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Aquatic Invasions Records

Distribution records of non-native terrapins in Castilla and León region (Central Spain)

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Abstract

During four years of project work (2006-2009), on the distribution and conservation of terrapins in the Castilla and León region (Spain), the majority of the rivers in this region were sampled. Datasets were obtained by compiling information after 2002, including citations by individuals and by field sampling, performed using visual linear transects (500-1000 m) and by live-capture using creels. The results reflect a significant increase in the number of records of non-native terrapins present. From more than 2000 points sampled a total of 67 positive results were obtained, distributed through nine provinces, in comparison with the six records and three provinces located in previous studies. These results allow us a more objective view of this problem and to determine with greater exactitude an action plan to manage it.

Key words: Castilla-León, distribution, invasion, Spain, terrapin, *Trachemys scripta*

Introduction

The appearance, at a global level, of non-native aquatic turtles in nature has long ceased, to be an anecdotal observation; true above all, when we speak of *Trachemys scripta elegans* (Weid, 1838). This terrapin is considered one of the hundred invasive alien species which cause most damage in the world (Lowe et al. 2004). Its presence has been confirmed in more than 25 countries (see GISD 2010) and in the majority of the continents (Cadi et al. 2004). Spain is not excluded from this process of invasion and by 2002 the presence of *T. s. elegans* had been confirmed in 29 provinces (Pleguezuelos et al. 2002). Specifically, in the region of study, Castilla and León, its presence was cited in one UTM 10×10 km square for Salamanca, two in Avila and four in Segovia. In December 1997 the EU banned the import of the species *T. s. elegans* (in Bringsøe 2006), this contributed to red-eared slider replacement by other species in the market of import (Adrados et al. 2002, in Bringsøe 2006). This could be one reason to new alien species us *T. s. scripta, Graptemys pseudo-geographica* (Gray, 1831), *Pseudemys floridana* (LeConte, 1830), *Chelydra serpentina* (Linnaeus, 1758), among others, begin to be observed in the nature (see for example Martínez-Silvestre et al. 2006).

A greater distribution, number of observations and studies of these alien species in other countries (see for example GISD 2010) and in other Spanish regions (De Roa and Roig 1997; Martínez Silvestre et al. 1997; Filella et al. 1999; Bertolero and Canicio 2000; Martínez-Silvestre and Cerradelo 2000; Mas and Perelló 2001; Ayres and Cordero 2002; Valdeón et al. 2010) could indicate that in Castilla and León the presence of these terrapins is underrated. During the period between years 2006-2009 the project "Distribution and State of Conservation of the terrapins in Castilla y Leon" was carried out, where one of the objectives was to determine the distribution of the non-native terrapins and to propose measures of action for their control.

Materials and methods

The data were obtained in two different ways; one by the compilation of data existing in the literature (Bermejo 2008; Alarcos et al. 2009) and from individual records and the other method was by direct sampling. The compilation of information was filtered using only those cited after the year 2002; the date in which the Atlas and Red Book of Amphibians and Reptiles of Spain was published (Pleguezuelos et al. 2002). Field sampling was performed from April to the middle of September during the four years that the project lasted (2006-2009). Sampling was carried out by visual transects between 500-1000 m distance along the banks of aquatic habitats, mainly rivers. On other occasions and due to the conditions of the habitat, non-determination of the species or other causes that impeded identification, nylon creels with attractive bait inside were used. We chose and sampled three points per UTM grid square of 10×10 km; however, if sampling of more stretches per grid square was considered appropriate the number of points was increased.

Results and discussion

More than 2000 points were sampled and a total of 67 positive points were obtained as distributed within the nine provinces of Castilla and León (Figure 1 and Table 1). The majority of the observations were of *T. s. elegans* and to a lesser extent *T. s. scripta*. Only two records of *G. pseudogeographica)* (E. Ayllón pers. com.) were obtained in the south of the province of Segovia. In many cases, the observations were of groups (see Table 1).

These new data yield a more reliable approach, compared with all record up to 2002, to the current spatial distribution of non-native terrapins in the region, and thus, facilitate immediate action on the part of the administrations. Note that poor previous prospection of the area might be responsible for the observed variation in the distribution between records showed in 2002 (Pleguezuelos et al. 2002) and our records obtained. New individual records are really valuable, but neither can prove new establishments nor expansion of alien species since 2002. Although large groups

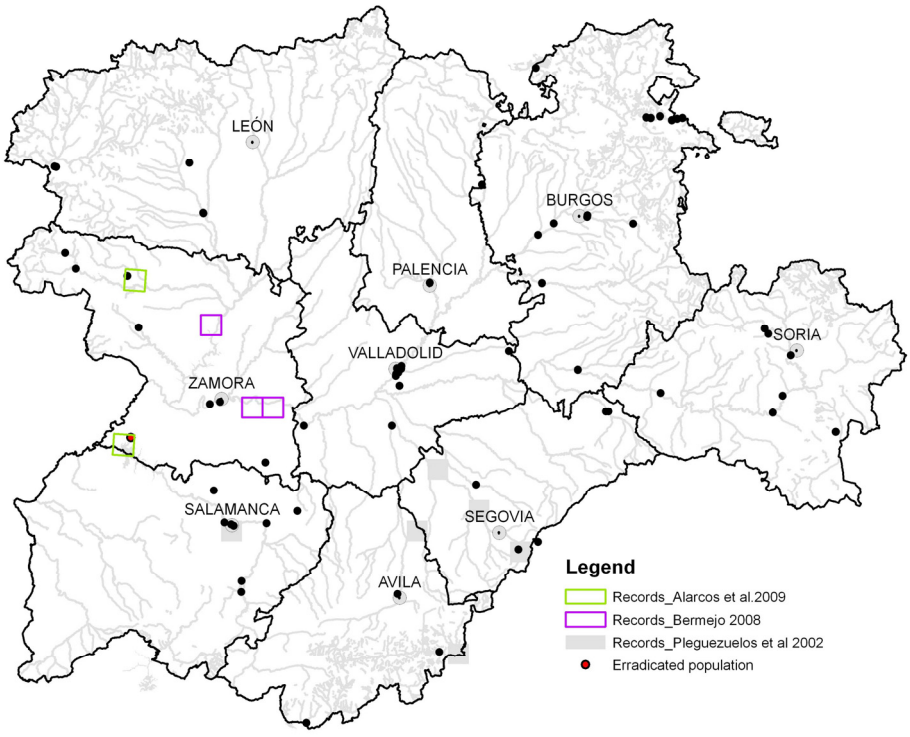

Figure 1. Map of the distribution of the new sites of non-native terrapins in the region of Castilla and León. The black points show the present distribution (new records of the present study), red point show an eradicated population (Rodríguez-Pereira & Lizana 2008), whereas the squares indicate the UTM grid squares 10×10 km with previous records (grey: belonging to the National Atlas, Pleguezuelos et al. 2002, green: Alarcos et al. 2009; purple: Bermejo 2008).

Table 1. Number of recorded non-native terrapins in the region of Castilla and León in 2006-2009. T.Re (Total records). UTM (UTM 10×10 Km square presence). NMax. (Maximum number of individuals observed together). Mean (Mean number observed in a same record). Total (Total terrapins observed).

	Ávila	Burgos	León	Palencia	Salamanca	Segovia	Soria	Valladolid	Zamora
T.Re	3	14	5	2	8	5	8	11	11
UTM	3	10	3	2	6	4	6	5	10
NMax	2	2	6	1	3	2	3	7	7
Mean	1,6	1,3	3,4	1	1,6	1,6	1,6	1,7	2,1
Total	5	16	17	2	13	8	13	19	23

of individuals have not been observed, the presence of both sexes at the same point has been confirmed and, thus, there is the possibility of reproduction, as occurs in other regions of Spain with warmer climates (De Roa and Roig 1997; Martínez Silvestre et al. 1997; Filella et al. 1999; Bertolero and Canicio 2000; Mas and Perelló 2001; Mingot et al. 2003). In addition, juveniles have been found in the province of Zamora (Bermejo 2008). Moreover, some of the individuals have been found close to or in the same stretches where native terrapins live, *Emys orbicularis* (Linnaeus, 1758) and *Mauremys leprosa* (Schweigger, 1812), which could give rise to competition (Cadi and Joly 2003; 2004) and/or transmission of pathogens (Bringsøe 2006; Hidalgo-Vila et al. 2008, 2009). These three points are sufficient argument to justify the commencement and development of a plan of action to minimise future releases or even their eradication. It is not necessary to wait to observe a large number of individuals and the possible problems caused to initiate a plan of action. The main objective of this proposed preventive action would be to diminish or eradicate the commerce via the aquarium trade and subsequent release of terrapins by individuals. Regulating or eliminating the sale of non-native terrapins in Spain is a difficult matter and slow to undertake administratively.

Nonetheless, acting on release prevention could prove more simple and viable. To this end we advise that a plan must be developed, which include outreach and education measures, e.g. placing of notices, talks in institutions/schools and making known any possible options for collection (agreements with zoos, animal rescue centres and points of sale). These actions could be complemented by an eradication plan, at least in high-risk zones; where a greater number of individuals have been observed; where they live together with native terrapin species; or in large aquatic habitats where the number of individuals is apparently increasing. Castilla and León has some of the largest reservoirs in Europe with surfaces of more than 8000 hectares. Waiting for these alien terrapins to settle or increase their number in these large masses of water as in other regions of Spain (see for example Bataller et al. 2009; Patiño and Marco 2005) would make their later eradication almost impossible, or at least very costly. This type of measure has already been taken into account in the province of Zamora (Rodríguez-Pereira and Lizana 2008).

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Annex 1. Records of non-native terrapin species in Castilla and León provinces during 2006-2009 (T.s.s. – *Trachemys scripta scripta*, *T.s.e* - *Trachemys scripta elegans, G.p.* - *Graptemys pseudogeographica). Notes and Pers.Com.* (1): G.M. Carrasco; (2): Alarcos et al. 2008; (3): E. Ayllón; (4): O. Alonso Bombín; (5):García Alfonso & Sanz Sanz; (6):Bermejo 2008).

Locality	Geographic coordinates			Species	Date	Notes and *Pers.com.*
	Latitude, N	Longitude, W	UTM 10×10			
Alberche River (Pte. Valsordo, Ávila)	40°25'29"	4°27'51"	30TUK77	*T.s.e*	2007	1 specimen
Adaja River (Emb. Fuentes Claras, Ávila)	40°40'32"	4°42'33"	30TUL50	*T.s.e*	2007	2 specimens
Tietar River (Emb. de Rosarito, Ávila)	40°06'27"	5°12'49"	30TUK14	*T.s.e*	2009	2 specimens
Ebro River (Emb. Del Ebro Arija, Burgos)	42°59'05"	3°56'59"	30TVN25	*T.s.e*	2008	1 specimen
Arlanzón River (Celada, Burgos)	42°15'22"	3°55'33"	30TVM27	*T.s.e*	2008	1 specimen
Arlanza River (Villahoz, Burgos)	42°02'41"	3°53'58"	30TVM25	*T.s.e*	2009	1 specimen
Arlanzón River (Brandovinez, Burgos)	42°18'23"	3°50'01"	30TVM38	*T.s.e*	2008	1 specimen
Duero River (Aranda de Duero, Burgos)	41°40'02"	3°41'07"	30TVM41	*T.s.e*	2008	2 specimens
Pool (Fuentes Blancas, Burgos)	42°20'09"	3°38'19"	30TVM48	*T.s.e*	2007	1 specimen
Wetland (Fuentes Blancas, Burgos)	42°20'36"	3°38'11"	30TVM48	*T.s.e*	2008	1 specimen
Arlanzón River (Emb. De Urquiza Villasur de Herreros, Burgos)	42°18'29"	3°22'4"	30TVM68	*T.s.e*	2006	1 specimen
Ebro River (Frias, Burgos)	42°46'17"	3°17'34"	30TVN73	*T.s.e*	2008	1 specimen
Ebro River (Montejo de Cebas, Burgos)	42°46'08"	3°15'54"	30TVN73	*T.s.e*	2008	1 specimen
Ebro River (Sta. Mª de Garoña, Burgos)	42°46'33"	3°12'36"	30TVN83	*T.s.e*	2008	1 specimen
Ebro River (Tobalinilla, Burgos)	42°45'31"	3°08'28"	30TVN83	*T.s.e*	2008	2 specimens
Ebro River (Tobalinilla, Burgos)	42°45'54"	3°06'35"	30TVN93	*T.s.e*	2008	1 specimen
Ebro River (Emb. Puentelarrá Villanueva Soportilla, Burgos)	42°46'07"	3°04'41"	30TVN93	*T.s.e*	2008	1 specimen
Carucedo Lakes (Carucedo, León)	42°29'42"	12°46'57"	29TPH80	*T.s.e*	2009	2 specimens
Carucedo Lakes (Carucedo, León)	42°29'35"	12°46'21"	29TPH80	*T.s.e*	2009	3 specimens
Emb. Baardiel (Antoñal del Valle, León)	42°32'04"	5°59'18"	30TTN51	*T.s.e*	2009	1 specimen
Tuerto River (Santa Colomba de la Vega, León)	42°19'00"	5°53'43"	30TTM68	*T.s.e*	2009	6 specimens (1)
Tuerto River (Santa Colomba de la Vega, León)	42°19'11"	5°53'50"	30TTM68	*T.s.e*	2009	5 specimens
Carrión River (Palencia)	42°02'16"	4°33'26"	30TUM75	*T.s.e*	2009	1 specimen
Castilla Channel (Naveros de Pisuerga, Palencia)	42°28'12"	4°15'34"	30TUN90	*T.s.e*	2008	1 specimen
Tormes River (Salamanca)	40°57'42"	5°40'29"	30TTL73	*T.s.e*	2006	Same individuals (2)
Tormes River (Salamanca)	40°57'15"	5°39'43"	30TTL73	*T.s.e*	2009	3 specimens
Wetland (Riolobos, Salamanca)	41°01'47"	5°17'49"	30TUL04	*T.s.e*	2009	1 specimen
Tormes River (Huerta, Salamanca)	40°58'22"	5°28'29"	30TTL93	*T.s.e*	2009	1 specimen
Tormes River (Villamayor, Salamanca)	40°58'16"	5°42'56"	30TTL73	*T.s.e*	2009	2 specimens
Cañedo Stream (Torresmenudas, Salamanca)	41°06'26"	5°47'10"	30TTL65	*T.s.e*	2009	1 specimen
Tormes River (Fresno Alhándiga, Salamanca)	40°43'05"	5°36'09"	30TTL71	*T.s.e*	2009	1 specimen
Tormes River (Embalse de Santa Teresa, Salamanca)	40°40'03"	5°36'20"	30TTL70	*T.s.e*	2007	1 specimen
Pirón River (Carbonero el Mayor, Segovia)	41°09'40"	4°16'07"	30TUL95	*T.s.e*	2007	1 specimen
Eresma River (Salto del Olvido Valsain, Segovia)	40°52'51"	4°01'10"	30TVL12	*G.p.*	2008	1 specimen (3)
Cambrones River (Emb. Pontón Alto La granja, Segovia)	40°54'54"	3°54'24"	30TVL22	*T.s.e* *G.p.*	2007	2 specimens
Riaza River (Maderuelo, Segovia)	41°29'09"	3°31'15"	30TVL59	*T.s.e*	2007	2 specimens

Annex 1. (continued)

Locality	Geographic coordinates			Species	Date	Notes and *Pers.com*.
	Latitude, N	Longitude, W	UTM 10×10			
Riaza River (Maderuelo, Segovia)	41°29'10"	3°30'23"	30TVL59	*T.s.e*	2007	2 specimens
Duero River (Baniel, Soria)	41°33'19"	2°29'37"	30TWM40	*T.s.e*	2006	1 specimen
Jalón River (Monteagudo de las Vicarias, Soria)	41°23'41"	2°11'14"	30TWL68	*T.s.e*	2006	1 specimen
Jalón River (Monteagudo de las Vicarias, Soria)	41°23'40"	2°11'19"	30TWL68	*T.s.e*	2007	1 specimen
Duero River (San Esteban de Gormaz, Soria)	41°34'08"	3°12'15"	30TVM80	*T.s.e*	2006	1 specimen
Duero River (Pedrajas, Soria)	41°50'56"	2°35'51"	30TWM33	*T.s.e*	2007	1 specimen
Duero River (Pedrajas, Soria)	41°49'31"	2°34'34"	30TWM33	*T.s.e*	2009	2 specimens
Duero River (Los Rábanos, Soria)	41°43'48"	2°26'42"	30TWM42	*T.s.e*	2008	3 specimens
Duero River (Almazán, Soria)	41°28'52"	2°33'04"	30TWL39	*T.s.e*	2006	2 specimens
Esgueva River (Embalse de Encinas, Valladolid)	41°44'49"	4°05'17"	30TMV02	*T.s.e*	2010	2 specimens (4)
Duero River (Castronuño, Valladolid)	41°24'06"	5°16'19"	30TUL18	*T.s.e*	2009	1 specimen
Pisuerga River (Valladolid)	41°37'47"	4°44'42"	30TUM51	*T.s.e*	2009	2 specimens
Lake (Laguna de Duero, Valladolid)	41°35'16"	4°43'18"	30TUM50	*T.s.e*	2007	1 specimen
Esgueva River (Valladolid)	41°39'57"	4°42'53"	30TUM51	*T.s.e*	2004	1 specimen (5)
Pisuerga River (Valladolid)	41°38'18"	4°44'34"	30TUM51	*T.s.e*	2007	3 specimens (5)
Pisuerga River (Valladolid)	41°40'21"	4°42'45"	30TUM51	*T.s.e*	2009	7 specimens
Esgueva River (Valladolid)	41°39'40"	4°42'53"	30TUM51	*T.s.e*	2006	1 specimen
Pools of Walvo Park, (Matapozuelos, Valladolid)	41°24'40"	4°45'42"	30TUL58	*T.s.e*	2007	a lot of (5)
Grande Park, Valladolid	41°38'43"	4°43'49"	30TUM51	*T.s.e*	2007	a lot of (5)
Castilla Channel (Valladolid)	41°39'43"	4°44'23"	30TUM51	*T.s.e*	2003	1 specimen (5)
Tormes River (Embalse de la Almendra, Zamora)	41°19'36"	6°16'18"	29TQF27	*T.s.e*	2006, 2007, 2008	1 specimen (2)
Duero River (Toro, Zamora)			30TTL99	*T.s.e*	2008	1 specimen (6)
Duero River (Toro, Zamora)			30TTL89	*T.s.e*	2008	1 specimen (6)
Esla River (Zamora)			30TTM63	*T.s.s*	2008	7 Neonates (6)
Aliste River (San Vicente de la Cabeza, Zamora)	41°48'30"	12°14'59"	29TQG23	*T.s.e*	2009	1 specimen
Duero River (Carrascal, Zamora)	41°29'07"	5°49'14"	30TTL69	*T.s.e*	2009	2 specimens
Duero River (Zamora)	41°29'47"	5°45'44"	30TTL69	*T.s.e*	2009	2 specimens
Pool (Fuentesaúco, Zamora)	41°14'17"	5°29'17"	30TTL96	*T.s.e*	2009	4 specimens
Tera River (Galende, Zamora)	42°07'08"	6°41'51"	29TPG96	*T.s.e*	2009	2 specimens
Tera River (Puebla de Sanabria, Zamora)	42°03'11"	6°37'55"	29TPG95	*T.s.e*	2006	1 specimen
Pool (Mombuey, Zamora)	42°01'47"	6°19'40"	29TQG25	*T.s.e*	2009	1 specimen (2)