

## Reptiles in the diet of a *Oncorhynchus mykiss* (Osteichthyes: Salmonidae) naturalized population in Piedmont (N Italy)

FRANCO BERNINI <sup>1</sup>, ALESSANDRO CANDIOTTO <sup>1</sup>, PIETRO ANGELO NARDI <sup>1</sup>, SIMONE ROSSI <sup>1</sup>, AND EDOARDO RAZZETTI <sup>2</sup>

<sup>1</sup> *Dipartimento di Biologia Animale, Università degli Studi di Pavia, Piazza Botta 9, I-27100 Pavia* – email: franco.bernini@unipv.it –

<sup>2</sup> *Sistema Museale d'Ateneo, Sezione Museo di Storia Naturale, Università degli Studi di Pavia, Piazza Botta 9, I-27100 Pavia* – E-mail: razzetti@unipv.it

**Abstract.** The authors report on predation by salmonid fish on some reptile species in two tributaries of the Tanaro river in the Alessandria province (NW Italy). The remains of *Podarcis muralis*, *Anguis fragilis* and of an undetermined colubrid of the genus *Natrix* were found in bromatological analyses performed on 117 *Oncorhynchus mykiss* specimens. Salmonid predation on herpetofauna once again confirms the alimentary opportunism of these fishes; however, predation is an occasional phenomenon and not a threat to the local reptile populations.

**Keywords.** Predation by fish, Salmonidae, *Oncorhynchus mykiss*, *Anguis fragilis*, *Podarcis muralis*.

---

While predation by salmonids and other fish on amphibian populations is already well documented (Hecnar & M'Closkey, 1997; Picariello et al., 1996), information about predation by fish on reptiles is scarce (cf. Eder et al., 1988). It therefore seems useful to report observations concerning this phenomenon obtained during a research about on the feeding of *Oncorhynchus mykiss* (Walbaum, 1792) in the Northern Apennines.

The study was carried out in two tributaries of the Tanaro river, the torrents Lemme and Gorzente, which are entirely confined to the territory of Alessandria province.

These water bodies have a relatively small section (width 4-5 m) within the study area, which is located in the mountainous-hilly reach of the tributaries (300-600 m a.s.l.). The plenty of emerging rocks provides a tight link between the aquatic environment and the surrounding landscape.

Fish communities in the study area feature four species of cyprinids, one gobiid, and consistent salmonid populations following human introductions. In addition to brown trout (*Salmo trutta*) probably of Atlantic origin, there are two of the very few populations of rainbow trout (*Oncorhynchus mykiss*) naturalized in Europe.

Bromatological analyses were performed on *O. mykiss* specimens caught by electrofishing in the Rio del Molino, an affluent of the Gorzente stream and in the Lemme

stream located at Molini near Fraconalto (Alessandria province). The samples were collected from the beginning of February to the end of June 2001 and 2002. Seven fish species were found (see Table 1). We also observed the herpetofauna present along the banks of the collecting place.

Andreone & Sindaco (1999) report six species of amphibians and twelve species of reptiles for the UTM square in which the study area is located (Table 2). We observed the following species during fish sampling: *Bufo bufo*, *Rana temporaria*, *Anguis fragilis*, *Lacerta bilineata*, *Podarcis muralis*, *Natrix natrix* and *N. tessellata*. *R. temporaria* had not previously been reported in this area; while the *N. tessellata* observation corroborates a historical record cited in Andreone & Sindacos' atlas (1999).

A hundred and seventeen specimens of rainbow trout (75 from the Lemme torrent and 42 from Rio del Molino, total length 87-390 mm) were studied. Analysis of stomach contents revealed predation of aquatic macroinvertebrates between February and April; whereas in late spring (May and June) diet was mainly based on the organisms living on

**Table 1.** Fish species found in the Lemme stream and in the Rio del Molino and relative abundance estimates (x=present; xx=abundant, xxx=dominant).

species	Lemme	Rio del Molino
<i>Salmo trutta</i>	xxx	xx
<i>Oncorhynchus mykiss</i>	xxx	xxx
<i>Barbus caninus</i>	x	
<i>Barbus plebejus</i>	xx	
<i>Leuciscus cephalus</i>	xx	
<i>Telestes muticellus</i>	xx	xx
<i>Padogobius bonelli</i>	x	

**Table 2.** Herpetofauna reported by Andreone & Sindaco (1999) for the UTM square in which the research area is located.

Amphibians	Reptiles
<i>Salamandra salamandra</i>	<i>Anguis fragilis</i>
<i>Triturus alpestris</i>	<i>Lacerta bilineata</i>
<i>Triturus carnifex</i>	<i>Podarcis muralis</i>
<i>Speleomantes strinatii</i>	<i>Chalcides chalcides</i>
<i>Bufo bufo</i>	<i>Coronella austriaca</i>
<i>Rana dalmatina</i>	<i>Coronella girondica</i>
	<i>Zamenis longissimus</i>
	<i>Hierophis viridiflavus</i>
	<i>Natrix maura</i>
	<i>Natrix natrix</i>
	<i>Natrix tessellata</i> (historical)
	<i>Vipera aspis atra</i>

**Table 3.** Data on predation by *Oncorhynchus mykiss* on herpetofauna (SVL =snout-vent length; TL = total length; W = weight).

prey	SVL of prey (mm)	date	watercourse	TL of predator (mm)	W of predator (g)
<i>Podarcis muralis</i>	38	25/05/01	Lemme	250	177
<i>Podarcis muralis</i>	-	02/06/01	Rio del Molino	179	56
<i>Anguis fragilis</i>	-	02/06/01	Rio del Molino	189	70
<i>Natrix</i> sp.	-	27/06/01	Lemme	244	175

the stream banks and surrounding environments. In addition to the terrestrial and riparian invertebrates which make up most of the diet, some reptiles were noticed: remains of *Podarcis muralis*, *Anguis fragilis* and of an undetermined colubrid of the genus *Natrix* were found in the digestive apparatus of four rainbow trout (see Table 3).

This finding confirms the already well-known fact (Pentelow, 1932; Delmastro, 1981) that the diet of salmonids is opportunistic. The presence of reptiles in the diet of *O. mykiss* was only observed in the summer months, in correspondence with the activity period of these animals. The capture of reptiles by salmonids is an occasional phenomenon, not to be considered a threat to the populations living along the watercourse, unlike their predation on crayfish and amphibians, also noticed during our study.

#### REFERENCES

- Andreone, F., Sindaco, R. (1999): Erpetologia del Piemonte e della Valle d'Aosta. Atlante degli Anfibi e dei Rettili. Monografia XXVI. Torino. Museo Regionale di Scienze Naturali.
- Delmastro, G.B. (1981): Contributo allo studio dell'alimentazione di *Salmo gairdneri* Rich. (Osteichthyes, Salmonidae). Riv. Piem. Stor. Nat. **2**: 71-78.
- Eder, J., Eder, H., Schumacher, A., Schumacher, D. (1988): Die Ringelnatter, *Natrix natrix* (Linnaeus, 1758) als Beute der Regenbogenforelle, *Salmo gairdneri* Richardson, 1836, und der Seeforelle, *Salmo trutta lacustris* Linnaeus, 1758. Herpetozoa **1**(1/2): 69-71.
- Hecnar, S.J., M'Closkey, R.T. (1997): The effects of predatory fish on amphibians species richness and distribution. Biol. Cons. **79**: 123-131.
- Pentelow, F.T.K. (1932): The food of the brown trout (*Salmo trutta* L.). J. An. Ecol. **1**(2): 101-107.
- Picariello, O., Scillitani, G., Viglietti, S. (1996): Prime osservazioni sulla predazione di *Rana italica* Dubois, 1987 da parte di *Salmo trutta* L., 1758 nell'Appennino campano. Studi Trent. Sci. Nat. – Acta Biol. **71**(1994): 197-200.