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CONTENT

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NOTE FROM THE EDITOR

Thanks to the efforts of several authors and reviewers you can find a wide variety of articles and reports in this issue. I am very happy that more species from different continents are covered this time. This issue is once again a very thick one, at the maximum size for the printing machine. I can tell you that the reviewers have accepted another 3 articles and reports, and that the manuscripts are under revision by the authors.

Morten Elmeros, Liana Geidezis, Romana Hartl, Roel Hoeve, Jordi Ruiz-Olmo, Dave Rowe-Rowe, and Jevgeni Shergalin provided references for the list, which is not complete due to the shortage of space. I am very keen to gain information on unpublished reports, theses, etc., which may not be found by standard searches. I did not include references in this list, which may be found by mean of electronic search programmes. Furthermore, you can also find information on new books, and upcoming congresses. Please note the two calls for information and contact the searching parties directly.

The printing of this issue was sponsored by 'Amt der OÖ. Landesregierung Naturschutzabteilung'. Roel Hoeve once again organised the postage of a part of this issue.

Caterina Carugati (Italy) provided the photo of *Aonyx capensis*. I would like to ask all of you to contribute photos for the title pages for coming issues.

Kevin Roche (Třeboň) functions again as a reader for those contributions, which are not reviewed by at least one native speaker. Alvaro Soutullo (Uruguay) translated the abstracts into Spanish. I have to thank the 'Otter Bulletin Team' - Barbara Gutleb-Rainer (Oosterbeek), Hans van den Berg (Wageningen), and Els Hoogsteede-Veens (GRAFISCH SERVICE CENTRUM VAN GILS, Wageningen) - for their continuing help. Tobias and Helena did all the work with the envelopes.

IUCN/SSC OSG GROUP

FROM THE CHAIRMAN'S DESK

More than 400 e-mails, faxes or letters since the last issue of this bulletin - this is my personal balance of the efforts to revise the Otter Action Plan (OAP). Step by step we are going ahead but, unfortunately, these steps are too small. As is visible from table 1, the interim results are quite different for the three main chapters. For chapter 1 ('Introduction to the biology of the subfamily Lutrinae') the drafts for all three African species and one Asian species (*L. perspicillata*) have arrived and the chapter for *L. lutra* is already almost completely revised. This latter species is also the only one (of 13!) where a draft for chapter 2 ("Conservation") is completely written. Thanks to the initiative of Janice Reed-Smith and Sheila Sykes-Gatz, drafts for the sub-chapters on *L. canadensis* and *P. brasiliensis* in captivity are also available. However, that's all I have got so far for one of the most important parts of the OAP!

Thanks to the great efforts of Jan Nel, Dave Rowe-Rowe, and Helene Jacques, the drafts of the status reports for nearly all the African countries have already been completed. This is true, unfortunately, for only half of the European, and a quarter of the Asian country reports. Further, more than 12 months after sending out the manuscript instructions, not a single line has arrived to date from Latin America, North America, and for the sea otter!

Table 1. Revision Chapters 1-3 Of Oap State: November 15, 1999

	Chapter 1	**Chapter 2**	**Chapter 3**
	Biology	*Conservation*	*Country reports*
Africa	3 out of 3 ready for 2nd revision	0 out of 3	52 out of 54 ready for 2nd revision
Asia	1 out of 3 ready for 2nd revision	0 out of 3	9 out of 43 ready for 2nd revision
Europe	1 out of 1 ready for 3rd revision	1 out of 1 ready for 2nd revision	25 out of 47 ready for 2nd revision
Latin-America	0 out of 4	1 sub-chapter (captivity *P. brasiliensis*) ready for 2nd revision	0 out of 34
North-America	0 out of 1	1 sub-chapter (captivity *L. can*adensis) ready for 2nd revision	0 out of 61
Sea otter	0 out of 1	0 out of 1	0 out of 3

But this is not my only pain. Twelve months ago I invited, as decided in Trebon, several people to participate in the preparation of chapter 4 (‘Review of current research techniques’). The intention of this chapter was to give an overview of study designs and research techniques already used in otter research - independent of the otter species or the continent. The target was to offer people starting work on otters ideas for studies, help them avoid mistakes in study designs (already done by others), and to summarise examples from other, well studied, otter species, such that information could be collected for otter species which have not been studied so intensively. All regional co-ordinators of the OSG have been asked to nominate specialists for the ten topics of this chapter, additional to those who were nominated at the last Otter Colloquium in Trebon. However, it seems that something went wrong - so far, only two (4.8 and 4.10) of the ten sub-chapters are being worked on.

Having edited several books, I am not in a panic about this situation, quite the contrary. I fully expected these problems, knowing that it would be a great challenge to bring more than 100 authors from all over the world "under one umbrella". First, therefore, I want to thank all the people who have already contributed to this important project of the OSG. Second, I want to remind all the people who have promised to contribute to the OAP to keep their promises - and to send their manuscripts immediately. Thirdly, I ask all otter specialists to have a look at table 2 and decide whether they can contribute to one of the topics of chapter 4, or if they are prepared to act as a co-ordinator for one of the sub-chapters which are not being worked on so far.

Asking people for manuscripts, reminding authors of deadlines, and revising manuscripts of the OAP, has kept me so busy over the last few months that some other projects I had planned for this year had to stay in the background. I hope for your understanding over this.

The only new information I have from the European 'Reintroduction Advisory Committee' (RAC) is the completion of a legal opinion from the University of Bremen on ‘the preconditions for the release of otters on the basis of EU and other international legal regulations’. Unfortunately, it is in German and we have to find someone who is prepared to translate these very interesting 36 pages into English. Apart from that, we are still waiting for the draft of the ‘catalogue of minimum preconditions’ that should be met by otter release projects, which Addy de Jongh agreed to prepare.

We are also waiting for the completion of the ‘husbandry guidelines for *Lutra lutra*’, and I am happy to hear that Sheila Sykes-Gatz and some other colleagues are working on ‘husbandry guidelines for *Pteronura brasiliensis*’.

The 'Otter Habitat Network Europe' (OHNE) project is showing good progress - despite unbelievable problems in getting digitised data for GIS mapping. The first habitat corridors have been identified for Germany, and will be introduced to the German otter people in early February. As a first step on the international level, it is planned to complete the ‘European otter distribution map’ - in a digitised form. It sounds unbelievable, but there was no 10x10km UTM grid available in a digitised form for the whole of Europe. It has therefore been necessary to develop it ourselves. On this basis, all European otter

specialists will be contacted in the near future and will be asked to provide their data for this map. The advantage of this 'electronic' map will be its much higher reliability, a much higher possibility fo its completion, and the chance to make it available via internet (e.g. for GIS applications).

Our Asian colleagues have been very busy too. Organised by the Asian Section of the OSG, the Otter Research Group of Japan, the National Taiwan University, and the Tung-Hai University, a four-day workshop on 'conservation and public awareness of otters' will be held at Taichung, Taiwan, in December. This meeting follows the successful workshop on survey methods, which was held in Thailand in November 1997, and is the result of the great fundraising efforts of our Japanese colleagues, Motokazu Ando and Hiroshi Sasaki, in particular.

The results of this workshop, and some of the other small steps the OSG is undertaking, will be introduced in the next issue of the bulletin. Till then, I wish all otter people a good start into the year 2000. Two dates for the New Year should be noted early. On October 4 - 11, 2000, the 'World Conservation Congress' of the IUCN will take place in Amman, Jordan (see http://www.iucn.org). Next, on November 4 - 7, 2000, an international workshop entitled 'How to implement the OAP?' is planned at the German otter centre (information will be available from around May 2000 onwards at http://www.otterzentrum.de).

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RESUMEN- Desde el escritorio del presidente

Más de 400 e-mails, faxes y cartas desde el último número de este boletín, ese es mi balance personal de los esfuerzos por revisar el Plan de Acción para Nutrias (OAP). Paso a paso estamos avanzando, pero desafortunadamente esos pasos son muy pequeños. Para el capítulo 1 (Introducción a la biología de la subfamilia Lutrinae) han llegado los manuscritos de las 3 especies africanas y una asiática, y el capítulo de *L. lutra* ya está casi complemente revisado. Esta especie es también la única (de 13!) para la que existe un manuscrito del capítulo 2 (Conservación). También están disponibles los manuscritos de los subcapítulos sobre *L. canadensis* y *P. brasiliensis* en cautiverio. Sin embargo, eso es todo lo que tengo hasta ahora para una de las partes más importantes del OAP. Han sido completados los manuscritos de los reportes sobre el estado de casi todos los países africanos. Esto es verdad sólo para la mitad de los europeos y un cuarto de los asiáticos. No ha arribado una sola línea sobre Latinoamérica, Norteamérica y la nutria marina. Hace 12 meses invité a varias personas a participar en la preparación del capítulo 4 (Revisión de técnicas actuales de investigación), hasta ahora sólo 2 de los 10 subcapítulos están siendo trabajados. Habiendo editado varios libros no me pone en pánico la situación, por el contrario, esperaba estos problemas, sabiendo que sería un gran desafío poner a más de 100 autores de todo el mundo "bajo el mismo paraguas". Entonces, primero quiero agradecer a todas las personas que ya han contribuido con este importante proyecto del OSG. Segundo, quiero recordar a todos los que han prometido contribuir con el OAP que mantengan sus promesas. Tercero, solicito a todos los especialistas en nutrias que decidan si pueden contribuir a alguno de los tópicos del capítulo 4. Pedirle a la gente manuscritos, recordar fechas límites a los autores y revisar manuscritos para el OAP me ha mantenido tan ocupado los últimos meses que otros proyectos que había planificado para este año tuvieron que permanecer en segundo plano. La única información que tengo del "Comité europeo asesor en reintroducciones" es la elaboración de una opinión legal de la Universidad de Bremen sobre "las precondiciones para la liberación de nutrias sobre las bases de la UE y otras regulaciones legales internacionales". Aparte de eso, aún aguardamos el manuscrito del "catálogo de precondiciones mínimas" que deben alcanzarse por los proyectos de liberación de nutrias. También aguardamos que se completen los "lineamientos de crianza para *Lutra lutra*", y estoy feliz de saber que se está trabajando en lineamientos para *Pteronura brasiliensis*. El proyecto "Red Europa de hábitats para nutrias" (OHNE) está avanzando. Nuestros colegas asiáticos han organizado un taller de 4 días sobre "conciencia pública y conservación de nutrias", a realizarse en Diciembre en Taiwan. Los resultados del mismo y otros pequeños pasos que el OSG está dando van a ser introducidos en el próximo número del boletín. Hasta entonces le deseo a toda la gente de nutrias un buen comienzo del año 2000.

V I E W P O I N T

PROTECTING OTTERS IN A NON-MEGADIVERSE THIRD WORLD COUNTRY

Alvaro Soutullo

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The world-wide protection of areas of great conservation value should be everybody's concern, as the loss of biological diversity is everybody's problem. As most of these areas are located in poor or developing countries with few opportunities to invest in biodiversity conservation, the rest of the countries, and especially those with better economic conditions, should support the protection of those key areas. It is on behalf of everyone that, for example, Amazonia should be protected. Why demand Brazil, Bolivia, Ecuador, Peru, or Colombia to do so, when these countries have severe economic and social problems to attend to. Local people sense that these problems are more serious than conservation, whilst local political agenda's will consider them of much higher priority. Wildlife conservation, therefore, is not actually a national priority for third world countries. Only a fool expects that their national government would invest large amounts of money to avoid the loss of biological diversity. Besides, they are not the only people responsible for the degradation, and we shouldn't consider that they are the ones that must solve the problem. We live in one world, and the loss of biological diversity is a problem that we all have in common. What happens in one part of the world rebounds in other parts, and is also probably a consequence of something that happened somewhere else. That is a lesson we should have already learnt. It is true, Amazonia is being affected by South American people, but the machines and the oil used for that, as well as most of the products of the cutting, and the profits it gives, comes from and goes to somewhere else. Since species richness seems to be maximal in the tropical regions, international efforts for conservation have been directed to the countries in those regions. But what about those regions that are not so 'rich'? The third world is not an enormous rainforest full of species unknown to science. None of them are Latin American. What is to be done, therefore, about conservation in third world countries located outside tropical regions? Where will the funds for that come from? Is it unimportant to avoid nature degradation there? Is the number of species the critical variable to consider when evaluating what to conserve? Isn't protection of local ecological processes also a priority? Should we remain resigned to loosing areas of the world still not critically disturbed because of the current lack of interest in them? Should we wait to have an area degraded before thinking of conserving it? Wouldn't it be more wise to invest the few economic resources destined for conservation before the degradation problems get too serious, when the damage may be stopped or reverted without enormous efforts? For those of us living in countries where bio-diversity is not astonishingly high, it is very difficult to get foreign resources for research and conservation (and of course, as already mentioned, almost impossible to get funds from local governments).

What should the OSG position be regarding these topics? These are real problems for those, like me, who work in conservation in a region where, besides receiving almost no foreign support, the national funds for conservation are few. In the previous issue of this bulletin, Andreas Kranz suggested that "more support should be addressed to those people working with otters in South America". For me, living as I do in South America, this is good to hear. However, I have two observations about Andreas's statement:

1) Other regions in the world have the same problems we have here in South America. Support for people working with otters in these countries should also be a focal point for the OSG.
2) Not every country in the third world has the same access to support from foreign and international organisations. Countries with more problems to access such funds, and those where conservation and research on otters is incipient or null, should be a particular concern for the OSG.

During the VIIth International Otter Colloquium in Trebon, some of the attendants discussed the need of looking for ways to support the work of those of us with more problems in carrying out our research and conservation efforts with otters. Some of the possible ways to support our work discussed were:

a) Supporting the organisation of regional meetings.

b) Supporting fellowships to allow people of countries of the same region to participate in each other's projects, thereby enhancing mutual co-operation.
c) Supporting fellowships to allow the improvement of skills of third word researchers and conservationists, thereby helping them to carry out successful projects at home and allowing them to attend courses and participate in otters projects in developed countries.
d) Providing assistance and advice for fundraising, project writing, and publication of scientific results.

Maybe this is a good time to recall those conversations and start thinking about how to start working together to conserve otters world-wide in the next millennium.

ARTICLE

SURVEY OF DANISH FREE LIVING OTTERS *Lutra lutra* – A CONSECUTIVE COLLECTION AND NECROPSY OF DEAD BODIES

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(received 8th July 1999, accepted 23rd July, 1999)

Abstract: During 1979-1993 194 dead Danish otters *Lutra lutra* were received. Of these, 145 were necropsied and the cause of death, sex, age and body condition determined. Traffic mortality (45.4%) and drowning (32.5%) constituted the major cause of death. Shot-gun lead pellets were detected in 5% of the otters. Inclusion bodies indicating distemper virus infection were found for the first time in a free living otter population. *Angistrongylus vasorum* larvae were found in the lungs of free living otters for the first time. No ectoparasites were found. Infectious agents were detected in 22.1 % of the otters although only few otters appeared to have died from infections. The age distribution was not significantly different between the two sexes. Body condition for otters, which died violently in Denmark was comparable to findings in Shetland, where thriving populations exist. The results showed a considerable decrease in number of otters found drowned in fish traps coinciding with the introduction of stop grids in fish traps in 1986. The results suggest that the existing otter population in Denmark is healthy and in good condition but it cannot be excluded that the large number of otters killed by traffic threatens the continued expansion of the species.

Keywords: European otter, *Lutra lutra*, necropsy, causes of death, Denmark

INTRODUCTION

The Eurasian otter *Lutra lutra*, is a highly vulnerable mammal in Denmark as well as in much of Europe (MACDONALD and MASON, 1994). In 1996 a national survey (HAMMERSHØJ et al., 1996) concluded that the species occurs in the northern part of Jutland; in the counties of Nordjylland, Viborg, Ringkøbing, Århus, Ribe and Vejle. On Zealand, in the county of Vestsjælland, no signs of otters were found in the national survey, but in a more detailed survey undertaken parallel to the national survey (LETH and BYRNAK, 1996), signs of otters were found at two sites (Fig. 1).

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It has been clai, and mercury have been responsible for the rapid decline in otter populations in Europe (MACDONALD and MASON, 1994). Decreasing otter population in Denmark was thought mainly to be due to river regulation, wetland destruction, drowning in fish traps, and intensified traffic (MADSEN, 1991). med that contaminants such as the organochlorine pesticide dieldrin, polychlorinated biphenyls

Otter carcasses have been collected annually in several European countries. In Germany eg. more than 50 otters were found dead each year, but only a small number of these were necropsied (ZOGALL and REUTHER, 1992). Likewise only 24 of 113 dead otters collected in Shetland were necropsied (KRUUK and CONROY, 1991). In south-west England only 77 wild otters were examined post-mortem (SIMPSON, 1997).

In this paper a comprehensive necropsy results of 145 carcasses submitted from a population of free living otters are evaluated to assess current threats to otters.

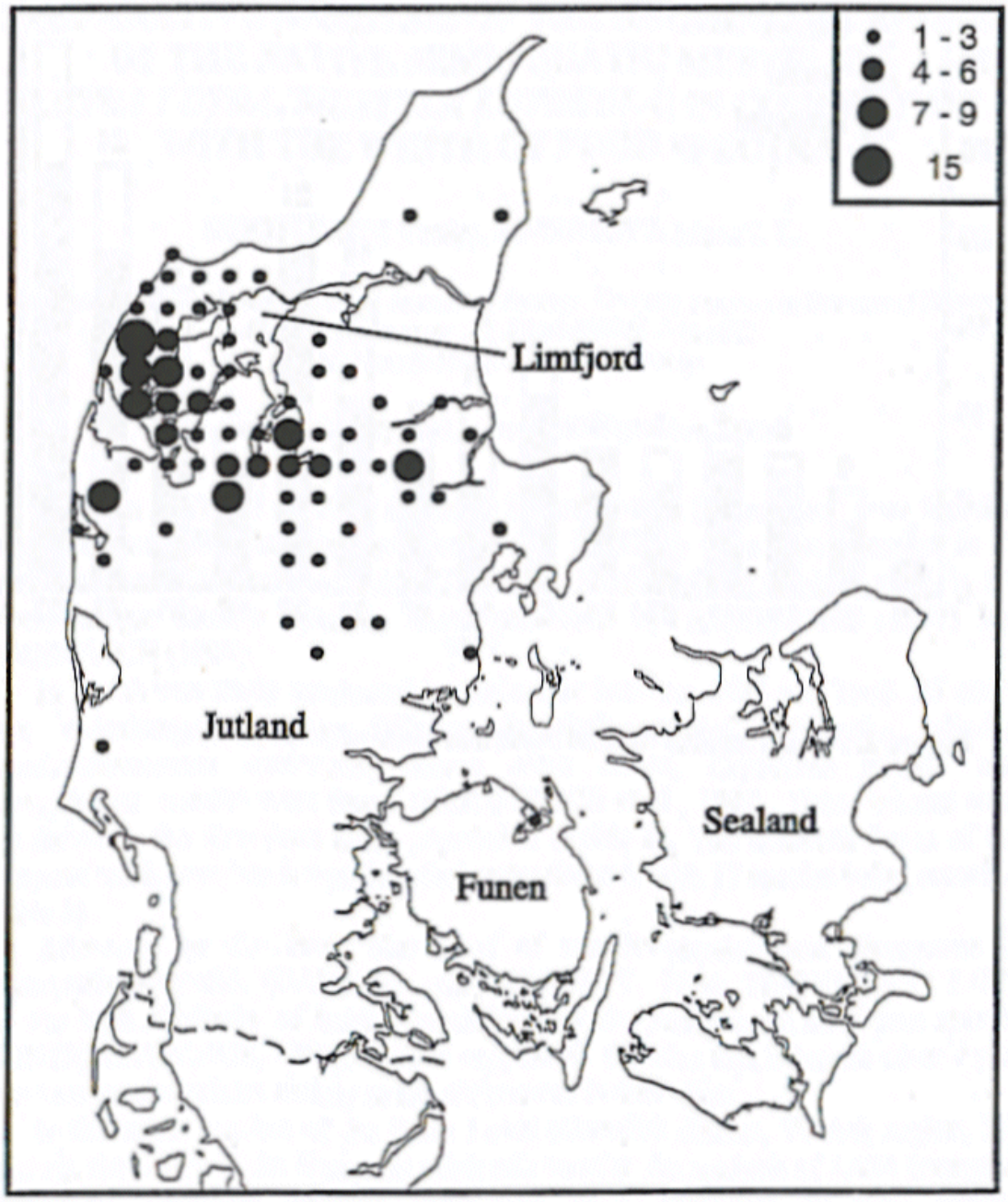

Figure 1. Geographical distribution of dead otters (n=193). The origin of one otter is unknown

MATERIALS AND METHODS

Dead otters were received from hunters, motorists, anglers, forestmen etc. The otters were usually followed by written information about circumstantial evidence like killed on a road, died in a fish trap etc. Carcasses were frozen immediately upon arrival and stored at -18° C until necropsy was performed.

Necropsy

After thawing, the length (nose to tail) and weight was recorded. The animals were pelted followed by a routine necropsy procedure, including a search of the subcutis for lead pellets. Otters were aged as juveniles (less than about 5 months old) if tooth replacement was incomplete, as subadults (5-18 months) if the epiphyseal closure of humerus and femur at their proximal and distal ends was not complete or as adults (older than about 18 months). In males the length of the os penis was also used in ageing (van BREE et al., 1966). The craniums were cleaned from muscles etc. and the upper and lower jaw was inspected by a dentist.

Laboratory tests

Lungs and gut contents were examined for parasites, eggs and larvae from parasites using McMaster and modified Baerman techniques (HENRIKSEN, 1965, HENRIKSEN and KORSHOLM, 1984). Scrapings of epithelial lining from thrachea, lungs, and urinary bladder from otters necropsied later than 1988 were examined for viral inclusion bodies using S3-staining and a routine immunohistochemical method to detect distemper virus. Bacteriological examinations (Aerobic cultures on blood agar), were performed on material from the digestive tract, lungs and kidneys.

The body condition (K) of otters was calculated using the equation $K=W/(a \times L^n)$ where W=weight (kg) and L=total length (m) according to LE CREN (1951). The constants were those calculated by KRUUK et al. (1987) viz. a=5.02 for females, 5.87 for males; n=2.33 for females, 2.39 for males.

To test for differences in age distribution between the two sexes, a Chi^2-test were used. Differences in length and weight of the two sexes and differences in body condition index were tested using a F-test.

RESULTS

194 otters were received of which 145 were necropsied. 52 otters were X-rayed. For some of the animals complete data were not received. Therefore, the number of individuals in the various examinations is inconsistent (Table 1).

Table 1. Salient data and the number of animals included

type of data presented	number of animals
total received	194
origin stated	193
sex determined	192
age determined	178
length and weight determined	158
necropsied	145
x-rayed	52

The geographical origins and densities of the otters are given in Figure 1. The vast majority came from the Limfjord area. One individual found in 1979 came from the island of Funen. Half of the otters were found in or close to marine habitats. The annual number of carcasses received varied from two in 1979 to 31 in 1993 (Fig. 2). Major causes of death were identified as traffic mortality (88=45.4 %) and drowning (63=32.5 %).

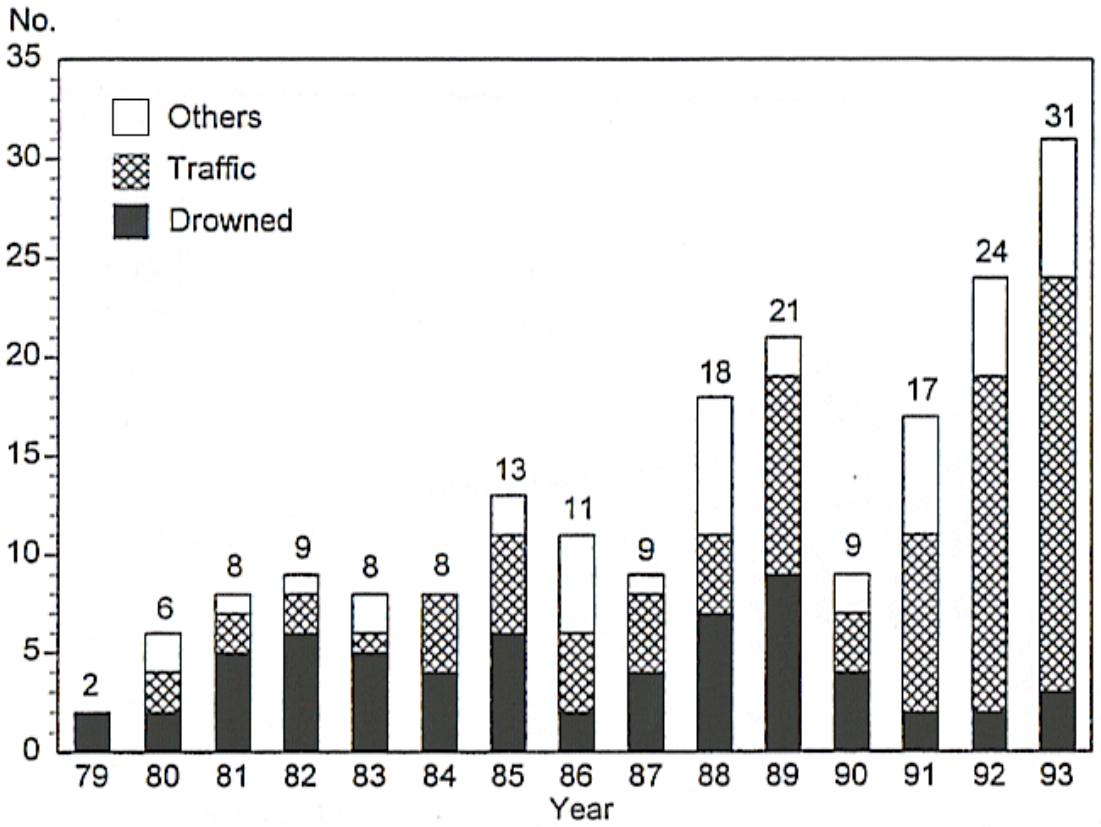

Figure 2. Annual number of dead otters and cause of death (n=194)

No significant difference was found in age distribution between the two sexes, (χ^2=0.43, d.f.=2, N.S.) (Table 2). Considerably more males (113) than females (79) were received during the survey. The weight and length of adult males were significantly larger than for adult females (t=9.60, df=65, *P*<0.001, weight; t=20.35, df=67, *P*<0.001, length). The condition index (K) of the otters had an overall mean value of 1.12, animals that died violently (traffic accidents and fish traps) had a value of 1.16 (Table 3).

Table 2. Sex and age distribution of dead otters

	females	males	unknown	total
juvenile	8	12	-	20 (10.3%)
subadult	30	48	-	78 (40.2%)
adult	34	44	2	80 (41.2%)
unknown	7	9	-	16 (8.3%)
total	79 (40.7%)	113 (58.2%)	2 (1.0%)	194 (100%)

Table 3. Weight and length of adult otters and calculated condition indices (K).

	x	s.d.	range	N
weight (kg)				
male	9.07	1.35	5.45-11.40	37
female	6.02	1.17	3.36-7.60	30
length (cm)				
male	112.9	5.06	90.0-130.0	36
female	103.0	3.17	95.5-110.0	33
condition index (K)				
non-violent	0.94	0.18		30
violent	1.16	0.16		124
sum	1.12	0.18		154

The results of necropsy and the corresponding pathological findings are detailed in Table 4. No ectoparasites were found. Signs of endoparasites were found in only 5 individuals viz. two with one egg of *Ascaridae* per gram in the intestinal tract, one with one egg of *Strongylidae* per gram in the intestinal tract and one with *Angiostrongylus vasorum* larvae in the lungs. Two tapeworm *Cestodae* eggs per gram were found in the intestinal tract of one individual.

Table 4. Numbers and types of pathological findings recorded at necropsy of dead otters (n=145).

pathological findings	number of animals	
parodontal disease	11	(7.6%)
endoparasites	5	(3.4%)
Ascaridae	2	
Strongylidae	1	
Angiostrongylus vasorum	1	
Cestodae	1	
viral infections	6	(4.1%)
distemper virus	6	
bacterial diseases	7	(4,8%)
pneumonia	5	
peritonitis	1	
Streptococcus sp.	1	
kidneystone	3	(2.1%)
gallstone/enlarged gall bladder	2	(1.4%)
hepatitis	2	(1.4%)
hypertrophied suprarenal gland	2	(1.4%)
tumour in spleen/enlarged spleen	2	(1.4%)
tumour in the small intestine	1	(0.7%)
umbilical hernia	1	(0.7%)
blindness	1	(0.7%)
total	43	(29.7%)

Inclusion bodies were found in 6 individuals, three females and three males of different age. These otters were all collected in the Limfjord area. The six otters were not believed to have suffered from clinical distemper.

Due to often severe decomposition bacteriological examination could only be applied to eight otters. Pneumonia due to bacterial infection was found in five individuals, four females and one male of which two were juveniles. One abandoned juvenile died from bacterial peritonitis two weeks after taken into captivity. Local infection with *Streptococcus sp.* was recorded in one animal.

Kidney stones consisting of ammonium urate were found in three adults, two males and one female, and two otters had a gall bladder enlarged by gall-stones. Two otters showed hypertrophy of the

suprarenal glands. A small intestinal tumour possibly a leiomyoma (severe decomposition) and a minor umbilical hernia was seen in two otters, respectively. The eyes of one adult, male otter were completely opaque, probably causing total blindness.

Lead pellets were found in 9 otters (5%) in numbers from one to five pellets except for one individual carrying 14 pellets. The lead pellets were generally found in the pelt or subcutaneously and none were found in or close to vital organs. Parodontal disease was detected in 11 otters indicating a relatively high proportion of diseased animals.

DISCUSSION

Based on condition (K) of violent death otters there was no significant difference between otters from Denmark (Table 3) and from Shetland (KRUUK and CONROY 1991, K=1.08±0.15, n=49), (t=2.99, d.f.=171, N.S.) where thriving populations exist. The results agree with condition indices estimated by the authors from Danish data collected by JENSEN (1964) (K=1.13±0.16, n=81).

The increase in the annual numbers of submitted otters during the survey period (Fig. 2) might indicate an expanding population of otters (MADSEN et al. 1992) but a greater public awareness of otters cannot be excluded as the underlying cause of the increasing number of submissions.

The present results show that males achieve a larger overall size than females. MASON and MACDONALD (1986) classified animals weighing more than 4 kg as adults. In our study adults were classified as individuals with fully developed growth. One female with pneumonia but no emaciation weighed as little as 3.36 kg confirming that the weigth and length alone may not be used as an indicator of age.

No ectoparasites and only small numbers of endoparasites were found. This indicates that in the present situation the otter is not parasitised very often, probably due to their solitary living and the relative scarcity of the species. However, decaying before collecting the dead otters combined with freezing might have disintegrated some parasites and larvae.

Except for the larvae of *Angiostrongylus vasorum* all other endoparasites recorded have been described earlier to occur in otters (JEFFERIES et al., 1990; SCHIERHORN et al., 1991; WEBER 1991). Otters forage on frogs, which might act not only as paratenic but also as intermediate hosts for *A. vasorum* (BOLT et al., 1993, 1995). None of the parasites recorded were considered to have influenced the health status of Danish otters.

Distemper virus in captive Eurasian otters was described by GEISEL (1979) and STEINHAGEN and NEBEL (1985). Our study is the first to record distemper virus in a free living population of otters, with the exception of two individuals from Austria (LOUPAL, in press). The fact that the infected otters were collected from the Limfjord area in a period, when distemper virus was present both in the common seal *Phoca vitulina* (BLIXENKRONE-MØLLER et al., 1989) and in major outbreaks of distemper in farmed mink in this area, indicates a wide range of host species for distemper virus. Negative findings in the remaining material may indicate a low propagatory rate of the virus in the population, but may also relate to the solitary life of otters and hence a low contact between animals.

Two cases of hepatitis probably causing severe health problems were seen. Pneumonic changes were found in five of 145 necropsied free living Danish otters. This corresponds to the findings of KRUUK and CONROY (1991) who found one case among 24 necropsied otters. Pneumonia has not hitherto been recorded in captive animals (ROGOSCHIK and BRANDES, 1991). One individual was recorded as blind in our study. WILLIAMS (1989) also reported blind otters from Britain during the period 1957-80.

Based on our study we would argue that only the two animals with hepatitis, and the five animals with pneumonia were likely to have died because of the diseases detected. In addition, one animal with peritonitis definitely died from this disease.

Since 1967, the Danish otters have been protected by law. During the period 1967-1982, fish farmers could be granted a special permission to kill otters at fish ponds but this exemption was terminated in 1982. However, this study shows that totally protected animals are still shot at. To the less experienced

hunter an otter may be mistaken for a free living mink of which more than 8.000 are shot annually in Denmark (ASFERG, 1999).

The level of PCBs in otters from Denmark (MASON and MADSEN, 1993) is at the same level as found in 1988 among young common seals in the Limfjord area (STORR-HANSEN and SPLIID, 1993) and much lower than the 50 mg/kg which causes reproductive failure among mink in laboratory studies and which is assumed to be a critical level for otters as well (KEYMER et al., 1988; SMIT et al., 1994).

It is seen (Fig.2) that the number of otters dying in fish traps has decreased. It is believed that this is the successful effect of a 1986 compulsory use of stop grids in fish traps for fishermen (MADSEN and SØGAARD, 1994). It should be noted that traffic mortality constitutes 45% of the total mortality (males as well as females, young as well as adults) indicating the need for preventive measures where roads are crossing rivers in Denmark.

In conclusion, our results suggest that the population of otters seems healthy and in good reproductive condition (ELMEROS and MADSEN, 1999), although traffic mortality may constitute a threat to the spread of the population.

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RESÚMEN : Relevamiento de nutrias danesas *Lutra lutra* en libertad. Una colecta y necropsia consecutiva de cuerpos

Durante 1979-1993 fueron recibidas 194 nutrias danesas *Lutra lutra* muertas. A 145 de estas se les realizaron necropsias y se determinaron la causa de muerte, sexo, edad y condiciones corporales. La mortalidad debida al tráfico (45,4%) y el ahogamiento (32,5%) constituyeron las principales causas de muerte. Perdigones de armas de fuego se detectaron en el 5% de las nutrias. Se encontraron por primera vez en una población en libertad de nutrias cuerpos inclusivos indicando infección por virus. Se encontraron larvas de *Angistrongylus vasorum* en pulmones de nutrias de vida libre por primera vez. No se encontraron ectoparásitos. Se detectaron agentes infecciosos en el 22,1% de las nutrias, aunque pocas nutrias parecen haber muerto por infecciones. La distribución de edades no fue significativamente diferente entre sexos. Las condiciones físicas de las nutrias que murieron violentamente en Dinamarca fueron comparables con los hallazgos en Shetland, donde existen poblaciones prosperas. Los resultados muestran un decrecimiento considerable en el número de nutrias halladas ahogadas en trampas para peces con la introducción de rejillas de detención en las trampas para peces en 1986. Los resultados sugieren que la población de nutrias en Dinamarca es saludable y está en buenas condiciones, pero no puede descartarse que el gran número de muertes por tráfico amenaza la continua expansión de la especie.

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REPORT

COMPARATIVE ANALYSIS OF THE HELMINTHOCENOSES OF THE NATIVE SEMIAQUATIC MUSTELIDS (*LUTRA LUTRA, MUSTELA LUTREOLA*) IN CONNECTION WITH THE WIDTH OF FOOD SPECTRA

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Abstract: The helminth fauna of mink (*Mustela lutreola*) was compared with that of otters (*Lutra lutra*) and found to be more diverse. This probably reflects the fact that otters are more specialist predators than mink, and therefore exposed to fewer infesting sources of eggs and larvae.

Between 1987 and 1995, 38 dissected Eurasian otters (*Lutra lutra*) were found to be infested with five helminth species (Table 1). These were also common in 41 European mink (*Mustela lutreola*) (Table 2). Details of the method used in the helminthologic studies were as those described by ANISIMOVA (1997) and SIDOROVICH (1997).

Table 1. Helminth infestation of otter population in Belarus

Helminth species	**1987-** percentage occurrence of helminth species (n)	**1995** number of specimens. min-max (mean)
Euparyphium melis (Schrank, 1788)	34.2 (38)	6-79 (21)
Rossicotrema donicum Skrjabin et Lindtrop, 1919	2.6 (38)	3
Spirometra erinacei-europaei (Rud., 1819)	57.1 (49)	?
Capillaria mucronata (Molin, 1858)	18.4 (38)	1-6 (4)
Skrjabingylus nasicola (Leuckart, 1842)	8.2 (49)	?

In a previous study conducted by Shimalov between 1960 and 1980, 25 otters were examined and five different helminth species (*Metorchis albidus, Pseudamphistomum truncatum, Alaria alata* larvae, *Capillaria putorii, and Strongyloides martis*) were found (SIDOROVICH et al., 1997). These species were also found in the European mink population (Table 2). The helminth fauna of the European mink population was therefore more diverse, with 17 species being recorded (Table 2).

Table 2. Helminth infestation of the European mink population in Belarus

Helminth species	**1987-** HOC, % (n)	**1995** HN, sp. min-max (mean)
Euparyphium melis (Schrank, 1788)	40.0 (41)	3-14 (9)
Rossicotrema donicum (Skrjabin et Lindtrop, 1919)	11.8 (17)	2-4 (3)
Opistorchis felineus (Rivolta, 1884)	5.9 (17)	3
Metorchis albidus (Braun, 1893)	5.9 (17)	3
Pseudamphistomum truncatum (Rud.,1819)	5.9 (17)	2
Alaria alata, larvae (Goeze, 1782)	5.9 (17)	many
Spirometra erinacei-europaei (Rud., 1819)	90.0 (41)	?
Taenia mustelae (Gmelin, 1790)	11.8 (17)	1-2
Capillaria mucronata (Molin, 1858)	36.6 (41)	1-9 (6)
Capillaria putorii (Rudolphi, 1819)	35.3 (17)	2-32(9)
Trichinella spiralis, larvae (Owen, 1835)	25.0 (41)	1/28
Strongyloides martis (Petrow, 1940)	11.8 (17)	2-7 (4)
Skrjabingylus nasicola (Leuckart, 1842)	36.6 (41)	?
Filaroides martis (Werner, 1782)	31.7(41)	?
Molineus patens (Dui, 1845)	18.0 (17)	2-17 (10)
Ascaris devosi (Sprent, 1952)	11.8 (17)	2-3
Corynosoma strumosum (Rud, 1802)	5.9 (17)	4

HOC - occurrence of helminth species; HN - number of specimens of helminth species

Allowing for the fairly low level of morpho-physiological divergence in semiaquatic mustelids (DANILOV and TUMANOV, 1976; TERNOVSKY, 1977), and the high similarity of habitat conditions for the parasites in these two species (KONTRIMAVICHUS, 1963), there is support for the idea that helminth diversity in these two species relates mainly to the differences in their diets.

In the upper reaches of the River Lovat (Gorodok district, Vitebsk region, NE Belarus), the otter and the European mink still coexist. An analysis of 1,474 European mink scats, collected between 1986 and 1995, identified 49 prey species (SIDOROVICH, 1997). The occurrence of different prey categories in its diet was: amphibians - 47.4%, fish - 22.8%; small mammals - 11.1%, crayfish - 9.1%, birds - 2.7%, reptiles - 0.3%, water insects - 5.2%, and molluscs - 1.4%. At the same time, by analysing 802 otter spraints, only 29 prey species (mainly fish - 19 species) were found (SIDOROVICH, 1997). The occurrence of the main prey categories in its diet were as follows: fish - 51.8%, amphibians - 30.4%, crayfish - 14.3%. Other prey items comprised only 3.5%. To compare the overall diet diversity (food niche breadth) in the native semiaquatic mustelids, Levins's index (LEVINS, 1968) for occurrence of 8 prey categories was calculated. The food niche breadth of the European mink was 3.36, whereas that of the otter was substantially lower at 2.62.

These marked differences in diet suggest different probabilities of being infested by the high diversity of mustelid helminths, the European mink eating more prey species and, therefore, being exposed to a higher variety of infesting sources (either egg or larva) than the otter. Thus, the otter in Belarus, as a more specialised predator, is infested by fewer helminth species, whereas the helminth fauna of the European mink, a more generalised predator of stream valleys, was substantially more diverse.

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RESÚMEN: Análisis comparativo de la helmintocenosis de los mustélidos semiacuáticos nativos (*Lutra lutra, Mustela lutreola*) en relación con la amplitud del espectro alimenticio
Entre 1987 y 1995, 38 nutrias eurasiáticas (*Lutra lutra*) disecadas estaban infectadas por 5 especies de helmintos. Estos eran también comunes en 41 visones europeos (*Mustela lutreola*). En un estudio previo realizado entre 1960 y 1980 en el que se examinaron 25 nutrias, se encontraron 5 especies distintas de helmintos (*Metorchis albidus, Pseudamphistomum truncatum, Alaria alata, Capillaria putorii, Strongyloides martis*). Estas especies también se encontraron en la población de visones, por lo que la fauna de helmintos del visón europeo fue más diversa, con 17 especies registradas. Debido a las pocas diferencias morfofisiológicas en los mustélidos semiacuáticos, y a la gran similitud en las condiciones del hábitat para los parásitos de estas 2 especies, existe sostén para la idea de que la diversidad de helmintos en estas 2 especies se relaciona principalmente con las diferencias en sus dietas. Nutrias y visones aún coexisten en el tramo superior del Río Lovat (NE de Bielorrusia). El análisis de 1474 fecas de visones, colectadas entre 1986 y 1995, permitió identificar 49 especies de presas. La ocurrencia de diferentes categorías de presas en su dieta fue la siguiente: anfibios 47.4%, peces 22.8%, pequeños mamíferos 11.1%, cangrejos de río 9.1%, aves 2.7%, reptiles 0.3%, insectos 5.2%, moluscos 1.4%. En 802 fecas de nutrias sólo se encontraron 29 especies de presas (principalmente peces, 19 especies). La ocurrencia de las principales categorías de presas fue: peces 51.8%, anfibios 30.4%, cangrejos de río 14.3%. Otros ítems alimenticios comprendían sólo el 3.5%. Se calculó el índice de Levins para la ocurrencia de 8 categorías de presas para comparar la diversidad de dieta (amplitud del nicho trófico) entre los mustélidos semiacuáticos nativos. La amplitud del nicho trófico del visón fue 3.36, mientras que el de la nutria fue sustancialmente inferior, 2.62. Estas diferencias marcadas en la dieta sugieren diferentes probabilidades de infección debido a que el visón ingiere más especies de presas, teniendo una mayor variedad de fuentes de infección que la nutria. Por eso en Bielorrusia, la nutria, como predador más especializado, pudo ser infectada por menos especies de helmintos, mientras que la fauna de helmintos del visón, un predador más generalista, fue sustancialmente más diversa.

REPORT

RESULTS OF THE 1999 SURVEY OF THE REINTRODUCED SEA OTTER POPULATION IN WASHINGTON STATE

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Abstract: Fifty-nine sea otters were released off the west coast of the Olympic Peninsula of Washington State during the summers of 1969 and 1970; all had been translocated from Amchitka Island, Alaska. In 1970, 30 otters were released. Surveys to assess the results of this translocation began in 1977. Up to 1989, the population has grown at near the maximum rate of increase (r_{max}) for sea otter populations of 17-20% yr^{-1}. Since 1989, however, the rate of increase appears to have declined to about 11% yr^{-1}. The results of the survey this year are encouraging and indicate the population has been growing at a finite rate of about 11% since 1989.

Fifty-nine sea otters (*Enhydra lutris kenyoni*, WILSON et al., 1991) were released off the west coast of the Olympic Peninsula of Washington State during the summers of 1969 and 1970 (JAMESON et al., 1982); all had been translocated from Amchitka Island, Alaska. In 1969 the otters were released, with no time to acclimate or recondition their fur, directly to the open ocean. Sixteen of the 29 sea otters translocated in 1969 were found dead within 2 weeks on beaches near the release site. No doubt some carcasses went undiscovered. In 1970 release procedures were changed, and the 30 otters were allowed to acclimate for several days in floating pens prior to release. All were liberated in excellent condition. Thus, the initial nuclear population in Washington could never have been larger than 43 otters and may have dropped to less than 10 individuals by the early 1970's.

No surveys were conducted to assess the results of this translocation until 1977 (JAMESON et al., 1982, 1986). From 1977 to 1989, the population has grown at near the maximum rate of increase (r_{max}) for sea otter populations of 17-20% yr^{-1}. Since 1989, however, the rate of increase appears to have declined to about 11% yr^{-1}. In contrast, the sea otter population in central California increased at an overall rate of about 4-5% yr^{-1} until 1995, but has been declining since then.

METHODS

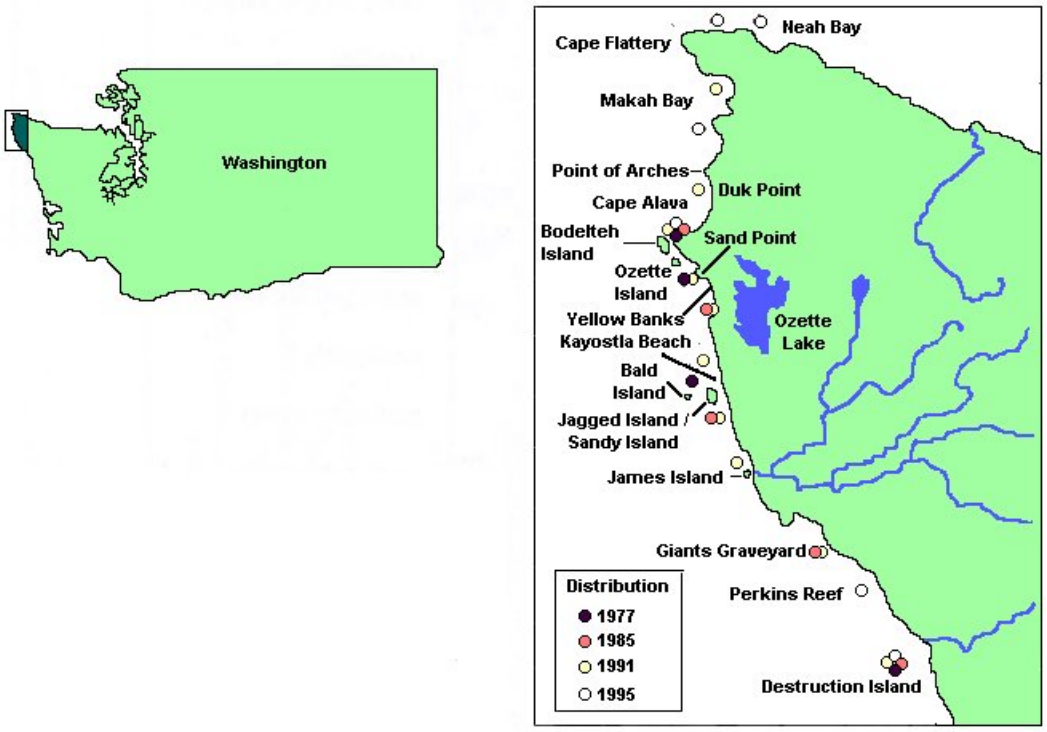
The survey was conducted from 6-9 July, 1999. The entire inshore area from Pt. Grenville (including Destruction Island) to the Sekiu River was surveyed, and counting conditions ranged from fair to excellent. The survey was conducted cooperatively by biologists of the Biological Resources Division of the United States Geological Survey, and the Washington Department of Fish and Wildlife. We wish to thank the U. S. Fish and Wildlife Service and the Washington Department of Fish and Wildlife whose funding support made this year's survey possible.

Most of the range was surveyed from a fixed-winged aircraft, but several ground stations were occupied (Sand Pt., Cape Alava, and Norwegian Memorial). Protocol calls for two surveys per day over a period of three days. Thus, when conditions are favorable, six surveys of the entire range are completed. Inclement weather on 7 July precluded aerial surveys. Only one survey of the entire range was completed on 6 July, and two each were completed on 8 and 9 July. Because of the lower than expected count in 1998 and observations made by BRD researchers indicating some large groups of sea otters were resting offshore 1-2 kilometers, we decided to modify the survey technique this year to include an offshore transect.

The survey total is calculated by summing the highest daily total for the south (Destruction Island to La Push) and north (La Push to Sekiu River) segments of the sea otter range. This assumes that there is

little or no movement between the two segments during the survey period. Examination of survey data from years past and this year and documented movements of instrumented sea otters by USGS researchers in Washington support this assumption. Large groups (>20) observed from the air were counted and photographed and recounted from the developed photographs. Counts from photographs were used when image quality was good.

Figure 1: Study area in Washington, USA



RESULTS

The highest count for the survey was 605 sea otters observed on 9 July under excellent conditions, an increase of nearly 40% from 1998 (Table 1). Since an increase of 40% is twice the maximum level of productivity for the species (KENYON, 1969; RIEDMAN and ESTES, 1990), and nearly 4 times the rate of increase for this population for the last decade (JAMESON and JEFFRIES, 1998), it seems reasonable to assume the 1998 count of 433 was inaccurate.

Most of the increase was noted South of La Push where record numbers were observed at Destruction Island and Perkins Reef, up 66% and 554% respectively. Particularly noteworthy was the increase of more than 5 fold at Perkins Reef (Table 1, Figure 1). In 1998, 13 sea otters were counted at Perkins Reef, and this year 85 were tallied including 12 pups. This area is now second only to Cape Alava in having the largest concentration of reproducing females in the population, an important change in population distribution. Also of interest was the finding of a large group of animals offshore from Cape Johnson; and, based on this survey and observations by BRD biologists this past summer, an apparent increase in use of the area south of the Chilean Memorial by adult females. Few sea otters have been observed between Cape Johnson and La Push in past surveys.

Pups are difficult to see from aircraft; therefore, the only accurate pup counts are those obtained at ground stations. Consequently, the total pup count presented in the table is undoubtedly low. Pup: independent ratios at ground count stations, however, continue to indicate pup production is good in Washington (17:100).

During the summer months, the vast majority of sea otters in Washington occur between Makah Bay and Destruction Island. Last year nine sea otters were observed in the area from Tatoosh Island to Bullman Creek; this year, however, none were noted. Counts made during the winter months by BRD biologists show that 100(±) sea otters have occupied the area east of Cape Flattery each winter since

1995. The easternmost winter concentration in 1999 was located near Shipwreck Point about 15 kilometers east of Neah Bay.

Table 1. Results of the Sea Otter surveys in Washington 6-9 July 1999 and 7-10 July 1988

	1999			1998				
Location	**independent**	**pups**	**total 1999**	**independent**	**pups**	**total 1998**	**absolute change in number, 19999-1998**	**% change by loation 1999/1998**
DESTRUCTION I. [1]	169	2	171	102	1	103	68	66%
HOH RIVER / PERKINS REEF[1]	73	12	85	12	1	13	72	554%
GIANTS GRAVEYARD / TEAHWHIT HEAD	2	0	2	0	0	0	2	-100%
QUILLLAYUTE NEEDLES	0	0	0	1	0	1	1	-1%
S. CAPE JOHNSON / CHILEAN MEMORIAL	11	2	13	0	0	0	13	
CAPE JOHNSON / BLUFF PT	13	2	15	34	1	35	-20	-57%
OFFSHORE 0.5 MILES BLUFF PT[1]	56	0	56	0	0	0	56	
SANDY I.	3	1	4	6	0	6	-2	33%
JAGGED I.	1	0	1	1	0	1	0	0%
CEDAR CRK. / NOR. MEM.*	9	2	11	12	3	15	-4	-27%
KAYOSTLA BEACH	3	0	3	0	0	0	3	
OFFSHORE YELLOW BANKS	0	0	0	35	0	35	-35	-100%
YELLOW BANKS AREA	17	1	18	13	2	15	3	20%
NORTH PT	0	0	0	1	0	1	-1	-100%
SAND PT*	33	3	36	30	3	33	3	9%
INSHORE WHITE ROCK / WEDDING ROCKS*	1	0	1	0	0	0	1	
OZETTE / CAPE ALAVA / BODELTEH*	98	19	117	115	28	143	-26	-18%
WEST END OF BODELTEH	1	0	1	0	0	0	1	
OZETTE RIVER	1	0	1	0	0	0	1	
DUK PT	38	5	43	11	3	14	29	207%
FATHER AND SON / PT OF ARCHES	15	1	16	5	2	7	9	129%
MAKAH BAY	5	0	5	11	0	11	-6	-55%
FUCA PILLAR	1	0	1	0	0	0	1	
TATOOSH I	5	0	5	0	0	0	5	
TOTALS	555	50	605	389	44	433	172	40%

*1999 Counts made from the ground
[1]1999 Counted from photograph

DISCUSSION

Survey results this year support the hypothesis we proposed last year suggesting that survey conditions combined with a shift in distribution may have resulted in the low number observed in 1998 (JAMESON and JEFFRIES, 1998). The count expected for this year, based on the mean growth rate from 1989 through 1997, was 640. The actual observed number (605) is well within the range of expectations and suggests the 1998 count was truly anomalous. The results also exemplify the need to be flexible with survey protocols, while maintaining comparability, and the importance of making adjustments when field observations suggest there are changes in the distribution of the population that may affect survey results.

Three major changes in distribution were noted this year. First, the number at Destruction Island increased by 66%, and the relatively low number of pups observed there suggests a large group of males or non-reproductive animals were using the island this July. Second, the Perkins reef count increased 5 fold since 1998 and was nearly 3 times that obtained in 1997. This is an important shift in distribution. Interestingly, the number of sea otters between Perkins Reef and La Push has changed very little in recent years with very few animals found throughout the area from Perkins Reef to just south of Cape Johnson. The most notable change to the north was the large group found offshore from Cape Johnson. A similar, but smaller, group was found offshore of Yellow Banks in 1998.

Table 2. Distribution of sea otters in Washington State, 1977 - 1999, showing otters per kilometer of coastline and percent of total located in the segment

Segment	1999		1998		1997	
	Otters per kilometer	% in Segment	Otters per kilometer	% in Segment	Otters per kilometer	% in Segment
Tatoosh Island - Cape Alava	2.3	12%	1.0	7%	2.0	12%
Cape Alava - James Island	7.9	46%	8.1	66%	9.2	64%
James Island - Hoh River	9.9	43%	4.6	27%	4.5	24%
Total	6.6	101%*	4.8	100%	5.5	100%

*Percentage sums to more than 100% due to rounding

Densities of sea otters between the north and south segments have changed as well (Table 2). Prior to this year the density and relative distribution of sea otter in Washington had changed little. Most otters were located north of La Push In 1997 and 1998, but this year the distribution has changed. This is particularly true for the area from Cape Alava to La Push and from La Push to the Hoh River. In 1997and 1998 the percentage of the total count in the northern area was 64-65%, and the southern area was occupied by about 24% of the population. This year the values have nearly equalized between the Cape Alava-La Push area and the La Push-Hoh River segment with 46% and 43%, respectively. This is a major shift in distribution from years past and only future surveys will determine if the changes are permanent. Although the proportions of the population in each segment have changed the actual dispersion patterns have not. In the northern half, sea otters are found throughout the area with the largest concentrations near Cape Alava; in the south, the vast majority of animals are found near the south end near Perkins Reef and Destruction Island (Table 1, Figure 2). However, the number of individuals between these locations and La Push are minimal even though habitat in the area appears to be good.

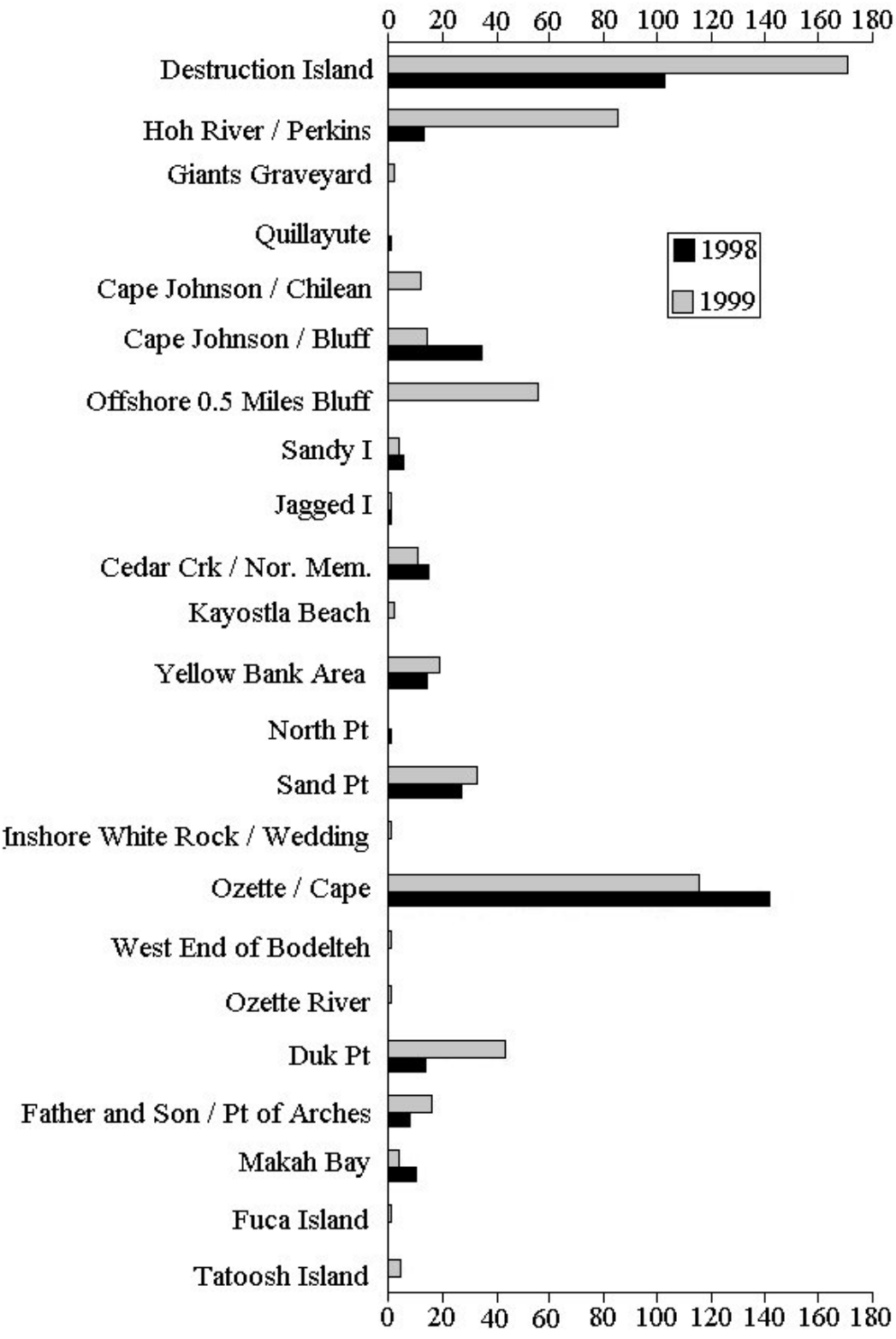


Figure 2. Distribution of Sea Otters in Washington, July 1999. The increments on the x-axis are not of equal length. Destruction Island is located at 47.68ºN, 124.49ºW, a coastal distance of 104 km.

The results of the survey this year are encouraging and indicate the population has been growing at a finite rate of about 11% since 1989. Based on the recent shift of such a large number of sea otters to the southern end of the range it's tempting to speculate about expansion to the south. Although sea otters occurred near Pt. Grenville (SCAMMON, 1874) the historical record suggests there were few sea otters between there and Destruction Island. There is little quality habitat between Destruction Island and Pt. Grenville. This is particularly true for females with small pups. This important segment of the population seems to require refugia from winter storms in the form of protective reefs, kelp beds, or good haul out sites. Little such habitat exists south of Destruction Island before reaching the Pt. Grenville/Grays Harbor area.

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REPORT

REPORT ON THE REHABILITATION AND RELEASE OF TWO GIANT RIVER OTTER (*Pteronura brasiliensis*) PUPS IN THE BITA RIVER (VICHADA, COLOMBIA)

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(received 30th August 1999, accepted 2nd December, 1999)

Abstract: Two Giant Otter (*Pteronura brasiliensis*) cubs were rehabilitated and released successfully and adopted into wild otter groups. The protocol used is presented. For a successful rehabilitation and release program, it is necessary to understand the basic ecology and behaviour of the species, as well as to have the appropriate facilities, feeding protocols, and adequate veterinary services available.

INTRODUCTION

Giant river otters face numerous biotic and abiotic threats throughout their geographical distribution. In Colombia, otters are also captured to satisfy the local demand for pets. Many of these pets, upon reaching maturity, become an enormous expense for the family that possesses it. This expense is a result of the large quantity of food that the otters require. Likewise, as a result of their considerable size and strength, many otters are killed by frightened humans. During the field phase of the Bojonawi Project [Ecology of the Giant Otter (*Pteronura brasiliensis*), in the Bita River, Vichada Colombia] (1997-1998), rehabilitation and release of two giant river otter cubs was undertaken. This activity was carried out by the two authors associated with the OMACHA Foundation over a period of 7 continuous months. Since this activity was not formally developed before hand, it was mainly through trial and error. Due to a lack of information and financial resources, our actions depended on the situation at the moment, but we always tried to make decisions that were for the benefit of the otter cubs. The first pup (Ñamñam), a female, was received at approximately 2 months of age and she participated in the program for a period of 6 months, until her liberation. The second otter cub (Pepe), a male of approximately 4.5 months old, participated in the program for only 1 month, but was also liberated. We know for sure that the two cubs were adopted by a wild otter family that resided within the study area, in an area adjacent to the NIMAJAY Ecotourism Campsite that also served as the base camp for the larger study on giant river otter ecology. The two cubs came from different places; Ñamñam came from a small village (Cumaribo, Vichada), and Pepe came from Puerto Carreño City (Vichada). Both cubs were kept as pets and they were donated after a long talk with the people that owned them. Neither cub was bought.

METHODS

Table 1 presents, in chronological order, each activity related to the rehabilitation and release process. The options are mentioned, the decision that was taken, and some comments in this respect are indicated.

Table 1.

ACTIVITY	OPTIONS	DECISIONS	COMMENTS
RECEIPT OF THE INDIVIDUAL # 1 (Ñamñam, Female, 2 month old aprox.)	• To rehabilitate it physically and biologically for subsequent release locally. • To rehabilitate it physically, to maintain it in captivity • To attempt the rehabilitation and release whilst keeping open the option to use the individual for breeding during this period. • To sacrifice the individual.	To rehabilitate it physically and biologically for subsequent release locally.	Ñamñam had 2 injuries in the neck region on the right side. These injuries were deep and not healing, but weren't infected. She was very active and had a good appetite.
PLACE OF TREATMENT	• To treat her wounds in the city of Puerto Carreño. • To take her to the otter study camp and to begin the rehabilitation process immediately.	To take her to the otter study camp, and to begin the process immediately.	In Puerto Carreño, Ñamñam was in contact with domestic animals, from which she had contracted several illnesses. We considered that Ñamñam should be introduced as soon as possible to her natural environment.
TRAINING FOR THE CAPTURE OF FISH	• To offer dead fish (whole or in parts). • To create artificial ponds stocked with fish that could be captured by Ñamñam. • In open areas (rivers or lagoons), to offer her live fish, but with restricted mobility. • To swim and play with Ñamñam, in and out of the water, several times a day. During this time she would be able to capture fish when hungry.	To create artificial ponds stocked with fish that could be captured by Ñamñam. In open areas (rivers or lagoons), to offer her live fish, but with restricted mobility. To swim and play with Ñamñam, in and out of the water, several times a day.	The period of confinement was modified as the individuals advanced in their ability to capture fish. These activities were continued until Ñamñam began to fish by herself in open areas locally, including pipes, lagoons, and the river.
FEEDING	• To contact international otter specialists and obtain the information about diet and feeding products to raise giant otter cubs. • To depend on our knowledge and intuitions, in order to offer the appropriate foods despite the scarce of economic resources that were available.	To depend on our knowledge and intuitions, in order to offer the appropriate foods despite the scarce resources that were available	Initially, Ñamñam was fed with a mixture of human poudered milk formula for human babies, cod liver oil and a small dose of a multivitamin. As Ñamñam grew, we offered her live fish so that she would recognise them as prey and learn to capture them herself.
COEXISTENCE WITH HUMANS	• To avoid contact with humans. • To take advantage of Ñamñam's presence to	To avoid contact with humans.	Because the camp was a tourist site, containig numerous visitors and workers,

	develop an environmental education campaign.		an educational campaign was implemented toward the conservation of the species. Ñamñam was transferred to a nearby area not visited by humans.
RECEPTION OF INDIVIDUAL 2 (Pepe, Male, approx. 5.5 month old)	• To isolated him in quarantine, away from individual 1 (Ñamñam). • To put him in contact immediately with Ñamñam.	To put him in contact immediately with Ñamñam.	Although we knew that quarantine would be better, due to the lack of personnel and appropriate facilities Pepe was placed with Ñamñam. We chose this option in order to take advantageof the fact that Pepe could learn important survival skills from Ñamñam.
RELEASE (Ñamñam and Pepe)	• Release them in an area already inhabited by other otters and to let them establish a territory or join an existing group. • Release them in an uninhabitated area.	Release them in an area already inhabited by other otters and to let them establish a territory or join an existing group.	They were adopted by a wild family group that inhabited the area near the camp. Thus, it was not necessary to force the separation between the otters and humans.
FOLLOW-UP OBSERVATIONS	Follow-up observations were made on three occasions during which the released individuals were confidently identified.		During the larger study on the ecology of otters, it was necessary to establish the distribution and abundance of otters throughout the study area. These observations facilitated the identification of the group that eventually adopted the two pups. The pups were individually recognisable due to the unique fur coloration on their necks.

CONCLUSIONS

The rehabilitation and release of the giant river otter cub (*Pteronura brasiliensis*) into the natural environment is a difficult process, but can be accomplished successfully.

For a successful rehabilitation and release program, it is necessary to understand the basic ecology and behaviour of the species, as well as to have the appropriate facilities, feeding protocols, and adequate veterinary services available.

It would be helpful to compile other rehabilitation and release experiences in order to develop an action protocol based on the knowledge obtained.

ACKNOWLEDGEMENTS *- Jeffery P. Jorgenson, OMACHA Foundation, Royal Netherlands Embassy, INNOVA Kayaks, friends and people that directly or indirectly help in the success of the project.*

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Resumen: Reporte de la rehabilitación y liberación de 2 crías de nutria gigante (Pteronura brasiliensis) en el Río Bita (Vichada, Colombia)
Las nutrias gigantes de río además de todos los factores de presión comunes en las diferentes áreas donde se distribuyen, se enfrentan en Colombia, a la captura de sus crías para ser usadas mascotas. Muchas de estas mascotas, al alcanzar cierta edad, representan un gasto enorme para la familia que la posee, debido a la gran demanda de alimento que requieren, así mismo como una amenaza por tratarse de un animal de considerable tamaño y fuerza, por lo que son asesinadas. Durante la fase de campo del proyecto Bojonawi [Ecología de la Nutria Gigante (Pteronura brasiliensis), en el Bajo Río Bita Vichada Colombia], se llevó a cabo el proceso de rehabilitación física y biológica de dos crías de Nutria Gigante, durante un período de 7 meses. La primera cría (Ñamñam), una hembra, se recibió de aproximadamente 2 meses de edad. Se trabajó con ella durante un período de seis meses, hasta su liberación. El segundo (Pepe), un macho de aproximados 4,5 meses, también fue liberado. Se tiene la certeza que los dos individuos fueron 'adoptados', por una familia silvestre, que habita dentro del área de estudio. Se presenta un cuadro en orden cronológico donde junto a cada actividad relacionada al proceso de rehabilitación y liberación de los individuos, se mencionan las opciones a seguir, la decisión tomada y algunos comentarios al respecto.

REPORT

AN OVERVIEW OF THE GIANT OTTER-FISHERMAN PROBLEM IN THE ORINOCO BASIN OF COLOMBIA

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Abstract: The giant otter faces a new threat in the Orinoco Basin because fishermen in that area see it as a competitor. This study examines the species of fish caught by commercial and sport fishermen in the area and compares it to the species eaten by the otters. Although overlap exists in some of the families of fish that the otter consumes and those that the fishermen of the area extract, the competition for fish is minimal. Although we cannot ignore that a problem exists between otters and in particular the commercial fishermen, this is not because of any impact that the otter has on the populations of fish. Rather, the problem can be attributed to the local inhabitants' lack of information about the importance of the otter as a key species of the ecosystem.

INTRODUCTION

The giant otter faces a new threat in the Orinoco Basin because fishermen in that area see it as a competitor, alleging that the species diminishes the populations of fish that they (the fishermen) hope to capture. Due to these new conflicts between the otters and the inhabitants of the basin, it was deemed necessary to carry out a study that would clarify the supposed competition that exists between the otters and fishing activities.

STUDY AREA AND METHODS

The study area is located in the lower basin of the Bita River, in Easter Colombia, belonging entirely to the Department of Vichada. The altitude varies between 50 - 80 m.s.n.m. (IGAC, 1996). The annual mean temperature is 28°C and the average annual precipitation is approximately 2.200 mm. It belongs to the region known as the Llanos (IDEAM, 1998).

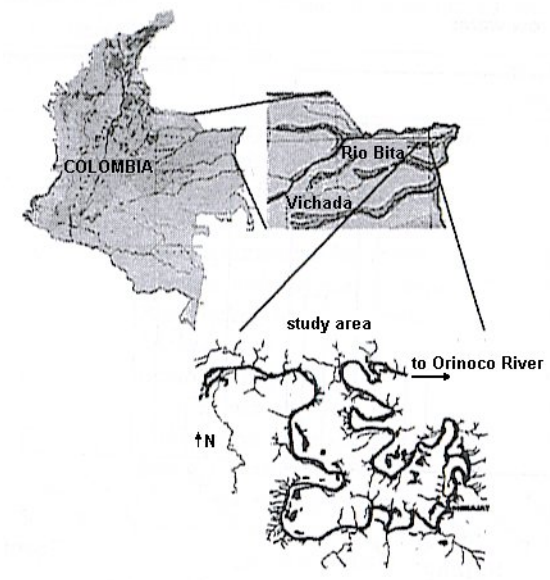

Figure 1. Study area location

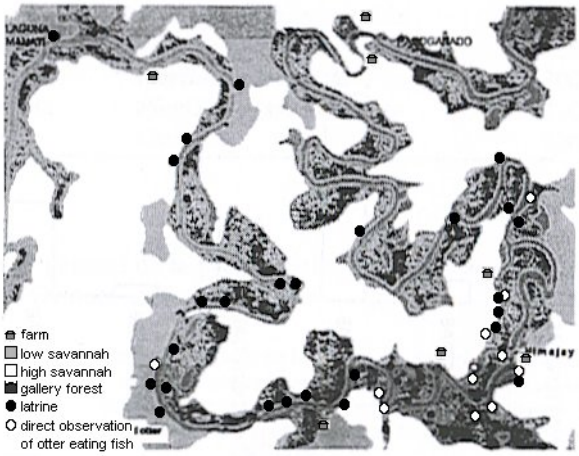

Figure 2. Latrines and observations of giant otters eating fish

The soils of the area are poor and not suitable for pasture development and thus ranching is not common, instead, commercial fishing is one of the main economic activities in the area, providing the nutritional base for the inhabitants of the area. Most of the fish are consumed domestically, although some fishing co-operatives exist which standardise their fishing gear in line with the parameters allowed by the law. However, much fishing is now undertaken illegally, at prohibited times, and with illegal fishing methods ('chinchorros' [net with fine holes, like a mosquito net], wait nets, poisoning, and dynamite). These methods cause great harm to the fauna present in the region (pers. obs.). Sport fishing is a very limited source of revenue to some inhabitants of the area as there are commercial companies in the main cities of the country which organise such activities.

The project had a duration of 15 months (Jul 1997-Oct 1998), but only 10 were dedicated to field work (Sep 1997-Jul 1998). The investigation was carried out over the periods of high water levels (May-Sep), transition (Mar-Apr, Oct-Nov), and low water levels (Dec-Feb) of the river Bita**.** Visits were made to markets, refrigerated storage rooms, and areas of fish discharge at the jetty of Puerto Carreño, where data was gathered on morphotype of fish, minimum and maximum sizes, fishing area, fishing method, and conflicts with groups of otters. A list of the species of fish of commercial importance was also elaborated, with legal minimum size of capture, to compare with the data found in the analysis of diet of the otter.

The data for commercial fishes was taken during the dry and transition seasons (Nov-Apr), the periods of the year when this activity is allowed. Sport fishing data was taken in the dry season as the presence of sport fishermen is restricted to this period. Both sets of data included the number of fish captured, their size, and weight.

The relative abundance of each species in catches was determined, and the similarity of the relative abundance of fishes taken was compared with the diet of the otter (determined in the larger study 'Feeding Ecology of the Giant Otter (*Pteronura brasiliensis*), in the Bita river, Vichada Colombia' (GÓMEZ, 1999). To assess similarity, the coefficient of similarity of communities of Sørensen and Morisita was used (FRANCO, 1995).

Table 1. Commercially important species, common names and minimum capture size in the Orinoco's Basin (INPA, 1998)

common name	species	minimum size of captured (mm)
Valentón	*Brachyplatystoma filamentosum*	1000
Paletón	*Sorubimichthys planiceps*	950
Dorado	*Brachyplatystoma flavicans*	850
Amarillo	*Paulicea luetkeni*	800
Rayado - Tigre	*Pseudoplatistoma fasciatum*	650
Cajaro	*Phractocephalus himliopterus*	650
Apuy	*Brachyplatystoma juruensis*	500
Sierra Cagona	*Sachsdora sp.*	600
Sierra Copora	*Oxydoras niger*	550
Yaque	*Leiarius marmoratus*	440
Mapurito	*Callophysys macropterus*	320
Blanco Pobre	*Brachyplatystoma vaillanti*	400
Cachama Negra	*Colossoma macropomum*	600
Cachama - Coporo	*Piractus brachypomus*	510
Bocachico - Coporo	*Prochilodus recticulatus magdalenae*	270
Sapuara	*Semaprochilodus laticeps*	350
Palometa	*Mylossoma duriventris*	240
Yamu	*Brycon sp.*	280
Agujeto	*>Boulengerella sp.*	300
Payara	*Hydrolycus scombreroides*	550
Sardinata Real	*Pellona sp.*	400
Guabina	*Hoplias malabaricus*	300
Burra-Curbinata	*Plagioscion surinamensis*	320
Pavón	*Cichla sp.*	300

RESULTS

Character Of The Diet

The diet of giant otters consisted of fish (96.2% belonging to 4 different orders and 12 families), reptiles (2.2%, primarily turtles), birds (0.8%), and mammals (0.8%).

The most frequently consumed fish were from the family Erythrinidae (primarily *Hoplias malabaricus*), followed by Pimelodidae (primarily *Pseudoplatystoma fasciatum* and *Leiarius marmoratus*), Cichlidae (represented by the species *Mesonauta festivum*, *Geophagus* sp. and *Plagioscion surinamensis*), and Characidae (with the genera *Brycon* spp. and *Acestrorynchus* spp.).

The relative frequency of occurrence produced the same order as in occurrence frequency: Erythrinidae, Pimelodidae, Cichlidae, Characidae, Serrasalmidae, Osteoglossidae, Anostomidae, Auchenipteridae, Cynodontidae, Curimatidae, Ctenolucidae and Loricaridae.

Potential Competition Between Otters And Fishermen

Commercial fishing

Commercial fishing in the area is allowed only in the dry and transition seasons, leaving a period of approximately 4 months during which potential competition doesn't occur directly.
For commercial fishermen, the most frequently taken fish were members of the Serrasalmidae Family (28.6%), followed by Myrenidae (24.0%), Pimelodidae (19.0%), Curimatidae (18.3%), and Cichlidae (6.6%).

When the characteristic diet of the giant otter in this area is compared with that extracted by the commercial fishing enterprises it can seen that, although the otter is consuming fish that have some commercial importance (i.e. Curimatidae, Myrenidae, Serrasalmidae and Pimelodidae), the great majority of its diet is based upon families of no imporatance (i.e. Erythrinidae, Cichlidae, Anostomidae, Ctenolucidae, Osteoglossidae, and Cynodontidae).

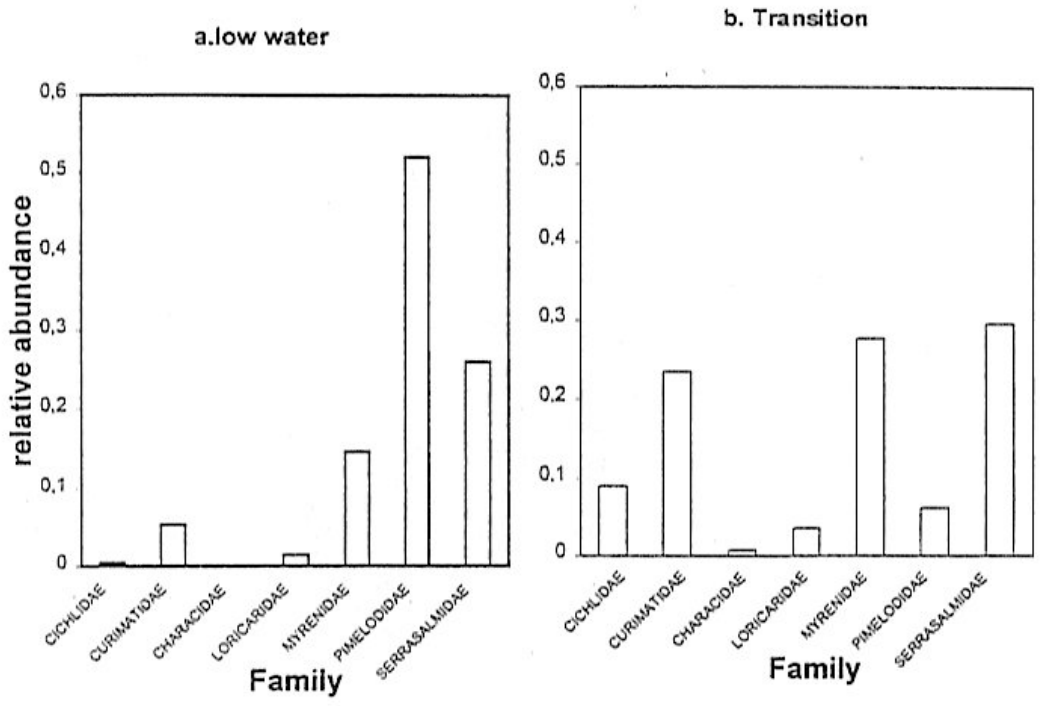

Figure 3. Percentage of captured fish in commercial activities at the study area 1997 - 1998

The level of similarity (FRANCO, 1995) between the fish in the diet of the giant otter and those taken by commercial fisheries differed to a large extent, principally in the composition of families (Im = 32.5% in total).

Fishermen in the region, however, also claim that the otter is undesirable as it frightens fish from the key fishing areas. This problem was impossible to measure during the field phase and no previous work exists on this subject.

It is also important to say that, according to informal interviews with fishermen, a decrease in the fishing resource in the area has been noted. However, this is almost certainly due to the increase in illegal and non-specific fishing activities in the area and not because the giant otter has increased its consumption rate of commercial fish.

Sport Fishing

Reports of conflicts between sport fishermen and giant otters are not known. Sportsman apparently enjoy the presence of these animals, instead of seeing them as a nuisance or threat to their activity. However, Since commercial fishermen in the region are the same people who guide sport fishermen, some conflict has resulted.

The sport fishing in the area is restricted to the dry season only, therefore any possible competition could only occur in an annual period no bigger than 4 months.

The river Bita is very well known to sport fishermen for its excellent fishing of Pavón (*Cichla* sp.). The family Cichlidae, therefore, is the most affected by this activity (48%), followed by the Serrasalmidae (21%), and the Cynodontidae (18%).

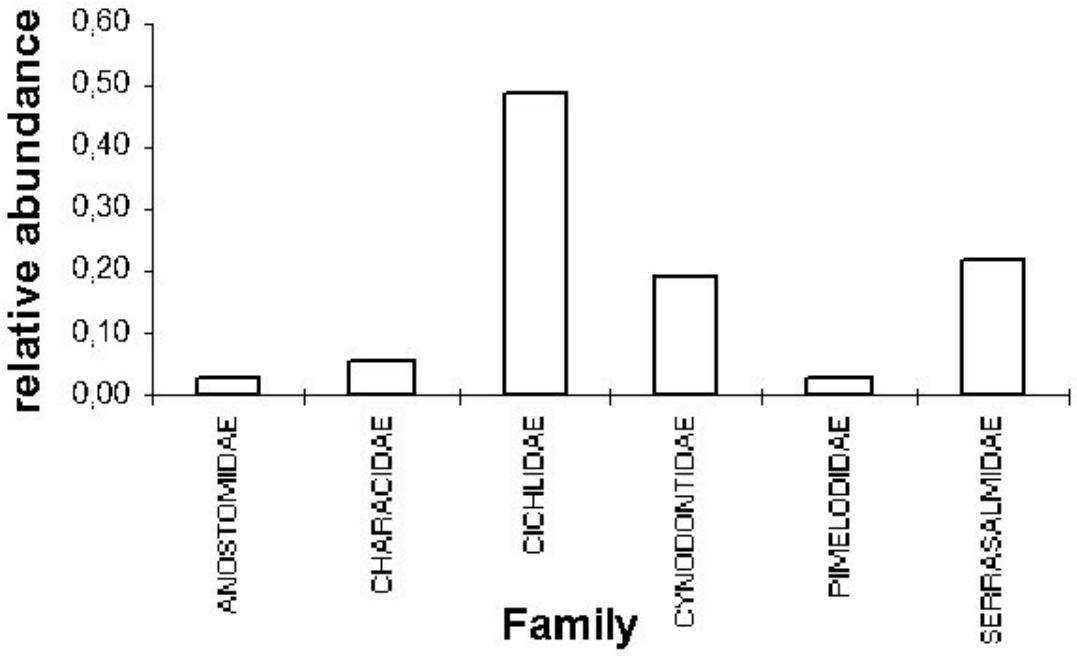

Figure 4. Percentage of fish captured by sport fishermen at the study area 1997 - 1998

The data was calculated in the same way as that for commercial fishing. The comparison of similarity between sport's catches and the typical diet of the giant otter in the area produced a figure of 55% similarity, a result of more similarity to that of commercial fishing (Im = 35%), It should be kept in mind, however, that the species of the family Cichlidae pursed by the sport fishermen (*Cichla ocellaris* and *Cichla temensis*), are not the same as those consumed by the otter (*Geophagus* sp. and *Mesonauta festivum*). Sport fishermen also look for the biggest size in their prey and not the largest number (highest availability) of prey. Thus, representatives of the families Cichlidae (*Cichla* spp.), Serrasalmidae, and Cynodontidae, tend to be pursed by the sportsmen, leaving the other families of fish available for the giant otter.

CONCLUSION

Although overlap exists in some of the families of fish that the otter consumes and those that the fishermen of the area extract, the competition for fish is minimal. The two samples differ as per the composition of families (Im=40% in total). Although the otter consumes some fish that have commercial importance (though in quantities that do not exceed 4 kg per day), the most representative fish in their diet lack commercial value.

A further reason that fishermen consider the giant otter an undesirable animal is that, according to them, the otter frightens fish the key fishing zones. This problem was impossible to measure during the field phase and no previous work exists in this respect. It may be possible to counteract any conflict regarding this issue through educational workshops which persuade the fishermen to see the otter as a form of bioindicator, otters being distributed in those areas where fish numbers are likely to be most abundant.

Although we cannot ignore that a problem exists between otters and some fishing activities, and the commercial fishermen in particular, this problem is not due to any impact that the otter has on the populations of fish. Rather, the problem can be attributed to the local inhabitants' lack of information toward the importance of the otter as a key species of the ecosystem. Further, there is a problem of interests, where the fishermen don't accept that they may themselves be the cause of the decrease of the resource, looking for other explanations to the phenomenon. For example, as the fishermen see that the otter takes out big fish, and makes a lot of noise when catching and consuming it, they believe that they frighten the fish away.

Unlike the problems between otters and fish farms in Europe or Asia, the fishermen along the Bita River do not invest resources or effort in either fish cultivation or conservation of the fishing resource in the area. Instead they only harvest fish, apparently without any control. A change in the attitudes of fishermen is required, therefore, if the giant otter is not to become the victim of increasing conflict.

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RESÚMEN: Un Panorama General De La Problemática Entre Pescadores Y Nutrias Gigantes En La Cuenca Del Orinoco En Colombia

La Nutria Gigante enfrenta nuevas amenazas en la Cuenca del río Orinoco. Los pescadores comerciales la ven como competidora por el recurso pesquero, alegando que disminuyen las poblaciones de peces que ellos pretenden capturar. Debido a este nuevo conflicto entre nutrias y habitantes de la zona, se plantea la necesidad de implementar un estudio que pueda esclarecer la supuesta competencia entre nutrias y las actividades pesqueras.

ARTICLE SUMMARY

CONTAMINANTS IN OTTER, MINK AND MARTEN IN BRITISH COLUMBIA

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Abstract: As a continuation of studies of mustelids on the Columbia and Fraser River systems in north-western North America, chlorinated hydrocarbon and trace metal contamination of mink, marten and river otter were assessed in relation to physiological and reproductive measures of condition. Mink, marten and river otter were collected during the winters 1994/95 and 1995/96 from commercial trappers. Necropsies included evaluation of the following biological parameters: sex, body mass and length, age, thymus, heart, liver, lung, spleen, pancreas, kidney, gonad, omentum, adrenal gland and baculum (in males) masses, baculum length, and stomach contents. Livers were analysed, individually or in pools, for residues of organochlorine (OC) pesticides, polychlorinated biphenyls (PCBs), dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs). Contamination levels were relatively low compared to those documented in other North American populations, although they ranged higher than those detected during an earlier survey (1990-92) of these regional populations. Nutritional condition varied slightly amongst collection regions, but showed no relationships with contaminant burdens. Specifically, mink from the upper Fraser River appeared to have less fat stores (evaluated by stomach contents and omentum mass), but also showed some of the lowest OC contamination levels observed. Similarly, a few individuals with enlarged livers and kidneys had unremarkable contamination profiles. Although a few individuals with gross abnormalities of reproductive systems did not show high levels of contamination, there was a significant negative correlation between Aroclor 1260 concentrations and baculum length in juvenile mink. The influence of baculum length on reproductive success is unknown, but given similar associations found in juvenile otter from Oregon, the incidence of smaller baculum size and its influence on reproduction needs to be further characterized in a larger subset of these populations. Also, the bias against collection of females introduced by using commercial traps may underestimate the true contaminant burden in the subset most likely to show detrimental reproductive effects. Other means of collecting breeding-age females should be explored.

Chlorinated hydrocarbon and trace metal contamination of mink (*Mustela vison*), marten (*Martes americana*) and river otter (*Lutra canadensis)* were assessed in relation to physiological and reproductive measures of condition. Specimens were collected during the winters 1994/95 and 1995/96 from commercial trappers. Necropsies included evaluation of the following biological parameters: sex, body mass and length, age, thymus, heart, liver, lung, spleen, pancreas, kidney, gonad, omentum, adrenal gland and baculum (in males) masses, baculum length, and stomach contents. Livers were analysed, individually or in pools, for residues of organochlorine (OC) pesticides, polychlorinated biphenyls (PCBs), dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs).

Reproductive tract abnormalities were seen in a few male mink and otter. In one mink and one otter, a testicle had not descended into the scrotum, but was instead located in the inguinal canal. The latter otter was also missing a kidney on the same side as the undescended testicle. In two male mink, no testes or bacula were found. Another otter was missing one testicle, and had an under-developed second testicle. No abnormalities were seen in the reproductive tracts of the females. Of the two female mink and four female otter known to be of breeding age, only one otter was pregnant. She carried two foetuses measuring 6 cm from crown to rump and weighing 9.9 and 10.5 g.

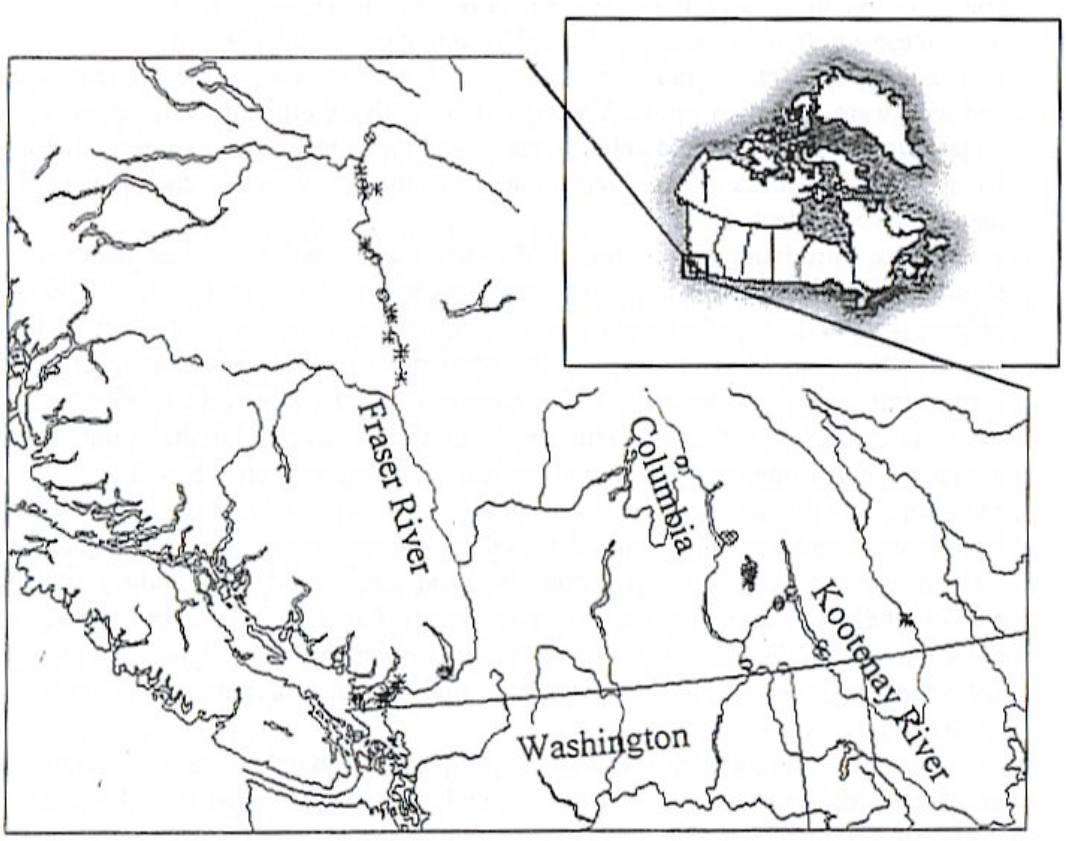

Figure 1: Study Area

Three mink showed other lesions not associated with reproductive organs. One male mink had a healed umbilical infection with some associated abdominal adhesions. Another mink had a thickened, scarred area on the mucosa of its stomach, while a third had an enlarged, haemorrhagic mesenteric lymph node.

The individual organochlorine scans by the Environment Canada laboratory found dieldrin, *p,p*-DDD, *p,p*-DDE and Aroclor 1260 in several mink, and heptachlor epoxide, *p,p*-DDE and Aroclor 1260 in several otter. Aldrin, endosulfan I and II, endrin, heptachlor, and Aroclors 1221, 1232, 1242, 1016, 1254, and 1262 were not detected in any liver samples. One mink from the upper Fraser River had relatively high hepatic concentrations of DDE and Aroclor 1260, while two mink from the lower Fraser were less contaminated with a suite of compounds. In general, hepatic burdens of detectable pesticides and PCBs in mink ranged slightly higher than those found in mink from the upper Fraser River in an earlier, related. In Marten livers, no organochlorine residues were detectable.

The six mink livers analysed by a private laboratory (low resolution) showed very low levels of pesticides and PCBs, and no detectable PCDDs or PCDFs. One mink from the Kootenay River and one from the lower Fraser River showed some elevations in DDE, oxychlordane, and PCB contamination. The pesticides heptachlor epoxide and hexachlorobenzene were consistently detected at low levels. With the exception of the coplanar PCBs 77 and 126, hepatic organochlorine concentrations in these mink were much lower than concentrations in otter from the same regions. Concentrations of PCBs 77 and 126 were up to several thousands pg/g higher in mink liver compared to otter liver on a lipid weight basis.

Otter showed relatively high concentrations of DDE (up to 110 ng/g ww or 3056 ng/g lipid weight/lw) and, occasionally, other pesticides like endosulfan, hexachlorobenzene, and oxychlordane, by high resolution GC/MS. In addition, a female otter, from the lower Columbia River contained relatively high hepatic burdens of PCBs, particularly congeners 138 (4615 ng/g lw), 153 (5769 ng/g lw), and 180 (7308 ng/g lw). Otter composites collected from the lower Fraser River had the highest concentrations of PCDDs and PCDFs, especially OCDD (a - 1860 pg/g lw; b - 6923 pg/g lw). Otter from the Kootenay

and lower Columbia River regions had the highest concentrations of coplanar PCB 169 (KOT - 2667 pg/g lw; LCO - 1231 pg/g lw).

Patterns of PCB contamination varied between the two aquatic species and also within a species, amongst regions. Mink had detectable concentrations of CBs 18, 22, and 56/60 (all <1 ng/g), whereas otter did not. Conversely, otter had detectable concentrations of CBs 31, 84, 89, 151, 141, 137, 177, 171/202, 191, 201, 196/203, 189, 195/208, 207, 205, 206, 209, and 169, while mink did not. In particular, CBs 31, 196/203, 195/208, and 206 were all present in concentrations >10 ng/g in otter; also, the presence of the coplanar CB-169 in otter and not mink is significant, because of the higher toxicity associated with the *non-ortho* congener family to which it belongs. The dominant congeners in mink were 180>138>153>118, while the otter CB profiles were dominated by 153>138>180>170. Within the six mink analysed, the Kootenay River mink showed five congeners not present in the lower Fraser River mink (70/76, 101, 87, 110, and 149), while the latter showed one congener (156) not present in the Kootenay mink. Otter from the upper Fraser River had only 15 of the most dominant congeners, while those from the lower Fraser River were only lacking 13 of the 54 congeners analysed for. Apart from these differences in contamination level, otter from the upper Columbia River lacked congeners 44, 151, 141, and 171/202, and otter from the Kootenay River lacked congener 49, all present in otter collected from other regions. Since otter were composite samples, it is difficult to determine the consistency of these differences.

Metal concentrations in tissues of mink, river and marten otter were generally low and within the range of values reported for ranch and wild populations. A small number of differences among collection areas, sexes and species were detected, and the river otter collected below the metal smelter at Trail, B.C. showed elevated lead concentrations.

Mink and marten collected from the Kootenay-Columbia River system exhibited significantly different kidney levels of cadmium (P=0.032), magnesium (P=0.011), manganese (P=0.015), mercury (P=0.007), potassium (P=0.03), strontium (P=0.003), and zinc (P=0.03). Mink had higher concentrations of the heavy metals, cadmium, mercury and strontium, while marten had higher concentrations of magnesium, manganese, potassium and zinc. The higher concentrations of mercury in mink may reflect their aquatic prey, because of methylation of mercury in sediments and uptake in aquatic biota, as opposed to the terrestrial prey of martens. Northern squafish (*Ptychocheilus oregonensis*) and walleye (*Stizostedion vitreum*) from the lower Columbia had means of 0.48 - 0.62 μg/g ww mercury and 0.21 -0.40 μg/g ww mercury, respectively, while whitefish (*Prosopium williamsoni*) from the lower Columbia had significantly elevated mercury levels (mean of 0.069 μg/g ww) compared to fish from the Slocan River (0.033 μg/g ww). These values are low compared to a mean of 0.11 μg/g ww in whitefish muscle from 54 uncontaminated lakes throughtout B.C.

Kidney cadmium concentrations in mink collected from the Kootenay River were above those from the lower Fraser River during this study (P=0.012). However, the Kootenay mink, with an average cadmium concentration of 3.6 mg/g ww, were not likely to be experiencing any toxic effects from this level of contamination. Although cadmium toxicity is not well documented in mustelids, studies with other mammals suggest that renal dysfunction occurs at kidney concentrations around 40 to 200 mg/g ww.

Kidney mercury concentrations were also high in Kootenay mink compared to those from the lower Fraser River. The maximum value detected in mink from this study was 6.68 mg/g dry weight (2.27 mg/g ww).

In addition to cadmium and mercury regional differences, mink from the Kootenay River had higher levels of iron (P=0.002), and lower levels of magnesium (p=0.045) and manganese (P=0.01) than mink from the lower Fraser River, but values are still likely not sufficient to produce toxic effects in affected mink.

In six mink collected from the lower Fraser River, approximately half of the compounds tested were preferentially partitioned to one or the other of the two organs assessed. Cadmium levels were greater in the kidney (P<0.001), while copper (P=0.046), iron (P=0.001), manganese (P<0.001), magnesium (P=0.002) and zinc (P=0.002) levels were greater in the liver. Tissue concentrations of calcium, chromium, lead, mercury and sodium did not differ.

When liver concentrations of metals in livers of mink and river otter were compared on the Fraser River system, only calcium (P<0.001), copper (P=0.039), manganese (P=0.009), sodium (P=0.032) and zinc (P=0.017) concentrations were species-specific. Copper and manganese were higher in otter, while calcium, sodium and zinc were higher in mink. Although statistically significant, differences in these metals were not extreme and values were within the ranges described in the literature. No species differences in liver concentrations of the heavy metals, cadmium, lead and mercury, were detected.

When correlations were tested between metals and biological parameters, a significant association was found between mink age, and liver (r=0.636, P=0.003) and kidney (r=0.841, P=0.036) cadmium concentrations. Average adult liver cadmium concentration was 0.55 mg/g dry weight, compared to 0.09 and 0.13 mg/g dry weight for yearlings (1 yr) and juveniles (<1 yr), respectively. However, the relationship must be considered with caution given the small sample size involved in the evaluation (two adults, three yearlings and fourteen juveniles). If the association is real, it suggests that cadmium may bioaccumulate in this species. Unfortunately, those mink with the highest cadmium concentrations, the Kootenay River group, were not aged. There were no other significant correlations between metals and liver, kidney or spleen somatic indices or age or sex in either species (r<0.6, P>0.05). A female river otter collected near a lead smelter on the lower Columbia River showed a liver lead concentration several orders of magnitude higher than individuals from other areas (P<0.001).

Overall, contamination levels were relatively low compared to those documented in other North American populations, although they ranged higher than those detected during an earlier survey (1990-92) of these regional populations. Nutritional condition varied slightly amongst collection regions, but showed no relationships with contaminant burdens. Similarly, a few individuals with enlarged livers and kidneys had unremarkable contamination profiles. Although a few individuals with gross abnormalities of reproductive systems did not show high levels of contamination, there was a significant negative correlation between Aroclor 1260 concentrations and baculum length in juvenile mink. The influence of baculum length on reproductive success is unknown, but given similar associations found in juvenile otter from Oregon, the incidence of smaller baculum size and its influence on reproduction needs to be further characterized in a larger subset of these populations. Also, the bias against collection of females introduced by using commercial traps may underestimate the true contaminant burden in the subset most likely to show detrimental reproductive effects. Other means of collecting breeding-age females should be explored.

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

OTTER SPEED ON LAND

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There have been several experimental recordings of otters' aquatic movements and swimming speeds (WAYRE, 1977; EGGERS, 1985; de JONGH 1986) and GREEN et al., (1984) gave figures for aquatic travel recorded by radio tracking wild otters, but there has been less work on locomotion on land. WAGENFÜHRER (1984) analysed the gaits, foot sequences and speeds of captive otters, but so far as is known there is no record of the speeds, which wild otters can attain over measured distances. On August 5th 1999 at 21:50 on a minor road in Dumfries and Galloway, south west Scotland an otter was followed by car in such a way that the distance and time covered by the sighting could be measured and the animal's varying speed could be measured on the speedometer. The otter covered a distance, later measured with a surveyor's tape measure, of 670m in 111 seconds, giving an average speed of 6.036 m/sec or 21.73 km/hr. The road runs over a rise of about 5m and round several sharp bends; the otter chose a course, which took it from side to side of the road to shorten the distance on the bends. Speeds recorded on the speedometer, by driving at a regular distance behind the otter, ranged from 16-38.6 km/h. Slower speeds were noted on the uphill slope and the top speed was just touched on the downhill slope. For most of the sighting speed was in the range of 19-24 km/h. Otters have been seen on this stretch of road many times, crossing from one loch to another, but this was the first time the whole route was observed. It is of interest that the animal took a route along a small burn to the road, along the road and then onto another tiny burn flowing into the second loch, involving a distance of 1370m, rather than the shortest overland crossing of 250m. The road never has much traffic and on this occasion there were no other cars about. The animal completely disregarded the observer's car, appearing from the culvert right in front of it, necessitating sharp braking, and setting off along the road without a backward look. The otter could have left the road at any point, but gave the impression of knowing exactly where it was going and of travelling at its chosen speed.

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Resumen: Velocidad De Las Nutrias Sobre La Tierra.

Ha habido varios registros experimentales de los movimientos acuáticos y la velocidad de nado de las nutrias. Pero ha habido menos trabajo sobre la locomoción en tierra. Wagenfuhrer analizó el andar, la secuencia de las patas y la velocidad de nutrias en cautiverio, pero hasta donde se sabe no hay registros de la velocidad que las nutrias pueden alcanzar a lo largo de distancias medidas. En agosto de 1999 se siguió en auto a una nutria en una ruta menor en el SO de Escocia. Esto se realizó de una manera en que fue posible medir la distancia y el tiempo cubierto durante el avistaje, y registrar con el cuentakilómetros la velocidad variable del animal. La nutria cubrió una distancia de 670 m en 111 segundos, lo que da una velocidad promedio de 6.036 m/s o 21.73 km/h. Las velocidades registradas con el cuentakilómetros, manejando a una distancia regular detrás de la nutria, fluctuó entre 16 y 38.6 km/h. Se notaron menores velocidades en la pendiente de subida y la velocidad máxima se alcanzó en la pendiente de bajada. La mayor parte del tiempo la velocidad se encontró entre 19 y 24 km/h. En ese trecho han sido vistas nutrias varias veces, cruzando de un lago a otro, pero esta fue la primer vez que se observó todo el trayecto. Es interesante que el animal haya tomado un trayecto a lo largo de un

pequeño riachuelo hacia la ruta, a lo largo de la ruta y luego hacia otro riachuelo que fluye hacia el segundo lago, totalizando una distancia de 1370 m, en vez de recorrer los 250 m del cruce por tierra. La ruta nunca tiene mucho trafico y en este caso no había otros autos. El animal desatendió por completo el auto. La nutria pudo haber abandonado la ruta en cualquier punto, pero dio la impresión de saber exactamente hacia dónde iba y de estar viajando a la velocidad deseada.

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2nd QUARTERLY REPORT ON THE TEN PROJECT

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The booklet gives an overview on the progress of this project dealing with the spatial structures of wetlands and their connections. The project is a co-operation of provinces of several EU members countries, namely United Kingdom (Norfolk, Suffolk, The Netherlands (Overijssel, Drenthe, Fryslân, Groningen), Germany (Bremen, Niedersachsen, Schleswig-Holstein) and Denmark (Sønderjylland). The defined goals are the construction of a communal data bank in a geographical information system (GIS), for which ecological data and topographical data are collected. Data sets will be used to identify zones with high conflict potential. Areas, which may function as corridors between wetlands of high value, will be defined and further nature conservation measures including public awareness campaigns will be started.

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N E W B O O K S

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Residents of Canada and United States = please submit a cheque or money order in Canadian or US funds payable to Alpha Wildlife. Canadian Orders = add 7% GST ($ 3.50/book) to total amount. Others: please submit an international money order in US funds. (allow a minimum of 6-8 weeks for delivery).

1. Review of current mammal trap technology in North America. G. Proulx
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LA NUTRIA EN ESPAÑA

RUIZ-OLMO, J. & DELIBES, M.
SECEM,
Barcelona - Sevilla - Málaga, 1998, 300 pp.
ISBN: 84-605-8567-0

In this book the current distribution of the European otter (*Lutra lutra*) in all Spanish provinces is given.

For further information please contact:
Jordi Ruiz-Olmo, Generalitat de Catalunya, Dept. d´Agricultura Ramaderia i Pesca, Subdirecció General de Conservació de la Natura, Gran Via de les Corts Catalanes, 612-614, 08007 Barcelona, SPAIN

CALL FOR INFORMATION

OTTERS AND DEEP WATER RESERVOIRS

We presently have a student studying the diet and habitat use of otters (*Lutra lutra*) around a deep water reservoir in the Czech Republic. However, the published information on this subject appears to be virtually zero! We would therefore like to put out a call for information on this, or related subjects. Please send any suggestions to the following address:

Kevin Roche / Kerry Rhodes
Czech Otter Foundation Fund
POB 53
Trebon 379 01
Czech Republic
Tel / FAX: +420 333 722088
e-mail: otter@envi.cz

REQUEST FOR OTTER SKULLS OF KNOWN AGE

(This Call for Information has been published earlier - *IUCN OSG Bull. 15/2* - but at the 18th Marderkolloquium earlier this year a better use of museum material was recommended in one of the workshops. Therefore it is published again - The editor)

Dear friends and colleagues,

At the Marderkolloquium it was recommended during a round table meeting that material in museums should be made available for scientific research.

The ability to determine the age of animals is one of the most important conditions for interpreting various field and laboratory work. Not only the interpretation of population structure, but also of physiological data or animal behaviour is closely connected with as precise knowledge as possible of the absolute age of the animals. Besides many methods of age determination, the use of growth lines is most promising and serviceable. This method is based upon the assumption that, in the course of growth, skeleton material and especially teeth periodically deposit well defined layers of bone substances, cementum and dentine.

Nevertheless, application of this method encounters objective and subjective difficulties as well. Contrary to roe deer, red fox and other game species, for instance, there is no concrete evidence for the periodical or annual deposition of cementum lines in the otter. Also seasons and time period of forming growth lines vary interspecifically and are hardly known for this species. To adapt this method for otter ageing we need skulls of European otters (Lutra lutra) of known absolute age. Such material can be or become available, for instance, in zoological gardens, veterinarian and zoological institutes. Skulls in every stage and condition (fresh, macerated, skull fragments) can be used; if only teeth are available in lieu of a skull preparation, they can be used towards the same purpose. For age determination, only one tooth will be extracted from the alveole and two longitudinal sections (50-100 *m thick) of the tooth root will be taken. After re-insertion of teeth into the alveoles, no damage to the face of the skull will be evident. Therefore, also skulls for exhibition use or teeth from dermoplastics are of interest.

If you have any information about known-age otters or otter skulls we would be very grateful for your help.

Dr. Hermann Ansorge Silke Hauer
Staatliches Museum für Naturkunde Görlitz Institut für Zoologie
Am Museum1 Martin-Luther-Universität Halle
PF 300154 Domplatz 4
D - 02806 GÖRLITZ D - 06108 HALLE/ Saale
Fax: 0049-3581/401742 Fax: 0049-345/5527152
e-mail: SMNG.Ansorge@t-online.de or hauer@zoologie.uni-halle.de

STANDARDS FOR THE KEEPING OF WILDLIFE SPECIES

Zoocheck Canada is a national wildlife protection charity based in Toronto, Canada. We are currently conducting an analysis of legislated and individual institutional standards for the keeping of wildlife species native to Ontario in captivity (see list below).

We are seeking input from zoological institutions, organizations, and private individuals who (a) maintain "exceptional" exhibits that satisfy the biological/behavioral requirements of one or more of the listed species or (b) who possess a high level of expertise in the natural history, care, accommodation and display of one or more of the listed species.

In addition, we are requesting anyone reading this request to forward contact information regarding institutions or individuals who may be able to contribute to this study.

To ensure that information from each contributor is manageable for the purposes of this study, a generic template (see below) for the collection of data on each listed species has been developed. Not all criteria listed in the template will apply to all species and contributors have the option of providing as much, or as little, detail in each category as they like. Additional categories can be created if required.

Information obtained from each contributor will be used in the analysis and development of suggested standards of care, accommodation and display of native Ontario wildlife in captivity. The results of the analysis will be made available to all contributors upon completion of the project.
Zoocheck Canada would appreciate a response, as soon as possible, regarding whether or not you are able to assist with this study. To respond, or to obtain additional information, please contact Rob Laidlaw (zoocheck@idirect.com).

Thank you for your assistance

Rob Laidlaw

CONGRESS ANNOUNCEMENTS

The 10th Northern Furbearer Conference
"Furbearers and Biodiversity"

April 20th- April 21th, 2000 Fairbanks, Alaska, USA

The organizers of the 10th Northern Furbearer Conference announce the first call for papers to be presented at the meeting scheduled for the 20-21 of April 2000 in Fairbanks, Alaska, USA. The meeting theme "Furbearers and Biodiversity" is highly appropriate as our society struggles with new concepts on the use or value of wildlife. We believe that highlighting the significance of furbearers to biodiversity and environmental health is more important now than ever because of declining interest in this group worldwide. This conference brings together researchers, managers, and trappers from northwestern North America and provides a unique opportunity to exchange information between different interest groups.

Abstracts are due by 15 February 2000. Abstracts should be submitted electronically as Word documents or text files (preferably via e-mail as an attached file) to:
Abstracts should include a statement of objectives, brief description of methods, concise presentation of results, and a summary of conclusions. Format should follow guidelines of the Journal of Wildlife Management. Please include title, names and addresses of authors and the main body of the text (which should not exceed 200 words).

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MARTES2000

The official web pages for MARTES2000 is now up and running. It provides you with the information you will need to register on line as well as information to authors. Brochures will be mailed out soon.

The page address is:
http://www3.nf.sympatico.ca/nf/mbrazil/MARTES2000.html=20

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