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Table of Contents

| | |
|---|----------|
| Estimating River Otter Abundance and Habitat Use | 1, 3 |
| Management and Reproduction of the Giant Otter at the Cali Zoo..... | 2-3, 6-8 |
| Otter Updates | 4 |
| How Important are Yellowstone Cutthroat Trout to River Otters?..... | 5 |
| President's Message | 9 |
| Update on the Proposal to Restore River Otter to New Mexico | 9 |
| Wild River and Sea Otter Experiences Along the Pacific Coast | 10 |
| South America Zoo Receives Otter Education Grant | 11-12 |



Photo by Kaiti Ott

Estimating River Otter Abundance and Habitat Use through Coastal Latrine Site Surveys in Kenai Fjords National Park and Prince William Sound, Alaska

By Kaiti Ott and Merav Ben-David,
Department of Zoology and Physiology, University of Wyoming

During the summer of 2004 a team of collaborators from the Alaska Department of Fish and Game, the National Park Service, The US Forest Service, and the University of Wyoming conducted a survey of coastal river otters (*Lontra canadensis*) in Kenai Fjords National Park (KFNP) and Prince William Sound (PWS), Alaska. River otters are considered a keystone species for the aquatic-terrestrial interface and they serve as indicator species for levels of environmental contamination (Bowyer et al. 2003). The effects of lingering oil contamination from the Exxon Valdez oil spill (EVOS), as well as disturbance from logging, development, and recreational use are key issues that may affect this species. The goal of these surveys was to assess the long-term effects of the Exxon Valdez oil spill on the viability of river otter populations in PWS and to establish a baseline of river otter numbers in both regions.

continued on page 3

THE RIVER OTTER JOURNAL is a semi-annual publication of the River Otter Alliance. Look for the next edition of **THE RIVER OTTER JOURNAL** in Spring 2005!

River Otter Alliance Mission

The River Otter Alliance promotes the survival of the North American River Otter (*Lontra canadensis*) through education, research and habitat protection. We support current research and reintroduction programs, monitor abundance and distribution in the United States, and educate the general public through our newsletter, **THE RIVER OTTER JOURNAL**, on the need to restore and sustain River Otter populations.

Our goal is to be a center of communications among wildlife biologists, environmental organizations, fishermen, and all interested parties on a national and international basis, in order to ensure the healthy future of the North American River Otter.

Management and Reproduction of the Giant Otter (*Pteronura brasiliensis*) at the Cali Zoo

By German Corredor Londoño¹ & Natasha Tigreros Muñoz²

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Article Note from Janice Reed-Smith: A scholarship allowing German Corredor Londoño to attend the IXth International Otter Colloquium was funded by the AZA Otter SSP and the River Otter Alliance. Below I have excerpted the paper prepared for the Colloquium proceedings by German and his co-author, with German's permission. To date, the Cali Zoo is the only captive facility that has had captive-born giant otter pups from several litters survive into adulthood. All photos provided by German Corredor and the Cali Zoo.

Introduction

The giant river otter *Pteronura brasiliensis* is one of the major carnivores of South America, and one of the most endangered mammals in the world (Wünnemann, 1995). Given that its status is considered vulnerable (IUCN, 1996), different priorities have been defined for its conservation. These include in- and ex-situ strategies such as the realization of field surveys, protected area management, legal protection, public education and captive breeding programs (Foster-Turley et al., 1990).

In 2001 the world population in captivity of the giant river otter was 48 individuals, distributed among 22 institutions. Only six individuals, held in three pairs in Brazil, Germany, and Colombia, have reproduced successfully (Sykes-Gatz, 2001); an additional pair held at the Philadelphia Zoo produced one pup in 2004, which is still living at the time of writing. The inexperience of the parents, the stress of the individuals due to confinement and/or inadequate management, and disease have been the principal causes of reproductive failure (Duplaix-Hall, 1975; Hagenbeck and Wünnemann, 1992; Wünnemann, 1995; Sykes-Gatz, 2001).



Giant otter mother picking up a pup by the scruff of the neck.

Table 1. Parturitions of *P. brasiliensis* in the Cali Zoo.

| Parturition No. | Date of Parturition | No. of Pups | Successful Litter |
|-----------------|---------------------|-------------|-------------------|
| 1 | November 2, 1999 | 1.1.1 | No |
| 2 | January 31, 2001 | 1.0 | No |
| 3 | April 20, 2001 | 2.0 | Yes |
| 4 | November 13, 2001 | 2.1 | No |
| 5 | July 14, 2002 | 1.2 | Yes |
| 6 | February 12, 2003 | 2*.1 | Yes |
| 7 | August 12, 2003 | 1.0 | Yes |
| 8 | February 7, 2003 | 2.0 | No |

* Two males were stillborn.

The Cali Zoo has maintained an exhibit of giant river otter since 1993, forming a stable pair in 1998. From 1999 to 2004, there were eight litters born, of which four have been successful (50%). Thus far, four males and three females have survived (Table 1).

Little is known about the biology and the ecology of *P. brasiliensis* (Carter and Rosas, 1997; Staib and Schenck, 1994), and much less about its behaviour. This study focuses not only on the reproduction of the giant river otter in captivity, but also on aspects of its biology and reproductive behaviour.

Methodology

The reproductive activity of a pair of *P. brasiliensis* was studied at the Cali Zoo for five consecutive years (1999-2004). The management techniques were evaluated, and their biology and behaviour were observed.

For the fifth and sixth litters (Table 1), a study was conducted on parenting behaviour during the first four months of pup rearing. Observations were made four days

a week, between 7:00-12:00 and 13:00-17:00 hours. The monitoring of the individuals was done by means of an infrared camera in the nest box, and by direct observations of the exhibition habitat. In addition, observations were made during the parturition of August 2003 (sixth parturition), with the purpose of expanding and confirming observations from the previous litters.

The rearing of the neonates together with siblings from previous litters was evaluated. For the birth of the February 2003 litter, three juveniles (7 months of age) from the previous litter were still residing in the exhibit with their parents. In August 2003, the successful rearing of a pup together with a sister of 13 months and another of 6 months of age was achieved.

Housing

The exhibition has a total area of 250 m², with a water-land ratio of 2:1. The barriers are walls of artificial rock (2 m high), with plants in the upper part. In addition, there are three nest choices designed as whelping

Estimating River Otter Abundance and Habitat Use

continued from page 1

boxes: one of brick and cement, another of wood, and a third of artificial rock and a dirt floor. This last one has been the most used by the otters during the breeding period and is located in the quietest zone of the enclosed area, far from the management area, other exhibitions and the public. This nest box has an entrance in the form of a tunnel with trunks and artificial rock (2.5 m long) that ends in a chamber (1.7 m x 1.2 m x 0.70 m high), with a dirt and sand floor.

Management

Approximately one week before the parturitions, the enclosed area is isolated visually from the public with a piece of green polypropylene (2 m high). After parturition and most importantly, during the two first weeks, an effort was made to maintain the greatest silence possible near the nest and the exhibit. The exhibit was kept closed for four months during the first successful birth, three months for the second, and two-and-a-half months for the last two litters. Opening of the exhibit to the public was done gradually. These isolation measures have been recommended by: Autuori and Deutsch 1977, Hagenbeck and Wunnemann 1992, Wunnemann 1995, Flügger 1997, Sykes-Gatz 2001.

For the last two litters it was necessary to enter the nest box on several occasions to treat the pups medically. To do this, the adults were kept entertained with live fish while the pups were handled. The medical intervention as well as the weighing, measuring and taking of the pups' temperatures did not last for more than ten minutes. In addition, when the nest was too wet, sand was added.

The family of otters was fed basically on fish (manteco) (*Trachinotus sp.*) with occasional live ones as a way of enriching their diet (*Tilapia sp.*). The rations were offered

We assessed the abundance of latrines along the shoreline in both areas by surveying the coast with skiffs. To identify latrines, each team sought those habitat features that are selected by river otters. Otters tend to select areas of old-growth forest when visiting latrine sites (Bowyer et al. 1995), so surveyors scanned the coastline looking for areas with old-growth forest, high canopy cover, and easy access to the water. Once a latrine was found, we measured the habitat characteristics for each site and counted the number of feces. Any fresh fecal material was collected and preserved in ethanol for DNA analysis. In Prince William Sound, a second survey of known latrine sites was conducted after 48-hours following the initial survey. By re-surveying a location of known otter activity after a designated period of time, we can develop an index of population abundance. Such an index can be evaluated frequently, whereas fecal DNA analysis is usually time consuming. Therefore, developing an index that corresponds with an actual estimate from fecal DNA analysis is beneficial for long term monitoring. To ensure that we didn't count old feces twice, we marked old samples with glitter. The glitter proved extremely useful on the 2 days of rain when older feces became "shiny" and "smelly" again. Luckily (and unusually) we had only 2 days of rain in over 3 weeks of survey.

River otter abundance can be estimated through fecal DNA analysis by genotyping individual samples and identifying individuals through unique DNA fingerprints. Once the samples were brought to the lab, we spent weeks sieving out the prey remains and parasites from all 832 feces we collected. Then we extracted the DNA from the fecal matter, using protocols developed by our friend Heidi Hansen. The next step involves amplifying the otter and only otter DNA with species-specific primers. Right now we are in that part of the process, hoping to be able to complete it within the next few months. Once the genetic analysis is complete, we

will use information on the collection sites of the fecal samples to estimate river otter population size, distribution, and movements. We hope to be able to compare our results from KFNP and PWS to see if the lingering effects of EVOS and other disturbances translate to differences in populations. We hope that our protocols will also be useful for monitoring otter populations and trends in other areas.

In addition to population estimates, habitat use, and movement patterns, we will also examine the incidence of intestinal parasites in river otter feces from KFNP and PWS. Intestinal parasites have been sieved from the fresh fecal samples and will be sent for identification in specialized labs. This added information will help us determine what factors might affect the abundance of otters in each area. Our preliminary observations suggest that otters in KFNP had a higher occurrence of intestinal parasites.

During the survey in KFNP, we observed over 30 otters in a six-day period. These observations included single animals, relatively large groups of 7 – 10 individuals, and in one case 2 adults with a young pup. Most observations were brief with animals diving away quickly after detecting us. Nonetheless, these observations were the highlight of the survey and turned into a bit of a contest between the teams. In the course of the PWS survey, however, fewer than 5 otters were observed in a two-week period while the activity at latrine sites seemed comparable to that found in KFNP. This observation warrants further investigation into the possibility that river otter movements are affected by the activities of recreational and commercial boaters. This information, coupled with the data which will be derived from our surveys on river otter habitat use, movement patterns, and abundance would be invaluable to our understanding of river otter ecology and the subsequent conservation of the species in coastal environments of Alaska.

continued on page 6

Otter Updates

By Tracy Johnston

The IX International Otter Colloquium was held at Frostburg State University in Frostburg, Maryland on June 4 - 10, 2004.

Organizers report the conference was a great success with approximately 215 people attending from 33 different countries. Topics discussed included the status and worldwide distribution of all otter species, veterinary care, reintroduction efforts, threats, genetics, and the histories and missions of international conservation organizations. In addition, over 70 persons attended an Otter Keeper Workshop June 2 - 4, 2004, where issues discussed included health, nutrition, rehabilitation, enrichment, training and other captive management-related topics.

The Philadelphia Zoo's giant river otters, Nina and Banjo, are the proud parents of "Primero," the first-ever giant river otter pup to be born and survive in a North American zoo. Primero, which means "first" in Spanish, was born on March 30, 2004 and currently weighs about 2/3 of his expected adult weight at 45 lbs. Zoo officials report he began swimming at about three weeks old with the aid of his parents and now swims on his own, but never ventures too far. Primero has a ravenous appetite, consuming about seven lbs. of fish per day. His favorites include tilapia, trout and herring. (See related article, "Management and Reproduction of the Giant Otter (*Pteronura brasiliensis*) at the Cali Zoo" in this newsletter.)

All the otters treated at The Clinic for the Rehabilitation of Wildlife (CROW) in Sanibel, Florida this past summer have now been successfully released back into the wild.

In mid-June, eight orphaned juvenile river otters were released in the Estero area, after maturing from pups to adolescents at the Clinic. Shortly after that, CROW received a report one of the eight young otters had been discovered in a flower patch behind a neighborhood Estero home after becoming separated from its group. Unlikely able to survive without its support group, the juvenile otter was recaptured and placed with an adult otter receiving treatment at the Clinic for a head wound inflicted by a predator. The pair quickly bonded and were successfully released together in August.

A lone sea otter was spotted at Simpson Reef on Oregon's Cape Arago. The otter was last sighted on Labor Day weekend after apparently spending at least six months in the area. Confirmed sightings of sea otters along the Oregon coast have increased noticeably over the last ten years, according to Roy Lowe, project leader for the Oregon Coast National Wildlife Refuge. Sea otters have been sighted at Cape Blanco, Yachats and Yaquina Bay, although the one sighted at Cape Arago seems to be the only one to have stayed in one location for a period of time. Naturalists hope this is an indication the species is beginning to recolonize Oregon's southern coast where the kelp beds near shore reefs attract sea urchins and abalone, a favorite food of the sea otter.



Photo by Eric Peterson®

The Otter Spirit, a book by river otter field researcher and author, Judy Berg, will be published in April, 2005. The book, based on Judy's research in Colorado's Rocky Mountain National Park, "... is a natural history story of the life of a river otter, the autobiographical complement of the otter's researcher, and the spiritual connection that brings them together."

How Important are Yellowstone Cutthroat Trout to River Otters?

By Jamie R. Crait and Merav Ben-David, Dept. of Zoology and Physiology, University of Wyoming

Yellowstone National Park (YNP) supports the largest remaining population of Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*) and comprises up to 91% of the current range of this subspecies. The park's largest body of water, Yellowstone Lake, comprises nearly 80% of the remaining lacustrine habitat for Yellowstone cutthroat trout. In addition to their socio-economic value as a sport fish and tourist attraction, these fish are a key food source for a number of avian and mammalian predators in and around Yellowstone Lake.

An estimated 42 species prey on cutthroat trout in Yellowstone Lake, including bald eagles (*Haliaeetus leucocephalus*), brown bears (*Ursus arctos*), osprey (*Pandion haliaetus*), white pelicans (*Pelecanus erythrorhynchos*), and river otters (*Lontra canadensis*). While several of these animals feed on cutthroat throughout the year, their availability to fish predators increases from late spring through summer when cutthroat make annual spawning migrations from the lake into tributary streams. While present in shallow water sections of these streams, spawning cutthroat trout are a readily accessible, energy-rich prey item for terrestrial and semi-aquatic predators.

In recent years, however, two non-native stressors--introduced lake trout (*Salvelinus namaycush*) and whirling disease (caused by the *Myxobolus cerebralis* parasite)--have contributed to an apparent decline of the cutthroat trout population in Yellowstone Lake. Such a population reduction raised concern regarding the persistence of cutthroat trout and effects on fish predators in Yellowstone Lake. For example, Clear Creek, one of the lake's better studied-tributaries, sustained a 90% decrease in the number of upstream migrating cutthroats from 1990 to 2004.

As semi-aquatic fish specialists, otters are relatively restricted in their ability to move to different watersheds in search of food (in contrast to avian predators) or to switch to a non-fish diet (in contrast to generalist and omnivorous predators). For a cutthroat-

dependent otter population, a significant reduction in numbers of these fish will likely result in changes in behavior, and possibly a decline in number of otters, making river otters a reliable indicator species for changes in densities of cutthroat trout.

River otters are opportunistic feeders and usually capture fish species in direct proportion to their abundance and density, and in inverse proportion to their swimming ability. Several studies on the diet of otters have documented a preponderance of slow-moving, less agile fishes such as those from the families Catostomidae and Cyprinidae, and comparatively fewer agile fish, such as those in the family Salmonidae. In Yellowstone Lake, slow-moving fish species such as the longnose sucker (*Catostomus catostomus*) may form an important prey base for otters.

Beginning in summer 2001, we assessed the risks of a declining cutthroat trout population to river otters in Yellowstone Lake. Our first step was to determine diet composition from fecal samples collected along spawning streams and the lake shores from May through August in each year of the study (2001 – 2003). This time frame covered the spawning and post spawning periods of cutthroat trout. Our analyses of over 500 samples revealed that trout remains were found in 90-100% of all feces collected at latrines along the lake shores throughout the summer in all years. Trout were also the most frequent (>90%) prey remains in feces collected along tributary streams in May and June, but were less frequent (50-60%) in July and August when longnose sucker became more prevalent. In 65 samples sent to a specialized lab, remains of only three lake trout were identified. These data suggest that cutthroat trout are an important food item for otters in Yellowstone Lake.

In addition, we monitored the activity of otters along tributary streams and the lake shores by visiting latrine sites repeatedly throughout the summer. At each visit we recorded the number of new feces at each site and developed an otter activity index

for tributary streams and the lake shores. Our data indicated an increased otter use of spawning streams and decreased use of Yellowstone Lake during the height of spawning season, with a return to elevated otter activity on the lake after cutthroat spawning had ended. This suggests that otters seasonally track the distribution of cutthroat trout. That otter activity declined along tributary streams while longnose suckers were still spawning there suggests that cutthroat trout are the most important food source for otters in that system.

The question remains: can river otters switch to feed on lake trout? Such a switch will require special adaptation to diving at high altitude. Yellowstone Lake is located at 2,357m in the Yellowstone Plateau and lake trout do not migrate into tributary streams and also tend to occupy deeper depths of the lake (~40m). Diving at high altitude may require special physiological adaptations in addition to those exhibited by non-diving animals for the following reasons: 1. Air breathing animals are constrained by aerobic dive limits even at high oxygen pressure (low altitude), and multiple adaptations are exhibited by diving marine mammals and birds. 2. Diving usually results in a decline in ambient temperature and increase in barometric pressure, both of which reduce the delivery of oxygen to tissue in the periphery. To answer the question, we hope to be able to live-capture river otters in Yellowstone Lake and obtain a blood sample from each individual. We will use these blood samples to determine the oxygen carrying capacity of their hemoglobin as well as determine what factors (such as pH, concentrations of chloride, nitric oxide, and other effectors) influence the delivery of oxygen to otter tissues. By comparing results from Yellowstone otters with those of sea-level dwelling otters we hope to determine whether Yellowstone otters possess the special adaptations required for diving at high altitude.

Management and Reproduction of the Giant Otter

continued from page 5

the group four times daily. The individual adults consumed an average of two kilos (from 1.7-2.5 kg.) and the one-year juveniles about 2.5 to 3 kg. per day.

Reproductive Biology

The Cali Zoo pair of *P. brasiliensis* have reproduced throughout the year (Table 1). From 3-10 days after the parturition, independent of whether the pups survived or not, there were repeated copulations for 8.6 (± 2.5) days (range, 5-11 days, $N = 7$). The duration of the copulation varied from 5-110 minutes. Although at the onset of the period of oestrus, the male tried to copulate with the female on land and even within the nest, the copulations always occurred within shallow water, where the female could support her forefeet. The copulations were more noticeable when the pair was visually isolated.

The period of gestation was 70 (± 2.1 , $N = 3$) days. Four pseudo-pregnancies were identified, in which there was expansion of the abdomen and development of the mammary glands, but there were no parturitions. On one occasion, palpation confirmed that the uterus was empty. The duration of the pseudo pregnancy coincided with the period of gestation (72 days) as was observed (Bateman, 2003) in the Asian small-clawed otter.

The time between the parturition of a successful litter and the following one ranged from 180 to 214 days ($N = 4$). Thus the female conceived again when the pups were between 6 and 7 months of age. If the pups died in the first few days after their birth, the following parturition occurred after approximately 79 days. It was deduced that *P. brasiliensis* can retain the zygote and implant it later, depending on whether the pups survive or not, given that the only copulations observed between one parturition and another were post-parturition. It seems that the female implants the zygote retained after losing the pups or when they have reached an age between 3.7 and 4.9 months. The duration of the zygotic retention is directly correlated with the number of pups from the previous parturition (correlation coefficient 0.95).

The average number of pups per parturition was 2.25 (± 0.89 , $N = 8$) individuals. The sex ratio was 2:1 (Table 1).

Reproductive Behaviour

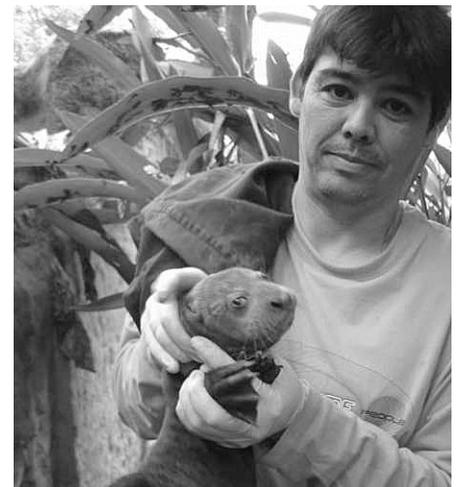
Activity of the family of otters

When the female was nearing parturition, she began to spend more time in the nest box, and her movements were slower. At the same time, all the individuals of the family became quiet and only vocalized at times of great stress. On four occasions, it was determined that the parturition occurred in the morning between 8:00 a.m. and 10:00 a.m.

During the period the female was rearing the pups, she remained more inactive than the rest of the family. Over four months the female rested 53% of the time when under observation, the male 33%, and the juveniles 38%. When the otters were not resting, they were generally to be found active in the water. Nevertheless, the female remained in the water for only a short time (18% of the time under observation), in contrast with the juveniles (38%) and the male (42%). Another important daily activity for the otters was playing. This included turning over in the water, chasing each other, and biting some object or the other sibling while playing. The play activity took up almost 30% of the time of the juveniles under observation, 12% for the male and only 7% for the female.

The female spent more time in the den during the breeding period than the male and the juveniles. In the first two months, she spent more than half the time in the nest box with the neonates, feeding them and/or sleeping.

Fifteen weeks after parturition in 2002, the family left the main den and began using the wooden den. In the two following reproductive events, the pups were moved temporarily several times to different dens, but they did not abandon the original nest box.

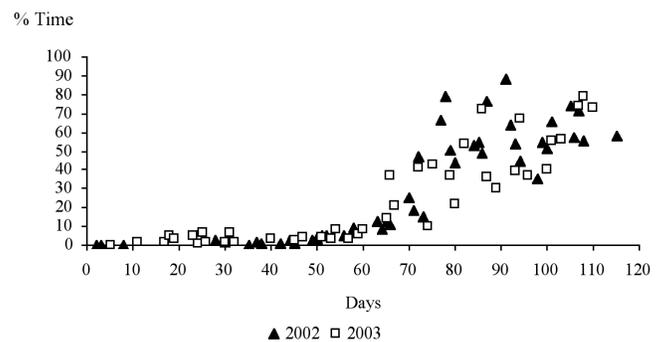


German Corredor holding a giant otter pup for physical examination

Activity of the pups outside the den

When the pups were one month old, the male, the juveniles and principally the female began to take them out from the nest box regularly. Initially, the female transported the pups in her mouth as has been illustrated by Duplaix-Hall (1975), after day 65 the pups left the den following the adults. From that day onwards, the pups began to spend more time outside the nest box. The pups were taken out of the den and put into the water, on some occasions, at a very early age (before 30 days of age). This generally coincided with some factor of stress, such as an unknown noise or the presence of a stranger.

Cubs out the Den



The female began to take the pups to the water regularly, teaching them how to swim after they reached one month of age. At the

beginning she swam with one of the pups, holding it in her mouth, then she began to let go, swimming with it against her chest and pushing it to the surface with her snout and forefeet. At 65 days of age, the pups were already swimming by themselves.

Feeding the pups

To nurse the pups, the female directed them toward her breasts with the aid of her forefeet. When the pups began to suckle, they emitted an intermittent sound and moved their tails. They also reacted similarly (vocalization and movement of their tail) when the female cleaned their faeces.

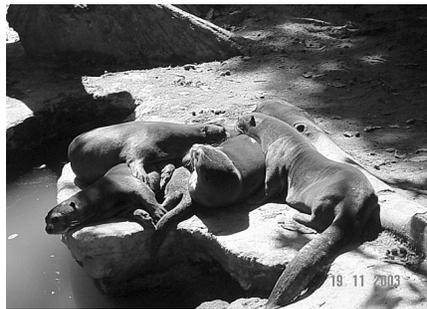
In the first month of rearing, the female invested 40% of her time nursing the pups; in the second month, 32%; in the third month, 26%; and in the fourth month, 19%. The frequency with which the female fed her pups during the observation sessions was from four to five times per day in the first month, about 3 times in the second and third month, and one to two times in the fourth month. Although it was not possible to determine the age of weaning of the pups, it appears that it varies for each litter.

From 10 to 12 weeks of age, the pups began to eat fish. Both the male and the female began to offer them soft pieces of fish one or two weeks before they began to eat by themselves. Although at the beginning the juveniles took the food away from the pups, after a few weeks they themselves began to offer it to them.

Roles in rearing the pups

During the first four months of rearing, the female remained most of the time with the neonates. In addition to nursing them, cleaning the faeces was the exclusive task of the female. The female also taught the pups how to swim, which fulfilled an important role in the supply of solid food (fish) for them.

The male did not have much contact with the neonates during the first two months of their rearing, especially, on the occasions in which they were found in the company of the juveniles. He played an important role in the protection of the family, patrolling



Giant otter family group, youngest pup in the middle

the territory while the others slept. The male also was alert (head raised, periscope position) and vocalized with greater frequency than the rest of the family. The male did contribute to the supply of food for the pups and was very active, playing with both the juveniles and with the pups once they were over three months of age.

In general, the juveniles had a great deal of contact with the young pups. When the adults left the nest box, some juveniles frequently slept with the newborns. At all times they were interested in handling the pups and they were often observed placing them on their abdomen, imitating their mother. On only three occasions, was a juvenile observed nursing for a few seconds. From the onset the juveniles were the playmates of both the male and the pups. They also contributed to the supply of solid food for their younger siblings.

Neonate Development

Based on three reproductive events, a pattern of development for the first four months of age of *P. brasiliensis* was established. The neonates open their eyes during the fourth week after birth. The first teeth that appear are the canines at week 6, and at week 10, the molars begin to emerge. In the fifth week, they begin to walk, raising their bodies a little, and by the sixth week, they coordinate their movements better. By the ninth week, the pups leave the nest box walking after the adults. They swim by themselves at around the 8th week after birth. Initially, they swim with their heads above the water, but by the 12th week, they begin to submerge totally for short, intermittent periods. By week 14, the pups are already

playing and turning over in the water. From week 9 onward, they begin to use the latrine. They begin to feed from 10 to 12 weeks of age.

On two different occasions, it was possible to monitor the weight of a neonate in order to obtain a growth curve for the first 70 days. The neonates that did not survive all had a weight below the growth curve.

DISCUSSION AND CONCLUSIONS

The reproductive success of the pair of *P. brasiliensis* at the Cali Zoo (50% success rate) has been the highest in the history of this species in captivity. It can be said that both the conditions and the management of the exhibit/holding area and the compatibility of the pair have been key to the success of their reproduction.



The reproductive biology of this species is highly complex. The pair had repeated post-parturition copulations, the frequency and duration of which coincided with those reported by (Hagenbeck & Wunnermann 1992, Trebbau 1978). As is seen in *Lontra canadensis* and other species of Mustelidae, the female of *P. brasiliensis* presents zygotic retention or delayed implantation (Duplaix-Hall, 1975; Foster-Turley 1990, Lewis 1995, Partridge 1997). In addition, they can have pseudo-pregnancies, as also occurs in the North American river and Asian small-clawed otters (Duplaix-Hall, 1975; Bateman, 2003).

During the pup-rearing period, the female spends more time resting and less time active in the water than the rest of the family, and that reported for other females that are

continued on page 8

Management and Reproduction of the Giant Otter

continued from page 7

not rearing their young (Carter & Rosas 1997). The male spends a lot of time outside the nest box, resting, swimming or patrolling the territory. The juveniles accompany both the female and the male during their activities. Some individuals may prefer to be more with the male, more time in the water, or with the female in the nest box together with the neonates.

Our experience was different than that reported by others (Wunnemann 1995, Flügger 1997), as our pair was successful at rearing a new litter with older siblings present. The juveniles did not hurt the pups nor drink their milk. Even though the sub-adults always tried to play with the pups, the female maintained control over them, repelling the juveniles (grunting at them) on the occasions when she did not want them to be handled. Only when the family was under great stress (for example after the death of one of the neonates), the female lost "interest" in the pups for a few days, and the juveniles began to transport them from one place to another.

With each reproductive event, the pair of otters has been improving their pup-rearing techniques. The parents have become more tranquil and handled the pups more gently. The juveniles have also been learning how to handle the pups and offer them solid food during the process. Thus, for both the parents and the juveniles, the experience has enriched their parental aptitudes.

With their greater experience, the pair of otters has become more tolerant of certain disturbances. This has made it possible with the latter litters to open the exhibition to the public 75 days after their birth, and the nest box can be checked without affecting the process. Nevertheless, strange noises (of machines, shouts, etc.) cause the family to react by vocalizing, and in the more extreme cases they take the pups out of the den and put them in the water.

The moving of the pups to different dens is common in this species, both in the field and in captivity (Brecht Munn and Munn, 1988). Abandoning the nest box can be caused by stress or poor environmental conditions in the den, (i.e., dampness). Nevertheless, in the two reproductive events in which the den was kept dry, thanks to the addition of sand, the family did not change nest boxes. Thus, the excessive moisture of the nest box was identified as the main reason for abandoning the den. (*Article note: The authors were able to demonstrate the presence of bacteria in damp denning situations that led to clinical illness/death in the pups.*)

Unsuccessful rearing

The death of the neonates of *P. brasiliensis* has been attributed to parental mistreatment and to different diseases (Sykes-Gatz, 2001). In addition to this, the first litters of a pair can be affected by the parents' inexperience.

It is necessary to bear in mind that the individuals in captivity have generally been separated from the family at an early age and therefore they have not been able to acquire any experience of rearing their younger siblings.

Stress is a factor that can always affect the rearing of the pups. The same as with other mammals in captivity, it is the active stress of a "caring behaviour" that generally results in the wearing out and mistreatment of the pups (Baker et al., 1996). Although the juveniles handle and play with the pups, they do not mistreat them if the conditions are adequate: parents with experience and a low level of stress.

Acknowledgements

We would like to express our appreciation to Pierre Guy, Director of the Zoo of Doué La Fontaine for his financial support in order to be able to carry out this study. We would also like to thank Sheila Sykes-Gatz for her opportune advice in husbandry and management of the giant otters. We are also grateful to the staff of the Cali Zoo, particularly to the caretakers Alex Laso, Elianet, and Jacobo Becerra and the veterinarian Delio Orjuela, the nutritionist Gustavo Caicedo and the zoo technician Carolina Hartmann for their continued collaboration.

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President's Message

Dear Readers,

Welcome to the fall 2004 edition of [The River Otter Journal](#).

In this edition, we have many outstanding articles, including two co-authored by Dr. Merav Ben-David. The first is an article by Kaiti Ott and Dr. Ben-David on estimating river otter abundance and habitat use in Alaska's Kenai Fjords National Park and Prince William Sound. The second article, by Jamie Crait and Dr. Ben-David, discusses the importance of Yellowstone cutthroat trout to river otters. We also have two articles related to giant river otters in Columbia, South America, one on management and reproduction of the otters at the Cali Zoo and one on an educational grant given to Parque Recreativo y Zoológico Piscilago-Colsubsidio. We also have an update on the proposed New Mexico river otter reintroduction by Dr. Melissa Savage and an article by Diane Tomecek on her experiences viewing river and sea otters along California's Pacific Coast. I hope you enjoy the newsletter.

I want to extend congratulations to River Otter Alliance Board Member Lissa Margetts, who was named "Citizen of the Year" by the Telluride Foundation on August 9, 2004. This award recognizes persons who have "unselfishly contributed to the Telluride (Colorado) regional community's quality of life. . ." Lissa founded the Rocky Mountain Ark Wildlife Rehabilitation Center in 1977 and currently serves as the Director. Through her direct work, the Ark has rehabilitated and released over 2,000 animals and reached over 100,000 children with its education programs. Lissa cares for both North American River Otters and Asian Small-Clawed Otters at her facility.

As always, we appreciate hearing from you, our readers, on current events, research and other otter-related topics. We also appreciate your annual dues contributions. This year the River Otter Alliance was able to provide German Corredor a \$100 donation to assist with his travel expenses from Cali, Colombia to the IXth International Otter Colloquium last June. We also awarded a \$200 scholarship to the University of Wyoming's Student Chapter of the Wildlife Society to assist with the students' expenses for their bi-annual river otter field surveys of the Colorado River headwaters in Rocky Mountain National Park. Thank you all for making this possible.

— Tracy Johnston, ROA President and Newsletter Editor

Update on the Proposal to Restore River Otter to New Mexico

by Melissa Savage

Steady progress is being made on the road to potential restoration of the river otter to the waters of New Mexico. Most heartening is the willingness of the Department of Game and Fish to pursue an investigation into the feasibility of a restoration. In the late winter of 2004, the Department made a presentation to the State Game Commission, informing them that they were going to proceed with an exploration of a potential restoration effort. The Department then secured federal dollars in the form of a State Wildlife Grant to conduct a feasibility study, a formal step in the process of making a decision in the management of a wildlife species. The New Mexico River Otter Working Group has been assisting the Department in the fulfillment of that study.

One last stretch of potential habitat for otters was completed in the early summer by the Working Group. White Rock Canyon, the

stretch of the Rio Grande below the town of Espanola was surveyed and found to have good to excellent habitat. The Upper Rio Grande, from the Colorado border down to Espanola had been previously surveyed. This stretch of the big river offers excellent habitat, much of it remote and protected, and appears to be the number one priority for otter restoration in the State. This summer the Department also conducted fish biomass surveys on the upper Rio Grande and found abundant fish.

In early winter, the Department and the Working Group partnered to conduct three public meetings, in Santa Fe, Silver City and Taos, to listen to the opinions and concerns of the public. Many came to listen and learn about otter habits and the potential for restoration. One concern expressed is that otters might have a negative impact on sport

fishing. Taylor Streight, an international fishing guide from Taos, responded that in his conversations with fishermen in states where otters have been restored, the quality of fishing has not declined and in some cases has improved.

The Department of Game and Fish feasibility study should be completed by the end of February, 2005, and at that point the Department will assess the findings and make a decision about how to go forward to the next step. There is now the beginning of a fund for actual restoration activities which we hope to expand over the next year in order to be able to pay for putting otters in the water. We look forward to the Game Commission choosing to support the development of a plan for the implementation of river otter restoration soon.

Wild River and Sea Otter Experiences Along the Pacific Coast

By Diane Tomecek

Let me begin by stating that I am an otter fanatic! I think many of us are; and how could we not be - they are adorable creatures after all. It seems many individuals experience both river and sea otters in aquariums or zoos, but it is extra special to encounter them in their natural habitat. My husband and I have had the privilege of experiencing both river and sea otters in aquariums and wildlife sanctuaries, as well as in the wild.

As a photographer, I'm always looking to combine my love of travel with that of otters. Since my husband has a fairly flexible schedule, I am able to schedule a vacation at least once, if not twice a year. I find myself continuously drawn to the Pacific in central California or the rugged coastlines of British Columbia and Vancouver Island. Could it be that these areas are home to my favorite...the sea otter? Yeah, that's it!



Photo by Diane Tomecek©

Our first experience, though, with otters in the wild of the Pacific Northwest was with two river otters in Oak Bay along the southeast coastline of Vancouver Island. My husband and I were out for an early evening drive along the coast. I was watching the water for signs of wildlife, especially river otters. I had read about a family of river otters that inhabit the waters between Discovery Island and Oak Bay, so I was especially vigilant to spot any sign of river otters. I was not really expecting to see anything, however. But upon our arrival at a calm inlet site, I saw an animal which I assumed to be a cormorant dive into the water. I watched for

a minute and saw it appear again and swim along the top of the water. This was no cormorant! My husband, being also "otter alert," saw what I had witnessed and was already pulling our car over to a parking area. Well, he was not fast enough for this otter fanatic because immediately upon identifying the "cormorant" as a river otter, I yelled "Stop! Pull over! That is a river otter!" He calmly turned to me in my excitement and said "Don't worry, we are stopping. I have you covered. I see it too." Needless to say, I did not hear him. I had already unpacked my camera and was high-tailing it to a section of rocks to watch the otter. "Wow, this is so cool!" I thought. Upon reaching the rocks, though, I was in for another surprise - swimming closer to shore was another river otter. I could not believe our luck! This was an experience to remember forever! We stayed on the rocks watching the otters for

close to an hour. It was incredible to witness them come out onto the rocks about fifty feet from our location to "chow" on their fish dinner. I still watch our video of them just to remind myself of our incredible experience.

In addition to our fantastic wild river otter experience on this trip, we had a wonderful time watching and photographing the two adorable sea otters living at the Vancouver Aquarium. Vancouver Aquarium has a wonderful program where visitors can go on a behind-the-scenes tour with the otters. Unfortunately, we had missed the last tour of the day and were scheduled to leave early the

next morning, so we were not able to participate. No loss though; something to look forward to for the next trip to Vancouver!

Our most recent wild otter experience was during our trip to the Monterey Bay area this past spring. We had never been to the Monterey Bay area in the spring. We were in for a pleasant surprise...spring is pupping season! We had the privilege of watching the incredible love shown between mother sea otters and their pups. There are many other animals that show love between parent and child, but I have always found the snuggling and "carrying" between mother otter and pup indicative of their camaraderie. I'd like to highlight one very special, and according to a local expert, rare experience. One morning while on a trek to explore tide pools, I noticed a sea otter swimming close to shore. Of course, the tide pools provided the otter a late morning snack! As we approached the area, we noticed something incredible. Across a pool of water was a second, larger otter sunning itself on a set of rocks. Shortly thereafter, the otter in the water swam over to the otter on the rocks and joined in the sunning party! As we continued to witness this rare occurrence of sea otters coming ashore, we saw a much smaller otter on the rocks and realized it was a pup. Soon the mother and pup went swimming together and we were close enough to hear the squeaking call when the pup ventured too far without its mother. Witnessing these sea otters ashore and sharing a brief moment with the mother and pup as they frolicked in the waves, I realized again that otters are incredibly special creatures.

As otter lovers, there are many facilities and locales we can visit to see both river and sea otters, but as habitat diminishes we need to remember our experiences and do our best to help otters and other wildlife. Organizations such as the River Otter Alliance keep us aware of the issues facing otters. I'd like to thank the River Otter Alliance and all the other organizations dedicated to educating the public about otters and helping to protect the special creatures. These organizations ensure that many future generations will have experiences similar to the ones illustrated here.

Parque Recreativo y Zoológico Piscilago-Colsubsidio Colombia, South America Receives Otter Education Grant

By Jan Reed-Smith, Meyer-Reed Ecological Fund Director and Diana Sarmiento, Conservation, Education Director, Piscilago-Colsubsidio Zoo

Article Note from Janice Reed-Smith: Diana Sarmiento is the Conservation and Education Department Head of the Piscilago-Colsubsidio zoo in Colombia; we met while attending a workshop on developing in-situ (field) conservation programs for zoos and aquariums in Texas this year.

The article below is excerpted from a proposal submitted to the Meyer-Reed Ecological Fund for funding assistance to develop an educational component to the zoo's new giant and neotropical otter exhibits, two species important to the ecological health of the Colombian landscape.

It is with great pleasure I announce that the Piscilago-Colsubsidio zoo was awarded \$2,000.00 by the Meyer-Reed Ecological Fund to continue their community education work on these endangered and vulnerable species.

The giant otter (*Pteronura brasiliensis*) and the river otter (*Lontra longicaudis*), are species that are distributed within Colombia. *Lontra longicaudis* is a species that lives in the influence area of the Recreational and Zoological Park Piscilago-Colsubsidio in the municipality of Nilo, Cundinamarca, Colombia. *Pteronura brasiliensis* is listed in the Critical category (CR) and *L. longicaudis* is considered vulnerable (VU), according to the

list of Colombian Mammals with some Extinction Risk. Both species are part of the zoo collection and are included in the Conservation Program of Threatened Species in Captivity, proposed by the Colombian Association of Zoological Parks and Aquariums (ACOPAZOA) and the Environment Ministry of Colombia.

Recently, Piscilago Zoo built a new exhibit for both species. This new exhibit is designed to show the animals in an environment conducive to successful captive reproduction of both species. As part of this new exhibit we are developing educational information about each species, the threats facing them, conser-



Diane Sarmiento (middle) with zoo colleague, Paula Valencia, Piscilago Vet and Gonzalo Valezquez, exhibit architect

vation initiatives, and human behavior alternatives that can aid in conservation of the otters.

The Piscilago Zoo receives approximately 500,000 visitors annually from different regions in the country. The park has an area of 86 hectares where we are developing

continued on page 12



The River Otter Alliance

ENROLL NOW FOR 2005!

As a member you will be supporting research and education to help ensure the survival of *Lontra canadensis*, the North American River Otter. You will receive a semi-annual newsletter, **THE RIVER OTTER JOURNAL**, with updates on otter-related:

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Parque Recreativo y Zoológico Piscilago

continued from page 11

different projects focusing on the Conservation of the Tropical Dry Forest which characterizes the area. The species *L. longicaudis* is a high-priority species within this program since it is a species naturally distributed in the region of the park and it is threatened by hunting and habitat destruction.

With the development of an educational module for the otter exhibits, we hope to generate an impact on the community population that lives in the region and comes in contact with the otter, particularly the *Neotropical* species. We are developing printing material, focused on school groups and the indigenous community and planning special activities for Otter Days with the Environmental Regional Corporation (CAR). We hope this program



Neotropical Otter Pup
Photo by Reynoso

will help the otter population status and contribute to the reduction of illegal hunting and trade in both species.

Ultimately, we hope that through the exhibition of the otters in captivity, supported by appropriate educational material, we can further the conservation of the otter (*L. longicaudis*), their habitats within the region of the Sumapaz valley and the Magdalena River, and by extension, the conservation of otters throughout Colombia.

Visit the River Otter Alliance Web Page at www.otternet.com/ROA

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The River Otter Alliance is a non-profit, tax-exempt group organized to promote the survival of the North American River Otter (*Lontra canadensis*) through education, research, reintroduction, and habitat protection.

All work and efforts for this organization and newsletter are on a volunteer basis by those who share a common concern for the welfare of the river otter and its habitat. We invite all interested persons to contribute their time at any level of the organization.



Photo by Eric Peterson®

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*Estimating Otter Abundance and Habitat Use,
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