RISK ASSESSMENT FOR EXOTIC REPTILES AND AMPHIBIANS INTRODUCED TO AUSTRALIA – Pond Slider (*Trachemys scripta*) (Schoepff, 1792)

Class Reptilia; Order Testudines; Family Emydidae (Rafinesque, 1815); Genus *Trachemys* (Agassiz, 1857); (The Reptile Database 2007)

Score Sheet

<table>
<thead>
<tr>
<th>SPECIES: Pond Slider (<em>Trachemys scripta</em>)</th>
<th>Emydidae is the largest and most diverse family of living turtles with two subfamilies generally recognised: Batagurinae or Old World pond turtles, and Emydinae or New World pond turtles. Emydinae are separated into two generic complexes: Clemmys complex that includes the genera Clemmys, Embytooidea, Emys and Terrapene; Chrysemys complex that includes the freshwater genera Chrysemys, Deirochelys, Graptemys, Pseudemys, Trachemys and the brackish water genera Malaclemys. (Ernst 1990) Trachemys was originally separated from the genera Chrysemys and Pseudemys but subsequently all three have been considered, on occasion, to be congeneric and placed in the genus Chrysemys however, recent work agrees with slider turtles being separated on their own in Trachemys (Ernst 1990). Taxonomy of the genera Trachemys is subject to ongoing review. The genus has the largest distribution of turtles in the New World with 26 extant forms (Seidel 2002); most are recognised as subspecies of the mega-species Trachemys scripta (Ernst 1990).</th>
</tr>
</thead>
</table>

In North America, there are three described subspecies each with their own distinct colour pattern; *T. scripta scripta*, *T. s. elegans* and *T. s. troostii* (Ernst et al 1994, Iverson et al 2000, Seidel 2002) as In (Somma et al 2007).

Species Description - as from USA government factsheet - a medium sized freshwater turtle (carapace length 125-289 mm. Although subspecies are variable they have a prominent patch or patches of red, orange or yellow post-orbital on each side of the head (Ernst and Barbour 1989). The three North American subspecies (Ernst et al 1994) have different colour patterns; in all subspecies these distinctive patterns may be obscured in older, melanistic (darker) males (Somma et al 2007).

*Trachemys scripta scripta* (Schoepff, 1792) yellow-bellied slider has a large yellow patch behind the eye that is most evident in juveniles and females. Broad vertical bands (when viewed from the side) are often present on the carapace, the yellow plastron (lower shell) typically has round dusky smudges or none at all, and narrow yellow stripes mark the front surface of the forelegs (Ernst et al 1994, Conant and T. 1998). Occurs in southeastern Virginia to northern Florida (Ernst and Barbour 1989).

*Trachemys s. elegans* (Wied-Neuwied, 1838), the red-eared slider, has a unique, broad red or orange (rarely yellow) stripe behind each eye. Younger individuals have numerous dark, eyelike spots on the yellow plastron) (Ernst et al 1994, Conant and T. 1998). *T. s. elegans* considered to be the most common and has been introduced to numerous localities worldwide (Salzberg 2000) as in Somma et. al 2007. Occurs in Mississippi Valley from Illinois to the Gulf of Mexico (Ernst and Barbour 1989).

*Trachemys s. troostii* (Holbrook, 1836), the Cumberland slider, is similar to the red-eared slider, but has a narrower yellow stripe behind each eye, and fewer, wider stripes on the legs, neck, and head (Ernst et al 1994, Conant and T. 1998). Occurs in upper parts of the Cumberland and Tennessee rivers from southeastern Kentucky to northeastern Alabama (Ernst and Barbour 1989).

General Information - In the southern part of its natural range *T. scripta* can be active year-round but in the north sliders must hibernate during winter (some individuals emerge on warm days), they become inactive at water temperatures below 10 degrees Celsius (although some have been observed swimming under ice). Clutch size 2 – 23
eggs, up to 5 clutches per year, [length of incubation usually within 60 – 80 days but determined by temperature, (Ernst et al 1994)] successful hatching usually requires temperature above 20 degrees Celsius. Sliders can spend considerable time under water, especially during hibernation. They are primarily diurnal and at night sleep by resting on the bottom or floating at the surface and forage for food during the day (preferring shallow water less than 3 m); the habit of basking during the day is well developed even in hatchlings. Movement between water bodies can be in response to feeding, reproduction, basking, in search of more favourable sites, or droughts and seasonal fluctuations in water level; longest recorded movement greater than 5 km. (Ernst et al 1994) Sliders spend time basking and will pile up several deep at prime basking sites (Ernst and Barbour 1989).

*Trachemys* is predominately freshwater but may enter brackish coastal waters (Ernst 1990). Tolerance to salty conditions is uncertain with little specific information available in the literature and opinions differ among researchers. There is anecdotal evidence in Australia of a low salt tolerance (pers. comm. Scott O’Keeffe) however, in the Chesapeake Bay area in the USA an upper limit appeared to be 10 ppt (Gibbons 1990, National Exotic Marine and Estuarine Species Information 2008). Dr Tony Tucker (Manager Marine Sea Turtle Research Project at MOTE Marine Laboratory, Sarasota, Florida) suggests most observations of Red-eared sliders are animals washed into brackish or salt-water areas after storms, and prolonged exposure to salt will kill the turtles; max. salt tolerance of 10 bats/1000 (pers. comm. Scott O’Keeffe, 2008).

**Longevity** - the species is long-lived - survives in captivity for up to 40 years (Slavens and Slavens 2006), believed to live 50 – 75 years (Dundee and Rossman 1989); most don’t live past 30 years (Dewey and Kuhrt 2002).


**DATE OF ASSESSMENT:** 15/11/2007

**Bird and Mammal Model Used:** (Bomford 2008) using PC CLIMATE (Brown et al 2006, Bureau of Rural Sciences 2006)

**The Risk Assessment Model**

Models for assessing the risk that exotic vertebrates could establish in Australia have been developed for mammals, birds (Bomford 2003, 2006, 2008), reptiles and amphibians (Bomford et al 2005, Bomford 2006, 2008). Developed by Dr Mary Bomford of the Bureau of Rural Sciences (BRS), the model uses criteria that have been demonstrated to have significant correlation between a risk factor and the establishment of populations of exotic species and the pest potential of those species that do establish. For example, a risk factor for establishment is similarity in climate (temperature and rainfall) within the species’ distribution overseas and Australia. For pest potential, the species’ overseas pest status is a risk factor. The model was originally published in ‘Risk Assessment for the Import and Keeping of Exotic Vertebrates in Australia’ (Bomford 2003) available online http://www.daff.gov.au/brs/land/feral-animals/management/risk. This model used the Apple Mac application CLIMATE (Pheloung 1996) for climate matching.

The risk assessment model was revised and recalibrated ‘Risk Assessment for the Establishment of Exotic Vertebrates in Australia: Recalibrated and Refinement of Models’(Bomford 2006) and the climate application changed to PC CLIMATE software (Bureau of Rural Sciences 2006), available online at http://affashop.gov.au/product.asp?prodid=13506. The most recent publication (Bomford 2008) includes updated instructions for using the exotic vertebrate risk assessment models and an additional model for freshwater fish. A bird and mammal model for New Zealand has also been included.

**Which models are being used for the assessments:**

Birds and mammals have been assessed using the Australian Bird and Mammal Model (Bomford 2008), pp 16-28, including both versions of stage B, models 1 (4 factors) and 2 (7 factors). All reptiles and amphibians were assessed using three models; the Australian Bird and Mammal Model (Bomford 2008), including Model A, using 3 factors from stage B (pp 54-55), and Model B, using 7 factors from stage B (pp 20), and the Australian Reptile and Amphibian Model (Bomford 2008), p 51-53. The rational for using additional models for reptiles and amphibians is to compare establishment risk ranks of the three models for a precautionary approach. If the models produce different outcomes

Pond Slider (*Trachemys scripta*) risk assessments for Australia. Win Kirkpatrick, Amanda Page and Marion Massam, November 2007, Department of Agriculture and Food, Western Australia.
for the establishment potential of any reptile or amphibian, the highest ranked outcome should be used (Bomford 2008).

**Climate Matching Using PC CLIMATE**

Sixteen climate parameters (variables) of temperature and rainfall are used to estimate the extent of similarity between data from meteorological stations located in the species’ world distribution and in Australia. Worldwide, data (source; worlddata_all.txt CLIMATE database) from approximately 8000 locations are available for analysis. The number of locations used in an analysis will vary according to the size of the species’ distribution. Data from approximately 762 Australian locations is used for analysis.

To represent the climate match visually, the map of Australia has been divided into 2875 grid squares, each measured in 0.5 degrees in both longitude and latitude. CLIMATE calculates a match for each Australian grid by comparing it with all of the meteorological stations within the species’ distribution (excluding any populations in Australia) and allocating a score ranging from ten for the highest level match to zero for the poorest match. These levels of climate match are used in the risk assessment for questions B1 (scores are summed to give a cumulative score), C6, and C8. For a grid square on the Australian map to score highly, it must match closely all 16 climatic variables of at least one meteorological station in the species’ distribution for each level of climate match. [The score for each grid is based on the minimum Euclidian distance in the 16-dimensional variable space between it and all stations in the species’ distribution. Each variable is normalized by dividing it by its worldwide standard deviation.]

**LITERATURE SEARCH TYPE AND DATE:** NCBI, CAB Direct, MEDLINE, Science Direct, Web of Knowledge (Zoological Records, Biological Abstracts), SCIRUS, Google Search and Google Scholar 14/11/2007

**FACTOR SCORE**

**PROBABILITY ESCAPED OR RELEASED INDIVIDUALS WILL ESTABLISH FREE-LIVING POPULATION**

**Model A: Using the first three factors/questions from stage B of the Australian Bird and Mammal Model (Bomford 2008) pp 54-55**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1. Degree of climate match between species overseas range and Australia (1–6)</td>
<td>6</td>
</tr>
<tr>
<td>Climate Match Score = 2768 Extreme climate match with Australia</td>
<td></td>
</tr>
<tr>
<td>Climate data from 2730 locations (see species’ worldwide distribution map) were used to calculate the CMS; natural distribution of <em>Trachemys scripta</em> is southeastern North America to Venezuela, with introduced populations occurring worldwide (see questions B2 and B3).</td>
<td></td>
</tr>
</tbody>
</table>
| [See above information on climate matching.]

| B2. Exotic population established overseas (0–4) | 4 |
| Exotic population established on island larger than 50 000 km² or anywhere on a continent |
| The most commonly traded reptile in the pet industry with commercial production of the species on ranches in the US, particularly in Louisiana (Warwick et al 1990). Many pets, once reaching adult size, can inflict painful bites, are more difficult to keep and are released into the wild (Chen and Lue 1998, Cox et al 1998, Ficetola et al 2002, Cadi et al 2004, Dykes 2007, Ramsay et al 2007). Large numbers of sliders are released into the wild in Asian countries as part of Buddhist cultural practices (Ramsay et al 2007). [A slider was reportedly seized at Brisbane airport being carried into Australia for this purpose (Pers comm. Scott O’Keeffe 2008).] |
| *T. s. scripta* and *T. s. elegans*. have established outside their natural distribution and introduced populations now occur worldwide (Ramsay et al 2007). Many of these populations are self-sustaining through natural breeding. However, in some countries or localities that have very cold winters such as England and New Zealand breeding may not occur and populations are sustained at reasonably high numbers because of the longevity of the species [50 years plus (Dundee and Rossman 1989)] and recruitment from deliberate release by people of unwanted pets or by

1. **United States:**
The species has established in many states beyond the Midwestern states where it occurs naturally. Introduced populations established in Maine, New York, New Jersey, Massachusetts, Connecticut, Pennsylvania, Virginia, North Carolina, South Carolina, Florida, Indiana, Wisconsin, Texas, Arizona, Oregon, southern Ohio, Maryland, Washington, and Michigan (small isolated breeding populations in southern Michigan are able to survive winters) with origins from multiple introductions of released pets, but some archaeological evidence of *T. scripta* possibly being a relic species from ancient times (Holman 1994) (Ernst et al 1994, Conant and Collins 1998, Somma et al 2007, National Exotic Marine and Estuarine Species Information 2008). Large population established in ponds of the United States National Arboretum in Washington DC (Ernst 1990).

Iowa - red-eared turtles (*T. scripta*) continue to be found in scattered ponds, usually rural, throughout the state (Christiansen 2001).

California with populations well established and breeding reported (Spinks et al 2003).

Pennsylvania – widespread in the southeast with well established breeding populations (Urban and Morgan 2005).

Florida, occurs naturally in northwest Florida but introduced populations occur in Dade County, Lake Conway – Orlando and southern Pinellas County (Hutchison 1992); populations noted in southern Florida 1996 (King and Krakauer 1966) but establishment not reported until much later (Wilson and Porras 1983).

2. **Canada:**
At two localities in Ontario (Harding 1997).

3. **Mexico:**
Recorded in Mexico in Baja California (Stebbans 1985) however, possibly not *T. scripta* but the indigenous *T. nebulosa* (Seidel 2002).

4. **Bermuda** widely distributed on the island (Lever 2006).

5. **South America:**
Chile: Reported as an invasive species of concern in Chile; imported commercially in large numbers for the pet trade (Iriarte et al 2005); feral specimen collected in El Toyo on the Maipo River (Nunez et al 2002).

Reportedly introduced to **Brazil** and **Panama** (Moll 1995) and **Guyana** (Lever 2006).

6. **West Indies and Caribbean Sea:**
Bahama and **Cayman Islands** (Alderton 1988).

In the **Lesser Antilles** on Guadeloupe (Schwartz and Thomas 1975, Censky and Kaiser 1999).

**British Virgin Islands** – a breeding population established in a manmade pond (built in 1980s), adults observed soon after construction of the pond and hatchlings first recorded in 1998; eradication efforts failed (Perry et al 2007).

**Trinidad** - Possible presence of feral populations as captive adults kept under semi-natural conditions and hatchlings are widely available in pet shops (Murphy 1997).

7. **Europe:**
Imported into Europe in huge numbers for the pet trade and now widely distributed in wetlands (Cadi and Joly 2004):
- Hungary (Kovacs et al 2004, Balázs and Györfy 2006)
- Austria (Kaltenegger 2006)
- Sweden (Nilson and Andren 1986) (Bringsæ 2006)
- Czechoslovakia (Chemelik and Korinek 1994)
- Spain (Luiselli et al 1997, Bertolero and Canicio 2000, Cordero Rivera and Ayres Fernandez 2004)
- Italy (Ferri and Soccini 2003) (Ficetola et al 2002)
- France – widely distributed and found in lakes, ponds and rivers of all major hydro graphic basins, breeding has been recorded at Toulouse, Tours and Ales (Arvy and Servan 1998, Cadi et al 2004, Cavitte et al 2007)
- Greece - reported from the mainland (Athens) and Crete - Zakynthos and Kos (Bruekers et al 2006)
- Germany, where breeding occurs (Ernst et al 1994, Pieh and Lauder 2006) (Bringsæ 2006)
- Belgium (Hermanns and Nizet 1998)
- United Kingdom – found in many locations in ponds, lakes, reservoirs; also on Jersey in Channel Islands and in Cardiff, South Wales; breeding in UK currently unconfirmed (Beebee and Griffiths 2000)
- Cyprus (King and Burke 1989)
- European countries where the species is found in the wild but no self-sustaining populations established include: Denmark, western Russia, Finland, Lithuania, Poland (Bringsæ 2006).

8. **Middle East**
- Israel (Bouskila 1986, King and Burke 1989)
- Bahrain (Leviton et al 1992)

9. **Pacific Islands:**
On the islands of Guam (well established) and the Mariana Islands (established) (McCoid 1993, Ernst et al 1994, McCoid and Kleberg 1995).
- Hawaii – collected from water bodies on Hawaii, Kauai and Oahu islands (Hawaiian Ecosystems at Risk project (HEAR) 2007), (Lever 2006) and Palau (Miles 2007).
- French Polynesia – widely distributed (Servan and Arvy 1997).
- Micronesia – Eastern Caroline Islands, one specimen recorded for Pohnpei by deliberate or inadvertent human-assisted transport, not established (Buden et al 2001).

10. **Indian Ocean**
Reunion island in the Mascarene Islands (Servan and Arvy 1997).

11. **South Africa:**
Release of unwanted pets that were imported into the country with tropical fish now occupy ponds and streams near Pretoria, Johannesburg, Silverton and Durban (Lamar 1997, Branch 1998, Salzberg 2000).

12. **Asia:**
The most conspicuous turtle in Southeast Asia due to its habit of basking in the open; widely kept as a pet (imported from the US) and released into city parks, temple ponds and national parks; breeding widespread under Asian tropic conditions and the species is expected to spread widely throughout the region; populations recorded for Thailand, Malaysia, Vietnam, Korea, Japan, Indonesia, Taiwan, and China (unconfirmed but the species is widely traded.

Present on **Hong Kong** (Hong Kong Reptile & Amphibian Society 2008).


**Korea** – recorded at Pusan (Platt and Fontenot 1992, Lever 2003). Recorded from a number of areas in Korea where they were first imported in 1970 for Buddhist release ceremonies and later for pets; importation was banned in 2001 (Ramsay et al 2007).

**Taiwan** – species can be found in various water bodies including rivers, ponds, lakes and artificial reservoirs and at some sites they are as abundant as native turtles; gravid females, nests and hatchlings have been found indicating establishment in Taiwan (Chen and Lue 1998).

**Singapore** (Lamar 1997), present in many freshwater bodies with densities high in some areas such as Botanical Gardens, Bedok Reservoir and Bukit Batok Town Park (Goh and O’Riordan 2007).

13. **New Zealand** (Global Invasive Species Database 2007)

Found in waterways especially along the Waikato River (Dykes 2007); sightings in the wild around Huntly that is situated on either side of Waikato River 93 kilometres south of Auckland (Hudson and Thornton 1994). Reports of red-eared sliders in the wild in NZ, believed to be all released or escaped captives; conditions in Hamilton area of the North Island would allow sliders to successfully live long term however, for breeding to occur lengthy warm conditions are necessary for sex-determination of eggs. These conditions would be possible in micro-habits along rivers but occurrences limited and therefore establishment of breeding populations unlikely (Thomas and Hartnell 2000).

[No reports of breeding in the wild in NZ found at the time of this assessment.]

14. **Australia:**

**Queensland** – Two breeding population of red-eared sliders, one in the Pine Rivers area and another in the Caboolture Shire and sightings in other locations in southeast Queensland (Townsend 2005, Queensland Department of Natural Resources and Water 2007a, b). Breeding population in Yeramba Lagoon, southern Sydney area of **New South Wales** (Burgin 2006), and gravid female found in late 2007 at Wolli Creek reserve, Sydney (pers. comm. Geoffrey Ross, Wildlife Management Officer, Central Branch, Parks & Wildlife Division, Department of Environment & Climate Change 2007). **Victoria** – *T. scripta* discovered in Melbourne, Victoria (Edwards 2007).

Single animals have also been removed from urban areas in Western Australia (DAFWA Unpublished reports) (Limpus 2006)

<table>
<thead>
<tr>
<th>B3. Overseas range size score (0–2)</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 = 0; 1 – 70 = 1; &gt;70 = 2</td>
<td></td>
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</tbody>
</table>

**Establishment Risk Score**

**SUM OF SCORE A (B1) + SCORE B (B2) + SCORE C (B3) (1-12)**

11
<table>
<thead>
<tr>
<th>B4. Taxonomic Class (0–1)</th>
<th>1</th>
<th>Reptile (The Reptile Database 2007).</th>
</tr>
</thead>
</table>
| B5. Diet score (0–1)    | 1 | Generalist with a broad diet of many food types  
The species is omnivorous, and a wide range of food is consumed: including plant material, snails, fish, dipteran larvae and pupae and terrestrial insects (Chen and Lue 1998). Prey items reported in Louisiana include crawfish, other smaller crustaceans, insects and small vertebrates (Gulf States Marine Fisheries Commission 1999).  
The juveniles require more animal food for greater growth which is linked to a higher survivorship (Pan et al 2004, Bouchard and Bjornal 2006). However, another study found juvenile *T. scripta* faecal content comprised >70% plant matter, while adult males and females had equal proportions of plant and animal matter in their faeces; the data indicated that dietary shifts occur (Dreslik 1999). Stomach contents of adult females collected from two ponds in France showed diet was omnivorous and included fish, vegetable material, insects and terrestrial ants as well as plastic, stones and paper (Prevot-Julliard et al 2007). In Queensland, digestive tracts of some captured animals contained large quantities of grass.  
Food items include water insects, snails, tadpoles, crayfish, fish, crustaceans and molluscs: plants eaten include arrowhead (*Sagittaria latifolia*), water lilies, water hyacinths and duck weed, carrion is also eaten (Smither 2004).  
Adults are omnivorous showing no preference for either plant or animal food, they will take almost any food item available; foods recorded include duckweed, algae, assorted emergent herbaceous plants, tadpoles, small fish, insects (adults and larvae) crayfish, shrimp, amphipods, various molluscs (mostly snails) (Ernst and Barbour 1989).  
Food can be taken while the turtle is on land but is consumed in the water to aid swallowing (Smither 2004). |
| B6. Habitat score - undisturbed or disturbed habitat (0–1) | 1 | Can live in human-disturbed habitats  
The species is highly adaptable and tolerates brackish water (see earlier note on salt tolerance), it can live in man-made canals, irrigation ditches and city ponds and lakes (Somma et al 2007). They prefer soft bottomed (i.e. muddy) quiet bodies of water such as slow moving rivers, streams, swamps, ponds, creeks, also stock tanks. They spend a significant amount of time just floating (assisted by their inflatable throat) and basking on the shore close to the water’s edge, on logs or rocks (Smither 2004). Occupies most freshwater habitats preferring quiet waters with soft bottoms, abundant aquatic plants and suitable basking sites (Ernst et al 1994). They use objects floating or projecting over water to bask upon and may climb bushes to heights of a metre (Minton 1972).  
Noted that sliders can live in waters contaminated with radioactive material, variety of chemical pollutants, water with high organic load, and thermally polluted water (Gibbons 1990). *T. scripta* living in a lake receiving thermal effluent from a coal-fired power plant had higher reproductive potential and higher rate of population increase than *T. scripta* living in natural lakes (Thornhill 1982).  
The species can survive European winters by hibernating, some with severe winters with extended periods of minus ten degrees (Cadi and Joly 2003). |
| B7. Non-migratory behaviour (0–1) | 1 | Non-migratory or facultative migrant in its native range  
Both extrapopulational (long-range) and intrapopulational movement occur and are usually associated with breeding (females searching for nest sites, males seeking mates), hatching movement from nest to aquatic habitat, individuals seeking favourable sites to hide or periods of dormancy, away from adverse conditions, in search of seasonal resources (tropical *T. scripta* in response to rainfall patterns but this type of movement not common), to hibernation sites. This type of movement is not seasonal on an annual bases therefore is not classed as migratory movement: all activity is diurnal (Gibbons et al 1990, Somma et al 2007). |

**Establishment Risk Score** 15
### Australian Reptile and Amphibian Model (Bomford 2008, pp 51-53)

| **Score A. Climate Match Risk Score Degree (Sum of species 4 scores for Euclidian match classes 7 - 10)** | 92 | **CMRS = 100(2553/2785)**

The natural distribution of *Trachemys scripta* is southeastern North America to Venezuela, with introduced populations occurring worldwide (Gibbons 1990) (see Score C of Bird and Mammal Model for details). |
| **Score B. Has the species established an exotic population in another country? (0–30)** | 30 | **Species has established a breeding self-sustaining exotic population in another country**

*T. s. scripta* and *T. s. elegans*. have established outside their natural distribution and introduced populations now occur worldwide (Ramsay et al 2007). Many of these populations are self sustaining through natural breeding however, in some countries or localities that have very cold winters such as England and New Zealand breeding may not occur and populations are sustained at reasonably high numbers because of the longevity of the species [50 years plus (Dundee and Rossman 1989)] and recruitment from deliberate release by people of unwanted pets or by pets escaping. (Thomas and Hartnell 2000) (Holman 1994, Cadi et al 2004) (Williams 1999, Kovacs et al 2004) (Lever 2006) (see Score B of Bird and Mammal Model for details). |
| **Score C. Taxonomic Family risk score (0–30)** | 15 | **High risk family (Bomford 2006)**

Family Emydidae (The Reptile Database 2007)

The largest and most diverse family of living turtles with two subfamilies generally recognised: Batagurinae or Old World pond turtles, and Emydinae or New World pond turtles. Emydinae are separated into two generic complexes: Clemmys complex that includes the genera Clemmys, Emyboidea, Emys and Terrapene; Chrysemys complex that includes the freshwater genera Chrysemys, Deirochelys, Graptemys, Pseudemys, Trachemys and the brackish water genera Malaclemys. (Ernst 1990). |

**ESTABLISHMENT RISK SCORE**

**SUMMARY OF RESULTS**

### Establishment Risk Ranks – Risk of establishing a wild population

| **Model A: Using the first three factors/questions from stage B of the Australian Bird and Mammal Model (Bomford 2008) pp 54-55)** | 11 | **Extreme**

≤ 4 = low establishment risk; 5-7 = moderate establishment risk; 8-9 = serious establishment risk; 10-12 = extreme establishment risk |

| **Model B: Using the seven factors/questions from stage B of the Australian Bird and Mammal Model (Bomford 2008) pp 20)** | 15 | **Extreme**

≤ 6 = low establishment risk; 7-11 = moderate establishment risk; 12-13 = serious establishment risk; ≥ 14 = extreme establishment risk |
<table>
<thead>
<tr>
<th>Australian Reptile and Amphibian Model (Bomford 2008, pp 51-53)</th>
<th>EXTREME</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 22 = LOW ESTABLISHMENT RISK; 23-60 = MODERATE ESTABLISHMENT RISK; 61-115 = SERIOUS ESTABLISHMENT RISK; ≥ 116 = EXTREME ESTABLISHMENT RISK</td>
<td>EXTREME – ENDORSED BY VPC</td>
</tr>
<tr>
<td><strong>HIGHEST ESTABLISHMENT RISK RANK</strong></td>
<td></td>
</tr>
<tr>
<td>(When establishment risk ranks differ between the models, the highest ranked outcome is used (Bomford 2008).)</td>
<td></td>
</tr>
<tr>
<td>Median number of references for Establishment Risk for all reptiles assessed by (Massam et al 2010) (n=11)</td>
<td>15</td>
</tr>
<tr>
<td>Total number of references for this species</td>
<td>82 – more than the median number of reptile references were used for this assessment, indicating a decreased level of uncertainty.</td>
</tr>
</tbody>
</table>
WORLDWIDE DISTRIBUTION – Pond Slider (*Trachemys scripta*) including natural populations (black) and introduced populations (red).

Each black or red dot is a location where meteorological data was sourced for the climate analysis (see B1); faint grey dots are locations available for CLIMATE analysis but are not within the species distribution therefore not used.
Map 1. Climate match between the world distribution of Pond Slider (*Trachemys scripta*) and Australia for five match classes.

<table>
<thead>
<tr>
<th>Colour on Map</th>
<th>Level of Match from Highest (10) to Lowest (6)</th>
<th>No. Grid Squares on Map</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>10 HIGH MATCH</td>
<td>1</td>
</tr>
<tr>
<td>Pink</td>
<td>9 HIGH MATCH</td>
<td>317</td>
</tr>
<tr>
<td>Dark Green</td>
<td>8 MOD MATCH</td>
<td>1235</td>
</tr>
<tr>
<td>Mid Green</td>
<td>7 MOD MATCH</td>
<td>1000</td>
</tr>
<tr>
<td>Lime Green</td>
<td>6 LOW MATCH</td>
<td>215</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CMS = 2768</strong></td>
</tr>
</tbody>
</table>
Map 2. Climate match between the world distribution of Pond Slider (*Trachemys scripta*) and Australia for eight match classes.

<table>
<thead>
<tr>
<th>Colour on Map</th>
<th>Level of Match from Highest (10) to Lowest (3)</th>
<th>No. Grid Squares on Map</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>10 HIGH MATCH</td>
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<td>4 LOW MATCH</td>
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<td>Light blue</td>
<td>3 LOW MATCH</td>
<td>2</td>
</tr>
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References


Pond Slider (*Trachemys scripta*) risk assessments for Australia. Win Kirkpatrick, Amanda Page and Marion Massam, November 2007, Department of Agriculture and Food, Western Australia.


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