GUYANA GIANT OTTER PROJECT ©

2002-2004 RESEARCH RESULTS

Dr Nicole Duplaix
Oceanic Society Scientific Advisor

Oceanic Society Expeditions

GUYANA GIANT OTTER PROJECT ©

TABLE OF CONTENTS

A. Introduction and Background

B. Project Location

C. Project Overview

D. Project Objectives

E. Methods

F. Role of Participants in Research

G. Rupununi River Survey 2002-2004

H. Findings 2002-2004

I. Conservation Discussion and Conclusion

J. Maps, Tables, Figures, Photographs, Fauna Lists

K. Articles published in *Friends of the Giant Otter Bulletins* 2003 and 2004

L. Principal Investigator

A. INTRODUCTION and BACKGROUND

The Guyana Shield region is one of the largest, still pristine, continuous tropical rainforest complexes in the world, a biodiversity "hot spot" and one of the last strongholds for giant otters

The giant otter (*Pteronura brasiliensis*) is one of the larger carnivores of South America with adults measuring up to six feet. They live in large, noisy family groups and feed principally on fish. Furriers hunting the otters for their thick beautiful pelt brought them to the brink of extinction in the late 1960s.

Although much reduced as a threat, hunting of giant otters is now just one of many factors that appear to be preventing the recovery of the giant otter from its current endangered status. Now added to the continued threat of hunting is the widespread damming of Amazonian rivers, fishing with gillnets, disturbance by local people and tourists, and contamination of the entire Amazon ecosystem by the mercury released in the process of mining and extracting gold. Today, with a total population of approximately 3,000, they are endangered throughout their range.

B. PROJECT LOCATION

Karanambu Ranch is located in the remote Rupununi southwest Guyana. It is an area of extensive grasslands punctuated by bush islands with a backdrop of the wind-sculpted peaks of the Kanuku Mountains.

C. PROJECT OVERVIEW

The long-term goal of this project is to address threats to giant otters by collecting information on their life histories and their ecological role in their environment. The project will also address the impact of human activities on otters, and assess the success of the giant otter rehabilitation and reintroduction project. Studying otters is also valuable, because they are considered an environmental indicator species – sensitive to degradation of water quality and a disrupted food chain.

D. PROJECT OBJECTIVES

There has been no systematic study of the giant otters of the Upper Rupununi River. Our objectives are to collect data on the abundance, distribution and behavioral ecology of giant otters in this region. Six groups of giant otters have territories near Karanambu Ranch and we observe their behavior and track their movements.

patterns are sketched, using a video or still camera, so that individual otters can be identified should they be seen again. The researcher attempts to follow the otters at a distance for as long as possible unless the otters show alarm – if so, the observation is stopped. No attempt is made to call to the otters or attract them.

At Karanambo Ranch, Guyana, a group of habituated Giant otters are fed once or twice a day by the staff to get them to come close for tourists visiting the river. We never fed otters and kept interaction to a minimum on all other rivers.

Fauna lists

Biodiversity assessments were made on each river visited, using the river as a transect line, we record and identify all mammal and bird species seen (lists below).

All riparian vertebrate fauna seen or heard during the day or night were identified (when possible) and noted. A detailed list of the mammals and birds seen is made on each river survey . GPS locality data is noted for endangered species or species of special interest.

Human use and threats

A detailed report is made and photographs taken of any unusual circumstance or event including human activities: deforestation, gold mining, commercial net fishing, natural fish kills, heavy motor boat use, and hunters not belonging to local communities.

The data obtained in this manner provide an assessment of both the presence/absence of Giant Otters and the level of human use in a form that can be readily quantified and compared.

F. ROLE OF PARTICIPANTS IN RESEARCH

Volunteers are crucial to the success of this project. Each group of Oceanic Society Expedition volunteers provides hands-on assistance with data collection, sampling, and monitoring. On-site training takes place on the first day so that each volunteer can work side by side with the field researcher. Volunteers are divided into "teams" and receive specific daily assignments.

The main points that are covered on the project are:

- Explore the river and creeks near the ranch to draw up a detailed map of the area.
- Find, measure and mark otter campsites.
- Find and explore the otter trails in the forest near the campsites.
- Find and watch the otters for as long as possible.
- Try to sketch the throat pattern of each otter seen.

G. GIANT OTTER BIOLOGY

***The species*.** The Giant otter, *Pteronura brasiliensis*, one of the larger carnivores of South America, is a primarily terrestrial mustelid that has become extremely well adapted to using an aquatic environment. Adult males measure up to 1.8 m and weigh 26-32 kg., females measure up to 1.7 m and weigh 22-26 kg. It lives in large, noisy family groups.

Its status. Such a large, diurnal and gregarious animal used to be an easy target for pelt hunters. Today it is the combined effects of habitat loss, pollution and the past demands of the fur industry that are responsible for *Pteronura*'s endangered status over much of its range in South America.

***Habitat selection and seasonal requirements*.** Like many carnivores, Giant otters select habitat according to prey abundance/availability/vulnerability criteria that may fluctuate seasonally. Giant otters prefer slow-flowing clear black water creeks and rivers, particularly during the dry season when they prey heavily on fish that rest on the bottom in shallow water like *Hoplias* (called *uri* in Guyana*)* and catfish species. The availability of preferred prey species in shallow water is the governing factor in *Pteronura*'s seasonal movements. Also, low sloping banks with good cover and close access to prime fishing areas are preferred by otters for their campsites where they rear their cubs.

Group structure. Pteronura are generally seen in groups ranging in size from two (a pair) to an extended family group of 7. Solitary animals, usually subadults, are transient animals passing through the area that seldom remain for long.

Senses. Giant otters are entirely diurnal; they emerge from their den or campsite shortly after dawn and return to it to sleep at dusk. The hunt by sight, chasing and cornering fish even in muddy waters. Their sense of smell is excellent as indicated by the presence of well-developed scroll bones in the nasal chambers of the skull. The snout is provided with a generous supply of nerve endings. Extensive use of the two anal scent glands is made when marking. When investigating or walking on land the otter frequently smells the substrate. Nose to nose contact is often made when family members meet.

H. Upper Rupununi River surveys near Karanambu Ranch

Background:

The area: The Karanambu Ranch is a 324km² of savannah grasslands with some riverine forest.

there were 9 very large Black caiman (>3m) residing there as well. We did not see any interaction between otters and caiman, the caiman swimming away slowly or submerging when the otter group fished nearby and carried their catch to a log near the bank.

Group structure. *Pteronura* in Suriname and Guyana are seen in groups ranging in size from two (a pair) to an extended family group of 7 or 8. Solitary animals, usually sub-adults, are transient animals passing through the area that seldom remain for long and avoid contact with resident groups.
Giant otters were identified individually using the variation in white spots and blotches on their necks (see charts of Groups K and S showing the neck patterns of all the otters observed.). After a few weeks' observation it was possible to recognize all 8 individuals in the resident Group K. Easy individual recognition is a great asset in determining territory boundaries and group movements up and down the river on a daily and seasonal basis. We established that there were both resident and transient otters in the Karanambu area.

- ***Group K.*** The resident group composed of an adult wild pair (Anya and Zhivago) and their four cubs born in late October 2001 (5 cubs were born but 1 cub disappeared in 2002, another in 2003 – see neck charts). This group occupies an area of the Upper Rupununi immediately upstream from the ranch up to and including nearby oxbow lakes/ ponds: Acuri and Romeo Ponds, Nobay Lake, Crane Pond (see map).
  Group K in 2002: one adult pair had 5 cubs in late 2001 (one disappeared when 3-monthsold). The group accepted two hand-reared rehabilitated subadults (Pluto ♂, Persephone♀). They had 8 sites: not in use 4 (3dens); 4 in use (4 dens).
  Group K in 2003: the same adult pair had a single cub (Solo ♂), 3 subadults (another of '02 cubs disappeared). The adult pair ejected the two rehabilitated otters from last year at the start of the rainy season (both disappeared). The adult pair accepted another rehabilitated subadult otter (Rewa ♂) that participated fully in group activities. They had 8 sites (including 2 new ones, 1 collapsed): not in use 4 (4 dens); 4 in use (4 dens).
- ***Top Group****.* A group of otters also resides even further upstream from Group K. Their lowest site was found in October 2002. It is a large, perennial communal campsite with two dens (one now collapsed) and sheer banks. The communal campsite is at the top of the bank but single scats were also found on the large protruding roots of a tree in the bank itself. Another campsite with a den on the opposite bank collapsed and was not used in 2003. We did not locate this group's other sites further upstream due to low water.
- ***Group S*****.** We also surveyed the portion of the river downstream on the ranch to and including Simuni Creek and nearby oxbow lakes/ponds: Buffalo Pond, Moura Pond and Riverburst. While these areas are excellent potential otter areas we found no fresh traces of otters on Simuni Creek in March 2002, even though there were 7 abandoned

campsites and it appeared as if the otters were no longer using the old sites on the creek. As the ponds on the creek are prime fishing areas used by commercial net fishermen the otters may have been disturbed. In October 2002, we saw a pair in Simuni Creek, and again soon after together with a subadult ♂, in Riverbust, near the entrance of Simuni Creek. The sites in and around Simuni sites were visited by the otters again in October 2002: 7 sites: 1 old (1 den), 6 in use (4 dens).

- ***Group S2***. On the upper portions of Simuni Creek, at least 20 km upstream from the entrance of the creek and Group S, in low swamp forest, there is another resident group which was heard but not seen. There were 4 sites: 1 old, 3 in use (1 den). As we saw the S Group that day far downstream we knew this was a different group.

Conclusions of River Survey

There is high overall biodiversity in the Kanuku region around Karanambu Ranch with its unusual diversity of lowland and highland areas, but there is low habitat heterogeneity along this portion of the Upper Rupununi River except for Simuni Creek. Presence of threatened species: Giant otter, Black caiman, Giant River turtle and *Arapaima* in reasonable numbers. The Karanambu area offers ideal otter research conditions. The availability of a habituated resident group that can be observed closely on a daily basis provides the opportunity for close behavioral observation which is usually available only after long months or years of habituation. Here the adults and the cubs, both wild and rehabilitated, can be approached to within 1m and the behavior of even the smaller cubs can be observed – a unique opportunity to further our knowledge of Giant otters.

I. Behavioral Observations of the Karanambo Giant Otters

Several interesting behavioral observations were made concerning the adults and cubs during our three visits to Karanambo Ranch in 2002 and 2003. These include:

Territorial Behavior

1. **Ledges near the den entrances and/or the flat access points by the waterside are usually marked** with scats and urine prior to the group leaving the den and swimming away (see photo). In Suriname, this behavior is seen on the large communal campsites above the dens, but here, due to the sheer banks, campsites are not cleared directly above the dens (see photos). Instead small, flat ledges near the den entrance or on the shoreline below are used (<2m in diameter). We could smell the rank and fishy odor of these fresh ‘mini’ campsites as we approached.

Social Behavior

2. **The group used 3 of their 4 dens in 5 days**, sometimes 2 dens on the same day (see photos). One den may be used for resting during the day, another for sleeping at night. All the otters appear to sleep or rest together in the same den once the cubs join the group .

3. The **otters enter the dens still wet with no pause to rub their coat dry first**. Since most dens here are excavated in sand, they may rub themselves dry or "drip-dry" inside the den. Rubbing the coat dry is observed both on logs and, as in Suriname, when resting on communal campsites.

4. **Grooming and allo-grooming activities take place immediately after feeding**, the group forming a tight cluster with both the cubs and subadults (see photos). "Daisy Chain" grooming (a new term) is observed when *more* than two Giant otters groom each another: one otter grooms another next to it that grooms the other next to it, etc. (see photos). The otter at the end of the row may be grooming itself. All the otters are usually grooming simultaneously. All the otters in a group of seven were grooming simultaneously (see photo - one is seen pausing briefly - even the juvenile male on the extreme left, is grooming its mother).

5. **Cubs remain close to group**. After a while the cubs may start playing in the water but remain within a few meters of the adults. Grooming takes place in the shallows, resting half-submerged on logs and not ashore on campsites as is common in Suriname (this may be due to the lack of campsites and the sheer banks in Karanambo).

Parental and Juvenile Behavior

6. The **parents actively kept the 3-6 month old cubs away from human observers,** on the other side of the river 30-40 meters away, whereas subadults were allowed to come as close as they wanted, even into the boat. If the cubs swam on their own more than halfway across, an adult would quickly herd them back to the shallows on the other side

7. In 2002, Pluto, the **male sub-adult rehabilitated otter that had been accepted by Group K, was a very attentive "minder"** of the cubs, bringing them fish after he had fed, grooming them, herding them into the den, and generally being very "aware" of their needs. Persepone, the female sub-adult rehabilitated otter also accepted by Group K, was also attentive but noticeably less than Pluto. In 2003, Rewa, another male sub-adult rehabilitated otter, was also a very attentive "minder" of the cubs just like Pluto has been the year before. The adults accepted this and did not interfere or show alarm or aggression.

8. The **juveniles crowd around an adult eating a fish with loud food-begging calls** and twice snatched the fish from the adult forcibly. The other juveniles would then also try to tear it from the juvenile that would give warning screams and wave its tail up and down while turning its back to the

others to keep them at bay. Satiated adults shared fish with juveniles but juveniles do not share with other juveniles except by force. This food-sharing behavior has not been reported in the wild before and may be due to the fact that these particular otters are fed by hand twice a day to encourage them to come closer to the tourist boat.

9. Pluto, a **male sub-adult, while protecting its fish gave a warning growl** and lunged at Zhivago, the dominant adult male, who snorted and moved away, making no effort to steal the fish. It was the first time I had seen a sub-adult lunge at an adult – in this case a rehabilitated male otter lunging at the dominant wild male.

10. **While swimming the juveniles stay close** behind the head of the adult, usually Anya the mother, either in a cluster formation or strung out in a V-line behind her (see photo). The mother makes re-assuring hum-coos just prior to swimming off and while swimming which appears to be a “herding” vocalization to both juveniles and subadults who follow her lead.

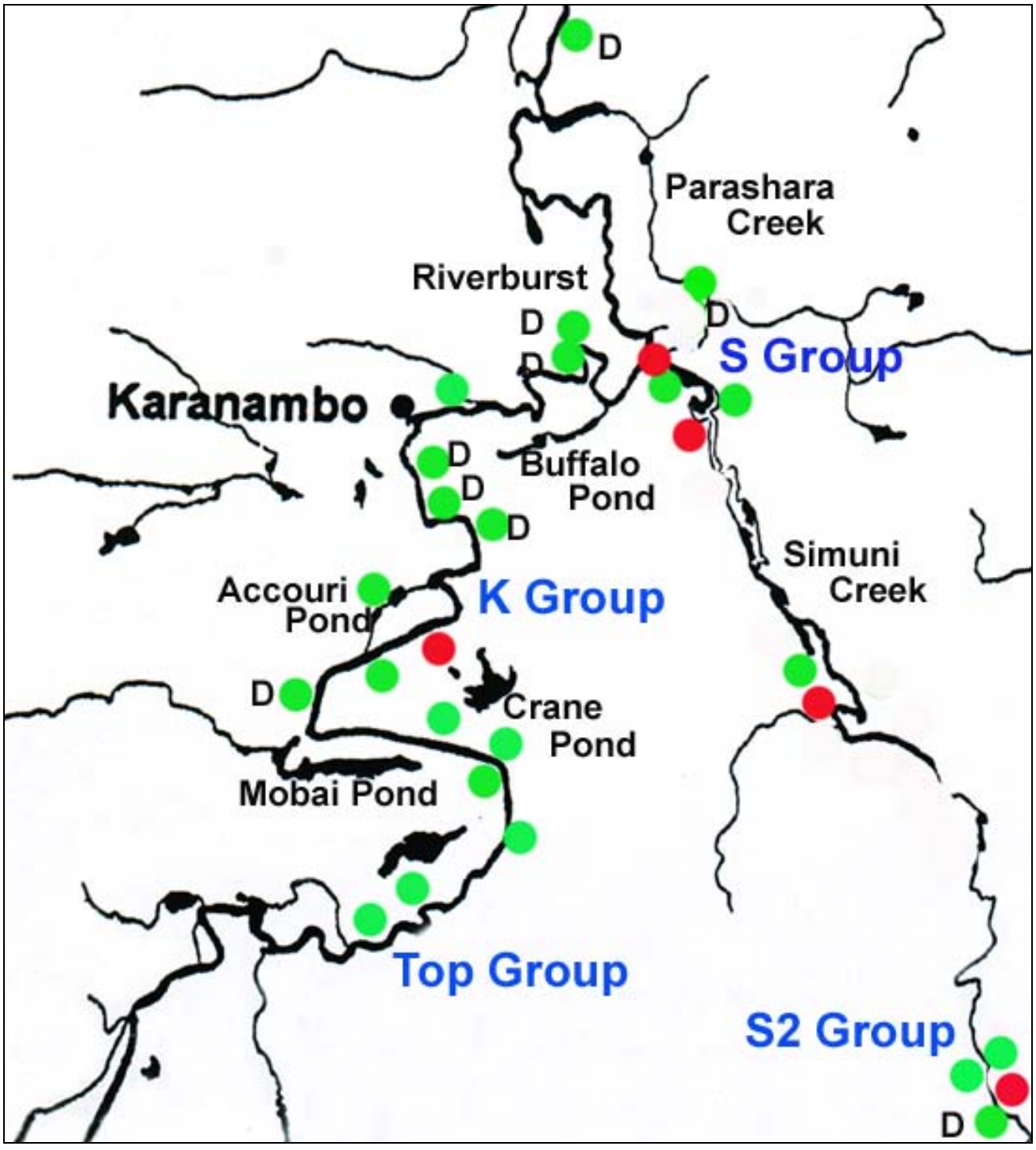
11. **One 4-month old juvenile, Shy, was twice separated from its group in March 2002** and once, apparently for several days (unless it was hiding in a den). On both occasions, the cub lingered outside the den in the shallows below when the group had retreated for the night and had not rejoined the group when we observed it the next day. This did not happen in 2003 when there was only one cub (Solo).

12. **A rehabilitated juvenile (Rewa) that was beginning to stray further up an down the river,** before it was accepted by Group K, was seen swimming in the river at 22.00 hours, 4 hours after sunset when wild otters enter their dens for the night. This was highly unusual behavior as Giant otters are diurnal as a rule. There were large Black caiman in the vicinity that were active at night.

Sites of four groups of Giant Otters on the Rupununi River near Karanambu Ranch, Guyana

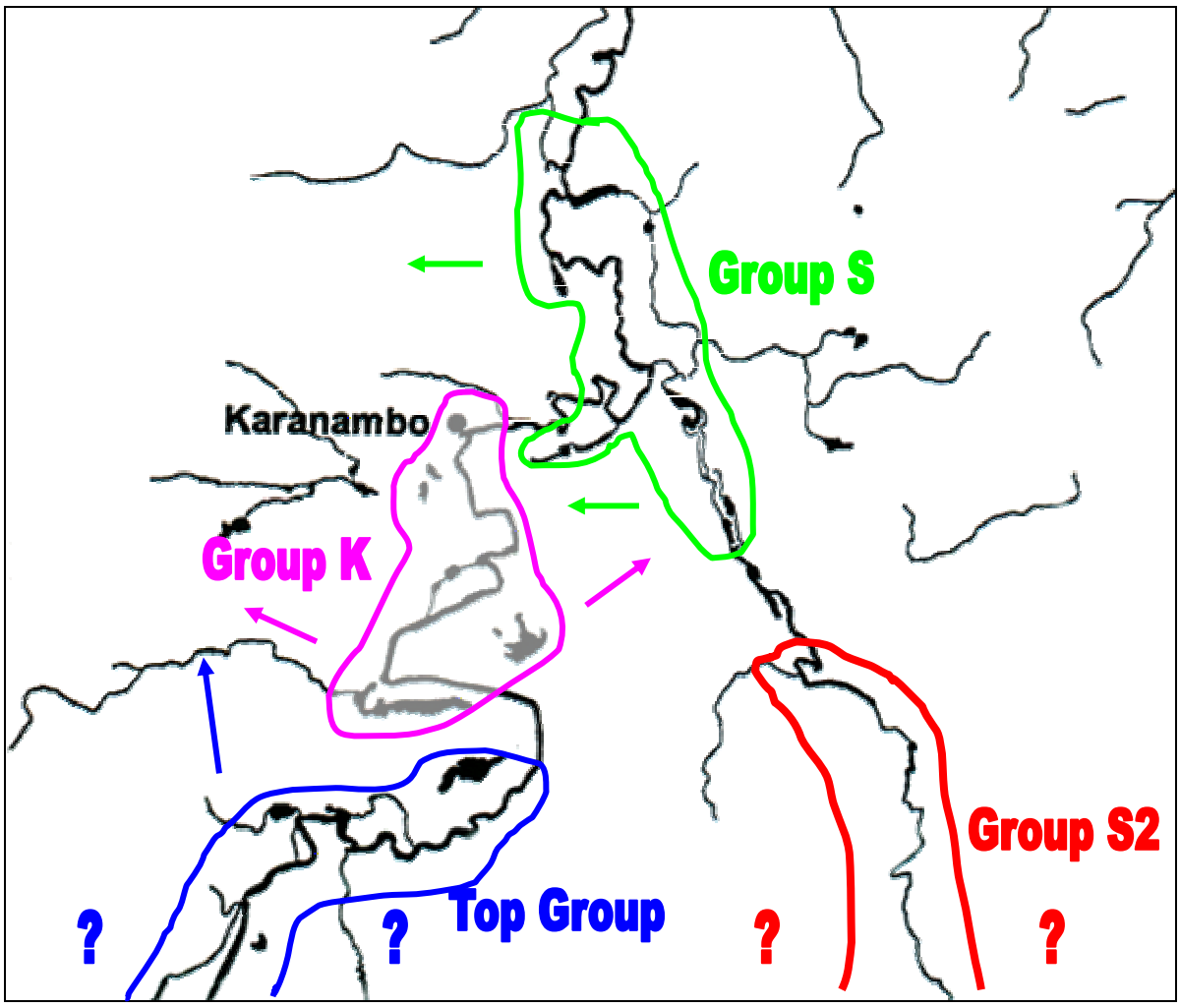
Composite of three visits: March and November 2002, March 2003

KEY: = campsite in use = campsite not in use **D** = den



Dry season territories of 4 groups of Giant otters on the Rupununi River near Karanambu, March 2003

KEY: Arrows indicate movements of group during the rainy season that may result in aggressive encounters with neighboring otter groups. Each group follows spawning fish into the flooded forest oxbow lakes and savannah swamps as water levels rise until the whole area is virtually flooded.

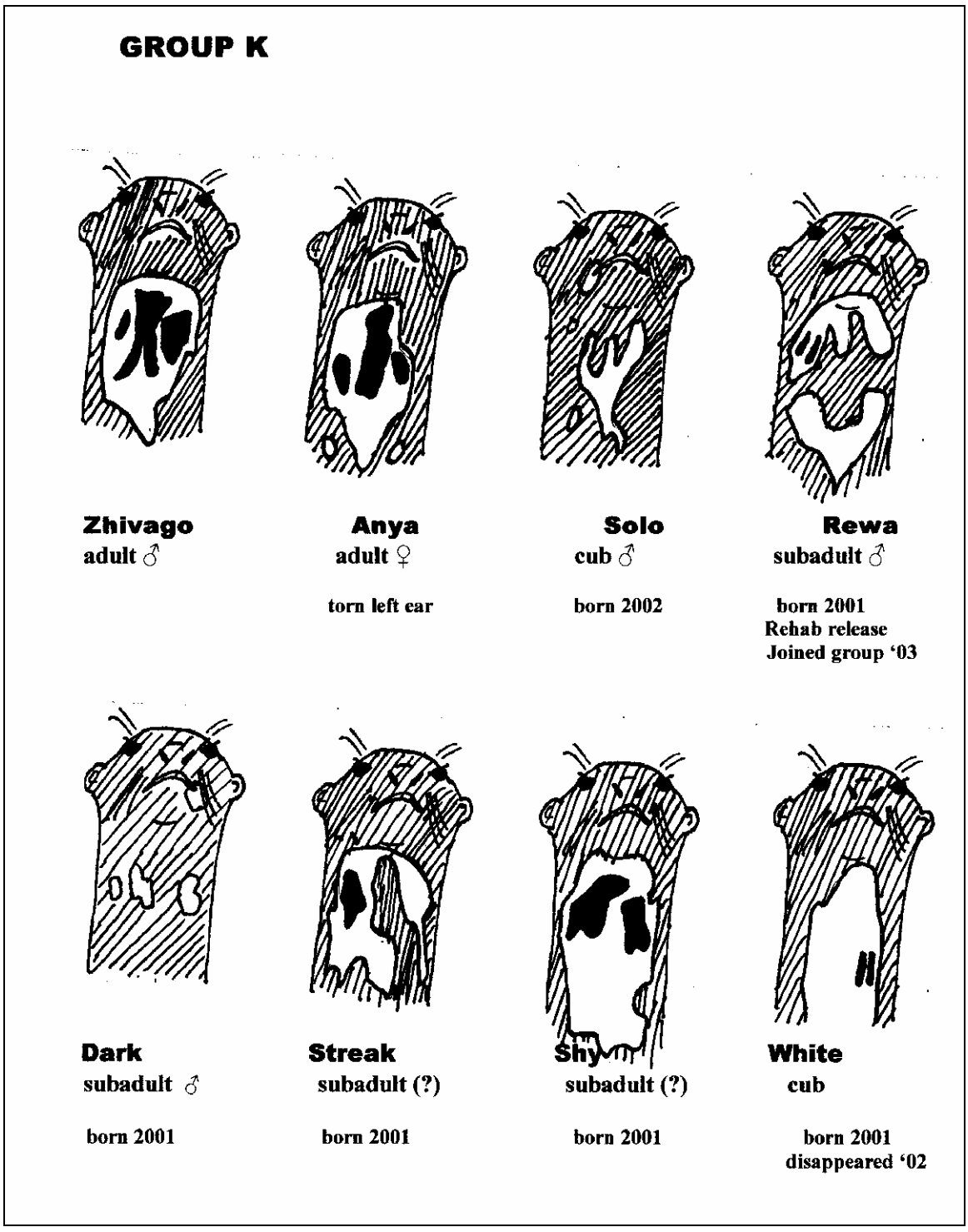


GIANT OTTER SITES at KARANAMBO RANCH, UPPER RUPUNUNI RIVER, GUYANA

June & October 2002, March 2003

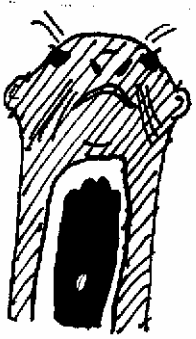
SITE	TAG #	LOCATION	bank side	NOT IN USE	IN USE Oct '02	IN USE Mar '03	scratch wall	tracks	den	nr. lake, creek	otters seen	NOTE
Upper Rupununi River												
Group K 7 otters: 1 adult pair, 4 subadults (including 1 male rehabilitated), 1 juvenile												
RUP1D	1	N 03.45.04.3 W59.17.57.4	L	✔		new			✔			rest spot under roots
KAUR1D	81	N 03.44.36.9 W59.18.28.4	R	✔	✔	gone	✔	✔	✔			in use in Oct., collapsed
KAUR2D	4	N 03.43.47.3 W59.18.12.5	R		✔	✔	✔	✔	✔		✔	den in use, smell
KAUR3D	79	N 03.43.31.4 W59.18.39.9	L		✔		✔					vertical wall den
KAUR3B	80	N 03.44.23.0 W59.18.19.2	R		✔	✔	✔	✔	✔			vertical wall den, smell
RUP2D	3	N 03.44.06.9 W59.18.06.7	L			new		✔	✔			on sand bank nr. water
KAUR3B	2	N 03.44.21.6 W59.18.18.3	R		✔	✔	✔	✔	✔	✔	✔	"safe" den, smell
KAUR6D	77	N 03.43.36.3 W59.18.26.2	R	✔	✔				✔			birthing den
KARST2	5	N 03.43.25.6 W59.18.46.4	R	✔			✔			✔		sand bank + path
KAUR7D	6	N 03.43.14.1 W59.19.02.4	R	✔		✔	✔		✔	✔		major site, old+new dens
Top Group Number of otters in group unknown												
KAUR5X	?	N 03.42.57.6 W59.18.38.3	L			✔	✔	✔	✔			sand bank, nr. Water
KAUR5D	78	N 03.42.57.1 W59.18.34.9	L	✔			✔		✔			abandonned
Simuni Creek												
Group S 4 otters: 1 adult pair, 1 subadult, 1 cub - minimum												
KASID1	90	N 03.45.29.4 W59.16.52.3	R		✔		✔	✔	✔			vertical wall den, smell
KASID2	89	N 03.45.29.4 W59.16.52.3	L	✔				✔	✔		**2, shy**	old latrine
KAS13	88	N 03.43.42.3 W59.15.59.9	R	✔				✔				old latrine
KAS14	87	N 03.43.36.7 W59.15.55.0	L	✔				✔				old latrine
Group S 2 Number of otters in group unknown												
KASI5	86	N 03.43.35.9 W59.15.54.5	R		✔			✔				latrine in use
KASID6	85	N 03.43.07.2 W59.15.49.8	L		✔			✔	✔			latrine in use
KASI7	84	N 03.43.00.2 W59.15.35.7	L	✔			✔					old latrine
KASI8	83	N 03.42.38.5 W59.15.06.5	R		✔		✔	✔				fresh latrine, smell
Riverburst, oxbow loop (**Group S** - see Simuni above)												
KARB1D	no	N 03.45.23.1 W59.17.28.1	L		✔		✔	✔	✔	✔	**2 (1.1)**	old den
KARB2D	no	N 03.45.20.1 W59.17.26.9	L		✔		✔	✔	✔			brand new birthing den
Upper Rupununi River, below Parashara Pond (**Group S** - see Simuni above)												
KAPBDN	no	N03.47.14.8 W59.17.44.7	R		✔			✔	✔	✔	1	transient otter, Group S?

Throat patterns of Group K at Karanambu, Upper Rupununi River, Guyana (2002-2003)

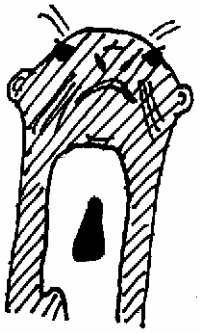


Throat patterns of Group S at Karanambu, Upper Rupununi River, Guyana (2002-2003)

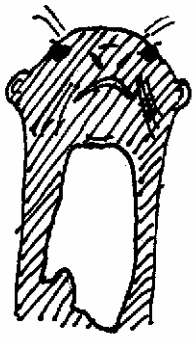
GROUP S (shy group)



Fingers
adult ♂?



Arrow
adult ♀?



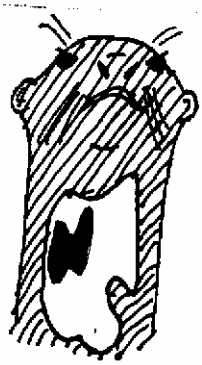
Parashara
subadult

born 2001

Riverburst
cub

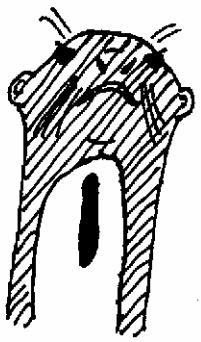
born 2002

Hand-reared rehab releases



Pluto
subadult ♂

born 2000
joined Group S '01
Disappeared '02



Persephone
subadult ♀

born 2000
joined Group S '01
Disappeared '02

Parawong
subadult ♂

born 2001

Disappeared '02

J. Conservation Discussion and Conclusions

Background. To identify Giant otter conservation problems and to make recommendations on how best to address them, we must first understand the adaptations as semi-aquatic carnivores that Giant otters make to live complex in complex tropical freshwater ecosystems. Unlike larger terrestrial carnivores, like the jaguar for instance, that have huge home ranges of 30,000 ha or more to hunt in (Rabinowitz, 1986), Giant otters exploit only a very small proportion of the habitat available. Otter home ranges are narrow bands of <200ha along the riverbanks of a river, creek or lake and the swamps or lakes nearby – this may represent a tiny portion of a small river in a huge reserve like the Central Suriname Nature Reserve (Duplaix, 1980, 1982). Therefore, anthropogenic impacts in that small home range, and particularly those affecting the river, will h0.001 <20024 uspicunt impacs on the otterst

like the(jagua), G

When the subadults leave the group and are on their own, mortality is also a significant limiting factor, as they no longer have the ‘security in numbers’ of a group and ever-vigilant adults. These subadults, called ‘transients’, must find both an attractive *and* empty territory as well as a mate as they wander up and down the river. The odds do not appear to be in their favor unless there is a high otter population density present. While mortality data are unavailable for transients, many do not re-appear as adult pairs in such well-studied areas as Karanambo. So we must ask ourselves: Are Giant otter populations viable long-term in the Guianas where human pressures on the rivers are increasing?

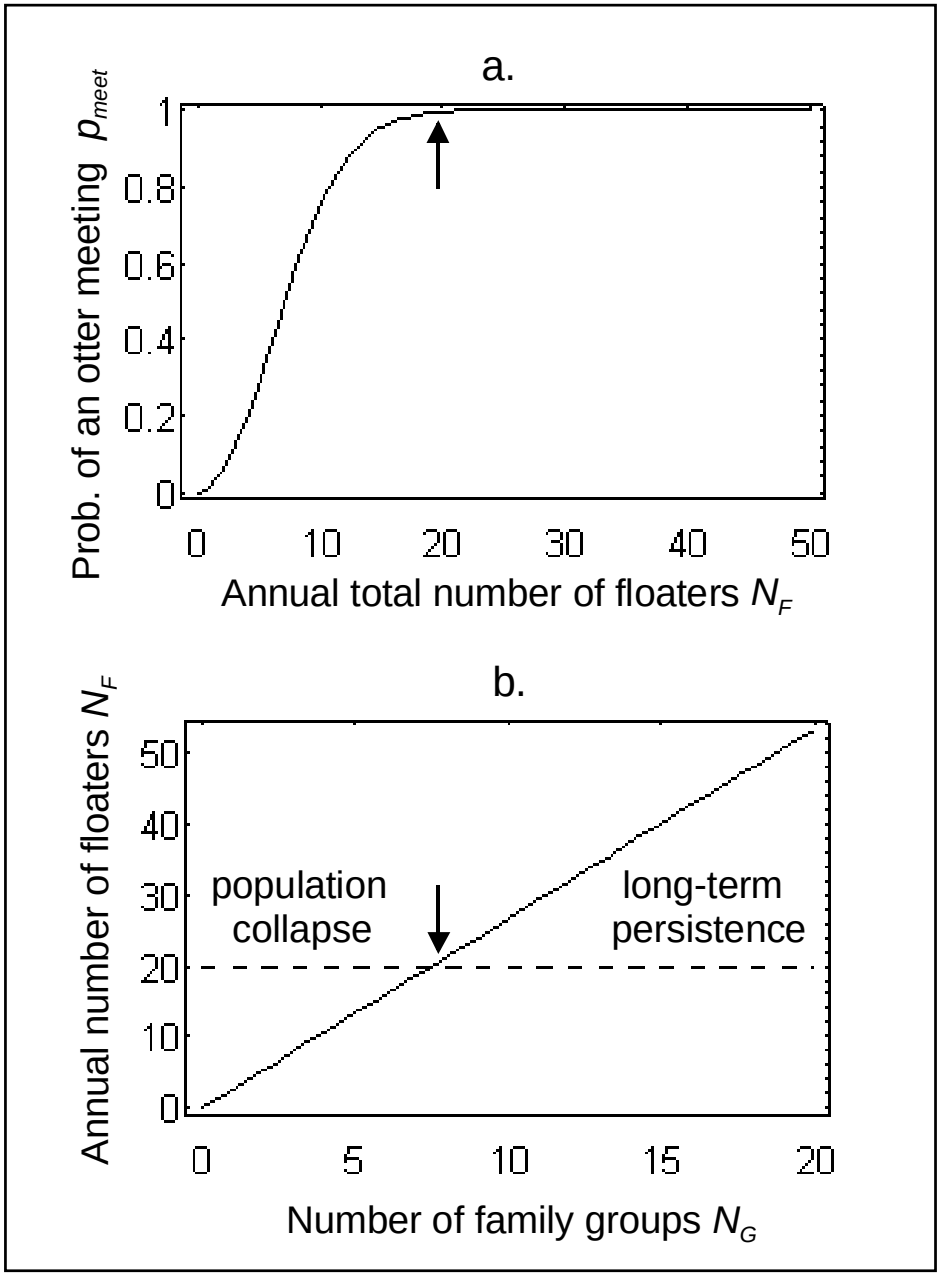
From our surveys, we can conclude that in watersheds like the Upper Coppename River in the CSNRin Suriname and the upper reaches of the Rewa and Kitaro rivers, still pristine, isolated and largely undisturbed, Giant otters will continue to survive for many years. It is in the smaller rivers and creeks such as Kaburi Creek, Bat Creek and the Cusewijne River that the future is uncertain with human threats rapidly mounting and where Giant otter habitats are limited due the size of the rivers themselves.

Colonizing a vacant river or re-colonizing vacant portions of a disturbed river is not straightforward. Once Giant otters have abandoned a river (or, worse, a watershed) or been extirpated by hunters this creates a gap that must be found within a limited time frame by transient otters seeking territories. It is unlikely that such young, inexperienced animals, would find an adjacent empty river or watershed that would involve long and dangerous overland exploration. Their chances of exploring the river they know appear to be higher.

In Peru, Schenk and his colleagues, created a model to test the likelihood of a transient otter meeting a mate at the right time in the right place *and* finding an empty territory (see below and Schenk *et al.,* 2002). First, there must be a reasonable number of transients in a given river looking for mates each year. Second, each group must have a minimum number of cubs surviving in order to have a minimum number of transients available. High cub mortality, due to predation, disease or collecting by humans, will have a direct effect the number of transients that will set out on their own (see photos).

This ‘colonization potential’ by transients is clearly the vital key to the longterm viability or collapse of a Giant otter population on any given river in the Guianas just as it is in Peru. If the population numbers are high enough to withstand accidental loss of cubs or transients all is well and the resident population may even expand. The more resident otter groups breeding each year = the more subadults must leave their groups. The more transients on the river each year looking for a mate, the higher the probability of success and the quicker a territory is created or re-occupied. If, through attrition, pollution or accidental loss, the otter population number falls below a certain critical level or, if the population becomes too isolated geographically from the next nearest group of resident otters the transients will not be able to reach it in time, the collapse of the population is inevitable because there is minimal likelihood that transients will meet or find mates.

Establishing the minimum number of transients needed each year to insure the longterm viability of the Giant otter population in a given watershed is difficult to determine



This model shows that the number of Giant otter family groups present (bottom) and the number of dispersing, sexually mature sub-adult 'floaters' or transients (top) are the two most critical factors for the long-term persistence of Giant otters in Manu National Park, Peru – a park larger than the Central Suriname Nature Reserve. *Schenck et al., 2002*

as it probably varies with the type of river system and how many potentially attractive empty territories are available and how far they are apart from each other. The most important factor in ensuring survivability is *preventing* increased Giant otter mortality due to anthropogenic factors that may trigger the irreversible population collapse of this endangered species in one river system after the other.

Human threats and mortality factors. Today the potential of such human-related increased mortality factors are visible on many rivers in the region and in many forms: the use of fishing nets (Corentyne, Kaburi, Upper Coppename, Cusewijne), gold mining (Cusewijne and on many rivers not yet surveyed), human-otter conflicts (Kaburi, Karanambo, Cusewijne) and tourism (Karanambo, Cusewijne, Kaburi). Further, as the populations of riverine settlements in the interior increase so do the resource exploitation levels, obviously. Inevitably, conflict will arise between people and otters competing for the same favored fish species. Add to that the 'outsider factor' as more urban hunters and fishermen travel to the interior for recreation. Add to that the 'ecotourism factor" as more and more people wish to see charismatic otters up close. Wildlife on rivers, be they manatees, otters, caiman, waterfowl, are easily disturbed by speed boats and outboard motors. And finally, and potentially the worst of all for both the people and the otters, the 'yellow metal factor" and the deadly mercury contamination that gold mining spawns far downstream.

Gold mining. Illegal gold mining has become common place in many remote rivers of the interior across the three Guianas. The mercury concentrations in the fish and people that have been sampled near gold mining areas in Guyana (Singh *et al.,* 1996) and in Suriname(Qwik & Ouboter, 2000) are higher than what is considered safe for humans, and also, therefore, for Giant otters. Similar unsafe levels have also been found in sampling studies in Peru (Gutleb *et al.,* 1997) and in French Guiana (Richard *et al.,* 2000.) Recently, the French army was sent to investigate the number of illegal Brazilian gold miners in southern French Guiana and they estimated that over 40,000 of them had now settled in a hitherto remote and inaccessible region (de Thoisy, pers. comm., 2003). I fear that the same is occurring in remote areas of the very isolated upper watersheds of rivers in the other Guianas

Such unsafe concentrations of mercury present in the water, fish and sediments pose serious threats to both humans and the wildlife that depend on fish for their survival. Steps to stop such unsafe gold mining practices with mercury release in rivers and creeks in the rainforest *must cease* to protect both humans and wildlife.

Commercial fishermen drying their catch with lines or nets on the Upper Rupununi River, Guyana. Commercial fishing has recently increased due to the demand by Brazilian miners in the area and amy pose a threat to the Giant otters.

Macushi Indians on the Upper Rupununi have wounded and killed Giant otters with bow and arrows (used for fishing). Giant otters are sometimes viewed as competitors for dwindling fish stocks.

Human campsite on a Giant otter campsite in the Cusewijne River Nature Reserve, Suriname. The heavy tourist traffic has scared away the Giant otters and most otter campsites there are now abandoned.

Dead Giant egret in the Cusewijne Nature Reserve, Suriname. Illegal hunting and net fishing occurs frequently as there is virtually no law enforcement.

Both Neotropical and Giant otter cubs are collected by indigenous people in Suriname and Guyana to keep as pet or to sell in town even though both species are protected.

Dead Neotropical otter run over by a car on a coastal road in French Guiana (photo, B de Thoisy). Giant otter road kills are rarely recorded as they prefer rainforest rivers in the interior.

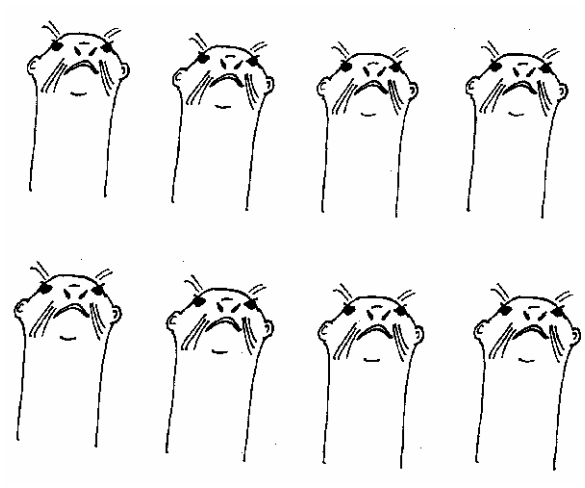
Each Giant otter has a unique throat pattern of spots and white areas, making individuals easy to recognize. (A tick can be seen in right ear). Kaburi Creek, Suriname.

The sex of individuals is hard to determine unless the otter goes ashore. Adult males (picture at left) may have larger necks than females (above). Karanambo, Guyana

Some otters also have more white on their muzzle than others. Karanambo, Guyana

Subadult, Karanambo, Guyana

Part of a group in an oxbow lake in Karanambo, Guyana.



When a new otter is sighted, a sketch of its throat pattern is quickly made on a printed sheet.

Giant otters are semi-aquatic and diurnal, living on rivers, creeks and lakes. They are curious, often approaching boats, and are vulnerable to poachers.

Otters investigate while swimming with a 'periscope' head-up posture. Cubs are unable to raise their necks out of the water until they become strong swimmers.

Family group in oxbow lake, two adults in front followed closely by 3 cubs. Karanambo, Guyana

A family group of 7 otters (adult pair, subadults and cubs) on Kaburi Creek, Suriname.

A subadult may leave the family group after 2 years before the next litter is born or be pushed out by the adults with a fight. They become 'transient'(s) until they find a mate, set up a territory or, rarely, join another group in the area.

Adult female showing scars (below eye, right ear missing) from fights with subadults as they are ousted from the group. Hostile encounters between neighbouring groups occur rarely, the otters avoiding contact instead.

‘Daisy chain grooming’, a new term used to describe when more than two otters groom one another simultaneously. Karanambo, Guyana

‘Daisy chain grooming’ in a family group. All 7 otters are grooming one another, save one that has paused momentarily. Karanambo, Guyana.

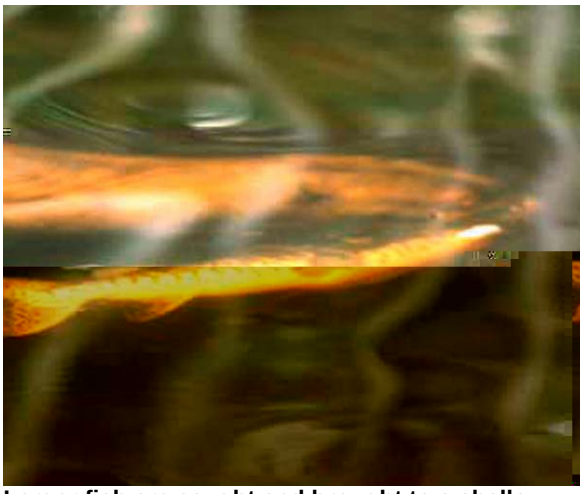
Three subadults groom a cub simultaneously. One otter has its forepaw wrapped around the cub’s head to keep it still (arrow). Karanambo, Guyana.

Otter ‘autogrooming’ its abdomen. Karanambo, Guyana.

Otters rest during the day, after feeding and /or grooming. Adult male resting in shallows in Kaburi Creek, Suriname.

Adult male resting on log. Karanambo, Guyana.

Giant otter fishing in shallow water during dry season. Karanambo, Guyana.

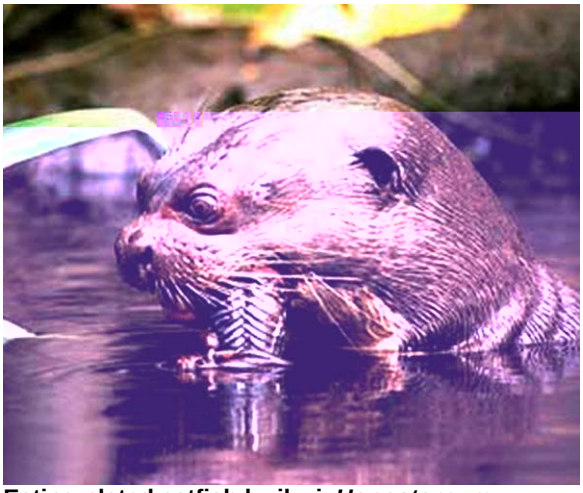


Larger fish are caught and brought to a shallow spot near the bank. Kaburi Creek, Suriname

Fish are eaten head first, except for large catfish where the bony head is discarded first. Tiger catfish *Pseudoplatystoma fasciatum*. Karanambo, Guyana.

Eating a large grey piranha, *Serrathalmus* sp. Karanambo, Guyana.

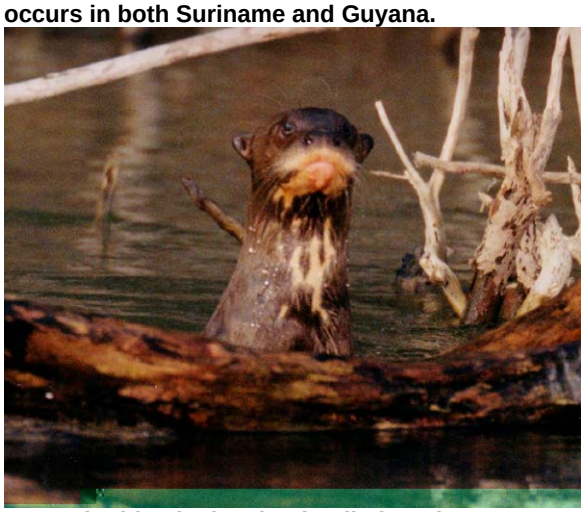
Eating a warapa *Hoplorythrinus unitaeniatus*, a preferred prey. Kaburi Creek, Suriname.



Eating plated catfish kwikwi, *Hoposternum thoracatum*, a common prey in small creeks. Kaburi Creek, Suriname.

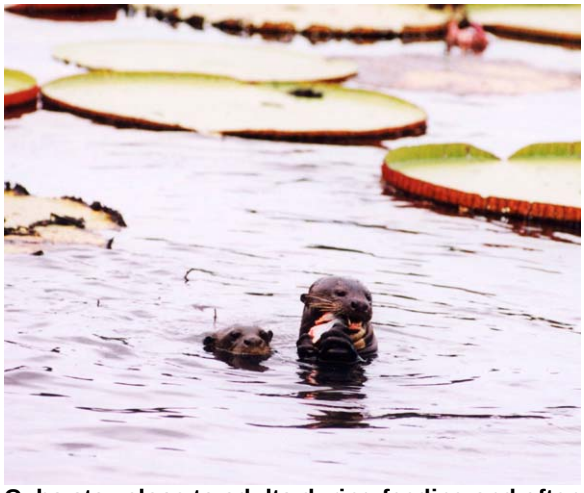
These small cubs were removed from their den to keep as pets, later confiscated by wildlife officers. Such young cubs have little chance of survival. This occurs in both Suriname and Guyana.

Female otter exiting den, followed by male 4-month old cub. Karanambo, Guyana.



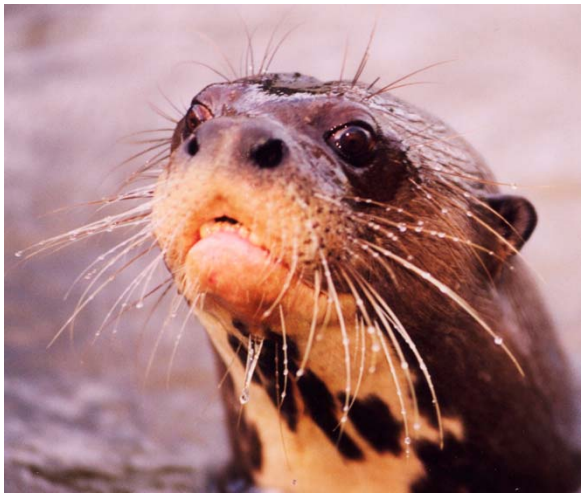
4-month old cub showing its distinct throat pattern. Its white patches are still cream-colored, and will turn white later. Karanambo, Guyana.

Family group, cub at far left next to mother. Adult male in water with mouth open, three subadults cluster around him. Karanambo, Guyana.

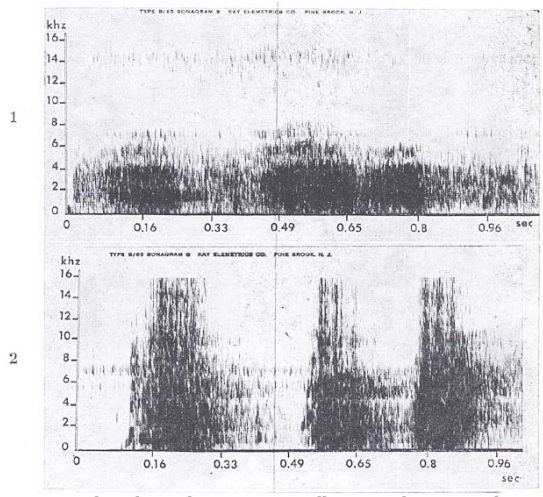


Cubs stay close to adults during feeding and often give food 'begging call' (see Vocalizations). Karanambo, Guyana.

Cubs eat fish shared with them by adults or subadults, even when still suckling. Small pieces are eaten while lying on the back. Karanambo, Guyana.

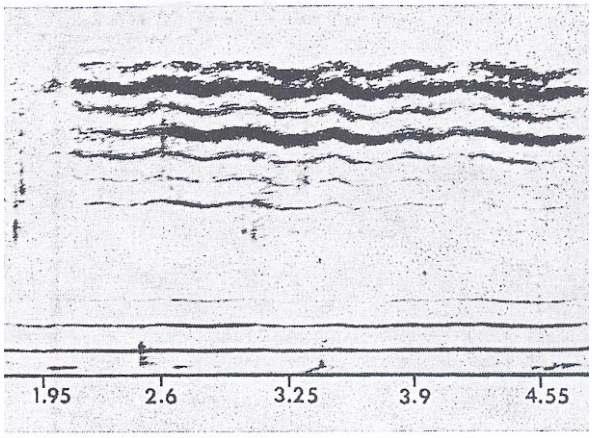


A startled otter will emit a sharp ‘HAH !’, a discrete sound given with the mouth partly open. Indicates a low level of alarm or interest.



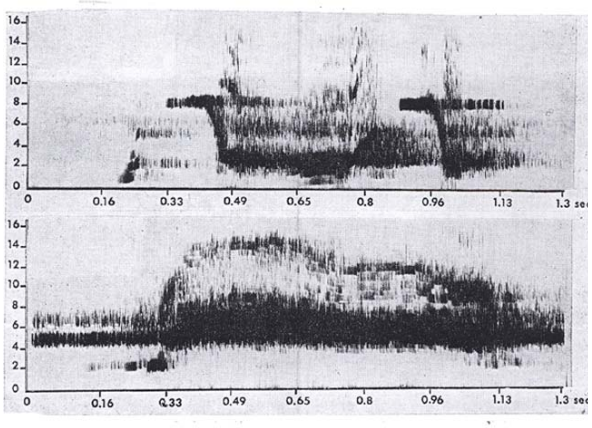
3 HAH! (top) and 3 ‘snorts’ (bottom), a much louder, explosive, sound indicating alarm.

When alarmed, otters may lie very still and silent in the water, usually hidden under vegetation.



A long ‘hum-growl’ is a low intensity threat given by adult otters. It may turn into a much louder wavering scream and attack.

A cub (right) gives a ‘food begging call’ ignored by the adult (left). Subadults will give such calls too and steal fish from each other.



3 ‘food begging calls’ (top) and a longer, modulated one (bottom).

Mammals and birds observed at Karanambu and on the Upper Rupununi River, Guyana

Compiled by Dr Nicole Duplaix and the volunteers of the Oceanic Society
(please send additions or corrections to NDParis@aol.com)

NOTE: * denotes animals rarely seen or of special concern
KEY: T = tracks, N = nesting, ● = seen, ○ = heard

Mammals	**April 2002**	**Oct. 2002**	**Mar. 2003**	**Nov. 2003**
Squirrel monkey	●		●	●
Capuchin	●	○	●	●
Howler monkey	○			●
Bearded saki*	●	●	●	
White-faced saki*	●			
Agouti	●		●	
Capybara	●	●	●	
Savannah fox				●
Coati*			●	
Giant otter	●	●	●	
Neotropical river otter*	●			
Jaguarundi*			●	
Jaguar*			○	
Sac-winged bat	●	●	●	●
Fish-eating bat	●	●	●	●
Free-tailed bat			●	●
Myotis bat sp.			●	●
Giant anteater*	●	●		●
Tapir*	●	T		T
White-tailed deer				●
Birds				
Tinamidae				
Great tinamou		○		
Undulated tinamou		○	●	○
Red-legged tinamou			○	
Podicipedidae				
Pied-billed grebe	●	●		
Phalacrocoracidae				
Neotropical cormorant	●	●	●	●

Anhingidae				
Anhinga	●	●	●	●
Anaditae				
Muscovy duck*	●	●	●	●
White-faced whistling duck			●	
Black-bellied whistling duck			●	
Blue-winged teal			●	
Orinoco goose*		●		
Ardeidae				
White-necked / Cocoi heron	●	●	●	●
Snowy egret	●	●	●	●
Cattle egret			●	
Capped heron	●	●	●	●
Striated heron	●	●	●	●
Yellow-crowned night heron	●	●	●	●
Black-crowed night heron	●	●	●	●
Blue heron	●		●	●
Rufescent tiger heron	●	●	●	●
Chestnut-bellied heron	●	●		●
Tri-colored heron				●
Cochleariidae				
Boat-billed heron *		●	●	●
Threskiornithidae				
Green ibis *	●	●	●	●
Sharp-tailed ibis*		●	●	○
Roseate spoonbill*	●		●	
Ciconiidae				
Jabiru Stork*	●	●N	●	●N
Wood stork	●	●	●	●
Cathartidae				
Black vulture	●	●	●	●
Turkey vulture	●	●	●	●
Yellow-headed vulture			●	
Pandionidae				
Osprey	●	●	●	●
Accipitridae				
Swallow-tailed kite *	●	●	●	
Plumbeous kite	●	●		●
Pearl kite*			●	●

Snail kite*			●	
Hook-billed kite				●
Roadside hawk		●	●	●
Gray hawk	●	●	●	●
Common black hawk			●	●
Great black hawk	●	●	●	●
White-tailed hawk				●
White hawk				●
Gray-headed kite*	●			
Black-collared hawk	●	●	●	●N
Savanna hawk	●	●	●	●
Crane hawk	●	●	●	●
Zone-tailed hawk		●		●
Ornate hawk-eagle*		●		
Falconidae				
Yellow-headed caracara	●	●	●	●
Crested caracara	●	●	●	●
Red-throated caracara	●	●		
Bat falcon	●	●		●
Laughing falcon	●	●		●
American kestrel				●
Aplomado falcon*				●
Slaty-backed forest falcon*				●
Cracidae				
Little chachalaca	●	●	●	●
Marail guan	●			
Black curassow			●	●
Odontoporidae				
Crested Bobwhite				●
Aramidae				
Limpkin*			●	
Rallidae				
Purple gallinule*		●		
Gray-necked woodrail*			●	○
Eurypygidae				
Sunbittern *	●	●	●	●
Heliornithidae				
Sun grebe	●	●		●

Jacanidae				
Wattled jacana	●	●	●	●
Charadriidae				
Pied lapwing	●	●	●	●
Southern lapwing	●	●	●	●
Scolopacidae				
Spotted sandpiper	●	●	●	●
Solitary sandpiper			●	
Lesser Yellowlegs				●
Burhinidae				
Double-stripped thick-knee		●		●
Laridae				
Yellow-billed tern	●	●	●	
Least tern			●	
Rynchopidae				
Black skimmer	●	●	●	●
Columbidae				
Scaled pigeon	●	●	●	
Pale-vented pigeon	●	●	●	●
Ruddy pigeon	●	●	●	●
White-tipped dove	●	●	●	●
Ruddy dove			●	●
Eared dove				●
Psittacidae				
Blue and Yellow macaw	●			
Scarlet macaw *	●			
Red and green macaw	●			●
Red-shouldered macaw				●
Brown-throated parakeet		●	●	●
Golden-winged parakeet	●	●		●
Blue-headed parrot		●	●	●
Yellow-headed parrot	●	●	●	●
Orange winged parrot	●	●	●	●
Mealy parrot	●	●	●	●
Cuculidae				
Squirrel cuckoo		●	●	●
Greater ani		●	●	●
Smooth-billed ani		●	●	

Strigidae				
Spectacled owl		○	○	○
Tropical screech owl				●N
Nyctibiidae				
Common potoo	●	○		○
Great potoo				●
Caprimulgidae				
Pauraque			○	●
Nacundo nighthawk		●	●	●
Band-tailed nighthawk		●	●	●
Blackish nightjar			●	●
Least nightjar		●	●	●
Apodidae				
Fork-tailed palm swift	●	●	●	
Trochilidae				
Rufous-breasted hermit			●	
Reddish hermit	●	●		
Blue-tailed emerald		●	●	●
Black-throated mango		●		●
Long-billed star-throated				●
Blue-chinned sapphire				●
White-vented plumeteer				●
Trogonidae				
White-tailed trogon	●	●	●	●
Violaceous trogon	●			●
Alcedinidae				
Ringed kingfisher	●	●	●	●
Amazon kingfisher	●	●	●	●
Green kingfisher	●	●	●	●
Green and rufous kingfisher	●	●	●	●
Pygmy kingfisher	●	●	●	●
Galbulidae				
Green-tailed jacamar			●	●
Brown jacamar			○	
Bucconidae				
Black nunbird	●	●		
Swallow-wing	●	●	●	●

Ramphastidae				
Black-necked aracari	●			
Green aracari	●			
Channel-billed toucan	●	●		
Red-billed toucan	●			
Picidae				
Ringed woodpecker			●	
Yellow-throated		●		
Crimson-crested woodpecker	●			
Lineated woodpecker	●	●	●	●
Red-necked woodpecker	●			●
Golden-collared woodpecker		●		
Chestnut woodpecker				●
Dendrocolaptidae				
Straight-billed woodcreeper		●	○	○
Buff-throated woodcreeper		●	○	○
Furnariidae				
Pale Legged hornero		●	●	●N
Formicariidae				
Black-crested antshrike		●		●
Mouse-colored antshrike	●	●		
Cinereous antshrike	●	●	●	
White-flanked antwren	●		●	●
White-fringed ant wren	●			●
White-browed antwren				●
Black-chinned antbird	●			●
Warbling antbird			○	
White-bellied antbird		●		●
Cotingidae				
Screaming piha	●	○		○
Bare-necked fruitcow			●	
Pipridae				
Golden-headed manakin	●			
Blue-backed manakin		●		●
Blue-headed manakin	●			○
Tyrannidae				
Tropical kingbird	●	●	●	●
Gray kingbird				●
Boat-billed flycatcher	●	●	●	●
Rusty-margined flycatcher	●	●	●	●

Fork-tailed flycatcher	●	●	●	●
Vermilion flycatcher		●		●
Greater kiskadee	●	●	●	●
Lesser kiskadee			●	●
Cinnamon attila		●		●
Common tody flycatcher	●		●	
Mouse-colored tyrannulet		●		●
Slender-footed tyrannulet			●	
Drab water-tyrant			●	●
Rufous-tailed flatbill			●	
Crested elaenia		●		●
Yellow-headed elaenia			●	
Helmeted pygmy tyrant				●
Hirundinidae				
White-winged swallow			●	
White-banded swallow	●	●	●	
Blue and white swallow	●		●	●
Bank swallow	●	●	●	●
Barn swallow			●	
Gray-breasted martin		●		
Brown chested martin				●
Troglodytidae				
Coraya wren		●		
Buff-breasted wren	●	●	●	○
Musician wren *		●		
House wren			●	
Mimidae				
Tropical mockingbird	●		●	●
Black-capped mocking thrush	●		●	
Turdidae				
Bare-eyed thrush			●	
Pale-breasted thrush			●	●
Sylviidae				
Tropical gnatcatcher		●		
Vireonidae				
Rufous-browed pepper shrike			●	●
Red-eyed vireo				●
Icteridae				
Crested oropendola	●	●	●	●
Green oropendola	●	●		

Yellow-rumped cacique		●	●	●
Red-breasted blackbird			●	
Giant cowbird	●			
Shiny cowbird	●			●
Moriche oriole			●	
Yellow oriole		●	●	●
Troupial		●	●	
Parulidae				
River warbler			●	
Bananaquit	●	●	●	
Gray-headed warbler		●		
Ovenbird	●	●	●	
Thraupidae				
Red-legged honeycreeper			●	
Blue-gray tanager	●	●	●	●
Palm tanager	●	●	●	●
Silver-beaked tanager	●	●	●	●
Burnished-buff tanager				
Hooded tanager		●	●	
Fringillidae				
Blue-black grosbeak			●	
Grayish saltator	●	●		
Yellow-green grosbeak			●	
Chestnut-bellied seedeater			●	
Blue-black grassquit			●	
Red-capped cardinal	●	●	●	●
Plain-colored seedeater			●	●
Ruddy-breasted seedeater			●	●

Reptiles and Amphibians observed at Karanambu and along the Upper Rupununi River, Guyana

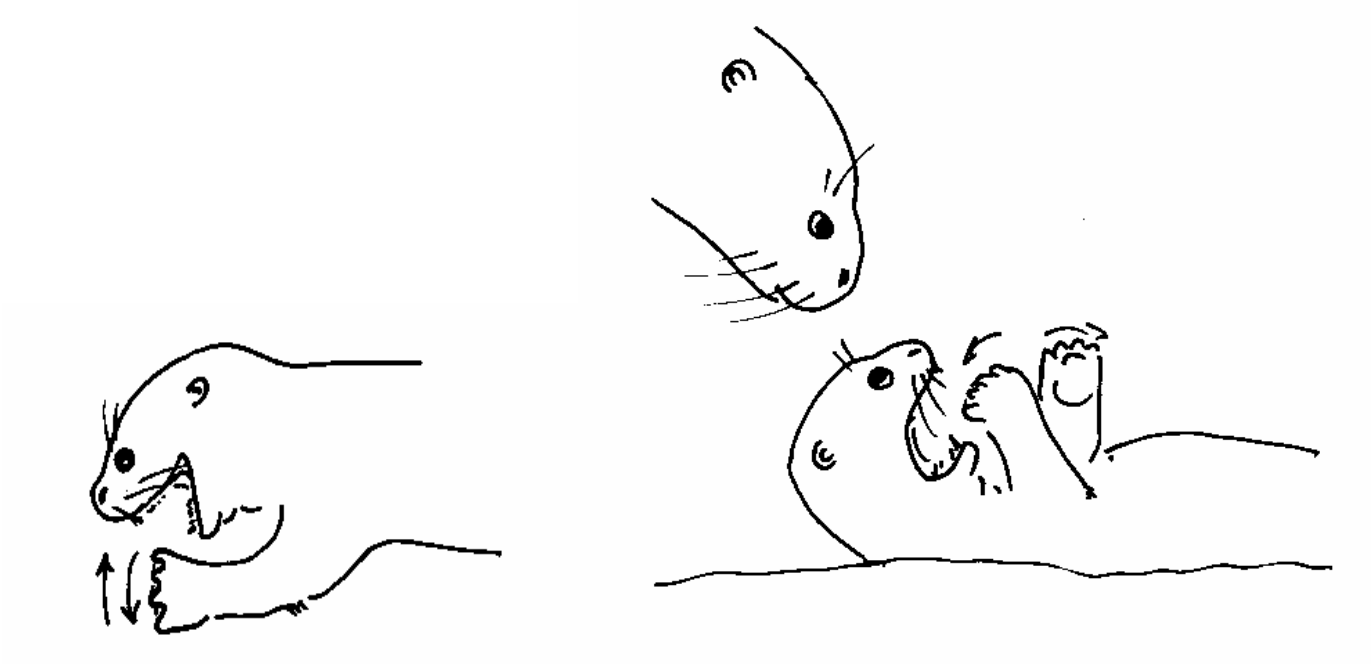
Compiled by Steve Conners (MetroDade Miami Zoo), Dr Nicole Duplaix and the volunteers of the Oceanic Society
(please send additions or corrections to NDParis@aol.com)

Amphibians		**November '02**
Marine toad,	*Bufo marinus*	●
Small spotted toad,	*Bufo margaritifera?*	●
Boans' gladiator frog,	*Hyla boans*	●
Large tree frog?	*Hyla*?	●
Reptiles		
Black caiman,	*Melanosuchus niger*	●
Yellow-spotted sideneck turtle,	*Podocnemis unifilis*	●
Arrau turtle,	*Podocnemis expansa*	●
Mata mata turtle,	*Chelus fimbriatus*	●
Green iguana,	*Iguana iguana*	●
Spiny lizard,	*Tropidurus hispidus*	●
Many-colored anole,	*Polychrus marmoratus*	●
Mop-headed iguana,	*Uranoscodon superciliosa*	●
Jungle runner,	*Ameiva ameiva*	●
Skink,	*Mabuya nigropunctata*	●
Gecko,	*Thecadactylus rapicaudatus*	●
Worm lizard,	*Amphisbaena fulginosa*	●
Amazon tree boa,	*Corallus enhydris*	●
Blunt headed treesnake,.	*Imantodes sp*	
Snail eating snake,	*Dipsas variegata*	●
Banded cat-eyed snake,	*Leptodeira annulata*	●

K. Articles Published by the Researcher on the Giant Otter Project Findings

Appeared in -- *Friends of the Giant Otter Bulletin*, Number 8, August 2003

Cub submissive panic posture



Head and body pressed to ground

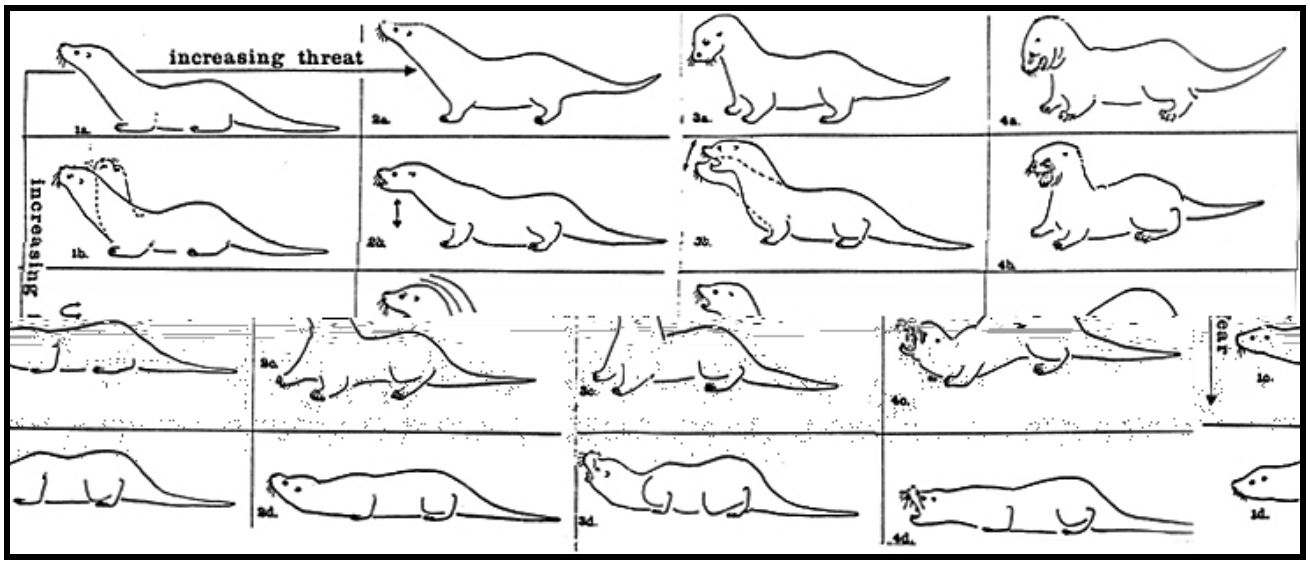
On back – looking up at subadult female

Background: Two hand-reared male juveniles (Rewa and Parawong) in Guyana, both aged 5 months, had been raised with an older subadult female (Persephone) that had been successfully re-introduced and lived with a wild group (Group K). Two months later, she returned for a visit and when re-introduced to the cubs they both elicited extreme alarm and submissive behavior. When an otter shows mild submissive behavior without alarm, usually the head is turned sideways, away from the aggressor (see 1b in table below).

Posture: The cubs, when approached by the sub-adult, opened their mouths very wide, as wide as possible and waved their fanned forepaws on either side of their muzzles very rapidly up and down, parallel to but not touching the face. The head is shaken from side to side rapidly. At first I thought they had something stuck in their throat that they were trying to remove. Both screamed continuously, a wavering intimidation scream. The sub-adult female did not show any agressive behavior, did not growl but gave a friendly chortles and coos – this did not stop the cubs' scream or frantic pawing up and down. (for detailed vocalization descriptions see Duplaix, PhD thesis, 1981)

Discussion: I've seen a similar posture in captive *L. lutra* and *Lontra longicaudis* in similar circumstances but only lying on the belly and screaming with mouth opened very wide, neck and body pressed against the ground, and without the frantic pawing (Duplaix, PhD thesis, 1981). Similar behavior has been reported when hand-reared subadults are released and approach a wild group that may or may not accept them. An attack by the group may follow, sometimes the 'intruder' is killed, or it is accepted into the group and remains with them (Diane McTurk, pers. com.).

I have been studying the wild Group K at the Karanambu Ranch in Guyana for two years and they have accepted hand-reared subadults in both years: 2001-2002 "Pluto" male, "Persephone" female and in 2002-3 "Rewa" male. The accepted hand-reared subadults participate fully in the group's activities, baby-sit the cubs and play with and groom other subadults and cubs and the adult pair in the group. In 2002, just before or during the rainy season the 'intruders', Pluto and Persephone, were evicted from the group and disappeared.



Increasing threat posture from left to right, increasing alarm from top to bottom. Bottom right hand corner is mouth wide open panic posture as seen in Lutra/Lontra otters which is similar to the Giant otter subadult behavior observed but does not have the rapid forepaw waving or head shaking. (illustration from Duplaix thesis, 1981)

Appeared in -- *Friends of the Giant Otter Bulletin*, Number 8, August 2003

Daisy Chain grooming – a new descriptive term

Daisy Chain grooming is observed when *more* than two Giant otters groom each other: one otter grooms another next to it that grooms the other next to it, etc. The otter at the end of the row may be grooming itself. All the otters are usually grooming simultaneously. In the bottom picture all the otters in the group of seven were grooming simultaneously (one is seen pausing briefly).

Appeared in -- *Friends of the Giant Otter Bulletin*, No. 9, January 2004

Tail-waving and scent marking: the ontogeny of a behavior pattern

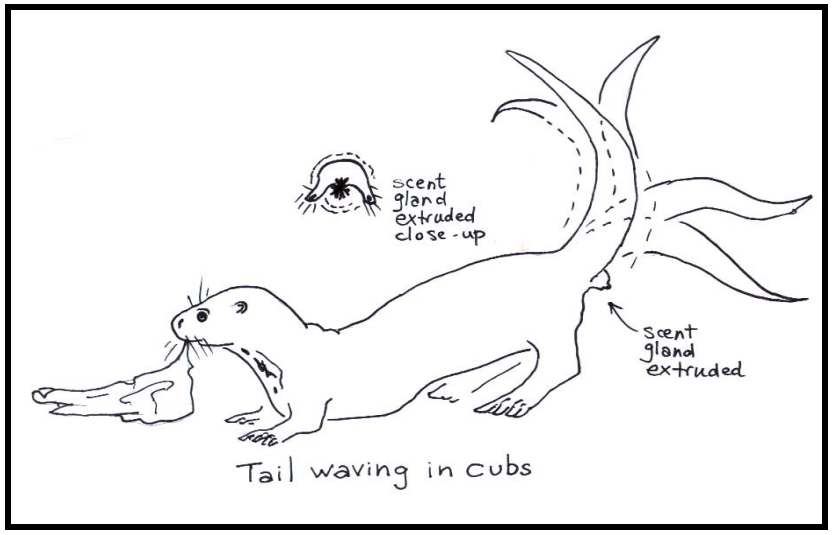
During scent-marking and scat-spreading on campsites in the wild, giant otters wave their tails vertically and horizontally while defecating and urinating. The scent gland in the anus may be protruded and scent sprayed and/or deposited. Pure scent is a yellowish mucilaginous substance which has a strong musky smell but does not have a 'fishy' smell like an otter scat. Tail waving may occur also when the otters are kneading/mixing the scats into the substrate with circular movements of their forepaws (Duplaix, 1980).

Also, tail-waving is used as an intimidation behaviour when an otter is "protecting" its fish from another otter that may attempt to steal it. The animal keeps its waving tail turned toward the approaching otter. The hind legs may be stiffened so the hindquarters are raised, hind feet stamping alternately. The tail-waver may give an intimidating long, wavering call but not a growl. Intimidation tail-waving may also be used during play between juveniles to protect a play object.

During hand-rearing of orphaned cubs, tail-waving was seen in cubs as young as 2 weeks old (D. McTurk, pers. comm.). Tail-waving in captive cubs may occur:
1) while cubs suckle milk from a bottle. The scent gland is protruded but there is no odour noticeable until the cub is 3 months old.
2) after suckling, when the cub is settling down to sleep, or when waking up briefly. The cub will start whining or squeaking loudly and begin rapid tail waving. The scent gland is protruded from the anus – both gland openings are visible. In cubs older than 11 weeks the hind paws may be spread, the hindquarters may be raised and the hind paws may or may not be stamped alternately as in adults. During tail waving, the cub noses into covers and suckles on a corner of a thin cloth until it falls asleep again. Again, the tail waving cub will turn its back to another cub as if "protecting" its nipple or sucking towel.

Discussion: Clearly tail waving in small giant otter cubs and juveniles does not have the same function as during scent spreading in adults, yet the posture is essentially the same. Both captive and wild juveniles and subadults use this posture during play to "protect" toys or fish, thereby discouraging approach by siblings, and the scent gland is protruded. The intimidation vocalizations are similar in young cubs and subadults. This posture has also been described in play sequences of other captive otter species, *Lontra canadensis* and *Lutra (Lutrogale) perspicillata* (Duplaix, 1982). Adult giant otters do not share the fish they catch (except with cubs) and actively protect it from others attempting to steal it (Duplaix, 1980).

The ontogeny of this intimidation behaviour pattern in giant otters may begin with nipple choice in young otter cubs. Nipple ‘ownership’ was first described in domestic kittens (but does not include tail waving) who suckle consistently from the same nipple and shoulder aside other kittens to reach it. This early form of intimidation behaviour between otter cubs protecting their nipple may then evolve into protecting prey (fish) in juveniles and as adults, in marking (advertising) their campsites. In all forms, these intimidation behaviour patterns are used to prevent aggressive encounters and injury. Giant otter cubs, and other carnivores such as puppies and kittens, have very sharp claws from birth that could inflict serious scratches to litter mates. The prevention of injuries may then be the selective pressure responsible for perfecting nipple ownership – as noted by Ewer (1959, 1968).



Cub sucking cloth

Related Bibliography

Duplaix, N. (1980). Observations on the Ecology and Behavior of the Giant River Otter (*Pteronura brasiliensis*) in Suriname. *Rev. Ecol. (Terre Vie),* vol. 34 (1980); pp. 496-620

Duplaix, N. (1982) Contribution à l'Ecologie et à l'Ethologie de Pteronura brasiliensis (Carnivora, Lutrinae): Implications Evolutives. Doctorat Thesis, Univ. of Paris-Sud, 352 pp.

Ewer, R.F. (1959) Suckling behaviour in kittens. Behaviour, 15, 146-162.

Ewer, R.F. (1968). Ethology of Mammals. London: Logos Press Ltd. 418 pp.

L. PRINCIPAL INVESTIGATOR

Dr. Nicole Duplaix is the founder and former Chairman of the IUCN-SSC Otter Specialist Group. She has 18 years' experience studying otters worldwide and has extensive field experience in the Guyana Shield Region She was the first biologist to study Giant Otters in the wild as part of her doctoral thesis. She is author of the 2001 World Wildlife Fund report "Evaluation of the Animal and Plant Trade in the Guyana Shield Eco-region" and the 2003 World Wildlife Fund report "Giant Otter Final Report: Guianas Rapid River Bio-Assessments and Giant Otter Conservation Project" (both reports available from *www.GiantOtterResearch.com* .) When not working to protect wildlife, Dr. Duplaix is a photographer for the National Geographic Society Image Collection. She is scientific advisor and principal investigator for the Oceanic Society's Giant Otter Projects in Guyana and Suriname.