EU NON-NATIVE ORGANISM RISK ASSESSMENT SCHEME

Name of organism: ***Trachemys scripta***

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Risk Assessment Area: South and Mediterranean Countries

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EU CHAPPEAU	
QUESTION	**RESPONSE**
1. In how many EU member states has this species been recorded? List them.	France; Germany; Greece; Italy; The Netherlands; Spain; Portugal; Slovenia; Austria (Van Dijk, et al, 2013). Romania (Dimancea, N., 2013), Hungary (Puky et. Al, 2004), Croatia (Lukac et al, 2015), Bulgaria (Mollov et al, 2013) , Slovakia (Ficetola et al, 2012), Czech (Brejcha et al, 2009). The Global Invasive Species Database (2009) lists it as a pest in France, Germany, Latvia, Poland and Spain. LIST: France; Germany; Greece; Italy; The Netherlands; Spain; Portugal; Slovenia; Austria; Latvia; Poland;
2. In how many EU member states has this species currently established populations? List them.	Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Global Invasive Species Database, 2009). Currently this species is introduced as breeding in many countries, especially in Mediterranean countries (France, Greece, Italy, Portugal, and Spain; GENIEZ & Cheylan, 1987; Araujo, 1996; LUISELLI et al., 1997; Filella et al., 1999), which it is kept in all types of water bodies due to its great adaptability, even at very waters contaminated (Gibbons, 1990). Reproduction in Slovenia has also been confirmed (Vamberger M, 2012). Also in Austria (Kleewein, 2014). In Europe it is becoming increasingly abundant, especially in Portugal, Spain and France. (Van Dijk, et al, 2013). However, a tendency for expansion of invasion range to the northern and eastern parts of Europe is also obvious: in recent publications one can find evidence of funding populations of T.s.elegans in Germany (Pieh and Laufer, 2006) in Poland (Najbar, 2001) and the Baltic Region (Pupins, 2007). The Global Invasive Species Database (2009) lists it as a pest in France, Germany, Latvia, Poland and Spain. LIST: France, Greece, Italy, Germany, Latvia, Poland, Portugal, Slovenia and Spain.
3. In how many EU member states has this species shown signs of invasiveness? List them.	Currently he is introduced as breeding in many countries in Eastern Europe (Tiedemann, 1990; CHEN & LUE, 1998) especially in Mediterranean countries (France, Greece, Italy, Portugal, and Spain; GENIEZ & Cheylan, 1987; Araujo, 1996; LUISELLI et al., 1997; Filella et al., 1999), which it is kept in all types of water bodies due to its great adaptability, even at very waters contaminated

	(Gibbons, 1990). In Europe it is becoming increasingly abundant, especially in Portugal, Spain and France. (Van Dijk, et al, 2013). The Global Invasive Species Database (2009) lists it as a pest in France, Germany, Latvia, Poland and Spain. In Spain, it is considered one of the most harmful invasive species (GEIB 2006) and is included in the Spanish Catalogue of Invasive Alien Species. Populations in Europe are in places considered to represent a threat to local turtle species (through competition). *Trachemys scripta elegans* is included in the IUCN/SSC Invasive Species Specialist Group's 100 Worst Invasives List. (Van Dijk, et al, 2013) LIST: France, Greece, Italy, Portugal, Spain, Germany, Latvia, Slovenia and Poland.
4. In which EU Biogeographic areas could this species establish?	Mediterranean biogeographical region. Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli et al. 1997, Martinez-Silvestre et al. 1997, Cadi et al. 2003, in Cadi & Joly 2003). Following the countries in which has been recorded and their biogeographical regions, it could be the following: Mediterranean, Atlantic and Continental. LIST: Mediterranean, Atlantic and Continental .
5. In how many EU Member States could this species establish in the future [given current climate] (including those where it is already established)? List them.	Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli et al. 1997, Martinez-Silvestre et al. 1997, Cadi et al. 2003, in Cadi & Joly 2003). For that reason, this species could establish in countries included in Mediterranean biogeographical region: France; Greece; Italy; Spain; Portugal; Slovenia; Malta, Cyprus It can also established in Germany; Austria; Netherlands; and United Kingdom (Gibraltar)). The Global Invasive Species Database (2009) lists in Latvia and Poland. Reproduction in Slovenia has also been confirmed (Vamberger M, 2012). LIST: France; Germany; Greece; Italy; The Netherlands; Spain; Portugal; Slovenia; Austria; Latvia; Poland; Belgium; Denmark; Ireland; United Kingdom; Finland; Czech Republic; Estonia; Lithuania; Romania; Slovakia; Bulgaria; Sweden;

	Luxembourg; Malta; Cyprus
6. In how many EU member states could this species become invasive in the future [given current climate] (where it is not already established)?	Populations in Europe are in places considered to represent a threat to local turtle species (through competition). *Trachemys scripta elegans* is included in the IUCN/SSC Invasive Species Specialist Group's 100 Worst Invasives List. (Van Dijk, et al, 2013) Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli et al. 1997, Martinez-Silvestre et al. 1997, Cadi et al. 2003, in Cadi & Joly 2003). For that reason, this species could establish in countries included in Mediterranean biogeographical regions: Malta and Cyprus. The Global Invasive Species Database (2009) lists it as a pest in France, Germany, Latvia, Poland and Spain. Following the same biogeographical regions, these countries: France; Germany; Greece; Italy; The Netherlands; Spain; Portugal; Slovenia; Austria; Latvia; Poland; Belgium; Denmark; Ireland; United Kingdom; Finland; Czech Republic; Estonia; Lithuania; Romania; Slovakia; Bulgaria; Sweden; Luxembourg; Malta; Cyprus. LIST: France, Germany, Latvia, Poland, Spain, Greece, Italy, The Netherlands, Portugal, Slovenia, Austria, Belgium, Denmark, Ireland, United Kingdom, Finland, Czech Republic, Estonia, Lithuania, Romania, Slovakia, Bulgaria, Sweden; Luxembourg, Malta and Cyprus.

SECTION A – Organism Information and Screening		
Stage 1. Organism Information	**RESPONSE** **[chose one entry, delete all others]**	**COMMENT**
1. Identify the organism. Is it clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank?	*Trachemys scripta* (Schoepff, 1792) **Common Name(s):** Yellow-bellied Slider Turtle, Red-eared Slider Turtle, Cumberland Slider Turtle, Slider, Common Slider **Synonym(s):** *Chrysemys scripta* (Schoepff, 1792) *Emys cumberlandensis* Holbrook, 1840 *Emys elegans* Wied, 1839 *Emys troostii* Holbrook, 1836 *Pseudemys scripta* (Schoepff, 1792) *Testudo scripta* Schoepff, 1792 *Trachemys scripta* subspecie *elegans* (Wied, 1839) Trachemys scripta subspecie *troostii* (Holbrook, 1836) (Van Dijk, et al, 2013).	Previously considering about 15 subspecies in North, Central and South America, most former subspecies have been elevated to species rank in recent years, leaving only *Trachemys scripta scripta, T.s. troostii* and *T.s. elegans* as current subspecies (see Seidel 2002, TTWG 2007, Fritz and Havas 2007, for details).
2. If not a single taxonomic entity, can it be redefined? (if necessary use the response box to re-define the organism and carry on)	N/A	
3. Does a relevant earlier risk assessment exist? (give details of any previous risk assessment)	No	Former risk assessment consider or just one country or do not include impacts on climate change, ecosystem services or other important issues.
4. If there is an earlier risk assessment is it still entirely valid, or only partly valid?	No	

5. Where is the organism native?	Mexico (Coahuila); United States (Alabama, Arizona - Introduced, Arkansas, California - Introduced, Florida, Georgia, Hawaiian Is. - Introduced, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland - Introduced, Michigan - Introduced, Mississippi, Missouri, Nebraska, New Jersey - Introduced, North Carolina, Ohio, Oklahoma, Pennsylvania - Introduced, South Carolina, Tennessee, Texas, Virginia, West Virginia) (Van Dijk, et al, 2013).	*Trachemys scripta* is native to the eastern and central United States of America (Iverson 1992). Its subspecies are distributed as follows: *T.s. scripta*: Atlantic drainages from southern Virginia to northern Florida. *T.s. elegans*: Alabama to extreme northeastern Mexico, up to Cuatro Cienegas. *T.s. troostii:* Southwestern Virginia to northeastern Alabama (west of Appalachians).
6. What is the global distribution of the organism (excluding Europe)?	Cambodia; Canada; China; Guadeloupe; Indonesia; Israel; South Africa; Taiwan; Thailand ; Japan; Turkey; Australia. (Van Dijk, et al, 2013). Brasil (Martins et al, 2014)	**Introduced populations** of *T.s. elegans* have been reported from Mexico: feral populations exist throughout the country; parts of the United States (Arizona, California, Hawaiian Islands, northeastern States); Guadeloupe (France): Occurs on Grande Terre and Basse Terre (Iverson 1992, Malhotra and Thorpe 1999); Portugal: widespread, especially in the south; Spain: widespread at low elevations; France: widespread, except in the north; Italy (scattered throughout the country); Slovenia (near Italian border region); Greece (Crete); Austria (Vienna region); Germany; southwestern Switzerland; Netherlands; Turkey; Israel; South Africa; Taiwan; Thailand; Cambodia; Indonesia; and Australia. (Van Dijk, et al, 2013).
7. What is the distribution of the organism in Europe?	France; Germany; Greece; Italy; Netherlands; Spain; Switzerland; Portugal; Slovenia; Austria; Germany; Switzerland. (Van Dijk, et al, 2013). Reproduction in Slovenia has also been confirmed (Vamberger M, 2012).	Introduced populations of *T.s. elegans* have been reported from Mexico: feral populations exist throughout the country; parts of the United States (Arizona, California, Hawaiian Islands, northeastern States); Guadeloupe (France): Occurs on Grande Terre and Basse Terre (Iverson 1992, Malhotra and Thorpe 1999); Portugal: widespread, especially in the south; Spain: widespread at low elevations; France: widespread, except in the

		north; Italy (scattered throughout the country); Slovenia (near Italian border region); Greece (Crete); Austria (Vienna region); Germany; southwestern Switzerland; Netherlands; Turkey; Israel; South Africa; Taiwan; Thailand; Cambodia; Indonesia; and Australia. (Van Dijk, et al, 2013). According to Urošević (2014) The spread of T. s. scripta has been documented in Spain (Martínez Silvestre et al. 2006; Alarcos et al. 2010; Valdeón et al. 2010), Sweden, Finland (Bringsøe 2006) and Austria (Kleewein 2014). There are also online reports of this subspecies from several islands in Greece: Corfu, Crete and Kos (Balej & Jablonski 2006-2014).
8. Is the organism known to be invasive (i.e. to threaten organisms, habitats or ecosystems) anywhere in the world?	Yes	The Global Invasive Species Database (2009) lists it as a pest in Australia, Bermuda, Brazil, British Virgin Islands, Canada, Cayman Islands, Dominican Republic, France, Germany, Israel, Ruyuku Islands (Japan), Latvia, Poland, Puerto Rico, Singapore, South Africa, Spain, Taiwan and Thailand. In Spain, it is considered one of the most harmful invasive species (GEIB 2006). Despite being native to parts of the United States, it has spread to most states, including Hawaii (Somma et al. 2009b). It was introduced into most countries via the pet trade (GISD 2009; WWF 2010) Populations in Europe are in places considered to represent a threat to local turtle species (through competition) and the ecosystem in general (competition, predation). *Trachemys scripta elegans* is included in the IUCN/SSC Invasive Species Specialist Group's 100 Worst Invasives List.
9. Describe any known socio-economic benefits of	Economic profits as a result of trade of this species	Market trade data are not available. More

the organism in the risk assessment area.	in EU	information can be checked in "Understanding the biological invasion risk posed by the global wildlife trade: propagule pressure drives the introduction and establishment of Nearctic turtles" (http://www.researchgate.net/profile/Pablo_Garcia7/publication/267634539_Understanding_the_biological_invasion_risk_posed_by_the_global_wildlife_trade_propagule_pressure_drives_the_introduction_and_establishment_of_Nearctic_turtles/links/546bf3380cf2f5eb180927d6.pdf) TARIC CODE difficults monitoring species at this level allows upper group (reptiles) monitoring. Only indirect data are available from exports in US (Mali et al, 2014): Between 2002 and 2012, a total of 126,600,529 individual freshwater turtles were exported from the US. Based on the marginally significant simple linear regression ($F = 3.91$; $df = 1,9$; $p = 0.08$), the number of exported turtles decreased on average 500,000 turtles per year over the 11 year period. However, in 2007, residual standard deviation was 2.5 times higher than the average residual standard deviation. In 2007, there was a 79% increase (18,457,520 individual turtles) compared to 2006. Overall, 53% were commercially bred, 28% were classified as farmed or ranched, and 19% were classified as wild caught individuals. When we partitioned the total exports by source, the number of captive bred exports declined after 2007 while wild caught exports increased after 2009. Exported Taxa The following genera were exported: *Apalone*,

		Chelydra, Chrysemys, Clemmys, Deirochelys, Emydoidea, Graptemys, Kinosternon, Macroclemys, Malaclemys, Pseudemys, Sternotherus, Terrapene, and *Trachemys*. Combined, *Pseudemys* and *Trachemys* represented between 61% (Florida; 1,321,202 individual turtles) and 96% (Louisiana; 81,404,579 individual turtles) of all species traded from the top four exporting states. *Chelydra* consisted of 12% (4,248,913 individuals) of the exports from California, 5% (99,846 individuals) of the exports from Texas, and 5% (125,276 individuals) of the exports from Florida. *Apalone* consisted of 25% (540,815 individuals) of all exports from Florida and 5% (99,024 individuals) from Texas. For the top four exported genera (*Apalone, Chelydra, Pseudemys*, and *Trachemys*), regression coefficients showed significant increase in traded Trachemys in Louisiana ($p = 0.02$) and significant decrease in traded *Trachemys* in California ($p<0.01$). Traded *Apalone* significantly increased in Florida and California ($p<0.01$) while traded *Chelydra* increased in Louisiana and California ($p<0.01$).

SECTION B – Detailed assessment

PROBABILITY OF ENTRY

Important instructions:

- Entry is the introduction of an organism into Europe. Not to be confused with spread, the movement of an organism within Europe.
- For organisms which are already present in Europe, only complete the entry section for current active pathways of entry or if relevant potential future pathways. The entry section need not be completed for organisms which have entered in the past and have no current pathways of entry.

QUESTION	RESPONSE [chose one entry, delete all others]	CONFIDENCE [chose one entry, delete all others]	COMMENT
1.1. How many active pathways are relevant to the potential entry of this organism? (If there are no active pathways or potential future pathways respond N/A and move to the Establishment section)	few	medium	*Trachemys scripta elegans* is 'the' traditional pet turtle, farmed in large quantities in the southern USA for the global pet trade and in recent years also for raising for consumption in Asian countries; the latter is increasingly replaced by domestic, ex-situ farming in the consuming countries. Nearly all animals in commercial trade, which amounts to about 6 million individuals per year, are produced in near-closed-cycle farms. Wild harvest from native populations has involved mainly adult animals as breeder stock for farms, as well as adults for the domestic and international consumption trade; wild-caught females are sold to turtle farms, while surplus males enter the consumption trade. Eggs may be harvested from the wild. Following a ban on the import of *Trachemys scripta elegans i*nto the European Union as a potential invasive, the pet turtle farming industry partly shifted to *Trachemys scripta scripta*, intergrades scripta x elegans,

			and other Emydid species. Attempts have been made in recent years to lift the US domestic pet trade ban. (Van Dijk, et al, 2013). With effect from 22 December 1997 the EU banned the import of the subspecies *T. scripta elegans* via the Protection of Species of Wild Fauna and Flora by Regulating Trade (Bringsøe 1998, 2001b, Bringsøe 2006). While it is no longer allowed to import the red-eared slider within the EU it is still legal to keep and distribute them within many EU countries. (Compiled by: IUCN SSC Invasive Species Specialist Group). In Spain and Portugal 23.000 exotic invasive specimens of tortoises have been caught in the wild during the LIFE+Trachemys (LIFE09 NAT/ES/000529) project implementation. Its wide spreading has been stopped in some wetlands, while the native tortoise populations have also been recovered. Natural spreading is also now one of the main spreading ways.
1.2. List relevant pathways through which the organism could enter. Where possible give detail about the specific origins and end points of the pathways. For each pathway answer questions 1.3 to 1.10 (copy and paste additional rows at the end of this section as necessary).	[Deliberate release into the wild by humans]		However trade is banned in Spain since the inclusion of this species in the Spanish Catalogue of Invasive Alien Species (Act 630/2013, 2nd August, that regulates the Catalogue) many private owner still keep in captivity this species.
Pathway name:	[Deliberate release into the wild by humans]		
1.3. Is entry along this pathway intentional (e.g. the organism is imported for trade) or accidental (the	intentional accidental	low medium	N/A

organism is a contaminant of imported goods)? (If intentional, only answer questions 1.4, 1.9, 1.10, 1.11)		high very high	
1.4. How likely is it that large numbers of the organism will travel along this pathway from the point(s) of origin over the course of one year? Subnote: In your comment discuss how likely the organism is to get onto the pathway in the first place.	very likely	high	Following a ban on the import of *Trachemys scripta elegans* into the European Union as a potential invasive, the pet turtle farming industry partly shifted to *Trachemys scripta scripta*, intergrades scripta x elegans, and other Emydid species (Van Dijk, et al, 2013). However not other measures were taken and internal trade is still possible in many European countries. In Spain its trade has been banned but there are many individuals,that were bought before banning, kept in private collections or as pets.
1.5. How likely is the organism to survive during passage along the pathway (excluding management practices that would kill the organism)? Subnote: In your comment consider whether the organism could multiply along the pathway.	very unlikely unlikely moderately likely likely very likely	low medium high very high	N/A
1.6. How likely is the organism to survive existing management practices during passage along the pathway?	very unlikely unlikely moderately likely likely very likely	low medium high very high	N/A
1.7. How likely is the organism to enter Europe undetected?	very unlikely unlikely moderately likely likely very likely	low medium high very high	N/A
1.8. How likely is the organism to arrive during the months of the year most appropriate for establishment?	very unlikely unlikely	low medium	N/A

	moderately likely likely very likely	high very high	
1.9. How likely is the organism to be able to transfer from the pathway to a suitable habitat or host?	likely	high	Most of the red-eared terrapins that still survive in captivity are still probably a source for release in this kind of habitat. In Europe, *T. scripta elegans* are generally released in freshwater areas which are frequented by humans such as public ponds which are considered of low biological value (e.g. Kordges 1990, Thiesmeier & Kordges 1990 1991, in Bringsøe 2006). Natural habitats close to urban areas are also used for releases (Bringsøe 2006).
1.10. Estimate the overall likelihood of entry into Europe based on this pathway?	very likely	very high	The species is already present in many European countries.
End of pathway assessment, repeat as necessary.			
1.11. Estimate the overall likelihood of entry into Europe based on all pathways (comment on the key issues that lead to this conclusion).	very likely	high	Together with natural spread from established populations new releases of individuals are the principal way to colonize new areas.

PROBABILITY OF ESTABLISHMENT

Important instructions:

- For organisms which are already well established in Europe, only complete questions 1.15 and 1.21 then move onto the spread section. If uncertain, check with the Non-native Species Secretariat.

QUESTION	RESPONSE	CONFIDENCE	COMMENT
1.12. How likely is it that the organism will be able to establish in Europe based on the similarity between climatic conditions in Europe and the organism's current distribution?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.13. How likely is it that the organism will be able to establish in Europe based on the similarity between other abiotic conditions in Europe and the organism's current distribution?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.14. How likely is it that the organism will become established in protected conditions (in which the environment is artificially maintained, such as wildlife parks, glasshouses, aquaculture facilities, terraria, zoological gardens) in Europe? Subnote: gardens are not considered protected conditions	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.15. How widespread are habitats or species necessary for the survival, development and multiplication of the organism in Europe?	widespread	high	In its native range, *Trachemys scripta* is an inhabitant of a wide variety of waterbodies, and is most abundant in soft-bottomed shallow habitats with minimal flow, abundant access to sunlight and extensive vegetation. In Mexico, it is primarily a riverine species. In Europe, the species is an opportunistic inhabitant of freshwater habitats, generally in close proximity to human habitation

			and/or recreation centres. (Van Dijk, et al, 2013). *Trachemys scripta* is omnivorous and consumes a wide variety of plant and animal matter. Males may reach 24 cm carapace length (CL), females 29 cm. Maturity is reached at about 9-11 cm CL and two to five years in males, 15-20 cm CL and five to eight years. Longevity is about 30 years maximum. Generation time is probably around 12-15 years. Females produce 0-3 clutches of 5-20 eggs per year. Incubation takes 60-91 days. Hatchlings measure 23-35 mm (Thomas 2006, Ernst and Lovich 2009). In its introduced range in Europe egg deposition has been observed in Spain (de Roa and Roig, 1997; Martinez-Silvestre, 1997; Bertolero and Canicio, 2000; Capalleras and Carretero, 2000, in Cadi et al. 2004), and near Paris, France (Moran Pers. Comm., in Cadi et al. 2004). However, sex determination of the *Trachemys* embryos is temperature-dependent, with cooler incubation temperatures producing only males, and warmer incubation temperatures only females (Ewert et al. 199, in Cadi et al. 2004). Therefore, incubation temperature could be a limiting factor for the invasion of this species in parts of Europe, if hatchlings of only one sex are produced in the wild (Cadi et al. 2004). A strong bias towards female red-eared sliders has been detected in capture sampling in France. This may reflect a potential strong female bias of imported juveniles; the incubation at high temperature leads to rapid hatching, but produces females in this species with temperature dependent sex determination (Godfrey

			et al. 2003, in Prévot-Julliard et al. 2007).
1.16. If the organism requires another species for critical stages in its life cycle then how likely is the organism to become associated with such species in Europe?	NA very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.17. How likely is it that establishment will occur despite competition from existing species in Europe?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.18. How likely is it that establishment will occur despite predators, parasites or pathogens already present in Europe?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.19. How likely is the organism to establish despite existing management practices in Europe?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.20. How likely are management practices in Europe to facilitate establishment?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.21. How likely is it that biological properties of the organism would allow it to survive eradication campaigns in Europe?	very likely	medium	Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli et al. 1997, Martinez-Silvestre et al. 1997, Cadi et al. 2003, in Cadi & Joly 2003). The competitive advantages of the slider may also include lower age at maturity, higher fecundity,

			and larger adult body size (Arvy & Servan 1998, in Cadi & Joly 2003). The minimum length of the male red-eared slider at maturity is less than that of the native European pond turtle (*Emys orbicularis orbicularis*) and the age to maturity is two to five years for *T. scripta elegans* versus six to 16 years for *E. orbicularis orbicularis* (Cagle 1950, Servan & Arvy 1997, in Ramsay et al. 2007). Turtles may compete for food, egg-laying sites, or basking places (Bury & Wolfheim 1973, Bury et al. 1979, Rovero et al. 1999, Lindeman 1999, in Cadi & Joly 2003). Because their metabolism is governed by body temperature, in regions where mean temperatures fall below minimum requirements basking is a vital activity (Rollinat 1934, Cagle 1946, Lebboroni & Chelazzi 1991, in Cadi & Joly 2004). In a study by Cadi and Joly (2003), *Emys* were shown to shift their basking activity toward places considered to be of lower quality, while the dominant *Trachemys* occupied the better basking sites. Basking increases body temperature and thus activates metabolism (Jackson 1971, Kepenis & McManus 1974, in Cadi & Joly 2003) and increases the ingestion rate (Parmenter 1980, in Cadi & Joly 2003). Other studies have also shown red-eared sliders to compete with indigenous species for food and basking sites (Frank & McCoy 1995, Williams 1999, Salzberg 2000, in Somma & Fuller 2009). The red-eared slider has also been considered occasionally aggressive towards other individuals (Cadi & Joly 2003).

			Pearson et al. (2015) indicates that Red-eared slider turtles (*Trachemys scripta elegans*) have been introduced to wetlands throughout the world and have negatively impacted native species, particularly other species of turtles. In our controlled feeding experiments in mesocosms juvenile red-eared slider turtles negatively impacted the growth of juvenile red-bellied turtles (*Pseudemys rubriventris*), an IUCN near threatened species and a Pennsylvania threatened species, through exploitative competition for limited food.
1.22. How likely are the biological characteristics of the organism to facilitate its establishment?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.23. How likely is the capacity to spread of the organism to facilitate its establishment?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.24. How likely is the adaptability of the organism to facilitate its establishment?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.25. How likely is it that the organism could establish despite low genetic diversity in the founder population?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.26. Based on the history of invasion by this organism	very unlikely	low	

elsewhere in the world, how likely is to establish in Europe? (If possible, specify the instances in the comments box.)	unlikely moderately likely likely very likely	medium high very high	
1.27. If the organism does not establish, then how likely is it that transient populations will continue to occur? Subnote: Red-eared Terrapin, a species which cannot re-produce in GB but is established because of continual release, is an example of a transient species.	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.28. Estimate the overall likelihood of establishment (mention any key issues in the comment box).	very unlikely unlikely moderately likely likely very likely	low medium high very high	

PROBABILITY OF SPREAD

Important notes:

- Spread is defined as the expansion of the geographical distribution of a pest within an area.

QUESTION	RESPONSE	CONFIDENCE	COMMENT
2.1. How important is the expected spread of this organism in Europe by natural means? (Please list and comment on the mechanisms for natural spread.)	major	medium	Natural dispersal (local): Red-eared sliders may disperse up to 2 km to lay eggs (Gibbons *et al*. 1983, in O'Keeffe 2009). Reproduction: Sexual maturity is reached in the third to fourth year (Obst 1983, Pupins Unpub. Data, in Pupins 2007). *T. scripta* exhibits complex courtship behaviour in the water. The female usually excavates a nest on the shore of a freshwater body or on beaches in places such as Costa Rica (Bringsøe 2006; Scalera 2006). Females may move as far as 1.6 kilometers to find a suitable nest site; the jug-shaped nest is generally up to 12 centimeters deep (Bringsøe 2006). Depending on body size and other factors up to six clutches a year containing up to 30 eggs may be laid; mean values of natural populations is around 6 to 11 eggs per clutch (Bringsøe 2006; Scalera 2006). Mean annual fecundity for *T s. elegans* in Illinois and Louisiana is close to the 30 eggs per year (estimated by Cagle 1950 and Thomhill 1982, in Tucker 2001). Mean annual fecundity estimates for the *T. scripta scripta* from South Carolina seem exceedingly low in comparison (Tucker 2001). Incubation takes 59 to 112 days (Scalera 2006). Hatching times are weather dependent: temperatures between 22°C to 30°C for 55

			to 80 days are preferred (Pendlebury 2006, in Pupins 2007). Hatching of eggs requires 50 to 60 days at 26 °C. Longevity is approximately 20 years in the wild and 40 years in captivity. In its introduced range in Europe egg deposition has been observed in Spain (de Roa and Roig, 1997; Martinez-Silvestre, 1997; Bertolero and Canicio, 2000; Capalleras and Carretero, 2000, in Cadi et al. 2004), and near Paris, France (Moran Pers. Comm., in Cadi et al. 2004). However, sex determination of the Trachemys embryos is temperature-dependent, with cooler incubation temperatures producing only males, and warmer incubation temperatures only females (Ewert *et al.* 199, in Cadi *et al.* 2004). Therefore, incubation temperature could be a limiting factor for the invasion of this species in parts of Europe, if hatchlings of only one sex are produced in the wild (Cadi *et al.* 2004). A strong bias towards female red-eared sliders has been detected in capture sampling in France. This may reflect a potential strong female bias of imported juveniles; the incubation at high temperature leads to rapid hatching, but produces females in this species with temperature dependent sex determination (Godfrey *et al.* 2003, in Prévot-Julliard *et al*. 2007). Although chelonians might never be considered explosive breeders, the number of T. s. elegans individuals could surpass that of native aquatic chelonians in southern Spain, where T. s. elegans reach maturity earlier, are more fecund and their eggs are more fertile (Perez-Santiagosa et al, 2008). Habitat:

			Within its natural range Trachemys scripta lives in a wide variety of freshwater habitats including rivers, ditches, swamps, lakes and ponds (Bringsøe 2006). *T. scripta* prefers large quiet water bodies with soft bottoms, an abundance of aquatic plants and suitable basking sites (Carr 1952, Ernst *et al*. 1994, Bringsøe 2001b, in Bringsøe 2006). Although they prefer quiet waters, red-eared sliders are highly adaptable and can tolerate anything from brackish waters, to manmade canals, and city park ponds (Ernst et al. 1994, Cox et al. 1998, Salzberg 2000, in Somma & Fuller 2009). Small turtles usually limit their activity to areas of heavy floating vegetation. It is thought that the terrapins do not feed or grow beyond temperature range of 10°C to 37°C (Ramsay et al. 2007). Trachemys scripta is omnivorous and consumes a wide variety of plant and animal matter.(Thomas 2006, Ernst and Lovich 2009) In Europe, *T. scripta elegans* are generally released in freshwater areas which are frequented by humans such as public ponds which are considered of low biological value (e.g. Kordges 1990, Thiesmeier & Kordges 1990 1991, in Bringsøe 2006). Natural habitats close to urban areas are also used for releases (Bringsøe 2006). Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli *et al.* 1997, Martinez-Silvestre *et al*. 1997, Cadi et al. 2003, in Cadi & Joly 2003). The occurrence of the red-eared slider in a tropical urban polluted river in Brazil supports evidence of its capacity to use anthropogenic environments. Polluted rivers can offer a high amount of organic residues and food items, which can represent an advantage for such a generalist

			freshwater turtle species (Moll 1980, Lindeman 1996, Souza & Abe 2000, in Ferronato *et al*. 2009).
2.2. How important is the expected spread of this organism in Europe by human assistance? (Please list and comment on the mechanisms for human-assisted spread.)	major	medium	Intentional release: As red-eared sliders reach adulthood, many are released by their owners into natural ecosystems (Cadi *et al*. 2004). In Europe, *T. scripta elegans* are generally released in freshwater areas which are frequented by humans such as public ponds which are considered of low biological value (e.g. Kordges 1990, Thiesmeier & Kordges 1990 1991, in Bringsøe 2006). Natural habitats close to urban areas are also used for releases (Bringsøe 2006).
2.3. Within Europe, how difficult would it be to contain the organism?	with some diffcult	medium	Preventative measures: With effect from 22 December 1997 the EU banned the import of the subspecies *T. scripta elegans* via the Protection of Species of Wild Fauna and Flora by Regulating Trade (Bringsøe 1998, 2001b, Bringsøe 2006). While it is no longer allowed to import the red-eared slider within the EU it is still legal to keep and distribute them within many EU countries. After this legislation was passed the red-eared slider was semi-replaced in the market by other North American turtles which fetch higher prices and are imported in lower quantities (Adrados *et* al. 2002, in Bringsøe 2006). This may change if American turtle farmers manage to improve breeding success of these species in turtle farms. Unfortunately some of the species replacing the red-eared slider in the market are substantially better adapted to cold climates (such as Nova Scotia and Siberia, respectively) and probably represent a

			higher ecological risk; they are cryptic species and are significantly more carnivorous than the red-eared slider (P.P. van Dijk Pers. Comm. 2006). Physical: Sliders can be captured by hand or through various trapping devices. Floating boards used by sliders as basking sites seem very effective when equipped with baited cages on top (Scalera 2006). Sniffer dogs can be used to detect and remove both turtles and their eggs; eggs can also be found and removed by following females at nesting areas (Scalera 2006). Many eradication campaigns are being held in several places and various methods of elimination and trap models have been tried. Valdeon et al (2010) present the Aranzadi Turtle Trap (ATT), which has been tested with great effectiveness in a fluvial backwater stretch of the Arga River in Pamplona (Spain). In Spain and Portugal 23.000 exotic invasive specimens of tortoises have been caught in the wild during the LIFE+Trachemys (LIFE09 NAT/ES/000529) project implementation. Its wide spreading has been stopped in some wetlands, while the native tortoise populations have also been recovered. Natural spreading is also now one of the main spreading ways. An exotic invasive turtle eradication handbook has been produced as a final result of the LIFE TRACHEMYS (LIFE09 NAT/ES/000529) project. The control strategy and methods of capture and eradication of exotic species are shown in it. The most effective control method was fishing pots. Different

			nest location techniques have been tested: dog training, ground penetration radar, and gravid female radio tracking; as well as they can be applied depending on circumstances. The diverse tested trapping methods (floating traps, baited traps, etc.) allow improving the effectiveness of catches. Control of *Trachemys scripta* will allow carrying out reintroduction programs of *Emys orbicularis*.
2.4. Based on the answers to questions on the potential for establishment and spread in Europe, define the area endangered by the organism.	France, Germany, Latvia, Poland, Spain, Greece, Italy, The Netherlands, Portugal, Slovenia, Austria, Belgium, Denmark, Ireland, United Kingdom, Finland, Czech Republic, Estonia, Lithuania, Romania, Slovakia, Bulgaria, Sweden; Luxembourg, Malta and Cyprus.	medium	Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli et al. 1997, Martinez-Silvestre *et al*. 1997, Cadi et al. 2003, in Cadi & Joly 2003). However, a tendency for expansion of invasion range to the northern and eastern parts of Europe is also obvious: in recent publications one can find evidence of funding populations of T.s.elegans in Germany (Pieh and Laufer, 2006) in Poland (Najbar, 2001) and the Baltic Region (Pupins, 2007).
2.5. What proportion (%) of the area/habitat suitable for establishment (i.e. those parts of Europe were the species could establish), if any, has already been colonised by the organism?	10-33	medium	Mediterranean biogeographical region. Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli et al. 1997, Martinez-Silvestre et al. 1997, Cadi et al. 2003, in Cadi & Joly 2003). Following the countries in which has been recorded and their biogeographical regions, it could be the following: Alpine, Mediterranean, Atlantic, Boreal, Continental and Macaronesian.

			LIST: Mediterranean, Alpine, Mediterranean, Atlantic, Boreal, Continental and Macaronesian (some parts of these regions)
2.6. What proportion (%) of the area/habitat suitable for establishment, if any, do you expect to have been invaded by the organism five years from now (including any current presence)?	10-33	medium	Mediterranean biogeographical region, since Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli et al. 1997, Martinez-Silvestre et al. 1997, Cadi et al. 2003, in Cadi & Joly 2003). In Europe it is becoming increasingly abundant, especially in Portugal, Spain and France. (Van Dijk, P.P., Harding, J. & Hammerson, G.A. 2013. *Trachemys scripta*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>). The Global Invasive Species Database (2009) lists it as a pest in France, Germany, Latvia, Poland and Spain. In Spain, it is considered one of the most harmful invasive species (GEIB 2006).
2.7. What other timeframe (in years) would be appropriate to estimate any significant further spread of the organism in Europe? (Please comment on why this timeframe is chosen.)	40	medium	It would be necessary to estimate evolution of this species long-term, taking into account biological characteristics, habitat and climate change evolution.
2.8. In this timeframe what proportion (%) of the endangered area/habitat (including any currently occupied areas/habitats) is likely to have been invaded by this organism?	10-33	medium	Mediterranean biogeographical region since natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli et al. 1997, Martinez-Silvestre et al. 1997, Cadi et al. 2003, in Cadi & Joly 2003).

			Besides, take into account countries in which has been recorded and their biogeographical regions, it could be the following: Alpine, Mediterranean, Atlantic, Boreal, Continental and Macaronesian. It is basic the importance of climate change evolution in this timeframe.
2.9. Estimate the overall potential for future spread for this organism in Europe (using the comment box to indicate any key issues).	moderately	medium	Taking to account the following factors: Preventative measures: With effect from 22 December 1997 the EU banned the import of the subspecies *T. scripta elegans* via the Protection of Species of Wild Fauna and Flora by Regulating Trade (Bringsøe 1998, 2001b, Bringsøe 2006). While it is no longer allowed to import the red-eared slider within the EU it is still legal to keep and distribute them within many EU countries. After this legislation was passed the red-eared slider was semi-replaced in the market by other North American turtles which fetch higher prices and are imported in lower quantities (Adrados *et* al. 2002, in Bringsøe 2006). This may change if American turtle farmers manage to improve breeding success of these species in turtle farms. Unfortunately some of the species replacing the red-eared slider in the market are substantially better adapted to cold climates (such as Nova Scotia and Siberia, respectively) and probably represent a higher ecological risk; they are cryptic species and are significantly more carnivorous than the red-eared slider (P.P. van Dijk Pers. Comm. 2006). Physical measures: Sliders can be captured by hand or through various trapping devices. Floating boards used by sliders as basking sites seem very effective

			when equipped with baited cages on top (Scalera 2006). Sniffer dogs can be used to detect and remove both turtles and their eggs; eggs can also be found and removed by following females at nesting areas (Scalera 2006). Natural reproduction conditions: Mediterranean biogeographical region since natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli et al. 1997, Martinez-Silvestre et al. 1997, Cadi et al. 2003, in Cadi & Joly 2003). Countries in which has been recorded and their biogeographical regions, it could be the following: Alpine, Mediterranean, Atlantic, Boreal, Continental and Macaronesian. Climate change: It is basic the importance of climate change evolution in this timeframe. Natural dispersal conditions: Reproduction: Sexual maturity is reached in the third to fourth year (Obst 1983, Pupins Unpub. Data, in Pupins 2007). *T. scripta* exhibits complex courtship behaviour in the water. The female usually excavates a nest on the shore of a freshwater body or on beaches in places such as Costa Rica (Bringsøe 2006; Scalera 2006). Females may move as far as 1.6 kilometers to find a suitable nest site; the jug-shaped nest is generally up to 12 centimeters deep (Bringsøe 2006). Depending on body size and other factors up to six clutches a year containing up to 30 eggs may be laid; mean

			values of natural populations is around 6 to 11 eggs per clutch (Bringsøe 2006; Scalera 2006). Mean annual fecundity for *T s. elegans* in Illinois and Louisiana is close to the 30 eggs per year (estimated by Cagle 1950 and Thomhill 1982, in Tucker 2001). Mean annual fecundity estimates for the *T. scripta scripta* from South Carolina seem exceedingly low in comparison (Tucker 2001). Incubation takes 59 to 112 days (Scalera 2006). Hatching times are weather dependent: temperatures between 22°C to 30°C for 55 to 80 days are preferred (Pendlebury 2006, in Pupins 2007). Hatching of eggs requires 50 to 60 days at 26 °C. Longevity is approximately 20 years in the wild and 40 years in captivity. In its introduced range in Europe egg deposition has been observed in Spain (de Roa and Roig, 1997; Martinez-Silvestre, 1997; Bertolero and Canicio, 2000; Capalleras and Carretero, 2000, in Cadi et al. 2004), and near Paris, France (Moran Pers. Comm., in Cadi et al. 2004). However, sex determination of the Trachemys embryos is temperature-dependent, with cooler incubation temperatures producing only males, and warmer incubation temperatures only females (Ewert *et al.* 199, in Cadi *et al.* 2004). Therefore, incubation temperature could be a limiting factor for the invasion of this species in parts of Europe, if hatchlings of only one sex are produced in the wild (Cadi *et al.* 2004). A strong bias towards female red-eared sliders has been detected in capture sampling in France. This may reflect a potential strong female bias of imported juveniles; the incubation at high temperature leads to rapid hatching, but produces females in this species with temperature dependent sex determination (Godfrey *et al.* 2003, in Prévot-

			Julliard *et al*. 2007). Habitat: Within its natural range Trachemys scripta lives in a wide variety of freshwater habitats including rivers, ditches, swamps, lakes and ponds (Bringsøe 2006). *T. scripta* prefers large quiet water bodies with soft bottoms, an abundance of aquatic plants and suitable basking sites (Carr 1952, Ernst *et al*. 1994, Bringsøe 2001b, in Bringsøe 2006). Although they prefer quiet waters, red-eared sliders are highly adaptable and can tolerate anything from brackish waters, to manmade canals, and city park ponds (Ernst et al. 1994, Cox et al. 1998, Salzberg 2000, in Somma & Fuller 2009). Small turtles usually limit their activity to areas of heavy floating vegetation. It is thought that the terrapins do not feed or grow beyond temperature range of 10°C to 37°C (Ramsay et al. 2007). Trachemys scripta is omnivorous and consumes a wide variety of plant and animal matter.(Thomas 2006, Ernst and Lovich 2009) Human conditions to dispersal: In Europe, *T. scripta elegans* are generally released in freshwater areas which are frequented by humans such as public ponds which are considered of low biological value (e.g. Kordges 1990, Thiesmeier & Kordges 1990 1991, in Bringsøe 2006). Natural habitats close to urban areas are also used for releases (Bringsøe 2006). Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli *et al.* 1997, Martinez-Silvestre *et al*. 1997, Cadi et al. 2003, in Cadi & Joly 2003). The occurrence of the red-eared slider in a tropical urban polluted river in Brazil supports evidence of its

			capacity to use anthropogenic environments. Polluted rivers can offer a high amount of organic residues and food items, which can represent an advantage for such a generalist freshwater turtle species (Moll 1980, Lindeman 1996, Souza & Abe 2000, in Ferronato *et al*. 2009). Invasive potential: *Trachemys scripta elegans* is included in the IUCN/SSC Invasive Species Specialist Group's 100 Worst Invasives List. (Van Dijk et al, 2013).

PROBABILITY OF IMPACT

Important instructions:

- When assessing potential future impacts, climate change should not be taken into account. This is done in later questions at the end of the assessment.
- Where one type of impact may affect another (e.g. disease may also cause economic impact) the assessor should try to separate the effects (e.g. in this case note the economic impact of disease in the response and comments of the disease question, but do not include them in the economic section).
- Note questions 2.10-2.14 relate to economic impact and 2.15-2.21 to environmental impact. Each set of questions starts with the impact elsewhere in the world, then considers impacts in Europe separating known impacts to date (i.e. past and current impacts) from potential future impacts. Key words are in bold for emphasis.

QUESTION	RESPONSE	CONFIDENCE	COMMENTS
2.10. How great is the economic loss caused by the organism within its existing geographic range, including the cost of any current management?	minimal	medium	While this species can certainly cause ecological damage wherever competition with threatened native terrapins is an issue, the economic loss caused by *Trachemys scripta elegans* appears to be minor throughout its existing geographic range.
2.11. How great is the economic cost of the organism currently in Europe excluding management costs (include any past costs in your response)?	minimal	medium	Excluding management cost there are not concrete data. The red-eared slider's economic impact is apparent in the methods of management and control employed due to its invasion. Methods of removing the red-eared sliders require time, effort, and funding
2.12. How great is the economic cost of the organism likely to be in the future in Europe excluding management costs?	minimal	medium	The red-eared slider's economic impact is apparent in the methods of management and control employed due to its invasion. Methods of removing the red-eared sliders require time, effort, and funding. There are virtually no means by which Trachemys scripta elegans could cause direct negative economic effects. The three main risks would be due to: 1. predation on commercially valuable fish stocks (in fishing lakes or freshwater fish farms), although adults of this species are largely herbivorous and have almost

			no impact on fish populations; 2. the possible disruption of economically important activities (e.g. the leisure use of freshwater bodies) due to the perceived or actual dangers caused by pathogens, such as Salmonella, known to be carried by this species; 3. Damage to commercial watercress beds due to the feeding activities of adult terrapins These risks, however, are so minimal as to be unmeasurable.
2.13. How great are the economic costs associated with managing this organism currently in Europe (include any past costs in your response)?	major	high	In Spain and Portugal 23.000 exotic invasive specimens of tortoises have been caught in the wild during the LIFE+Trachemys (LIFE09 NAT/ES/000529) project implementation. Its wide spreading has been stopped in some wetlands, while the native tortoise populations have also been recovered. Natural spreading is also now one of the main spreading ways. This project had a budget of: 1,200,754.00 €
2.14. How great are the economic costs associated with managing this organism likely to be in the future in Europe?	major	medium	If no measures are taken cost of control will increase rapidly.
2.15. How important is environmental harm caused by the organism within its existing geographic range excluding Europe?	major	high	Parasite host-switching is of big concern with reference to native *M. leprosa* turtles in natural environments of Southern France and Northern Spain (Meyer et al, 2015). As a result, invasion of *T. s. elegans*, together with its associated parasitic load, could be a key stressor to endemic turtle species (Meyer et al, 2015). It is invasive in Japan: https://www.nies.go.jp/biodiversity/invasive/DB/detail/30050e.html According to the Global Invasive Species Database is managed by the Invasive Species Specialist Group (ISSG) of the IUCN theLocation Specific Impacts: Asia

			Competition: The CITES (2003, in Ramsay et al. 2007) report on the trade in chelonians noted that if there is competition with other terrapins, it is more likely to be in temperate regions where basking becomes more important. Australia Ecosystem change: Overseas, red-eared sliders have had major impacts (eg. Levell 2000) and could present a similar hazard in Australia (Burgin 2006). New South Wales (Australia) Competition: Competition from this exotic species could have a detrimental impact on local species such as the common snake-neck turtle (*Chelodina longicollis*) and the Sydney Basin Turtle (*Emydura macquararii dharuk*) (Burgin 2006). Queensland (Australia) Competition: Red-eared sliders have the potential to multiply rapidly and spread through Queensland's waterways, becoming the most common turtle in creeks and rivers and replacing native turtles (NRM&W). Disease transmission: Red-eared sliders have the potential to carry new diseases and pathogens to native turtles and other aquatic wildlife (NRM&W). Sydney (Australia) Competition: Competition from this exotic species could have a detrimental impact on the local species, the common snake-neck turtle (*Chelodino longicollis*) and the Sydney basin turtle *Emydura macquarii dhoruk* (Shelley 2007). Bermuda Ecosystem change: The full extent of its impact on freshwater ecosystems in Bermuda has not been extensively studied (Bacon Gray & Kitson 2006). Reduction in native biodiversity: *T. scripta elegans* may be a threat to endemic fish species in brackish ponds

			(De Silva 2003, in Varnham 2006), for example the the endemic and endangered killifish (*Fundulus bermudae*) on which the red-eared slider may prey on in sympatric ponds. *T. scripta elegans* also inhabits some of the only habitat for the diamondback terrapin (M. terrapin); a highly localised native species. The ecological impact of the red-eared slider on native chelonians in other regions has been documented, however, the impact on the Bermudian diamondback is currently unknown (Outerbridge 2008). Local conservationists fear that the feral sliders are competing with the diamondbacks for nesting sites; all known nesting sites for the diamondback in Bermuda are limited to six small sand bunkers on a golf course, of which three are also being used by sliders; further studies are needed to determine the extent to which diamondbacks are being negatively affected by sliders (Outbridge 2008). Brazil Competition: *P. Geoffroanus* feeds mainly on Chironomidae larvae (Souza & Abe 2000, in Ferronato et al. 2009), which could possibly also be a prey for red-eared sliders. *T. scripta elegans* has a large dispersal and dispersion capacity (Gibbons 1990, Bodie & Semlitsch 2000, in Ferronato et al. 2009). It also seems to be more aggressive than other freshwater turtles (Bels et al. 2008, in Ferronato et al. 2009). *P. geoffroanus* nests in the anthropogenic forest of the Piracicamirim stream. This area could be suitable as nesting habitat for *T. scripta elegans* as well. Predation of P. *geoffroanus* nests occurs, however, *T. scripta elegans* nests can be located at great distances from the water (Mount 1975, in Ferronato et al. 2009) and their eggs can be laid 140 cm deep (Packard et al. 1997, in

			Ferronato et al. 2009). These characteristics could act defensively against local predators (Ferronato et al. 2009). While Cadi & Joly (2003 2004) noted competition for basking sites between native turtles (*Emys orbicularis*) and introduced red-eared sliders Ferronato and colleagues (2009) have no evidence of competition with native species (*Hydromedusa tectifera* and *P. geoffroanus*) as water temperature is considerably milder than in Europe, reducing the need for basking. Human health: Red-eared sliders may pose a potential risk to human health as they carry salmonella (de Sa and Solari 2001). British Virgin Islands Other: Ecological impacts remain unstudied, but are likely to be small because of the localised nature of the invasion and the artificial nature of the habitat (Perry et al. 2007). Canada Competition: In Ontario, Red-eared Sliders that have been released into Grenadier Pond have established a local population that apparently competes directly with the natural turtle population (Dog Legislation Council of Canada 1998, in Bunnell 2005). Disease transmission: The western painted turtle has been observed at the pond in the Richmond Nature Centre in the past (Griffith 2000, in Bunnell 2005). Sanders and colleagues (2004, in Bunnell 2005) noted attempted nest-building by sliders at the pond, indicating that the species is present and potentially capable of sharing pathogens with native turtles. Cayman Islands Hybridisation: The red eared slider *Trachemys scripta* has the potential to hybridise with native Taco River slider (*Trachemys decussata angusta*) (Cottam,

			2004 in Varnham, 2006). Dominican Republic Hybridisation: *T. scripta* competes and hybridises with native turtles (Powell et al. 2000), possibly diluting unique gene pools (Powell & Incháustegui 2009). France Competition: Red-eared slider reproduction has been recorded in three places where the European pond turtle (*Emys orbicularis*) is living. There is a wide overlap in their ecological niches. Threat to endangered species: The IUCN Red List Near Threatened European pond turtle *Emys orbicularis*, in particular the subspecies *Emys orbicularis galloitalica*, face competitive pressure from introduced red-eared sliders. Germany Ecosystem change: The concern for the natural environment became obvious from the 1980s (especially in Germany), because increasing numbers of red-eared sliders were released (Bringsøe 2006). Israel Competition: In Israel, *T. scripta* is believed to compete with *Mauremys caspica* (Bouskila 1986, in Ramsay et al. 2007). Ryukyu Islands (Japan) Other: Various types of impacts on the indigenous biodiversity have been shown for feral populations of *T. scripta elegans* outside Japan (Lever 2003, Cadi & Joly 2004, in Ota et al. 2004). However, no pertinent data are available yet for the Ryukyu population. Latvia Threat to endangered species: Spread of invasion of *T. scripta elegans* in Latvia, besides the influence of this species on the habitat, can result in a direct competition of the species with the extremely rare Latvian species of

			turtle Emys orbicularis (Pupins 2005, Pupins & Pupina 2005, in Pupins 2007). Poland Competition: On the market, the substitute for the red-eared terrapin has presently become Troost's terrapin *Trachemys scripta troostii*, since other turtles are too expensive. Troost's terrapin may also pose a threat for the native European pond turtle Emys orbicularis. Boqueron State Wildlife Refuge (Puerto Rico) Disease transmission: The red-eared slider (Trachemys *scripta elegans*) is a known potential vector of diseases that can be transmitted to humans (e.g. *Salmonella*) (Felix Grana., pers.comm., November 2007). Reduction in native biodiversity: The red-eared slider (*Trachemys scripta elegans*) is reported to compete with the endemic Puerto Rican slider, *Trachemys stejnegeri* stejnegeri (see *Trachemys stejnegeri* in IUCN Red List of Threatened Species) (Felix Grana., pers.comm., November 2007). Singapore Competition: Sulaiman (2002, in Ramsay et al. 2007) noted that a major concern for conservationists in Singapore was that sliders may outcompete local species, such as the spiny terrapin and the Malayan box terrapin (*Cuora amboinensis*). Sulaiman (2002) noted that a female slider can produce up to a dozen eggs twice a year and may out-breed the Malayan box terrapin that lays two eggs each time. Other: The large numbers of *T. scripta elegans* imported into Singapore for sale as pets every year, some of which may be released, is a cause for concern (Sulaiman 2002, in Goh & O'Riordan 2007) because they are present in many freshwater bodies. Some localities, such as the Botanic Gardens, Bedok

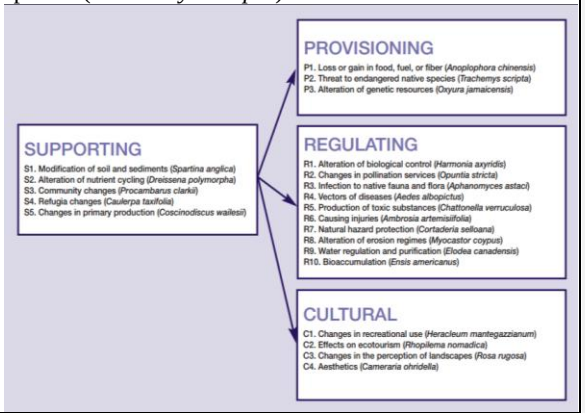
			Reservoir and Bukit Batok Town Park, have high population densities (Goh 2004, in Goh & O'Riordan 2007). It is unknown what adverse effects, if any, *T. scripta elegans* as an alien species may have. South Africa Competition: In South Africa it is suspected that *T. scripta* has displaced the native *Pelomedusa subrufa* through competition (Ramsay et al. 2007). Spain Competition: Although chelonians might never be considered explosive breeders, the number of *T. scripta elegans* individuals could surpass that of native aquatic chelonians in southern Spain, where *T. scripta elegans* reach maturity earlier, are more fecund and their eggs are more fertile (Perez-Santigosa Diaz-Paniagua & Hidalgo-Vila 2008). Also, the absence of Spanish terrapins in areas with high predation risk occupied by *T. scripta* (Pleguezuelos 2002, in Polo-Cavia, Lopez & Martin 2007) suggests that native species are more sensitive to predation pressure. Although these freshwater turtles are predominately aquatic, they have to come to land for basking, where they are potential prey of birds and mammals (Greene 1988, Martin & Lopez 1990, in Polo-Cavia, Lopez & Martin 2007). Behavioral asymmetries could contribute to the greater competitive ability of introduced T. scripta within anthropogenically disturbed environments (Polo-Cavia, Lopez & Martin 2007). Polo-Cavia Lopez & Martin (2009a) hypothesised that interspecific differences in morphology, and thus, in heating and cooling rates, might confer competitive advantages to introduced *T. scripta*. *T. scripta* showed a more rounded shape than *M. leprosa*, a lower surface-to-volume ratio and a greater thermal inertia, which facilitates body heat retention and favors the

			performance of activities and physiological functions such as foraging or digestion, thus aggravating the competition process with native turtles in Mediterranean habitats. Ecosystem change: In studies by Polo-Cavia Lopez & Martin (2009b) *M. leprosa* preferred water with chemical stimuli of conspecifics and avoided water with chemical cues of *T. scripta*(while T. scripta showed no preference) which suggests that chemical cues could be used by native *M. leprosa* to avoid water pools occupied by introduced *T. scripta*. The authors suggest that this avoidance behavior of native *M. leprosa* may be one of the causes that contributes to the observed displacement of their populations by the invasive T. scripta. Threat to endangered species: In the Iberian Peninsula, the introduced red-eared slider is an invasive species that is competing and displacing the endangered native Spanish terrapin (*Mauremys leprosa*) (Polo-Cavia, Lopez & Martin 2007). The introduction of exotic turtles is considered to threaten the status of the two native species of aquatic turtles (European pond turtle (*Emys orbicularis*) and *M. leprosa*), which are at present listed as vulnerable, with declining populations (Pleguezuelos et al. 2004, in Perez-Santigosa Diaz-Paniagua & Hidalgo-Vila 2008). <u>Taiwan</u> Herbivory: In the Taipei Botanical Garden, released individuals of the sliders have almost eradicated the vegetation (water lilies) in a pond (Ramsay et al. 2007). Reduction in native biodiversity: Lue and Chen (1996, in Ramsay et al. 2007) suggested that the wide ecological tolerance and dietary habits of sliders may cause impacts on indigenous chelonians in Taiwan. <u>Thailand</u>

			Competition: The red-eared slider has the potential to disrupt native turtle populations (Thirakhupt & van Dijk 1994). United States (USA) Human health: The red-eared slider may carry diseases harmful to humans and many other species. For example, it is considered a potential vector of Salmonella (Scalera 2006). Arizona (United States (USA)) Other: Potential negative consequences of the widespread introduction of sliders are little-studied, and in some cases may be benign, including in Arizona (Stitt 2005). Stitt (2005) writes "In completely urban settings, where wetlands have been created where once there were none, sliders may provide a glimpse of nature to people otherwise removed from wilderness. There, they join park ducks, swans, and squirrels and provide enjoyment to a sedentary society that appreciates nature, any nature, regardless of origin. In these urban aquatic islands, perhaps red-eared sliders have their place, feeding on koi and grass carp, and being chased into the water by little kids and dogs." California (United States (USA)) Competition: Red-eared sliders (*Trachemys scripta elegans*) out-compete native turtles, such as the western pond turtle (see *Clemmys marmorata* in IUCN Red List of Threatened Species), for food and basking spots. Disease transmission: Red-eared sliders (*Trachemys scripta elegans)* may introduce new diseases to native turtle populations.
2.16. How important is the impact of the organism on biodiversity (e.g. decline in native species, changes in native species communities, hybridisation) currently in	major	medium	Populations in Europe are in places considered to represent a threat to local turtle species (through competition). *Trachemys scripta elegans* is included in

Europe (include any past impact in your response)?			the IUCN/SSC Invasive Species Specialist Group's 100 Worst Invasives List. (Van Dijk et al, 2013). The introduction of exotic species has contributed to the global loss of biodiversity and to the increase in the number of threatened or endangered species (Wilson 1988, in Cadi et al. 2004). Competitive interactions between *T. scripta elegans* and the European pond turtle (*Emys orbicularis*) are of particular interest, as the latter is registered as an endangered species (Appendix II of the Bern Convention, Corbett 1989, Luiselli et al. 1997, Martinez-Silvestre et al. 1997, in Cadi & Joly 2003, see Competition). Turtles introduced near Paris were revealed to have consumed aquatic plants and animals (mostly arthropods and molluscs)(Prévot-Julliard et al. 2007, in Teillac-Deschamps et al. 2008)
2.17. How important is the impact of the organism on biodiversity likely to be in the future in Europe?	major	high	The competitive advantages of the slider may include lower age at maturity, higher fecundity, and larger adult body size (Arvy & Servan 1998, in Cadi & Joly 2003). Turtles may compete for food, egg-laying sites, or basking places (Bury & Wolfheim 1973, Bury et al. 1979, Rovero et al. 1999, Lindeman 1999, in Cadi & Joly 2003). In a study by Cadi and Joly (2003), Emys were shown to shift their basking activity toward places considered to be of lower quality, while the dominant *Trachemys* occupied the better basking sites. Other studies have also shown red-eared sliders to compete with indigenous species for food and basking sites (Frank & McCoy 1995, Williams 1999, Salzberg 2000, in Somma & Fuller 2009). The red-eared slider has also been considered occasionally aggressive towards other

			individuals (Cadi & Joly 2003). Competitive interactions between *T. scripta elegans* and the European pond turtle (*Emys orbicularis*) are of particular interest, as the latter is registered as an endangered species (Appendix II of the Bern Convention, Corbett 1989, Luiselli et al. 1997, Martinez-Silvestre et al. 1997, in Cadi & Joly 2003, see Competition). Continuous releasing of exotic pet turtles in natural ecosystems increases the risk of parasite transmission to native species, and highlights the impending need for regulation of pet turtle trade in Europe (Hidalgo-Vila et al. 2008); the red-eared slider is known to carry nematodes (Hidalgo-Vila et al. 2008). Turtles introduced near Paris were revealed to have consumed aquatic plants and animals (mostly arthropods and molluscs, Prévot-Julliard et al. 2007, in Teillac-Deschamps et al. 2008). Parasite host-switching is of big concern with reference to native M. leprosa turtles in natural environments of Southern France and Northern Spain (Meyer et al, 2015). As a result, invasion of T. s. elegans, together with its associated parasitic load, could be a key stressor to endemic turtle species. (Meyer et al, 2015)
2.18. How important is alteration of ecosystem function (e.g. habitat change, nutrient cycling, trophic interactions), including losses to ecosystem services, caused by the organism currently in Europe (include any past impact in your response)?	moderate	low	The impacts of *T. scripta* on natural habitats and ecosystems are unknown; should the red-eared slider be released in natural habitats with high ecological value, it would be relevant to monitor any consequences on native fauna and flora, typically invertebrates, amphibians, native turtles and nesting birds (Bringsøe

			2006). *Trachemys script elegans* which competes with the European pond turtle for food and basking spaces. Invasive species in Europe causing a variety of impacts on ecosystem services include (a) American crayfish (*Procambarus clarkii*), (b) common slider (*Trachemys scripta elegans*), (c) prickly pear cactus (*Opuntia maxima*), and (d) muskrat (*Ondatra zibethicus*) (Villa e al. 2010). Examples of impact types of invasive species in Europe, classified into four categories of ecosystem services, based on Binimelis et al. (2007). PROVISIONING: P2. Threat to endangered native species (*Trachemys scripta*) 
2.19. How important is alteration of ecosystem function (e.g. habitat change, nutrient cycling, trophic interactions), including losses to ecosystem services,	major	low	The impacts of *T. scripta* on natural habitats and ecosystems are unknown; should the red-eared slider be released in natural habitats with high ecological value, it

caused by the organism likely to be in Europe in the future?			would be relevant to monitor any consequences on native fauna and flora, typically invertebrates, amphibians, native turtles and nesting birds (Bringsøe 2006). *Trachemys script elegans* which competes with the European pond turtle for food and basking spaces. Many aquatic organisms have significant effects on ecosystem functioning and benthic communities. Considering the large density and the high biomass of fresh-water turtles in aquatic ecosystems (Congdonet al., 1986), it is important to recognize the impact that *T. s. elegans* may have on pondecosystems and community dynamics . Whileomnivorous feeding can directly affect ecosys-tems by influencing aquatic food webs on different trophic levels (McCann and Hastings, 1997;Duffy, 2002), *T. s. elegans* may also potentiallyalter ecosystem functioning through influencingresource availability, increasing habitat distur-bance, or modulating environmental conditionssuch as sediment accumulation, pH or conduc-tivity (Hooper et al., 2005).
2.20. How important is decline in conservation status (e.g. sites of nature conservation value, WFD classification) caused by the organism currently in Europe?	major	high	The Florida common slider (*Trachemys scripta*) can wipe out amphibian species in good conservation status habitats.
2.21. How important is decline in conservation status (e.g. sites of nature conservation value, WFD classification) caused by the organism likely to be in the future in Europe?	major	medium	The impacts of *T. scripta* on natural habitats and ecosystems are unknown; should the red-eared slider be released in natural habitats with high ecological value, it would be relevant to monitor any consequences on native fauna and flora, typically invertebrates, amphibians, native turtles and nesting birds (Bringsøe

			2006).
2.22. How important is it that genetic traits of the organism could be carried to other species, modifying their genetic nature and making their economic, environmental or social effects more serious?	No data available		
2.23. How important is social, human health or other harm (not directly included in economic and environmental categories) caused by the organism within its existing geographic range?	Major	High	Reptiles, including turtles, are well-recognised reservoirs for Salmonella, and are a source of human salmonellosis (Nagano *et al*. 2006). *Clostridium butyricum* BoNT/E was isolated from water from tanks housing pet 'yellow-bellied' terrapins (Trachemys scripta scripta): in case A the terrapins were in the infant's home; in case B a relative fed the terrapin prior to holding and feeding the infant when both visited another relative. C. butyricum isolates from the infants and the respective terrapin tank waters were indistinguishable by molecular typing. Review of a case of C. butyricum BoNT/E botulism in the UK found that there was a pet terrapin where the infant was living. It is concluded that the C. butyricum-producing BoNT type E in these cases of infant botulism most likely originated from pet terrapins. These findings reinforce public health advice that reptiles, including terrapins, are not suitable pets for children aged (Shelley et al., 2014).
2.24. How important is the impact of the organism as food, a host, a symbiont or a vector for other damaging organisms (e.g. diseases)?	Major	High	Continuous releasing of exotic pet turtles in natural ecosystems increases the risk of parasite transmission to native species, and highlights the impending need for regulation of pet turtle trade in Europe (Hidalgo-Vila *et al*. 2008); the red-eared slider is known to carry nematodes (Hidalgo-Vila et al. 2008). The importance of disease-mediated invasions and the role of parasite spillover as a substantial threat to the

			conservation of global biodiversity are now well known. Although competition between invasive sliders *Trachemys scripta* elegans and indigenous European turtles has been extensively studied, the impact of this invasive species on diseases affecting native populations is poorly known. During winter 2012-2013 an unusual event was detected in a population of *Emys orbicularis* (Linnaeus, 1758) inhabiting a pond system in Galicia (NW Spain). Most turtles were lethargic and some had lost mobility of limbs and tail. Necropsies were performed on 11 turtles that were found dead or dying at this site. Blood flukes belonging to the species *Spirorchis elegans* were found inhabiting the vascular system of 3 turtles, while numerous fluke eggs were trapped in the vascular system, brain, lung, heart, liver, kidney, spleen, and/or gastrointestinal tissues of all necropsied animals. Characteristic lesions included miliary egg granulomas, which were mostly found on serosal surfaces, particularly of the small intestine, as well as endocarditis, arteritis, and thrombosis. The most probable cause ofdeath in the 3 turtle specimens which were also examined histologically was a necrotic enteritis with secondary bacterial infection associated with a massive egg embolism. The North American origin of *S. elegans*, the absence of prior recorded epizootics in the outbreak area, and the habitual presence of its type host, the highly invasive red-eared slider, in this area suggest a new case of parasite spillover resulting in a severe emerging disease (Iglesias et al, 2015)
2.25. How important might other impacts not already covered by previous questions be resulting from introduction of the organism? (specify in the comment	NA		

box)			
2.26. How important are the expected impacts of the organism despite any natural control by other organisms, such as predators, parasites or pathogens that may already be present in Europe?	Major	Very high	Populations in Europe are in places considered to represent a threat to local turtle species (through competition) and the ecosystem in general (competition, predation). *Trachemys scripta elegans* is included in the IUCN/SSC Invasive Species Specialist Group's 100 Worst Invasives List. (Van Dijk et al, 2013).
2.27. Indicate any parts of Europe where economic, environmental and social impacts are particularly likely to occur (provide as much detail as possible).	All countries include in the Mediterranean, Atlantic and Continental biogeographical regions.	high	France; Germany; Greece; Italy; The Netherlands; Spain; Portugal; Slovenia; Austria; Latvia; Poland; Belgium; Denmark; Ireland; United Kingdom; south of Finland; Czech Republic; Estonia; Lithuania; Romania; Slovakia; Bulgaria; south of Sweden; Luxembourg; Malta; Cyprus

RISK SUMMARIES			
	RESPONSE	**CONFIDENCE**	**COMMENT**
Summarise Entry	likely	high	Natural spread from established populations and new releases are the principal way to colonize new areas.
Summarise Establishment	lvery likely	high	This species has a great capacity to settle in a great variety of wetlands due to the biological characteristics of the organism.
Summarise Spread	rapidly	medium	Natural spread: *Trachemys scripta elegans* is included in the IUCN/SSC Invasive Species Specialist Group's 100 Worst Invasives List. (Van Dijk et al, 2013). Human conditions to dispersal: In Europe, *T. scripta elegans* are generally released in freshwater areas which are frequented by humans such as public ponds which are considered of low biological value (e.g. Kordges 1990, Thiesmeier & Kordges 1990 1991, in Bringsøe 2006). Natural habitats close to urban areas are also used for releases (Bringsøe 2006). Natural reproduction of the red-eared slider in Europe under Mediterranean climate conditions has been reported (Luiselli *et al.* 1997, Martinez-Silvestre *et al*. 1997, Cadi et al. 2003, in Cadi & Joly 2003). The occurrence of the red-eared slider in a tropical urban polluted river in Brazil supports evidence of its capacity to use anthropogenic environments. Polluted rivers can offer a high amount of organic residues and food items, which can represent an advantage for such a generalist freshwater turtle species (Moll 1980, Lindeman 1996, Souza & Abe 2000, in Ferronato *et al*. 2009).
Summarise Impact	major	high	Ecosystem and biodiversity impact: The introduction of exotic species has contributed to the

			global loss of biodiversity and to the increase in the number of threatened or endangered species (Wilson 1988, in Cadi et al. 2004). Competitive interactions between *T. scripta elegans* and the European pond turtle (Emys orbicularis) are of particular interest, as the latter is registered as an endangered species (Appendix II of the Bern Convention, Corbett 1989, Luiselli et al. 1997, Martinez-Silvestre et al. 1997, in Cadi & Joly 2003, see Competition). Populations in Europe are in places considered to represent a threat to local turtle species (through competition) and the ecosystem in general (competition, predation). *Trachemys scripta elegans* is included in the IUCN/SSC Invasive Species Specialist Group's 100 Worst Invasives List. (Van Dijk et al, 2013). Competitive interactions: between *T. scripta elegans* and the European pond turtle (*Emys orbicularis*) are of particular interest, as the latter is registered as an endangered species (Appendix II of the Bern Convention, Corbett 1989, Luiselli et al. 1997, Martinez-Silvestre et al. 1997, in Cadi & Joly 2003, see Competition). Public Health impact: Reptiles, including turtles, are well-recognised reservoirs for Salmonella, and are a source of human salmonellosis (Nagano *et al*. 2006). Animal Health: Continuous releasing of exotic pet turtles in natural ecosystems increases the risk of parasite transmission to native species, and highlights the impending need for regulation of pet turtle trade in Europe (Hidalgo-Vila et al. 2008); the red-eared slider is known to carry nematodes (Hidalgo-Vila et al. 2008).

			American common sliders, *Trachemys scripta*, are opportunistic predators that changes from carnivorous in juvenile stage to omnivorous as an adult, feeding on plants and animals, insects and other invertebrates to vertebrates such as amphibians, reptiles, small mammals and birds. Then again, the antipredatory behaviour that some native amphibian tadpoles have in the presence of native terrapins, doesn´t show in the presence of common sliders. Common sliders have negative impact on biodiversity as they eat several aquatic plants, which could deeply alter local vegetation, and also because it competes for other food items, basking and nesting sites, with native turtles. It can be a vector of dangerous diseases to humans, like Salmonella, and some can impose painful bites, and can spread other diseases and parasites to native turtles and wildlife, for example nematodes and bacteria (EEA 16, 2012).
Conclusion of the risk assessment	major	high	Impacts: Ecosystem and biodiversity, Public Health, Animal Health, Competitive interactions with native species. Populations in Europe are in places considered to represent a threat to local turtle species (through competition) and the ecosystem in general (competition, predation). *Trachemys scripta elegans* is included in the IUCN/SSC Invasive Species Specialist Group's 100 Worst Invasives List. (Van Dijk et al, 2013). Parasite host-switching is of big concern with reference to native M. leprosa turtles in natural environments of Southern France and Northern Spain (Meyer et al, 2015). As a result, invasion of T. s. elegans, together with its associated parasitic load, could be a key stressor to endemic turtle species. (Meyer et al, 2015).

			Spirorchidiasis can decimate small population (Iglesias et al, 2015), all turtle species that act as vector for these parasites should be banned. The import of four species (Red-eared slider (*Trachemys scripta elegans*); American bullfrog (*Rana catesbeiana*); Painted turtle (*Chrysemys picta*); American ruddy duck (*Oxyura jamaicensis*)) which constitute an ecological threat is prohibited under the Wildlife Trade Regulation (Council Regulation 338/97) primarily designed to control trade in endangered species. Member States have established inspection and control procedures under the Regulation, but there are no assessment procedures.

ADDITIONAL QUESTIONS - CLIMATE CHANGE			
3.1. What aspects of climate change, if any, are most likely to affect the risk assessment for this organism?	Temperature increase New wetlands	high	The rise in global temperature will increase the appropriate altitude and ecologic range for the species Increase of marine water levels could generate new wetland areas appropriate for the species. According to the document "Exotic turtles in the Netherlands: a risk assessment" (file:///C:/Users/at_tragsatec_21/Downloads/20111111_AlterraRapport2186_turtles%20(5).pdf) there are two different possible pathways for introduction of exotic species to the Netherlands: through introduction by humans (escaped/discarded pets or accidental or willing introduction) and through species extending their range to the Netherlands from populations in neighbouring countries. In both cases, their suitability for the present and expected Dutch conditions determines the probability of adult survival, reproduction success and successive population establishment. Since present conditions are generally too cold for turtle reproduction, the principle factor determining the boundary conditions for successful invasion is Climate Change. All species are assessed against this background. The risk of a turtle species becoming invasive increases: 1) if it is already present in or established at close distance to Dutch nature, 2) if it naturally occurs in or has successfully colonised areas with climatological conditions comparable to present or future Dutch ones, and 3) if it is available in the pet-trade or has 'pet potential'. As the climate warms redeared slider range should expand northward
3.2. What is the likely timeframe for such changes?	50 years	medium	It is basic the importance of climate change evolution in

Gewijzigde veldcode

			this timeframe.
3.3. What aspects of the risk assessment are most likely to change as a result of climate change?	The suitable area for establishment of the species will be increased	medium	The rise in global temperature favours species proceeding from tropical climates The increases of the suitability of some habitats for the colonization of the species will increase the speed dispersal ability of the species.
ADDITIONAL QUESTIONS – RESEARCH			
4.1. If there is any research that would significantly strengthen confidence in the risk assessment please summarise this here.		medium	Additional studies are necessary to know how the presence of the species impacts on the ecosystem services of the habitat where it occurs

REFERENCES:

- Acuna-Mesen and Rafael Arturo, 1992. Potential exploitation of captive Slider Turtles (*Trachemys scripta*) in Costa Rica: A preliminary study. *Brenesia.* 0(38).157-158. **Summary:** Report from Costa Rica.
- Adrados LC, Briggs L (eds) (2002) Study of application of EU Wildlife Trade regulations in relation to species which form an ecological threat to the EU fauna and flora, with case studies of American bullfrog (*Rana catesbeiana*) and red-eared slider (*Trachemys scripta elegans*). Study report to the European Commission. Amphi Consult, Denmark.
- Agosta *et al*., 1999. Autoecology and synecological relationships in populations of *Trachemys scripta elegans* introduced in Lombardy. Preliminary data. *Rivista di Idrobiologia.* 38(1-3). Gennaio-Dicembre, 1999. 421-430. **Summary:** Reports of *Trachemys scripta elegans* in Italy.
- Aliens 19 & 20, Double issue. 2004. Invasive Species Specialist Group of the IUCN Species Survival Commission. ISSG, Auckland, New Zealand. **Summary:** Interesting and timely information on invasive species and associated issues. Focuses on conservation issues and includes news of upcoming conferences, publications, and reports.
- Bacon, Jamie P; Gray, Jennifer A; Kitson, Lisa., 2006. Status and conservation of the reptiles and amphibians of the Bermuda islands. Applied Herpetology 3: 323-344
- Bauer, A.M., Sadlier, R.A., Ineich I. (trad.) 2000. - The Herpetofauna of New Caledonia. Ithaca, Society for the Study of Amphibians and Reptiles, 310 p.
- Bettelheim, Matthew P; Bury, R. Bruce; Patterson, Laura C; Lubcke, Glen M., 2006. *Trachemys scripta elegans* (red-eared slider). Reproduction. Herpetological Review. 37(4). DEC 2006. 459-460

- Bodie J. R., 2001. Stream and riparian management for freshwater turtles. Journal of Environmental Management (2001) 62, 443–455
- Bomford, M., 2003. Risk Assessment for the Import and Keeping of Exotic Vertebrates in Australia. Bureau of Rural Sciences, Canberra. **Summary:** Available from: http://www.feral.org.au/wp-content/uploads/2010/03/PC12803.pdf [Accessed August 19 2010]
- Bouskila A, 1986. On the danger of spreading of the Red-eared terrapin, Chrysemys scripta, in natural habitats in Israel. Hardun no. 4: 27-30.
- Brejcha, Jindrich; Vojtech Miller; Lenka Jerabkova and Martin Sandera., 2009. Distribution of pond slider (*Trachemys scripta*) in the Czech Republic. Herpetologické informace, 2009, Vol. 8 (1) **Summary:** Abstract: The North American species of turtle *Trachemys scripta* has been introduced into the Czech Republic. First records of the pond slider are from the 60's.We have put together a list of 190 records of the pond slider in the Czech Republic, on the basis of published data, verbal notices and unpublished data. In 9 cases we have noted a count of 10 and more specimens.The main areas of occurrence are regions with warmer climate: Prague and surroundings, Polabí (along Elbe river), north Moravia (Opava and Ostrava regions) and some localities in south Moravia. 4 attempts of reproduction were noted. In one case the eggs were succesfully artificially incubated for the period of 95 days at 25,5°C.
- Brett, B.D Gartrell and E.J. Ted Kirk., 2005. Euthanasia of Reptiles in New Zealand: Current Issues and Methods. Kokako 12 (1) 12-15, 2005 **Summary:** Available from: http://www.victoria.ac.nz/srarnz/files/Gatrell_Kirk_Euthanasia_Reptiles.pdf [Accessed 28 December 2009]
- Breuil, M. 2002. Histoire naturelle des Amphibiens et des Reptiles terrestres de l'archipel Guadeloupéen. In Patrimoines Naturels, MNHN, Paris. **Summary:** Ce livre propose une synthèse sur les amphibiens et reptiles terrestres de l'archipel Guadeloupéen. Six espèces d'anoures, 5 de tortues, 21 de lézards dont 4 éteintes et 7 de serpents sont détaillées.
- Bringsøe, H. 2006. NOBANIS – Invasive Alien Species Fact Sheet – *Trachemys scripta* **Summary:** The North European and Baltic Network on Invasive Alien Species (NOBANIS) is a gateway to information on alien and invasive species in North and Central Europe. The participating

countries are Denmark, Estonia, Finland, Faroe Islands, Germany, Greenland, Iceland, Latvia, Lithuania, Norway, Poland, European part of Russia, Sweden. The NOBANIS project will provide fact sheets on 60 of the most invasive alien species of the region, covering both animals and plant as well as microorganisms. We intend to upload 60 fact sheets - so please visit this page regularly.
NOBANIS is available from: www.nobanis.org, this page is available from: http://www.nobanis.org/files/factsheets/Trachemys_scripta.pdf [Accessed 31 October 2006]

- Buden, D.W., Lynch, D.B., and Zug, G.R. 2001. Recent records of exotic reptiles on Pohnpei, Eastern Caroline Islands, Micronesia. *Pacific Science*. 55 (1): 65.
- Bunnell, Corey G., 2005. Field Survey of red-Eared Sliders (*Trachemys scripta elegans*) In The Lower Fraser River Valley, British Columbia, In 2005. Featrured Article Wildlife Afield **Summary:** Available from: http://www.wildlifebc.org/UserFiles/File/2_2_Bunnell.pdf [Accessed 28 December 2009]
- Burgin, Shelley., 2007. Confirmation of an established population of exotic turtles in urban Sydney. Australian Zoologist. 33(3). JUN 2006. 379-384 **Summary:** Shelley (2007) investigated whether exotic turtle species were capable of establishing breeding populations in the Sydney area and confirmed that two exotic species were present: *Trachemys scripto elegans* and *Clemmys marmorato*.
- Cadi, A., and Bertrand, A. 2003. Conséquences des lâchés de Trachémyde â tempes rouges (*Trachemys scripta elegans*) dans les milieux humides européens. Manouria 6(18): 17-22.
- Cadi, A., and Joly, P. 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., Delmas, V., Prevot-Julliard, A.C., Joly, P. Pieau, C and Girondot, M. 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.
- Cadi, A; Joly, P., Impact of the introduction of the red-eared slider (*Trachemys scripta elegans*) on survival rates of the European pond turtle (*Emys orbicularis*). Biodiversity & Conservation. 13(13). December 2004. 2511-2518.
- Cadi, Antoine; Pauline Teillac; Virginie Delmas; Marc Girondot; Veronique Servais & Anne-Caroline Prevot-Julliard., 2008. Slider turtles *Trachemys scripta elegans* released in France: a case of integrated research and conservation program. Rev. Esp. Herp. (2008) 22:111-114 **Summary:** Available from: http://www.herpetologica.org/revista/rev22/Resumen11%20CADI%20ET%20AL%20segundo.pdf [Accessed 28 December 2009]
- Carr, John L., 2008. Terrestrial Foraging by Two Species of Semiaquatic Turtles (Testudines: Emydidae). Southeastern Naturalist. 7(4). 2008. 748-752.
- Chen and Lue, 1998. Ecological notes on feral populations of *Trachemys scripta elegans* in northern Taiwan. *Chelonian Conservation & Biology.* 3(1). Aug., 1998. 87-90. **Summary:** Report from Taiwan.
- Chen, Tien-Hsi., 2006. Distribution and status of the introduced red-eared slider (*Trachemys scripta elegans*) in Taiwan. Pages 187-195. In Koike, F., Clout, M.N., Kawamichi, M., De Poorter, M. and Iwatsuki, K. (eds), Assessment and Control of Biological Invasion Risks. Shoukadoh Book Sellers, Kyoto, Japan and IUCN, Gland, Switzerland, 2006. **Summary:** Available from: http://data.iucn.org/dbtw-wpd/edocs/2006-061.pdf#page=196 [Accessed 28 December 2009]
- CONABIO. 2008. Sistema de información sobre especies invasoras en México. Especies invasoras - Reptiles. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. Fecha de acceso. **Summary:** English: The species list sheet for the Mexican information system on

invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (http://www.conabio.gob.mx/invasoras/index.php/Portada), under the section Novedades for information on updates.

Invasive species - reptiles is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Reptiles [Accessed 30 July 2008]

Spanish: La lista de especies del Sistema de información sobre especies invasoras de méxico cuenta actualmente con información aceca de nombre científico, familia, grupo y nombre común, así como hábitat, estado de la invasión en México, rutas de introducción y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la página de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualización, por favor consulte la portada (http://www.conabio.gob.mx/invasoras/index.php/Portada), en la sección novedades, para conocer los cambios. Especies invasoras - Reptiles is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Reptiles [Accessed 30 July 2008]

- Congdon, J.D.,Greene,J.L.,Gibbons,J.W.(1986): Biomassof freshwater turtles: A geographic comparison. Am.Midland Nat. 115: 165-173
- da Silva Eduardo and Manual Blasco 1995. *Trachemys scripta elegans* in Southwestern Spain. *Herpetological Review*. 26(3).133-134. **Summary:** Available from: http://www.freewebs.com/trachemysadoption/articles/DaSilvaBlasco.pdf [Accessed 18 January 2009]
- DAISIE (Delivering Alien Invasive Species Inventories for Europe) 2009. Species Factsheet *Trachemys scripta* (Schoepff, 1792) **Summary:** Available from: http://www.europe-aliens.org/speciesFactsheet.do?speciesId=50003 [Accessed 28 December 2009]
- De Lathouder, Raymonde; Darryl N. Jones & Stephen R. Balcombe., 2009. Assessing the abundance of freshwater turtles in an Australian urban landscape. Urban Ecosyst (2009) 12:215–231

- de Sa, I.V.A. and Solari, C.A. 2001. Salmonella in Brazilian and imported pet reptiles. *Brazilian Journal of Microbiology*. 32 (4): 293-297. **Summary:** Notes on red-eared slider in Brazil and salmonella.
- Department of the Environment, Water, Heritage and the Arts., 2009. Ecological Australia: Prioritisation of High Conservation Status Mainland Islands. Project No 09SUTNRM-0002. Prepared for Department of the Environment, Water, Heritage and the Arts
- Derraik, Jose´ G. B. & Simon Phillips., 2009. Online trade poses a threat to biosecurity in New Zealand. Biol Invasions DOI 10.1007/s10530-009-9595-0
- Diesmos, Arvin C; Brown, Rafe M; Alcala, Angel; Sison, Rogelio V., 2008. Status and Distribution of Nonmarine Turtles of the Philippines. Chelonian Conservation & Biology. 7(2). DEC 2008. 157-177
- DIMANCEA, N. (2013). Note upon the presence of Trachemys scripta elegans (Reptilia) in Oradea city, western Romania. HERPETOLOGICA, 7, 41-47.
- Dolan, Chad R; Lamer, James T; Tucker, John K. ., 2006. *Trachemys scripta elegans* (Red-eared slider). Herpetological Review. 37(1). MAR 2006. 105.
- Duffy, J.E. (2002): Biodiversity and ecosystem function: theconsumer connection. Oikos 99 : 201-219.
- Dupre, Alain; Servan, Jean; Veysset, Alain., 2006. Florida turtle, *Trachemys scripta elegans*: recuperation in France and international trade. Bulletin de la Societe Herpetologique de France.(117). 2006. 5-24. **Summary:** A survey of abandons of *Trachemys scripta elegans* in several reception centres in 2004 shows a decrease of abandons since the ban in the European Union.

- EEA technical report No 16/2012. The impacts of invasive alien species in Europe, http://www.eea.europa.eu/publications/impacts-of-invasive-alien-species
- Emer, S. 2004. Growth of an introduced population of *Trachemys scripta elegans*, at Fox Pond, Eckerd College, Pinellas County, Florida. *Herpetological Review*. 35 (1): 34-35.
- Emer, Sherri., 2004. Growth of an introduced population of *Trachemys scripta elegans* at Fox Pond, Eckerd College, Pinellas County, Florida. Herpetological Review. 35(1). March 2004. 34-35.
- Ernst CH, Barbour RW (1989) Turtles of the World. Smithsonian Inst. Press, Washington, DC.
- Ernst, C.H. and Lovich, J.E. 2009. *Turtles of the United States and Canada. Second edition*. Johns Hopkins University Press, Baltimore.
- Ernst, C.H., Lovich, J.E. and Barbour, R.W. 1994. *Turtles of the United States and Canada.* Smithsonian, Washington, DC. 578 pp.
- Fattizzo, Tiziano., 2004. Distribution and conservational problems of *Emys orbicularis* in Salento (South Apulia, Italy). Biologia (Bratislava). 59(Suppl. 14). 2004. 13-18. **Summary:** To obtain reliable data on the current situation of *Emys orbicularis* in the Salentine peninsula (Salento, South Apulia, Italy), 15 wetlands along the Adriatic and Ionic coasts were surveyed. *E. orbicularis* was recorded in 13 sites. However, reproduction was confirmed only for six populations. A particular cause of concern is the presence of reproducing red-eared sliders (*T. scripta elegans*) at three sites.
- Feldman, M. L., 2007. The red-eared slider turtle (Trachemys scripta elegans) in New Zealand. The Newsletter of Chelonian Conservationists and Biologists, Turtle and Tortoise Newsletter Apr 2007 : Issue 10, pg(s) 2-39. **Summary:** No abstract

- Ferri, Vincenzo; Soccini, Christiana., 2003. Reproduction of *Trachemys scripta elegans* in a semi-natural habitat in Lombardy (northern Italy). Natura Bresciana. 33 2003. 89-92. **Summary:** During ecological studies carried out on some introduced populations of *Trachemys scripta elegans*, for the first time egg-laying patterns and reproductive success has been recorded in semi-natural habitats of Lombardy.
- Ficetola G. F., Rödder D.and Padoa-Schioppa E. Trachemys scripta (Slider Terrapin). http://digilander.libero.it/lyrgus/Ficetola%202012%20Trachemys.pdf
- Fidenci, Pierre., 2006. *Trachemys scripta elegans* (Red-eared Slider). Reproduction. Herpetological Review. 37(1). MAR 2006. 80.
- Fritz, U. and Havas, P. 2007. Checklist of Chelonians of the World. *Vertebrate Zoology* 57(2): 149-368.
- Gianaroli, *et al*., 1999. Problems of conservation of the European pond turtle in Modena. The case of the Villa Sorra park. *Atti della Societa Dei Naturalisti e Matematici di Modena*. 130 1999. 115-124. **Summary:** Reports of *Trachemys scripta elegans* in Italy.
- Gibbons, J.W. (ed.). 1990. *Life History and Ecology of the Slider Turtle*. Smithsonian Publications, Washington DC.
- Global Biodiversity Information Facility (GBIF), 2009. Subspecies: *Trachemys scripta elegans* **Summary:** Available from: http://data.gbif.org/species/14835399 [Accessed 15 June 2010]
- Goh, Ter Yang; O'Riordan, Ruth M., 2007. Are tortoises and freshwater turtles still traded illegally as pets in Singapore? Oryx. 41(1). JAN 2007. 97-100.
- Group of experts on Invasive Alien Species. 2005. CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS, Group of experts on Invasive Alien Species, 6th meeting, Palma de Majorca (Spain), 9-11 June 2005, BELGIUM / BELGIQUE: Actions taken in Belgium in response to the threats of Invasive alien species.

- Gulf States Marine and Fisheries Commission (GSFMC), 2009. *Trachemys scripta elegans* (Wied) **Summary:** Available from: http://nis.gsmfc.org/nis_factsheet.php?toc_id=208 [Accessed 28 December 2009]
- Haffner, P., 1997. Assessment of recent introductions of amphibians and reptiles in inland aquatic systems in Metropolitan France. Bulletin Francais de la Peche et de la Pisciculture. 0(344-345). 1997. 155-163. **Summary:** In Metropolitan France, 36 regularly breeding amphibians and 33 regularly breeding reptiles are presently recorded. The red-eared turtle (*Trachemys scripta elegans*) may be naturalised in the near future.
- Hatzofe O, 2006. Invasive Species in Israel. Israel Nature & Parks Authority internal report.
- Hidalgo-Vila, J; Diaz-Paniagua, C; Ribas, A; Florencio, M; Perez-Santigosa, N; Casanova, J. C., 2009. Helminth communities of the exotic introduced turtle, *Trachemys scripta elegans* in southwestern Spain: Transmission from native turtles. Research in Veterinary Science. 86(3). JUN 2009. 463-465.
- Hooper, D., Chapin III, F., Ewel, J., Hector, A., Inchausti, P.,Lavorel, S., Lawton, J., Lodge, D., Loreau, M., Naeem,S. (2005): Effects of biodiversity on ecosystem function-ing: a consensus of current knowledge. Ecol. Monogr. 75 : 3-35.
- Ibarra-Vidal, Hector., 2007. Record of the Red Eared Slider, *Trachemys scripta elegans*) (Wied-Neuwied, 1839), (Testudinata, Emydidae) in a wetland in Concepcion, Chile. Boletin de la Sociedad de Biologia de Concepcion. 78 2007. 49-50. **Summary:** *Trachemys scripta elegans* is recorded in Chile. It is discussed as a possible invading species in Chile's mediterraean zone.
- Iglesias R, García-Estévez JM, Ayres C, Acuña A, Cordero-Rivera A. (2015). First reported outbreak of severe spirorchiidiasis in *Emys orbicularis*, probably resulting from a parasite spillover event. Diseases of Aquatic Organisms, 113(1):75-80

- Ineich, Ivan., 2009. Herpetological survey of Maiao Island, Society Archipelago (French Polynesia). Bulletin de la Societe Herpetologique de France.(130-31). 2009. 51-63. **Summary:** Twelve species form the native herpetofauna of Maiao Island, Society Archipelago (French Polynesia). Two geckos (*Hemidactylus frenatus* and *Phelsuma laticauda*) have been recently introduced and *T. scripta elegans* was introduced about 15 years ago (Ineich 2009).
- ITIS (Integrated Taxonomic Information System), 2005. Online Database *Trachemys scripta elegans* **Summary:** An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals. Available from: http://www.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Trachemys+scripta+elegans&p_format=&p_ifx=plglt&p_lang= [Accessed March 2005]
- IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. **Summary:** The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on taxa that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those taxa that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable). The IUCN Red List also includes information on taxa that are categorized as Extinct or Extinct in the Wild; on taxa that cannot be evaluated because of insufficient information (i.e. are Data Deficient); and on taxa that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme (i.e. are Near Threatened).
  Available from: http://www.iucnredlist.org/ [Accessed 25 May 2011]

- IUCN. 2011. IUCN Red List of Threatened Species (ver. 2011.1). Available at: http://www.iucnredlist.org. (Accessed: 16 June 2011).
- IUCN/SSC Invasive Species Specialist Group (ISSG)., 2010. A Compilation of Information Sources for Conservation Managers. **Summary:** This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.
- Iverson J B; Etchberger, C R ., 1989. The Distributions of the Turtles of Florida USA. Florida Scientist. 52(2). 1989. 119-144 **Summary:** The distribution of all 25 turtle species recorded from Florida are mapped and reviewed.
- Iverson, J.B. 1992. *A Revised Checklist with Distribution Maps of the Turtles of the World*. privately published, Richmond, Indiana.
- Joglar, Rafael L; Alberto O. Álvarez; T. Mitchell Aide; Diane Barber; Patricia A. Burrowes; Miguel A. García; Abimael León-Cardona; Ana V. Longo; Néstor Pérez-Buitrago; Alberto Puente; Neftalí Rios-López; Peter J. Tolson., 2007. Conserving the Puerto Rican herpetofauna. Applied Herpetology 4: 327-345
- Kirkpatrick, Win; Amanda Page and Marion Massam, November 2007, Pond Slider (*Trachemys scripta*) risk assessments for Australia. Department of Agriculture and Food, Western Australia. **Summary:** Models for assessing the risk that exotic vertebrates could establish in Australia have been developed for mammals, birds (Bomford 2003; Bomford 2006, 2008), reptiles and amphibians (Bomford 2006, 2008; Bomford *et al*. 2005). These Risk Assessment models have been further explored by Western Australia Department of Agriculture & Food (DAFWA) to confirm that they reasonably predict public safety, establishment and pest risks across a full range of exotic species and risk levels. Mammals and birds were assessed

for the pest risk they pose if introduced to Australia, by calculating Vertebrate Pests Committee (VPC) Threat Categories. These categories incorporate risk of establishing populations in the wild, risk of causing public harm, and risk of becoming a pest (eg causing agricultural damage, competing with native fauna, etc). The 7-factor Australian Bird and Mammal Model was used for these assessments.

- Kitowski, Ignacy and Dorota Pachol., 2009. Monitoring the Trade Turnover of Red - eared Terrapins (*Trachemys scripta elegans*) in Pet Shops of the Lublin Region, East Poland. North-Western Journal of Zoology Vol. 5, No. 1, 2009, pp.34-39 P-ISSN: 1584-9074, E-ISSN: 1843-5629 Article No.: 051105 **Summary:** Available from: http://herp-or.uv.ro/nwjz/content/v5.1/nwjz.051105.Kitowski.pdf [Accessed 28 December 2009]
- Kleewein, A. (2014) Natural reproduction of Trachemys scripta troostii (Holbrook, 1836) x Trachemys scripta scripta (Schoepff, 1792) in Austria. Herpetozoa, 26(3/4), 183–185.
- Kosuge, Yasuhiro; Ogano, Hirokazu; Hasegawa, Masami., 2003. Spatial distribution of the fresh water turtles along Koito River, Boso Peninsula. Journal of the Natural History Museum & Institute Chiba Special Issue.(6). March 31, 2003. 55-58. **Summary:** Distribution pattern of freshwater turtles was investigated along the Koito River basin, Boso Peninsula, central Japan.
- Krysko, Kenneth L; Sheehy, Coleman M. III., 2005. Ecological status of the Ocellated Gecko, *Sphaerodactylus argus argus* Gosse 1850, in Florida, with additional herpetological notes from the Florida Keys. Caribbean Journal of Science. 41(1). 05. 169-172.
- Lamer, James T; Dolan, Chad R; Tucker, John K., 2007. *Trachemys scripta elegans* (Red-eared slider). Coloration. Herpetological Review. 38(3). SEP 2007. 336.
- Leatherman, Brian M; Jennings, Mark R., 2007. *Actinemys marmorata* (Pacific pond turtle) and *Trachemys scripta elegans* (Red-eared slider). Reproductive behavior. Herpetological Review. 38(3). SEP 2007. 327.
- Leberer, Trina., 2003. Records of freshwater turtles on Guam, Mariana Islands. Micronesica 35-36:649-652. 2003

- Lee, D. S., 2005. Reptiles and amphibians introduced to the Bahamas; a potential conservation crisis. Bahamas Journal of Science [Bahamas J. Sci.]. Vol. 12, no. 2, pp. 2-6. May 2005. **Summary:** The number of exotic species of reptiles and amphibians introduced to the Bahamas continues to grow. Lee (2005) reviews the documented introductions and reports on four additional species.
- Lever C (2003) Naturalized reptiles and amphibians of the world. Oxford University Press, Oxford, UK.
- Lorvelec, O., Pascal., M., Pavis, C., Feldmann, P. 2007. Amphibians and reptiles of the French West Indies : Inventory, threats and conservation. Applied Herpetology 4, 131-161 **Summary:** Cet article fait le point des connaissances sur les amphibiens et les reptiles indigènes et introduits des Antilles françaises. Les impacts des espèces introduites sur la faune indigène sont discutés. Le cas de la conservation des populations d' *Iguana delicatissima* sur lîle de Petite-Terre est présenté.
- Lukač, M.; Horvatek , D.; Cizelj, I.; Mašala, N.; Belić, M.; Habuš, J.; Martinković, F.; Štimac, I.; Turk, N.; Prukner-Radovčić, E. Screening of selected pathogens and general health status of freshwater turtles (Trachemys sp.) introduced to Croatia. Proceedings of International Conference on Diseases of Zoo and Wild Animals / Szentiks, C, A ; Schumann, A (ed). - Berlin : Leibniz Institute for Zoo and Wildlife Research , 2015. 165.
- Malhotra, A. and Thorpe, R.S. 1999. *Reptiles & Amphibians of the Eastern Caribbean*. Macmillan Education Ltd, London & Oxford.
- Mali I., Vandewege M. W., Davis S. K., and Forstner M. R. J. Magnitude of the Freshwater Turtle Exports from the US: Long Term Trends and Early Effects of Newly Implemented Harvest Management Regimes PLoS One. 2014; 9(1): e86478.
- Martins R.A., Moreira Assalim A. and de Barros Molina F.. Herpetology Notes, volume 7: 437-441 (2014) (published online on 5 July 2014) The presence of the Red-eared slider, Trachemys scripta elegans (Wied, 1838) (Testudines, Emydidae), an invasive species, in the Paraibuna river basin, Southeastern Brazil . http://www.herpetologynotes.seh-herpetology.org/Volume7_PDFs/Martins_HerpetologyNotes_volume7_pp437-441.pdf

- Massam M, Kirkpatrick W and Page A., 2010. Assessment and prioritisation of risk for forty introduced animal species. Invasive Animals Cooperative Research Centre, Canberra. **Summary:** This report documents work contributing to a project commissioned by the Invasive Animals Cooperative Research Centre to validate and refine risk assessment models used in decisions to import and manage introduced vertebrate species. The intent of the project was to: a) increase predictive accuracy, scientific validation and adoption of risk assessment models for the import and keeping of exotic vertebrates, and b) reduce the risk of new vertebrate pests establishing introduced populations in Australia.
  Available from: http://www.feral.org.au/wp-content/uploads/2010/08/DAFWA_RA_060510.pdf [Accessed 16 March 2011]
- McCann, K., Hastings, A. (1997): Re-evaluating theomnivory-stability relationship in food webs. Proc. Roy.Soc. B 264: 1249-1254
- Meyer L., Du Preez L., Bonneau E., Héritier L., Franch Quintana M., Valdeón A., Sadaoui A., Kechemir-Issad N., Palacios C. and Verneau O. (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 Volume 10, Issue 1: 79–91
- Mollov I.A.; Naumov B. Y.; Dobrev D. D.; Popgeorgiev G.S. Conservation activities for European pond turtles (*Emys orbicularis*) in Bulgaria. Herpetology Notes, volume 6: 135-138 (2013) (published online on 22 March 2013)
- Mosimann, Denis; Cadi, Antoine., 2004. On the occurrence and viability of the European pond turtle (*Emys orbicularis*) in Moulin-de-Vert (Geneva, Switzerland): 50 years after first introduction. Biologia (Bratislava). 59(Suppl. 14). 2004. 109-112. **Summary:** This paper reports on an investigation designed to survey a mixed population of *Emys orbicularis* and *Trachemys scripta elegans* in the Moulin-de-Vert reserve (Canton of Geneva, SW Switzerland) 50 years after introduction of the first *E. orbicularis*, and to study the habitat use by *E. orbicularis* there. The authors estimate the population size to be 306 +/- 10.5 turtles. This corresponds to a density of 64 individuals per hectare.

- Nagano, Noriyuki; Oana, Shinji; Nagano, Yukiko; Arakawa, Yoshichika., 2006. A severe *Salmonella enterica* serotype paratyphi B infection in a child related to a pet turtle, *Trachemys scripta elegans*. Japanese Journal of Infectious Diseases. 59(2). APR 2006. 132-134.
- Najbar and Bartlomiej, 2001.The red-eared terrapin *Trachemys scripta elegans* (Wied, 1839) in the Lubuskie province (western Poland). *Przeglad Zoologiczny* . 45(1-2). 2001. 103-109. **Summary:** Spread of *Trachemys scripta elegans* in Poland.
- Neil F. Ramsay; Pek Kaye; Abigayle Ng; Ruth M. O'Riordan and Loke Ming Chou., 2007. Chapter 8: The red-eared slider (*Trachemys scripta elegans*) in Asia: a review In Biological invaders in inland waters: Profiles, distribution, and threats Vol2 Invading Nature - Springer Series In Invasion Ecology. Francesca Gherardi **Summary:** This chapter reviews what is currently known about the status of red-eared sliders in Asia, as well as the potential impact of this non-indigenous species on the native Asian biota. It includes published literature, information from websites, as well as mentioning ongoing research where known.
- NOBANIS (North European and Baltic Network on Invasive Alien Species) 2009. *Trachemys scripta* (Testudinidae, Reptilia & amphibia) **Summary:** Available from: http://www.nobanis.org/speciesInfo.asp?taxaID=713 [Accessed 27 December 2009]
- Ota, Hidetoshi; Mitsuhiko Toda; Gen Masunaga; Akira Kikukawa and Mamoru Toda., 2004. Feral Populations of Amphibians and Reptiles in the Ryukyu Archipelago, Japan. Global Environmental Research 8(2)/2004: 133-143 **Summary:** Available from: http://www.airies.or.jp/publication/ger/pdf/08-02-04.pdf [Accessed 28 December 2009]
- Outerbridge, Mark E., 2008. Ecological Notes on Feral Populations of *Trachemys scripta elegans* in Bermuda. Chelonian Conservation & Biology. 7(2). DEC 2008. 265-269.
- Parham, J.F. and van Leuvan, T. 2002. *Emys orbicularis* (European Pond Turtle). *Herpetological Review*. 33 (2): 147.

- Pascal, M., Barré, N., De Garine-Wichatitsky, Lorvelec, O., Frétey, T., Brescia, F., Jourdan, H. 2006. Les peuplements néo-calédoniens de vertébébrés : invasions, disparitions. Pp 111-162, in M.-L. Beauvais *et al*., : Les espèces envahissantes dans l'archipel néo-calédonien, Paris, IRD Éditions, 260 p.+ cédérom **Summary:** Synthèse des introductions d'espèces de vertébrés en Nouvelle-Calédonie et évaluation de leurs impacts.
- Pearson S.H., Avery H. W., Spotila J. R. Juvenile invasive red-eared slider turtles negatively impact the growth of native turtles: Implications for global freshwater turtle populations. Biological Conservation 186 (2015) 115–121
- Perez-Santigosa, Natividad; Diaz-Paniagua, Carmen; Hidalgo-Vila, Judith., 2008. The reproductive ecology of exotic *Trachemys scripta elegans* in an invaded area of southern Europe. Aquatic Conservation. 18(7). NOV-DEC 2008. 1302-1310.
- Perry, Gad; Owen, Jennifer L; Petrovic, Clive; Lazell, James; Egelhoff, Jim., 2007. The red-eared slider, *Trachemys scripta elegans*, in the British Virgin Islands. Applied Herpetology. 4(1). 2007. 88-89.
- Piovano, *et al*., 1999. *Trachemys scripta elegans* monitoring in Torino urban park. *Rivista di Idrobiologia.* 38(1-3). Gennaio-Dicembre, 1999. 499-508. **Summary:** Red-eared slider population monitoring.
- Polo-Cavia, Nuria; Lopez, Pilar; Martin, Jose., 2008. Interspecific differences in responses to predation risk may confer competitive advantages to invasive freshwater turtle species. Ethology. 114(2). FEB 2008. 115-123.
- Polo-Cavia, Nuria; Lopez, Pilar; Martin, Jose., 2009a. Interspecific differences in heat exchange rates may affect competition between introduced and native freshwater turtles. Biological Invasions. 11(8). OCT 2009. 1755-1765.
- Polo-Cavia, Nuria; Lopez, Pilar; Martin, Jose., 2009b. Interspecific differences in chemosensory responses of freshwater turtles: consequences for competition between native and invasive species. Biological Invasions. 11(2). FEB 2009. 431-440.

- Powell, Robert and Sixto J. Incháustegui., 2009. Conservation of the herpetofauna of the Dominican Republic. Applied Herpetology 6 (2009) 103–122
- Prevot-Julliard, Anne-Caroline; Gousset, Emeline; Archinard, Chloe; Cadi, Antoine; Girondot, Marc., 2007. Pets and invasion risks: is the Slider turtle strictly carnivorous? Amphibia-Reptilia. 28(1). JAN 2007. 139-143.
- Probst J.-M. 1997. Animaux de la Réunion. Azalées Editions. 168 pp.
- Puky, Miklos; Gemesi, Dorottya; Schad, Peter., 2004. Distribution of *Emys orbicularis* in Hungary with notes on related conservational and environmental education activities. Biologia (Bratislava). 59(Suppl. 14). 2004. 55-60. **Summary:** In 2001 an intensive herpetofaunal mapping project was launched to build a detailed database for Hungary. Using different sampling methods, *Emys orbicularis* was found in semi-natural lentic and lotic waters as well as in canals, fishponds and other artificial water bodies. Both natural and anthropogenic factors endanger *E. Orbicularis* causing local extinctions, e. g., through habitat destruction, fragmentation, drought, and isolation. Sporadic records of *Trachemys scripta elegans* in the wild are known as well but no evidence has been collected on its reproduction so far. *E. Orbicularis* has the potential to become not only a keystone species in biological monitoring but also a symbol of wetland conservation.
- Pupins, Mihails., 2007. First report on recording of the invasive species *Trachemys scripta elegans*, a potential competitor of *Emys orbicularis* in Latvia. Acta Universitatis Latviensis, 2007, Vol. 723, Biology, pp. 37–46 **Summary:** Available from: http://biologs.bf.lu.lv/grozs/LU/LU_Bio_Raksti/LUBioRaksti/2007/Pupins.pdf [Accessed 28 December 2009]
- Queensland Government, Department of Employment, Economic Developmentand Innovation (DEEDI) 2009. Red-eared slider turtle **Summary:** Available from: http://www.dpi.qld.gov.au/4790_8289.htm [Accessed 18 January 2009]

- Real, Raimundo; Marquez, Ana L; Estrada, Alba; Munoz, A. Roman; Vargas, J. Mario., 2008. Modelling chorotypes of invasive vertebrates in mainland Spain. Diversity & Distributions. 14(2). MAR 2008. 364-373.
- Reptiles Database, 2010. *Trachemys scripta* Thunberg, 1792 **Summary:** Available from: http://reptile-database.reptarium.cz/species.php?genus=Trachemys&species=scripta [Accessed September 8 2010]
- Republic of Korea, 2002. Wetlands Part 1 **Summary:** Report from Republic of Korea.
- Republic of Korea, 2002. Wetlands Part 2 **Summary:** Report from Republic of Korea.
- Roll, Uri; Tamar Dayan & Daniel Simberloff., 2008. Non-indigenous terrestrial vertebrates in Israel and adjacent areas. Biol Invasions (2008) 10:659–672
- Samedi & D. T. Iskandar. 2000. Freshwater turtleand tortoise conservation and utilization in Indonesia. In: Asian turtle trade: proceedings of a workshop on conservation and trade of freshwater turtles and tortoises in Asia. pp:106–111. P. P. van Dijk, B. L. Stuart & A. G. J. Rhodin (Eds). Chelonian Research Monographs No. 2 **Summary:** *T. scripta elegans*, an invasive species introduced by pet trade to fresh water bodies nearly all over the world, has recently been listed for Sulawesi.
- Scalera R., 2007. An overview of the natural history of non indigenous amphibians and reptiles. In: Gherardi F. (editor) Biological Invaders in Inland Waters: Profiles, Distribution and Threats. Springer. Pp. 141-160.
- Scalera R., 2007. Virtues and shortcomings of EU legal provisions for managing NIS: *Rana catesbeiana* and *Trachemys scripta elegans* as case studies. In: Gherardi F. (editor) Biological Invaders in Inland Waters: Profiles, Distribution and Threats. Springer. Pp. 669-678.
- Scalera, R. 2006. *Trachemys scripta*. Delivering Alien Invasive Species Inventories for Europe.

- Scalera, Riccardo., 2006. *Trachemys scripta*. Datasheet DAISIE (Delivering Alien Invasive Species Inventories for Europe) **Summary:** Available from: http://www.europe-aliens.org/pdf/Trachemys_scripta.pdf [Accessed 28 December 2009]
- Seidel, M. 2002. Taxonomic observations on extant species and subspecies of slider turtles, Genus *Trachemys*. *Journal of Herpetology* 36(2): 285-292.
- Selman, Will; Qualls, Carl., 2009. *Trachemys scripta elegans* (Red-eared Slider). Maximum Basking Duration
- Servan, J. and Arvy, C., 1997. The introduction of *Trachemys scripta* in France: A new competitor for the European pond turtles. *Bulletin Francais de la Peche et de la Pisciculture.* 0(344-345).173-177. **Summary:** Report from France.
- Servan, Jean; Dupre, Alain., 2003. Reintroduction and introduction and are two aspects of wild fauna and flora management. Bulletin de la Societe Herpetologique de France.(105). 2003. 9-40. **Summary:** Examples of turtles (mainly *Emys orbicularis* and *Testudo hermanni hermanni*) reintroductions and introductions (*Trachemys scripta elegans*) in France are analysed.
- Shacham, Boaz; Hatzofe, Ohad., 2008. The red-eared slider, *Trachemys scripta elegans*, in Israel. Applied Herpetology. 5(2). 2008. 199-200.
- SHELLEY E. B., O'ROURKE D., GRANT K., MCARDLE E., CAPRA L., CLARKE A., MCNAMARA E., CUNNEY R., MCKEOWN P., AMAR C. F. L., COSGROVE C., FITZGERALD M., HARRINGTON P., GARVEY P., GRAINGER F., GRIFFIN J., LYNCH B. J., MCGRANE G., MURPHY J., NI SHUIBHNE N. AND PROSSER J.. Infant botulism due to C. butyricum type E toxin: a novel environmental association with pet terrapins. Epidemiol. Infect., Page 1 of 9. © Cambridge University Press 2014. http://www.researchgate.net/profile/Kathie_Grant2/publication/267567588_Infant_botulism_due_to_C._butyricum_type_E_toxin_a_novel_environmental_association_with_pet_terrapins/links/54afbeef0cf2b48e8ed68f79.pdf

- Soccini, Christiana; Ferri, Vincenzo., 2004. Bacteriological screening of *Trachemys scripta elegans* and *Emys orbicularis* in the Po plain (Italy). Biologia (Bratislava). 59(Suppl. 14). 2004. 201-207. **Summary:** Since 1999, introduced *Trachemys scripta elegans* from artificial and natural water bodies in the Po plain (North Italy) were bacteriologically screened. From 2001 onwards, a survey of *Emys orbicularis* was started in the same area. 15 carcasses and 349 cloacal swabs from *T. scripta elegans*, and 100 cloacal swabs from *E. Orbicularis* have been studied. Most samples yielded positive bacteriological results. Bacteria known as pathogens for chelonians (eg: *Aeromonas hydrophila*, *Citrobacter freundii*, *Pseudomonas* spp., *Edwardsiella tarda*), have been identified.
- Somma, Louis A; Ann Foster, and Pam Fuller. 2009. *Trachemys scripta elegans*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. **Summary:** Available from: http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=1261 [Accessed 28 December 2009]
- Stitt, Eric., 2005. The Red-Eared Slider (*Trachemys scripta elegans*). Sonoran Herpetologist 18(6) 2005 **Summary:** Available from: http://tucsonherpsociety.org/Stitt%202005_18(6)65.pdf [Accessed 28 December 2009]
- Stone, Paul A; Hranitz, John M., 1997. *Trachemys scripta elegans* (red-eared slider). Colonization. Herpetological Review. 28(3). 1997. 150.
- Teillac-Deschamps Pauline; Delmas Virginie; Lorrillière Romain; Servais Véronique; Cadi Antoine and Prévot-Julliard Anne-Caroline., 2008. CASE STUDY 12: Red-eared Slider Turtles *Trachemys scripta elegans* Introduced to French Urban Wetlands: an Integrated Research and Conservation Program. Society for the Study of Amphibians and Reptiles Urban Herpetology. J.C. Mitchell, R.E. Jung Brown, and B. Bartholomew, editors Herpetological Conservation 3:xx-xx. **Summary:** Available from: http://www2.mnhn.fr/cersp/IMG/pdf/Tiellac_al-HerpetologicalConservation-2008.pdf [Accessed 28 December 2009]

- Teillac-Deschamps, Pauline; Lorrilliere, Romain; Servais, Veronique; Delmas, Virginie; Cadi, Antoine; Prevot-Julliard; Anne-Caroline., 2009. Management strategies in urban green spaces: Models based on an introduced exotic pet turtle. Biological Conservation. 142(10). OCT 2009. 2258-2269.
- The Outlaws of the Ecosystem - Invasive Alien Species Ministry of Environment, Republic of Korea. **Summary:** Report from Republic of Korea.
- Thirakhupt, Kumthorn; Van Dijk, Peter Paul., 1994. Species diversity and conservation of turtles of western Thailand. Natural History Bulletin of the Siam Society. 42(2). 1994. 207-259. **Summary:** Up to 16 species of native turtles still inhabit the Mae Klong basin and adjacent minor drainages; among these are several rare species; the high number of genera (10 to 15) may make it the world's most diverse turtle community (Thirakhupt & Van Dijk 1994). Exotic turtle species, specifically the chinese softshell (*Pelodiscus sinensis*) and the red-eared terrapin (*Trachemys scripta elegans*) were introduced to Thailand in recent years. The exotic turtle species present in Mae Klong basin have a proven potential to disrupt native turtle populations. Their establishment in the wild should be prevented.
- Thomas, R.B. 2006. Trachemys scripta - Slider or Yellow-Bellied Slider. In: Meylan, P.A. (ed.), *Biologya and Conservation of Florida Turtles*, pp. 296-312. Chelonian Research Foundation, Lunenburg, MA.
- Townsend, Josiah H; Krysko, Kenneth L; Reppas, Anthony T; Sheehy, Coleman M., 2002. Noteworthy records for introduced reptiles and amphibians from Florida, USA. Herpetological Review. 33(1). March, 2002. 75.
- TTWG (Turtle Taxonomy Working Group). 2010. Turtles of the World, 2010 Update: Annotated Checklist of Taxonomy, Synonymy, Distribution, and Conservation Status. *Chelonian Research Monographs* 5: 000-85-000164.
- Tucker, John K., 2001a. Clutch frequency in the red-eared slider (*Trachemys scripta elegans*). Journal of Herpetology. 35(4). December, 2001. 664-668.

- Tucker, John K., 2001b. Nesting red-eared sliders (*Trachemys scripta elegans*) exhibit fidelity to their nesting areas.
- Tucker, John K; Lamer, James T; Dolan, Chad R., 2007. *Trachemys scripta elegans* (Red-eared slider). Kyphosis. Herpetological Review. 38(3). SEP 2007. 337-338.
- Turtle Taxonomy Working Group [Bickham, J.W., Iverson, J.B., Parham, J.F., Philippen, H.D., Rhodin, A.G.J., Shaffer, H.B., Spinks, P.Q., and van Dijk, P.P.]. 2007. An annotated list of modern turtle terminal taxa with comments on areas of taxonomic instability and recent change. In: Shaffer, H.B., FitzSimmons, N.N., Georges, A., and Rhodin, A.G.J. (eds), *Defining Turtle Diversity: Proceedings of a Workshop on Genetics, Ethics, and Taxonomy of Freshwater Turtles and Tortoises*, Chelonian Research Monographs No 4, pp. 173-199.
- UROŠEVIĆ A. (2014). Report of two subspecies of an alien turtle, Trachemys scripta scripta and Trachemys scripta elegans (Testudines: Emydidae) sharing the same habitat on the island of Zakynthos, Greece. Ecol. Mont., 1 (4), 268-270
- Valdeón A., Crespo-Diaz A., Egaña-Callejo A. and Gosá A. (2010). Update of the pond slider Trachemys scripta (Schoepff, 1792) records in Navarre (Northern Spain), and presentation of the Aranzadi Turtle Trap for its population control. Aquatic Invasions Volume 5, Issue 3: 297-302
- Vamberger M (2012). HERPETOZOA 25 (1/2) Wien Short Note pp 76-79.
- Van Dijk, P.P., Harding, J. & Hammerson, G.A. 2013. *Trachemys scripta*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on **05 May 2015**.
- van Dijk, P.P., Harding, J. & Hammerson, G.A. 2013. *Trachemys scripta*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on **11 May 2015**.

- Van Wilgen, Nicola J; Richardson, David M; Laard, Ernst H. W., 2008. Alien reptiles and amphibians in South Africa: Towards a pragmatic management strategy. South African Journal of Science. 104(1-2). JAN-FEB 2008. 13-20.
- Varnham, K. 2006. Non-native species in UK Overseas Territories: a review. JNCC Report 372. Peterborough: United Kingdom. **Summary:** This database compiles information on alien species from British Overseas Territories.
  Available from: http://www.jncc.gov.uk/page-3660 [Accessed 10 November 2009]
- Vilà M., Basnou C., Pys v ek P., Josefsson M., Genovesi P. , Gollasch S., Nentwig W., Olenin S., Roques A., Roy D., Hulme P. E, and DAISIE partners (2010). How well do we understand the impacts of alien species on ecosystem services? A pan-European, cross-taxa assessment Front Ecol Environ 8(3): 135–144, doi:10.1890/080083 (published online 20 Apr 2009)
- VOV News 26th Feb, 2004 Invasive turtle species discovered in Hoan Kiem. **Summary:** Report from Viet Nam.
- Walton, Craig pers. comm., April 2006. **Summary:** Craig Walton. Principal Project Officer, Queensland Interagency Pest Management Committee.
- Watkins-Colwell, Gregory J; Twan A. Leenders; Brian T. Roach; Daniel J. Drew; Gregg Dancho and Jeanne Yuckienuz., 2006. New Distribution Records for Amphibians and Reptiles in Connecticut, with Notes on the Status of an Introduced Species. Bulletin of the Peabody Museum of Natural History 47(1):47-62. 2006 **Summary:** Recent field work and a review of catalogued specimens in the herpetology collections at the Yale Peabody has yielded 170 new town records for amphibians and reptiles in Connecticut. These are reported here, along with observations on the status of the red-ear slider (*Trachemys scripta elegans*) in Connecticut.
- Wilson, A., A. Wilke & Z. Saraç. 2009. Invasive plants and animals: Freshwater plants and animals. Queensland Government: Department of Primary Industries and Fisheries.

- Witzell, W.N. 1999. Aquatic turtles (Testudines: Emydidae) in an urban south Florida man-made pond. *Florida Scientist*. 62 (3-4): 172-174. **Summary:** Study on red-eared slider in Florida
- Yasukawa, Yuichirou., 2005. Alien freshwater turtles which may become established in Japan in the near future. Bulletin of the Herpetological Society of Japan.(2). 2005. 155-163. **Summary:** This paper outlines alien freshwater turtles which may become established in Japan in the near future. The following turtles designated by the law for the protection of indigenous ecology are discussed: *Macroclemys temmincki*, *Apalone* spp., *Graptemys* spp., *Pseudemys* spp. *Trachemys scripta scripta* and *Ocadia sinensis*. *Trachemys scripta elegans* and *Polodiscus sinensis sinensis* are already established in Japan.