



A Captive Study of Interactions between the Invasive Red-eared Slider, *Trachemys scripta elegans* (Wied 1838), and Native Indian Turtles

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Photographs by the author.

Native flora and fauna are facing diverse and intense threats, including the rising impact of invasive species (Marchetti and Engstrom 2016). Many nations throughout the world are losing their natural and endemic biodiversity due to multiple invasive species (Lowe et al. 2004). The IUCN identifies an Invasive Alien Species (IAS) as a non-native species that becomes established in natural or semi-natural ecosystems or habitats and threatens native biological diversity (Lowe et al. 2004). IAS remained a neglected subject until 1982, when the General Assembly of the Scientific Committee on Problems of the Environment (SCOPE) addressed the ecology of biological invasions (Drake et al. 1989). In India, this issue was discussed and

addressed properly for the first time as a national concern in 1989 (Ramkrishnan 1991). In 2017, the Zoological Survey of India compiled a list of 157 invasive species in India, of which 24 were either terrestrial or freshwater vertebrates (ZSI/BSI 2017). Of those 24, 19 were fishes, one was reptilian, two were birds, and two were mammals. Unfortunately, that list did not lead to formulating any applicable national legislation. Consequently, India continues to be a thriving import market for many exotic plants and animals, including the Red-eared Slider, *Trachemys scripta elegans* (Fig. 1).

The Red-Eared Slider, one of three currently recognized subspecies of the Pond Slider, is a medium-sized (carapace length to 30 cm) semi-aquatic turtle with a consider-



Fig. 1. A female Red-eared Slider (*Trachemys scripta elegans*) at the Sayaji Baug Zoo, Vadodara, Gujarat, India.

able presence in the Indian pet market. The native habitat of *T. scripta elegans* is the greater Mississippi River Valley of North America (Ernst and Lovich 2009; Powell et al. 2016). Many USA-based breeding farms export millions of individuals annually for the pet trade, food, or religious purposes (Telecky 2001). Turtle farms in many Asian countries, including Thailand, Malaysia, and China, also contribute to the problem (Ramsay et al. 2007; Shi et al. 2008).

Red-eared Sliders are omnivorous, exhibiting an ontogenetic shift from a mostly carnivorous diet in smaller individuals to one that is primarily herbivorous in larger turtles (Ernst and Lovich 2009). Juveniles benefit from a protein-rich diet that facilitates growth (Bouchard and Bjorndal 2006). Also, although the largest turtles tend to herbivory, reproductive females exhibit a shift to more animal food, which appears to promote egg production (Works and Olson 2018).

Red-eared Sliders are the most widely distributed turtles in the world (Lever 2003; Ramsay et al. 2007; Kraus 2009), largely attributable to the live animal trade (Ng et al. 2005; Ramsay et al. 2007; Singh 2015). Naturalized populations have been recorded from at least 73 countries and overseas territories in Europe, Africa, Asia, Australia, North, Central, and South America, and Oceania (Lever 2003; Chen 2006; Scalera 2006; Pupins 2007; Ramsay et al. 2007; Kraus 2009; Kikillus et al. 2010; van Dijk et al. 2011; Ficetola et al. 2012; Uetz et al. 2020), one of the fundamental reasons why the IUCN has identified and listed this species as one of world's top 100 worst invasive animals (Lowe et al. 2004). Numerous studies have reported that the invasive Red-eared Sliders breed successfully in their new habitats (e.g., Arvy and Servan

1998; Cadi and Joly 2004; Shi et al. 2004, 2008; Kikillus et al. 2010; Pérez-Santigosa et al. 2011; Ficetola et al. 2012).

Many household aquarists and private hobbyists in India keep Red-eared Sliders. Private dealers and some zoos also have been maintaining breeding populations for sale and exhibition purposes, and large numbers of these turtles are imported or smuggled into India every year (Mukherjee 2013). The presence of the species in India was first noted by Pupins (2007), who provided no additional details. Red-eared Sliders are now well established in many Indian states, including Maharashtra (Goenka 2013; Kunju 2014; Telang 2016; Chatterjee 2018), Karnataka (Chetan 2013), Gujarat (Munjpara 2014; Vyas 2015, 2019; Patel and Vyas 2019), Telangana (Reddy 2016), Chandigarh, (Singh 2015), West Bengal (Bandyopadhyay 2015; Choudhuri et al. 2018), Goa (Jadav et al. 2018a), and Rajasthan (Vyas 2019).

Relatively few studies have addressed the effects of this invasive species on native turtles (but see Cadi and Joly 2003, 2004; Pupins 2007; Polo-Cavia et al. 2008; Martins et al. 2014; Moradi and Rastegar-Pouyani 2015; Pearson et al. 2015). The potential impact of an exotic invasive turtle on the endemic Indian fauna, especially the native turtles, is unknown and needs to be studied (Choudhuri et al. 2018; Patel and Vyas 2019; Vyas 2019). Herein I present the results of an investigation with the intent to better understand interactions between Red-eared Sliders and native turtles in captivity.

Methods

I conducted a one-year study of captive turtles from January to December 2015 at the Sayaji Baug Zoo, Vadodara,



Fig. 2. A female Indian Roofed Turtle (*Pangshura tecta*) at the Sayaji Baug Zoo, Vadodara, Gujarat, India.



Fig. 3. An adult male Indian Flap-shelled Turtle (*Lissemys punctata*) (left) and a juvenile Indian Roofed Turtle (*Pangshura tecta*) (right) feeding on plant leaves (*Coriandrum sativum*) at the Sayaji Baug Zoo, Vadodara, Gujarat, India.

Gujarat, India, where 16 Red-eared Sliders of various ages and sizes were housed with a breeding population (9M:6F) of Indian Roofed Turtles, *Pangshura tecta* (Fig. 2) and two juvenile Indian Flap-shelled Turtles, *Lissemys punctata* (Fig. 3). The rectangular enclosure measured 4 x 5 m and was furnished with stones and plants to resemble natural habitat. The top was screened with wire mesh for protection against predators. An irregularly shaped water tank (3 x 2 m and a

depth of 0.5 m) had a gentle slope on one side. The soil inside the enclosure was mixed with equal amounts of sand to prevent it from becoming too compacted. Turtles were fed once daily with eight species of plants (see Vyas 1997) mixed with some chopped fish and meat. The water inside the pool was cleaned every 15–20 days at which time the health of each turtle was checked (Fig. 4); all turtles were dewormed every three months.



Fig. 4. All of the Red-eared Sliders (*Trachemys scripta elegans*) and Indian Roofed Turtles (*Pangshura tecta*) held temporarily in a bathtub for inspection and deworming at the Sayaji Baug Zoo, Vadodara, Gujarat, India.



Fig. 5. Adult female Red-eared Sliders (*Trachemys scripta elegans*) capturing hatchling Indian Roofed Turtles (*Pangshura tecta*) at the Sayaji Baug Zoo, Vadodara, Gujarat, India.

Observations

During January, interactions between turtles were limited to low levels of aggression during feeding time and turtles basked in close proximity to one another. In February, we found a pair of Indian Roofed Turtles dead in the water with bite marks and injuries on their tails and limbs. Unable to determine the actual cause of death, we presumed that the pair probably died as the result of an intra-specific fight.

During the first week of March, two female Indian Roofed Turtles engaged in nesting activities. Although they were observed digging nest-pits, we were unable find any actual nests. Toward the end of the month, we noted the loss of two pairs of Indian Roofed Turtles but were unable to find any remains except the carapace of a male in the pool. We enhanced our vigilance, and, on 4 May, we observed a few hatchling Indian Roofed Turtles swimming in the pool. They probably had

hatched the previous evening. On 5 May, we noticed an adult female Red-eared Slider chasing one of the hatchlings. She soon caught it (Fig. 5) and consumed it in a few minutes. During the next half hour, we noticed large female sliders pursuing and catching each of the seven hatchlings.

At noon on a day during the second week of May, we observed four new hatchling Indian Roofed Turtles in the pool. The hatchlings probably were less than a day old. One by one, all hatchlings were caught and consumed by large female sliders (Fig. 6).

By the end of September, we had lost another male Indian Roofed Turtle along with both juvenile Flap-shelled Turtles. Remains were limited to a few skeletal elements and shell fragments at the bottom of the pool.

At the end of the year, we had lost one male Red-eared Slider, both juvenile Flap-shelled Turtles, and the majority of



Fig. 6. Hatchling Indian Roofed Turtles (*Pangshura tecta*) in the grip of female Red-eared Sliders (*Trachemys scripta elegans*) at the Sayaji Baug Zoo, Vadodara, Gujarat, India.

the breeding population of Indian Roofed Turtles, of which only four males and a single female survived.

Discussion

This study clearly demonstrates that housing native Indian turtles and an invasive species together is unsustainable. Red-eared Sliders are aggressive and known to prey on fishes (Ma and Shi 2017) as well as frogs and possibly turtles (Polo-Cavia et al. 2010). In its native range, Ligon (2007) documented a Red-eared Slider killing a Red-winged Blackbird (*Agelaius phoeniceus*). The first record of predation on a native Indian turtle (*L. punctata*) was recorded in the Temple Tank of Malleswaram, Bangalore (Chetan 2013).

Albeit in captivity, the events documented herein clearly demonstrate that invasive Red-eared Sliders prey on native species of turtles. This is in addition to the negative impact that has been described in other non-native populations. These include competition with native turtles for resources such as food, shared habitat, and basking sites (Cadi and Joly 2003; Kaltenecker 2006; Polo-Cavia et al. 2010). Another threat posed by Red-eared Sliders is the transmission of diseases and pathogens to native turtle populations (Shen et al. 2011; Meyer et al. 2015; Heritier et al. 2017; Demkowska-Kutrzepa et al. 2018). Included among those pathogens is *Salmonella*, which can infect humans (Mermin et al. 2004; Shen et al. 2011; Di Chiacchio et al. 2014) and captive animals (Gopee et al. 2000).

Particularly vulnerable to the threats posed by invasive Red-eared Sliders are the native turtles known to be sympatric in the freshwater ecosystems of at least nine Indian states. These include Indian Flap-shelled Turtles (*Lissemys punctata andersoni*) in West Bengal (Chaudhuri et al. 2018); Indian Black Turtles (*Melanochelys trijuga*) and Indian Flap-shelled Turtles in Goa (Jadhav et al. 2018b) and Ganges Soft-shelled Turtles (*Nilssonina gangetica*), Indian Flap-shelled Turtles, and Indian Roofed Turtles in Gujarat (Vyas 2019). All of these native species are protected under the Indian Wildlife Protection Act, 1972 as Schedule I animals. The increased presence of invasive species in India must be identified clearly as a threat to natural ecosystems and relevant legislation and regulations should be implemented and enforced before the loss of endemic biodiversity becomes a historical fact.

Acknowledgements

I am very thankful to Dr. C.B. Patel, Ex. Curator and Veterinary Officer, Sayaji Baug Zoo, and the staff, especially Mr. Narendra Jala. I also thank Mr. Dhiren Talapada, Executive Engineer, Vishwamitri River Project, Municipal Corporation, Vadodara, for his support, and Miss Khushboo R. Vyas for improvements to the manuscript.

Literature Cited

Arvy, C. and J. Servan. 1998. Imminent competition between *Trachemys scripta* and *Emys orbicularis* in France, pp. 33–40. In: U. Fritz (ed.), *Proceedings*

of *The Emys Symposium Dresden 96, 4th to 6th October 1996, Staatliches Museum für Tierkunde Dresden*. Deutsche Gesellschaft für Herpetologie und Terrarienkunde (DGHT), Salzhemmendorf, Germany.

- Bandyopadhyay, K. 2015. Exotic turtle found in Rajarhat waterbody. *The Times of India*, 21 August 2015, Kolkata, India. <<https://timesofindia.indiatimes.com/city/kolkata/Exotic-turtle-found-in-Rajarhat-waterbody/article-show/48564218.cms>>.
- Bouchard, S.S. and K.A. Bjorndal. 2006. Ontogenetic diet shifts and digestive constraints in the omnivorous freshwater turtle *Trachemys scripta*. *Physiological and Biochemical Zoology: Ecological and Evolutionary Approaches* 79: 150–158.
- 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.
- Chaudhuri, A., A. Banerjee, S. Chowdhury, and K. Deuti. 2018. Report of red-eared slider turtle (*Trachemys scripta elegans*) from a wetland near Kolkata, West Bengal, India. *The Herpetological Bulletin* 146: 41–42.
- Chatterjee, B. 2018. 65 exotic turtles have made 122-year-old pond at Mumbai's Juhu temple their home. *Hindustan Times*, 30 May 2018. <<https://www.hindustantimes.com/mumbai-news/65-exotic-turtles-have-made-122-year-old-pond-at-mumbai-s-juhu-temple-their-home/story-jjL0sibuinG89bWC3fkWAI.html>>.
- Chetan, R. 2013. Water wars reason for turtle deaths. *Bangalore Mirror*, 27 November 2013, Bangalore, India. <<https://bangaloremirror.indiatimes.com/bangalore/others/Indian-Pond-Terrapin-Indian-Flapshell-turtles-Dakshinamukha-Nanditheertha-templeMalleswaram-Kadu-Malleshwara-temple-BBMP-wildlife/articleshow/26428674.cms> [no longer accessible]>.
- Chen, T.H. 2006. Distribution and status of the introduced red-eared slider (*Trachemys scripta elegans*) in Taiwan, pp. 187–195. In: F. Koike, M.N. Clout, M. Kawamichi, M. De Poorter, and K. Iwatsuki (eds.), *Assessment and Control of Biological Invasion Risks*. Shoukadoh Book Sellers, Kyoto, Japan, and the World Conservation Union (IUCN), Gland, Switzerland.
- Demkowska-Kutrzepa, M., M. Studzińska, M. Roczeń-Karczmaz, K. Tomczuk, Z. Abbas, and P. Rózański. 2018. A review of the helminths co-introduced with *Trachemys scripta elegans* – a threat to European native turtle health. *Amphibia-Reptilia* 39: 177–189.
- Di Chiacchio, R.G., G.N. Penido Junior, C.A.I. De Souza, F.E.S. Prioste, M. Siqueira Prado, T. Knöbel, M.C. Meñao, and E.R. Matushima. 2014. Enterobacterial colonization in captive red-eared sliders (*Trachemys scripta elegans*). *Journal of Zoo and Wildlife Medicine* 45: 919–921.
- Drake, A.J., H.A. Mooney, F. Di Castri, R.H. Groves, F.J. Kruger, M. Rejmanek, and M. Williamson (eds.). 1989. *Biological Invasions: A Global Perspective (SCOPE 37)*. Wiley & Sons, New York, New York.
- Ernst, C.H. and J.E. Lovich. 2009. *Turtles of the United States and Canada*. Second edition. Johns Hopkins University Press, Baltimore, Maryland.
- Ficetola, G.F., D. Rödder, and E. Padoa-Schioppa. 2012. *Trachemys scripta* (slider terrapin), pp. 331–339. In: R.A. Francis (ed.), *A Handbook of Global Freshwater Invasive Species*. Earthscan, Abingdon, United Kingdom.
- Gopee, N.V., A.A. Adesiyun, and K. Caesar. 2000. Retrospective and longitudinal study of salmonellosis in captive wildlife in Trinidad. *Journal of Wildlife Diseases* 36: 284–293.
- Goenka, K. 2013. There's something fishy going on in Powai lake: Foreign fish making a meal of their native cousins. *DNA*, 22 August 2013, Mumbai, India. <<https://www.dnaindia.com/mumbai/report-there-s-something-fishy-going-on-in-powai-lake-foreign-fish-making-a-meal-of-their-native-cousins-1878066>>.
- Héritier, L., A. Valdeón, A. Sadaoui, T. Gendre, S. Ficheux, S. Bouamer, N. Kechemir-Issad, L. Du Preez, C. Palacios, and O. Verneau. 2017. Introduction and invasion of the red-eared slider and its parasites in freshwater ecosystems of southern Europe: risk assessment for the European pond turtle in wild environments. *Biodiversity Conservation* 26: 1817–1843.
- Jadhav, T.D., Sawant N.S. and S.K. Shyama. 2018a. First report on presence and status of introduced invasive species Red-eared Slider, *Trachemys scripta elegans* in Goa, India. *NeBIO* 9: 177–179.
- Jadhav, T.D., N.S. Sawant, and S.K. Shyama. 2018b. Diversity and distribution of freshwater turtles (Reptilia: Testudines) in Goa, India. *Journal of Threatened Taxa* 10: 12194–12202.

- Kaltenegger, D. 2006. Die heimische Europäische Sumpfschildkröte (*Emys orbicularis*) und die zunehmende Problematik durch illegal ausgesetzte Rotwangenschmuckschildkröten (*Trachemys scripta elegans*). *Österreichs Fischerei* 59: 93–97.
- 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 (suppl. 1): 5–15.
- Kraus, F. 2009. *Alien Reptiles and Amphibians: A Scientific Compendium and Analysis*. Invading Nature – Springer Series in Invasion Ecology 4. Springer, Dordrecht, The Netherlands.
- Kunju, S.S. 2014. Indian Flapshell Turtle and Red Eared Slider Turtle rescued at Bhandup. PAWS-Mumbai Press Kit Update, 11 August 2014, Mumbai, India. <<http://pawsmumbairesskitupdate.blogspot.com/2014/08/indian-flapshell-turtle-and-red-eared.html>>.
- Lever, C. 2003. *Naturalized Reptiles and Amphibians of the World*. Oxford University Press Inc., New York, New York.
- Ligon, D.B. 2007. *Trachemys scripta elegans* (Red-eared Slider). *Predation. Herpetological Review* 38: 201–202.
- Lowe, S., M. Browne, S. Boudjelas, and M. De Poorter. 2004. *100 of the World's Worst Invasive Alien Species. A Selection from the Global Invasive Species Database*. The Invasive Species Specialist Group (ISSG), Species Survival Commission (SSC), World Conservation Union (IUCN), Auckland, New Zealand.
- Ma, K. and H. Shi. 2017. Red-eared Slider *Trachemys scripta elegans* (Wied-Neuwied), pp. 49–76. In: F. Wan, M. Jiang, and A. Zhan (eds.), *Biological Invasions and its Management in China*. Invading Nature – Springer Series in Invasion Ecology 13. Springer, Singapore.
- Marchetti, M.P. and T. Engstrom. 2016. The conservation paradox of endangered and invasive species. *Conservation Biology* 30: 434–437.
- Martins, R.A., A.M. Assalim, and F. de Barros Molina. 2014. The presence of the Red-eared slider, *Trachemys scripta elegans* (Wied, 1838) (Testudines, Emydidae), an invasive species, in the Paraíba river basin, southeastern Brazil. *Herpetology Notes* 7: 437–441.
- Mermin, J., L. Hutwagner, D. Vugia, S. Shallow, P. Daily, J. Bender, J. Koehler, R. Marcus, and F.J. Angulo for the Emerging Infections Program FoodNet Working Group. 2004. Reptiles, amphibians, and human *Salmonella* infection: A population-based, case-control study. *Clinical Infectious Diseases* 38 (suppl. 3): S253–S261.
- Moradi, N. and N. Rastegar-Pouyani. 2015. Biological aggression of the introduced Red-Eared Slider, *Trachemys scripta elegans* (Wied, 1939) (Testudines: Emydidae) in Iran. *Russian Journal of Herpetology* 22: 133–135.
- Mukherjee, K. 2013. Turtle that inspired Ninja cartoon smuggled as pet. *The Times of India*, 20 July 2013. <<https://timesofindia.indiatimes.com/city/kolkata/Turtle-that-inspired-Ninja-cartoon-smuggled-as-pet/articleshow/21178481.cms>>.
- Munjpara, S.B. 2014. Will the exotic Red-eared Slider Turtle *Trachemys scripta elegans* become invasive in India? *Jalaplavit* 5(2): 47–48.
- Meyer, L., L. Du Preez, E. Bonneau, L. Héritier, M.F. Quintana, A. Valdeón, A. Sadaoui, N. Kechemir-Issad, C. Palacios, and O. Verneau. 2015. Parasite host-switching from the invasive American red-eared slider, *Trachemys scripta elegans*, to the native Mediterranean pond turtle, *Mauremys leprosa*, in natural environments. *Aquatic Invasions* 10: 79–91.
- Ng, P.K.A., R.M. O'Riordan, N.F. Ramsay, and L.M. Chou. 2005. Are Red-Eared Sliders reproducing in Singapore? [abstract], p. 77. In: Abstracts and Programme, Fifth World Congress of Herpetology, Stellenbosch, South Africa.
- Patel, H. and R. Vyas. 2019. Reptiles of Gujarat, India: Updated checklist, distribution and conservation status. *Herpetology Notes* 12: 765–777.
- 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.
- Pérez-Santigosa, N., M. Florencio, J. Hidalgo-Vila, and D.C. Díaz-Paniagua. 2011. Does the exotic invader turtle, *Trachemys scripta elegans*, compete for food with coexisting native turtles? *Amphibia-Reptilia* 32: 167–175.
- Polo-Cavia, N., P. López, and J. Martín. 2008. Interspecific differences in responses to predation risk may confer competitive advantages to invasive freshwater turtle species. *Ethology* 114: 115–123.
- Polo-Cavia, N., A. Gonzalo, P. López, and J. Martín. 2010. Predator recognition of native but not invasive turtle predators by naïve anuran tadpoles. *Animal Behaviour* 80: 461–466.
- Powell, R., R. Conant, and J.T. Collins. 2016. *Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America*. 4th edition. Houghton Mifflin Harcourt, Boston, Massachusetts.
- Pupins, M. 2007. First report on recording of the invasive species *Trachemys scripta elegans*, a potential competitor of *Emys orbicularis* in Latvia. *Acta Universitatis Latvianica Biologia* 723: 37–46.
- Ramsay, N.F., P.K.A. Ng, R.M. O'Riordan, and L.M. Chou. 2007. The Red-eared Slider (*Trachemys scripta elegans*) in Asia: a review, pp. 161–174. In: F. Gherardi (ed.), *Biological Invaders in Inland Waters: Profiles, Distribution, and Threats*. Invading Nature – Springer Series in Invasion Ecology 2. Springer, Dordrecht, The Netherlands.
- Ramkrishnan, P.S. (ed.). 1991. *Ecology of Biological Invasions in the Tropics*. National Institute of Ecology, International Scientific Publications, New Delhi, India.
- Reddy, U.S. 2016. Red-eared turtle takes over lakes. *Deccan Chronicle*, 7 November 2016, Hyderabad, India. <<https://www.deccanchronicle.com/lifestyle/pets-and-environment/071116/red-eared-turtle-takes-over-lakes.html>>.
- Scalera, R. 2006. *Trachemys scripta*. Delivering Alien Invasive Species Inventories for Europe (DAISIE). <<http://www.europe-alien.org/> [no longer accessible]>.
- Shen, L.L., H. Shi, R. Wang, D. Liu, and X. Pang. 2011. An invasive species Red-eared Slider (*Trachemys scripta elegans*) carrying *Salmonella* pathogens in Hainan Island. *Molecular Pathogens* 2: 28–32.
- Shi, H., Z. Fan, F. Yi, and Z. Yuan. 2004. New data on the trade and captive breeding of turtles in Guangxi Province, South China. *Asiatic Herpetological Research* 10: 126–128.
- Shi, H., J.F. Parham, Z. Fan, M. Hong, and F. Yin. 2008. Evidence of the massive scale of turtle farming in China. *Oryx* 42: 147–150.
- Singh, V.J. 2015. Wildbuzz: Born not to be free. *Hindustan Times*, 31 May 2015, New Delhi, India. <<https://www.hindustantimes.com/chandigarh/wildbuzz-born-not-to-be-free/story-oRWPYUJeAdckQJvxoGJI.html>>.
- Telang, S. 2016. Turtle tidings. *The Afternoon Despatch & Courier*, 5 August 2016, Mumbai, India. <http://www.afternooncd.in/city-news/turtle-tidings/article_173754 [no longer accessible]>.
- Telecky, T.M. 2001. United States import and export of live turtles and tortoises. *Turtle and Tortoise Newsletter* 4: 8–13.
- Uetz, P., P. Freed, and J. Hošek (eds.). 2020. The Reptile Database. <<http://www.reptile-database.org>>.
- van Dijk, P.P., J. Harding, and G.A. Hammerson. 2011. *Trachemys scripta* (errata version published in 2016). *The IUCN Red List of Threatened Species* 2011: e.T22028A97429935.
- Vyas, R. 1997. 1997. Notes on growth and maturity in the Indian Roofed Turtle (*Kachuga tecta*). *Journal of the Bombay Natural History Society* 94: 160–162.
- Vyas, R. 2015. Status of Ganges Soft-shell Turtle *Nilssonina gangetica* amidst deplorable scenarios in urban wetlands of central Gujarat State, India. *Reptile Rap* 17: 3–12.
- Vyas, R. 2019. Distribution of invasive Red-eared Sliders, *Trachemys scripta* (Testudines: Emydidae) in the wetlands of Gujarat State, India. *Reptiles & Amphibians* 26: 145–150.
- Works, A.J. and D.H. Olson. 2018. Diets of two non-native freshwater turtle species (*Trachemys scripta* and *Pelodiscus sinensis*) in Kawai Nui Marsh, Hawaii. *Journal of Herpetology* 52: 444–452.
- ZSI (Zoological Survey of India)/BSI (Botanical Survey of India). 2017. National Conference on Status of Invasive Alien Species in India, 14th – 15th December 2017, Kolkata, West Bengal. Zoological Survey of India and Botanical Survey of India, Ministry of Environment & Climate Change, Government of India, Kolkata, India.