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Distribution and status of *Rana latastei* in Italy (Amphibia, Ranidae)

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INTRODUCTION

Rana latastei Boulenger, 1879 is a monotypic endemic species of the Padano-Venetian plain, the Po plain hills, the Canton Ticino (Grossenbacher, 1982, 1988, 1997) and Istria (Ceï, 1944; Schmidler, 1977; Burlin & Dolce, 1986). In Italy, it is present in Piedmont, Lombardy, Venetia, Friuli-Venezia Giulia, Emilia-Romagna, with records referring to 118 UTM squares (S.H.I., 1996). Variations between the Po plain and Istrian populations were investigated using biochemical methods by Capula (1991) and by Capula *et al.* (1991). Recently, Pearman *et al.* (2002, Pearman P. B., Garner T. J. W., Hettyey A., Angelone S. - Genetic depletion, reproductive failure, and habitat-specific competitive effects in the endangered anuran, *Rana latastei*. *Abstract* in IV Congr. Naz. Soc. Herpetol. Ital., Ercolano, p. 42) described the genetic variability of some populations in relation to their position in the distribution range.

The aim of our study, which is part of the project "Monitoraggio dello stato di conservazione di anfibi della fauna italiana particolarmente a rischio" supported by grants of the Ministero dell'Ambiente, is to delineate *R. latastei* distribution and status in Italy. However, due to the resources at our disposal, data from some sampling areas chosen according to the availability of bibliographic records were analysed. By comparing the bibliographic information with the original field data, we wish to furnish a first evaluation of the possible risk of rarefaction of this species throughout the national territory, and to increase knowledge of its ecology.

MATERIALS AND METHODS

Observations were performed in an area corresponding to a large part of the distribution range in Italy. In particular, we considered the following regions: Piedmont, Lombardy, Venetia and Friuli-Venezia Giulia.

Data regarding the sites of presence partly derive from field surveys and observations made during the winter and spring months of the year 2000, and partly from direct observations, or with the help of collaborators, within research projects during the last decade. A minor part of data is derived from literature; we lack recent confirmation for some of these stations.

Bibliographic sources were studied to find papers published in scientific journals, congress proceedings or monographs. General information published in regional and provincial herpetological atlases regarding the species' distribution range was also critically considered.

In some sample areas, monitoring investigations on populations already started more than 5 years ago were continued (Vercesi *et al.*, 2000; Bernini *et al.*, 2000). The study involved the annual count of egg-clumps in about 40 reproductive sites, and individual electronic tagging with passive transponders of a fraction of the adult population.

The following parameters were registered during field observations: habitat type, number of individuals observed, breeding and spawning activity, presence of tadpoles, syntopic amphibian species. All sites of presence of the species, either published or unpublished, have been indicated using UTM coordinates. Therefore, all collected data were filed and elaborated with the Microsoft Excel 2000® software as an integrant part of the project "Monitoraggio dello stato di conservazione di anfibi della fauna italiana particolarmente a rischio".

Conservation status of populations studied in different regions is defined according to the IUCN categories (IUCN, 1994).

ABSTRACT

Data regarding distribution, demographic parameters, ecological preferences and conservation status of *Rana latastei* in Italy are reported. By comparing bibliographic information and original field data, the authors wish to provide a first estimate concerning the possible risk of rarefaction of this species throughout the national territory. Observations were carried out in an area corresponding to a large portion of the distribution range in Italy; in particular, the following regions were considered: Piedmont, Lombardy, Venetia and Friuli-Venezia Giulia. The populations of *Rana latastei* seem to have undergone a constant decline in recent decades; the species is threatened mainly from the limited extension and fragmentation of suitable habitats and should probably be considered in the category "vulnerable".

KEY WORDS: Amphibia - Anura - *Rana latastei* - Distribution - Conservation status.

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¹ Francesco Barbieri prematurely died on 22th September, 2001

RESULTS AND DISCUSSION

Records of presence

Seventy-five sites of presence were detected (Table I); among these, 18 refer to the year 2000 and were visited during the survey, while 38 refer to observations carried out in the 90s and were largely reconfirmed; the remaining sites are known from literature.

Further information on the distribution was obtained from regional herpetological atlases. In Piedmont (Boano & Sindaco, 1999), *Rana latastei* is present in 14 UTM squares (4.3%) and appears to be very localised because the majority of sites here, fall within the Cuneo-Turin plain; other records refer to the Ivrea moraine amphitheatre, the Ticino valley in the Novara province and the Po river area in the Vercelli and Alessandria provinces. In Lombardy (Bernini *et al.*, 2004), it is present in 100 UTM squares (35.7%) and is relatively common along the main tributaries left of the Po River; large populations were observed in the Ticino valley (Vercesi *et al.*, 2000), in the Varese and Brianza hills, in riverine areas of the Cremona and Mantua provinces. In the eastern sector of the range, it is mainly found in Venetia plain (Verona, Vicenza, Padua, Venice and Treviso provinces) and in Friuli. In particular, for Friuli-Venezia Giulia (Lapini *et al.*, 1999), it is reported in 36 UTM squares (32.4%) both in the plain and prealpine areas (Dolce & Lapini, 1989; Lapini, 1990). South of the Po

River, it is rare and mostly localised along the riverine banks of the western part of Emilia-Romagna in the Piacenza province. Two unconnected sites are also known in the eastern sector of the same region in the Bologna and Ravenna provinces (Mazzotti *et al.*, 1999).

Though sometimes locally substantial, populations of *R. latastei* seem to have undergone a constant reduction during recent decades, in particular in the plain areas, and are best considered in the IUCN category "vulnerable".

Altitudinal distribution

Table II shows the distribution of the species according to altitudinal belts; most observations refer to altitudes lower than 400 m a.s.l., and stress the preference for lowland areas and low hills, also confirmed by the data of regional atlases.

Demographic parameters

Information on aspects of population biology is available from a limited number of papers, and considering the wide variability of reported values, it does not seem to allow an extrapolation of data for the whole distribution range.

As regards to population consistency, Pozzi (1980) reports values of 173 and 137 individuals/ha, respectively for Bosco Fontana (Mantua province) and for a riverine wood along the Lambro River; Richard & Semenzato

TABLE I - Data referring to *Rana latastei*'s distribution in the examined regions. Captions: No. bibl., number of sites known from literature; No. prov., number of sites in a province; No.c/no.i, number of confirmed sites / number of investigated sites during the 1999-2000 census; IUCN, threat level according to IUCN categories assessed on the basis of data collected.

Region	No. bibl.	No. prov.	No.c/no.i	IUCN	Reference source
Piedmont	3	Alessandria 2 Cuneo 1 Novara 1 Vercelli 1	2/2	V	Boano & Sindaco, 1992, 1998
Lombardy	32	Bergamo 4 Brescia 1 Como 7 Cremona 7 Lecco 1 Lodi 5 Mantua 7 Milan 6 Pavia 10 Varese 8	16/16	LR	Bennati <i>et al.</i> , 1996; Bernini <i>et al.</i> , 2004; Ferri <i>et al.</i> , 1992; Gariboldi <i>et al.</i> , 2000; Pozzi, 1980; Scaravelli, 1993
Venetia	7	Padua 3 Venice 3 Treviso 1	6/6	V	Richard & Semenzato, 1988, 2000; Semenzato, 1985
Friuli-Venezia Giulia	7	Udine 7	5/5	V	Dolce <i>et al.</i> , 1985; Dolce & Lapini, 1989; Lapini, 1990

TABLE II - *Altitudinal distribution of Rana latastei. For each region the number of presence sites detected during the research period is indicated, for altitudinal belts every 100 meters of height.*

Region	0-100	101-200	201-300	301-400	401-500
Piedmont	3	1	1	-	-
Lombardy	29	6	11	9	1
Venetia	7	-	-	-	-
Friuli-Venezia Giulia	5	1	-	1	-

(1988) found a value of 68 individuals/ha (Bosco di Carpenedo, Venice province); Boano & Sindaco (1992) estimated a density of about 90 individuals/ha (Bosco del Merlino, Cuneo province); Agapito Ludovici & Colli (2000) reported a maximum density of 306 individuals/ha for 1983 in the "Le Bine" Nature Reserve (Mantua and Cremona provinces) which increased to more than 952 in 1996. The sex ratio has always been detected in favour of males, with reported values of 1.5 (Pozzi, 1980), 1.73 (Dolce *et al.*, 1985), 1.17 (Boano & Sindaco, 1992). In the area examined by Boano & Sindaco (1992), immature individuals form about 24% of the population; such an incidence of young individuals is notably lower than the values estimated by Pozzi (1980) in the Bosco Fontana (Mantua province) and by Dolce *et al.* (1985) in the Bosco Baredi (Udine province), respectively 58% and 65%.

The consistency of the population in a protected area (Bosco Castagnolo, Pavia province) was estimated for more than five years through annual recordings of egg-clump numbers; an average value of 327 egg-clumps were registered and, though with fluctuations, a substantial stability of the examined population was highlighted (Bernini *et al.*, 2004).

Ecology

Rana latastei is present in plain woods, in particular, in the remaining fragments of *Quercus-Carpinetum boreo-italicum* of the Po plain characterised by oak and hornbeam, in hygrophilous woods classified as *Cladio-Fraxinetum angustifoliae* and in riverine woods with willow trees and poplar groves, characterised by black and white poplars, white willow and alder trees. Sometimes, it can also be found in open areas such as peat bogs, wet meadows, sedge-marshes, reed swamps of *Phragmites* sp. (Mazzotti & Pellizzari, 2000), in bushy areas and poplar plantations with grassy and shrubby undergrowth.

During our research, *R. latastei* was found syntopic with the following amphibian species: *Triturus carnifex*, *T. vulgaris*, *Bombina v. variegata*, *Bufo bufo*, *B. viridis*, *Rana dalmatina*, *R. synklepton esculenta* and *Hyla intermedia*.

Reproduction occurs from the end of February to

mid-April, for a period which varies from 2-3 to 15 days; although we observed egg depositions with minimum water temperature of 2° C, the maximum activity coincides with values of about 7° C. Females remain in the breeding site only for the time needed for deposition, while males remain there on a continuous basis, or with brief sojourns in the immediate area, up to a period of 4-5 weeks (Vercesi *et al.*, 2000). Deposition takes place in river pools, ponds, springs and ditches, but also in temporary pools such as flooded meadows or puddles. These habitats are usually characterised by rich aquatic vegetation, though pools and loops of canals with many leaves and submerged branches are also used. Eggs hatch 10-15 days after deposition, and tadpoles complete their metamorphosis in about three months. The concentration of neometamorphosed is at its peak by the end of July. During summer, adult activity usually decreases; while between September and October there is a renewal of activity and it is common to observe animals near reproduction sites.

Guarino & Mazzotti (2001) estimated a maximum life span of three years for both sexes; while Ravera (1998, Ravera S. - Stima dell'età e analisi dell'accrescimento in rane rosse dalla Valle del Ticino. Unpublished Thesis, Univ. of Pavia) reports a 5-year longevity; such results show that *R. latastei* is less long lived and has higher sexual precocity among brown frogs.

In a population of the Ticino valley (Pavia province), Bernini *et al.* (2000) pointed out a higher growth rate than the one noticed by Dolce *et al.* (1985) in the lower Friuli plain. During the same study, notable differences between sexes were reported, with average values higher in females with regards to some biometric parameters (total length, head width, leg length). These results agree with those reported by Boano & Sindaco (1992) for a population in the province of Cuneo.

Threats and conservation perspectives

R. latastei is an endemic taxon practically limited to the Po plain in Italy. Although the distribution range is quite wide, the species is threatened by the limited extension and fragmentation of suitable habitats, particularly those of the surviving riverine woods fragments. The taxon is listed in Appendix II of the Berne Convention, in Annexes II and IV of the Habitats Directive and is mentioned as a potentially interesting species for its conservation by Sindaco (1993). In Piedmont, where the species is particularly vulnerable (Andreone, 1992), all the known sites were proposed as sites of European community and regional importance in accordance with the Habitats Directive (Boano & Sindaco, 1998). In Lombardy, a three-year conservation project was carried out involving seven protected areas of the plain; in particular, habitat management plans for the creation of new reproductive sites were devised, as well as translocation interventions, using tadpoles bred in semi-natural conditions and released immediately before metamorphosis (Scali *et al.*, 2000).

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