Ruiz-Olmo et al., 2005), to areas that are artificial wetlands and urban parks (Sanz, 2009).

It has been suggested that the otter makes temporary use of places where food can be easily found. This is the case for dams and similar areas where more food can be obtained than in stressed rivers and streams (Pedroso et al., 2007). They also make use of pools and lakes during the reproduction season of amphibians (Lizana and Pérez-Mellado, 1990). In fact, in studies available on habitat selection it has been shown that the main limiting factor for the otter is the availability of prey which is conditioned by the availability of water in Mediterranean areas (López-Martín et al., 1998).

The presence of otters on golf course waters was first noted by Duarte and Rubio (2007) when signs were found and specimens were seen on courses in Malaga (Andalusia, southern Spain) (Fig. 1). Since then, otters have been seen on other occasions and in other nearby golf courses (individual sightings and reports from

maintenance staff on the golf courses), in addition some animals have been killed on nearby roads (Duarte et al., 2008). In this note we demonstrate that they visit these areas to forage.

Figure 1. Location of the study area: Andalusia region (south of Spain), Málaga province (MA) and Benahavís municipality (BHV). In detail the the two rivers with otters and three points representing the location of the golf courses with positive signs for otter presence and feeding.

During the spring and summer of 2010, twenty two visits were made to sample land vertebrates on 10 golf courses in the province of Malaga (27 hours-observer of mean field effort). In six of these courses (60%) signs and indications were found confirming the presence of otters. Three sites (30%) had evidence of feeding (i.e. excrement and remains of prey) around the artificial lakes on the courses. The remains of prey included scales and fish heads (mainly from carps) and turtle shells and plastrons. All of the remains were found within 1.5 m of the shores of the artificial lakes (Fig. 2, 3).

The three golf courses where the findings were made are near the rivers Guadalmansa and Guadalmina (36º30'N, 5º00'W), where the habitual presence of otters has been confirmed (López-Martín and Jiménez, 2008). The average distance between the artificial lakes and the main basin of these rivers is 1,055.3 ± 253.8 m. In all three cases, there is also a small reservoir for agricultural irrigation near the golf courses (at an average lake-reservoir distance of 575.3 ± 182.5m) and a network of ditches and streams that run through the golf courses to the reservoir (average distance lake-course for nearest water 69.9 ± 12.1 m). The presence of otters in these ditches and in the reservoirs has also been confirmed. The artificial lakes that are used as feedings points by the otters have an average surface area of 249.9 ± 33.2 m^2 and a minimum depth of 1.5 m. The bottom is lined with waterproof roofing felt. There is no macrophytic vegetation in the lake and the shore line is mostly barren. On one of the sites, the perimeter is divided by one shore made of a stone breakwater and the other, a continuation of the previous one, is made up of a grass shore with ornamental

vegetation that is 2 m from the shoreline. In the other cases, the entire shoreline consists of a continuous stone breakwater. Between the stone breakwater and the water there is an area that is barren, varying in size depending on the depth of the water. The roofing felt overlaps and it has a steep incline (see Fig. 4 for typology and detail of these lakes).

Figure 2. Carp (*Cyprinus carpio*) remains and otter's food remnants (a: operculum; b: pectoral fins; c: other bones and skin with scales). Otter excrement (d) in one of the artificial lakes of Los Arqueros Golf (Benahavís, Málaga). Photo: Jesús Duarte.

Figure 3. Carcass remains of a freshwater turtle in one of the artificial lakes of Los Flamingos Golf (Benahavís, Málaga). Photo: Jesús Duarte.

Figure 4. Types of artificial lakes inhabited by otters in golf courses. Details of the artificial lake shores: poor vegetative coverage (a), stone breakwater (b) and roofing felt (c). Photo: Jesús Duarte.

The usual fauna in these lakes, which has the potential to serve as food sources for the otters, is made up of abundant specimens of Mediterranean turtle (*Mauremys leprosa)*, the exotic Red-eared slider (*Trachemys scripta)*, the Iberian water frog (*Pelophylax perezi)*, and on the outside with frequent specimens of European common toad (*Bufo bufo)*. The lakes are stocked on a regular basis with carps by the golf course maintenance team as they tend to disappear completely from the lakes (personal communication from green-keepers). The aims are to control the presence of mosquitoes and also for aesthetic aspects.

In the Mediterranean area, the otter's diet is usually complemented with amphibians and reptiles (Clavero et al., 2005, Saldana and Prunier, 2006), especially in spring and summer (Beja, 1992; Clavero et al., 2003), as the drought reduces the availability of prey in the reservoirs, rivers and streams. The paucity of vegetation in the feeding areas does not condition the use of an area as a hunting ground for the otter (Beja, 1996), which is confirmed in the case described here. The difficulty of access, especially when exiting the water and manipulating the prey on the shore, seems not to be an obstacle. Neither the stone breakwater nor the steep incline of the roofing felt seem to be a problem for the otter. The fact that the otter apparently frequent the areas at night would facilitate to hunt for food and manipulate the preys without any cover. They are undisturbed in the area. During the night, a golf course is deserted and there are no human beings to be found or any potential predators to threaten the otters. In addition, the range of average movement of an otter during the day can reach up to 14 km (Ruiz-Olmo et al., 1995). Both the golf courses and the reservoirs found nearby are within this range, and the natural and artificial habitats are also inter-connected.

In summary, and in line with what has already been put forward by other authors (Yasuda and Koike, 2006; Boone et al., 2008; Colding et al., 2009), the artificial wet areas of the golf courses can serve as temporary refuges or provide

resources in times of stress for certain groups of wildlife, and this also seems to be the case with the otter, which uses them as a hunting ground and source of food in the summer. However, more research is needed to clarify the relationships of otters with these human-dominated areas. Golf courses could also act as corridors connecting points upstream or downstream. Herbicides, fertilizers and phyto-sanitary products usually applied in these facilities can also affect the otter through ingesting fish and aquatic vertebrates living in golf courses.

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RÉSUMÉ

UTILISATION DES LACS ARTIFICIELS DES TERRAINS DE GOLF COMME ZONE OÙ S'ALIMENTE LA LOUTRE (*Lutra lutra*)

Entre le printemps et l'été 2010 des preuves ont été obtenues que les loutres utilisent les lacs artificiels des terrains de golf du Sud de l'Espagne comme zone où se trouve des ressources alimentaires. Des restes de carpes et de tortues d'eau douce mangées par des loutres ont été trouvés. La présence de ces loutres dans ces zones est en rapport avec la distance et la connectivité d'habitats naturels de l'espèce et l'utilisation des lacs comme zone potentielle de ressources alimentaires compte tenu du stress environnemental existant en région méditerranée.

RESUMEN

USO DE LAGUNAS ARTIFICIALES EN CAMPOS DE GOLF COMO ZONAS DE ALIMENTACIÓN POR LA NUTRIA (*Lutra lutra*)

Durante la primavera y el verano de 2010 se han encontrado evidencias de la presencia y del uso como zonas de alimentación por parte de nutrias de lagunas artificiales en campos de golf del sur de España. Se ha observado restos de carpas y de galápagos comidos por nutria. Se relaciona la presencia de las nutrias en estas zonas con la distancia y conectividad con hábitats naturales de la especie y con el uso de las lagunas como zonas de despensa en época de estrés ambiental en la región mediterránea.

R E P O R T

REPORT OF AN ADAPTIVE REINTRODUCTION OF A JUVENILE GIANT OTTER (*Pteronura brasiliensis*)

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Abstract: Adaptive programs based on soft release and individual behavior changes may increase the survival rate of reintroduced giant otters (*Pteronura brasiliensis*). Key components of the program include the development of temporary enclosures and shelters, implementation of a responsive feeding program, an environmental adaptation program, as well as recording vocal repertoire and behavior information. This study was conducted by the Omacha Foundation, from March to June in 2008 in the Colombian Orinoco Ecoregion. The entire process occurred over 74 days, with 54 days spent evaluating the animal, and the following 20 days spent implementing an intensive adaptive reintroduction program. The juvenile otter was successfully reintroduced, as evidenced by its repeated sighting up to 17 months after release.

Keywords: *Pteronura brasiliensis*; soft release; rehabilitation; animal behaviour; vocal repertoire; otter diet

INTRODUCTION

The Giant otter (*Pteronura brasiliensis*) is an endemic mustelid of the lowland forest in South America. The species is globally categorized as Endangered (A3cd) by the International Union for Conservation of Nature – IUCN (Duplaix et al., 2008). It was in peril in the past mainly due to the direct hunting for its fur. Currently it is threatened by habitat loss, fragmentation and poaching (IUCN-OSG, 2007).

In Colombia a significant threat is the conflict between this species and fishermen, who consider the animal to be a competitor for fish resources. Other threats include unsustainable tourism, river contamination by oil spills in Arauca, and by mercury contamination in the Orinoco and Amazon rivers, overfishing exploitation at the Vichada Department, and capture and sale or trade as pets (Trujillo et al., 2006). Often, when giant otters are taken as pets, the parents were killed in order to approach the cubs. However, other times parents are just hit to keep them away from the cubs. Afterwards, the cubs are sold or go to their captor's home. The first months are the most exciting for the captors since otters are very playful animals, but as time goes on, the animal demands more food. Otters become more expensive and clever, as they

can learn how to open the refrigerator, and often play more and more aggressively in response to interaction with humans, becoming a burden to the family (Morales-Betancourt, pers. observ.).

Other issues occur when captive otters are restricted to enclosures in the backyard and frequently play and interact with dogs and other domestic animals. Captors may decide to tie them up, leading to scratches that can cause infection and in many cases death (Morales-Betancourt, pers. obs.). In some cases the animals are handed over to Regional Environmental Authorities (known as CAR in Colombia). In other cases these institutions or the police confiscate the animals, as it is illegal to keep them as pets in Colombia (Decree 1608 in 1978 and Law 599 in 2000).

When the animal is at the CAR, it confronts three possible options: euthanasia, life in captivity in an ex situ conservation center or starting the rehabilitation process (IUCN, 2000). This last option is restricted to the areas where the environmental authorities have rehabilitation programs in place (Ministerio de Medio Ambiente, 2002), and only a few currently exist. More commonly, the CAR will give the animals to an organization that agrees to pursue a rehabilitation and reintroduction process. These organizations are mainly NGO's, as is the case of the Omacha Foundation.

The reintroduction process for otters can prove to be problematic. Few reintroductions have been documented for the giant otter and even fewer include any follow-up monitoring of animal survival, resulting in a high level of unknown success rates. (Gómez et al., 1999; Gómez, 2003; McTurk and Spelman, 2005).

At the Omacha Foundation, the reintroduction process begins after a suitable place is selected according to the species' natural distribution range, previous research determining whether other otters are in the area, whether the area fulfills the species' requirements such as nest sites and food availability through the year, the possible presence of competitors and potential natural and anthropogenic threats. The animal needs to be in optimal physical and health condition, as well as demonstrating appropriate behavioral responses. The reintroduction process is customized for each animal and does not stick to a rigid date schedule; it includes activities that habituate the animal to its surrounding area and motivate it to develop activities that ensure its survival in an adaptive process tailored to the behavior changes exhibited by the animal.

OBJECTIVE

The objective of the process was to design and implement an adaptive reintroduction program for the giant otter (*Ptenorura brasiliensis*).

To achieve this objective, four components were considered:

- developing temporary enclosures and a shelter;
- developing and implementing a progressive feeding program to transition the animal to hunting for itself;
- creating an environmental adaptation program; and
- recording vocal repertoire and behavior information, which fed into the components above to allow tailoring to the individual animal's development.

STUDY AREA

This process took place at the Bojonawi Private Natural Reserve, Eastern Colombia, which has a size of 4.682 ha. It is located in the Orinoco Ecoregion, in the

Vichada Department by the border with Venezuela, next to the Orinoco River (Fig. 1). This area is part of the corridor in the El Tuparro World Biosphere Reserve.

The rainy season occurs here between April and November with an annual precipitation of 1700mm. During the rainy season, the temperature fluctuates between 35°C and 25°C and during the non-rainy season, temperatures vary between 42°C and 32°C (IDEAM, 2008).

The area has one small lagoon "El Pañuelo" with riparian forest and Precambrian rock formations, two creeks that flow to the Orinoco River. El Pañuelo during the flood season connects with the Orinoco River as well. A solitary otter, as well as a family of otters live in the lagoon (Morales-Betancourt, pers. obs.).

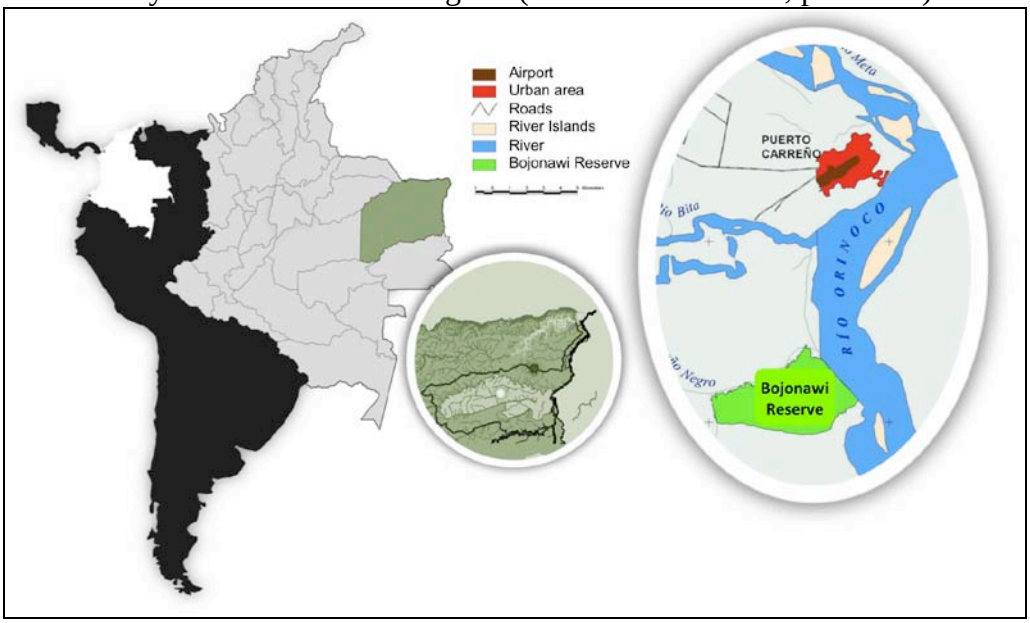

Figure 1. Location of the Bojonawi Reserve (Source: Omacha Foundation)

REINTRODUCTION PROGRAM

A sixth month old male giant otter was given to Omacha Foundation by the CAR (Regional Environmental Authority) "CORPORINOQUIA" after remaining under their care for 25 days at their establishment in La Primavera (Vichada). The animal had already been imprinted. Information on the specimen provided from the CAR is shown in Table 1.

Table 1: Technical information on the animal provided by the Regional Environmental Authority.

Technical Data	
Date of Confiscation	5 April 2008
Place of Confiscation	La Primavera (Municipio) Vichada (Department)
Name	Keyko
Species	*Ptenorura brasiliensis*
Gender	Male
Estimated age	6 months (estimated)
Weight	5.2 kg
Length	95 cm

Program Components

1. Develop temporary enclosures and shelter

The enclosures were made using the natural materials available. The first one was built on land 300m away from existing infrastructures. The purpose was to keep

the animal away from people at night. The second enclosure was built 500m away from the infrastructure area. Part of this enclosure included natural water from the lagoon and its purpose was to improve the animal's hunting skills.

First Enclosure:
Total area was 6.25m^2 with chain-link fencing supported by wood posts and a wooden ledge along the bottom to prevent the otter digging underneath. Inside the enclosure, there was one wooden shelter where the animal could sleep. There was also a 9 gallon plastic container for water (Fig. 2).

Second Enclosure:
Total area was 40m^2 with chain-link fencing supported by wood posts at the ground surface and a wood fence reinforced with chain-link fencing on the outside of the aquatic area. The area contained a natural wood shelter, with other natural features and materials (fallen leaves, sprouting vegetation, a large tree). The fencing on the lagoon side ended a few centimeters above the water level to allow the otter to move freely between the aquatic enclosure and the surrounding lagoon area, whilst retaining live fish introduced into the enclosure water area (Fig. 2).

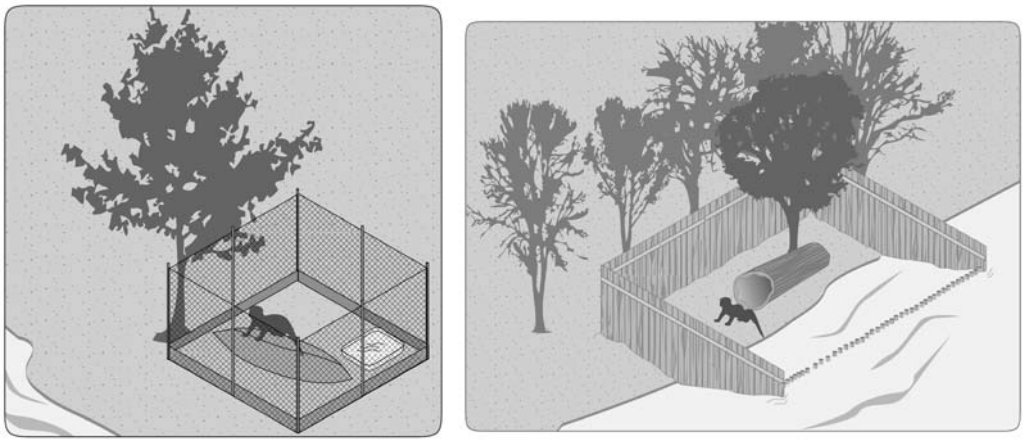

Figure 2. Left: First enclosure; Right: Second enclosure (Source: Ochoa F.).

Shelter:
Two wooden planks 1m in length and 25cm wide were placed to form a roof on two supports each consisting of two square-cut timbers measuring 5x5cm and 50cm long laid on their sides, one on top of the other (Fig. 3) to make a night shelter for the otter outside the fence close to the riparian area of the lagoon. The purpose was to provide shelter from environmental conditions, and potentially from other animals, while also providing the otter with the opportunity to move about and explore 24 hours a day. At first the otter did not use the shelter, but as he explored more of his environment, he started to use it.

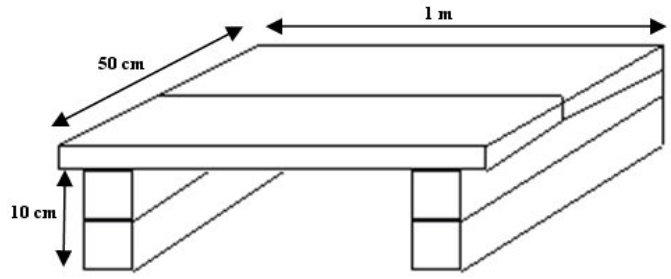

Figure 3. Shelter diagram, showing the arrangement of the timbers

2. Implement feeding program

The Omacha Foundation evaluated the feeding behavior of the animal by first testing his capabilities with little pieces of fresh fish when he arrived at the Reserve. From this, it was possible to determine if the animal was able to eat whole fish.

Feeding sessions ran from 6:30h to 17:00h, with feeds every two hours. The animal was always fed in the water, and at first was fed close to the bank outside any enclosure, because he was not used to the water and his swimming and hunting skills were undeveloped.

The main parameters observed were about the otter´s swimming and catching skills, and included the ability of the otter to find and eat the freshly killed fish provided underwater by thrown or placed on the shore by the researcher. At first he was fed next to the bank in less than 20cm of water with freshly killed fishes. At all times, the fish were always visible to the otter (i.e. not concealed in any way, and the water was clear), and feeding alternated between live fish given in a plastic container and freshly killed fish. A selection of the fish species available in the area was provided. To measure the amount of fish needed to adequately feed the otter, fish were provided until the otter only ate the heads of the fish, at which point it was assumed he had eaten enough to satisfy his appetite. Additionally, to allow for personal feeding preferences, if a new species was provided and the otter did not eat the entire fish, another of a familiar species was given to ensure that he ate enough food in total to be no longer hungry.

From the 11th day, the time between feeding sessions increased to three hours, with live fish provided at the bank as well as fish that were struck on the head and thrown 1m from the bank. The otter vocalized more at the first feed of the day, especially when this was of live fish. The first enclosure with the plastic container was no longer used. By now, the animal was swimming freely in the lagoon, using different areas and moving frequently from shore to bank. Because of this, we began to use a new feeding zone in the lagoon and used this once per day. The site was located close to the emergent woody vegetation that the otter utilized for eating. The second enclosure was also used as a location to provide some live fish, in order to restrict the possibility of the fishes escaping.

Species provided came from fishing conducted daily in the early morning, with the most frequently given fish including “palometa” (*Mylossoma duriventris)*, “arenca” (*Triportheus angulatus)*, “chorrosco” (*Pimelodus blochii)* and “platanote” *(Laemolyta taeniata)*. Even though some “sierra” (*Oxydoras niger)* and “cucharros” (*Hemisorubim platyrhynchos)*, were given, the otter did not eat them, possibly due to the hard structures of the species (Table 2).

After nine days of this new feeding routine, the animal dramatically reduced contact with the researcher and more fish were left in the second enclosure to avoid unnecessary contact with the researcher for food. The otter’s catching skills improved significantly, and by this time, the animal was catching more than 90% of the live fish provided to him at greater than 4m depth in the lagoon area.

In the last three days of the process, the otter received one fish each day in the early morning, the researcher approached the area where the otter was sleeping using a canoe, the otter approached the researcher and then fish were thrown, but no additional contact was made during the day.

No fish were provided after the 28th day. The second enclosure was kept available until it flooded for a further 15 additional days, in case the otter wanted to go back, and live fish were provided in it available for hunting.

The average weight of fish eaten per day during the process was 1.8 kg. The animal had increased in weight by 4.1kg since the confiscation; 16 days after the program started the otter weighed 9.3kg at an approximate age of 8 months.

3. Recording Behavior

Observation of the otter's behavior was done from May 30th through June 17th , after 54 days at Bojowani; 515 records were made, 318 in the morning and 195 in the afternoon. Of these records, 39.22% were related exclusively to water activities, 40.19% to activities on the ground or rock surfaces, and 19.22% to activities on the shore and emergant woody vegetation.

Table 2. List of all species given as food to the giant otter during rehabilitation process

Common Local Name	Scientific Name
Bocachico	*Prochilodus* sp
Palometa	*Mylossoma duriventris*
Arenca	*Triportheus brachipomus*
Chorrosco	*Megalonema platycephalum*
Cabeza de manteco	*Leporinus* gr. *Friderici*
Pavón	*Cichla temesis*
Saltón	*Parodon* sp.
Cucharo	*Hemisorubim platyrhynchos*
Payarín	*Rhaphiodontichthys vulpinus*
Dientón	*Hoplias malabaricus*
Sierra	*Oxydoras niger*
Sardinata	*Agoniates* sp.
Burra	*Plaguiscion squamosissimus*
Caribe pechi rojo	*Pigocentrus cariba*
Caribe	*Serrasalmus* sp.
Sapuara	*Semaprochilodus laticeps*
Pampano	*Piaractus brachypomus*
Platanote	*Laemolyta taeniata*
Mapurito	*Calophysus macropterus*
Tingolino	*Trachycorystes trachycorystes*
Nicuro	*Pimelodidae Pimelodella*
Coporito	*Curimatella inmaculata*
Gata	*Sorobium* sp.

The observations were made at 21 different points inside the reserve.

Categorization of behavior was done using Duplaix (1980) as a reference, with some regrouping and creation of two new categories: request for food and escape.

1. Aquatic Locomotion: swimming (including diving)
2. Terrestrial Locomotion: walking, trotting, galloping
3. Feeding: including hunting activity
4. Grooming: including rubbing, fur nibbling and scratching
5. Resting: only in the daytime, including yawning
6. Playing: with seeds, fruits, branches, and other objects
7. Alarm: after a noise or animal passing by: periscope, jump, straight head and body (not related with searching)
8. Elimination: defecation and urination

9. Agonistic: where inter or intraspecific encounters are avoided, sometimes with side movement of the head (left-right and right-left) with vocalizations
10. Searching: olfactory and visual search with paused locomotion, sometimes approaching animals or objects
11. Affiliative: searching for or keeping contact with family members (in this case with the researcher)
12. Request for food: the animal approaches the researcher to smell her mouth, insistently also making vocalizations.
13. Escape: climbing or digging close to the fence, trying to get out.

Vocal Repertoire

All sounds were recorded with video, and annotations were made regarding the context, followed by typing and categorization.

Categorization was based on Staib (2005) and Duplaix (1980); their categorizations are related to behavior between the animals and their age. One of the categorizations was difficult to use: we found we hand to group screams and whistling into a group named "calls". The following categories were used: contact murmur or hum, growl, warning or snort, HAH, and the "comfort" category. This additional category was created because the previous categorizations did not have a similar sound description. This sound is made prior to the animal sleeping, when it is already in a comfortable position. It appears as though the otter is imitating a suckling movement with the mouth and makes a corresponding specific sound.

Two non-vocal sounds were also reported: hiccup and yawn, and there were no reports for other non-vocal sounds like sneeze and cough that Duplaix (1980) reported.

Analysis of the behavior, location of occurrence and vocalization were made in order to modify the adaptation program appropriately to the behavioral development of the animal.

4. Environmental adaptation program

This program includes exploration, recognition and adaptation activities. It started after 54 days at the Bojonawi Reserve with the otter living in the first enclosure during the assessment phase. Once the environmental adaptation program began, vocalization and behavior information was recorded following *ad libitum* methodology. The adaptation activities were designed to allow the animal to learn to relate to the wild environment.

Exploration activities were made by the otter walking and swimming along the shore of the lagoon and flooding channels, which are natural routes for the species in this location. As the water started to rise during the flooding season, a canoe was used more often by the researcher, leading the otter who swam alongside. Focus areas were otter latrine spots and dens that were not in use at that time. Specific direct interactions with other species were encouraged on a few occasions, including swimming in the "Charapa" pond, a very small pond containing turtles (*Podocnemis expansa*), located in the flooded savanna where water clarity is very high and fish can be easily seen underwater. Another example was a small creek "Caño verde" that is used by the other giant otters in the rainy season as a natural corridor.

Recognition activities consisted of going back to previously explored sites and taking more time to carefully explore. Adaptation activities included the otter establishing campsites on the shore of the lagoon where he was able to go into the

water to play and swim, eat at the shore, and rest, groom, and sleep on the upper rocky area. Close to the campsite the otter established a latrine spot. The adaptation activities in total usually lasted for a period of about five hours in the morning and three hours in the afternoon. The otter initially established two campsites by the lagoon, but after the third day, he avoided that site, therefore a new campsite close to the forest and other wild otters was chosen. This program encouraged the otter to use the water a lot because he did not have very much experience of swimming before the program started.

Evolution of the process

At the beginning the animal remained close to the researcher and did not swim underwater; he was constantly seeking eye contact, constantly returning to the bank or getting into the canoe. On the third day, the animal became interested in exploring the shore of the lagoon in the flooded forest, finding seeds, and following fish. After three weeks the animal was going into the lagoon by himself without the researcher encouraging him to do so; the otter was also going to deeper water, swimming for longer periods underwater, and increasing his speed. Some minor amounts of terrestrial exploration activities were made, and were focused on the natural seasonal paths of the species in the area. During periods of rainfall, the animal remained in the water and was seen to be able to stay there for four hours.

On the ninth day, the otter made continued vocalization while searching in the flooded forest, where he encountered a group of five otters. The group of otters made snort sounds (Duplaix, 1980) and they moved away from each other. Following this, the otter in rehabilitation stayed in the forest without contacting the researcher for one hour. Without making any vocalizations, the otter then approached the researcher and the program continued. On the 13th day, the otter did not follow the researcher during the recognition swim through the lake, and instead swam back to the flooded forest area of the lagoon. Later that day and on the 14th day new contacts were made with other otters, but due to the water levels rising in flood, it was impossible for the researcher to determine if it was the previous group contacted or the solitary individual; several vocalizations were heard before and after the contacts.

During the adaptation activity on this day, the otter swam 15m away from the shore, which is a sign of improved swimming ability and confidence in moving though the aquatic area. That night, the otter used the shelter for the first time. On the morning of the 16th day and the afternoon of the 17th, we considered that the exploration part of the program was complete, because the otter's behavior was changing and it was evident that contact from the otter might finish at any time.

On the 18th day during the afternoon, a solitary otter approached the campsite from the lagoon making "HAH!" vocalizations (Duplaix, 1980). The otter in the rehabilitation program was resting, however, and did not seem to notice the presence of the other otter. From the 18th day onward, the otter stayed in the forest by his own choice and slept in the other shore that was frequently used for the adaptation process. On the 19th day, after eating one fish provided by the researcher from the canoe and close to his new campsite, the otter followed the researcher through the lagoon, but then went back by himself. One hour later, the otter joined the researcher at the campsite and stayed there for a couple of hours. At noon he left again and returned one hour later; a couple of live fishes were provided, but while he did not catch the first two, he caught and ate the third fish. He played in the area and slept in the forest again in the same place. The next day in the early morning, he received two fishes in

the water, which he caught quickly and ate. After he swam back to the area where he slept, he was not seen for the following seven days.

At this point, we considered that the rehabilitation program had ended as the otter had self-released back into the environment.

A photo showing the neck pattern was distributed to the researchers and local assistants in the reserve, in order to track sightings of this individual. After four months, the otter was sighted again and a few sightings even occurred 17 months later. Multiple staff members had reported the sightings, including the researcher that carried out the rehabilitation process.

CONCLUSIONS

- As individual captive otters may have different skills and relationships with the natural environment, individualized adaptive programs may be a way to increase the rate of successful reintroductions of the giant otter in appropriate areas.
- Feeding programs need to be a key component of the rehabilitation process, with a focus on developing catching skills in conjunction with the environmental adaptation program.
- Behavioral changes will give insights to the researcher as to an appropriate timeline and pace for the different components of the process.
- Some species that are part of the natural diet of other otters in the area were not consumed by this individual. This could be due to the wide availability of fish species, allowing him to develop certain preferences instead of eating the first available option.
- Other food resources such as small reptiles were not provided. This may reduce the future preferences of the otter for this type of food in the wild.
- Enclosures to enhance fishing skills proved to be a good complementary method to develop hunting capabilities.
- Shelters are needed for animals that are not used to being exposed to different climatic conditions, especially during the rainy season.
- Continued documentation of these types of program with other individuals is necessary to determine if there are increased survivals rates for reintroduced otters prepared using this kind of approach
- Because otters are territorial animals, sufficient area with appropriate conditions is required for future program development and expansion in the region; there must be enough space for the introduced otter to avoid the residents if necessary
- Although affiliation behavior was recorded between the otter and the researcher, it did not seem to create a barrier to the reintroduction process in this case.
- It is important to develop research investigation motivations, history and current status of the propensity of the public to have giant otters as pets, in order to better understand this trend and estimate the threat this poses to the species.

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RÉSUMÉ

BILAN DE L'ADAPTATION D'UNE JEUNE LOUTRE GEANTE (*Pteronura brasiliensis*) SUITE A SA REINTRODUCTION

Les programmes d'adaptation basés sur des relâchers adaptés et sur la variabilité des comportements individuels peuvent augmenter le taux de survie des loutres géantes réintroduites (*Pteronura brasiliensis*). Les éléments clés du programme comprennent la mise en place d'enclos et de refuges temporaires, la mise en œuvre d'un programme d'alimentation adapté, un programme d'adaptation à l'environnement, ainsi que l'enregistrement d'un répertoire vocal et de données comportementales. Cette étude a été menée par la Fondation Omacha, de Mars à Juin 2008 dans l'éco-région colombienne de l'Orénoque. L'ensemble du processus s'est déroulé sur 74 jours, avec 54 journées consacrées à l'évaluation de l'animal, et les 20 jours suivant alloués à la mise en œuvre du programme intensif d'adaptation à la réintroduction. La jeune loutre a été réintroduite avec succès comme en témoignent ses observation répétées durant 17 mois.

RESUMEN

REPORTE DE UNA REINTRODUCCIÓN ADAPTATIVA DE UN INDIVIDUO JUVENIL DE NUTRIA GIGANTE (*Pteronura brasiliensis*)

Las liberaciones suaves teniendo en cuenta el cambio de comportamiento en cada individuo puede ser el método para incrementar el porcentaje de éxito de la reintroducción de las nutrias gigantes (*Pteronura brasiliensis*) a la vida silvestre. En el presente estudio fue determinante incluir los siguientes componentes: desarrollo de encierros temporales y una madriguera, la implementación de un programa de alimentación acorde a la evolución del individuo en el programa de adaptación al ambiente, y adicionalmente realizar registros del repertorio vocal y del comportamiento. Este estudio fue realizado por la Fundación Omacha entre marzo y junio de 2008 en la ecorregión del Orinoco colombiano. El proceso duró en total 74 días de los cuales 54 fueron realizando cortas actividades para evaluar al individuo y los 20 días restantes realizando un intensivo programa de reintroducción adaptativo. El ejemplar fue reintroducido exitosamente ya que se continua observando incluso 17 meses después en el área.

R E P O R T

A RECORD OF SMALL-CLAWED OTTERS (*Aonyx cinereus*) FORAGING ON AN INVASIVE PEST SPECIES, GOLDEN APPLE SNAILS (*Pomacea canaliculata*) IN A WEST SUMATRA RICE FIELD

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Abstract: A small-clawed otter (*Aonyx cinereus*) survey in West Sumatran rice fields was conducted from April to September 2010. During this survey, golden apple snail (*Pomacea canaliculata*) shell remains were found on a rice field bank as suspected prey remains of small-clawed otters. This suspicion was later proved by the occurrence of snail material (pieces of operculum and shell) in otter spraints. This is the first evidence of small-clawed otters foraging on this invasive pest species. Characteristics of the shell remains and spraints are described.

Keyword: small-clawed otter, invasive species, spraint, snail shell, operculum

An otter survey was conducted in rice fields in the Padang Pariaman District of the West Sumatra province from April to September 2010. Surveyed locations are rice fields artificially irrigated from the Bendungan Anai dam. This dam irrigates 13,640 hectares of rice fields in four sub-districts: Lubuk Alung, Sintuk Toboh Gadang, Batang Anai, and Ulakan Tapakis. The otter survey used a line transect method by following rice field banks and irrigation channels (Aadrean et al., 2010). Tracks, spraints and other otter signs were collected.

During this survey, we found shell remains of the golden apple snail (Fig. 1). at 0°42.332'S and 100°17.360'E. We suspected that these snails had been preyed on by small-clawed otters. The shells appeared to have been bitten, with regular cracks following the shell spiral to get at the meat. This damage pattern differed from that produced by human pest control – in the latter case, the snails are captured by hand and put on the rice field bank to dry out and die, and usually either complete shells are found, or the shells are irregularly crushed if they have been walked on by humans passing along the bank.

The predated snail shell remains were found in groups containing 4-7 shells per group. They were found lying on a rice field bank behind small irrigation channel near an otter spraint site, during the planting season when water levels are kept low.

Figure 1. Snail shell remains found on a rice field bank. Insert right bottom: Morphology and measurement of shell remains

17 out of a total of 28 otter spraints found contained this snail material. Spraints consisting predominantly of snail remain are black in color, and sometimes also contain undigested snail eggs of pink color. If in fresh condition, these spraints are more slimy than usual, very rancid with a rotten snail smell and sometime snail meat with white slime was found in them. After few days, and having been washed by rain, pieces of operculum and shell become apparent (Fig. 2).

Pieces of operculum found in otter spraints were compared with known golden apple snail operculum. Their identification was confirmed by the similarities of growth spiral morphology**.** In this survey, golden apple snails were observed to be a major pest in all of this rice field area.

The golden apple snail (*Pomacea canaliculata*) is a native species from South America, which has become an invasive species throughout the world. It was introduced to Indonesia as aquarium fauna in 1981. However, by few years after its introduction, the golden apple snail had became a major pest of rice in Java and Sumatra and is estimated to have reduced yields by 15% (Suharto, 2002). Because of great impact of this invasive species, the IUCN Invasive Species Specialist Group (ISSG) has placed it among the top 100 of the "World's Worst" invaders (Lowe et al., 2000)

Invasive species arriving in an area will affect the whole ecosystem. The role of any predator as controlling factor will therefore be important. As one of the top carnivores, small-clawed otter occurrence in West Sumatra rice fields has been confirmed in a previous study (Aadrean et al., 2010). However, small-clawed otter were mainly found to be crab eaters, and molluscs were not prominent in its diet (Kruuk et al., 1994; Hon et al., 2010).

Figure 2. Small-clawed otter spraint with golden apple snail as the dominant component. Pieces of operculum and shell are apparent. **Inserts:** Spraint material after washing and sieving, Right: Pieces of snail shell. Left: Pieces of operculum.

Previously, Wright et al. (2008) have reported the occurrence of golden apple snails in hairy-nosed otter habitat in Cambodia, and speculated that they might be a potential food source for otters; it is as yet unclear whether this will be a net threat or benefit for the hairy-nosed otter. Our findings reveal utilization of this invasive pest species as part of the diet of small-clawed otters. Predation on exotic or invasive species by otters has been also reported for crabs (Weber, 2008) and fish (Blanco-Garrido et al., 2008; Porciuncula and Quintela, 2010).

This record contributes to knowledge of otters foraging on exotic or invasive species in aquatic environments. However, we could not establish whether this was a nutritious additional food source, or an indicator of lack of indigenous, and possibly preferred food, as described by Smith (1990): in feeding preferences, a consumer will select less nutritious species if high quality alternatives are rare. Here it may, however, just indicate the opportunistic nature of otter diet. If this could be established, it may help in devising conservation measures for native prey species. Further diet composition data from spraint analysis is needed to establish any degree of preference for this snail, and the quality and quantity of alternative food in snail-containing areas compared to areas without the snail.

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RÉSUMÉ

PREDATION D'UNE LOUTRE CENDREE (*Aonyx cinereus*) SUR UNE ESPECE INVASIVE, L'ESCARGOT JAUNE (*Pomacea canaliculata*), DANS UN CHAMPS DE RIZ DE L'EST DE SUMATRA

Une enquête de terrain sur la Loutre cendrée (*Aonyx cinereus*) a été menée dans les champs de riz de l'ouest de Sumatra d'avril à Septembre 2010. A cette occasion, des restes d'Escargot jaune (*Pomacea canaliculata*) ont été trouvés sur une rive d'un champ de riz et considérés comme la proie d'une loutre cendrée. Cette suspicion a été prouvée plus tard grâce à la découverte de restes d'escargot dans des épreintes (pièces de l'opercule et morceaux de coquille). C'est la première donnée de prédation de la Loutre cendrée sur cette espèce invasive. Les caractéristiques des restes de coquille et les épreintes sont ici décrits.

RESUMEN

REGISTRO DE LA NUTRIA DE UÑA PEQUEÑA ASIÁTICA (*Aonyx cinereus*) ALIMENTANDOSE DE CARACOLES MANZANA *Pomacea canaliculata*), UNA ESPECIE DE PLAGA INVASORA EN UN CAMPO DE ARROZ EN WEST SUMATRA.

Un seguimiento de la nutria de uña pequeña asiática (*Aonyx cinereus*) a los campos de arroz en West Sumatra fué conducido desde abril a septiembre de 2010. Durante este seguimiento, residuos de la concha de caracoles manzana (*Pomacea canaliculata*) fueron hallado en una orilla del campo de arroz como presunta presa de nutrias de uña pequeña asiática. Esta sospecha fué luego confirmada por la aparición the residuos de caracol (piezas de opérculo y concha) en las heces estudiadas. Esta es la primera

evidencia de nutrias de uña pequeña alimentandose de esta especie de plaga invasora. Las características de los residuos en heces son descritas.

RINGKASAN

SEBUAH CATATAN PEMANGSAAN JENIS HAMA INVASIF, KEONG MAS (*Pomacea canaliculata*) OLEH BERANG-BERANG CAKAR KECIL (*Aonyx cinereus*) DI AREA PERSAWAHAN SUMATERA BARAT

Survei berang-berang cakar kecil di area persawahan Sumatera Barat telah dilaksanakan dari April sampai September 2010. Selama survei ini, sisa cangkang keong mas (*Pomacea canaliculata*) ditemukan di pematang sawah. Hal ini diduga sebagai sisa hewan mangsa dari berang-berang cakar kecil. Dugaan ini kemudian dibuktikan dengan keberadaan materi keong mas (pecahan operculum dan cangkang) di dalam kotoran berang-berang. Ini merupakan bukti pertama berang-berang cakar kecil memangsa jenis hama invasif ini. Karakteristik sisa cangkang dan kotoran dideskripsikan.

R E P O R T

AN EVALUATION OF THE UTILITY OF CAMERA TRAPS IN MONITORING GIANT OTTER POPULATIONS

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Abstract: Monitoring populations of giant otter, *Pteronura brasiliensis*, poses unique challenges. Important information such as sex, reproductive status, home range size and pack composition are often difficult to obtain during a short field season with limited observers. We conducted a pilot study on the use of camera traps to assist in monitoring a population of giant otters in the Bolivian Amazon. We found that while fewer individuals were resolved using camera traps than by direct observation, they were useful in complementing the observation approach to resolve pack membership and greatly facilitated the identification of the breeding pair. Camera traps were useful in resolving latrine activity patterns, the results of which are presented here.
Key words: Giant otter, camera trap, individual identification, population monitoring.

INTRODUCTION

The giant otter is an endangered species with a widespread distribution throughout many different habitats of South America (Carter and Rosas, 1997). While populations in some parts of the range have begun to recover from the population crash in the last century (Tomas et al., 2000; Recharte and Bodmer, 2009), threats to the survival of the giant otter are increasing elsewhere (Duplaix et al., 2008). Monitoring both recovering and declining populations poses logistical difficulties as well as the potential of causing stress to the animals, which can lead to failed reproductive efforts (Schenck, 1996).

Giant otters form packs usually from two to twelve strong, typically comprising a breeding pair, subadult young from previous litters and unrelated adult immigrants (Duplaix, 1980; Staib, 2005). They are diurnal, active from first light, typically resting during midday on cleared banks, known as 'campsites', and are active until dusk (Duplaix, 1980). The social structure of giant otter packs has been studied extensively in Manu by Staib (2005) and Groenendijk et al. (2006). However we still understand very little about the ultimate reasons for monogamy and alloparental care in this species, or the reasons for the complex latrine behaviour.

Biologists have been quick to capitalize on the small, relatively cheap, lightweight camera trap units in a waterproof housing initially developed by the hunting industry. They have been used both for estimating species distribution and abundance (Karanth and Nicholls, 1998; Rowcliffe et al., 2008) as well as determining patterns of activity and behaviour (Bridges et al., 2004; Maffei et al., 2005) without the need to directly

observe the target species. The use of camera traps in monitoring giant otter populations was first suggested by Utreras and Pinos (2003), in which they used Camtrakker equipment with 35mm film set up on otter latrines in Ecuador. The potential of these units was restricted by the problems inherent with film loading cameras in the tropics, namely the growth of mould and the necessity of developing the photographs, a time consuming process. The development of digital technology now allows storage of many thousand photographs in each unit with the ability to instantly view the images in the field, leading to the potential of a much more flexible and opportunistic approach to camera trapping when targeting foal packs.

As part of an investigation into the spatial organisation and relatedness among packs along a river, we assessed the utility of using camera traps in the photographic identification of giant otters. We tested three different camera trap models on four different packs and compared the quality of data obtained from camera traps with direct field observation. Research was conducted on the Rio San Martin in the Bolivian Amazon. The giant otter population in this river has expanded following near extirpation during the pelt hunting of the last century (van Damme et al., 2002), and sections of the river have been surveyed for giant otters by Asociacíon FaunAgua from 2004 to 2008. The river holds approximately 90 animals divided among 15 packs on the main stream and three others in the tributaries San Joaquin, Orince and Blanco immediately upstream of the community of Bella Vista (Zambrana Rojas, 2007).

METHODS

Three researchers spent 43 days recording membership of the giant otter packs of the Rio San Martin. Direct observations of packs took place both from boats and field hides. Researchers used two Canon 400D digital SLRs with 500mm and 300mm lenses and a Sony handicam video recorder. Researchers were split between two boats and were tasked with recording different focal packs. We focused on using the camera traps to assist in recording membership, activity and home range of four key packs.

Two Reconyx R45 camera traps were selected due to the model's fast 'wake-up' time and rate of image capture (up to 3 frames per second). Extreme III compact flash cards were used capable of holding either 2GB or 4GB. Traps were triggered by a PIR motion sensor and were mounted with an infrared LED illuminator. Camera setup was as follows: Medium image quality; no firing delay; extremely high sensitivity. We also used a Stealthcam I230IR and Moultrie I40. Both these models were selected to take 10 second bursts of video footage.

Each trap was fixed to a tree or stake on the edge of a latrine. We found it useful to carry several pre-cut stakes firstly as there is often an absence of suitable trees for attachment due to the frequently dense nature of latrine undergrowth and secondly, this avoids undue machete work and trampling on the latrine, reducing the impact of human presence. Due to the giant otter's low profile, a low camera position (approximately 50cm above the ground) performed better at recording throat patterns. Following trap erection, the latrine was doused thoroughly with water flung by paddles from the canoe in order to dampen the smell of human presence.

Camera trapping was opportunistic as we were restricted by the distance from camp, which had to be travelled to check the cameras and the number of cameras. We attempted to maintain cameras on active latrines, requiring a judgement of the pack's movements. If a latrine with a camera on had not been used for three days, the camera was moved to a different latrine.

RESULTS AND DISCUSSION

Comparison of camera trap models

While colour images from the Moultrie camera were of good quality, and its triggering speed reasonable, its down-time meant that over a minute's worth of recordings would be lost between capture events, leading to far fewer throat markings being recorded. The one particular advantage of the Moultrie model is its inbuilt laser, which is extremely useful for angling the correct setup. Stealthcam performed poorly, producing very grainy footage and suffering the same problem of a mandatory minute lag time between firing bouts and a slow wake-up speed. By contrast, the Reconyx models produced an image of higher clarity, with a much faster triggering speed and lack of downtime. The Reconyx takes 6x C cell batteries and by the end of the fieldwork after six weeks, battery power was still at 50%.

Comparison of camera trap data with direct observation

In total, 2hrs 40 minutes of giant otter footage from 4 packs was recorded on latrines using camera traps over the course of the fieldwork. This footage comprised 17 visits and led to the identification of 16 individuals. While most of the pack members were identified by direct observation, three of them were only identified by camera traps on latrines. The camera traps also recorded several incidences of investigation of latrines by individuals from outside the pack, something which wasn't directly observed.

Information recorded by the camera traps

Average time spent on the latrine was extremely short, 70% of visits were under 10 minutes in duration (Fig. 1). This highlights the importance of fast triggering time on the camera trap to avoid losing these briefer visits. Two activity peaks were observed- between 8:00 and 12:00 and then between 14:00 and 18:00 (Fig. 2).

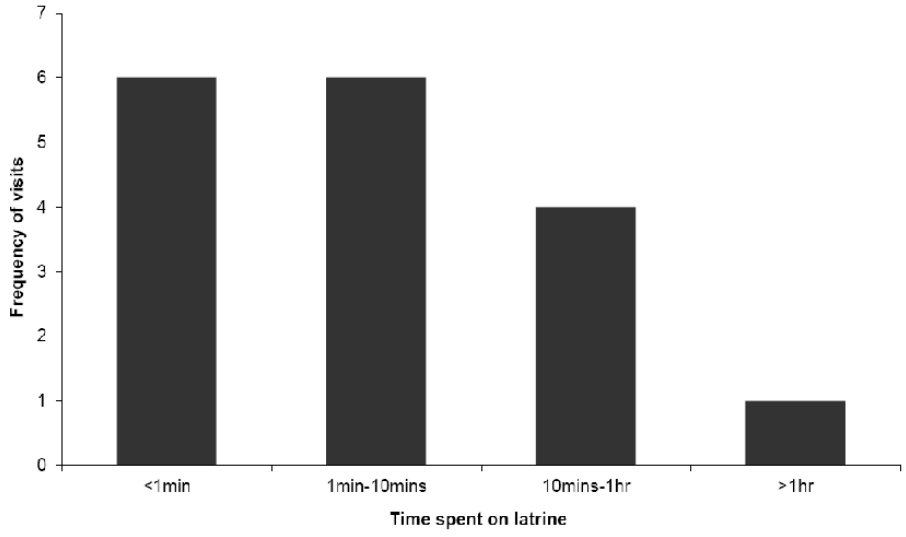

Figure 1. Duration of latrine visits

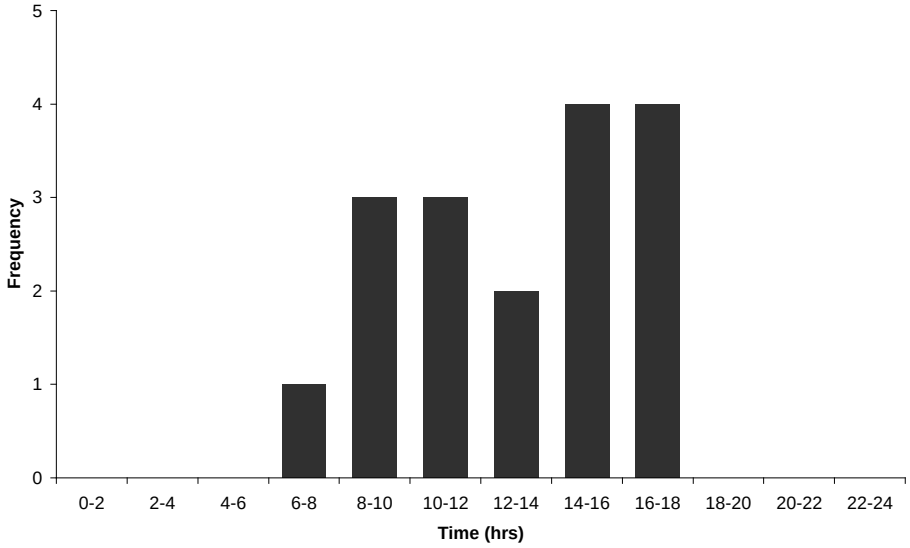

Figure 2. Time of day of visit over 24 hours.

Camera trap images enabled the identification of the reproductive pair for three packs and identification of the breeding female for the fourth. Objective sexing of individuals is extremely important when considering pack social dynamics. While males tend to be heavier than females with thicker necks and broader heads (Duplaix, 1980; Sykes-Gatz, 2005), the variation within each sex means that this rule cannot be relied on for accurate sex determination. Visible genitalia in camera trap images provide a more objective method. However we found that males can often be misidentified, as a protruding anal gland from an otter can often resemble testes. Similarly, a cautionary note must be made regarding lactation. It can be easy to mistakenly assume the presence of multiple lactating females in a pack when two females with visible teats are seen. However, once a female has been suckled, her teats will remain long and visible years after the event (Sykes-Gatz, 2005; Groenendijk, pers. comm.). The lactating female often has more obvious turgid teats (Fig. 3).

Figure 3. Lactating female with a full udder and enlarged teats (left) and male with visible scrotum (right)

Juveniles (six months to one year old, Sykes-Gatz, 2005) are extremely difficult to identify in brief observations made by boat as they rarely periscope and are kept to the periphery by the rest of the pack. Furthermore the distinction between juvenile and sub-adult (one to two years) can be problematic in the field. Despite the fact they

rarely appear on latrines, we recorded the presence of three juveniles from 2 different packs using camera traps and obtained good neck markings from these individuals.
On three occasions camera traps were instrumental in resolving the extent of packs' home ranges. Home range was defined as lying between the furthest points on the river in which the pack was recorded. Camera traps left on active latrines lying midway between two packs resolved ownership of the latrines, resulting in home range extensions in these three cases.

Disturbance to animals and reaction to the camera traps
We noticed very little reaction to the trap's presence. On four occasions the otters initially approached cautiously and appeared to smell in the direction of the camera. However, following this behaviour they continued with their latrine activities. Despite the fact that giant otters have been observed to grapple and break branches and saplings on their latrines, the camera traps were never investigated or interfered with. All models tested used red LEDs to illuminate in low light conditions. We noticed no reaction from the giant otters to the red light and suggest that models with red light rather than white light be used whenever camera trapping with these animals. We found camera trapping to be a far less invasive way of monitoring pack composition than by direct observation, which led to higher levels of stress and on two occasions, den changes. While giant otters encountered in the river by canoe will often periscope and present throat markings directly to the camera, it is believed that the "periscoping" behaviour results from a stressful situation and can interrupt the current daily activities of the pack.

Non-target species occurrence
Of the 48 triggering events, 31 were due to non-target species. These were predominantly the grey-necked woodrail, *Aramides cajanea*, (29%), dove sp (16%), ocelot, *Leopardus pardalis*, (13%), and curassow sp (10%). Interestingly Jaguar, *Panthera onca*, and giant anteater, *Mymercophaga tridactyla*, were also recorded investigating the latrines and coprophagy of giant otter spraint by common opossum, *Didelphis marsupialis*, was filmed on two occasions. Sun basking on more open latrines by the rufescent tiger heron, *Tigrisoma lineatum*, consumed a large amount of memory in single triggering event, highlighting the need for large capacity CF cards.

Limitations of camera trapping
Not every individual otter in the pack is likely to be easily recorded on the latrines. In particular, juveniles frequently appeared relegated to the periphery and were rarely recorded during a bout of activity. Furthermore camera traps are not cheap pieces of field equipment. For example, the Reconyx models used in this study cost $450 each. This cost has to be weighed against the level of information required from the study. If the aim of the study is to obtain a simple abundance estimation, then these costs are unlikely to be justified. However, if there is an ongoing monitoring program in which individuals are tracked from year to year, and information such as age class and body condition are important, then this method of data capture and its associated cost may be a worthwhile investment of resources.

CONCLUSION

We found that even using a small number of camera traps greatly increased the speed with which pack membership could be resolved. While the number of individuals

identified in the camera traps was less than that recorded from direct observation, this method was particularly useful in delivering information on sex, age and reproductive status not easily available from direct observation. Furthermore, the quality of the images obtained was often superior and the camera traps provided extra detail of throat markings to complement photographs taken directly. More importantly, camera trapping appears to be less invasive than direct observation and has the potential to deliver important information on the role latrines and scent marking play in this unusual social mustelid.

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RÉSUMÉ

EVALUATION DE L'UTILITE DES PIEGES PHOTOGRAPHIQUES POUR LE SUIVI DES POPULATIONS DE LOUTRES GEANTES

Le suivi des populations de loutres géantes, *Pteronura brasiliensis*, pose des défis uniques. Des informations importantes telles que le sexe, l'état reproducteur, la taille du domaine vital et la composition du groupe sont souvent difficiles à obtenir au cours d'une saison de terrain et un nombre d'observateurs très limités. Nous avons mené une étude pilote sur l'utilisation des pièges photographiques afin d'aider à la surveillance d'une population de loutres géantes d'Amazonie bolivienne. Alors que moins d'individus sont détectés en utilisant les pièges photographiques que par l'observation directe, les appareils sont utiles pour compléter l'observation visuelle et permettent ainsi de préciser les membres d'un groupe mais aussi de faciliter l'identification des couples reproducteurs. Les pièges photographiques ont enfin été utiles pour la compréhension de l'activité autour des latrines dont les résultats sont présentés ici.

RESUMEN

EVALUACIÓN DE LA UTILIDAD DE FOTOTRAMPAS EN EL MONITOREO DE POBLACIONES DE NUTRIA GIGANTE

El monitoreo de poblaciones de nutria gigante (*Petronura brasiliensis*) presenta desafíos únicos. Información de relevancia como el sexo, el estatus reproductivo, el tamaño de las áreas de uso y la composición de la manada son indicadores difíciles de obtener durante una temporada corta con un número de observadores limitado. Conducimos un estudio piloto sobre el uso de fototrampas para ayudar al monitoreo de una población de nutrias gigantes en el Amazonas Boliviano. A pesar que utilizando las fototrampas se obtuvo una cantidad menor de individuos comparado con la observación directa, la información así obtenida fué muy útil en complementar el método de observación para differenciar los miembros de la manada y facilitó ampliamente la identificación de las parejas reproductoras. Las fototrámpas fueron así mismo útiles para establecer los patrones de comportamiento en las letrinas cuyos resultados son presentados aquí.

COUNTRY UPDATE

COUNTRY UPDATE: NEPAL

Gandhiv KAFLE

Nepal Representative, IUCN/OSG (gkafle@scientist.com)

The major annual update/findings of the Nepal Otter Research and Conservation Initiative in Nepal are presented.

Identification of otter presence sites

- *Kaski district:* Eurasian otters have been confirmed in Rupa Lake and Bijaypur stream of Pokhara valley. Begnas Lake is a potential site that needs further investigation. It is possible that there are no otters at Phewa Lake as no signs of otters were found in the current survey.
- *Gorkha district:* In Pyaudikhola watershed of Chyangling hills of Gorkha district, Aarukharka stream - a streamlet to Pyaudi stream and Pandel stream - a streamlet heading to Kamaltar Bazaar could possibly be used by Eurasian otters (Fig. 1,2). In Kapringkhola watershed of Gaikhur hills of Gorkha district, Kapring streamside joining the Marsyangdi stream nearby Dhikure Bagaar and inlet of Kapring stream near Tiwaritaar village amidst the Thulapakha community forest could possibly be used by Eurasian otters (Fig. 3,4). The Trishuli River along the Thumka and Hiklung village range holds some potential for otter occurrence

Figure 1. Aarukharka stream, Chyangling VDC of Gorkha district

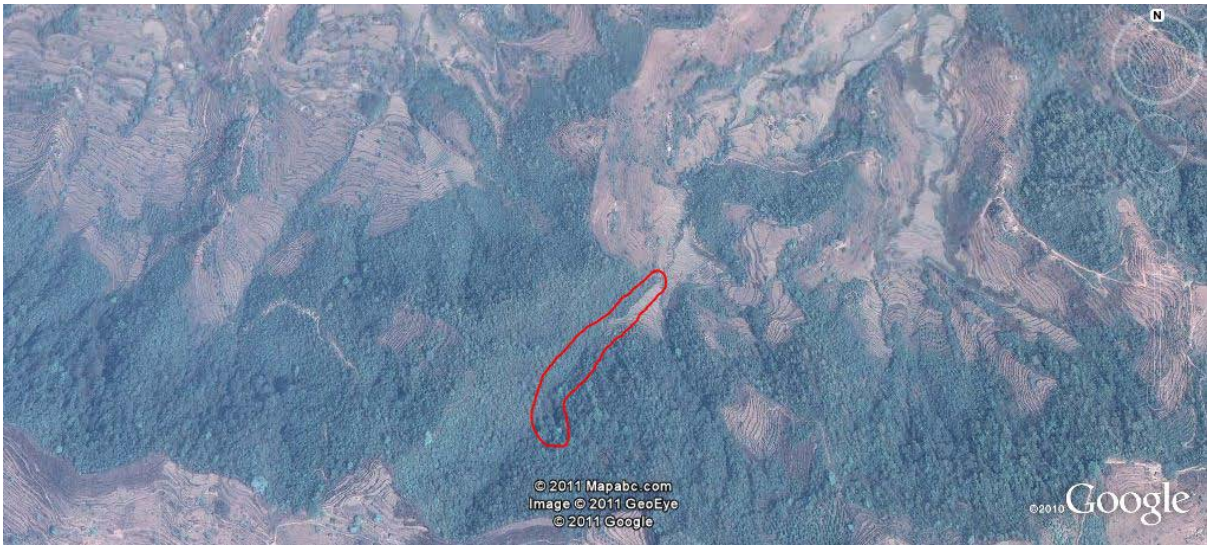

Figure 2. Pandel stream, Chyangling VDC of Gorkha district

Figure 3. Kapring stream section joining Marsyangdi river, Gaikhur VDC of Gorkha district

Figure 4. Tiwaritar stream joining Kapring stream, Gaikhur VDC of Gorkha district

- *Lamjung district:* Chepe stream along Alkatar village and Chepeghat range in Lamjung district could possibly be used by Eurasian otters.
- *Kavre and Sindhupalchowk districts:* Dharke stream and Indrawati stream bordering Kavre and Sindhupalchowk districts holds potential for the occurence of Asian Small-clawed otter and Smooth-coated otter. Patene stream, Roshi stream, Nanimata stream and Punyamata stream holds potential for the presence of three types of otter.

Threats to otters

The little known population of otters and other aquatic animals are affected by a number of adverse factors in freshwater resources.

Intentional killing of otters was reported in Rupa Lake due to predation of fish by otters.

The drying up of water sources, in the context of a changing climate, has affected fish population and their migration due to lowering water level and availability, subsequently affecting otter habitat and diet. Change of vegetation along stream banks was reported. This has contributed to habitat alteration and succession affecting survival of frog, snails and other small amphibians.

Extraction of rocks and sand from the stream and rivers is prevalent in wetlands of Kaski, Kavre and Sindhupalchowk districts.

Fishing with use of electricity and poison is prevalent in streams and rivers of Kavre and Sindhupalchowk districts. The leakage of chemicals and nutrients from the farming lands to water bodies has contributed to water pollution and eutrophication in the water bodies, affecting otter habitat and dietary diversity.

One of the major social factors hindering otter research and conservation in Nepal is the low, or in many cases complete lack of awareness in the general population of the existence of otters. Older people and those engaging in wetlands for subsistence are somewhat familiar with otters but younger individuals are completely ignorant of the existence of otters. It makes the project team difficult to find right volunteers to help in surveying in the communities.

Some older people mistakenly confused marten and mongoose with otters, as the external physical outline of these species are somewhat similar, and poor knowledge of these people of the morphological features of otters contributed to this.

Future direction

It is probably too early to initiate intensive detailed studies of otters in Nepal. The current need is to conduct rapid assessment through participatory means of the potential wetland sites in which otters are found. This information is not available for many districts. Once this information is available, intensive surveys for example using camera traps or spraint analysis to evaluate the distribution and population status of otters in the wetlands with otter populations should be conducted. Knowledge of importance of otters and their conservation should be transferred to local people using participatory outreach tools simultaneously with ongoing research. This will help to allocate scarce resources for use in research in potential otter habitats.

Acknowledgement - Part of this update was published in River Otter Journal, 2010. XIX (II): 8-9. The support from Rufford Small Grants Foundation, Chester Zoo, Columbus Zoo, River Otter Alliance, and International Otter Survival Fund is highly acknowledged.

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

New Members of OSG

Since the last issue, we have welcomed 23 new members to the OSG: you can read more about them on the Members-Only pages.

Lynda Burrill, UK: Lynda has taken over from Jo Elliot as European Otter EEP studbook keeper; Jo has moved onto other work and so has left the OSG.

Bosco Chan, China: Otters always fascinate me and I have always been concerned about the conservation of these animals. Unfortunately, very little have been done on the study and conservation of otters in China, and many populations may have quietly gone extinct. I hope to contribute to their future survival in our region by being a member of the OSG.

Will Duckworth, Lao PDR: I am a wildlife surveyor and conservation advisor, focusing upon birds and field-identifiable large mammals in South-east Asia, particularly Lao PDR. I am thus not an otter specialist, but because of the desperate conservation status of otters in much of SE Asia, reflecting that of their habitats and aggravated by directed hunting for them, they often receive high profile in my survey reports and management recommendations.

Vittoria Elliot, Cambodia: I am a field ecologist with particular expertise in mammals and molecular ecology. I am currently working in Tonle Sap lake, Cambodia, on the distribution and abundance of Hairy-nosed Otters, applying molecular techniques and protocols.

Laura Lerone, Italy: I started studying otters in 2008-2009 during a one year grant on *Lontra longicaudis* in Sonora (Mexico). In 2010 I worked as field assistant in Portugal in a project on radio tracking of the Eurasian otter. At present I'm PhD student at the University "RomaTre". My PhD project is focused on non-invasive genetic sampling of *Lutra lutra* at the periphery of its Italian range. My main interests concern the social behavior and behavioral ecology of otters, particularly dispersal and territoriality. I'm also very interested in implementing camera trapping technologies for otters.

Geoff Liles, United Kingdom: I am a consultant wildlife ecologist, specializing in mammals and river ecosystems. I have been director of the Welsh Wildlife Trusts' "Otters in Wales" project since 1979, and work actively in otter research. I was a member of OSG for many years and am now returning to the fold.

Sotheary Lim, Cambodia: I am interested in finding out if DNA from spraint samples can be used to distinguish between species, subspecies and subspecies hybrids in wild and captive otters

Ferdia Marnell, Ireland: I work for the Irish National Parks & Wildlife Service as Head of Animal Ecology, coordinating national mammal survey and monitoring programmes but also initiating and facilitating research projects on important species where necessary to inform national conservation policy. I coordinated the last national otter survey in Ireland and am also project officer for NPWS on the current national survey which is due to report next year. I was lead author on Ireland's recent Red Data List of Irish mammals.

Tina Mumm, Germany: I am a PhD student working on giant otter vocalisations here in Germany, and also in Peru.

Marcia Munick, Brazil: Marcia has worked on Giant Otter ecology for eight years, including radio-telemetry.

Sarah Paul, United Kingdom: I have been the research assistant for the Cardiff University Otter Project since October 2010 and prior to this carried out my undergraduate project on Eurasian otter (*L. lutra*) scent communication with Eleanor Kean. Current research areas include work on kidney stones and spatial patterns in phenotypic variation of the *L. lutra* in the UK.

Nisarg Prakash, India: Hi, I'm Nisarg, a wildlife biologist from India. I have previously surveyed for small-clawed otters in the Western Ghats, and worked on the impact of land-use on their occurrence and habitat-use.

Patricia Rosas-Ribeiro, Brazil: I studied the conflict between fishermen and giant otters in Western Brazilian Amazon and I currently monitor Neotropical otter and giant otter populations in the influence area of a hydroelectric dam that is being built in Madeira River. I have interest in the areas of applied ecology and conservation.

Myfanwy Rowlands, USA: My particular interest is in developing the use of remote underwater photography to observe otters in the aquatic environment.

Melissa Savage, USA: Director of the Four Corners Institute in New Mexico. a partner in the New Mexico River Otter Working Group; currently fundraising for an otter-related project in South America

Anthony Sebastian, Malaysia: Co-founder of Aonyx Consultancy, based in Kuching, East Malaysia, offering specialist services to environmental and development projects in Asia, the Middle East and Oceania. Strategic use of otters as wetland ambassador species to maximise opportunities for conservation-friendly development.

Ellie Sherrard-Smith, United Kingdom: As part of the Cardiff University Otter Project, I am working on otter parasites. *Pseudamphistomum truncatum* and *Metorchis albidus* (Platyhelminthes, Opistorchiidae) have been recently identified in the UK and together with the native tick species, *Ixodes hexagonus* (Acari, Ixodidae), comprise the main macroparasitic fauna of the Eurasian otter, *Lutra lutra*, in the UK. This presents a rare opportunity to study the dynamics of an invasive parasite on an island system.

Sabine Stolzenberg, Germany: My interest is the conservation of otters in the wild. Accordingly my work has been focussed on studying otter distribution and the identification of potential threats and/or barriers in the landscape. I have worked on Lutra lutra and am about to start an internship studying Lutrogale perspicillata in Malaysia.

Alexandra Switzer, USA: I am a veterinarian who is currently working on a PhD in Microbiology and Immunology, on classifying the oral and rectal microbiota of sea otters. I have also worked on attitudes to predation by mountain lions, jaguars and cheetahs, wildlife rescue and rehabilitation, other microbiological studies, and also a workshop on Avian Influenza in Bandar Lampung,Indonesia.

Meryl Theng, Singapore: Meryl is studying the ecology of the smooth-coated otter (*Lutrogale perspicillata*) in Singapore for her at the National University of Singapore under the supervision of Mr. N. Sivasothi. She will be widening her study to look at diet, population distribution and activity patterns of the species in Singapore.

Cristine Trinca, Brazil: I have been worked with conservation genetics with emphasis on genetic diversity, phylogeography, and demographic parameters of the Neotropical otter. My studies are focused on the analysis of different types os molecular markers and samples, including the use of non-invasive sampling, such as scats and hair.

Juan Valqui, Peru: I am currently working on a population genetics study of Lontra felina using non-invasive smapling along the Peruvian coast. At the same time, threats to the species are being assessed, and we are holding environmental education workshops in fishing ports.

Jitka Větrovcová, Czech Republic: monitoring techniques, research on ecology, behaviour, population dynamics, modelling, conservation approaches, solutions to conflicts with fisheries

C ON F E R E N C E S

29th MUSTELID COLLOQUIUM

3rd - 4th December 2011

Jury's Inn Hotel, Southampton, England

The scientific program includes invited plenary speakers, contributing presentations and poster sessions. Both oral and poster presentations are strongly encouraged. 54Depending on the number, posters are expected to be displayed during the whole meeting to promote variable viewing times.

General Instructions for Abstract Submissions

The paper should include new information, not presented in similar meetings. It should include: a brief introduction on the topic of research; its importance; brief description of the methods; major results; and the conclusions of the research. Abstracts that state "results will be discussed" will not be accepted. All abstracts should be sent to p.chanin@themammalsociety.org.uk and must be received by **July 31st 2011**

2nd Beaver Spring in 2012

In 2011, conservationists of Western Europe decided to organise an event to raise awareness of the European beaver: The Beaver Spring was born (Printemps des castors, , Biber Frühling). From Scotland to Switzerland, events, free lectures and field trips were organized by the specialists of the species.

The French Mammal Society (SFEPM) has decided to renew the event in France in 2012 (www.printempsdescastors.fr). So, I am pleased to invite you to participate in the 2nd Beaver Spring in 2012.

The event, which started with a project by the regions of northern France and Belgium, has rapidly expanded throughout France , Germany , Switzerland and Scotland . It shows the interest of conservationists for European beaver.

The Beaver Spring is a new tool to inform on the preservation of the species and aquatic mammals in general all over Europe. Above all, it creates the opportunity to

present the very important role that the European Beaver may have in the restoration of wetland biodiversity throughout Europe.

In order to even better prepare the Beaver Spring 2012, I'm looking for European partners. I plane to prepare a press review containing all the European articles about the event published in France and the neighboring countries. If you or your partners in your country are interested in supporting the Beaver Spring, do not hesitate to let me know.

If you have contacts in Europe you can also inform them of the Beaver Spring. In 2012 the event will be held from Tuesday 20 March to Wednesday 20 June. The main weekend will be Saturday 24 and Sunday 25 March.
Best regards

Samuel Dubie, French Mammal Society (SFEPM)
Chairman Living Water Northern France, North Otter and Beaver Group
sfepm@wanadoo.fr or samuel.dubie@neuf.fr
Phone : +33 (0)607757244

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

- **Running with otters**
  http://www.youtube.com/watch?v=n9APqLA2YKs

- **Anglers call on new weapon to ward otters off their fish – lions**
  http://www.independent.co.uk/environment/nature/anglers-call-on-new-weapon-to-ward-otters-off-their-fish-ndash-lions-2254765.html

- **Twycross Zoo has made its wildlife reference library publically available.**
  http://www.wildlifeinformation.org
  Information page for *Lutra lutra*
  http://wildpro.twycrosszoo.org/S/0MCarnivor/mustelidae/lutra/Lutra_lutra/Lutra_lutra.htm

- **Emellianna Bujak's Blog**
  http://worldofdifference.vodafone.co.uk/blogs/emmelianna-bujak/

- **A slide show about the release of the booklet "The Otter Tupi" can be seen at:** http://www.youtube.com/watch?v=g5qM9Rx8IYk

- **Instituto Ekko Brasil para a Conservaçao da Biodiversidade**
  www.ekkobrasil.org.br

SCREEN SHOT OF THE MONTH

http://www.iucn.org/about/work/programmes/species/?7958/IUCN-Ambassador-discovers-the-otter-world&utm_source=IUCN+SSC+Species+e-Bulletin&utm_campaign=69872bfa7e-SSC_Species_e_bulletin_August_20119_5_2011&utm_medium=email

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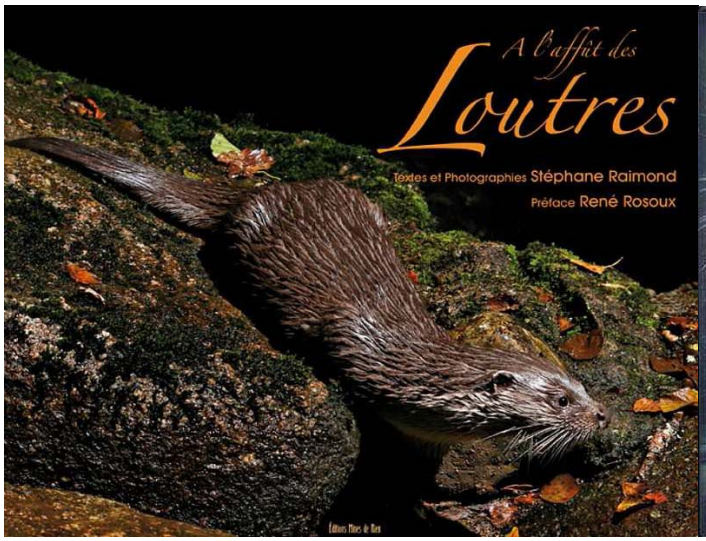
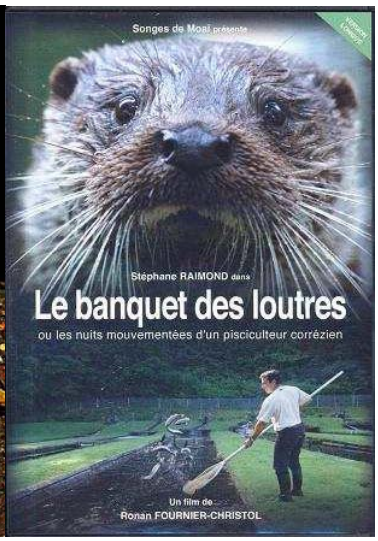
BOOKS

THE OTTER FRIENDLY FISHFARMER

A couple of years ago, Stéphane Raimond, a young fishfarmer from the region Limousin, France, had to face serious losses through otter predation. Never trying to "eliminate" the Problem, he looked for positive answers. Thanks to the help of local nature conservation organisations and to funding by the "Direction Régionale de l'Environnement du Limousin", his trout-farm could be protected by an otter-proofed fence.

After many nights spent observing otters in order to find a way to keep them away from his fishes, Stéphane Raimond started to get fascinated by those animals. Nowadays, he is even one of their protectors and became famous in France as the "otter friendly fishfarmer". Stéphane wrote a book to tell his story, "A l'affût des loutres", with plenty of great otter pictures taken by himself. The story is also told in a film "Le banquet des Loutres" available on DVD. Book and DVD (only available in French) can be purchased from the French Mammal Society (www.sfepm.org/boutique.htm).

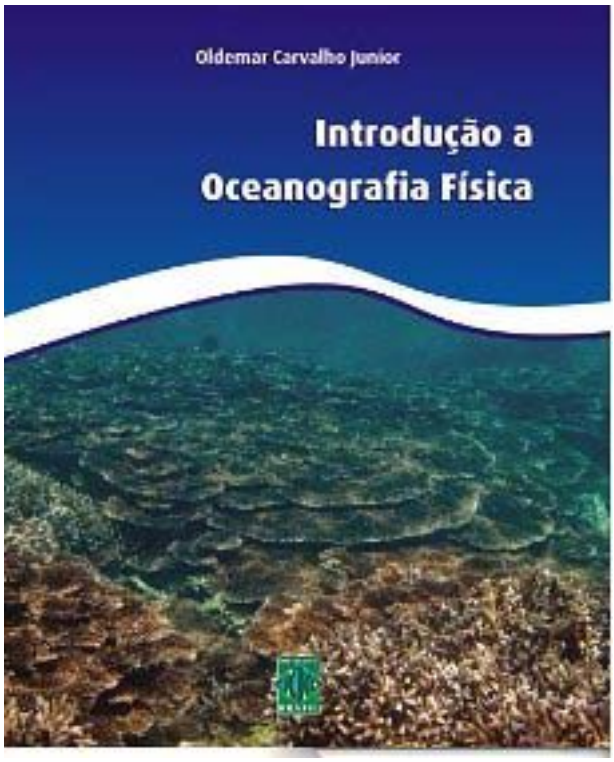




INTRODUÇÃO A OCEANOGRAFIA FÍSICA
(Portuguese Edition)

Oldemar Carvalho Junior, Member OSG

Este livro tem como principal objetivo servir de referência básica à cursos de oceanografia, biologia e geografia que possuem no conteúdo disciplinas relacionadas à oceanografia física. O conteúdo também serve como introdução ao estudo da dinâmica oceânica, em particular, à interação entre oceano e atmosfera e modelos de circulação em larga escala. A parte matemática é colocada dentro de um mínimo aceitável. Os aspectos relacionados com a interação entre o oceano e atmosfera são abordados nos dois primeiros capítulos. O capítulo 3 apresenta as leis fundamentais em oceanografia, analisando as equações do movimento através de uma descrição detalhada de cada componente. O capitulo final trata dos principais parâmetros da oceanografia física, a temperatura, a salinidade e a densidade. Esperamos que essa publicação seja útil aos alunos e outros interessados, e consiga transmitir um pouco da grandiosidade desse tema tão excitante que é a oceanografia física.
(available at Amazon).



THE OTTER

James Williams, Member OSG

Back from the brink of extinction, the otter is making a come-back in Britain today. Author James Williams, a life-long enthusiast of this fascinating, enigmatic creature, dispells some the mysteries in this beautifully-illustrated book: Reasons for the near-disappearance of the otter in the 1980s and the reasons for its recovery today; Why otters patrol their territories and fight for them; Breeding, natural history and behavior; Unusual otter information: blind otters, the work of otter groups, the difficulties of introducing otters in the wild, their surprising ability to live close to man; Otters as predators - their impact on fish stocks, the difficulty of fish-hunting in cold water, their favourite foods; Tracking otters through their prints, and through their spraints; Helping the otter to survive in the 21st century.
James Williams has spent a lifetime otter watching, from his boyhood in the Lake District, to his adult life in Somerset. He taught English in Taunton, but his west-country residence gave him the opportunity to study and record the changing fortunes of this elusive and fascinating mammal, from its near-extinction in the mid-1980s to its remarkable, though precarious, recovery today. Actively involved in many initiatives to monitor and aid the otter's restoration, Chairman of the Somerset Wildlife Trust's Otter Group, James continues to train and inspire a new generation of otter-enthusiasts through his popular training days and his role in various surveys."
(available at Amazon).