

REPORT

CITIZEN SCIENCE IN EURASIAN OTTER (*Lutra lutra*) RESEARCH SIGHTING REPORTS AND FINDINGS OF DEAD OTTERS

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ABSTRACT: Since 2003 the Swedish Museum of Natural History (SMNH) has administered a web page where the general public can report sightings of otters and otter tracks. Between 2003 and 2014 the Museum received 1142 reports. The reports were divided into season and type of sighting: live animals, tracks and group size. Most reports of live animals were received during spring (35%) and only originated near human populations; the data therefore does not represent the whole country. Nevertheless, this type of citizen science provides a great source of information about the elusive otter and increases public awareness of otters, thus helping to support otter conservation.

In Sweden, otters found dead are sent to the SMNH for necropsy and sampling for the Museum's Environmental Specimen Bank. A total of 701 dead otters were sent to SMNH between 2003 and 2014. Most otters were killed in traffic (80%) and some were bycaught in fishing gear (8%). Traffic casualties were more common during autumn and winter, whereas bycatches in fishing gear were most common during summer.

Reports of live otters or otter sign, together with the information about the dead otters, suggest patterns of distribution and reproduction status of otters in Sweden. The reports give interesting additional information on the status and behavior of otters and are valuable complements to scientific otter surveys.

Keywords: *Lutra lutra*, public reports, survey, seasonality, group size, cause of death

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INTRODUCTION

The otter (*Lutra lutra*) in Sweden decreased dramatically in numbers and distribution range during and after the 1950s, due to a combination of intense hunting over a number of years and elevated concentrations of environmental contaminants (Olsson and Sandegren, 1991a, 1991b; Roos et al., 2001). It was protected against hunting in 1969 and still is. PCBs and DDT were banned in the country in the 1970s, and twenty years after the bans an increase in otter numbers as well as an improved

reproductive health among females was observed (Roos et al., 2012). For the last several decades, otters have been surveyed every 5-6 years in various parts of the country, most often by different county boards. The otter is an elusive species, and is often difficult to observe in the wild, which is why surveys are frequently based on otter sign (e.g., scats) and not actual sightings of live animals. The otter does not seem to be too afraid of humans and can be found also in cities in Sweden, *i.e.* close to humans, for example in medium sizes cities like Mora, Linköping, Strängnäs, Kristianstad, Norrtälje and occasionally also in the capital, Stockholm). While otters can be active during the day, they are possible more active at night. Currently, the species is found in most parts of Sweden: in arctic northern Sweden with 24 hours of daylight during summer and darkness during winter, as well as in the most southern parts of the country.

Some people have the privilege of observing otters from their home, others when taking the dog for a walk, or when hunting or birdwatching. Many people realize that they have seen something special and wish to report the sighting. The Swedish Museum of Natural History (SMNH) has been studying otters since 1970s and has received an increasing number of reports by telephone from people who have seen otters once their population began to increase. Therefore, a webpage has been set up by SMNH for documenting sightings by the general public of live otters and tracks of otters. The reports are published on a map on the museum's webpage (www.nrm.se/utter). The data gives information on where and when otters are seen.

The otter belongs to the State according to a game law from 1974 and, if found dead, should be sent to SMNH for necropsy and sampling. The police as well as the general public help by sending carcasses to SMNH. Information on where and when the carcasses were found is published on the webpage together with the reports of live animals, and is compiled in this study.

MATERIAL AND METHODS

Reports of otters are received via an online web page at SMNH's homepage, and occasionally via telephone and mail. The required information includes name and contact information of the observer, if the otter is live or dead, tracks of otter, date, location and if live sightings: from what distance, how many individuals, size of the otter(s) and a description of the circumstances and the otter(s) behavior. Some observers also included photos or films with the report (see Figures 2 - 9). Each sighting has been reviewed to exclude other animals, for example mink or beaver, and sometimes several emails back and forth are needed before a report is accepted.

Dead otters are sent, most often frozen, to SMNH via post, with the help of the police, and sometimes private persons, county board, etc. The reports of live animals and information on dead otters are divided into different seasons; winter: December-February, spring: March-May, summer: June-August and autumn: September-November. The information of dead otters are divided into three categories: killed by traffic, drown in fishing gear, found dead from other causes (for example trapped/shot, sick, or unknown).

RESULTS

The museum webpage for reporting sightings of live otters and tracks of otters began in 2003. In the first 2 years (2003-2004) only 15 sightings were reported. Since then, the number of reports has steadily increased, as information about the webpage has spread and as the numbers of otters has increased. Altogether 1142 sightings of live otters or tracks were reported between 2003 and 2014 and were divided into number of live individuals or signs, as well as by season (Figure 1). In addition to the

live sightings, this study also includes information from 701 dead otters that have been found in Sweden and sent to the SMNH between 2003 and 2014 (Figure 1).

Most reports of live otters were received in spring (n=323, 35%), and the lowest number in autumn (n=103, 11%, Table 1). Observations of tracks (Table 2) were highest in winter (n=139, 67%), and lowest in summer (n=3, 1.4%). In contrast, dead otters were mainly found in autumn (n=261, 37%) in decreasing numbers until summer (n=130, 19%, Table 3). The most common cause of death was traffic (n=558, 80%), but some otters were accidentally drowned in fishing gear (n=58, 8%). Most traffic-killed otters were found during autumn and winter, and least number during summer. Instead, in summer the largest number of bycaught otters were found (n=21, 36%). Two juvenile otters were accidentally killed in traps for mink, and one subadult otter was shot, all of them during winter.

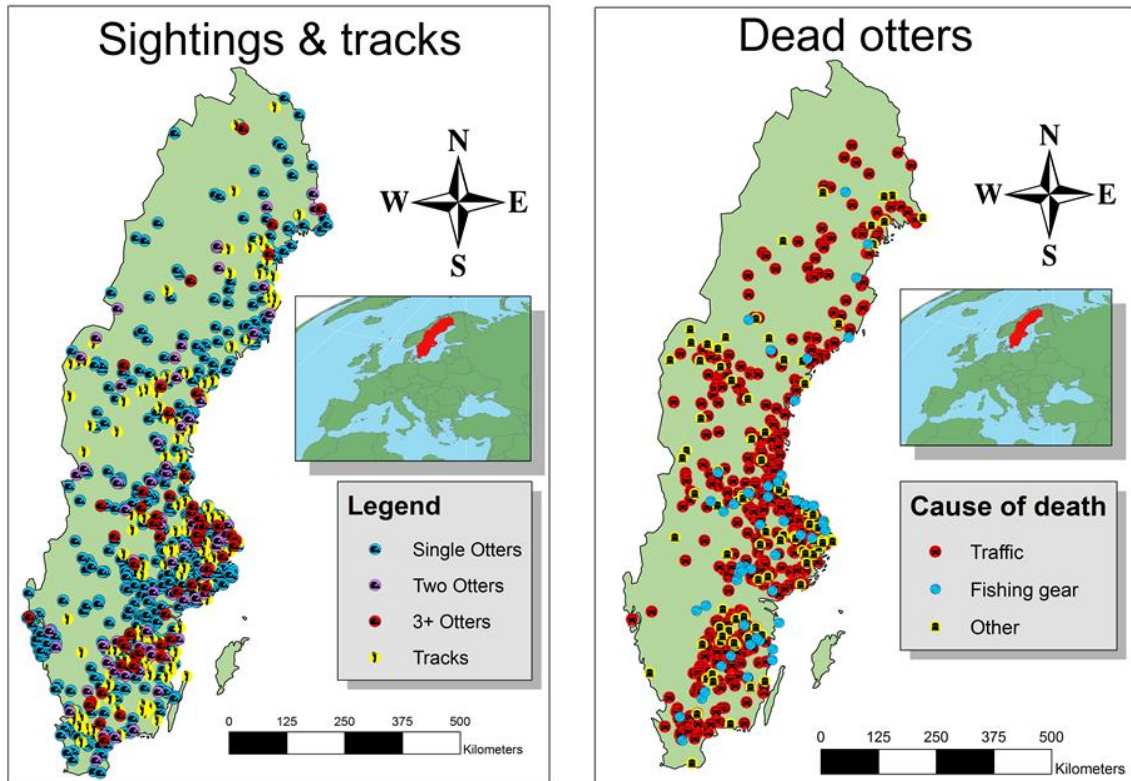


Figure 1. Map of Sweden, showing sightings of live (left) and dead otters (right).

Table 1. Numbers of reports of live otters, 1-5 individuals, during different seasons, altogether 934 reports.

Number live otters	Winter	Spring	Summer	Autumn
1 individual	193	288	214	82
2 individuals	44	26	13	8
3 individuals	30	8	5	12
4-5 individuals	7	1	2	1
Total amount	274	323	234	103

Table 2. Number of observed otter tracks (tracks and scats) divided into different seasons.

Season	Number of tracks
Winter	139
Spring	57
Summer	3
Autumn	9



Figure 2: Otter looking for food, in southern Sweden, in the Baltic, south of Kristianopol. January 16, 2017© Percy Christiansson



Figure 3: otter in Perstorp, Skåne (southern Sweden) February 26, 2018. © Lothar Franke



Figure 4: Abandoned otter cub in Höör, Skåne (Southern Sweden), February 10, 2018. A young male of 1.1 kg. He was rescued the day after by a local zoo (Skånes Djurpark). © Jesper Björk Rengbrandt



Figure 5: Otter in South-Eastern Sweden January 20, 2016© Ingrid Johansson-Hjortvid



Figure 6: Otter mother with two cubs in Lake Solgen, Southern Sweden, March 22, 2018. © Morgan Nilsson



Figure 7: Otter scats with a fishing hook, South-Eastern Sweden. © Ingrid Johansson-Hjortvid



Figure 8: Otter tracks in the snow. © Jasmine Zetterman



Figure 9: Otter tracks in the snow in Aneby, Southern Sweden, January 30, 2018 © Emil Brangefeldt

DISCUSSION

Citizen science stimulates engagement and interest for a species and can be a useful method in monitoring otters as a complement to standardized surveys. It has been used successfully in, for example, California (Black, 2009; Black et al., 2016), New Mexico (Savage and Klingel, 2015), Ireland (White et al., 2013) and Sweden (Kindberg et al., 2009). Depending on the species and the design of the study, it is possible to collect interesting data through citizen science at a low cost and effort. However, a number of problems must be overcome before the data is usable. For example, one problem is determining if a reported observation is the correct species, and another is the bias that comes with opportunistic data collected often in urban areas and scarcely in remote areas.

Table 3. Causes of death of 701 otters sent to the SMNH, 2003-2014.

Cause of death	Winter	Spring	Summer	Autumn	Total
Traffic	126	105	98	229	558
Fishing gear	10	14	21	13	58
Unknown or sick	22	30	11	19	82
Shot	3	0	0	0	3
Total	161	149	130	261	701

In the present study, most sightings of live otters were reported during spring and winter. The reason for this is probably attributed to the fact that otters are easier to see during this period due to snow cover; a dark body is easier to spot against a light background. In addition, the otter needs open water to forage and it is therefore easier to observe otters in a limited area when most lakes are covered with ice. The otter in Sweden seems to be more mobile during autumn, since the number of traffic killed

otters increase during that time compared to the other seasons. Grogan et al. (2013) point out that rush hour is an important reason for the seasonality of road-killed otters in the UK. In spring and autumn, rush hour traffic occurs around dawn or dusk, while in winter rush hour is after dark and in summer, it is in daylight. They argue that a dip of traffic casualties during winter could be the result of observers travelling in the dark. However, our data only partly support this hypothesis. We recorded a dip in traffic casualties during spring and summer. Most otters in the present study were killed in traffic during autumn and winter. A somewhat different pattern was found in a study on otters in Israel: 64% of otter roadkills occurred in winter and spring (Guter et al., 2005) compared with 41% in the present study. Nevertheless, traffic was by far the predominant cause of death among otters sent to SMNH, and in other studies as well (citations?). However, traffic is probably an overestimated cause of death, since otters that die from natural causes are not as likely to be found. The percentage of traffic-killed otters in this study (80%) is higher, for example, than in Denmark (45,5%, Madsen et al., 1999) and Germany (69,9%, Hauer et al., 2002) but efforts to collect otter carcasses vary between countries and data are not comparable.

A small peak of the numbers of otters found dead in fishing gear during the summer is observed, probably due to the fact that people fish more during summer. Otters were predominantly found as bycatch in fyke nets, but occasionally also in gillnets. One otter was shot, which is illegal in Sweden. Although this otter may have been mistaken for a mink, a few otters are illegally shot at in Sweden (Ågren et al., 2015).

A weak pattern in numbers of individuals killed can be seen during different seasons. Throughout the year most reports consist of single otters (83%). Reports of two individuals are highest during winter and spring, but groups of 3-4 individuals are most common during winter. Groups of 5 individuals have only been reported two times, once during the summer and once in autumn. Groups of two otters could consist of breeding pairs or a mother with her cub. A group of 3-5 individuals is probably a mother with cubs. Groups of 2-5 individuals were reported throughout the year. This is consistent with signs of year-round reproduction, such as placenta scars, lactation or pregnancies, observed from necropsies of otters at SMNH (Elmeros and Roos, 2011). In a study from England and Wales, otter pregnancies were also observed during most of the year and lactation during the whole year (Chadwick and Sherrard-Smith, 2010). Watt (1993) suggests that in areas where cubs have a longer dependence period, females have longer periods between mating (more than 12 months). If this is the case, it is important for the female to be able to reproduce during the whole year, as seen in Sweden, and not only during a short period.

It is difficult to see differences in mortality in patterns of gender and age among otters. This restricts speculation about the main period for mating and family constellations from this type of data. However, there is a pattern in the reports concerning numbers of individuals and season, which provides a good start to which raises new questions for further research. Data collected through citizen science, together with other observations such as signs of gestation from necropsies, can give a better picture about otter in Sweden.

It is important to keep in mind that these reports are correlated to the density of interested observers and does not accurately represent otter occurrence in the whole country. This makes it difficult to know if absence of data in certain areas is due to a lack of observations or because otters are not present. Therefore, standardized surveys are very important and cannot be replaced by opportunistic reports from the public. But when the public gets the opportunity to report their sightings and receive a

response, it is possible to create an engagement and interest in otters and simultaneously to collect valuable data.

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RÉSUMÉ

LA «SCIENCE CITOYENNE» DANS LA RECHERCHE SUR LA LOUTRE EURASIENNE (*Lutra lutra*), RAPPORTS D'OBSERVATIONS ET DÉCOUVERTE DE LOUTRES MORTES

Depuis 2003, le Musée d'Histoire Naturelle Suédois (MHNS) gère une page du site internet où le public peut signaler des observations et des traces de loutre. Entre 2003 et 2014, le musée a reçu 1142 rapports d'observations. Ces observations ont été répertoriées suivant la saison et le type d'observation : animaux vivants, traces et taille du groupe. La plupart des observations d'animaux vivants ont eu lieu au printemps (35%) et provenaient uniquement de sites proches de populations humaines; Ces données ne concernent donc pas l'ensemble du pays. Néanmoins, ce type de « science citoyenne » constitue une excellente source d'informations sur l'insaisissable loutre et sensibilise davantage le public aux loutres, contribuant ainsi à soutenir la protection de l'espèce.

En Suède, les loutres trouvées mortes sont envoyées au MHNS pour autopsie et échantillonnage destiné à la banque de données environnemental des spécimens du musée. Au total, 701 loutres mortes ont été envoyées au MHNS entre 2003 et 2014. La plupart des loutres ont été tuées dans des accidents de la route (80%) et certaines ont été capturées dans des engins de pêche (8%). Les accidents de la route étaient plus fréquents en automne et en hiver, alors que les captures dans les engins de pêche l'étaient davantage en été.

Les rapports d'observations de loutres vivantes ou d'indices de présence, ainsi que les informations sur les loutres mortes, suggèrent des schémas de répartition et un statut de reproduction des loutres en Suède. Ces rapports fournissent des informations complémentaires intéressantes sur le statut et le comportement des loutres et constituent des compléments appréciables aux suivis scientifiques des loutres.

RESUMEN

CIENCIA CIUDADANA EN LA INVESTIGACIÓN DE NUTRIAS (*Lutra lutra*) REPORTE DE AVISTAJES Y HALLAZGOS DE NUTRIAS MUERTAS

Desde 2003 el Museo Sueco de Historia Natural (SMNH) ha administrado una página web en la cual el público general puede reportar avistajes de nutrias y huellas de nutrias. Entre 2003 y 2014 el Museo recibió 1142 reportes. Los reportes fueron divididos entre estaciones, y tipo de avistaje: animales vivos, huellas y tamaño de grupo. La mayoría de los reportes de animales vivos fueron recibidos durante la primavera (35%) y se originaron solamente cerca de poblaciones humanas; los datos, por lo tanto, no representan a todo el país. Sin embargo, este tipo de ciencia ciudadana provee una gran fuente de información acerca de la elusiva nutria, e incrementa la sensibilidad pública hacia las nutrias, por lo tanto ayudando a apoyar su conservación.

En Suecia, las nutrias encontradas muertas son enviadas al SMNH para necropsia y toma de muestras para el Banco de Especímenes Ambientales del Museo. Entre 2003 y 2014 fueron enviadas un total de 701 nutrias muertas. La mayoría fue muerta por tráfico automotor (80%) y algunas fueron capturadas incidentalmente en artes de pesca (8%). Las muertes por tráfico automotor fueron más comunes durante el otoño e invierno, mientras que las capturas incidentales en artes de pesca fueron más comunes durante el verano.

Los reportes de nutrias vivas y de signos, junto con la información sobre nutrias muertas, sugieren patrones de distribución y status reproductivos de las nutrias en Suecia. Dan una interesante información adicional sobre el status y el comportamiento de las nutrias y son valiosos complementos de los relevamientos científicos.