FISH BIOMASS AND OTTER REPRODUCTION IN A MOUNTAIN RIVER OF THE SOUTHEAST SPAIN

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ABSTRACT

We report about fish biomass availability in a sector of a charasterictic river of the Eastern Betic Mountains (Cazorla and Segura), the Castril river, which allows presence and reproduction of the otter *(Lutra lutra*). By means of electric fishing, a biomass of 13,83 gr/m^2 was found, represented only by brown trouts *(Salmo trutta),* and so, the study area can be considered as an oligotriphic area. The local diet of the otter was based on the brown trout. We point out some implications on conservation of the relict population of otters in this mountain area.

Key Words: Conservation, fish biomass, *Lutra lutra*, reproduction, *Salmo trutta*, Southeast Spain.

RESUMEN

Biomasa de peces y reproducción de la nutria (Lutra lutra) *en un río del Sureste de España*

Se aporta información sobre la disponibilidad de biomasa piscícola en un sector de un típico río de las sierras béticas Orientales (Cazorla y Segura), el Castril, la cual permite la presencia y reproducción de la nutria (*Lutra lutra*). Por medio de pesca eléctrica, se encontró una biomasa piscícola de 13,58 gr/m^2, representada únicamente por la trucha común *(Salmo trutta),* por lo que el río Castril puede considerarse como oligotrófico. La dieta local de la nutria se basó en la trucha común. Se apuntan algunas implicaciones en la conservación de la población relíctica de nutrias de esta área montañosa.

Palabras Clave: Conservacion, biomasa piscícola, *Lutra lutra*, reproducción, *Salmo trutta*, Sureste de España.

INTRODUCTION

The otter *(Lutra lutra)* is considered as a «vulnerable» species in Spain (Blanco & González 1990), where it is well distributed occupying about 2/3 of the Spanish area (Delibes 1990). There are some isolated and relict populations in the heads of the tributary rivers of the Mediterranean Sea, in mountain areas within the ecological limit of the Iberian arid south-east (sierras de Segura y Alcaraz). The knowledge of the trophic needs and the available resources dependence in so limit environments are very important in order to design the local conservation bases of the otter (Kruuk 1995). This work supplies information about the biomass of fish in a river of the Eastern Betic Mountains,

the Castril river, where otter reproduction had been confirmed. This information is very important in the population dynamic of a predator so specialized on fishes as the otter (Mason & Mac Donald 1986), but it is very scarce in the Iberian Peninsula (Ruíz-Olmo 1995). Information about otter diet in Castril river is supplied too.

Study area

The Castril river (UTM) is a tributary of the Guadalquivir system, and it has 40 km of extend, with an altitude range of 650-1600 m. The otters are present in all the river, and it is a non isolated population because it continues as far as the Guadalquivir river (Gil-Sánchez 1993). The study area was the section delimited by the headwaters and the Castril village, with a total length of 17 km belong to a protected area (Parque Natural Sierra de Castril). It is a karstic area with *Pinus nigra*, *P. halepensis* and *Quercus ilex* forests. More information about climatic and vegetation may be consulted in Rivas-Martinez (1987). The volume of water during the study was 2,6 m^3/seg in April and 1,6 m^3/seg in June, and the waters are very clean, with a mean BMWP' index of 123 (Picazo 1995).

Methods

Reproduction of otter was confirmed through 17 surveys, looking for cubs tracks and reproduction dens (Green & Green 1980; Mason & McDonald 1986; Ruíz Martínez et al. 1989). The field work was carried out between May and April 1992. All the found scats were collected to determine the local otter diet by conventional analysis (see Wise et al. 1981).

Fish availability was studied through electric fishing (García de Jalón et al. 1993; Lobón-Cerviá 1991). A representative section (6,85x66,5 m) of the river was selected, and the DeLury's method was followed, with five fishing sessions of 20 minutes each one. All the captured fishes were measured and weighed, and they were released. The sampling was carried out in September, at the end of the legal fishing period. So, data represented the annual minimum population.

Results and discussion

Reproduction of otters could be confirmed by one reproduction den and by cubs tracks in seven surveys. According to Ruiz-Olmo (in press) in areas of high altitude (as the case, 1550 m of mean), the number of cubs for each female decreased (among 1-2 cubs per female) because of the effect of food availability.

So, in the studied section 2-3 individuals (considering the mother) could be estimated. The diet was based on brown trout *(Salmo trutta)*, and no more fish species appeared in the scats (Table 1).

TABLE 1
Diet of the otter (May-June) in the Castril river, expressed as frequency of occurrence (%F) and percentage of total prey (%N)

Alimentación de la nutria (mayo-junio) en el río Castril, expresada como frecuencia de aparición (%F) y porcentaje del total de presas (%N)

	% F n=40 scats	% N n=84 preys
Salmo trutta	100	67,85
Rana perezi	10	4,76
Natrix maura	2,5	1,19
Malpolon monspessulanus	2,5	1,19
Psammodromus algirus	2	2,38
unidentified reptiles	2,5	1,19
unidentified birds	5	4,76
Arthropods	7,5	16,16

During the fish sampling, only brown trouts were captured, 81 individuals with a total weight of 6263 g. The estimated total biomass was 6697 g or 13,83 g/ m^2 (r = -0,99, $p<0,001$), when the lowest seasonal trophic availability was present (see methods).

The high dependence on brown trout is a consequence of the low taxonomic availability in the headwaters of the Castril river, a normal situation in the headwaters of the Mediterranean rivers, like the central mountains of Spain (System Central) or here in the Subbetic mountains. On the other hand, the absence of the freshwater crayfish *(Austropotamobius pallipes)* may be an important limitation because crayfishes are an important local resource for otters. They are the main prey item in the next Guardal river during Summer (Gil-Sánchez & Alba Tercedor 1997). However, brown trout availability of the Castril river is sufficient to supplied the freshwater crayfish absence. Although the trouts are no present in the Castril river out the study section (because the increment of water temperature and Castril village pollution), otters are certainly present because of the abundance of ciprinids *(Barbus sclateri*, *Chondostroma polylepis* and *Leuciscus pyrenaicus)* and the red swamp crayfish *(Procambarus clarkii)*.

In other areas, the minimum requirements that allow otter be sedentary have been estimated in 10 g/m^2 of fishes (Kruuk et al. 1993; Ruiz-Olmo1995; in press). For reproduction occur, otters need a higher fish availability (Kruuk 1995). According to this last data, the Castril river may be considered as oligotrophic river, although the found trout abundance (a minimum seasonal value) allows otter reproduction.

Data of the present work are parcial, and this study must be continued in order to know as well as to be possible the local relationships. However, results can be eventually used for fishing management in this Mediterranean area, where otters are frequently present in rivers and streams (Guadalquivir, Guardal, Guadalentín, Borosa, Segura..., see Delibes, 1990), and trouts are the alone important resource (Ruiz-Olmo in press; Ruiz-Olmo & Palazón in press). In this all rivers human fishing pressure is generally very strong. The obtained biomass value may be used as a limit value at the end of fishing legal period, and fishing should be even forbidden in those section rivers where it would be necessary.

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