

## AMPHIBIANS OF ITALY: A REVISED CHECKLIST

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**ABSTRACT** The present paper provides a complete and updated checklist of all valid species and subspecies of amphibians reported for the Italian political territory. The species considered are 40, including 17 Urodela and 23 Anura, and the subspecies are 23, including 15 Urodela and 8 Anura. Nine species of Urodela and 5 species of Anura are endemic to Italy. The endemic subspecies are 9 (8 Urodela, 1 Anura). Two out of the 40 species occurring in Italy, i.e. *Rana catesbeiana* and *R. kurtmuelleri*, are allochthonous, and are to be considered naturalized in the Italian territory. The IUCN categories and the conservation status of each species and subspecies were assessed following the IUCN categorization.

**KEY WORDS** Amphibia, Urodela, Anura, checklist, conservation, Italy

### INTRODUCTION

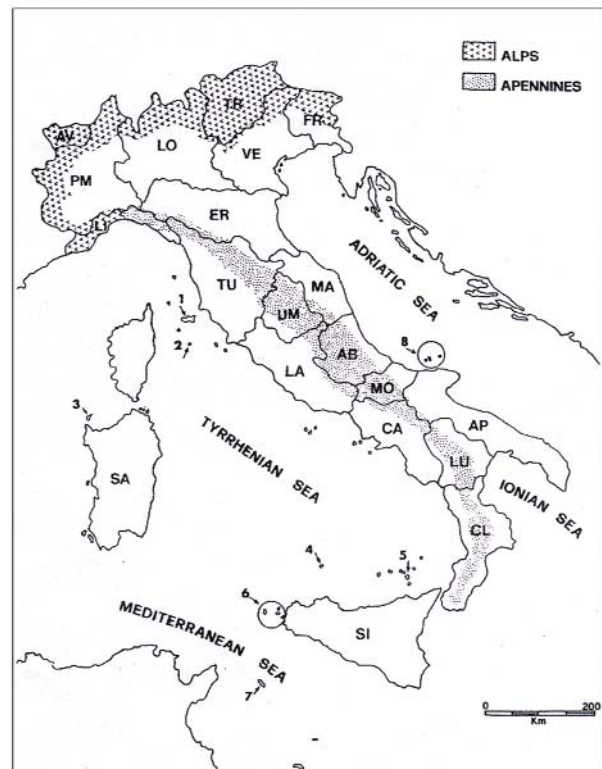
In the checklist of the Italian Vertebrata species (Amori et al., 1993), amphibians are mainly considered at the species level, and only the subspecies that are important from a conservation point of view are reported. The acquisitions concerning amphibians in Italy during the last decades of the 20th century (e.g. Lanza & Corti, 1996) and the recent analysis, based on a robust statistical design, of the conservation status of the various species of Italian amphibians by Andreone & Luiselli (2000), together with the need for a complete account concerning the present systematic status of all taxa occurring within the political Italian territory, have made a new checklist necessary.

The aim of the present paper is to provide a complete and updated checklist of all valid Italian species and subspecies of amphibians. In addition, both the Italian and the English common names of all species are reported, and the problems concerning the systematic position and conservation of some taxa in Italy are highlighted. Moreover, the conservation status of each taxon is given following the categorization proposed by IUCN (2001).

### MATERIALS AND METHODS

The area taken into consideration is the political Italy (Fig. 1). In order to better indicate the distribution of the various taxa, the Italian territory was subdivided in northern, central and southern Italy on the basis of an administrative-regional criterion (Tab. 1). According to this criterion, northern Italy indicates all the northern part of the country, including the following administrative regions: Piedmont, Aosta Valley, Lombardy, Trentino-Alto Adige, Venetia, Friuli-Venetia Julia, Liguria, Emilia-Romagna. Central Italy indicates the central part of the Italian peninsula, including Tuscany, Marche, Umbria, Latium, Abruzzi, Molise. Southern Italy indicates the southern part of the Italian peninsula, including Campania, Apulia,

Lucania, Calabria. For a better geographical location of the distribution of the considered taxa, the various administrative regions of the Italian territory are reported (Fig. 1).



**Fig. 1** Italian political territory with the administrative regions. AV = Aosta Valley; PM = Piedmont; LI = Liguria; LO = Lombardy; TR = Trentino-Alto Adige; VE = Venetia; FR = Friuli-Venetia Julia; ER = Emilia-Romagna; TU = Tuscany; MA = Marche; UM = Umbria; LA = Latium; AB = Abruzzi; MO = Molise; CA = Campania; AP = Apulia; LU = Lucania; CL = Calabria; SI = Sicily; SA = Sardinia. 1 = Elba Is.; 2 = Montecristo Is.; 3 = Asinara Is.; 4 = Ustica Is.; 5 = Lipari Iss.; 6 = Egadi Iss.; 7 = Pantelleria Is.; 8 = Tremiti Iss. (modified from Amori et al., 1999).

Only species found with certainty in the Italian territory have been considered. The checklist has been drawn at the subspecies level. The following papers have been taken, sometimes critically, as references for nomenclature, distribution, conservation and systematics of the considered taxa: Lanza (1968, 1983, 1993), Nöllert & Nöllert (1992), Lanza & Corti (1993, 1996), Societas Herpetologica Italica (1996), Gasc et al. (1997), Bulgarini et al. (1998), Lanza (1999a, 1999b), Andreone & Luiselli (2000), Sindaco (2000), Gattelli (2001), Razzetti et al. (2001), Arnold & Ovenden (2002), D'Antoni et al. (2003), AA.VV. (in press).

The Italian names of the species were chosen following Lanza (1968, 1983) and Razzetti et al. (2001), with some minor modifications.

The IUCN Red List categories were applied to the "Italian distribution area" of each species and, separately, to each subspecies occurring in the Italian territory, following Bulgarini et al. (1998) and IUCN (2001, 2003). The taxa which were introduced by humans (i.e. those not indigenous in Italy) were classified as "Not Evaluated" (NE).

In the text as well as in the tables, Italy is taken to mean the Italian mainland peninsula, while Sicily, Sardinia and other minor islands are mentioned separately.

## RESULTS AND DISCUSSION

The complete list of valid species and subspecies of amphibians occurring in political Italy, and their IUCN (2001) categories, are presented in Tab. 1. This list is composed by 40 species and 23 subspecies, including 2 species (*Rana catesbeiana* Shaw, 1802, and *R. kurtmuelleri* Gayda, 1940) which are allochthonous but definitely naturalized. The Italian amphibian fauna with 17 Urodela and 23 Anura ascribed to 10 families (Salamandridae, Plethodontidae, Proteidae, Bombinatoridae, Discoglossidae, Pelobatidae, Pelodytidae, Bufonidae, Ranidae, Hylidae) is one of the richest in Europe.

Table 2 provides the total number of species and subspecies. The number of Urodela endemic to Italy is very high (9 species, 8 subspecies) and also the number of endemic Anura is high, with 5 species and 1 subspecies. The ratio between the number of subspecies and species of Urodela is very high (cf. Tab. 2), suggesting a high degree of population differentiation in the former group. This is probably due both to the accentuated phylogeny and the very peculiar modes of dispersion of the Urodela compared with those of the Anura (e.g. Dolmen, 1981).

During the 20<sup>th</sup> century some taxa which were known from the neighbouring countries, e.g. *Triturus*

*vulgaris vulgaris* (Boulenger, 1882), were found within the Italian political borders (Lapini et al., 1993). On the other hand, the occurrence of some species, i.e. *Rana arvalis* Nilsson, 1758 and *Alytes obstetricans* (Laurenti, 1768), was not confirmed; the former species occurs in some localities of Slovenia and Austria very close to northeastern Italy (Lanza, 1983; Ishchenko, 1997), while the latter is known to be present in some localities of France (Alpes Maritimes) and Switzerland (Canton Ticino, Grigioni) close to the Italian border and was doubtfully reported for the Italian territory in the last century (Lanza, 1968, 1983; Bruno, 1978; Morisi, 1983; Andreone & Sindaco, 1999). Moreover, the occurrence of *Bombina pachypus* (Bonaparte, 1838) and *Rana dalmatina* Bonaparte, 1840 in Sicily was not confirmed, while the occurrence of *Salamandra salamandra* (Linnaeus, 1758) in the same island was recently confirmed (Turrisi & Vaccaro, 1998).

During the 20<sup>th</sup> century no amphibian species or subspecies is known to have become extinct in Italy (Lanza, 1983, 1993; Lanza & Corti, 1996).

As to the introduced species, i.e. *Rana catesbeiana* and *R. kurtmuelleri*, these can be considered at present as well-established and definitely naturalized (Andreone et al., 1987; Albertini & Lanza, 1988). *Rana catesbeiana* occurs in several localities of northern (Piedmont, Lombardy, Veneto, Emilia-Romagna) and central Italy (Tuscany, Latium), where it was introduced from U.S.A. (Louisiana) (Albertini & Lanza, 1988). *Rana kurtmuelleri* was introduced in northwestern Italy (Liguria: Imperia) from Albania during the first half of the last century (Lanza, 1962), and at present is widespread in several localities of Liguria and Piedmont (northwestern Italy) (Doria & Salvidio, 1994; Lanza & Corti, 1996; Andreone & Sindaco, 1999).

The current state of knowledge of the Italian amphibian fauna can be considered as good. The more recent systematic changes refer to *Speleomantes strinatii* (Aellen, 1958) and *S. ambrosii* (Lanza, 1955). According to Lanza (1993) *Speleomantes strinatii* should be considered monotypic and the subspecies *S. strinatii strinatii* (Aellen, 1958), *S. strinatii argentatus* (Stefani, 1969), *S. strinatii bonzanoi* (Bruno & Bologna, 1973), *S. strinatii ligusticus* (Stefani, 1969) are to be synonymized. As to *Speleomantes ambrosii*, according to Cimmaruta et al. (2002) it should be a polypitic species: *S. ambrosii ambrosii* (Lanza, 1955), occurring west of the Magra river, and *S. ambrosii* ssp. n. [undescribed], occurring east of the Magra river (B. Lanza, in litteris, 2004). Further investigation seems to be necessary in order (1) to assess the systematic validity of some subspecies (e.g. *Bufo bufo spinosus*

Taxa	Italian common name	English common name	Italian distribution	IUCN categories
<b>Urodela</b>				
<i>Euproctus platycephalus</i> (Gravenhorst, 1829)	Tritone sardo	Sardinian brook salamander	Sa (e)	CR A1acd, B1+2bc
<i>Salamandra atra</i> Laurenti, 1768	Salamandra alpina	Alpine salamander	N	VU B1, 2
<i>S. atra atra</i> Laurenti, 1768			N	VU B1, 2
<i>S. atra aurorae</i> Trevisan, 1982	Salamandra alpina di Aurora	Aurora's alpine Salamander	N (e)	CR B2, 3
<i>Salamandra lanzai</i> Nascetti, Andreone, Capula & Bullini, 1988	Salamandra di Lanza	Lanza's salamander	N	VU C2a
<i>Salamandra salamandra</i> (Linnaeus, 1758)	Salamandra pezzata	Fire salamander	N,C,S, Si	DD
<i>S. salamandra salamandra</i> (Linnaeus, 1758)			N	DD
<i>S. salamandra gigliolii</i> Eiselt & Lanza, 1956	Salamandra pezzata appenninica		C(?),S,Si (e)	LR/lc
<i>Salamandrina terdigitata</i> (Lacépède, 1758)	Salamandrina dagli occhiali	Spectacled salamander	N,C,S (e)	LR/lc
<i>Triturus alpestris</i> (Laurenti, 1768)	Tritone alpestre	Alpine newt	N,C,S	DD
<i>T. alpestris alpestris</i> (Laurenti, 1768)			N	DD
<i>T. alpestris apuanus</i> (Bonaparte, 1839)	Tritone alpestre appenninico		N,C (e)	LR/nt
<i>T. alpestris inexpectatus</i> Dubois & Breuil, 1983	Tritone alpestre della Calabria		S (e)	CR B2,3
<i>Triturus carnifex</i> (Laurenti, 1768)	Tritone crestato italiano	Italian crested newt	N,C,S	LR/cd
<i>T. carnifex carnifex</i> (Laurenti, 1768)			N,C,S	LR/cd
<i>Triturus italicus</i> (Peracca, 1898)	Tritone italiano	Italian newt	C,S (e)	LR/lc
<i>Triturus vulgaris</i> (Linnaeus, 1758)	Tritone punteggiato	Common newt	N,C,S	DD
<i>T. vulgaris vulgaris</i> (Linnaeus, 1758)	Tritone punteggiato europeo		N	DD
<i>T. vulgaris meridionalis</i> (Boulenger, 1882)	Tritone punteggiato italiano		N,C,S	DD
<i>Speleomantes ambrosii</i> (Lanza, 1955)	Geotritone di Ambrosi	Ambrosi's cave salamander	N (e)	VU B1, 2
<i>S. ambrosii ambrosii</i> (Lanza, 1955)			N (e)	VU B1, 2
<i>S. ambrosii</i> subsp. nova	Geotritone di Bianchi	Bianchi's cave salamander	N (e)	?
<i>Speleomantes flavus</i> (Stefani, 1969)	Geotritone del Monte Albo	Monte Albo cave salamander	Sa (e)	VU C2b,D2
<i>Speleomantes genei</i> (Temminck & Schlegel, 1838)	Geotritone di Gené	Gene's cave salamander	Sa (e)	LR/nt
<i>Speleomantes imperialis</i> (Stefani, 1969)	Geotritone imperiale	Scented cave salamander	Sa (e)	LR/nt
<i>S. imperialis imperialis</i> (Stefani, 1969)			Sa (e)	LR/nt
<i>S. imperialis sarrabusensis</i> Lanza, Leo, Forti, Cimmaruta, Caputo & Nascetti, 2001			Sa (e)	VU B1
<i>Speleomantes italicus</i> (Dunn, 1923)	Geotritone italiano	Italian cave salamander	N,C (e)	LR/lc
<i>Speleomantes strinatii</i> (Aellen, 1958)	Geotritone di Strinati	Strinati's cave salamander	N	LR/nt

**Tab. 1** Checklist of the Italian amphibians. Italian distribution: N = northern Italy; C = central Italy; S = southern Italy; Si = Sicily; Sa = Sardinia; El = Elba Island; Mo = Montecristo Island; Gi = Giglio Island; Ca = Capraia Island; Ar = Argentario; e = endemic; i = introduced. IUCN categories: CR = critically endangered; EN = endangered; VU = vulnerable; LR = lower risk; DD = data deficient; NE = not evaluated. For other symbols concerning the IUCN categories see IUCN (2001).

Taxa	Italian common name	English common name	Italian distribution	IUCN categories
<i>Speleomantes supramontis</i> (Lanza, Nascetti & Bullini, 1986)	Geotritone del Supramonte	Supramonte cave salamander	Sa (e)	LR/nt
<i>Proteus anguinus</i> Laurenti, 1768 <i>P. a. anguinus</i> Laurenti, 1768	Proteo	Olm	N N	VU B1+2bc,C2a
<b>Anura</b> <i>Bombina variegata</i> (Linnaeus, 1758) <i>B. variegata variegata</i> (Linnaeus, 1758)	Ululone a ventre giallo	Yellow-bellied toad	N N	LR/lc LR/lc
<i>Bombina pachypus</i> (Bonaparte, 1838)	Ululone appenninico		N,C,S (e)	LR/nt
<i>Discoglossus pictus</i> Otth, 1837 <i>D. pictus pictus</i> Otth, 1837	Discoglossino dipinto	Painted frog	Si Si	LR/nt LR/nt
<i>Discoglossus sardus</i> Tschudi, 1837	Discoglossino sardo	Tyrrhenian painted frog	Sa,Mo,Gi, Ar	LR/nt
<i>Pelobates fuscus</i> (Laurenti, 1768) <i>P. fuscus insubricus</i> Cornalia, 1873	Pelobate fosco Pelobate fosco padano	Common spadefoot	N N (e)	CR A1 CR A1
<i>Pelodytes punctatus</i> (Daudin, 1802)	Pelodite punteggiato	Parsley frog	N	CR B2,3
<i>Bufo bufo</i> (Linnaeus, 1758) <i>B. bufo bufo</i> (Linnaeus, 1758) <i>B. bufo spinosus</i> Daudin, 1803	Rospo comune	Common toad	N,C,S, Si N C,S,Si	DD DD DD
<i>Bufo viridis</i> Laurenti, 1768 <i>B. viridis viridis</i> Laurenti, 1768	Rospo smeraldino	Green toad	N,C,S, Si,Sa N,C,S, Si,Sa	DD DD
<i>Hyla arborea</i> Laurenti, 1768 <i>H. arborea arborea</i> Laurenti, 1768	Raganella comune	Common tree frog	N N	LR/nt LR/nt
<i>Hyla intermedia</i> (Boulenger, 1882)	Raganella italiana	Italian tree frog	N,C,S,Si (e)	DD
<i>Hyla meridionalis</i> Boettger, 1874	Raganella mediterranea	Stripeless tree frog	N	EN B2,3
<i>Hyla sarda</i> (De Betta, 1853)	Raganella tirrenica	Tyrrhenian tree frog	Sa, El, Ca	LR/nt
<i>Rana bergeri</i> (Günther, 1986)	Rana di Berger	Italian pool frog	N,C,S,Si (e)	DD
<i>Rana catesbeiana</i> Shaw, 1802	Rana toro	American bullfrog	N,C (i)	NE
<i>Rana dalmatina</i> Bonaparte, 1840	Rana agile	Agile frog	N,C,S	DD
<i>Rana kl esculenta</i> Linnaeus, 1758 (1)	Rana esculenta	Edible frog	N	DD
<i>Rana kl hispanica</i> (Bonaparte, 1839) (1)	Rana di Uzzell	Italian hybrid frog	N,C,S,Si (e)	DD
<i>Rana kurtmuelleri</i> Gayda, 1940	Rana dei Balcani	Greek marsh frog	N (i)	NE
<i>Rana italica</i> Dubois, 1987	Rana appenninica	Italian stream frog	N,C,S (e)	LR/lc
<i>Rana latastei</i> Boulenger, 1879	Rana di Lataste	Italian agile frog	N	EN A1
<i>Rana lessonae</i> Camerano, 1882	Rana di Lessona	Pool frog	N	DD
<i>Rana ridibunda</i> Pallas, 1771	Rana ridibonda	Marsh frog	N	EN B1,2
<i>Rana temporaria</i> Linnaeus, 1758 <i>R. temporaria temporaria</i> Linnaeus, 1758	Rana temporaria	Common frog	N,C N,C	LR/lc LR/lc

**Tab. 1** Checklist of the Italian amphibians (continued).

(1) Species of hybrid origin (Günther & Plötner, 1994) for which the taxonomic category ‘klepton’ was used following Dubois & Günther (1982) and Dubois & Ohler (1994).



Daudin, 1803, *Bufo viridis viridis* Laurenti, 1768, *Bufo viridis balearicus* Boettger, 1890), and (2) to point out whether some taxa described as subspecies (e.g., *Salamandra salamandra gigliolii* Eiselt & Lanza, 1956, *Triturus alpestris apuanus* (Bonaparte, 1839), *Pelobates fuscus insubricus* Cornalia, 1873) could be considered to be full species or semispecies.

As to the former species group, it must be noted that the subspecies *Bufo bufo spinosus* is still poorly defined and it should be probably synonymized with the nominal subspecies (Lanza, 1993). Thus, further genetic and morphometric investigations are needed in order to definitely evaluate its taxonomic position (e.g. Lüscher et al., 2001). A similar situation is found in *Bufo viridis* Laurenti, 1768. According to some authors (Hemmer et al., 1982) the Sardinian populations of this species should be ascribed to the subspecies *Bufo viridis balearicus* Boettger, 1890, while the Italian populations should belong to the nominate subspecies (*Bufo viridis viridis*). However, the validity of the former subspecies is uncertain (Lanza, 1993), and the taxonomy of the *Bufo viridis* populations occurring in Italy should be reconsidered on the basis of genetic, molecular and morphometric investigations (see e.g. Castellano & Giacoma, 1998; Odierna et al., 2000b).

As to the systematic status of the Italian subspecies

populations are characterized by a dorsal colouration with relatively small yellow patches (rather similar to the colouration of the populations from northern Italy), and perhaps by some unusual ecological characteristics (Capula & Luiselli, 1992).

As to *Pelobates fuscus* (Laurenti, 1768), the populations occurring in the Po valley (northern Italy) are traditionally ascribed to the endemic subspecies *insubricus* (Lanza, 1983; Nöllert & Nöllert, 1992; Andreone et al., 1993). However the systematic status of this taxon is in need of accurate revision (e.g. Lanza, 1993; Andreone & Sindaco, 1999). It must be noted that the bioacoustic investigations carried out by Andreone & Piazza (1990) indicate a certain degree of differentiation between the vocalizations of *P. fuscus insubricus* Cornalia, 1873 and *P. fuscus fuscus* (Laurenti, 1768). The taxonomy of the Italian populations should be therefore reconsidered on the basis of genetic, molecular and morphometric investigations.

According to Andreone & Luiselli (2000) the most endangered amphibian taxa of the Italian political territory are the following: *Euproctus platycephalus* (Gravenhorst, 1829), *Salamandra atra aurorae* Trevisan, 1982, *Salamandra lanzai* Nascetti, Andreone, Capula & Bullini, 1988, *Speleomantes*

Order	Total species	Endemic species	Introduced species	Total subspecies	Endemic subspecies	Introduced subspecies	Total subspecies total species
	N	N (%)	N (%)	N	N (%)	N	-
Urodela	17	9 (53%)	0	15	8 (53%)	0	0.88
Anura	23	5 (22%)	2 (0.09%)	8	1 (0.12%)	0	0.35
Total	40	14 (35%)	2 (0,05%)	23	9 (39%)	0	-

**Tab. 2** Number of Italian amphibian species and subspecies.

of *Salamandra salamandra*, i.e. *S. salamandra salamandra* (Linnaeus, 1758) and *S. salamandra gigliolii* Eiselt & Lanza, 1956, it must be stressed that these are in need of accurate revision. The populations of northern Italy are ascribed to the nominate subspecies, whereas the populations of southern Italy are ascribed to the endemic subspecies *gigliolii*. According to Olivieri (1991), Steinfartz et al. (2000) and Odierna et al. (2000a) *gigliolii* shows some peculiar genetic and molecular characters that should allow its elevation to the species level. The populations occurring in central Italy (Tuscany, Umbria, Marche, Latium, Abruzzi, Molise), though at present ascribed to the taxon *gigliolii*, probably belong to a subspecies different either from *salamandra* or *gigliolii*, and their taxonomy should be better defined on the basis of genetic, molecular and morphometric studies. These

*flavus* (Stefani, 1969), *Proteus anguinus* Laurenti, 1768, *Pelobates fuscus insubricus* Cornalia, 1873, *Pelodytes punctatus* (Daudin, 1802), *Rana latastei* Boulenger, 1879, *Rana ridibunda* Pallas, 1771. These taxa are at present severely endangered due to the effects of water pollution, habitat loss, highly reduced geographic range and over-collecting both for commercial and scientific purposes (Sindaco & Andreone, 1988; Corbett, 1989; Bulgarini et al., 1998; Andreone & Luiselli, 2000).

*Euproctus platycephalus* is endemic to Sardinia (Puddu et al., 1988). It is endangered especially by habitat loss and water pollution (Puddu et al., 1988; Lecis, 2002). The species is also threatened by the man-aided introduction of some species of fish, e.g. *Salmo trutta* Linnaeus, 1758, in several streams which were previously inhabited only by *Euproctus*

*platycephalus* and some other amphibian species (*Discoglossus sardus* Tschudi, 1837, *Hyla sarda* (De Betta, 1853)). The threat of over-collecting, mainly for scientific purposes but also for commercial interest, exists for all known populations of the species (Puddu et al., 1988; Bulgarini et al., 1998; Lecis, 2002). According to Andreone & Luiselli (2000), it is likely the most endangered amphibian species of the Italian political territory.

*Salamandra atra aurorae* is an Italian endemic salamander restricted to only two small mountain valleys of northeastern Italy, where it is at risk from uncontrolled collecting (Corbett, 1989). However, the habitat of this subspecies seems to be currently under control and it is very likely that there will be no serious danger of habitat loss or fragmentation for this taxon in the years to come (Andreone & Luiselli, 2000). It must be noticed that, according to information provided by Prof. Benedetto Lanza (in litteris, 2004), a new subspecies of *Salamandra atra* from Monte Pasubio (N Italy) should be described.

*Salamandra lanzai* is a species occurring only in the Cottian Alps (northwestern Italy) and some neighbouring areas of southeastern France (Massif du Queyras), where it is limited to rocky alpine meadows, usually above the timberline (Nascetti et al., 1988; Arnold & Ovenden, 2002). The threat of over-collecting, mainly for scientific purposes but also for commercial interest, exists for all known populations of the species. Unfortunately, collecting of *S. lanzai* is still not regulated by any Italian law, and control remains very difficult. The species is threatened also by habitat degradation (Bulgarini et al., 1998). *Salamandra lanzai* is especially vulnerable due to its highly reduced geographic range, which includes the Cottian Alps only, and to population fragmentation (Bulgarini et al., 1998).

*Speleomantes flavus* is endemic to Sardinia and limited to the Monte Albo massif, province of Nuoro (Lanza et al., 1995). The threat of over-collecting, mainly for scientific purposes but also for commercial interest, exists for all known populations of the species, although there is no precise documentation (Puddu et al., 1988). Unfortunately, collecting of *S. flavus* is still not regulated by any Italian law, and control on remote sites remains very difficult. The species is threatened also by habitat loss and degradation (Puddu et al. 1988; Lanza, 1999c). It is especially vulnerable due to its highly reduced geographic range, which includes the Monte Albo massif only, and to population fragmentation (Bulgarini et al., 1998; Andreone & Luiselli, 2000).

*Proteus anguinus* is a subterranean species confined to the limestone cave system of some areas of

northeastern Italy (Gorizia and Trieste), Slovenia and northwestern Croatia. Its habitat is reported as suffering from waste tipping, pollution, water abstraction and interference from caving activities (Lapini et al., 1999). Within the Italian territory the nominate subspecies only occurs (*Proteus anguinus anguinus*), while *P. anguinus parkelj* Sket & Arntzen 1994, which is characterized by dark pigmentation and fully developed eyes, is known to occur in southeastern Slovenia (Sket & Arntzen, 1994).

*Pelobates fuscus insubricus* is limited to the Po valley (northern Italy), where it occurs in flat open areas and in cultivated areas, not far from water (Andreone & Sindaco, 1999; WWF Italia, 2001). The threat of over-collecting, both for scientific purposes and commercial interest, exists for all known populations. It is threatened also by habitat degradation and water pollution (Bulgarini et al., 1998; WWF Italia, 2001). This taxon is especially vulnerable due to its reduced geographic range, which includes the Po valley only, and to high population fragmentation (Bulgarini et al., 1998; WWF Italia, 2001). Similar threats do also exist for *Rana latastei*, which occurs in the Po valley too (Andreone & Luiselli, 2000), for *Pelodytes punctatus*, the occurrence of which in the Italian territory is at present limited to a few localities of Liguria (western Italy) (Sindaco & Andreone, 1988; Doria & Salvidio, 1994; Andreone & Sindaco, 1999), and for *Rana ridibunda*, which is known to be present in some localities of the Trieste province only (northeastern Italy) (Lapini et al., 1999).

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