Referencias

Alarcos, G., Flechoso del Cueto, F., Rodríguez-Pereira, A. & Lizana, M. 2010. Distribution records of non-native terrapins in Castilla and León region (Central Spain). *Aquatic Invasions*, 5-3: 303-308.

Bertolero, A. & Canicio, A. 2000. Nueva cita de nidificación en libertad de *Trachemys scripta elegans* en Cataluña. *Boletín de la Asociación Herpetológica Española*, 11: 84.

Cadi, A. & Joly, P. 2004. Impact of the introduction of the red-eared slider (*Trachemys scripta elegans*) on survival rates of the European pond turtle (*Emys orbicularis*). *Biodiversity and Conservation*, 13: 2511-2518.

De Roa, E. & Roig, J.M. 1998. Puesta en hábitat natural de la tortuga de Florida (*Trachemys scripta elegans*) en España. *Boletín de la Asociación Herpetológica Española*, 9: 48-50.

Keller, C. & Andreu, A.C. 2004. *Emys orbicularis* (Linnaeus, 1758). Galápago europeo. 137-142. *In*: Pleguezuelos, J. M., Márquez, R. & Lizana, M. (eds.), *Atlas y libro rojo de los anfibios y reptiles de España*. Dirección General de Conservación de la Naturaleza-A.H.E. Madrid.

Lowe S., M. Browne, S. Boudjelas & De Poorter, M. 2004. *100 de las Especies Exóticas Invasoras más dañinas del mundo. Una selección del Global Invasive Species Database*. Grupo Especialista de Especies Invasoras (GEEI) - Comisión de Supervivencia de Especies; UICN. Auckland, Nueva Zelanda.

Martínez-Silvestre, A., Hidalgo-Vila, J., Pérez-Santigosa, N. & Díaz-Paniagua, C. 2011. Galápago de Florida –*Trachemys scripta*. *In*: Salvador, A. & Marco, A. (eds.), *Enciclopedia Virtual de los Vertebrados Españoles*. Museo Nacional de Ciencias Naturales, Madrid. <http://www.vertebradosibericos.org/> [Consulta: 1 julio 2015].

Martínez-Silvestre, A., Flecha, C. & Soler, J. 2012. Observaciones de interacciones entre *Trachemys scripta elegans* y *Mauremys leprosa* en el pantano del Foix (Barcelona). *Boletín de la Asociación Herpetológica Española*, 23-1: 106-109.

Pleguezuelos, J.M. 2004. Las especies introducidas de Anfibios y Reptiles. 501-532. *In*: Pleguezuelos, J.M., Márquez, R. & Lizana, M. (eds.), *Atlas y libro rojo de los anfibios y reptiles de España*. Dirección General de Conservación de la Naturaleza-A.H.E. Madrid.

Polo-Cavia, N., López, P. & Martín, J. 2014. Interference competition between native Iberian turtles and the exotic *Trachemys scripta*. *Basic & Applied Herpetology*, 28: 5-20.

Telecky, T.M. 2001. United States import and export of live turtles and tortoises. *Turtle and Tortoise Newsletter*, 4: 8–13.

The last vipers in the lower Guadalquivir river basin and Cádiz province

Juan M. Pleguezuelos[1], Miguel Moya[2], Stephen D. Busack[3] & Mónica Feriche[1]

[1] Departamento de Zoología, Facultad de Ciencias. Universidad de Granada. 18071 Granada. Spain. C.e.: juanple@ugr.es

[2] Cl. Altair 8, Avda. del Altillo. 11407 Jerez de la Frontera. Cádiz. Spain.

[3] North Carolina State Museum of Natural Sciences. Raleigh. North Carolina 27601. U.S.A.

Fecha de aceptación: 3 de noviembre de 2015.

Key words: *Vipera latastei*, southern Spain, isolated populations, threatened populations, natural vegetation patches.

Resumen: Se aportan algunos casos de poblaciones de víbora hocicuda, *Vipera latastei*, que se han mantenido aisladas en paisajes intensamente modificados por el hombre, de baja altitud, en el sur de la península ibérica, gracias a la conservación de parches de vegetación natural. Algunas ya han desaparecido, otras aún podrían mantenerse, pero unas y otras son una prueba de lo que predicen los modelos de distribución, que la especie potencialmente ocupaba la mayoría de las altitudes y paisajes presentes en la península ibérica.

Although the current distribution of Lataste's viper, *Vipera latastei*, in the Iberian Peninsula appears basically mountainous, detailed examination of distributional data also demonstrates presence in lowlands, particularly in the south (Pleguezuelos & Santos, 2002). Ecological-niche factor analysis indicated low marginality and high tolerance scores for the Iberian population, suggesting the species was able to live under any environmental conditions present within the region. The presence in the north of other parapatric vi-

per species (*Vipera aspis* and *Vipera seoanei*), general transformation of the landscape, and human density, however, negatively affect occurrence of *V. latastei* (Santos *et al.*, 2006). After working in Cádiz Province between 1969 and 1972, SDB reported *V. latastei* populations within the province to be extremely isolated, localized, and of low density, and suggested it was possible that centuries of goat grazing and agriculture had eradicated the species from most lowlands of southern Spain (Busack, 1977). For the same reason, theoretically it is possible to find isolated populations of Lataste's viper in lowland areas that have escaped destruction of natural habitats.

On 31 March, 1972, an individual (Figure 1; CM 157695) was collected on Finca Guadalbardilla, a large property approximately 15.6 km (airline) ENE (compass direction 78 degrees, true; approximately N37.50007º / W5.47059º; ~ 161 masl) from Carmona, Sevilla Province, by one of us (MM). The area during 1972 was a wild hunting area (coto) of about 0.20 to 0.25 km^2 populated by holm oaks, wild olive trees, low shrubs and bushes (mastic trees, royal palms, kermes oak, rockroses) with a seasonal lagoon at one end, and inhabited by a diverse community of birds and mammals. Dogs and horses were frequently bitten by vipers during hunting. The protected hunting area, then surrounded by a grove of olive trees and processed agricultural land, was destroyed, trees and shrubs uprooted, land plowed, and lagoon dried out, in the 1990s.

In June, 2012, the shepherd at the Finca la Monclova (Figure 2), a very large property 6.2 km (airline) NNE (compass direction 22 degrees, true) from Fuentes de Andalucía, Sevilla Province (N37.516963º / W5.315283º; ~ 167 masl) informed us that cattle in an approximately 1.1 km^2 plot devoted to ranching, but with native vegetation and a seasonal lagoon, were sporadically bitten by vipers. Cattle poisoning by vipers was apparently more common 35 years ago, when the area of this plot was approximately 6 km^2. Following issuance of Act 34/1979 "sobre fincas manifiestamente mejorables" (BOE, 1979) that, with some exceptions, permits governmental appropriation of farms determined to be underutilized for livestock or agriculture, the owners converted much of the original plot to agricultural use. Repeated surveys by MF and JMP in 2012 and 2013 failed to find vipers, a situation not unusual for elusive snake species (Seigel, 1993).

Vipera latastei likely has been extirpated from Finca Guadalbardilla. A relict population may yet survive at Finca la Monclova,

Figure 1: *Vipera latastei*, skin prepared by MM (CM 157695). (March 2013).
Figura 1: *Vipera latastei*, piel preparada por MM (CM 157695). (Marzo 2013).

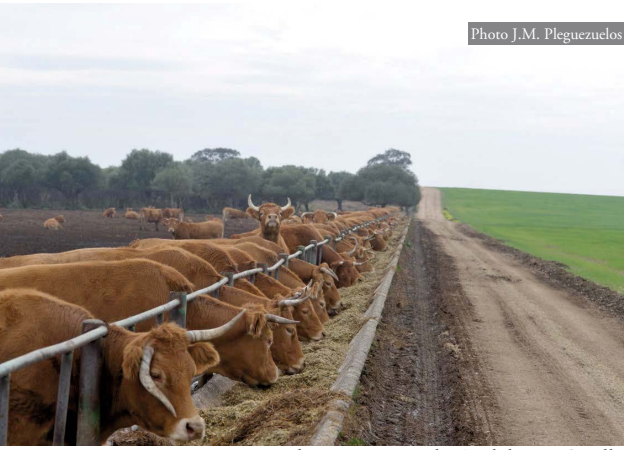
Photo J.M. Pleguezuelos

Figure 2: La Monclova, Fuentes de Andalucía, Sevilla Province. The forest behind the cattle corresponds to the remaining patch of natural vegetation supporting an isolated population of *V. latastei*.
Figura 2: La Monclova, Fuentes de Andalucía, provincia de Sevilla. El bosque detrás del ganado corresponde a los restos de una mancha de vegetación natural que alberga un población aislada de *V. latastei*.

and even at nearby Finca Miura-Zahariche (12 km WNW [airline], approximately N37.52545°, W5.45011°; ~ 148 masl; compass direction 275 degrees, true; L. García-Cardenete, personal comunication). But nearest known "donor" populations on the same slope of the Guadalquivir Basin are 60 airline kilometers distant (Baetic Mountains; UTM TF99), and those on the opposite bank of the Guadalquivir River are approximately 40 airline kilometers distant (Sierra Morena; UTM 10 x 10 km, UG09). Considering the species' low dispersal rate (Brito, 2003), the presence of the Guadalquivir river to the north, and the considerable landscape transformation, both historical and current (e.g., barriers like highways A-4 and A-92), affecting the lower Guadalquivir Valley, it is unlikely that emigration from distant populations into this area could be successful.

This note highlights the significance for conservation of patches of natural landscape in the Mediterranean Region. Although reduced in size, these patches serve to support species of high conservation concern (Byers *et al.*, 2001; Taïqui *et al.*, 2005), like isolated populations of *V. latastei* in the lower Guadalquivir valley and southeastern Cádiz Province (Busack & Salvador, 1984), persisting in areas largely managed and populated by humans from ancient times (Savory, 1968; Justicia, 1986).

References

BOE, 1979. Boletín Oficial del Estado 281: 27054-27056, 23 November 1979; <https://www.boe.es/buscar/doc.php?id=BOE-A-1979-27854> [Accessed: November 4, 2015] .

Brito, J.C. 2003. Seasonal variation in movements, home range, and habitat use by male *Vipera latastei* in northern Portugal. *Journal of Herpetology*, 37: 155–160.

Busack, S.D. 1977. Zoogeography of the amphibians and reptiles of Cádiz Province, Spain. Unpubl. M.S. thesis, George Mason University, Fairfax (Virginia). U.S.A. (<http://magik.gmu.edu/cgi-bin/Pwebrecon.cgi?BBID=69466>).

Busack, S.D., Salvador, A. 1984. Nuevos datos sobre la distribución de cuatro especies de reptiles en la provincia de Cádiz. *Doñana, Acta Vertebrata*, 11:322-325.

Byers, B.A., Cunliffe, R.N. & Hudak, A.T. 2001. Linking the conservation of culture and nature: a case study of sacred forests in Zimbabwe. *Human Ecology*, 29: 187–218.

Justicia, A. 1986. *Cambios en el uso agrícola del suelo en Andalucía: 1950-1980*. Facultad de Filosofía y Letras, Universidad de Málaga. Málaga.

Pleguezuelos, J.M., Santos, X. 2002. *Vipera latasti* Boscá, 1878. 299-301. *In*: Pleguezuelos, J.M., Márquez, R. & Lizana, M. (eds.), *Atlas y Libro Rojo de los Anfibios y Reptiles de España* (reimpresión en 2003 y 2004). Organismo Autónomo Parques Nacionales. Madrid.

Santos, X., Brito, J.C., Sillero, N., Pleguezuelos, J.M., Llorente, G.A., Fahd, S. & Parellada, X. 2006. Inferring habitat-suitability areas with ecological modeling techniques and GIS: A contribution to assess the conservation status of *Vipera latastei*. *Biological Conservation*, 130: 416-425.

Savory, H.N. 1968. Spain and Portugal. The prehistory of the Iberian Peninsula. *In*: Daniel, G. (ed.), *Ancient People and Places*. Vol. 61. Frederick A. Praeger. New York.

Seigel, R.A. 1993. Summary: future research on snakes, or how to combat "lizard envy". 395-402. *In*: Seigel, R.A. & Collins, J.T. (eds.), *Snakes – Ecology and Behavior*. McGraw Hill. New York.

Taïqui, L., Seva, E., Román, J.L. & Rha, A. 2005. Los bosquetes de los khaloa (morabitos) del Rif, Atlas Medio y región del Sus de Marruecos. *Ecosistemas*, 14: 31-41.