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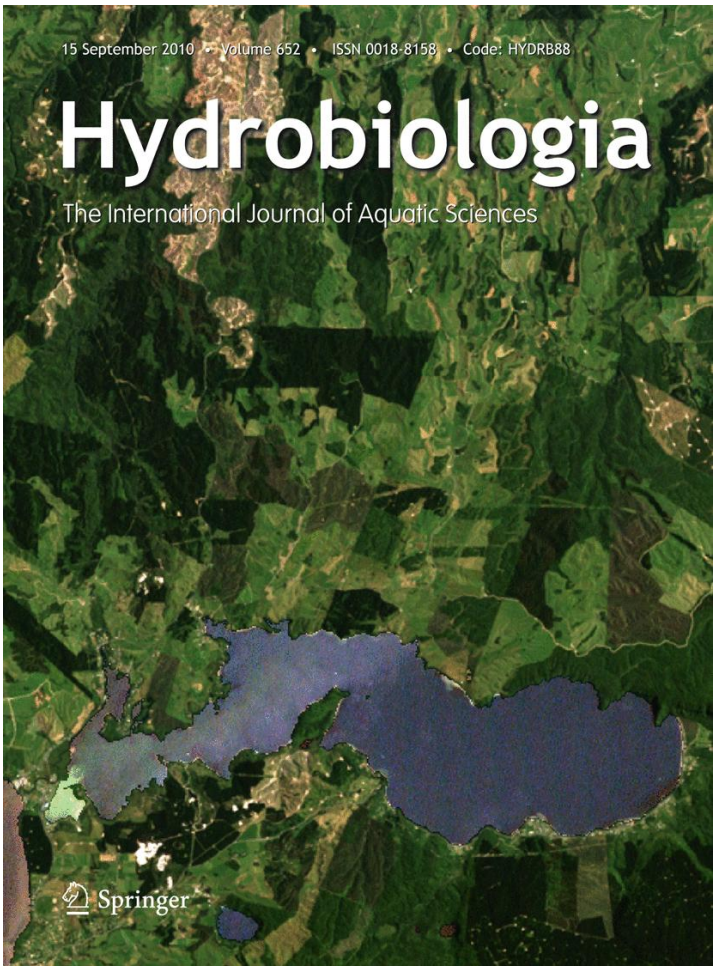

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SHORT RESEARCH NOTE

Defining conservation status using limited information: the case of Patagonian otters *Lontra provocax* in Argentina

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Abstract The Southern river otter or huillín *Lontra provocax* has been classified as 'endangered', with the loss of riparian forest identified as the main threat to its survival. We used new information on distribution from Argentina to define their status. There are no data on the huillin's population structure and dynamics, and no estimate of its abundance or population trends at a relevant scale. Our survey teams covered 435 locations in lakes, rivers and coastal sites using a standard and repeatable methodology of 600 m survey transects as adopted for otter surveys across Europe. We found that its present geographic range in Argentina is slightly larger than is characteristic of a species at risk of extinction at the national level, although its contemporary distribution is still radically contracted in comparison to its historical distribution.

Keywords Aquatic mammals · Geographical distribution · Forage specialization · Habitat requirements

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Introduction

Conservationists frequently have to make decisions based on limited information and limited time. Hayward (2009) highlights a distinction between the systems that define conservation status and those that define the processes that threaten extinction, concluding that while the former is robust and repeatable, there is less rigour in defining threats.

In the light of these information deficits, and as a case study of evaluating status with only partial information, in this article we evaluated the conservation status of the Southern river otter or huillín (*Lontra provocax*) in Argentina. Huillines are one of four South American otter species and are endemic to the south of Argentina and Chile (Chehébar, 1985; Medina-Vogel et al., 2003). This species is categorised as 'endangered' by the IUCN (Sepulveda et al., 2008) and by Argentina (Resolution 1030/2004—Secretaría de Ambiente y Desarrollo Sustentable) and Chile, and major threats to it that have been identified

hitherto are loss of riverbank vegetation, dam construction, river and stream canalisation, drainage for agriculture and dredging, and any other degradation of the riparian habitat.

Chehébar (1985) and Chehébar et al. (1986) published the first evaluation of the conservation status of *L. provocax* in Argentina and now, more than 20 years later, we up-date and add to their data. Data on the huillin's population structure and dynamics are only beginning to accumulate, and there are no estimates of its abundance or population trends. This otter therefore provides a case study of the all very common challenges of evaluating the status of a potentially threatened species in the absence of complete information, and where remedying this information deficit is infeasible in the short or medium term necessary for conservation action. Therefore, we used information on population distribution, following the IUCN's '2001 Categories & Criteria' document, which allows the use of presence/absence data when evaluating geographic range.

Methods

Argentinian Patagonia encompasses southern Argentina between parallels 36°S to 55°S, between the Andean mountain chain and the Atlantic Ocean (Fig. 1). It is dominated by two main types of ecosystems: the steppe that occupies most of the region, and the temperate forest, that forms a narrow fringe which lies almost entirely in the mountains (Fig. 1). Precipitation shows an abrupt longitudinal gradient from west to east (from 2000 mm or more to 700 mm in few kilometres), which explains the rapid transition between forest and a semi arid environment. The vegetation formation of temperate forest is dominated by *Nothofagus* trees, mainly 'lenga' (*N. pumilio*) and 'ñire' (*N. antarctica*) (Cabrera, 1971). The water's edges along steppe rivers and lagoons are typical of semi-desert regions, exhibiting substantially less complexity and vegetative cover than in the forests of the West (Cabrera, 1971). A significant proportion of the Patagonian forest is protected by an efficient network of National Parks, so habitats there, including the water's edge, are relatively well protected. Macro-crustaceans, the main prey of otters in freshwater habitats, are absent from the Manso, Futaleufú and Buenos Aires basins and from

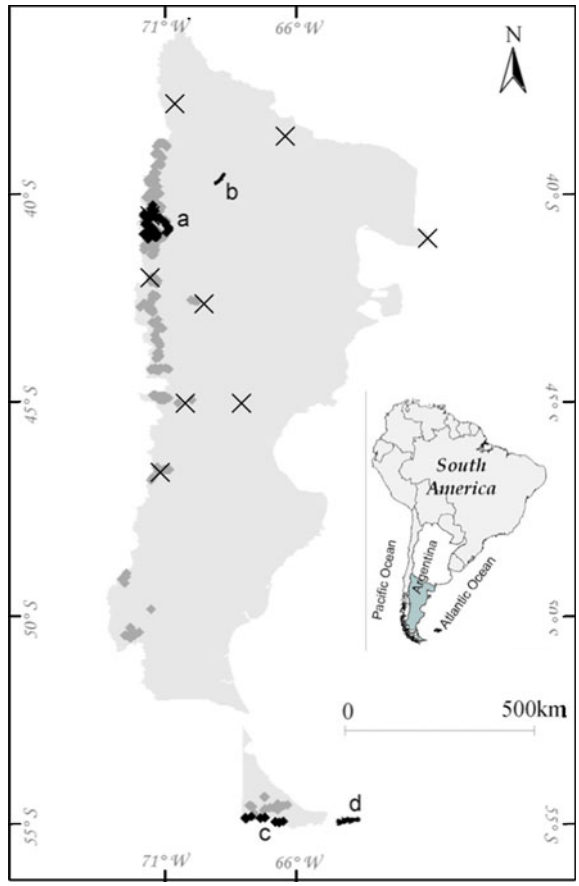

Fig. 1 Distribution of *L. provocax* in Argentinean Patagonia. *Crosses* indicate confirmed historical locations (Chebez, 1999). *Grey rhombuses* represent our surveyed sites visited in 2005–2009. *Black rhombuses* represented sites with positive signs of *L. provocax*. Two populations (Northern and Southern Patagonia) and four subpopulations (Limay River, Nahuel Huapi National Park, Beagle Channel and Staten Island) were distinguishable (indicated by a, b, c and d respectively). The stretch of Limay River with southern river otter signs was surveyed by Carmanchahi et al. (2006), and Staten Island by Parera et al. (1997) and genetically confirmed by Centrón et al. (2008)

Argentinean freshwater systems to the south of 47°S latitude, including those from Tierra del Fuego (Cassini et al., 2009).

Three teams surveyed the study area between January and May 2005, and between January and February 2006, November 2007, January and March 2008 and January 2009. Most sites were located in the forest because it was the only habitat described for this species in the previous survey conducted in the 1980s (Chehébar, 1985). On the southern coast of Tierra del Fuego, we surveyed most suitable habitats along 160 km of the Beagle Channel coast. In total,

we surveyed 435 locations in 68 lakes and 62 rivers and 15 sites on the marine coast (Fig. 1). At each site in freshwater habitats, we followed established protocol by searching for otter signs (footprints/droppings) along rivers (one riverbank), lake shores or the coast for 600 m (the distance generally used in other aquatic mustelid surveys; Bonesi & Macdonald, 2004). The distance between survey locations was 4–8 km to reduce the risk of one home range spanning two survey strips (Chehébar, 1985 following Macdonald, 1983), although home ranges may measure 11 km (Sepulveda et al., 2007). Along the coastlines, we surveyed transects of variable lengths, depending on accessibility and coastal characteristics. We were mindful that field surveys can be prone to bias, for example, if footprints were more detectable in certain surfaces (e.g. less detectable on rocky coasts), or if otters select a particular habitat for defecating (e.g. near trees), but our habitat analysis was at a coarser scale than likely to be affected by these fine-scale behaviour patterns. Faeces were attributed to species on the basis of appearance and odour, and confirmed analysing the microstructure of hair (Gomez & Cassini, 2010) and using genetic markers following Centrón et al. (2008) (which consisted of comparing the DNA sequence of a portion of cytochrome *b* obtained from faeces with the sequences published in the Gen Bank). A total of 185 faeces were analysed.

To assess 'extent of occurrence' (IUCN criterion B, IUCN, 2001), we measured the area of minimum convex polygons (Convex Hulls around points v 1.2 Jenness, 2004, extension for Arc View 3.2) containing all sites with evidence of otters, grouping those that were less than 100 km apart, always connected by water systems, bearing in mind that the greatest distance known to have been travelled by a dispersing huillin is 46 km (Sepulveda et al., 2007). The estimation of 'area of occupancy' is defined by the IUCN as the area within the extent of occurrence that is effectively used by the taxon (e.g. avoiding the inclusion of unsuitable habitat) and it is generally recommended to estimate this using grids. In the case of the Nahuel Huapi National Park, we used two different grids comprised of cells of: (a) 11 km × 11 km and (b) 5 km × 5 km, where the length of cell sides correspond to the mean home range estimated by Sepulveda et al. (2007), and half this length, respectively.

Results

Figure 1 displays the present distribution of *L. provocax* in Argentina. We found otter signs in the Limay River basin and the Beagle Channel. In Limay basin, we found otter signs at 69 sites along the shores of nine lakes: Nahuel Huapi, Espejo, Espejo Chico, Moreno, Correntoso, Traful, Falkner, Villarino and Hermoso (Fig. 2). In addition, 13 faeces were found at six transects along 40 km of the River Limay (up to 35 km from the Limay's source at Nahuel Huapi Lake). All positive sites were in the Nahuel Huapi National Park (except for one, in the south of Lanin National Park). The northern and southern limits of otter distribution in the continental forest were 40°21′S and 41°08′S, respectively (N–S length of 120 km). In Tierra del Fuego, otter spraints were recorded in 22 of 73 sites surveyed along the Argentinean coast of the Beagle channel. Apart from our own survey, we used data from previous recent surveys (Carmanchahi et al., 2006, Parera et al.'s (1997) data from Staten Island confirmed genetically by Centrón et al. (2008) and a record provided by H. Matarasso [pers. comm.] to the east of Lanín National Park.

We distinguished two populations, one in northern and one in southern Patagonia, with a combined extent of occurrence of 15,588 km^2. When the site-grouping criterion was set at 100 km four groups emerged, two in the north (Limay River and Nahuel Huapi National Park) and two in the south (Tierra del Fuego and Staten island), with an extent of occurrence for Argentina totalling 7395 km^2. For Nahuel Huapi National Park, the estimated area of occupancy using a 11 km ×11 km grid cell size was 3025 and 1125 km^2 using a 5 km × 5 km cell. Thus, our estimates for *L. provocax* in Argentina were over the limit suggested by the IUCN criteria for the Endangered (EN) category: extent of occurrence (5000 km^2) and area of occupancy (500 km^2) (IUCN, 2001, 2003).

Discussion

We used limited information to assess the conservation status of Patagonian otter *L. provocax* in Argentina. Our work in Argentina found at a regional level, although its distribution is still highly

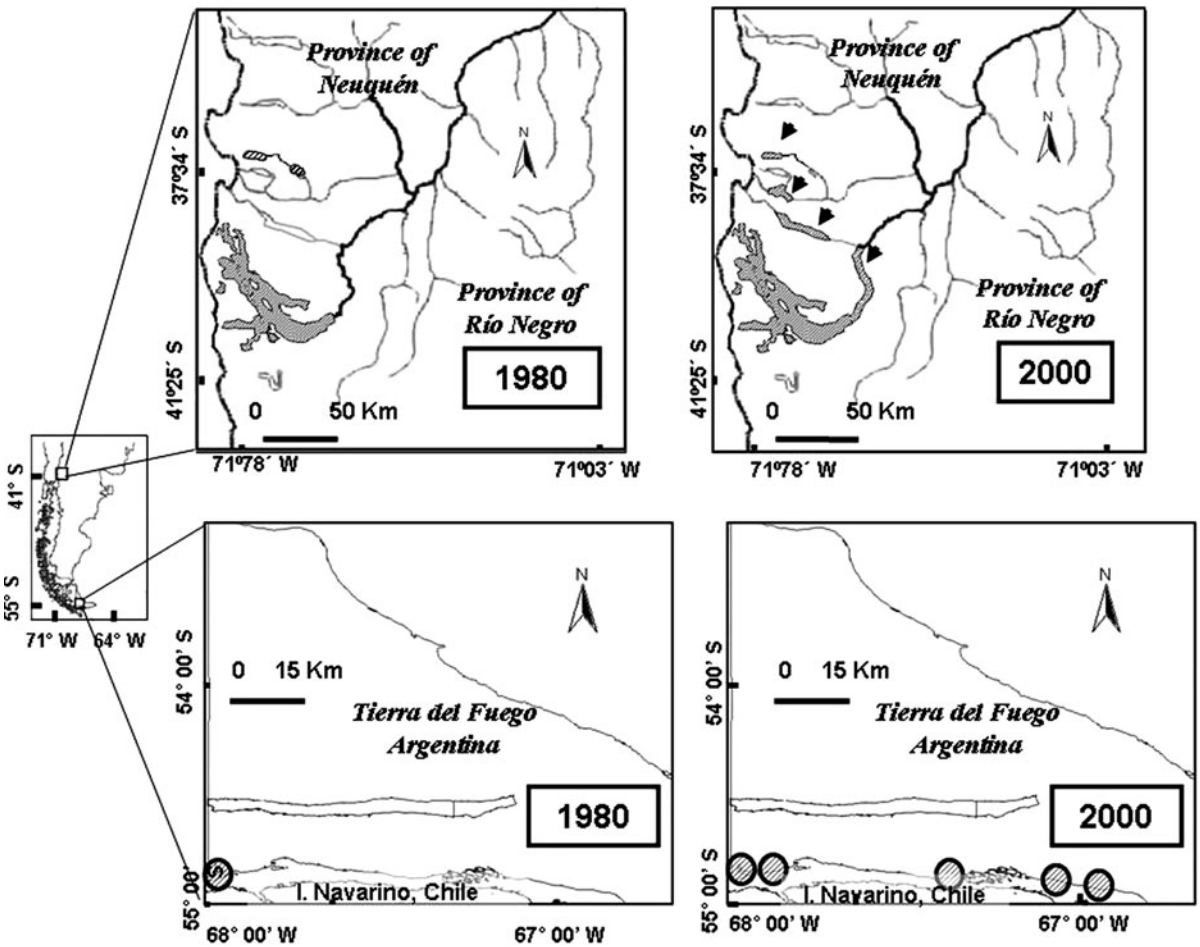

Fig. 2 Distribution of *L. provocax* in the Limay basin and Beagle Channel, in the 1980s and the 2000s. In the1980s, huillines were found in some lakes of Nahuel Huapi sub-basin, Hermoso and Meliquina lakes in Northern Patagonia and in Bahía Lapataia in Southern Patagonia. By 2000s, Northern distribution did not show expansion to the South (see intermediate situations between 80s and 2000s in Chehébar & Porro, 1998 and Aued et al., 2003), and in Tierra del Fuego new signs were found to the East along the Beagle channel coast but not to the North.

contracted in relation to its historical distribution, that huillines' present geographic range is slightly larger than expected from a species at risk of extinction. A brief discussion of main threats to this species follows.

IUCN proposed that loss of riverbank vegetation is the main risk to huillines, based on information collected mainly in Chile in the 1980s (Sepulveda et al., 2008). In this neighbour country, the Irrigation Law promotes investment in land drainage and consequently encourages the removal of riparian vegetation and the canalization of lowland rivers, in particular those rivers that flow through swamp forests (Medina-Vogel et al., 2003). It is therefore possible that habitat loss is a main threat in this country. Nevertheless, in the most recent survey conducted in freshwater environments of Chile, the importance of food availability as a key factor for otters was also addressed (Sepulveda et al., 2009).

In Argentina, a large proportion of huillin's habitat is under protection within the National Park system. Although in some localised sectors of lake coasts, riverbank vegetation has been seriously degraded, most National Parks present good habitat quality for otters. On the other hand, there are historical records prior to 1950 (Fig. 1) that suggest that southern can live in steppe rivers that are poorly vegetated at least at a landscape level. In summary, although it can be important threat to huillines in Argentina at a local level (Gomez & Cassini, 2010), habitat degradation

leading to less complex waterside habitat does not appear to be a main threat to these otters at a national scale.

Similar to the recent study conducted by Sepulveda et al. (2009) in Chile, Cassini et al. (2009) showed that huillin distribution at different ecological scales followed prey distribution. Therefore, it is expected that impacts on macro-crustaceans will threaten otter survival. For example, the importance of crustaceans in the diet of several species of introduced trout is widely documented (Ciancio et al., 2007). Trout have been repeatedly reintroduced for sport fishing in several lakes, so their densities are artificially maintained (Ciancio et al., 2007). Monitoring of these exotic species (and other impacts on the food base) may inform plans to support the recovery of the otter population, insofar as it underpins policy for their control and thus the alleviation of possible competition for food. The impacts of these species on crustacean, and hence on the Patagonian riparian ecosystem of which the huillin is a part, merit further study.

We have established a baseline survey that can be repeated in the future to monitor any changes in the distribution of the species. Such surveys are not designed to find all the otters but to show trends in the number of sites occupied and extent of range. A refinement of the survey technique would be to count and map otter field signs to show the relative density of signs as an index of population—the more sites occupied the greater the density of field signs, inferring a larger population present (Mason & Macdonald, 1987). This type of technique should be implemented in future surveys of otters in the Neotropics. Another approach on future studies should be to use microsatellite analyses of spraint samples to get information on population parameters such us male/female ratios, home range sizes and population abundance.

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References

Aued, M. B., C. Chéhebar, G. Porro, D. W. Macdonald & M. H. Cassini, 2003. Environmental correlates of distribution of Southern river otters (*Lontra provocax*) at different ecological scales. Oryx 37: 413–421.

Bonesi, L. & D. W. Macdonald, 2004. Evaluation of sign surveys as a way to estimate the relative abundance of American mink (*Mustela vison*). Journal of Zoology (London) 262: 65–72.

Cabrera, A. L., 1971. Fitogeografía de la República Argentina. Boletín de la Sociedad Argentina de Botánica 14: 1–42.

Carmanchahi, P., M. C. Funes, M. B. Bongiorno & O. B. Monsalvo, 2006. Actualización de la distribución del huillín en la provincia del Neuquén. In Cassini, M. H. & M. Sepúlveda (eds), *El Huillín Lontra provocax: Investigaciones sobre una nutria patagónica en peligro de extinción*, Serie Fauna Neotropical 1. Publicación de la Organización PROFAUNA, Buenos Aires: 105–111.

Cassini, M. H., L. Fasola, C. Chehébar & D. W. Macdonald, 2009. Scale-dependent analysis of an otter-crustacean system in Argentinean Patagonia. Naturwissenschaften 96: 593–599.

Centrón, D., B. Ramirez, L. Fasola, D. Macdonald, C. Chehébar, A. Schiavini & M. H. Cassini, 2008. Genetic diversity in Southern river otter (*Lontra provocax*) in Argentinean Patagonia. Journal of Heredity. doi: 10.1093/jhered/esm117.

Chebez, J. C., 1999. Los que se van, especies Argentinas en peligro. Albatros, Buenos Aires.

Chehébar, C., 1985. A survey of the Southern River Otter *Lutra provocax* Thomas in Nahuel Huapi National Park, Argentina. Biological Conservation 32: 299–307.

Chehébar, C. & G. Porro, 1998. Distribución y estatus del Huillín (*Lutra provocax*) en el Parque Nacional Nahuel Huapi, Argentina. Vida Silvestre Neotropical 7: 99–106.

Chehébar, C., A. Gallur, G. Giannico, M. Gottelli & P. Yorio, 1986. A survey of the southern river otter *Lutra provocax* in Lanín Puelo and Los Alerces National Parks, Argentina and evaluation of its conservation status. Biological Conservation 38: 293–304.

Ciancio, J. E., M. A. Pascual & D. A. Beauchamp, 2007. Energy density of Patagonian aquatic organisms and empirical predictions based on water content. Transactions of the American Fisheries Society 136: 1415–1422.

Gomez, J. J. & M. H. Cassini, 2010. Uso de pelos guardianes para la identificación de especies de carnívoros costeros en la Patagonia. Revista de Biología Marina y Oceanografía (Chile).

Hayward, M. W., 2009. The need to rationalize and prioritize threatening processes used to determine threat status in the IUCN red list. Conservation Biology 23: 1568–1576.

IUCN, 2001. IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.

IUCN, 2003. Guidelines for application of IUCN Red List criteria at regional levels: version 3.0. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.

Jenness, J., 2004. Convex hulls around points (conv_hulls_pts.avx) extension for Arc View 3.x, v.1.2 Jenness Enterprises. http://www.jennessent.com/arcview/, http://www.jennessent.com/arcview/convex_hulls.htm.

Macdonald, S. M., 1983. The status of the otter (*Lutra lutra*) in the British Isles. Mammal Review 13: 11–23.

Mason, C. F. & S. M. Macdonald, 1987. The use of spraints for surveying otter Lutra lutra populations: an evaluation. Biological Conservation 41: 167–177.

Medina-Vogel, G., V. R. Kaufman, R. Monsalve & V. Gomez, 2003. The influence of riparian vegetation, woody debris, stream morphology and human activity on the use of rivers by southern river otters in Lontra provocax in Chile. Oryx 37: 422–430.

Parera, A., A. Schiavini & E. Frere, 1997. Relevamiento ecológico de la Isla de los Estados: Observaciones sobre su estado de conservación y sugerencias de manejo. *Boletín Técnico No. 38 de la Fundación Vida Silvestre*, Buenos Aires.

Sepulveda, M., J. L. Bartheld, R. Monsalve, V. Gómez & G. Medina-Vogel, 2007. Habitat use and spatial behaviour of the endangered Southern river otter (*Lontra provocax*) in riparian habitats of Chile: conservation implications. Biological Conservation 140: 329–338.

Sepulveda, M., M. Franco, G. Medina, L. Fasola & R. Alvarez, 2008. Lontra provocax. In IUCN 2009. IUCN Red List of Threatened Species. Version 2009.2. www.iucnredlist.org. Accessed on 30 November 2009.

Sepulveda, M. A., J. L. Bartheld, C. Meynard, M. Benavides, C. Astorga, D. Parra & G. Medina-Vogel, 2009. Landscape features and crustacean prey as predictors of the Southern river otter distribution in Chile. Animal Conservation 12(6): 522–530.