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THE OTTER IN AUSTRIA: A REVIEW ON THE CURRENT STATE OF RESEARCH

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Abstract: As the status of the otter and the results of research work done in Austria have not been summarised within the last years, this article is an attempt to fill this gap. Status, habitat, captive animals, ecology and pollutant burden are reviewed. No national survey has been carried out, but the main otter distribution is along the northern and southeastern border. The northern population seems safe but the southern one is likely to be fragmented by developments such as planned hydropowerstations. There are some conflicts with fish farmers but compensation is paid. There is a breeding colony of otters in Alpenzoo Innsbruck and another group at the WWF station Grünau, which has not yet bred. Recent pollutant assay results are discussed, and heavy metal levels presented.

As the status of the otter and the results of research work done in Austria have not been summarized within the last years, this article is an attempt to fill this gap.

The main activities on otters are coordinated by the Institute for Wildlife Biology and Game Management at the University for Agriculture, Vienna and by the WWF Austria.

STATUS

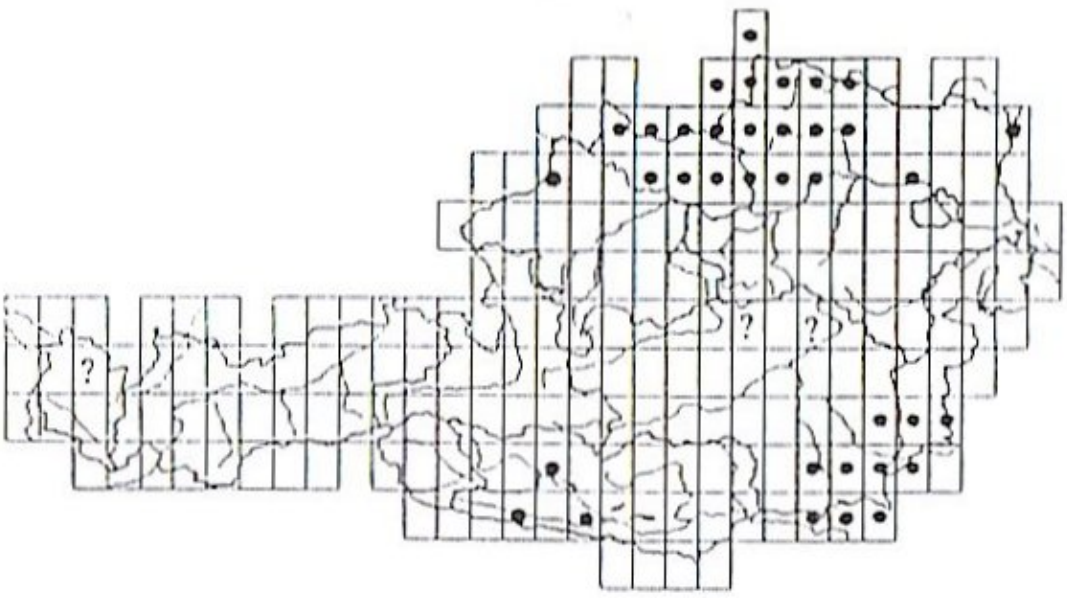

Figure 1. Distribution of *Lutra lutra* L. in Austria (modified according BMfGU (1988) with additions of: Gutleb, Hafner. Kranz, Kraus, Lutschinger, Pichler, Straker, Sieber, Wieser).

No national survey has been carried out for different reasons. The status of the otter varies greatly between various parts of Austria (see Fig. 1). The main area of its distribution is along the northern and southeastern border. Especially Waldviertel (Lower Austria) is keeping a good population. In Mühlviertel (Upper Austria), in the south of Burgenland and Styria populations seem to be in good

condition at the moment, but are restricted to only a few watercourses and are therefore possibly threatened by planned hydropowerstations and recreation activities. Siber (pers. comm.) found tracks in 1988 and 1991 at some places along the river Inn, bordering Germany. For Carinthia the results of a survey are in preparation and although there have been several reports on the existence of otters, only three positive sites were found (Wieser 1992). We know about observations of hunters and fishers, who told about having seen otters, so there might be a chance of finding otters in some other areas.

HABITAT PROTECTION

WWF spent about 250 000 U$ within the last six years for public relations and habitat protection.

In some parts of Waldviertel there are increasing otter populations which cause problems as otters sometimes kill a lot of adult fish in cultures, kept in small ponds (up to 10000 m^2) mainly during the winter. Together with the NÖ Landesjagdverband und NÖ Landesregierung, WWF is paying compensation in these cases. Nevertheless these occurrences decrease public acceptance of the otter and there is some evidence for illegal trapping although it has not been possible to verify one case so far. Michaela Bodner (WWF) is studying the possibilities of protecting these small ponds.

WWF has also rented parts of river systems (60 km) in order to create protected areas where no fishing is allowed. There fish populations are stocked according to ecological points of view.

In more or less intact habitats, the need for the otter to mark on certain places seems to be so strong that environmental influences like bankcover, usage of land between five to fifty metres from the bank, or disturbance from streets have no influence on marking behaviour. This means that spraints are not appropriate parameters for differentiated statements on suitability of habitats for otters (Baas et al. 1984; Gormally et al. 1983; Green et al. 1985; Jenkins et al. 1980; Prauser 1985).

The seasonal scent marking behaviour of otters on a 31 km stretch of river was investigated by Andreas Kranz. Marking during the winter (without strong ice) was more frequently than in summer. At the beginning of November the number of fresh spraints started to increase and stayed at that frequency until February; corresponding to results of Macdonald et al. (1987) and other authors from western Europe. As the climate of Waldviertel has a much more continental character than Great Britain, this fact seems remarkable. During the weeks of strong freezing otters concentrate on few places free of ice. As a result the assessment of marking behaviour in that period is difficult.

Andreas Kranz did another study on the evaluation of otter habitats with respect to hydromorphological aspects on the river Kamp. This river in the southeast of the Bohemian Massive runs to river Danube with a river basin of about 1750 km^2. The length of the river Kamp together with its tributaries wider than 3 m is 224 km.

The course of the river was subdivided into 11 areas, based on hydrogeographic and morphologic aspects. All parts of a size large enough for at least one family (Green et al. 1984; Erlinge 1967; historical findings). These areas were investigated for their hydromorphologic parameters (natural, hard regulated, storage lake deeper than 20 m). Along the more natural upper course (97 km) 2800 spraints were found in 1990. The next 35 km consist of storage lakes with deep water bodies and precipitous banks, so only 10 spraints were found. On a river going to the storage lake (16 km) and on the following 22 km watercourse down the dam (both being natural and with a lot of fish) altogether only 6 spraints were found. Before 1986 the parts of the river down the dam were used by otters. Further down no otter spraints were found owing to human activities (villages, embankments and water pollution) in 1986 and in 1990.

The river Kamp is an example of the hazard of isolation of otter populations owing to large dams (fish are not easily available anymore). Twenty two kilometres of natural habitat in regard to fish population and cover, and without disturbance, is too small to keep an otter population with rare contact with other populations for a long period.

Barbara Rauer-Gross (Institute for Wildlife Biology and Game Management) carried out a study on the feeding ecology of otters in the Waldviertel on the river Kamp between Arbesbach and Rosenburg (Rauer-Gross 1989).

The following results are given in absolute percentage, i.e. the percentage of spraints containing remains of different animals. As there are often remains of more than one animal in the spraint, the summing up of percentages is more than 100 %. The size of the most important feeding fish trout (*Salmo trutta f. fario*) and grayling (T*hymallus thymallus*] was determined by using the scales of 30 animals of each kind as a standard. For the determination of trout size, the total radius of the scales was used, whereas for the grayling it was possible to use the number of annual rings.
Trout is one of the main fish for the otter in all areas. The importance of other fish varies. High values for bull head (*Cottus gobio*) in one area and for grayling in another area are worth noticing. Except one area amphibians are found in equal parts: Crayfish is important in one area.

CAPTIVE BREEDING AND REPRODUCTION

In Austria there are two places where otters are held in captivity. Three otters (1,2) are kept in the Alpenzoo Innsbruck and another four (2,2) are in the WWF station Grünau. The station consists of four enclosures altogether 15 000 m^2. Whereas breeding has been successful in the Alpenzoo several times, no cubs have been born in Grünau so far, although all animals showed reproductional abilities before coming to Grünau. The reasons are still unknown. The enclosures seem to be very good and the diet is the same as in the Alpenzoo Innsbruck. In addition to the breeding attempts various research activities are conducted.

Henriette Lehmann (Institute for Biochemistry, University of Veterinary Medicine, Vienna) is studying various hormones in the faeces of captive and wildliving otters in order to get data on the reproduction cycle and the sex of the animals leaving spraints in the field.

The otter has, like other mustelids, an induced ovulation, and pregnancy diagnosis on the animals themselves is therefore impossible. The Institute of Biochemistry has established methods for monitoring the oestrous cycle using faecal samples. Measurement of progesterone metabolites (progestagens) in faeces is a non invasive method of *corpus luteum* monitoring in various species.

Five faecal samples from male and thirty faecal samples from female otters were obtained from the Alpenzoo Innsbruck and the WWF Otter Station in Grünau.

Results showed low progestagen values in non pregnant and in male otters (x - 0,5 ± 0,2 µmol/kg). Higher concentrations (x = 10,1 ± 3,5µmol.kg) were found in one female otter; this animal must have ovulated and might have been pregnant. For testing and reassuring this method progestation values in faecal samples from minks, both male and female (pregnant) were measured and the results were x - 0,3 ±0,1 µmo\/kg in male minks (n = 171), compared with I 1.7 ± 3,6 µmol/kg in female minks (n = 40) after implantation.

Concerning wild otters, determination of the sex by faecal steroid analysis would be helpful.
The presence of an otter in a certain district is in most cases detected only by faeces, which the animal leaves on exposed places along the river banks to mark its area. An enzyme immunoassay for 17-oxo-androgens, which are excreted mainly in faeces, showed evidently different androgen concentrations in the samples from male otters compared with those of females.

The values were x = 34,6 ± 2,5µmol/kg in males and x = 0,1 ± 0,02 µmol/kg in females. The samples for this project were collected in spring (breeding season) The results offer the possibility to gain more information about the structure of otter populations.

These methods, giving good results so far, might be useful for getting more information and facts about the biology of otters, and maybe other endangered species.

ECOLOGY

Andreas Kranz (Institute for Wildlife Biology and Game Management) studied the value of spraints for field studies (1990). The area of investigation is situated in Waldviertel in the southeast of the Bohemian Massive, 600 to 800 m above sea level. The ecologically interact rivers belong to the trout and grayling-region (rhithral) and are up to 15m wide. Between January 1988 and February 1990 6300 spraints were counted.

Spraints are excellent means to prove the existence of otters living in a certain area, as long as longer parts of watercourses (up to some km) are investigated (Kruuk et al. 1986). By looking for spraints it was possible to show that otters are inhabiting even smallest watercourses including headwaters and marshes.

Average total length for trout was estimated to be 168,4mm. The average length of grayling was 250,4 mm.

In 70 spraints (3,66 %) mammalian hair was found; 21,42 % from mustelids. A more specific determination was impossible owing to the similarity of mustelid hair, but it must definitely be from otters as a result of fur cleaning. Feathers were found in 41 spraints and 46 % of them could be identified to be from *Anas* sp.

Two projects on otters in Upper Austria (Mühlviertel, north of the river Danube) were carried out by Johanna Sieber (Konrad Lorenz-lnstitut für Vergleichende Verhaltensforschung). The results of a study for the Upper Austrian Government (Siber 1991) showed good otter populations on the river systems of Mühl and Aist. Also tracks of young otters were found. The populations of the rivers Rotbach and Maltsch are connected with populations in the CSFR. In contrast to Kraus (1986) no evidence of otters on the river Rodl was found in 1991.

POLLUTANTS

A study on the contamination of otters with heavy metals, organochlorine pesticides and PCBs (polychlorinated biphenyl) was initiated by WWF Austria. Otters, which were killed by traffic, fish and spraints are collected for this purpose.

The analytical work is still in progress but Arno C. Gutleb (Institute for Medical Chemistiy, University of Veterinary Medicine, Vienna) found cadmium and lead levels in otters (1992), comparable with those, which are assumed to be of no concern to otters (Mason 1989). Levels of zinc and copper in otters are within the known physiological range for mustelids (Stejskall et al. 1989), but are higher than levels reported for otters from the Netherlands (Broekhuizen 1987).

The levels of heavy metals in the spraints which have been already analyzed are within the range known from literature (Mason et al. 1986; Mason 1989). except one high value of 32,8 ppm for lead and the high values of zinc.

Table 1: Cadmium, lead, zinc and copper (mg kg^{-1} dry weight) in otter and spraint samples; n.d. = not detected

	cadmium		**lead**		**zinc**		**copper**	
	liver	**kidney**	**liver**	**kidney**	**liver**	**kidney**	**liver**	**kidney**
Otter 1	n.d.	0.030	0.359	0.370	150.3	327.0	42.5	12.2
Otter 2	0.104	0.045	0.071	0.420	101.9	37.7	33.3	6.5
Otter 3	0.032	0.312	0.166	0.732	43.7	65.3	28.5	10.4
Spraint from	**cadmium**		**lead**		**zinc**		**copper**	
Limbach/Burgenland	0.100		0.230		556.7		12.6	
Thaya/Waldviertal	0.217		32.801		246.8		22.4	
Thaya/Waldviertal	0.713	0.552	798.0	23.6				

A more detailed version including literature and figures will be obtained on request.

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