Distribution of the Exotic Pond Slider (*Trachemys scripta)* in Ontario

David C. Seburn

Seburn Ecological Services, 2710 Clarenda Street, Ottawa, Ontario K2B 7S5 Canada; email: davidseburn@sympatico.ca

Seburn, David C. 2015. Distribution of the exotic Pond Slider (*Trachemys scripta)* in Ontario. Canadian Field-Naturalist 129(4): 342–348.

The Pond Slider (*Trachemys scripta*) is a turtle native to the eastern United States, but, because of its popularity in the pet trade, it now occurs in many countries around the world as a result of escapes and the release of unwanted pets. The distribution of the Pond Slider in Ontario is reviewed based on 393 records obtained from various sources. Sliders have been reported from 130 spatially distinct sites in 35 districts. The Toronto area accounts for 67% of records, and more than 80% of reports are from urban areas. Pond Slider reports date back to the 1950s, but 63% of records are from 2010 or later. Sliders have been observed in Ontario during all months of the year except December. Sliders have bred in Ontario, but the spatial extent of successful reproduction remains unknown.

Key Words: Pond Slider; *Trachemys scripta*; invasive species; turtle; citizen science; pet trade

Introduction

The Pond Slider (*Trachemys scripta*) is a turtle native to eastern and central United States (Ernst and Lovich 2009). It has long been popular in the pet trade, with over 50 million exported from the United States from 1989 to 1997 (Global Invasive Species Database 2010). Most individuals in the pet trade belong to one subspecies, the Red-eared Slider (*T. s. elegans*). Although hatchlings are only 3 cm long (carapace length), adults can reach 30 cm (Ernst and Lovich 2009). The size of adults makes keeping them in captivity difficult because of the large aquaria required.

The large size and potential longevity of the species has resulted in the release or escape of many pet turtles. For example, 44% of households that previously owned a Red-eared Slider in Singapore had released the turtle (Ng 2009). The global pet trade has resulted in individuals being released beyond their natural range within the United States, including Hawaii (Ernst and Lovich 2009) as well as countries in Europe (e.g., Cadi and Joly 2003; Perez-Santigosa *et al.* 2008), Africa (Baard and de Villiers 2000), Asia (Haramura *et al.* 2008; Xu *et al.* 2012), Oceania (Burgin 2006; Feldman 2007), and South America (Iriarte *et al.* 2005; Alcalde *et al.* 2012). The Pond Slider is now the world's most widespread freshwater turtle (Ernst and Lovich 2009) and is considered one of the 100 most invasive species in the world (Lowe *et al.* 2000). Recognizing the threat of this invasive species, the European Union banned the import of Red-eared Sliders (but not other subspecies) in 1997 (Global Invasive Species Database 2010).

The effect of Pond Sliders on native turtle species is not well known. Sliders have been observed to compete for basking locations with native turtle species (Cadi and Joly 2003, 2004; Spinks *et al.* 2003). Native European Pond Turtles (*Emys orbicularis*) experienced both weight loss and high mortality in areas where Pond Sliders also occurred (Cadi and Joly 2004). Sliders may also be more efficient predators than some other turtle species (Nishizawa *et al.* 2014), and the presence of juvenile Pond Sliders can reduce the growth rate of other juvenile turtles when food resources are limited (Pearson *et al.* 2015). The ongoing release of exotic Pond Sliders into natural ecosystems also increases the risk of introducing non-native parasites (Oi *et al.* 2012) or spreading serious diseases, such as ranaviruses, to native turtles and other species (Johnson *et al.* 2007; Brenes *et al.* 2014).

Sliders have been confirmed to breed successfully in some introduced areas, including Spain (Perez-Santigosa *et al.* 2008), France (Cadi *et al.* 2004), Italy (Ficetola *et al.* 2009), Australia (O'Keefe 2009), Taiwan (Chen 2006), California (Spinks *et al.* 2003), and southwestern Ontario (Gillingwater 2013). Up to 98 nests a year have been reported from one site in Italy (Crescente *et al.* 2014). The potential reproductive output of Pond Sliders is considerable, as females nest as early as age 5 years and can lay multiple clutches a year (Perez-Santigosa *et al.* 2008).

Sliders have been reported from Ontario since the early 1950s (Lamond 1994), but their status and distribution has not been examined in detail. Currently seven of Ontario's eight native freshwater turtles are considered species at risk (Ministry of Natural Resources and Forestry 2015). The widespread presence of an exotic turtle species could have negative effects on native turtles. This paper summarizes what is known about the distribution of Pond Sliders in Ontario based on observations submitted to various citizen science monitoring programs and other sources.

Methods

Records were obtained from the Turtle Tally program of the Toronto Zoo, the Ontario Herpetofaunal Summary, the Ontario Reptile and Amphibian Atlas, published scientific literature, communications with biologists, and my own observations. The records from monitoring programs include observations until the end

A contribution towards the cost of this publication has been provided by the Thomas Manning Memorial Fund of the Ottawa Field-Naturalist's Club.

of 2013; observations from biologists extend to 2015. Twelve records had to be excluded because the reported latitude and longitude were within the Great Lakes or outside Canada. The major divisions of Ontario are referred to as districts in this paper, which include counties and regional municipalities. The number of discrete sites with Pond Sliders was determined by buffering all points using a 1.0-km radius using QGIS 2.0 Dufour (QGIS 2015). Buffered points that overlapped were considered to be part of the same site. A smaller radius would likely have produced more distinct sites, but would have separated some sites along rivers that are likely not isolated.

Results

A total of 393 records of Pond Sliders from across southern Ontario were obtained (Figure 1) representing 130 spatially distinct sites. The most northerly report of a Pond Slider was from just north of Kearney (45.5838°N). Sliders were reported from 35 districts. The city of Toronto accounted for 45% of all records and six Toronto area districts (Durham, Halton, Hamilton, Peel, Toronto, and York) made up 67% of the records. Urban areas accounted for more than 80% of all records. Most records were presumed to be Red-eared Sliders, as the red head stripes are the easiest diagnostic feature. Only one record specifically mentioned a Pond Slider without red head stripes (19 May 2003, from Cedar Creek Conservation Area in Essex county), but this does not confirm another subspecies as the head stripes can fade with age (Gillingwater and MacKenzie 2015).

The earliest known record from Ontario is a Pond Slider "at the mouth of Chedoke creek on the south shore of Cootes Paradise in the early 1950s" observed by G. A. Meyers (Lamond 1994). Most records (63%) are from 2010 or later (Figure 2). Sliders have been reported from Ontario in all months of the year except December (Figure 3). The earliest observation date was 12 January (2013) of a basking turtle in Toronto. The temperature that day reached 14.8°C at Pearson International Airport (Environment Canada 2015). The latest sighting date was 8 November (2009) with observations from three sites in Hamilton. The number of observations per month from April to August differed significantly with more observations in May than any other month ($\chi^2 = 12.006$, $P < 0.05$).

Most sites with observations of Pond Sliders have only one or a few observations of single turtles. The site with the greatest number of reported Pond Sliders is Grenadier Pond in High Park in Toronto. Sliders were first reported there on 20 September 1988, and up to 30 individuals have been observed at once (26 September 1993). Other sites with reports of at least five Pond Sliders include: Cootes Paradise in Hamilton (five observed on 30 June 2013), the Credit River in Mississauga (five observed on 8 August, 2013), Shoemaker Pond in Kitchener (six reported on 19 April 1996), Milliken Park in Toronto (seven observed on 18 August 2013), the Thames River in London (11 reported on 29 August 2013), and Ojibway Park in Windsor (at least 20 in 2012; Tom Preney, Ojibway Nature Centre, personal communication).

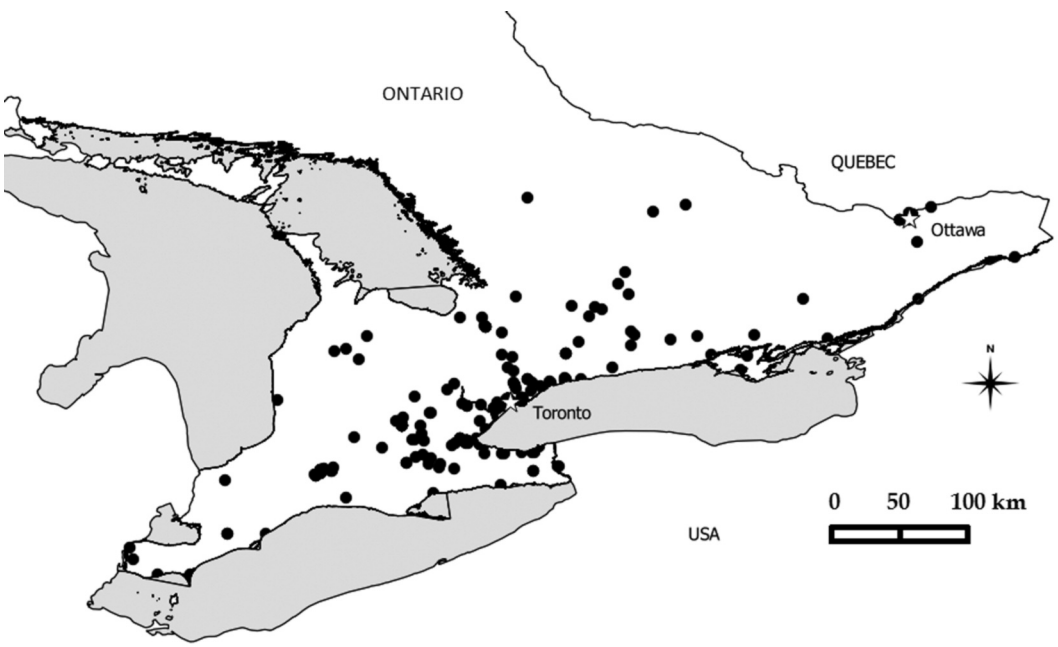

FIGURE 1. Location of 393 observations of the exotic Pond Slider (*Trachemys scripta*) in Ontario.

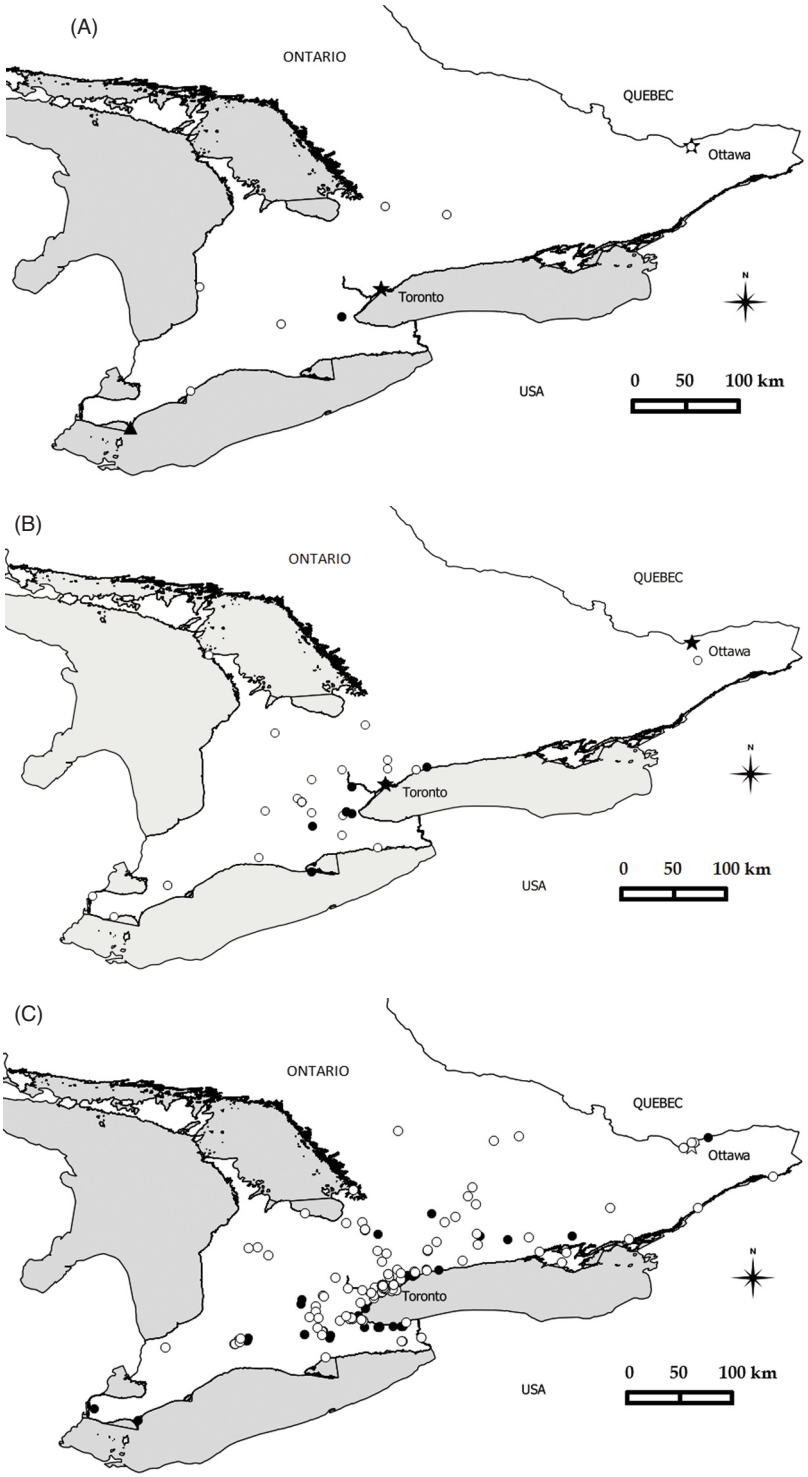

FIGURE 2. Location of observations of the exotic Pond Slider (*Trachemys scripta*) in Ontario by decade. (A) Observations from the 1950s (solid circles), 1960s (open circles), and 1970s (solid triangles). (B) Observations from the 1980s (solid circles) and 1990s (open circles). (C) Observations from the 2000s (solid circles) and 2010s (open circles).

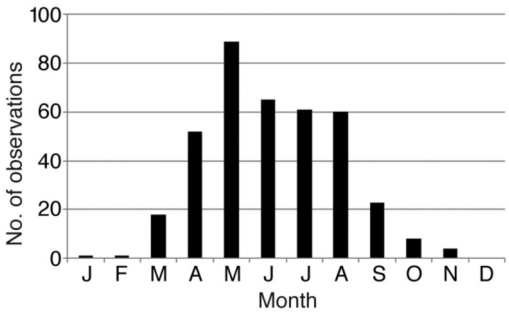

FIGURE 3. Frequency distribution of observations of the exotic Pond Slider (*Trachemys scripta*) in Ontario by month.

Twenty-one Pond Sliders, including four dead, were found on roads from 28 April to 17 October, with more such incidents reported in June than any other month. All but two observations (4 August 1990 in Bruce County and 3 July 1996 in rural Ottawa) were from 2009 or later. In addition to the four Pond Sliders found dead on roads, 12 dead Pond Sliders were found between 21 February and 29 May, possibly as a result of winter kill. Most reports were of individual dead turtles, but there were two observations of four dead Pond Sliders. The reports of multiple dead Pond Sliders were from Ojibway Park in Windsor (19 April 1994) and Lakeside Park in Kitchener (13 April 1997). Six of the 12 reports of dead Pond Sliders were from Lakeside Park in Kitchener, from 1994, 1996, and 1997.

The observation of Pond Sliders at the same site in multiple years suggests successful overwintering, although it is possible that new turtles were released each year. A Pond Slider in a former gravel pit near Orillia appears to have survived three winters (Jeff Hathaway, Scales Nature Park, personal communication). The most northerly location where Pond Sliders have been observed in multiple years is Britannia Conservation Area in Ottawa.

Observations of Pond Sliders in early spring are also suggestive of successful overwintering, as it seems unlikely that pet Pond Sliders would be released during cold weather. The report of a basking Pond Slider on 28 March in Toronto suggests that Pond Sliders can overwinter in southern Ontario. None of the 20 observations of Pond Sliders before the end of March are from locations north of the Toronto area. Only one of the 52 records from April is from north of Toronto: a Pond Slider found in Ottawa on 24 April 1962.

There were eight reports of Pond Sliders nesting in Ontario. As none of the observations provides any additional details, it is unclear whether the turtles were laying eggs. All of these observations were made between 14 May and 5 July, which corresponds to the typical turtle nesting period in Ontario. Although most of the observations are from the Toronto area, one report is from Peterborough and one from just south of Algonquin Provincial Park. Although not a nesting observation, I found an adult female Pond Slider wandering on land during the day, possible pre-nesting behaviour, at the Britannia Conservation Area in Ottawa on 18 June 2013. Three hatchling-sized Pond Sliders were found dead on roads in Windsor on three dates: 22 May 2013, 11 June 2013, and 27 May 2015 (Jonathan Choquette, SCC Ecological, personal communication). It is possible these turtles hatched in the wild, as adult Pond Sliders are known from the nearby Ojibway Park, but it is also possible that young Pond Sliders had been released in this area.

Discussion

There are many limitations to the data presented here. Twelve records had to be excluded because the data points were either from the middle of the Great Lakes or from the United States. It is unknown whether other locality information is incorrect, but still map within Ontario, as not all records include text descriptions of the locations. Despite some geographic uncertainty associated with the data, it is clear that Pond Sliders are widespread in southern Ontario. The distribution of Pond Sliders in Ontario is almost certainly underestimated, because many people assume that small basking turtles are Painted Turtles (*Chrysemys picta*). Also, one or two Pond Sliders among many Painted Turtles would be difficult to detect. In one case, an observation of two "Painted Turtles" submitted to the Toronto Zoo's Turtle Tally was accompanied by a photograph that revealed that one of the turtles was a Red-eared Slider. Without the photograph, the Pond Slider would have gone undocumented. There is also evidence that exotic species occurring at low densities will be overlooked by volunteer surveyors (Fitzpatrick *et al.* 2009). Nonetheless, citizen science programs are valuable in detecting exotic species across a broad geographic area (e.g., Delaney *et al.* 2008; Azzurro *et al.* 2013).

Significant increases in reports of Pond Sliders over the years may be because of an increase in released turtles, the growing popularity of monitoring programs, the proliferation of digital cameras making identification of turtles easier, or a combination of factors. For example, the increase in observations after the 1970s corresponds with the start of the Ontario Herpetofaunal Summary. The largest peak in data, in the 2010s, is a result of the Turtle Tally program of the Toronto Zoo, which was launched in 2003 but became very popular a few years later.

Sliders were available for sale in Toronto at least as early as 1945 (Francis Cook, Canadian Museum of Nature, personal communication). By 1960 over 150 turtle farms had been established in the southern United States to supply the demand in the pet trade (Ernst and Lovich 2009). This timeline suggests that Pond Sliders appeared in Ontario and were released into the wild soon after they entered the pet trade, as the first record from the province is from the 1950s in Hamilton.

By the end of the 1970s, Pond Sliders had been reported from only a few locations, and most of these were rural areas, including Rondeau Provincial Park and Point Pelee National Park. The only urban sites with reported Pond Sliders were in Hamilton and Ottawa. Either people were generally not releasing Pond Sliders in urban areas or observers were not reporting these releases. Sliders were not reported from High Park in Toronto until 1988, well after the Ontario Herpetofaunal Summary began in the early 1980s.

The observation of the largest number of Pond Sliders was 30 individuals in Grenadier Pond in High Park, Toronto, although it is uncertain how many Pond Sliders occur at this site. Exotic populations of Pond Sliders can reach large numbers: at least 125 were removed from a waterway in California (Spinks *et al.* 2003) and 662 were caught at four sites in Singapore (Ng 2009).

Winter mortality has been observed in Ontario, but it is unclear whether the small number of winter-killed Pond Sliders is because of successful overwintering or a lack of observations. Six of the 12 records of possibly winter-killed Pond Sliders were reported by one observer from one site in Kitchener, indicating that one dedicated observer can significantly influence results.

Over 80% of the reports of Pond Sliders were from urban areas. This is similar to results from California where most introduced Pond Sliders were found near urban areas (Thomson *et al.* 2010). If Pond Sliders are mainly limited to urban or suburban wetlands, then they may have less negative effect on native turtles. For example, at Point Pelee National Park, intensive survey work resulted in the capture of over 1500 turtles during 2001 and 2002, yet only three Pond Sliders were observed (Browne and Hecnar 2007). Similarly, turtle surveys at four natural sites along the north shore of Lake Erie from 1996 to 2015 resulted in the capture of over 2500 turtles, with only a single Red-eared Slider observed (Scott Gillingwater, Upper Thames River Conservation Authority, personal communication).

Although Pond Sliders can survive in many areas of the world, successful breeding is limited to a subset of these locations (Ficetola *et al.* 2009), mainly in areas with a climate similar to or warmer than the native range of the Pond Slider in southeastern United States (e.g., Kikillus *et al.* 2010). Sites with known breeding populations of Pond Sliders in Italy had warmer summer and winter temperatures than sites where breeding was not occurring (Ficetola *et al.* 2009). Climate change models suggest that Pond Sliders will be able to expand their breeding range greatly in Italy (Ficetola *et al.* 2009), and this will also likely be the case in Ontario, with feral Pond Sliders able to breed successfully beyond southwestern Ontario.

Hatchling Red-eared Sliders are currently for sale in many stores across Ontario (personal observation). Those that survive have a high probability of being released in the future when they become larger. One way to limit the release of Pond Sliders would be to ban their sale in Ontario, or at least ban the sale of turtles under a certain size. If the sale of hatchlings is stopped, then the market for Pond Sliders would likely be drastically reduced. There is precedent for this, as the United States banned the sale of domestic turtles less than 10 cm in length in 1975 because of the risk of salmonella (Ernst and Lovich 2009).

Although there is some evidence that exotic Pond Sliders can negatively affect native turtles (e.g., Cadi and Joly 2003, 2004; Spinks *et al.* 2003), there is limited information on their effects on turtles of eastern North America. For example, basking competition may not be a major issue in Ontario, as, within the native range of the Pond Slider, competition for basking sites is typically won by the largest individual turtle, regardless of the species (Lindeman 1999). Although Pond Sliders have been released across much of southern Ontario, it appears that most have been released in the Toronto area and other urban areas where the risk to native turtle populations is relatively low. The risk to other species groups may be greater. For example, Pond Sliders are confirmed transmitters of ranavirus to amphibians, while they are apparently unaffected by the disease themselves (Brenes *et al.* 2014). Without some control on the sale of Pond Sliders the number of individuals released into Ontario can only be expected to increase over time along with the risk of spreading disease.

Acknowledgements

I am grateful to all the dedicated volunteers who collected the Pond Slider observations and the various organizations that provided monitoring data for this review. Thanks to Jonathan Choquette, Francis Cook, Jeff Hathaway, Tom Preney, and Scott Gillingwater for their Pond Slider observations and to Rob Willson for GIS advice. This paper benefitted from review comments from Carolyn Seburn and two anonymous reviewers.

Literature Cited

Alcalde, L., N. N. Derocco, S. D. Rosset, and **J. D. Williams.** 2012. Southernmost localities of *Trachemys dorbigni* and first record of *Trachemys scripta elegans* for Argentina (Cryptodira: Emydidae). Chelonian Conservation and Biology 11: 128–133.

Azzurro, E., E. Broglio, F. Maynou, and **M. Bariche.** 2013. Citizen science detects the undetected: the case of *Abudefduf saxatilis* from the Mediterranean Sea. Management of Biological Invasions 4: 167–170.

Baard, E. H. W., and **A. L. de Villiers.** 2000. State of biodiversity: Western Cape Province, South Africa Amphibians and Reptiles. Western Cape Conservation Board, Stellenbosch, South Africa. Accessed 21 November 2015. http://www.oceandocs.org/bitstream/handle/1834/709/herpetofauna.pdf?sequence=1&isAllowed=y.

Brenes, R., M. J. Gray, T. B. Waltzek, R. P. Wilkes, and **D. L. Miller.** 2014. Transmission of ranavirus between ectothermic vertebrate hosts. PLOS ONE 9: e92476.

Browne, C. L., and **S. J. Hecnar.** 2007. Species loss and shifting population structure of freshwater turtles despite habitat protection. Biological Conservation 138: 421– 429.

Burgin, S. 2006. Confirmation of an established population of exotic turtles in urban Sydney. Australian Zoologist 33: 379–384.

Cadi, A., and **P. Joly.** 2003. Competition for basking places between the endangered European pond turtle (*Emys orbicularis galloitalica*) and the introduced red-eared slider (*Trachemys scripta elegans*). Canadian Journal of Zoology 81: 1392–1398.

Cadi, A., and **P. Joly.** 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.

Cadi, A., V. Delmas, A. C. Prévot-Julliard, P. Joly, C. Pieau, and **M. Girondot.** 2004. Successful reproduction of the introduced slider turtle (*Trachemys scripta elegans*) in the South of France. Aquatic Conservation: Marine and Freshwater Ecosystems 14: 237–246.

Chen, T.-H. 2006. Distribution and status of the introduced red-eared slider (*Trachemys scripta elegans*) in Taiwan. Pages 187–195 *in* Assessment and Control of Biological Invasion Risks. *Edited by* F. Koike, M. N. Clout, M. Kawamichi, M. De Poorter, and K. Iwatsuki. Shoukadoh Book Sellers, Kyoto, Japan, and International Union for Conservation of Nature, Gland, Switzerland.

Crescente, A., E. Sperone, G. Paolillo, I. Bernabò, E. Brunelli, and **S. Tripepi.** 2014. Nesting ecology of the exotic *Trachemys scripta elegans* in an area of Southern Italy (Angitola Lake, Calabria). Amphibia-Reptilia 35: 366–370.

Delaney, D. G., C. D. Sperling, C. S. Adams, and **B. Leung.** 2008. Marine invasive species: validation of citizen science and implications for national monitoring networks. Biological Invasions 10: 117–128.

Environment Canada. 2015. Climate. Environment Canada, Ottawa, Ontario, Canada. Accessed 19 January 2015. http://climate.weather.gc.ca/.

Ernst, C. H., and **J. E. Lovich.** 2009. Turtles of the United States and Canada. 2nd edition. Johns Hopkins University Press, Baltimore, Maryland, USA.

Feldman, M. L. 2007. The red-eared slider turtle (*Trachemys scripta elegans*) in New Zealand. Turtle and Tortoise Newsletter 10: 15–18.

Ficetola, G. F., W. Thuiller, and **E. Padoa-Schioppa.** 2009. From introduction to the establishment of alien species: bioclimatic differences between presence and reproduction localities in the slider turtle. Diversity and Distributions 15: 108–116.

Fitzpatrick, M. C., E. L. Preisser, A. M. Ellison, and **J. S. Elkinton.** 2009. Observer bias and the detection of low-density populations. Ecological Applications 19: 1673–1679.

Gillingwater, S. 2013. Successful reproduction in the wild of non-native Red-eared Slider in Ontario (abstract). Presented at the Canadian Amphibian and Reptile Conservation Network annual meeting, Orford, Quebec, 13–15 September 2013. Canadian Herpetological Society.

Gillingwater, S. D., and **A. S. MacKenzie.** 2015. Photo Field Guide to the Reptiles and Amphibians of Ontario. St. Thomas Field Naturalist Club, St. Thomas, Ontario, Canada.

Global Invasive Species Database. 2010. *Trachemys scripta elegans*. Invasive Species Specialist Group, Species Survival Commission, International Union for Conservation of Nature, Gland, Switzerland. Accessed 15 January, 2015. http://www.issg.org/database/welcome/.

Haramura, T., M. Yamane, and **A. Mori.** 2008. Preliminary survey on the turtle community in a lotic environment of the Kizu River. Current Herpetology 27: 101–108.

Iriarte, J. A., G. A. Lobos, and **F. M. Jaksic.** 2005. Invasive vertebrate species in Chile and their control and monitoring by governmental agencies. Revista Chilena de Historia Natural 78: 143–154.

Johnson, A. J., A. P. Pessier, and **E. R. Jacobson.** 2007. Experimental transmission and induction of ranaviral disease in western ornate box turtles (*Terrapene ornata ornata*) and red-eared sliders (*Trachemys scripta elegans*). Veterinary Pathology 44: 285–297.

Kikillus, K. H., K. M. Hare, and **S. Hartley.** 2010. Minimizing false-negatives when predicting the potential distribution of an invasive species: a bioclimatic envelope for the red-eared slider at global and regional scales. Animal Conservation 13 (Supplement S1): 5–15.

Lamond, W. G. 1994. The Reptiles and Amphibians of the Hamilton Area: An Historical Summary and the Results of the Hamilton Herpetofaunal Atlas. Hamilton Naturalists' Club, Hamilton, Ontario, Canada.

Lindeman, P. V. 1999. Aggressive interactions during basking among four species of emydid turtles. Journal of Herpetology 33: 214–219.

Lowe, S., M. Browne, S. Boudjelas, and **M. De Poorter.** 2000. 100 of the World's Worst Invasive Alien Species A selection from the Global Invasive Species Database. Invasive Species Specialist Group, Species Survival Commission, International Union for Conservation of Nature, Gland, Switzerland.

Ministry of Natural Resources and Forestry. 2015. Species at risk in Ontario list. Ministry of Natural Resources and Forestry, Toronto, Ontario, Canada. Accessed 3 October 2015. http://www.ontario.ca/environment-and-energy/species-risk-ontario-list.

Ng, P. K. A. 2009. The ecology of the non-native red-eared sliders and their potential impacts on the native fauna of Singapore. PhD thesis, National University of Singapore, Singapore.

Nishizawa, H., R. Tabata, T. Hori, H. Mitamura, and **N. Arai.** 2014. Feeding kinematics of freshwater turtles: what advantage do invasive species possess? Zoology 117: 315–318.

Oi, M., J. Araki, J. Matsumoto, and **S. Nogami.** 2012. Helminth fauna of a turtle species introduced in Japan, the red-eared slider turtle (*Trachemys scripta elegans*). Research in Veterinary Science 93: 826–830.

O'Keeffe, S. 2009. The practicalities of eradicating Red-eared Slider turtles (*Trachemys scripta elegans*). Aliens: The Invasive Species Bulletin 28: 19–25.

Pearson, S. H., H. W. Avery, and **J. R. Spotila.** 2015. Juvenile invasive red-eared slider turtles negatively impact the growth of native turtles: implications for global freshwater turtle populations. Biological Conservation 186: 115–121.

Perez-Santigosa, N., C. Díaz-Paniagua, and **J. Hidalgo-Vila.** 2008. The reproductive ecology of exotic *Trachemys scripta elegans* in an invaded area of southern Europe. Aquatic Conservation: Marine and Freshwater Ecosystems 18: 1302–1310.

QGIS. 2015. QGIS: A free and open source geographic information system. Accessed 20 January 2015. http://www.qgis.org/en/site/.

Spinks, P. Q., G. B. Pauly, J. J. Crayon, and **H. B. Shaffer.** 2003. Survival of the western pond turtle (*Emys marmorata*) in an urban California environment. Biological Conservation 113: 257–267.

Thomson, R. C., P. Q. Spinks, and **H. B. Shaffer.** 2010. Distribution and abundance of invasive red-eared sliders (*Trachemys scripta elegans*) in California's Sacramento River Basin and possible impacts on native western pond turtles (*Emys marmorata*). Chelonian Conservation and Biology 9: 297–302.

Xu, H., S. Qiang, P. Genovesi, H. Ding, J. Wu, L. Meng, Z. Han, J. Miao, B. Hu, J. Guo, H. Sun, C. Huang, J. Lei, Z. Le, X. Zhang, S. He, Y. Wu, Z. Zheng, L. Chen, V. Jarošík, and **P. Pyšek.** 2012. An inventory of invasive alien species in China. NeoBiota 15: 1–26.

Received 25 May 2015
Accepted 26 October 2015