

## REPORT

### AGONISTIC INTERACTIONS BETWEEN RIVER OTTERS AND BEAVERS: AN OBSERVATION AND REVIEW

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#### Abstract

We describe a rare observation of reciprocal aggression between two river otters (*Lontra canadensis*) and a beaver (*Castor canadensis*). Our observations and other literature accounts suggest that the relationship between these species may not be the commensal one suggested by some researchers. Because information on otter-beaver interactions in the literature is scarce and contradictory, we appeal for more information about behavioral interactions between the two species. Future research should aim to determine the frequency of these agonistic events and their overall cost to beaver survival and reproductive success, to determine if this relationship is really a commensal one or some integration of strong positive and negative effects.

**Keywords:** river otter, *Lontra canadensis*, Beaver, *Castor canadensis*, interspecific aggression, agonistic interactions

#### INTRODUCTION

The North American river otter (*Lontra canadensis*) is very difficult to observe in its natural environment. Because of this, behavioral information about specific topics such as aggressive behavior is scarce. Concerning events of intraspecific aggression, direct observations of river otters have been reported before, most notably during a long-term study of human-habituated coastal river otter groups on the north coast of California by J. Scott Shannon, who logged over 6000 otter hours of direct observations from 1986 to 1992 (Shannon, 1989, 1991, 1992, 1993). Liers (1951) also observed such events of aggression between river otters. Several accounts of this were reported for the giant otter (*Pteronura brasiliensis*), in South America (Weber Rosas and De Mattos, 2003; Ribas and Mourão, 2004; McTurk and Spelman, 2005). Direct observations (Erlinge, 1968) and indirect evidence (Simpson and Coxon, 2000; Simpson, 2000, 2006) of intraspecific aggression have also been reported for the Eurasian otter (*Lutra lutra*) in Europe. For these last two species, evidence of cannibalism has been reported (Simpson and Coxon, 2000; Mourão and Carvalho, 2001).

All these accounts show that aggression is a behavioral aspect of sociality in species of the Lutrinae, although the frequency with which otters in the wild take part in aggressive behavior is unknown and subject to debate (Simpson, 2006). Direct observations of aggressive interactions between otters and other animals are even scarcer. We have not found any observational account of this in the literature. In this

paper, we describe in detail an observation of agonistic interactions involving a beaver (*Castor canadensis*) and two river otters.

These two species are frequently associated together (e.g., Dubuc et al., 1990; Swimley et al., 1998). However, little is actually known about the nature of the relationship between them, apart from the well-documented river otter's use of habitats and structures created by beavers (Melquist and Hornocker, 1983; Rosell et al., 2005; Gallant, 2006). We discuss potential explanations for the observations we describe, in relation to the scarce and divergent behavioral information found in the literature for these two species. We also propose directions for future investigations aimed at elucidating this relationship.

## ACCOUNT OF OBSERVATIONS

The observations we report were made by one of us (ALS) in August 1960. At the time, ALS had a career in other aspects of freshwater ecology and never appreciated the unusual character of the episode until discussions with DG. No written notes were made at the time but the event was memorable both for the interaction and because these were the first river otters seen by ALS. On that evening, three off-duty fishery biologists visited a large beaver pond in Fourmile Brook, Coos Co., New Hampshire (44°55'N, 71°11'W). This pond, although fairly remote, was approached by a logging road and received regular but light use by anglers fishing for brook trout (*Salvelinus fontinalis*).

Between 18:00 and 20:00 Eastern Daylight Time, the three of us gathered on a large beaver lodge built against the bank. While eating and talking quietly, we heard mewling sounds from inside the lodge which we attributed to a litter of kits. Soon after, we noticed a pair of otters approaching from across the pond. The otters stopped approximately 20 m away from the lodge, postured vertically in the water, and vocalized (barked) at us. After a minute, we heard a splash inside the lodge and a large beaver surfaced between the lodge and the otters. The beaver swam rapidly toward the otters but never made contact. The threatened otter would dive and swim away while the other otter remained in place until the beaver rushed it also. The otter first attacked would then posture, bark and draw the next attack. During four to five attacks, the beaver never got closer than approximately 1 m and the otters never attempted to bite the beaver. The otters then withdrew approximately 100 m across the pond where they remained visible.

The beaver then swam toward the lodge but did not enter. Instead, it began to swim steadily, not directly toward the otters but counter-clockwise along the shoreline. Only the top of its head was visible and its wake was minimal. After traversing at least 200 m of shoreline, the beaver approached the otters with the low evening sun behind it. At the same time, the human observers stood up to see better; this movement may have distracted the otters and contributed to the next events. When 10 to 15 m from the otters, the beaver accelerated dramatically. Tailbeat frequency increased and its back appeared above water. The beaver struck one otter, which "screamed" loudly. There was much splashing and, at one point, half the otter's body length was above water. The two animals disengaged. The trio then resumed the chase and escape behaviour we had seen near the lodge but with one difference. This time the non-target otter darted in, struck and, presumably, bit the beaver. The beaver broke off its attack and pursued the attacking otter, which evaded it easily. After three or four chases by the beaver and successful attacks by both otters, the beaver swam

directly to the lodge and entered it. The otters were visible for several minutes and then disappeared from our sight.

## **DISCUSSION**

The presence of humans clearly influenced the intensity of the interactions we observed but probably not their direction or form. If the otters' curiosity about the three humans drew them closer to the lodge than they would have come otherwise, the first interaction was a consequence of our presence. We do not know how long the otters had been present in the pond. The otters, possibly after earlier interactions, might have avoided the vicinity of the lodge. In the second interaction bout, it is likely that the otters' attention was drawn to human movement on the lodge and the beaver would have been less successful in its attack without this distraction. However, the circuitous route and quiet swimming suggest a directed attack on the otters. The approach with the sun behind it probably was advantageous for the beaver but no foresight need be suggested; the route taken was simply the shortest shoreline distance between the lodge and the otters. In spite of the complicating role of observers, we suggest that beavers will defend not only the immediate neighborhood of a lodge containing young but larger areas possibly extending to entire ponds.

The fact that several studies have found beaver to be a small part of the river otter's diet (e.g., Greer, 1955; Reid, 1984; Reid et al., 1994a), suggests that river otters occasionally prey on beavers, possibly in response to instances of low availability of preferred prey such as fish. Young kits would be more vulnerable to otter predation than mature beavers and the aggressive stance adopted by the beaver in the event we described above could be linked to the kits that were in the lodge. In Manitoba, during winter, Green (1932) observed a changed, more prudent behavior of beavers at a pond that had been frequented by otters. Traditional knowledge gathered by Green (1932) asserts that otters can gang up on a lone adult beaver and kill it, and that otters would predate beaver kits opportunistically. Reid (1984) provided evidence suggesting that otters can occasionally displace beavers from their lodges in fall. This information, along with the direct observations of interspecific aggression we described above, is contrastingly different from those made by Melquist and Hornocker (1983) in Idaho. On three separate occasions, they observed beavers and otters in the same lodge simultaneously, without any discernable sign of agonism. In one of those instances, as many as four otters and three beavers were together in one large lodge. We therefore propose that availability of common prey items to river otters may determine their behavior toward beavers, while timing of parturition and rearing of young kits would determine the behavior of beavers toward otters. More information and focussed investigations are required to test these proposed hypotheses. Additionally, it remains to be proven that beaver hair found in otter scats (Greer, 1955; Reid, 1984; Reid et al., 1994a) more often result from predation and not scavenging.

Otters can purposefully create breaches in beaver dams in winter, possibly to create pockets of air between the ice and the water's surface, or to reduce water levels in ponds for easy predation on fish (Green, 1932; Reid, 1984; Reid et al., 1988). Dam-rifting has been recognised as an indirect source of stress that could be detrimental to beavers, because their survival in winter could be affected by low water levels that limit access to the food cache and by the entry of cold air under the ice, which would increase thermal stress (Reid, 1984). According to Reid (1984), loss of reproductive fitness from energetic stress (caused by dam-rifting) could be potentially caused by:

reduction of beavers' resistance to pathogens, reduction of body growth, increased predation risk from terrestrial predators, and resorption or abortion of fetuses. None of these potential effects have been documented to this date. If winter dam rifting by otters is found to be common and is proven to affect beaver survival and reproductive success by a considerable measure, the relationship between the species would be more akin to a parasitic one during winter at northern latitudes, while remaining a rather commensal one year-round in southern regions of North America, if a low frequency of direct aggressions by otters is assumed.

It is well known that the changes that beavers bring to freshwater ecosystems are beneficial to river otters, which often frequent ponds and use lodges and bank burrows created by beavers (e.g., Melquist and Hornocker, 1983; Reid et al., 1994b; Gallant, 2006). Noordhuis (2002) considered that the return of the river otter to Clarke County, Georgia (USA), was facilitated in part by the recovery of the beaver population in that area. Reid (1984) also suggested such a hypothesis for explaining an increase in the otter population of Alberta during the 1970's. LeBlanc et al. (2007) studied river otter usage of beaver ponds during summer, in the context of a commensal relationship in which the beavers and their ecosystem modifications influence river otter habitat use, without them being adversely affected by this semi-aquatic predator in any considerable way. However, for this relationship to be unambiguously viewed as a commensal one, as first proposed by Tumilson et al. (1982), future studies will need to determine the frequency of agonistic events between these species and the level of impact they have on beaver survival and reproductive success. The effects of dam-rifing on beaver fitness in temperate climates also needs to be assessed.

**Acknowledgments** - We thank two anonymous reviewers who kindly reviewed an earlier manuscript version of this text.

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## RESUME

### LES INTERACTIONS AGRESSIVES ENTRE LA LOUTRE DE RIVIÈRE ET LE CASTOR: UN RAPPORT D'OBSERVATION ET UNE REVUE DE LA LITTÉRATURE

Dans cette note, nous décrivons une observation rare d'interactions agressives entre deux loutres de rivière (*Lontra canadensis*) et un castor (*Castor canadensis*). Nos observations et d'autres informations dans la littérature suggèrent que la relation écologique entre ces deux espèces ne soit pas commensale, comme le suggèrent certains chercheurs. Puisque l'information sur les relations loutre-castor est rarissime et contradictoire dans la littérature, nous faisons appel pour plus d'informations à propos des interactions comportementales entre ces deux espèces afin de pouvoir déterminer la nature de la relation entre elles. Les recherches futures devraient viser à déterminer quelle est la fréquence de ces interactions agressives et quel est le coût encouru par le castor au niveau de la survie et du succès reproducteur, pour déterminer si la relation entre ces deux espèces peut toujours être considérée comme étant commensaliste ou si elle implique à la fois des effets positifs et négatifs considérables.

## RESUMEN

### INTERACCIONES AGONISTAS ENTRE NUTRIAS DE RÍO Y CASTORS: UNA OBSERVACIÓN Y REVISIÓN.

Describimos una observación rara de agresión recíproca entre dos nutrias de río (*Lontra canadensis*) y un castor (*Castor canadensis*). Nuestras observaciones y otras referencias en la literatura sugieren que la relación entre estas especies podría no ser comensal, como fuera sugerido por algunos investigadores. Dado que la información sobre interacciones nutria de río-castor en la literatura son escasas y contradictorias, nosotros urgimos por más información sobre comportamiento durante interacciones entre estas dos especies. Investigaciones futuras deben ser dirigidas a determinar la frecuencia de estos eventos agonistas y su costo total para la supervivencia y éxito reproductivo de los castors, para determinar si esta relación es en verdad comensal o si existe alguna integración de efectos positivos y negativos.