Acta Herpetologica 5(2): 161-177, 2010

Reptiles of Sardinia: updating the knowledge on their distribution

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Submitted on: 2009, 22th October; revised on: 2010, 3rd March; accepted on: 2010, 29th July.

Abstract. Sardinia shows a clear lack of herpetological data due to an evident paucity of herpetological surveys. This gap of knowledge is worthy of attention, since Sardinia hosts a rich herpetofauna with a large proportion of endemic species, and distribution data are crucial for targeting conservation efforts. In this paper we provide new distribution data for Sardinian reptiles, with the aim of updating our knowledge on their specific distribution. Data were opportunistically recorded during ten years of field research in Sardinia, carried out in more than twenty campaigns from April 1999 to June 2009. All the eighteen reptile species belonging to the Sardinian fauna were recorded. A total amount of 293 faunistic data were collected from 178 different localities covering the entire study area. Within this dataset, 137 faunistic data fall outside known species' ranges as reported in the Atlas of Italian amphibians and reptiles. In conclusion, data presented here produced a remarkable increase of knowledge on Sardinian reptiles' distribution. Nevertheless, it should be evidenced that, notwithstanding the present updating, the knowledge of Sardinian reptiles' distribution is probably still far from being exhaustive. Thus, further investigations are strongly required for obtaining a complete picture and identifying conservation priorities in terms of isolated species/populations and areas of high diversity and endemicity.

Keywords. Herpetofauna, reptiles, faunistics, Italy, Sardinia.

INTRODUCTION

The knowledge of species' distribution is crucial for their conservation. Thus, many studies focused on amphibian and reptile distribution in Italy. Most of these researches consisted in atlas projects carried out at different geographic scale, from single protected areas (e.g., Gentilli and Barbieri, 2002; Lapini, 2006), to several level of administrative units such as cities (e.g., Bologna et al., 2003), municipalities (e.g., Lapini, 1997), provinces (e.g.,

Fiacchini, 2003; Piazzini et al., 2005; Bologna et al., 2007), and regions (e.g., Doria and Salvidio, 1994; Mazzotti et al., 1999; Bologna et al., 2000; Vanni and Nistri, 2006). Local atlas projects has represented a first step towards the synthesis of data coming from a plethora of different sources, from bibliographic data and museum collections, to field observations by volunteers and researchers. The importance of these atlases appears evident in their role of sound and reliable basis for conservation initiatives and prioritization proposals (e.g., Brotons et al., 2004; Araújo et al., 2004; Rodríguez et al., 2006). A national-scale project started in 1994 aimed to gather a preliminary picture on the distribution of amphibians and reptiles found in Italy (Societas Herpetologica Italica, 1996). In recent times this large amount of data has been further updated and increased leading to a cartographic synthesis in the CKmap project (Stoch, 2000-2005) and in the Atlas of the Italian Amphibians and Reptiles (Sindaco et al., 2006). This book represents the state of the art of the knowledge on the distribution of amphibians and reptiles in Italy and is based on more than 70,000 records. The overall coverage of these data is on the whole relatively good, except for two regions, as evidenced by the same authors. Basilicata and Sardinia regions show a clear lack of herpetological data (Sindaco et al., 2006: p. 132). Concerning Sardinia, but this is probably true also for Basilicata, this pattern come from an evident paucity of herpetological surveys rather than a low level of herpetological diversity as evidenced by preliminary data reported in Bombi and Salvi (2008). This gap of knowledge is worthy of attention, since Sardinia hosts a rich and distinctive herpetofauna with a large proportion of endemic species, and distribution data are crucial for targeting conservation efforts. Concerning reptiles, Sardinia is inhabited by 18 recognised species, representing 35% of the reptiles diversity found in Italy (Sindaco et al., 2006). Three species are endemic to Sardinia and Corsica, *Algyroides fitzingeri*, *Podarcis tiliguerta*, *Archaeolacerta bedriagae* (Lacertidae), and another, *Euleptes europaea* (Sphaerodactylidae), is sub-endemic to these two islands being also present in some coastal localities of Tuscany and Liguria (Italy). *Podarcis sicula* (Lacertidae) and *Natrix natrix* (Colubridae) occur in Sardinia with distinctive populations respect to those spread on the continent, and are considered as Sardinian endemic subspecies (P. s. cetti) or even incipient species (*N. n. cetti*) (Thorpe, 1980; Aprea et al., 2000). Most of Sardinian reptiles have a high intrinsic conservation value and are listed as species with conservation priorities in the annexes II and IV of the Habitats Directive 92/43/EEC (*Euleptes europaea*, *Emys orbicularis*, *Testudo hermanni*, *Testudo graeca*, and *Testudo marginata*) or considered threatened in the IUCN red list (e.g., *Natrix natrix cetti* as Critically Endangered) (IUCN, 2010).

To date no one paper reviewed the knowledge about the entire Sardinian herpetological diversity at a regional scale, while several studies are available for specific areas (e.g. Cesaraccio and Lanza, 1984; Poggesi et al., 1996) or single species (Lecis and Norris, 2003; Bombi and Vignoli, 2004). The aim of this paper is providing new distribution data for Sardinian reptiles, from an investigation carried out throughout Sardinia, and updating our knowledge of Sardinian reptiles distribution.

MATERIALS AND METHODS

We considered the entire territory of the Sardinian region, amounting to more than 24,000 km^2. Sardinia is the second-largest island of Italy and in general of the Mediterranean Sea, placed south to

the island of Corsica, west from the Italian Peninsula, north from Tunisia, and east from the Balearic Islands. It has a Mediterranean climate, with rainfall concentrated in autumn and winter and hot/dry summers, which supports characteristic Mediterranean forests, woodlands, and scrub vegetation.

Contextually to a ten-years long field-based research in Sardinia, focused on ecology, distribution and phylogeography of some endemic reptile species (e.g. Bombi et al., 2009a, 2009b; Salvi et al., 2010), faunistic observations were opportunistically recorded. Fieldwork was carried out in more than twenty campaigns from April 1999 to June 2009, with a field effort of approximatively 50 weeks of activity. We surveyed all the main Sardinian domains, including mountain, mid-elevation, coastal, and micro-insular sites, and considering different reptile habitats. Surveys were carried out mainly during day between 0800 h and 1900 h from April to October. Only original data from direct observations has been included in the present study. We focused our attention to terrestrial and freshwater reptiles, thus excluding marine turtle species. We also excluded amphibian species because they need searching methodologies conflicting with our main field activity. Most of the individuals were captured by hands, nosed, or by means of rubber bands. Each captured animal was sexed, measured, photographed, and then released in the exact capture point. A low fraction of data came from road-killed specimens or from visual encounter surveys. Tracks of animal were not considered as indicator of species' presence since in most of the case they do not allow an unambiguous species identification. For each locality geographic coordinates were recorded by using a GPS device, and toponyms were assigned by identifying the closest locality reported in maps from the "Istituto Geografico Militare". For conservation reasons, in the light of the threatened status and vulnerability of many Sardinian species, we provided in Appendix 2 only low-resolution coordinates. More details shall be available from the authors upon specific request.

For each species, our data were compared with the currently known species distribution as reported in Sindaco et al. (2006). For each species we produced updated maps of distribution by overlapping our data with those from Sindaco et al. (2006) at 10×10 UTM grid scale. From these data we calculated the species richness per cell for identifying the hotspot of reptile diversity in Sardinia.

We utilised taxonomic names as in Sindaco et al. (2006) and we did not considered subspecies since for most of Sardinian reptiles the intraspecific taxonomy is under debate [e.g. for *Archaeolacerta bedriagae* (Salvi et al., 2009a, 2009b, 2010); for *Podarcis sicula* (Podnar et al, 2005); for *Podarcis tiliguerta* (Capula, 1996; Harris et al., 2005)].

RESULTS

All the 18 reptile species belonging to the Sardinian fauna were recorded. These species include: two Emydidae, three Testudinidae, three Gekkota, four Lacertidae, two Scincidae, and four Colubridae. The inventory of the sampled localities is provided in Appendix 2, and their location reported in Figure 1. A total amount of 293 faunistic data were collected from 178 different localities covering the entire study area. Within this dataset, 137 faunistic data fall outside UTM squares where species presence was documented before by Sindaco et al. (2006). These localities of occurrence produce an extension of the documented distribution ranges for of all but two species (i.e., *Chalcides chalcides* and *Hemorrhois hippocrepis*). In particular, *Emys orbicularis* has been observed in two localitites outside its known range, *Trachemys scripta* in one, *Testudo hermanni* in two, *Testudo graeca* in one, *Testudo marginata* in one, *Euleptes europaea* in three, *Hemidactylus turcicus* in five, *Tarentola mauritanica* in nine, *Algyroides fitzingeri* in 12, *Archaeolacerta bedriagae* in one, *Podarcis tiliguerta* in 36, *Podarcis sicula* in 26, *Chalcides ocellatus* in 10, *Hierophis viridiflavus* in 24, *Natrix natrix* in one, and *Natrix maura* in three. The updating of Atlas

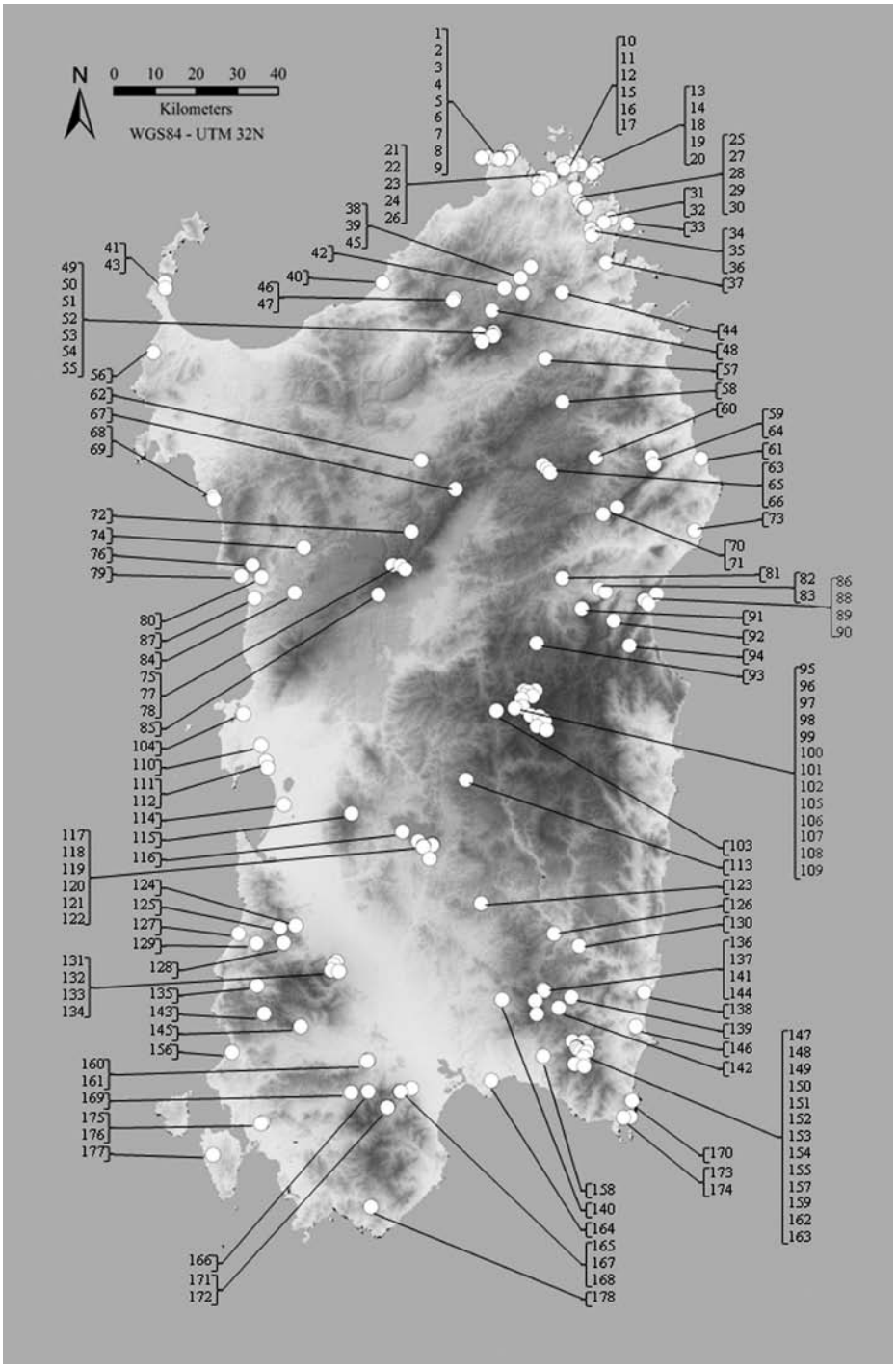

Fig. 1. Sampling localities. For details on geographic coordinates and toponyms see Appendix 2.

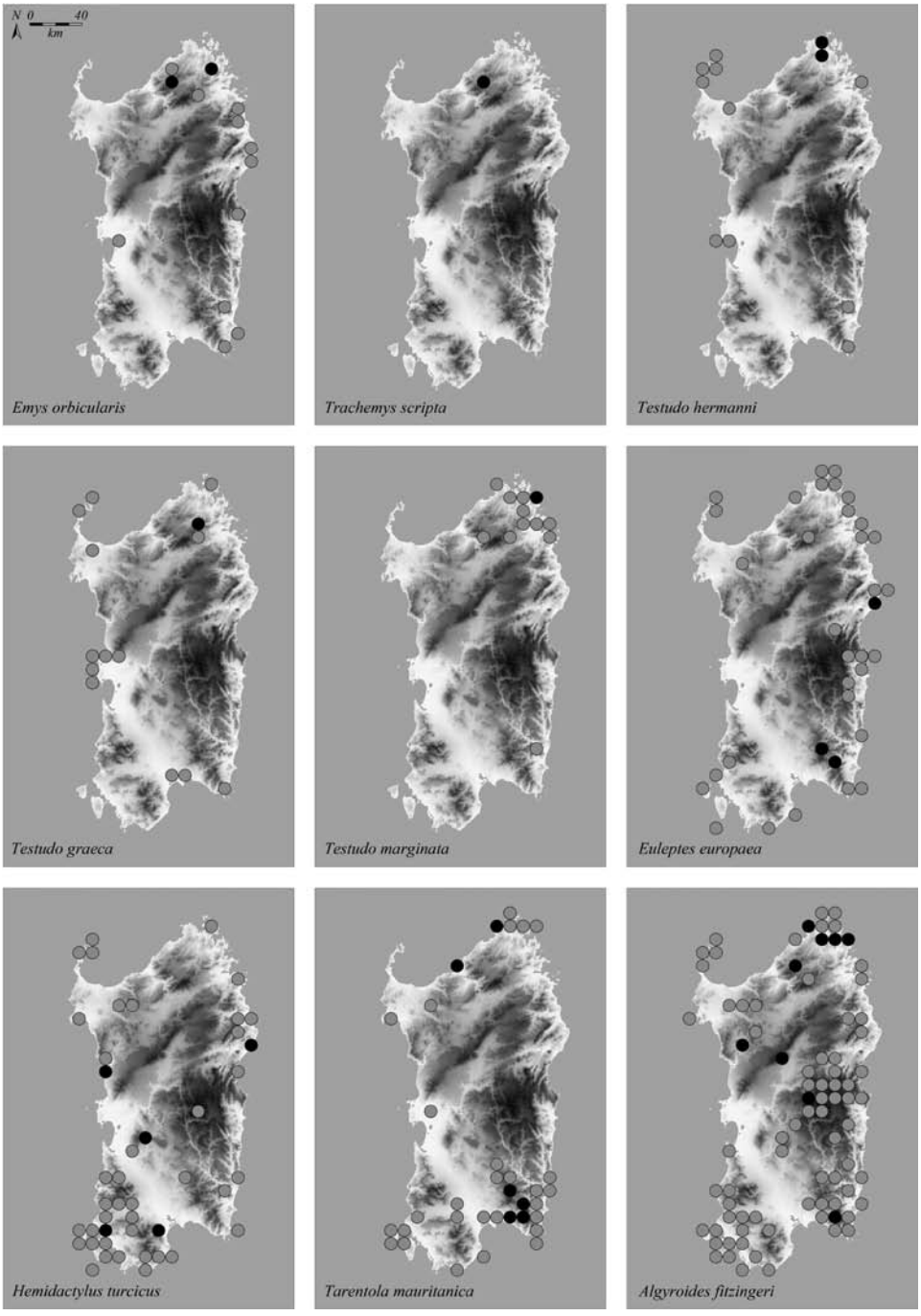

Fig. 2. Distribution maps for nine reptiles of Sardinia. Grey circles: UTM squares of presence reported in the Atlas of Italian amphibians and reptiles (Sindaco et al., 2006); black circles: new UTM squares of presence from this study.

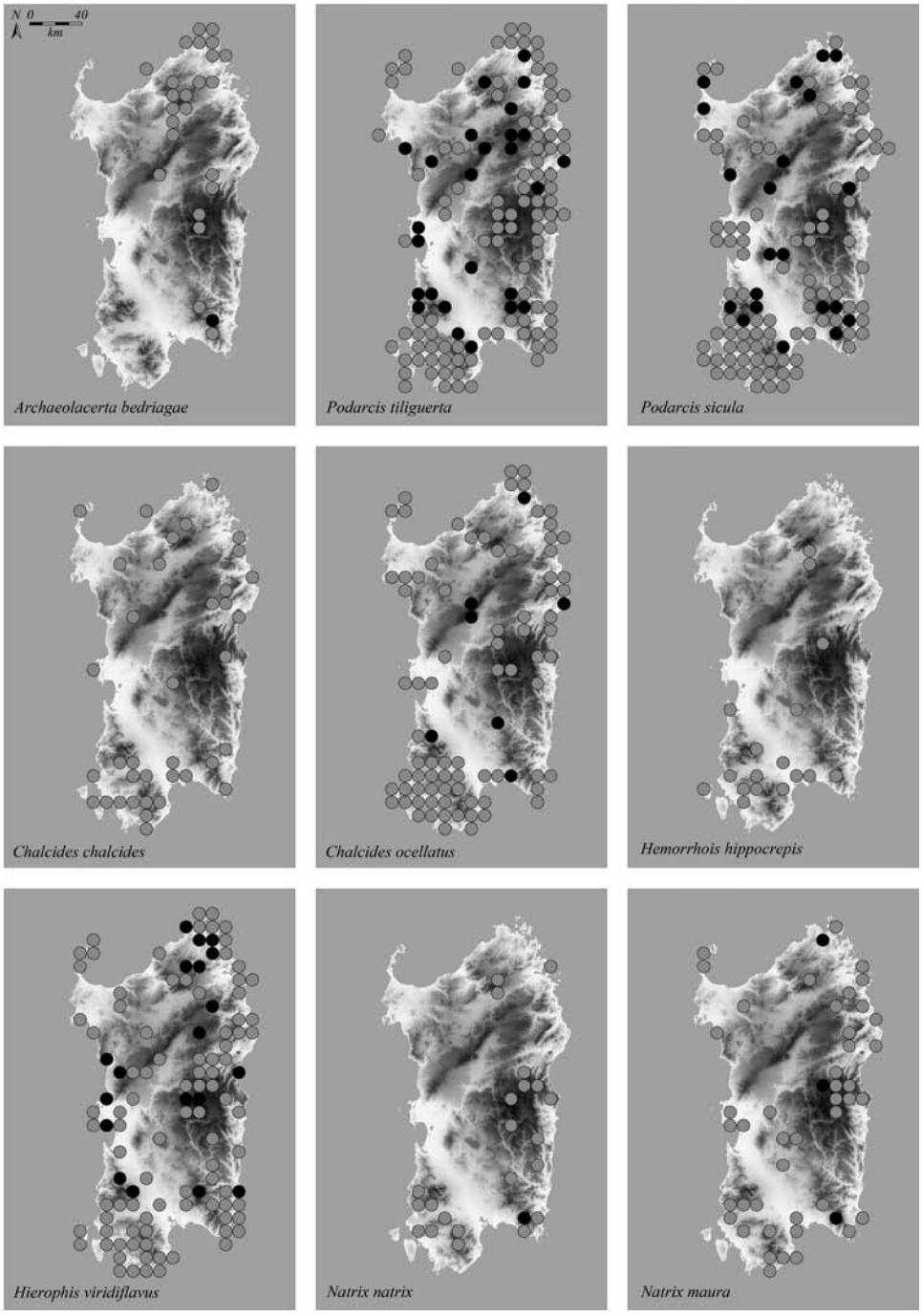

Fig. 3. Distribution maps for nine reptiles of Sardinia. Grey circles: UTM squares of presence reported in the Atlas of Italian amphibians and reptiles (Sindaco et al., 2006); black circles: new UTM squares of presence from this study.

Table 1. Number of UTM squares and number of localities for each species. In parentheses are evidenced the number of UTM squares where species' presence was not documented before and the number of localities falling in these cells.

Species	Number of UTM squares	Number of localities
Emys orbicularis (Linnaeus, 1758)	2 (2)	2 (2)
Trachemys scripta (Schoepff, 1792)	1 (1)	1 (1)
Testudo hermanni Gmelin, 1789	3 (2)	3 (2)
Testudo graeca Linnaeus, 1758	1 (1)	1 (1)
Testudo marginata (Schoepff, 1792)	2 (1)	2 (1)
Euleptes europaea (Gené, 1839)	5 (3)	5 (3)
Hemidactylus turcicus (Linnaeus, 1758)	9 (5)	9 (5)
Tarentola mauritanica (Linnaeus, 1758)	11 (6)	17(9)
Algyroides fitzingeri (Wiegmann, 1834)	16 (9)	20 (12)
Archaeolacerta bedriagae (Camerano, 1885)	14 (1)	23 (1)
Podarcis tiliguerta (Gmelin, 1789)	56 (26)	99 (36)
Podarcis sicula Rafinesque-Schmaltz, 1810	38 (21)	45 (26)
Chalcides chalcides (Linnaeus, 1758)	1 (0)	1 (0)
Chalcides ocellatus (Forskål, 1775)	9 (7)	12 (10)
Hemorrhois hippocrepis (Linnaeus, 1758)	1 (0)	1 (0)
Hierophis viridiflavus (Lacépède, 1789)	30 (19)	43 (24)
Natrix natrix (Linnaeus, 1758)	3 (1)	3 (1)
Natrix maura (Linnaeus, 1758)	4 (3)	6 (3)

maps from Sindaco et al. (2006) are provided in Figure 2 and 3. In Table 1 and in Appendix 1 are reported for each species the localities and UTM squares relative to their observation. The geographic pattern of reptile species richness is shown in Figure 4.

DISCUSSION

Data presented here produced a remarkable increase of knowledge on Sardinian reptiles distribution compare to that reported in the last available syntheses of the Atlas of Italian Amphibians and Reptiles (Sindaco et al., 2006). Among almost 300 data, 47% concerns localities placed outside the squares of documented presence as reported in above mentioned studies.

On the basis of the updated knowledge, it is possible to highlight that five species are widespread across Sardinia (*Algyroides fitzingeri*, *Podarcis tiliguerta*, *Podarcis sicula*, *Chal-*

Fig. 4. Distribution maps for reptile diversity in Sardinia. The number of species recorded in each cell is proportional to the relative gray tone (White = 0 species; Black = 12 species).

cides ocellatus, *Hierophis viridiflavus*). On the contrary, the other species are restricted to specific areas.

The distribution range has been significantly increased for two out of three endemic species (*A. fitzingeri* and *P. tiliguerta*). Concerning the endemic species *A. bedriagae* one data (Locality 148) would extend the range of this species in the northern part of the Sette Fratelli Mountains district. This area represents the southernmost portion of the species' range and it is of particular importance in the light of the isolation and distinctiveness of these southern populations (Guillaume, 1987; Bombi et al., 2009a, 2009b; Salvi et al., 2009a, 2009b).

The record of *Trachemys scripta* represents a serious threat for insular freshwater ecosystems. This threat is made still more real by the presence in the same area of *Emys orbicularis*. In fact, the interaction between these two species, even if its effect is controver-

sial, could lead to the extinction of the European pond terrapin. Recently, some other data have been reported for other areas of Sardinia (Bassu et al., 2008), suggesting a spreading of the red-eared terrapin across the Island. Thus, further surveys and deeper investigations should be planned for evaluating the current status of this species in the area and setting management action to avoid its further spread.

The finding of a new area where *Testudo hermanni* occurs, in the extreme North-East of the Island, is interesting for the conservation of this species. The Hermann's tortoise is known to be present in Sardinia only in localized and deeply isolated populations (Mazzotti, 2006; Bassu et al., 2008). In addition, it should be taken into account that this area is not protected, differently from other presence sites (i.e., Asinara Island and Sinis Peninsula). Therefore, this new area could represent a new opportunity for Hermann's tortoise conservation and specific measures should be focused on this area.

The horseshoe whip snake *Hemorrhois hippocrepis* is likely more common in southern Sardinia than believed and it could be hypothesized that its mainly nocturnal pattern of activity account for such underestimation (L. Luiselli, pers. comm.). Thus, we probably encountered this species just once because our fieldwork was concentrated during the day. It should be underlined that *H. hippocrepis* is one of the most endangered reptiles in Italy (Filippi and Luiselli, 2000). Therefore, the improvement of our understanding of the biology and distribution of the horseshoe whip snake assumes a crucial importance for guaranteeing the long-term conservation of this species.

Our surveys did not afford any data about *Zamenis longissimus* / *Z. lineatus*. Currently, the presence of this species in Sardinia is considered highly controversial. Two data from museum specimens have been referred to *Z. longissimus* or to *Z. lineatus* by different authors (see Razzetti and Zanghellini, 2006). Other two data, coming from field observations, were reported in Razzetti and Zanghellini (2006) and in Bassu et al. (2008), but in both cases not a single live specimen has been collected in Sardinia. Taking into account the large numbers of data collected for other snakes (e.g., 43 for *Hierophis viridiflavus*), we consider more likely *Z. longissimus* / *Z. lineatus* to be not present in Sardinia as autochtonous species, but at least present with localized acclimatized allochthonous individuals, as proposed by Puddu et al. (1998), despite further specific research should be carried out on these taxa.

The main hotspots of reptile diversity in Sardinia correspond to the Iglesiente area (south-western Sardinia), to the main mountain massifs of eastern Sardinia, and to some coastal areas of northern Sardinia. Most of this diversity hotspots represent also areas of endemicity. Indeed, the Iglesiente district together with the main mountainous areas of eastern Sardinia (Sette Fratelli Mount, Gennargentu Massif, and Limbara Mount) host many of the endemic herpetofauna (e.g. *Archaeolacerta bedriagae*, *Natrix natrix cetti*, *Euproctus platycephalus*, *Speleomantes* species). This congruence has a double interest. On the one hand, it gives preliminary indications for selecting areas with high conservation priority. On the other hand, it would provide a intriguing scenario for testing biogeographic and evolutionary hypotheses, underlying the origin of the observed pattern of diversity and endemism.

In conclusion, data presented here give a significant contribution for clarifying the distribution of Sardinian reptiles and compiling the inventory of the reptiles diversity occurring in different areas of the Island. Nevertheless, it should be evidenced that, not-

withstanding the present updating, the knowledge of Sardinian reptiles' distribution is probably still far from being exhaustive. Thus, further investigations are strongly required for obtaining a complete picture and identifying conservation priorities in terms of isolated species/populations and areas of high diversity and endemicity.

AKNOWLEDGMENTS

We wish to thank several people, who have contributed to samplings or supported this research: C. Argiolas, D. Blam, M. A. Bologna, V. Bordoni, M. A. Carretero, R. Corbeddu, M. D'Amen, N. Cabitta, A. Devaddis, C. Fassò, D. J. Harris, A. Loddo, L. Luiselli, P. Mesina, I. Pasquale, D. Pinna, D. Spagnesi, P. Tolu, R. Xavier, and L. Vignoli. We would also thank for logistic support Oasi WWF - Monte Arcosu and Ente Foreste Demaniali Sardegna.

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Appendix 1 - Localities of observation for each species. In bold are evidenced localities falling outside the UTM squares where species presence is currently known.

Family	Species	Localities
Emydidae	*Emys orbicularis* (Linnaeus, 1758)	35, 47
	Trachemys scripta (Schoepff, 1792)	47
Testudinidae	*Testudo hermanni* Gmelin, 1789	21, 23, 170
	Testudo graeca Linnaeus, 1758	38
	Testudo marginata (Schoepff, 1792)	9, 31
Gekkonidae	*Euleptes europaea* (Gené, 1839)	21, 31, 73, 137, 142
	Hemidactylus turcicus (Linnaeus, 1758)	15, 61, 73, 87, 115, 124, 156, 167, 175
	Tarentola mauritanica (Linnaeus, 1758)	7, 10, 15, 19, 20, 40, 137, 142, 146, 150, 152, 156, 158, 160, 162, 163, 177
Lacertidae	*Algyroides fitzingeri* (Wiegmann, 1834)	1, 2, 6, 10, 22, 25, 26, 31, 46, 49, 50, 74, 77, 88, 91, 102, 103, 118, 152, 158
	Archaeolacerta bedriagae (Camerano, 1885)	1, 5, 10, 19, 20, 25, 31, 44, 46, 49, 51, 54, 77, 91, 109, 137, 148, 149, 150, 151, 154, 155, 157
	Podarcis tiliguerta (Gmelin, 1789)	1, 2, 3, 4, 8, 10, 12, 14, 18, 19, 20, 25, 30, 31, 32, 33, 37, 43, 44, 47, 49, 50, 51, 52, 53, 54, 55, 57, 59, 60, 62, 63, 64, 65, 67, 68, 69, 70, 71, 73, 74, 75, 77, 79, 81, 83, 86, 88, 89, 90, 91, 94, 96, 99, 101, 105, 106, 107, 108, 110, 112, 113, 117, 118, 119, 120, 125, 126, 127, 129, 132, 133, 135, 136, 137, 139, 141, 144, 145, 147, 148, 149, 151, 152, 153, 154, 155, 157, 159, 160, 162, 163, 166, 168, 169, 170, 171, 177, 178
	Podarcis sicula Rafinesque-Schmaltz, 1810	15, 23, 25, 41, 47, 48, 56, 57, 68, 72, 76, 83, 85, 92, 110, 113, 114, 115, 116, 117, 119, 120, 121, 122, 124, 125, 130, 131, 132, 133, 134, 135, 136, 137, 139, 141, 143, 144, 145, 146, 156, 160, 163, 165, 176
Scincidae	*Chalcides chalcides* (Linnaeus, 1758)	174
	Chalcides ocellatus (Forskål, 1775)	25, 29, 30, 61, 72, 73, 78, 123, 124, 128, 156, 158
Colubridae	*Hemorrhois hippocrepis* (Linnaeus, 1758)	164
	Hierophis viridiflavus (Lacépède, 1789)	1, 10, 11, 13, 16, 17, 20, 24, 25, 27, 28, 31, 33, 34, 36, 37, 39, 42, 45, 58, 66, 68, 77, 80, 82, 84, 89, 97, 100, 102, 104, 108, 111, 124, 132, 138, 140, 141, 160, 161, 166, 173, 174
	Natrix natrix (Linnaeus, 1758)	95, 98, 152
	Natrix maura (Linnaeus, 1758)	23, 55, 93, 152, 166, 172

Appendix 2 - Sampling localities. Coordinates are provided in decimal degree format. Locality IDs correspond to those reported in the map in Figure 1.

Locality ID	IGM Toponym	Municipal district	Latitude	Longitude
1	Punta Falcone	Santa Teresa di Gallura	41,26	9,23
2	Faro Di Punta Falcone	Santa Teresa di Gallura	41,25	9,23
3	P. Acuta	Santa Teresa di Gallura	41,24	9,16
4	La Ficaccia 1	Santa Teresa di Gallura	41,24	9,22
5	Capo Testa	Santa Teresa di Gallura	41,24	9,14
6	La Ficaccia 2	Santa Teresa di Gallura	41,24	9,22
7	S. Teresa Gallura	Santa Teresa di Gallura	41,24	9,19
8	Porto Di Longone	Santa Teresa di Gallura	41,24	9,19
9	La Torraccia	Santa Teresa di Gallura	41,24	9,19
10	P.ta Dei Colmi	La Maddalena	41,23	9,39
11	C. Guardioli	La Maddalena	41,23	9,42
12	Madonnetta	La Maddalena	41,23	9,37
13	Becco Di Vela	La Maddalena	41,23	9,47
14	Poggio Stefano	La Maddalena	41,23	9,48
15	C. Susini	La Maddalena	41,23	9,43
16	Guardia Vecchia	La Maddalena	41,22	9,40
17	P. Nido D'Aquila	La Maddalena	41,22	9,38
18	Ferracciolo	La Maddalena	41,22	9,47
19	Teialone	La Maddalena	41,21	9,47
20	Pietraiaccio	La Maddalena	41,21	9,46
21	L'Isuledda	Palau	41,20	9,32
22	M. Iacheddu	Palau	41,19	9,34
23	La Sciumara	Santa Teresa di Gallura	41,19	9,31
24	Bonifica Di Barrabisa	Palau	41,19	9,32
25	L'Orso	Palau	41,17	9,41
26	St.zi Pittorra	Santa Teresa di Gallura	41,17	9,31
27	M. Piseddu	Arzachena	41,15	9,43
28	St.zo Silvaredda	Arzachena	41,14	9,43
29	Rio Mannu	Arzachena	41,13	9,44
30	P. Arzachena	Arzachena	41,13	9,44
31	M. Moro	Arzachena	41,11	9,52
32	Nibbaragghia	Arzachena	41,10	9,50
33	P.ta Rumazzino	Arzachena	41,09	9,56
34	C. Nuova	Arzachena	41,08	9,46
35	R. Di Petralonga	Arzachena	41,08	9,47
36	R. Di L'Umpitrato	Arzachena	41,07	9,46
37	Cugnana	Olbia	41,01	9,50
38	M. Lu Naracu	Sant'Antonio di Gallura	41,00	9,28
39	M.giu Santu	Calangianus	40,98	9,25
40	Li Iunchi	Badesi	40,97	8,86
41	L'Approdo	Stintino	40,97	8,23
42	M. Attunisi	Luras	40,96	9,21

Locality ID	IGM Toponym	Municipal district	Latitude	Longitude
43	Cala Di Vacca	Stintino	40,95	8,23
44	M. Pino	Telti	40,95	9,37
45	Catala	Calangianus	40,94	9,26
46	M. Della Croce	Aggius	40,93	9,06
47	R. Le Prugne	Aggius	40,93	9,06
48	St.zo L'Agnulu	Calangianus	40,91	9,17
49	Li Reni	Tempio Pausania	40,86	9,18
50	Campianatu	Tempio Pausania	40,86	9,13
51	P.ta Balistreri	Tempio Pausania	40,85	9,18
52	Mad.na Della Neve	Tempio Pausania	40,85	9,17
53	Giugantinu	Tempio Pausania	40,85	9,17
54	Sa Berritta	Tempio Pausania	40,85	9,17
55	Rio Contra Manna	Berchidda	40,84	9,14
56	Lampianu	Sassari	40,81	8,20
57	P.ta Turrita	Monti	40,80	9,32
58	Font.na Di Nicolau	Ala' dei Sardi	40,71	9,37
59	Cant.ra Di S. Anna	Ianna de Sant'Anna	40,58	9,63
60	Funt.na Patronu	Bitti	40,58	9,47
61	S. Lucia	Siniscola	40,58	9,77
62	Pinn.ta Tres Montes	Ozieri	40,58	8,97
63	N.ghe Loelle	Budduso'	40,57	9,32
64	Font.na Sa Mela	Siniscola	40,57	9,64
65	F. Tirso	Budduso'	40,56	9,33
66	Sa Janna Renosa	Bitti	40,55	9,34
67	M. Mesanu	Bultei	40,52	9,07
68	M. Fgheras	Villanova Monteleone	40,50	8,37
69	M. Romasino	Villanova Monteleone	40,49	8,37
70	Monte Albo	Lula	40,47	9,53
71	Pizzonchi	Lula	40,46	9,49
72	Foresta Burgos	Burgos	40,42	8,94
73	Sa Minda	Orosei	40,42	9,75
74	Funt.na Coloras	Padria	40,39	8,63
75	Tres Funtanas	Bolotana	40,35	8,89
76	C. Scala E Attos	Bosa	40,35	8,48
77	N.ghe Ortachis	Bolotana	40,35	8,91
78	P.ta Palai	Bolotana	40,34	8,92
79	C. Tentizzos	Bosa	40,32	8,45
80	M. Muradu	Bosa	40,32	8,51
81	S. N. De Su Monte	Nuoro	40,32	9,37
82	P.te Di Olos	Oliena	40,30	9,48
83	Sorg.te De Su Cologone	Oliena	40,29	9,49
84	Cant.ra Abbadtzu	Suni	40,29	8,61
85	Portolato	Bortigali	40,28	8,85
86	Calagonone	Dorgali	40,28	9,64
87	C.le S. Giorgio	Bosa	40,28	8,49

Locality ID	IGM Toponym	Municipal district	Latitude	Longitude
88	Sollapiolos	Dorgali	40,27	9,60
89	M. Bonacoa	Dorgali	40,27	9,61
90	Nuragheddu	Dorgali	40,26	9,62
91	Giulia	Oliena	40,25	9,43
92	Maidreu	Dorgali	40,23	9,52
93	Gianna Ferru	Mamoiada	40,18	9,30
94	Codula De Luna	Urzulei	40,17	9,56
95	Donurtei	Fonni	40,07	9,26
96	M. Spada	Fonni	40,07	9,29
97	Cu.le Qualbu	Fonni	40,07	9,27
98	Riu Su Trocu	Fonni	40,06	9,26
99	Funt.na Masiai	Fonni	40,06	9,28
100	Qu.le Sos Beraniles	Fonni	40,06	9,25
101	Qu.le Is Rulas	Desulo	40,04	9,26
102	Funt.na Curadore	Desulo	40,03	9,23
103	Tala Sazias	Tonara	40,03	9,18
104	Zerroi	San Vero Milis	40,02	8,46
105	Sa Code	Desulo	40,02	9,28
106	Br.cu Spina	Villagrande Strisaili	40,02	9,30
107	Arcu Gennargentu	Villagrande Strisaili	40,01	9,32
108	Funt.na ‘E Piraona	Desulo	40,00	9,30
109	P.ta La Marmora	Arzana	39,99	9,32
110	St.gno Pauli E Sali	Cabras	39,95	8,51
111	Parduierru	Cabras	39,92	8,53
112	Can.le Brabbau	Oristano	39,90	8,53
113	C.lo ‘E S’Accu ‘E Su Suergiu	Laconi	39,88	9,09
114	Idrov. A Sassu	Arborea	39,82	8,58
115	Su Varongu	Pau	39,80	8,77
116	Scala Seremida	Sini	39,76	8,91
117	Pauli Maiori	Tuili	39,74	8,96
118	Pauli ‘E Palla Cammisa	Gesturi	39,74	9,00
119	Funt.na Ortu	Gesturi	39,74	9,00
120	Arridroxiu	Tuili	39,73	8,97
121	S. Luisa	Tuili	39,73	8,97
122	Su Nuraxi	Barumini	39,71	8,99
123	Planu Senis	Suelli	39,61	9,14
124	Perda Quaddu	Guspini	39,56	8,61
125	Montevecchio	Guspini	39,55	8,57
126	S.S. Del Gerre	Ballao	39,54	9,34
127	Piscinas	Arbus	39,54	8,45
128	P.ta Cugui	Arbus	39,52	8,58
129	R. Casciera	Arbus	39,52	8,50
130	F. Flumendosa	Armungia	39,51	9,41
131	Sa Mandara	Villacidro	39,48	8,73
132	Coddu De Su Medaueddu	Villacidro	39,47	8,72
133	R. Coxinas	Villacidro	39,46	8,71

Locality ID	IGM Toponym	Municipal district	Latitude	Longitude
134	Villacidro	Villacidro	39,46	8,73
135	Lavera	Fluminimaggiore	39,43	8,50
136	Sa Domo De Sani	Villasalto	39,42	9,31
137	Br.cu Berritta	Villasalto	39,42	9,31
138	Costa Pireddu	Muravera	39,41	9,60
139	Qu.le Sa Gotti Sa Perda	Burcei	39,40	9,39
140	Is Cucureddus	Dolianova	39,40	9,20
141	Cuili Piccinnu	Sinnai	39,39	9,29
142	Su Piroi	Burcei	39,38	9,36
143	P.ta Cucurnia	Iglesias	39,37	8,52
144	Serpeddieddu	Sinnai	39,36	9,29
145	S. Giovanni	Domusnovas	39,34	8,63
146	Cuili Becciu	Muravera	39,34	9,57
147	Campu Omo	Sinnai	39,31	9,39
148	Mitza Poni Fogu	Sinnai	39,30	9,43
149	Punta Sa Ceraxa	Sinnai	39,29	9,44
150	Riu Maidopis 1	Sinnai	39,29	9,41
151	Riu Maidopis 2	Sinnai	39,29	9,41
152	Riu Maidopis 3	Sinnai	39,29	9,41
153	Riu Maidopis 4	Sinnai	39,29	9,41
154	Perd 'Asub' 'E Pari	Sinnai	39,28	9,42
155	Aqueddas 1	Sinnai	39,28	9,43
156	Rio Samasa	Gonnesa	39,28	8,43
157	Aqueddas 2	Sinnai	39,28	9,43
158	C. Cappai	Maracalagonis	39,27	9,31
159	Arcu Su Crabiolu	Sinnai	39,27	9,43
160	Cast.O D'Acquafredda	Siliqua	39,26	8,82
161	C. Deas	Siliqua	39,26	8,82
162	N.ghe Sa Fraigada	Sinnai	39,26	9,40
163	Dispensa Vecchia	Sinnai	39,25	9,43
164	Su Rulloni	Cagliari	39,22	9,16
165	S. Lucia	Uta	39,20	8,94
166	C. Camboni	Siliqua	39,20	8,82
167	Can.le Sperrimeddas	Uta	39,20	8,91
168	Sa Canna	Uta	39,20	8,91
169	Sera Cannisoni	Siliqua	39,19	8,77
170	Riu Su Strumpu	Castiadas	39,17	9,56
171	C. Perdu Melis 1	Uta	39,16	8,87
172	C. Perdu Melis 2	Uta	39,16	8,87
173	Molentis	Villasimius	39,14	9,56
174	Manunzas	Villasimius	39,14	9,54
175	Sa Tanca	San Giovanni Suergiu	39,13	8,52
176	Is Pes	San Giovanni Suergiu	39,12	8,52
177	Sa Corona Arrubia	Calasetta	39,05	8,38
178	P.te S'Accorradroxu	Domus De Maria	38,94	8,83