OTTERS AND FISH-FARMING: PRELIMINARY EXPERIENCES OF A WWF PROJECT IN AUSTRIA

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ABSTRACT – Simultaneously with a rise of the otter (*Lutra lutra)* population in the Northern Waldviertel (Austria) the number of complaints from pond owners (carp breeding) about damage in their ponds is constantly increasing. In this study precautions (electric fences) for keeping otters away from fish ponds are tested. Different fencing systems arc used, data about the maintenance effort (cutting vegetation, recharging battery) and the general effectiveness of the systems arc sampled. Eight fences were installed in August 1992, so far (till November 1993) the otter was kept out of **all** eight ponds. Running the fences in winter is possible, although due to an increase in humidity the voltage in the fence decreases. In addition, it is tested if by offering an alternative food ("diversion ponds") the otter can be kept away from other close ponds. All damage reports of the past 9 years will be analysed to identify possible patterns (preferences for pond size, fish size, density of stocked fish; seasonal variations of damagc). Thus, high risk ponds could be identified and protected selectively.

Key words: *Lutra lutra,* Fish-farming, Damage, Austria.

RIASSUNTO – *La lontra e gli allevamenti ittici: primi dati del progetto WWF in Austria* – L'espansione della lontra (*Lutra lutra)* nella parte settentrionale di Waldviertel (Austria) ha coinciso con I'incremento dei danni procurati dalla specie agli allevamenti ittici (soprattutto di carpa) in bacini artificiali. In questo studio, sono discussi alcuni interventi (recinzione elettrificata dei bacini) per tenere lontana la lontra dagli allevamenti. Sono state valutate l'efficacia di differenti sistemi di recinzione e le condizioni più idonee per il loro regolarc funzionamento (taglio della vcgctazione che interferisce con la recinzione, ricarica delle batterie). Nell'agosto 1992 sono state installate 8 recinzioni, per mezzo delle quali la lontra finora (novembre 1993) è stata tenuta lontana dagli allevamenti. In inverno, il sistema di elettrificazione ha un funzionamento ridotto, in quanto il voltaggio diminuisce in seguito all'aumento dell'umidità. E' stata anche testata la possibilith di offrire alle lontre fonti altcrnativc di cibo in bacini attigui (diversion ponds) a quelli in cui viene praticato I'allevamento intensivo del pesce. Un'analisi dei danni riscontrati negli ultimi 9 anni è in corso e permetterà di acquisire informazioni utili (variazionc stagionale dell'entità dei danni, prcfcrcnza di taglia dci pesci predati, scelta da parte della lontra dei bacini di allevamento in relazione all'abbondanza del pesce stoccato) per assicurare adeguata protezione agli allevamenti più a rischio.

Parole chiave: *Lutra lutra,* Allevamenti ittici, Danni, Austria.

INTRODUCTION

The status of the European otter *(Lutra lutra* L.) varies greatly between various parts of Austria (see Gutleb, 1992): about 80% of the country can be considered "otter - free". In the south of Burgenland and in Styria there seem to be small populations, restricted to only a few watercourses. The main areas for otter

distribution in Austria are the Northern Waldviertel (Lower Austria) and the neighbouring Muhlviertel (Upper Austria).

In the Northern Waldviertel, the otter population seems to have prospered in recent years (Kraus, 1990a and b). No regular surveys have been carried out but there is indirect evidence for an increase in the population: more and regular findings of spraints, a rapid increase in road mortality and increasing complaints from fish - farmers about serious damage.

It is reasonable to assume that the existence of the fish-farming industry in the Northern Waldviertel has some influence on the presence and development of the otter population in this area. To assess this influence, to analyse any interaction between otters and the fish - farming industry and to make a peaceful co-existence between them possible is the aim of this project.

DEVELOPMENT OF THE FISH-FARMING INDUSTRY

The earliest records of fish-ponds in the Northern Waldviertel date back to the 13th century. A majority of the ponds were built in the 15th and 16th centuries (Fischer-Ankern, 1989). In the 18th century, the fish - farming industry in this area declined and many ponds were drained and remained dry (Vogel, 1988). After the Second World War the fish - farming industry prospered again.

In 1986, 1371 ponds with a total area of 1635 ha were in use for fish - farming (Vogel, 1988). The majority of these (71%) are smaller than 0,5 ha and together cover 8.4% of the total pond area in the Waldviertel (Vogel, 1988). The rapid increase in the number of small ponds is mainly due to their recreational value: between 1980 and 1985, 316 new ponds were built in the districts of Zwettl and Gmund with a total area of 59 ha (mean size 0.186 ha per pond).

OTTER DAMAGE ACCOUNT

The main fish species farmed in the Waldviertel is carp (*Cyprinus carpio* L.). Usually, other cyprinid species (roach *Rutilus rutilus* L., rudd *Scardinius erythrophtalmus* L., tench *Tinca tinca* L., gudgeon *Gobio gobio* L., Prussian carp *Carassius auratus gibelio* Bloch, Crucian carp *Carassius carassius* L.) are kept together with the carp. Farming salmonids (rainbow trout *Salmo gairdrzeri* Richardson) are very rare.

The first rumours about otter damage in fish - ponds arose after 1980. The problem seemed to be confined to the winter season mostly, and this was considered to be due to the biology of the carps: they hibernate by standing in the mud without moving or eating for some months. Most of the ponds are very shallow (water depth less than one meter) and though they usually freeze in winter, the spot where the water flows into the pond normally remains open. If the carps are disturbed during hibernation (e.g. by an otter diving for prey) not only the eaten fish are a loss for the fish-farmer but also secondary damage may occur: loss of weight and general condition, higher susceptibility to diseases and, under bad conditions, the death of the whole fish population.

In 1984, the first otter damage case was officially reported. Considering the general status of *L. lutra* as an endangered species it seemed preferable to compensate the fish - farmer for his financial loss rather than risk serious attempts at

illegal killing. Thus, a system of compensation payments for fish-farmers has been established.

Fig. 1 shows the development of the damage reports: from the first case in 1984 the number of complaints increased rapidly up to 63 cases in 1992 with a total of 1,200000 AS (120000 US Dollars) being claimed last year. These settlements are paid in equal parts by 4 organisations (Department for Nature Conservation of the Government in Lower Austria, Hunting Authorities in Lower Austria, Organisation for the Conservation of Nature and the WWF Austria). The compensations are voluntary. The Lower Austrian Game-Act, which the otter is part of, offers no directions for such settlements.

The sum that is claimed by the fish - farmer is only paid out under certain

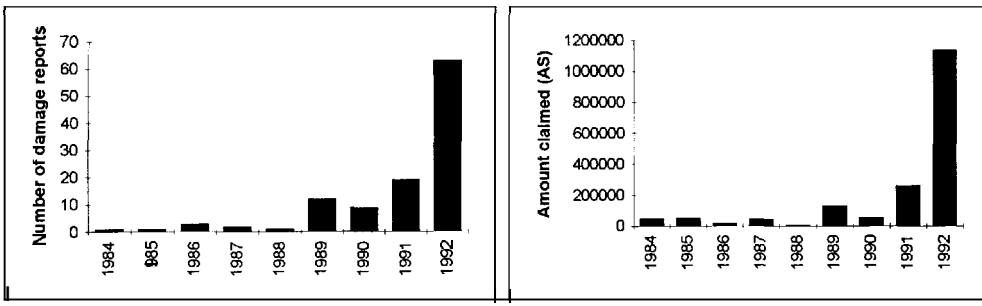

Fig. 1 – Development of damage patterns from 1984 to 1992 (**AS** = Austrian Shilling).

conditions: the fish ponds have to be controlled regularly for evidence of otters, any signs (spraints, tracks, partly eaten fish) must be documented (photos) and reported to the Ecological Station Waldviertel, whose members then do a check again in order to verify the otter's presence. The fish - farmer further has to put forward some proof about the stock in his ponds (e.g. bills for bought fish), the quality of the water has to be analysed at regular intervals and the pond has to be drained at least once a year (otherwise an overview about the actual numbers of fish is impossible). Also, other predators (herons, cormorant) have to be excluded. **If** not all of these conditions are fulfilled, only **a** small percentage of the damage is paid for.

Whereas this Otter Damage Account is a sensible "first - aid" means for a short period of time, it cannot be the only long - term strategy for otter conservation in this area: firstly, there is a limit to the amount of money that can be raised for compensations, secondly, from the conservationist point of view it is purely reactive and thirdly, from the educational side it teaches the fish - farmer to think about where he can turn to for money instead of how he can legally protect his pond.

PREVENTIVE MEASURES AND STRATEGIES

One of the aims of this project is to find and test measures that avoid otter damage, starting out from the following considerations:

1. It is easier to keep an otter away from a newly constructed pond than to drive it out of an old one which it knows well as a good source of food.
2. The success of each preventive measure decisively depends on the existence and availability of further sources of food. Accordingly, the individual's motivation to overcome any obstacle will be high or low.

3. The combination of the fence and a negative experience (electric impulse) should lead to the development of a conditioned reflex. As a result, the otter should in future avoid such electric fences.
4. If the preventive measures tested in this project are successful, offering other sources of food to the otter ("diversion ponds") should be discussed,

As a means to prevent otters from entering fish ponds, electric fences are tested in a two years' project in the field. An emphasis is put on the use of the fences during the winter for two reasons: firstly, the risk of damage seems higher then, and secondly the use of electric fences for technical reasons is much more difficult in winter.

Sixteen fish-farmers offered their co-operation within the project, 8 of which were chosen for the first part of this study (since August 1992). In all of the chosen ponds, otter damage had been reported and also confirmed at least one year previously. Furthermore, ponds of different sizes and with different types of vegetation on the banks were chosen in order to get a wider variety of experiences.

Based on the experiences of the Vincent Wildlife Trust (R. Green, pers. comm.), the FLEXINET ELECTRIC SUPER RABBIT NETTING (Bramley and Wellesley) and GALLAGHER Power Units (B150, B250, B600, MB200 and M400), charged by car batteries, are used.

All fences were surveyed regularly (at least twice a week) by the fish - farmers and at monthly intervals the current voltage values were controlled (Tab. 1). In addition, a specially developed measuring instrument and a computer program enabled a constant survey of the voltage value in the fence. In an experiment in the WWF-Otterstation in Grünau it was found that a 1000V impulse is sufficient to make an otter go away ("biologically relevant threshold value"). Thus it should be possible to evaluate the usefulness of the electric fence against otter invasion.

Tab. 1 – Range of voltage values from August 1992 to November 1993.

FENCE	PERIMETER (M)	POWER UNIT	VOLTAGE MIN-MAX (V)	MEAN VALUE (V)	No. OF MEASUREMENTS
1 KD	250	B 150	500 - 5500	1600	12
2 AF	225	MB 200 (Netz)	500 - 4300	2248	21
3 AAd	150	B 150	1700 - 5300	3150	10
4 FL	550	B 250, B 600	300 - 4600	2257	21
5 JB	350	B 250	600 - 4600	1700	10
7 AAl	75	B 150	1900 - 7300	5300	6
8 WZ	150	B 150	1300-6100	3242	3
10 JS	150	M 400 (Netz)	1500 - 3600	2575	4
11 MZ	250	M 400 (Netz)	4700 - 6400	5550	2
12 AF	400	B 600	4700 - 5700	5200	2

The basic voltage value of the unit (the value which was measured immediately after erecting the fence with the vegetation cut low and a new battery fully charged) is dependant on the earth connection: the better it is, the higher the basic voltage value.

A first analysis of the data taken by the permanent measuring instrument indicates two types of variations:

a. ***general variations:*** are weather - influenced, worst of all is an increase in the humidity of the air. The lowest voltage values are measured while it is drizzling or in a very moist fog. Snow and low temperatures seem of minor importance. The increasing discharge of the battery also results in decreasing voltage values in the fence.

b. ***focal variations:*** e.g. due to very strong vegetation at one particular stretch of fence or as a result of one stage being flooded. In one case a 100 m long section of the fence (total length 550 m) was flooded, the water was standing 10 cm high. As a result, the voltage dropped by one third compared to the other stages of the fence.

In addition, the voltage values show diurnal variations: with an increase in solar radiation the voltage values rise.

Since the start of the testing period in August 1992 no evidence at all was found that an otter entered one of the fenced - in ponds. In winter, at 4 ponds otter tracks were found in the snow which showed that the otter had approached the fence (partly as far as 0.5 m, partly as far as touching distance) and had then turned around and moved away.

DIVERSION PONDS

In November 1992 a pond was offered as a diversion pond for the WWF project. It (area about 300 m²) lies between two large ponds (Sageteich 8 ha, Wolfsgrube 1,2 ha) and immediately next to another very small pond (about 180 m²). The bypass of the Sageteich flows as a very small river alongside this diversion pond. For years evidence of otter presence had been found at these, the loss of fish staying at a constantly low level. At the annual pond draining scheme in Autumn 1992, only 1240 kg carp instead of expected 5000 kg (long term mean value from past years) were caught in the Sageteich. For the missing amount of fish the otter was blamed. The Sageteich was restocked with 4100 kg of carp (Tab. 2).

Tab. 2 – Fish stocking scheme of diversion pond and neighbouring ponds 1991/92 and 1992/93 (S: stocked fish; C: amount of fish caught when draining the pond).

YEAR	SÄGETEICH	WOLFSGRUBE	DIVERSION PONDS
	Fish species: carp	Fish species: carp	Fish species: Crucian carps
Autumn 1991	S: 3400 kg mixed size		
Autumn 1992	C: 1240 kg (expected 5000 kg)		S: Nov. 4th: 400 kg C: Dec. 19th: 30 kg (estimate)
	S: 4100 kg	S: 2192 kg (Intermediate storage from Oct. 1993)	S: Jan. 12th: 300 kg S: May 6th: 400 kg
Autumn 1993	C: 4500 kg (expected 6600 kg)	C: 1880 kg (expected 2417 kg, natural loss already deduced)	

Between these two ponds, the diversion pond was stocked with 1200 kg of Crucian carp (in three charges). The diversion pond was controlled daily, fresh

traces of otters could always be found. Twice during the winter in one night a number of fish were thrown out on the ice and only partly or not at all eaten. The diversion pond was drained in June 1993 and found completely empty. The pond draining scheme in autumn 1993 showed a total loss of 2637 kg of fish for Sageteich and Wolfsgrube. Altogether, 3837 kg of fish had been lost, which compares well to the 3760 kg from the Sageteich the year before. The financial loss for the fish - farmer was less in 1993 as the commercial value of the carp is much higher than that of the Crucian carp.

This suggests that by letting otters use fish species that are of less commercial value to the fish - farmer they possibly can be diverted from the much more "valuable" carp. This at least could help to reduce the financial dimension of the conflict between otters and fish - farmers in the Northern Waldviertel.

DEVELOPMENT OF THE RESEARCH

The experiences and results so far suggest that the otter can be kept out of a fish pond by an electric fence. However, the success of this measure highly depends on the care of the individual fish-farmer. An individual otter having once had a negative experience at one such electric fence will most likely avoid this fence at least at the same pond if not in general. The most important precondition for this conditioned reflex is that any contact with the fence must always lead to a negative experience. The biggest source of error is not recharging the battery in time, or, in other words, a lack of care by the individual fish-farmer.

The success of the diversion pond cannot be fully evaluated yet. The current experiments and studies shall be continued and, in addition to that, a combination of electric fences and diversion ponds will be studied. If by analysing the damage reports from the past 9 years any preferences (size of pond, size of fish, density of stocked fish) by the otters could be shown, it could be possible to identify high risk ponds that fulfil this criteria. These ponds could then be protected selectively by an electric fence or any other measure that proved successful in the testing period. From the conservationist point of view this would mean actively giving advice to the fish - farmer and preventing the damage instead of just standing by and watching the damage occur.

In this case, the fish farmer, by actively helping choose the best preventive strategy and applying it at his pond would actually be part of the conservation strategy instead of the otter's "enemy".

This, finally, could mean a peaceful coexistence between otters and fish - farmers.

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