

ARTICLE

PRELIMINARY FINDINGS FROM A NEW STUDY OF THE CONGO CLAWLESS OTTER (*Aonyx congicus*) ON THE DJI DJI RIVER, IVINDO NATIONAL PARK, GABON (OR “WHERE HAVE ALL THE OTTERS GONE?”)

Lisa C. DAVENPORT,¹ H  l  ne JACQUES², Marie-Louise YEDI³

¹Duke University Center for Tropical Conservation, Box 90381, Durham, NC 27708-0381, USA
e-mail: lisa.davenport@duke.edu. (corresponding author)

²DMV, 13 Place du 11 novembre 1918, 28320 Eybens, France, e-mail: h.jacques.otter@wanadoo.fr

³IRAF (Institut de Recherches Agronomiques et Foresti  res)/CENAREST, Libreville, Gabon,
e-mail: marielouiseyedi@yahoo.fr



Authors on the Ivindo River, Gabon (left to right, HJ, LCD, M-LY)

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Abstract: The Congo Clawless Otter (*Aonyx congicus*), is a little-known otter species that inhabits central African rivers and swamps. We report on the results of 3 field expeditions into the Dji Dji River, (Ivindo National Park, Gabon) of varying length (3 days to 6 weeks) to collect preliminary observations on this species, the sympatric spot-necked otter (*Lutra maculicollis*), and the fish community of the Dji Dji River. We also surveyed local people (primarily artisanal fishermen) in the Makokou area of Ivindo National Park about their knowledge of otter species and human/wildlife conflicts in the area. Sightings of otters in 2010 indicated both otter species to be common on the Dji Dji River. Fish sampling in 2011 indicated high abundance but low diversity of fishes in this blackwater river. Feeding observations of a solitary animal on the Dji Dji and a family of 3 on the Ivindo River indicate a high dependence on large earthworms (Annelidae) captured near the river’s edge. With a severe drought in 2011 affecting the Dji Dji River level, we found fewer otters compared to 2010 observations and no families with young. We speculate on the possibility of seasonal downstream movements, which could affect conservation of the species in the region.

Keywords: Congo Clawless Otter, *Aonyx*, Ivindo National Park, otter, tropical ichthyology, Dji Dji River, Gabon

INTRODUCTION

The Congo Clawless Otter (*Aonyx congicus* – henceforth AC), is a little-known otter species that inhabits central African rivers and swamps (Kingdon, 1997). So few studies exist on this species that most basic information on its ecology, social behavior, and reproduction in the wild is lacking (Kruuk, 1995; Jacques et al., 2002; Jacques et al., 2009). Our primary goal was to initiate the first long-term observational study of the species' ecology and behavior in the wild, at a site where the species is locally common (L. White, pers. comm.; Easton and Tezi, 2006), on the Dji Dji River (sometimes appearing on maps as Dilo River) in Ivindo National Park, Gabon (Davenport et al., 2011). Additional objectives were to 1) learn more about the river ecology by sampling the ichthyofauna; and 2) analyze potential threats to otters in the area from human/wildlife conflicts.

Here we report on the results of 3 field expeditions into the Dji Dji River of varying length (3 days to 6 weeks) undertaken in December 2009 (LCD), July 2010 (LCD), and July 2011 (LCD & HJ) to collect preliminary observations on the species. The expeditions were undertaken with the assistance of WCS-Gabon, IRET (Gabonese Institute of Tropical Ecological Research), IRAF, and ANPN, the Gabonese National Park Service.

METHODS

Field Site

Our main fieldsite is the Dji Dji River, a tributary of the Ogooué River of central Gabon. The Dji Dji's watershed drains much of the central portion of Ivindo National park, with headwaters near Mont Ngouadi (elevation 870 m) about 45 km south-east of the park border (Figure 1). The Dji Dji straddles the Equator and passes through lowland forests and swamps (Figure 2). The water is stained black, of low pH and low conductivity (see Results Table 3). The river substrate is a mixture of soft mud and sand, with occasional rocky outcrops that create sections of rapids and waterfalls that block easy access to motorized boats, hence ensuring the river's pristine condition. The Dji Dji meanders through its floodplain, creating small oxbow lakes parallel to the main channel. These lakes appear to be important breeding grounds for crocodiles, specifically, the dwarf crocodile (*Osteolaemus tetraspis*) and the rare false gaviail (*Crocodylus cataphractus*) (M. Shirley, pers. comm., and pers. obs.). Other dominant aquatic fauna include the two resident otter species, AC and the spot-necked otter (*Lutra maculicollis* - henceforth LM) and aquatic birds such as the Hadada Ibis (*Bostrychia hagedash*), Hammerkop (*Scopus umbretta*) and African Finfoot (*Podica senegalensis*) among others. A number of terrestrial mammals dependent on river edges are also common along the river, including talapoin monkeys (*Miopithecus ogoouensis*), De Brazza's monkey (*Cercopithecus neglectus*) and water chevrotains (*Hyemoschus aquaticus*) (pers. obs.).

A secondary fieldsite was Camp Edjibilolo on the Ivindo River about 1.7 km SW of Kongou Falls (Chutes de Kongou), Africa's third highest waterfall. At this point on the Ivindo, the river is approximately 250 m wide, substantially wider and deeper than the Dji Dji. Like the Dji Dji, the river is blackwater and of low pH and conductivity. The Ivindo River is braided, with numerous parallel channels and islands dominated by *Raphia textilis*, *Newtonia spp.*, and *Rubiaceae spp.* Rocky outcrops and rapids are frequent, as are sandy beaches. Floating and semi-attached aquatic plants (*Pistia stratiotes*, *Nymphoides sp.*, *Crinum natans*, and *Echinochloa pyramidalis*) occur in mats in calmer areas, as at Camp Edjibolo, where most of the border of the west bank was bordered by extensive vegetated mats of *E. pyramidalis* (Figure 3).

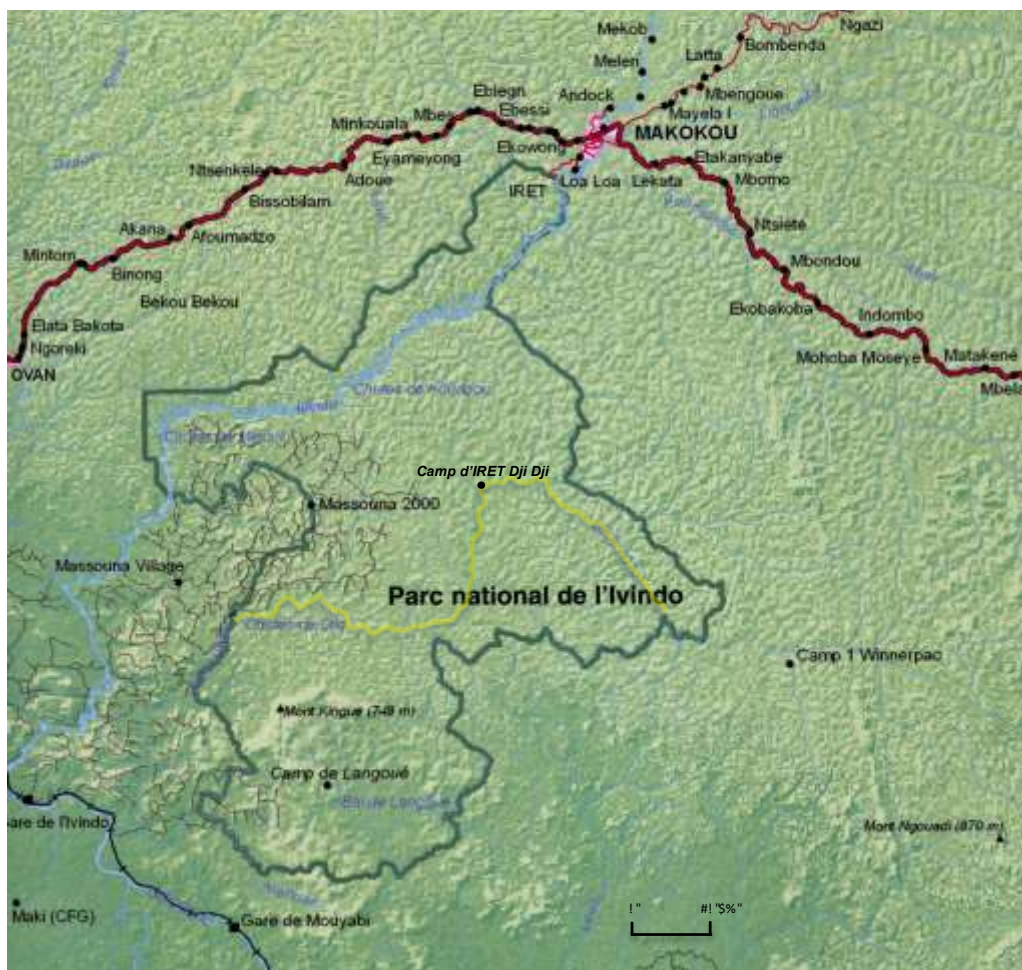


Figure 1. Location of the Djé Djé River (in yellow) in Ivindo National Park (adapted from Van den Weghe 2006).



Figure 2. The Djé Djé River, July 2010 (photo by LCD).



Figure 3. The Ivindo River near Edjibilolo Camp (with John Terborgh, husband of LCD, photo by LCD)

Field Surveys

Various sections of the Dji Dji were surveyed during the three site visits by canoe or portable (Pakboat) kayak. All such surveys were tracked on a Garmin GPS (GPSmap 60CSx) to record survey distance and date/time, and to map the locations of river features and all otter sightings, footprints or spraints. In July 2010, some basic limnological parameters (pH, conductivity, TDS, and Salinity) were recorded on an Oakton PCSTestr 35, and in July 2011, oxygen concentration with a Hanna HI9147 Oxy check meter. All locations of water samples, otter sightings, spraints, and river features were mapped using the Garmin MapSource software.

Interview Methods

Since the creation of the Ivindo National Park, permanent settlements have been prohibited within the park. However, some prior inhabitants of the park, primarily fisherman, are permitted to reside temporarily in small camps along the Ivindo River and practice artisanal fishing in a buffer zone region, provided authorization is obtained in advance. In 2011, HJ and M-LY conducted semi-structured interviews with Eco-guards from Loa Loa (Makokou area) and with fishermen in three such camps, questioning them about the presence of otters, any trends in population observed over time, conflicts with traditional fisheries, and uses in traditional medicine.

No formal questionnaire was used, but questions routinely asked included observer name, observation sites, otter size (and species), observation frequency, local names for otters, and the use of otters in medicinal treatments or rituals.

Fish sampling Methods

Fish were sampled at 4 different locations, employing 3 trapping methods. First, we placed a gillnet overnight between 6 pm and 6 am at various stations. The gill net was 10 m in length, 1.5 m in height, and 35 mm mesh. A second “Nasse” trap was set nearby to catch smaller fish. This type of trap is in the form of a cylindrical tube made of nylon mesh, with the cylinder approximately 50 cm long and 30 cm diameter, with graduated entrances, and baited with earthworms in an internal pocket. The third trapping method was use of a hook and line, hook sizes 16 and 18, baited with earthworms. All fish caught were identified in the field and counted. Only one

unknown species was collected for subsequent identification at IRAF, Libreville, Gabon, as were earthworms found on the rivers' edge. All specimens remain in IRAF.

Focal Animal Observations

All-day follows of AC's were attempted on the Dji Dji River and the Ivindo River after initial surveys. On the Dji Dji, after an individual AC was observed to return to a known feeding location, a single observer (LCD) hid under overhanging vegetation across from the location to record the otter's feeding success and prey consumption with binoculars (Canon IS 10 x 42) and digital voice recorders (Davenport, 2008). On the Ivindo, a family of 3 was observed from various viewpoints where the kayak could be stationed (typically on rocks or logs in the center of the river) opposite the riverbank where the family foraged. When not in view an approximate location was determined by the frequent cries of the youngest juvenile. When actively feeding in view of the observer, dives were timed with a digital watch, and the duration of dive, plus prey capture success was dictated into the Voice Memo program on an iPod Touch (4 Gen). Otters were videotaped with a small digital camera (Canon Powershot SX230HS) to record behavior, estimate age, and catalogue individuals' identifying facial marks.

RESULTS

2009 Trip

We selected the Dji Dji River for our study of *Aonyx congicus* based on expert opinion (L. White, pers. comm; J. Okouyi, pers. comm.), previous tourist prospection surveys (Easton and Tezi 2006), and after a larger survey of potential fieldsites in 2008-2009, that included visits to several parks in Gabon and Mbeli Bai in the Republic of Congo. The 2009 visit to Dji Dji was part of this survey, at which time LCD accessed the Dji Dji by hiking north from the WCS research station in the southwest of the park at Langoue Camp (Figure 1). This southern route involved a strenuous 25 km hike through hilly terrain and including a trek up Mount Kinguié (748m) the highest point in the Ivindo National Park (Van den Weghe, 2006). This trek reached a section of the Dji Dji that flows east-west in the southern part of the park.

The 2009 visit was brief, with only 3 days spent on the banks of the Dji Dji in December 2009, and only 1 day (December 16, 2009) exploring the river by canoe for about 7 km (one-way) upriver of the campsite. December is in the middle of Gabon's short dry season, but considerable rain fell just prior to our visit. No otters were sighted, although one spraint (likely *LM*) was found on a tributary creek. Recent rains had probably erased most tracks, and the high level of the river during the visit made detecting otters difficult; the river had swollen into surrounding backwaters, leaving large areas under overhanging vegetation where otters could forage undetected. Neither fish sampling nor interviews with local fishermen were conducted on this trip. Subsequent trips were scheduled during the dry season (June-October) to improve detection probabilities.

2010 Trip

In 2010, LCD accessed a northern section of the Dji Dji by hiking ~ 32 km south from the Ivindo River, starting just above Kongou Falls. The northern route allowed access through somewhat easier terrain, and also allowed an easier supply-route via the town of Makokou. Our base station on the Dji Dji was located at a rustic research camp on the Dji Dji established as an extension of the IRET Ipassa station by

Dr. Joseph Okouyi. We resided at this station for 10 days in 2010. Seven full days of river exploration were accomplished on this trip, using both a dug-out pirogue with a 15 hp motor and a 2-person (Pakboat Saranac) kayak. Including boat and foot travel, the expedition took place from July 2 to July 13, 2010.

The results of our 7-day expedition demonstrated a high local abundance of both species of otters, particularly upriver of the IRET camp (Table 1 and Figures 4 & 5). At least one otter was sighted every day in 2010, and we observed a mixture of solitary animals (presumably solitary males or juvenile females) and groups of 2. If we assume that we observed new individuals at each GPS point where otters were seen (but the same individual when revisited), then we observed 7 LM (in 5 sites) and 11 AC (in 7 sites). Some animals were spotted for very brief periods, and we could not identify individuals by their head and throat markings. We therefore expect that at least some of these sightings were repeated viewings of the same individuals, particularly upriver of the rapids where AC was most common (Figure 4). Otters were only spotted in the daytime, in spite of several opportunities to view them at night. One 2-h nighttime survey of the upriver portion of the river up to a major Rapid (“Rapid” in Figure 4) was undertaken (by LCD) in addition to daytime surveys, but no otters were spotted. Neither was any otter spotted by a crocodile researcher working for several hours every evening in the area concurrently with our study (M. Shirley, pers. comm.). It therefore appears that in this region, both otter species are largely diurnal.

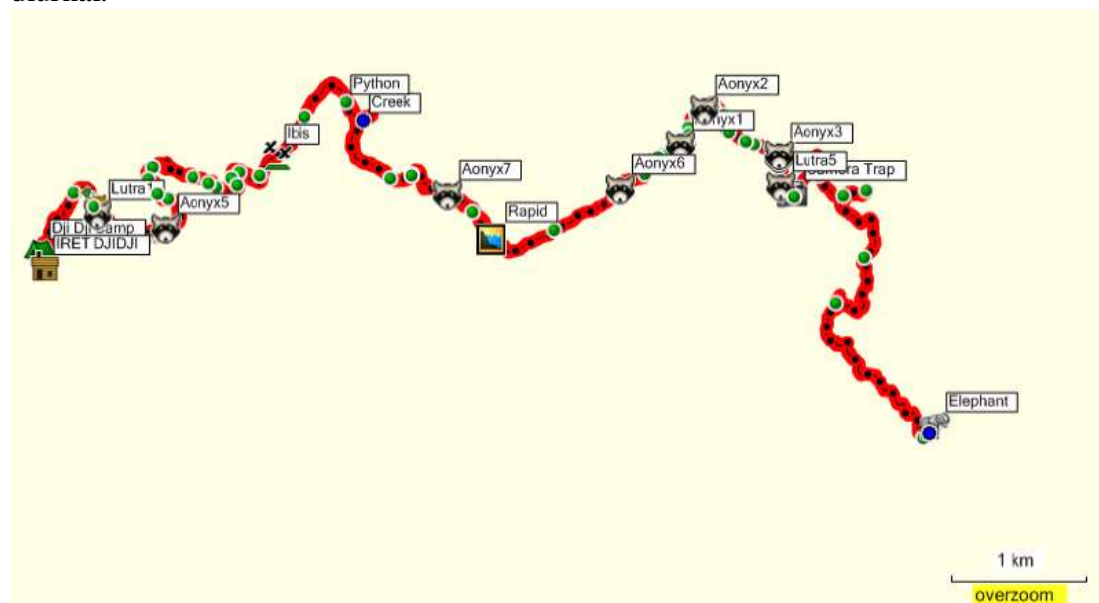


Figure 4. Dji Dji Trace upriver of IRET camp, indicating locations of otters with the “furbearer” symbol (Garmin Mapsource). The trace followed 15.6 km of river one-way.

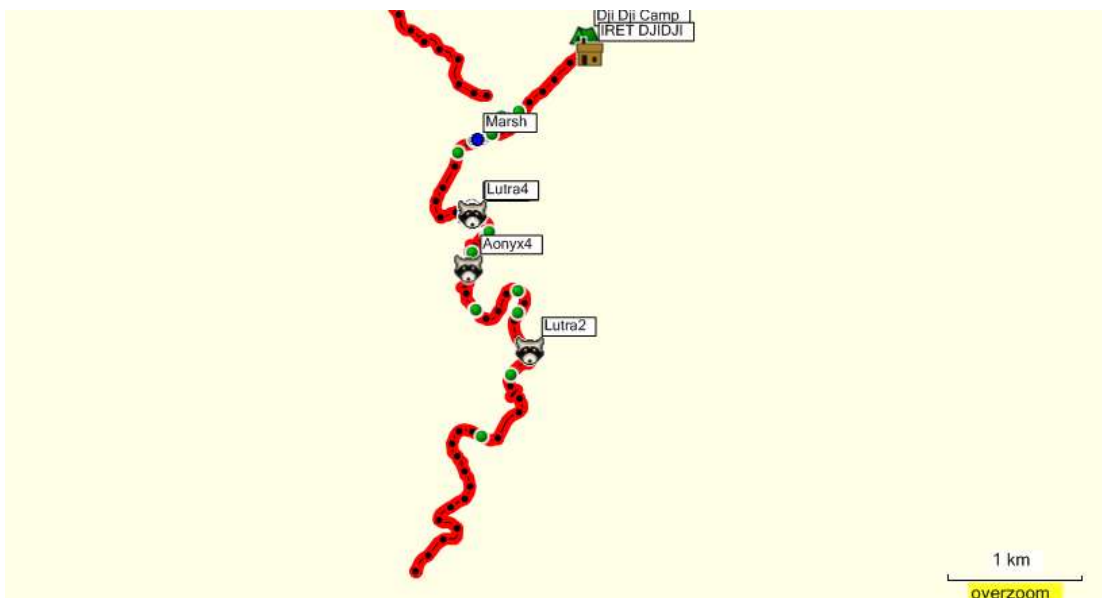
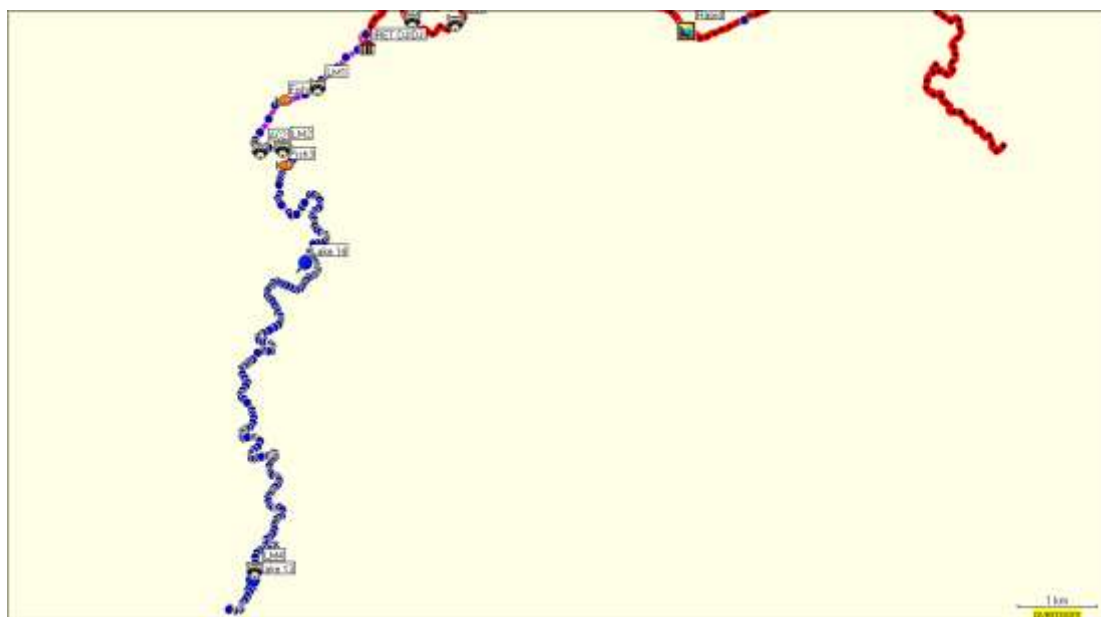


Figure 5. Dji Dji Trace downriver of IRET camp, indicating locations of otter sightings with the “furbearer” symbol (Garmin MapSource). The trace followed 10.0 km of river one-way.



Figure 6. Otter sightings upriver of Iret Camp, 2011. Locations of otter sightings noted with the “furbearer” symbol (Garmin MapSource).



Figures 7. Otter sightings downriver of Iret Camp, 2011. Locations of otter sightings noted with the “furbearer” symbol (Garmin MapSource).

Table 1. Otter observations between July 5 and July 11, 2010. (LM = *Lutra maculicollis*; AC = *Aonyx congicus*)

Date	Hour	Species	Number of Animals	GPS point
-Jul-10	9:21	LM	1	Lutra1
6-Jul-10	11:00	AC	1	Aonyx1
	11:15	AC	1	Aonyx2
	11:15	AC	1	Aonyx3
7-Jul-10	10:15	AC	2	Aonyx4
	11:30	LM	2	Lutra2
8-Jul-10	9:45	AC	1	Aonyx1
	16:00	AC	2	Aonyx5
9-Jul-10	6:50	LM	1	Lutra3
	8:00	LM	2	Lutra4
10-Jul-10	17:15	LM	1	Lutra1
11-Jul-10	12:35	LM	1	Lutra5
	13:50	AC	2	Aonyx3
	14:00	AC	2	Aonyx6
	14:20	AC	1	Aonyx7

Table 2. Otter observations between July 8 and July 30, 2011. (LM = *Lutra maculicollis*; AC = *Aonyx congicus*)

Date	Hour	Species	Number of Animals	GPS point
8-Jul-11	n/a	n/a	0	n/a
9-Jul-11	8:32	LM	1	LM1
	9:10	LM	1	LM2
10-Jul-11	12:54	AC	1	AC1
	15:17	LM	1	LM3
11-Jul-11	n/a	n/a	0	n/a
12-Jul-11	n/a	n/a	0	n/a
13-Jul-11	n/a	n/a	0	n/a
14-Jul-11	n/a	n/a	0	n/a
15-Jul-11	9:37	LM	1	LM4
16-Jul-11	11:50	AC	1	AC2
	15:59	LM	1	LM2
17-Jul-11	15:37	AC	1	AC3
	15:56	AC	1	AC4
	16:22	AC	1	AC5
18-Jul-11	16:20	AC	1	AC3
19-Jul-11	6:59	AC	1	AC3
20-Jul-11	6:45	AC	1	AC3
21-Jul-11	n/a	n/a	0	n/a
22-Jul-11	10:20	AC	1	AC6
23-Jul-11	15:07	AC	1	AC7
24-Jul-11	n/a	n/a	0	n/a
28-Jul-11	n/a	n/a	0	n/a
29-Jul-11	12:15	AC	3	AC8
30-Jul-11	6:30	AC	3	AC8

Table 3. Limnological parameters measured in 2010 and 2011 on Ivindo and Dji Dji Rivers

Station	Ivindo 1	Dji Dji 1	Dji Dji 2	Dji Dji 2	Dji Dji 3	Dji Dji 3	Dji Dji 4	Dji Dji 4	Dji Dji 5	Dji Dji 5
Date	July 2010	July 2010	July 2011	July 2011	July 2011	July 2011	July 2011	July 2011	July 2011	July 2011
Time	12h00	16h50	18h05	06h00	18h00	05h58	18h15	06h30	18h26	06h05
pH	6.26	6.34	--	--	--	--	--	--	--	--
Oxygen (mg/l)	--	--	7.8	7.3	7.5	6.9	7.5	6.8	7.4	7.0
Temperature (°C)	26.3	23.4	22.9	22.2	22.7	22.3	23.0	22.2	22.2	21.9
Conductivity (µS)	33.2	17.5	--	--	--	--	--	--	--	--
TDS (mg/l)	33.2	12.4	--	--	--	--	--	--	--	--

Table 4. Fish species and Capture Rates, Dji Dji River, July 2011

Family	Species	Authority	Trophic Guild	Station 1	Station 2	Station 3	Station 4	Station 5	Total	%
Schilbeidae	<i>Schilbe</i>	Pellegrin, 1913	Omnivore	45	25	96	2	217	385	71.3%
	<i>multitaeniatus</i>		/ piscivore							
Cyprinidae	<i>Labeobarbus</i>	Boulenger, 1903	Micro / macrophytophage	15	1	16	1	18	51	9.4%
	<i>progenys</i>									
Cyprinidae	<i>Barbus holotaenia</i>	Boulenger, 1904	Omnivore			7		29	36	6.7%
Hepsetidae	<i>Hepsetus odoe</i>	Bloch, 1794	Piscivore		3	1		32	36	6.7%
Clariidae	<i>Clarias gabonensis</i>	Gunther, 1867	Omnivore	1	1	4		10	16	3.0%
Claroteidae	<i>Parauchenoglanis punctatus</i>	Boulenger, 1902	Invertibrare					10	10	1.9%
Malapteruridae	<i>Malapterurus beninensis</i>	Gmelin, 1789	Piscivore					6	6	1.1%
Total				61	30	124	3	322	540	100%

2011 Trip

In 2011, LCD and HJ again accessed the northern IRET campsite from the Ivindo River downriver of Makokou. This visit came subsequent to a period of very low rainfall, purported to be the lowest on record for the first half of any year (K. Jeffery, pers. comm.). The lower water conditions made travel by motorboat nearly impossible on the Dji Dji, so all travel was by portable kayak. Otters were also observed with considerably less frequency than in 2010, and only solitary individuals were seen; only on the Ivindo River did we see mothers with young in 2011 (Table 2 and Figures 6 and 7). If we assume that we observed new individuals at each GPS point where otters were seen (but the same individual when revisited), then on the Dji Dji we observed 4 LM (in 4 sites) and 7 AC (in 7 sites) in 2011. On the Ivindo, we observed just 1 family of 3. Locals suggest that the otters may undertake seasonal movements to deeper water downstream in times of low water (J. Okouyi, pers. comm.); however, this possible explanation could not be verified during our visit. In fact, during one long day-trip to the furthest point downriver accessed (July 15, 2011), we saw only a solitary LM.

Spraints with remains of fish and crabs were common on emerging logs in the Dji Dji River, but not on the Ivindo. From size and contents, we suspect nearly all spraints were from LM. Locations were noted, and found to be nearly uniform in distribution. We did not collect or analyze the spraints further, although many were photographed and georeferenced. One scrape on a rock was found at the Ivindo River site that we believed to be of AC. It emitted a strong musty odor, but contained no identifiable prey remains. As yet, no good latrine locations of AC have been found for further study.

Feeding observations

Observations of a solitary focal animal feeding on the Dji Dji occurred over 3 days (July 18-20) and comprised about 6.5 h of contact, during the entirety of which the otter was actively foraging or moving in the water. Due to the low level of habituation of the animals at this stage in our study, we could not maintain constant contact with the otter throughout whole days. During portions of each day, the otter disappeared up or downriver from where we observed it to feed intensively, and we suspect at these times it was primarily on land resting between feeding bouts. As yet, though, we cannot provide a complete activity budget for our study animals.

While feeding, the solitary otter perched on a log between dives, scanning the area, never moving onto land. All prey items observed were of worms (Annelidae) caught underwater, usually in water of about 1-2 m maximum depth. Worms were typically passed to the otter's mouth above water. Of 215 dives counted, 94 resulted in

a successful prey capture. Dives averaged 21.0s in length, minimum 3s and maximum 40s. No statistical difference was measured between dives that succeeded in a prey capture and those that failed (successes: mean = 21.3s, SD = 7.0s; failures: mean = 20.8s, SD = 6.9s).

The solitary otter used feeding patches intensively, foraging in the same few square meters for several hours, indicating a high local density of worms. Distinct patches used sequentially were sometimes only 2-3 m distant; on a few occasions the otter crossed the river to a new patch, (about 30 m across) and on only one occasion, the otter was observed to move to a new patch about 520 m upstream of the usual foraging site before beginning to forage again (see [Supplementary Video](#)).

Observations of the Ivindo River family of 3 were also conducted by kayak, but due to the much greater width of the river, the observer could keep a greater distance, perched on mid-stream rocks or islands. It is unlikely the otters ever detected the observer throughout the 1½ days of observations. Unfortunately, observing feeding and behavior of this family was severely hampered by low visibility along the shoreline, a result of semi-attached aquatic vegetation (*Echinochloa pyramidalis*) lining the banks (Figure 3). The otters hugged the shoreline, never entering open water during the ~ 14 h of contact time with this group. Primarily, the main observer (LCD) tracked the position of the otters by listening for the frequent begging calls of the youngest cub. No effort to measure dive times could be made in a systematic format with such low visibility. However, when otters were observed in vegetation-free sections of the shore, this family was seen to forage like the Dji Dji focal animal, foraging near the shore, palpating the soil, and taking prey that consisted entirely of worms (5 good views of worms). Eventually the family descended a series of rapids where the kayak could not follow, and thus contact was lost.

Limnology

Our limnological measurements demonstrated somewhat low pH and very low conductivity measures on both the Ivindo River and the Dji Dji River (Table 3), indicating low nutrient availability. We also observed both rivers to have high clarity but dark staining from tannins. Most nutrients in these river systems likely come from allochthonous sources.

Fish sampling

Fish sampling demonstrated a high local abundance of fishes, but low diversity. Only 7 fish species were caught, the commonest (*Schilbe multitaeniatus*) comprising 71% of the captures (Table 4). This species, an omnivore, is locally known as “Yara” and is reported by fishermen as the favorite food of both otter species (although we never saw fish taken during our feeding observations with AC). The second most common species, the phytophagous *Labeobarbus progenys*, comprised only 9.4% of captures. Such low diversity in the fish fauna is likely a result of the barrier to fish migration posed by the Dji Dji Falls near the confluence of the Dji Dji with the Ogooué River, and by the overall low productivity of the system.

Interviews

All fishermen and family members knew about the local otters, and could describe differences between the two species. One interviewee claimed that he saw otters less frequently than before the creation of the park, but this statement was not corroborated by locals closer to Makokou, who reported continuing presence of otters even outside the strictly protected areas of Ivindo River.

Lucien Envam from Loa Loa village (on the Ivindo River near the Makokou port) stated that he sees otters regularly on the Ivindo River, sometimes eating fish from nets. Multiple respondents stated that they are not easy to catch with a spear or a gun and in the Ivindo River region, apparently neither meat nor skin is considered desirable. This finding is contrary to other parts of Gabon or Africa where otters are used in witchcraft or for medicinal purposes.

Local fishermen bait their nets with the long worms of the area on multiple small hooks bordering the net, possibly providing an interesting target for otters specialized in worm-eating. However, when asked if otters eat worms, all respondents claimed they ate fish rather than worms out of nets.

Local names of otters are “Niongo” in Kota and “Niong” or “Kein” in Zebi.

DISCUSSION

Otter surveys and feeding observations

The results reported here are preliminary and are not yet sufficiently detailed to estimate home range size, seasonal diet, or other life history features of interest. However, our repeat surveys in 2010 and 2011 revealed interesting similarities and differences. A number of “hotspots” of AC presence were repeatable between years, particularly above the large rapids upriver of the IRET research camp. As yet, it is unclear how large territory sizes are for the two otter species, how individuals in the “hotspot” areas are related, or what micro-habitat features might influence the patchiness of otter distributions. However, continuing work in the area may help elucidate some of these questions, particularly if we can continue to monitor known individuals.

Our finding that at least one solitary otter returned to the identical feeding patch on multiple days at the Dji Dji River site offers promise for continuing to work with the species on territory range and seasonal habitat use in greater detail. While no animal was habituated in this study so far, we found it possible to maintain observations on this animal over several days. It may also be possible to work with the species on the larger Ivindo River, although visibility is a limiting factor, with the higher growth of edge vegetation in this river.

Feeding observations at both sites indicate a strong dependence on worms in AC, while LC spraints indicated high take of fish and crabs. The two species therefore do not seem to be in competition for food resources at least in the dry season. These results parallel studies of LC and *A. capensis* in South Africa (Rowe-Rowe and Somers 1998; Perrin and Carugati 2000), where the two sympatric otters were also found to have low niche overlap, although with *A. capensis* highly specialized on crabs rather than worms.

Perhaps the most intriguing result of comparing observations during the same months of 2 subsequent years is the result that in a low rainfall year (2011), and with lower water levels, otters are less abundant, and families with young were not observed on the Dji Dji River, but were found in the larger Ivindo River. While locals suggested that the otters may move to the lower Dji Dji to deeper water and larger oxbow lakes, we could not confirm this suggestion. In most years, the river level should decrease to the level found in July 2011, as the rains typically do not return until nearly October. Therefore, downriver movements (or “migrations”) could be a seasonal feature of otters on the Dji Dji River. Another possibility is that AC may also be able to subsist on crabs and worms in the terrestrial zones adjacent to the river, although we saw little evidence of this. We did note several locations bordering the Dji Dji River where red river hogs (*Potamochoerus porcus*) had dug up the riverbanks, possibly in search of worms (J. Okouyi, pers. comm.). Densities of red

river hogs are high in Ivindo National Park (Henschel, 2010), so an increase in drought frequency, a possible effect of climate change – might pose challenges for the survival of AC (and the more aquatic LM) if they compete with red river hogs for prey in dry periods. Recently, AC has been downgraded by IUCN from Data Deficient to Least Concern. Given the difficulty of finding and studying the species, and the questions remaining of how it survives adverse climactic events such as the droughts of 2011, we suggest that this reversal may be short-sighted.

Fish sampling

Our initial work on the fisheries of the Dji Dji demonstrated high capture rates but low diversity. The high abundance likely reflects the pristine condition of the Dji Dji site, while the low diversity of fish species may in part reflect selectivity in the gill net sampling, from which most captures were drawn. It may also reflect the low water conditions during our sampling effort, which limited the use of gill nets to the regions of deepest water. However, low diversity is common in headwater fisheries, so repeat samples may confirm these findings as valid. The Dji Dji is isolated from potential fish migrations from larger water bodies by the barrier of the Dji Dji Falls downriver of our study site, so it is likely that low diversity may be characteristic of the area year-round. As the commonest fish species found, *Schilbe multitaeniatus*, is also reported to be a favourite food of otters by locals (but most likely LM more so than AC), at present, the food supply for Dji Dji otters appears to be excellent.

Conservation Implications

LM is widespread throughout Africa, and currently listed as Least Concern, although it may be declining in much of its range (IUCN 2011). The case of AC is less clear. *Aonyx congicus* may not be endangered where the forest is still well preserved (Gabon, parts of Republic of Congo). Nevertheless, road openings for wood exploitation could adversely affect the sustainable use of the forest with hunters using these roads for illegal activities. Deforestation has dramatically increased in Cameroon and the Democratic Republic of the Congo, and will probably be an even bigger problem in future. A forestry concession will soon begin operating in the headwaters of the Dji Dji River to the East of the park. It is unclear how these activities will affect the pristine conditions of the Dji Dji, the otters' prey base, hydrology of the watershed, and ultimately the otters themselves.

Overfishing has become a critical threat to otter populations as fish community structure has been decimated across the central Congo Basin. Fishes contribute between 23-50 percent of the animal protein consumed per capita for countries in Central Africa (with Gabon ~23%: FAO, 2011), a percentage likely to increase as the pace of bushmeat hunting is unsustainable (Wilkie et al., 2005). In addition to escalation of hunting for bushmeat and skins, habitat loss and degradation, and overfishing, otter populations in Central Africa are also susceptible to pressure from development of hydro-electric power projects (Crumley, 2009). Their habitat is also under-represented in Protected Area planning generally. Additional threats include accidental capture in fishing nets, a growing prevalence of arms and munitions facilitating greater capture success, as well as a dramatic decline in other species (such as the hippo) that contribute to aquatic ecosystem functioning. Some of these threats can be considered major, but more importantly is the dramatic combined effect of these threats on otter conservation.

More year-round, long-term data on otter presence, diet, and behaviour is urgently needed in both pristine and altered environments, to compare to this preliminary, short-term study.

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SUPPLEMENTARY VIDEO

S1. Video Clips of *Aonyx congicus* in 2010 and 2011 on the Dji Dji River and Ivindo River. 1) Juvenile on the Dji Dji, calling on riverbank, 11 July 2010; 2) Focal solitary on the Dji Dji River, slowly moving upriver, 18 July 2011; 3) Family of 3 on the Ivindo River, palpating for worms on the riverbank, 30 July 2011.

In most cases, the groups of 2 AC were clearly females with cubs born that year. Cubs vocalize frequently, even with observers nearby (see [Supplementary Video S1](#)). We usually could not capture identifying marks of individuals during the brief sightings we had of each otter, so we can only guess how many total individuals we saw and the extent of their territories. Nevertheless, the ease of finding and observing the animals in the daytime on this expedition encouraged us to undertake a larger effort in 2011 at the same locale and time of year.

RÉSUMÉ

PREMIERS RÉSULTATS D'UNE NOUVELLE ÉTUDE SUR LA LOUTRE DU CONGO (*Aonyx congicus*) SUR LA RIVIÈRE DJI DJI, PARC NATIONAL D'IVINDO, GABON (OU « OÙ SONT PASSÉES TOUTES LES LOUTRES ? »)

La loutre du Congo (*Aonyx congicus*) est une espèce très peu connue qui vit dans les rivières et les marécages d'Afrique centrale. Nous présentons ici les résultats de trois expéditions sur la rivière Dji Dji (Parc National d'Ivindo, Gabon) de durées variées (3 jours à 6 semaines), ayant eu pour but de collecter des données préliminaires sur cette espèce, sur la sympatrique Loutre à cou tacheté (*Lutra maculicollis*) et sur le peuplement piscicole de la rivière Dji Dji. Nous avons également interrogé les habitants (principalement des pêcheurs traditionnels) du secteur de Makokou au sein du Parc National d'Ivindo, au sujet de leurs connaissances sur les loutres et sur les conflits Homme/faune sauvage dans la région. Des observations de loutres en 2010 montrent que les deux espèces sont communes sur la rivière Dji Dji. Des prélèvements de poissons faits en 2011 indiquent une forte abondance mais une faible diversité dans cette rivière d'eau noire. Des observations d'individus en train de s'alimenter, un individu sur la rivière Dji Dji et une famille de trois sur la rivière Ivindo, montrent une forte dépendance vis-à-vis de grands vers de terre (*Annelidae*) capturés près des rives. Suite à une importante sécheresse en 2011 affectant le niveau de la rivière Dji Dji, nous avons trouvé moins de loutres qu'en 2010 et pas de familles avec des jeunes. Nous suspectons des mouvements saisonniers vers l'aval, ce qui pourrait affecter la conservation de l'espèce dans la région.

RESUMEN

HALLAZGOS PRELIMINARIOS DE UN NUEVO ESTUDIO DE LA NUTRIA SIN GARRAS DEL CONGO (*Aonyx congicus*) EN EL RÍO DJIDJI, PARQUE NACIONAL IVINDO, GABÓN (O “¿A DÓNDE SE HAN IDO TODAS LAS NUTRIAS?”)

La Nutria Sin garras del Congo (*Aonyx congicus*) es una especie poco conocida de nutria que habita en los ríos y pantanos de África central. Reportamos los resultados de 3 expediciones de campo en el Río DjiDji (Parque Nacional Ivindo, Gabón). Cada expedición fue de longitud variable (de 3 días a 6 semanas) para realizar observaciones preliminares de esta especie, de la simpátrica nutria de cuello manchado (*Lutra maculicollis*), y de la comunidad de peces del Río DjiDji. También encuestamos gente local (primariamente pescadores artesanales) en el área Makokou del Parque Nacional Ivindo, acerca de su conocimiento sobre las especies de nutrias y sobre conflictos entre los humanos y las especies silvestres en el área. Las

observaciones de las nutrias en el 2010 indicaron que ambas especies de nutrias son comunes en el Río DjiDji. Los muestreos de peces en el 2011 indicaron una elevada abundancia pero baja diversidad de peces en este río de aguas negras. Las observaciones sobre la alimentación de un animal solitario en el DjiDji y sobre una familia de 3 en el Río Ivindo indican una elevada dependencia en lombrices de gran tamaño (Annelidae), capturadas cerca del borde de los ríos. Luego de una severa sequía que en el 2011 afectó el nivel Río Dji Dji, encontramos menos nutrias en comparación a las observaciones del 2010, así como ninguna familia con juveniles. Especulamos sobre la posibilidad de movimientos estacionales corriente abajo, lo cual podría afectar la conservación de las especies en la región.