**V I E W P O I N T**

# SPECIES-WISE DISPARITY IN SCIENTIFIC KNOWLEDGE ABOUT OTTERS: AN OBSTACLE TO OPTIMAL MANAGEMENT AND CONSERVATION ACTIONS?

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**Abstract:** Some species of otters have been much more studied than others. A particular challenge in the management and conservation of otters worldwide is that some of the lesser-known species are also among those being the object of conservation concerns. In this paper, I argue about the importance of producing more scientific knowledge about lesser-known otter species and discuss the importance of integrating more species- and region-specific knowledge in survey practices. By comparing literature, I present examples showing how species-wise differences in behaviour and ecology can affect sign-based survey outcomes.

***Keywords:*** *otter behaviour, otter ecology, sign-based survey techniques, monitoring, scientific knowledge, inter-specific differences, knowledge disparities*

## INTRODUCTION

The most studied species of otter is without doubt the Eurasian otter (*Lutra lutra*). This is due to the fact that a considerable part of its range is on the European continent, spanning several heavily industrialized countries. The dramatic population declines of this species in Europe, due to pollution and habitat loss, sparked great interest from scientists and conservationists (see references in MASON and MACDONALD, 1987; ROBITAILLE and LAURENCE, 2002), reflecting the abundant and diverse scientific knowledge having been produced for this species up to now. Another well-studied species is the sea otter

(*Enhydra lutris*). I cite here as examples, some of the famous ecological studies on near-shore community structure and dynamics (ESTES and PALMISANO, 1974; ESTES et al., 1978; SIMENSTAD et al., 1978). A growing body of scientific literature is also available for other species such as the giant otter (*Pteronura brasiliensis*) (CARTER and ROSAS, 1997; DUPLAIX et al., 2003). This is also the case for the river otter (*Lontra canadensis*), especially in the United States, with conservation concerns in various parts of that country and many reintroduction projects (reviewed in RAESLY, 2001) and distribution surveys (e.g., SHACKELFORD and WHITAKER, 1997; SERFASS et al., 1999; PITT et al., 2003) having been conducted.

In many parts of the world where urgent need to monitor otters followed, researchers and conservationists often adopted the survey methods developed in Europe, for monitoring the Eurasian otter populations. Indeed, during the 1980's and 1990's, the waves of studies and surveys that followed for other freshwater otter species in various parts of the world were usually characterized by a short reference section, or loaded with citations of studies focused on species (mostly Eurasian otter) other than the one of interest (e.g., CHEHÉBAR et al., 1986; CLARK et al., 1987; VERWOERD, 1987; ROWE-ROWE, 1992). This situation attested the disparity in knowledge that existed about other otter species compared with the Eurasian otter. This disparity still exists because there is often no alternative to citing works on Eurasian otters to support specific arguments when explaining and discussing results of studies (e.g., GALLANT et al., 2007; GALLANT et al., in press). This reality credits European scientists, who have produced a large and diverse wealth of scientific literature about Eurasian otter ecology and conservation (see KRUUK, 1995). It also highlights the need to gain more knowledge about many of the other otter species.

With conservation issues comes the interest and resources to do ecological research for a better understanding of the species' needs. Yet for some species, reliable scientific information on basic ecology and population status remains scarce. Rareness and elusiveness of the animals, as well as lack of resources or difficult field conditions, can make data acquisition arduous and dangerous. Such examples are the Congo clawless otter (*Aonyx congicus*) (ALARY et al., 2002; JACQUES et al., 2002), the hairy-nosed otter (*Lutra sumatrana*) (LONG, 2000; LUBIS, 2005) and the neotropical otter (*Lontra longicaudis*) (WALDEMARIN, 2004; SILVA et al., 2005). This is a complex challenge because some species with data-deficient status might also be those that need pressing attention with regard to conservation issues (HUSSAIN, 2004; NEL and REUTHER, 2004).

The goal of this paper is to discuss the importance of evaluating the performance of survey methods, as well as producing and integrating regional ecological knowledge about otters of interest in survey design and data interpretation. Based on my own experiences of research on river otters in New Brunswick (Canada) and other examples from the literature, I further assert that producing more ecological knowledge, especially about the lesser-known species, is one of the keys for improving management and conservation of otters worldwide.

## ON SURVEYS AND OTTER SPECIES

Sophisticated survey methods have been proposed for elusive carnivores such as otters in the past (KRUUK et al., 1980; TESTA et al., 1994) and are still being developed (e.g., BEHELER et al., 2004; BEHELER et al., 2005). However, limited resources, coupled with the need to conduct large scale and long term monitoring, mean that cost-effective survey methods based on documentation of activity signs (i.e., scats and tracks) will remain the norm. Europe undoubtedly has the longest and most active history in development and implementation of otter monitoring programs through sign-based surveys. Much debate about these methods has taken place (KRUUK et al., 1986; CONROY and FRENCH, 1987; KRUUK and CONROY, 1987; MACDONALD and MASON, 1987; MASON and MACDONALD, 1987) and today, standardized sign-based survey techniques are proposed (e.g., REUTHER et al., 2000).

From 2003 to 2006, along with colleagues, I evaluated different aspects of the performance of sign-based survey methods (GALLANT et al., 2007; GALLANT et al., in press) because we were interested in developing a long-term monitoring program for a resident river otter population in Kouchibouguac National Park of Canada. One particular technique we evaluated (GALLANT et al., in press) was the popular standard sign-based survey method. Ideally, the sites of standardized shore-lengths, where searches are undertaken for signs of otter activity, should be chosen randomly. Because of accessibility and logistical constraints however, this procedure is often amended and sites are chosen non-randomly so that ease of access is guaranteed. Road bridges are often selected as starting points to conduct searches for signs of otter activity. This permits easy and quick access to riparian habitats and enables surveyors to maximize the number of locations that can be visited. This compromise has often been made in European surveys (e.g., MACDONALD, 1983; REUTHER and ROY, 2001; GEORGIEV, 2005). Bridges have also been used as sampling locations in North America (e.g., CLARK et al., 1987; SHACKELFORD and WHITAKER, 1997; BISCHOF, 2003).

Because we did not know if and how river otters in North America reacted to roads and bridges, we set out to investigate this bridge survey method in a North American setting. We found that for a given length of shoreline searched per site, results of bridge sites were very similar to randomly chosen sites (GALLANT et al., in press). This indicated that river otters did not actively avoid bridges and that these structures with associated human activity (i.e., traffic) would not affect chances of detecting river otter presence in a region of interest.

Interestingly, comparing our results with studies on the Eurasian otter showed that longer searches were necessary for us to reach high detection rates. This was caused by what seems to be a subtle, but nonetheless, important behavioural difference between the two species. A particularity of Eurasian otters is that they often use road bridges as marking sites by depositing scats (i.e., spraints or faeces) under them or in their vicinity

(ROMANOWSKI et al. 1996; REUTHER and ROY, 2001). During our research on river otters, involving winter (GALLANT et al., 2007; GALLANT et al., in press) and summer (GALLANT, 2006) fieldwork along rivers and streams, river otter scats were never found under bridges. They did not use road bridges as latrine sites and I was unable to find any indication that river otters in North America actively select bridges as latrine sites. SHACKELFORD and WHITAKER (1997) suggested that searching beyond 100 m of bridges would probably result in more river otter signs being discovered and was confirmed in GALLANT et al. (in press). This apparently benign behavioural difference between the species has important implications in the way we should view and interpret such sign surveys, depending on the species being monitored.

With the Eurasian otter in Europe, because most scats tend to be found under or near bridges (ROMANOWSKI et al., 1996; REUTHER and ROY, 2001), deliberately selecting bridges as search sites is very much akin to using a targeted sampling approach. As a matter of fact, surveyors are choosing to search locations where there are increased chances of detecting otter activity signs, if otters are present. For river otters in North America, because they apparently neither actively avoid nor use bridges as marking sites (GALLANT et al., in press), this is more akin to a random survey because bridges do not appear to influence river otters and they were not built at locations with river otter habitat needs in mind (i.e., availability of prey and shelter). This is a situation where the same method does not produce the same type of data. Different species of otters manifest different behaviour with regard to bridges. This has implications for interpreting survey data. For example, it is foreseeable that for targeted sampling designs, saturation of the response variable (e.g., presence-absence of activity signs at searched sites) would occur at much lower abundance of otters because we are sampling locations that are most likely to have activity signs deposited by the species of interest.

A second example of species-specific behavioural differences that potentially affects otter survey data can be found in the practice of collecting scats of otters from one region for use as foreign scats to stimulate otter marking in another. OGADA (2004), working with African clawless otters (*Aonyx capensis*), found such techniques to be useful for mapping otter territories in Kenya. However, BRZEZIŃSKI and ROMANOWSKI (2006), working on the Eurasian otter in Poland, found that using scats from unfamiliar individuals did not stimulate defecation any more than the practice of removing old scats. Information is generally lacking for inter-specific comparisons regarding this topic and the scarcity of available literature on this subject for Eurasian otters give contrasting results (discussed in BRZEZIŃSKI and ROMANOWSKI, 2006). Some species are probably more territorial than others. Therefore, such techniques would not be suitable for all otter species.

These examples confirm the need to give further consideration to behavioural and ecological differences between otter species. They show the need to integrate region- and species-specific knowledge into monitoring and management practices as they become available. This is a challenge because of the relative paucity of information for some species compared to others.

## ON ADAPTATIONS AND VALIDATIONS OF SURVEY METHODS

Truly, it is an advantage to be able to implement standardized survey methods over large areas (REUTHER et al., 2000; GROENENDIJK et al., 2005). If researchers and conservationists do not all use the same standardized survey method, we cannot hope to accurately make direct comparisons of survey results between regions and throughout time. However, accurate assessments of a given population's state is paramount and this justifies adaptations or innovations in survey methods, in as much as new scientific knowledge about the species and eco-region of interest shows that it is necessary and beneficial to do so. For example, regarding a specific otter species, it is possible that the behaviour of animals varies across regions. It will therefore be necessary to determine if differences, yet to be found, will have implications for the performance and accuracy of existing survey techniques applied on a large geographical scale. Moreover, species spanning different ecosystem-types exacerbate the difficulty that different shoreline substrates and vegetation can alter detection rates (CONROY and FRENCH, 1987; ROMANOWSKI et al., 1996). These issues are especially relevant to species that have large distribution ranges, such as the Eurasian and river otters (LARIVIÈRE and WALTON, 1998; ROBITAILLE and LAURENCE, 2002). This is also an issue at smaller geographical scales. For example, GEORGIEV and STOYCHEVA (2006) documented no less than twelve different types of riparian habitat used by Eurasian otters in southern Bulgaria. As more information on these issues become available, adaptations, modifications and innovations in survey methods are warranted. If standard methods are to change as little as possible for comparison purposes, at least some measure of adaptation in interpretation of survey data will become essential when we will have more detailed information regarding these issues.

One recent example of species- and region-oriented integration of ecological information relevant to management activities is found in HUBBARD and SERFASS (2004), who determined seasonal fluctuations in river otter marking activities in their region of western Pennsylvania. They then adapted their survey methods so that timing of sampling in the field coincided with river otter marking activity peaks, spring and fall, so maximizing detection rates. These spring and fall activity peaks are different from the results of MACDONALD and MASON (1987), who found that marking peaks for Eurasian otters in Wales (United Kingdom) consistently occurred in winter and early spring. ROBSON and HUMPHREY (1985), working on river otters in Florida, found that the scent-marking activity peak was in winter.

Giant otter monitoring practices constitute another example of species- and region-specific adaptations in survey techniques. In South America, timing of the sampling for monitoring of the giant otter coincides with the dry season, when water level is low and otters are restricted to permanent watercourses (GROENENDIJK et al., 2005). This limitation of movements by otters possibly increases the chances of detection. This species is also monitored using sign-based survey techniques (GROENENDIJK et al., 2005) but because it is a large and diurnal species that typically occupies open habitats, opportunities for detection of their presence via direct observations are frequent (DUPLAIX, 1980; GROENENDIJK et al., 2000; GROENENDIJK et al., 2005). Another advantage that is capitalized upon when doing surveys for this species is the possibility of identifying individual animals by observing the distinct spot patterns on their throat (UTRERAS and PINOS, 2003; GROENENDIJK et al., 2005). Researchers and conservationists, when in the field, can easily keep records of the whereabouts of individuals by direct observations and identification of these spot patterns (e.g., DUPLAIX, 1980; GROENENDIJK et al., 2000).

Finally, another consideration is that if a particular survey method is deemed inefficient, ineffective or inadequate for monitoring one otter species, this does not necessarily mean that it cannot be of use in monitoring other otter species. For example, even if freshwater otter species, as semi-aquatic mammalian predators, are very similar to each other, it does not mean that they will all behave or react in the same way in a given context. Even if ROBSON and HUMPHREY (1985) convincingly demonstrated the inefficacy of scent stations as a monitoring method for the river otter, scent stations remain a potential method for monitoring other species of otters, until we have scientific data that motivate us to drop that technique altogether when otters in general are concerned. The fact that river otters quickly loose interest in lures of scent stations (ROBSON and HUMPHREY, 1985) does not mean that other species of the same family or genus will respond in the same way. Our finding of different defecation behaviours in relation to bridges for river otters compared with Eurasian otters (GALLANT et al., in press) serves as a case example of this.

## CONCLUSION

The examples mentioned above show that not only is it important to encourage the development of cost-effective survey methods based on signs of otter activity (e.g., OGADA, 2004; HUBBARD and SERFASS, 2004; MERCIER and FRIED, 2004; SULKAVA, in press), it is also important to conduct studies to investigate existing methods to see if, and how, they can be validly used in different ecosystems to survey different species of otters. We need to constantly investigate and evaluate various aspects of the performance of methods we use (ROBSON and HUMPHREY, 1985; ELMEROS and BUSSENIUS, 2002; GALLANT et al., 2007) and ask how they might be improved or adapted to new environments and other otter species (e.g., HUBBARD and SERFASS, 2004; SILVA et al., 2005; GALLANT et al., in press). Corroboration of the adequacy of survey methods for other species and eco-regions is far from being useless redundancy; it is required information that is often lacking. We need to validate methods in different contexts and adapt or develop alternative methods when it is justified by new scientific results to do so.

The fact that so many of the studies I cited in this paper are from the IUCN Otter Specialist Group Bulletin is in itself a demonstration that the Otter Specialist Group is successful in its goal of guiding and promoting research on all otter species, to improve our knowledge about otter ecology, conservation, and monitoring practices. For the lesser-known species especially, there is still a lot to do in the way of eliminating the disparity in scientific knowledge. As researchers and conservationists with interests without borders, we must feel compelled to encourage, assist, and help those who are, with meagre resources more often than not, attempting to bring to all of us precious knowledge about the lesser known (and often threatened) otter species.

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## RÉSUMÉ :LA DISPARITÉ AU NIVEAU DES CONNAISSANCES SCIENTIFIQUES SUR LES DIFFÉRENTES ESPÈCES DE LOUTRES : UNE ENTRAVE À LEUR GESTION ET CONSERVATION OPTIMALE?

Certaines espèces de loutres ont été beaucoup plus étudiées que d'autres. Un défi particulier au sujet de la gestion et la conservation des loutres à l'échelle mondiale, c'est que certaines des espèces les moins connues comptent aussi parmi celles faisant l'objet d'inquiétudes quant à leur conservation. Dans cet article, je discute à propos de l'importance de produire plus de connaissances scientifiques à propos des espèces les moins connues et j'argumente au sujet de l'importance d'intégrer plus de connaissances particulières à l'espèce et la région d'intérêt dans les méthodes de suivi. En comparant la littérature disponible pour différentes espèces, je propose des exemples démontrant comment des différences entre les espèces, au niveau comportemental et écologique, peuvent influencer les résultats de suivis indiciaires.

## RESUMEN: DISPARIDAD EN EL CONOCIMIENTO CIENTÍFICO ENTRE LAS ESPECIES DE NUTRIA DE RÍO: ¿UN OBSTÁCULO PARA EL MANEJO ÓPTIMO Y LAS ACCIONES DE CONSERVACIÓN?

Algunas especies de nutria de río han sido más estudiadas que otras. Un desafío particular en el manejo y conservación de nutrias de río en el mundo es que algunas de las especies menos conocidas son aquellas sobre las que existe preocupación en cuanto a su conservación. En este artículo yo discuto la posibilidad de producir más conocimiento científico sobre especies menos conocidas y discuto la importancia de integrar conocimiento sobre ciertas regiones y especies durante relevamientos de campo. Mediante la comparación de literatura, presento ejemplos que muestran cómo diferencias en el comportamiento y ecología de diferentes especies pueden afectar los resultados de relevamientos de campo.