NEW YORK
TERRESTRIAL VERTEBRATE INVASIVENESS RANKING FORM

Scientific name:	Trachemys elegans
Common names:	Pond Slider, Red-eared Slider
Native distribution:	Texas, Oklahoma, Kansas, Missouri, Louisiana, Mississippi, Arkansas, western Tennessee, western, Alabama, western Kentucky, Illionois, western Indiana, southeastern Michigan, southeastern Ohio (Gibbs et al. 2007)
Date assessed:	1/3/2013
Assessors:	J. Corser
Reviewers:	
Date Approved:	Form version date: 3 January 2013

New York Invasiveness Rank: Moderate (Relative Maximum Score 50.00-69.99)

Distribution and Invasiveness Rank (*Obtain from PRISM invasiveness ranking form*)			
	Status of this species in each PRISM:	Current Distribution	PRISM Invasiveness Rank
1	Adirondack Park Invasive Program	Not Assessed	Not Assessed
2	Capital/Mohawk	Not Assessed	Not Assessed
3	Catskill Regional Invasive Species Partnership	Not Assessed	Not Assessed
4	Finger Lakes	Not Assessed	Not Assessed
5	Long Island Invasive Species Management Area	Not Assessed	Not Assessed
6	Lower Hudson	Not Assessed	Not Assessed
7	Saint Lawrence/Eastern Lake Ontario	Not Assessed	Not Assessed
8	Western New York	Not Assessed	Not Assessed

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	30 (30)	10
2	Biological characteristic and dispersal ability	30 (30)	22
3	Ecological amplitude and distribution	30 (30)	24
4	Difficulty of control	10 (10)	4
	Outcome score	100 (100)[b]	60[a]
	Relative maximum score †		60.00
	New York Invasiveness Rank §	Moderate (Relative Maximum Score 50.00-69.99)	

* For questions answered "unknown" do not include point value in "Total Answered Points Possible." If "Total Answered Points Possible" is less than 70.00 points, then the overall invasive rank should be listed as "Unknown."
†Calculated as 100(a/b) to two decimal places.
§Very High >80.00; High 70.00−80.00; Moderate 50.00−69.99; Low 40.00−49.99; Insignificant <40.00

A. DISTRIBUTION (KNOWN/POTENTIAL): Summarized from individual PRISM forms

A1.1. Has this species been documented in NY? (reliable source; voucher not required)	
☒	Yes – continue to A1.2
☐	No – continue to A2.1; Yes ☐ NA; Yes ☐ USA
A1.2. In which PRISMs is it known (see inset map)?	
☐	Adirondack Park Invasive Program
☒	Capital/Mohawk
☒	Catskill Regional Invasive Species Partnership
☒	Finger Lakes
☒	Long Island Invasive Species Management Area

☒	Lower Hudson
☒	Saint Lawrence/Eastern Lake Ontario
☒	Western New York

Documentation:
Sources of information:
Gibbs et al., 2007, NYSDEC Herp Atlas website.

A2.0. Is this species listed on the Federal Injurious Fish and Wildlife list?
☐ Yes – the species will automatically be listed as Prohibited, no further assessment required
☒ No – continue to A2.1

A2.1. What is the likelihood that this species will occur and persist given the climate in the following PRISMs? (obtain from PRISM invasiveness ranking form and/ or Climatch score)

Not Assessed	Adirondack Park Invasive Program
Not Assessed	Capital/Mohawk
Not Assessed	Catskill Regional Invasive Species Partnership
Not Assessed	Finger Lakes
Not Assessed	Long Island Invasive Species Management Area
Not Assessed	Lower Hudson
Not Assessed	Saint Lawrence/Eastern Lake Ontario
Not Assessed	Western New York

Documentation:
Sources of information (e.g.: distribution models, literature, expert opinions):

If the species does not occur and is not likely to survive and reproduce within any of the PRISMs, then stop here as there is no need to assess the species.

A2.2. What is the current distribution of the species in each PRISM? (obtain rank *from PRISM invasiveness ranking forms*)

	Distribution
Adirondack Park Invasive Program	Not Assessed
Capital/Mohawk	Not Assessed
Catskill Regional Invasive Species Partnership	Not Assessed
Finger Lakes	Not Assessed
Long Island Invasive Species Management Area	Not Assessed
Lower Hudson	Not Assessed
Saint Lawrence/Eastern Lake Ontario	Not Assessed
Western New York	Not Assessed

Documentation:
Sources of information:

A2.3. Describe the potential or known suitable habitats within New York. Natural habitats include all habitats not under active human management. Managed habitats are indicated with an asterisk.

Aquatic Habitats	Wetland Habitats	Upland Habitats
☐ Marine	☒ Salt/brackish marshes	☐ Cultivated*
☐ Salt/ brackish waters	☒ Freshwater marshes	☐ Grasslands/old fields
☐ Freshwater tidal	☐ Peatlands	☐ Shrublands
☒ Rivers/streams	☐ Shrub swamps	☐ Forests/woodlands
☒ Natural lakes and ponds	☐ Forested wetlands/riparian	☐ Alpine
☐ Vernal pools	☐ Ditches*	☐ Roadsides*
☒ Reservoirs/impoundments*	☐ Beaches/or coastal dunes	☐ Cultural*

Other potential or known suitable habitats within New York:
This turtle prefers quiet, deep freshwater lakes and slow rivers with soft bottoms and adundant vegetation, but also can be found in salt marshes in the southeastern US.

Documentation:
Sources of information:
Gibbs et al., 2007; Ernst and Lovich, 2009; Holman, 2012.

B. INVASIVENESS RANKING

1. ECOLOGICAL IMPACT

1.1. Impact on Ecosystem Processes and System-wide Parameters (e.g., energy cycle, nutrient and mineral dynamics, light availability, or geomorphological changes (erosion and sedimentation rates).

A.	No perceivable impact on ecosystem processes based on research studies, or the absence of impact information if a species is widespread (>10 occurrences in minimally managed areas), has been well-studied (>10 reports/publications), and has been present in the northeast for >100 years	0
B.	Influences ecosystem processes to a minor degree, has a perceivable but mild influence	3
C.	Significant alteration of ecosystem processes	7
D.	Major, possibly irreversible, alteration or disruption of ecosystem processes	10
U.	Unknown	

Score 3

Documentation:
Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)
As extremely low-energy organisms, turtles are unlikely to have a significantly effect physical ecoystem properties. However, red eared slider has been shown to have minor effects on some ecosystem processes in Texas (Lindsay, 2011).
Sources of information:
Ernst and Lovich, 2009; Holman, 2012; Lindsay, 2011.

1.2. Impact on Natural Habitat

A.	No perceived impact; causes no apparent change in native habitat	0
B.	Influences natural habitat (e.g., reduces the stem density and height of one or more native species in core habitat)	3
C.	Significantly alters natural habitat (e.g., produces a notable reduction in the population size of one or more native species in core habitat)	7
D.	Causes major alteration in natural habitat (e.g., results in the extirpation of one or more native species, or changes the community composition in core habitat towards species exotic to the natural community)	10
U.	Unknown	

Score 0

Documentation:
Identify type of impact or alteration:
No evidence of influencing habitat composition.
Sources of information:

1.3. Impact on other species or species groups, including cumulative impact of this species on other organisms in the community it invades (e.g., interferes with native predator/ prey dynamics; hybridizes with a native species; hosts a non-native disease which impacts a native species)

A.	Negligible perceived impact	0
B.	Minor impact (e.g. 1 species, <20% population decline)	3
C.	Moderate impact (e.g. 2-3 species and/ or 20-29% population decline of any 1 species)	7
D.	Severe impact on other species or species groups (e.g. >3 species and/ or ≥30% population	10

decline of any 1 species)

U. Unknown

Score 7

Documentation:
Identify type of impact or alteration:
T.s. scripta and T.s. elegans are known to hybridize, neither are considered native in NY. These turtles may transmit disease to native turtles. It has also been found to negatively impact certain European turtles (i.e., Emys orbicularis), but there would seem to be little niche overlap with other US turtles, except possibly the abundant and ubiquitous Painted turtle.
Sources of information:
Ernst and Lovich, 2009; Holman, 2012.

Total Possible	30
Section One Total	10

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode and rate of reproduction

A.	No reproduction (e.g. sterile with no sexual or asexual reproduction)	0
B.	Limited reproduction (e.g. intrinsic rate of increase <10%/ year)	1
C.	Moderate reproduction (e.g. intrinsic rate of increase between 10-30%/ year)	2
D.	Abundant reproduction (e.g. intrinsic rate of increase >30%/ year)	4
U.	Unknown	

Score 1

Documentation:
Describe key reproductive characteristics:
Average ~10 eggs/clutch in Great Lakes region; may proudce a second clutch; can be abundant in the southeast US; one mark recapture study found r to be negative--most die during their first or second year of life. Greater reproducation potential and differences in nestin g habitat give a competitive advantage over other turtles.
Sources of information:
Holman, 2012; Ernst and Lovich, 2009.

2.2. Migratory behavior

A.	Always migratory in its native range	0
B.	Non-migratory or facultative migrant in its native range	2
U.	Unknown	

Score 2

Documentation:
Describe migratory behavior:
This species is non-migratory.
Sources of information:
Ernst and Lovich, 2009.

2.3. Biological potential for colonization by long-distance dispersal/ movement.

A.	No long-distance dispersal/ movement mechanisms	0
A.	Adaptations exist for long-distance dispersal, but studies report that most individuals (90%) establish territories within 10 miles of parent or within a distance twice the home range of the parent, and tend not to cross major barriers such as rivers and major roads	1
B.	Adaptations exist for long-distance dispersal, movement and evidence that offsping often disperse greater than 10 miles of parent or greater than twice the home range of parent and will cross major barriers such as river and major roads	2
U.	Unknown	

Score 1

Documentation:
Identify dispersal mechanisms:
They are capable of finding and colonizing new habitats; maximum movements < 5km.
Sources of information:
Ernst and Lovich, 2009; Holman, 2012.

2.4. Practical potential to be spread by human activities, both directly and indirectly (possible vectors include: commercial sales, deliberate stocking, translocation, rehabilitation, pest control industry, agricultural escapes, pet abandonment and release, etc.)

A. Does not occur 0
B. Low (human dispersal to new areas occurs almost exclusively by direct means and is infrequent or inefficient) 1
C. Moderate (human dispersal to new areas occurs by direct and indirect means to a moderate extent) 2
D. High (opportunities for human dispersal to new areas by direct and indirect means are numerous, frequent, and successful) 4
U. Unknown

Score 4

Documentation:
Identify dispersal mechanisms:
High release rate primarily due to people releasing their pet turtles into the wild when they no longer wish to care for them. However, owing to suspected Salmonella transmission, trade in this species was supposed to have been banned in the 1972, although illegal trade continues to flourish.
Sources of information:
Ernst and Lovich, 2009; Gibbs et al., 2007; Holman, 2012.

2.5. Non-living chemical and physical characteristics that increase competitive advantage (e.g., tolerance to various extremes, pH, temperature, fill vacant niche, charismatic species)

A. Possesses no characteristics that increase competitive advantage 0
B. Possesses one characteristic that increases competitive advantage 4
C. Possesses two or more characteristics that increase competitive advantage 8
U. Unknown

Score 4

Documentation:
Evidence of competitive ability:
Overall, the ability to synthesize cryoprotectants is poorly developed and this turtle has high thermal preferences. The pond sliders' brain has an enormous ability to withstand anoxia (has anoxia tolerance).
Sources of information:
Ernst and Lovich, 2009.

2.6. Biological characteristics that increase competitive advantage (e.g., high fecundity, generalist, highly evolved defense mechanisms, behavioral adaptations)

A. Possesses no characteristics that increase competitive advantage 0
B. Possesses one characteristic that increases competitive advantage 4
C. Possesses two or more characteristics that increase competitive advantage 8
U. Unknown

Score 8

Documentation:

Evidence of competitive ability:
This species has at least three characterisitcs that lend it a greater competitive ability than other turtles: a high reproductive output, more generalized nesting habitat, and higher aggressiveness.
Sources of information:
Ernst and Lovich, 2009.

2.7. Other species in the family and/ or genus invasive in New York or elsewhere?

A.	No	0
B.	Yes	2
U.	Unknown	

Score: 2

Documentation:
Identify species:
T.scripta, scripta is also considered invasive along the east coast.

Total Possible	30
Section Two Total	22

3. ECOLOGICAL AMPLITUDE AND DISTRIBUTION

3.1. Current introduced distribution of established populations in the northern latitudes of USA and southern latitude of Canada (e.g., between 35 and 55 degrees)

A.	Not known from the northern US or southern Canada	0
B.	Established as a non-native in 1 northern USA state and/or southern Canadian province	1
C.	Established as a non-native in 2 or 3 northern USA states and/or southern Canadian provinces	2
D.	Established as a non-native in 4 or more northern USA states and/or southern Canadian provinces, and/or categorized as a problem species (e.g., "Invasive") in 1 northern state or southern Canadian province	3
U.	Unknown	

Score: 3

Documentation:
Identify states and provinces:
The current distribution includes ON, PA, NY, MA, and DE. However it is very likely that populations in these areas are either remnants of the warmer Hypsithermal phase about 6,0000 years ago, or else they could very well be natural range extensions due to recent climate warming. Because of extralimital populations becoming established by deliberate pet trade introductions, this is the World's most widespread freshwater turtle.
Sources of information:
- See known introduced range at www.usda.gov, and update with information from states and Canadian provinces.

Holman, 2012; Ernst and Lovich, 2009.

3.2. Current introduced distribution of established populations of the species in natural areas in the eight New York State PRISMs (Partnerships for Regional Invasive Species Management)

A.	Established in none of the PRISMs	0
B.	Established in 1 PRISM	1
C.	Established in 2 or 3 PRISMs	3
D.	Established in 4 or more PRISMs	5
U.	Unknown	

Score: 5

Documentation:
Describe distribution:
Occur commonly on Long Island, scattered elsewhere throught the state exclusive of the Adirondacks.
Sources of information:
Gibbs et al., 2007.

3.3. Number of known, or potential (each individual possessed by a vendor or consumer is a potential release), individual releases and/ or release events (propagule pressure)

A. None 0
B. Few releases (e.g., <10 annually) 2
C. Regular, small scale releases (e.g., 10-99 annually) 4
D. Multiple, large scale (e.g., ≥100 annually) 6
U. Unknown

Score 6

Documentation:
Describe known or potential releases:
Most popular pet trade turtle; no data on number of releases, but assumed to be very high.
Sources of information:
Gibbs et al., 2007; Ernst and Lovich, 2009.

3.4. Current introduced population density in northern USA and/ or southern Canada.

A. No known populations established 0
B. Low to moderate population density (e.g., ≤1/4 or < to 1/2 native population density) 1
C. High or irruptive population density (e.g., ≥1/2 native population density) 2
U. Unknown

Score 1

Documentation:
Describe population density:
Two NY breeding populations established. Not known to occur at high densities.
Sources of information:
Gibbs et al., 2007.

3.5. Number of habitats the species may invade

A. Not known to invade any natural habitats 0
B. Known to occur in 2/ 3 habitats, with at least 1/ 2 natural habitat(s) 2
C. Known to occur in 4 or more habitats, with at least 3 natural habitats 3
U. Unknown

Score 2

Documentation:
Identify type of habitats where it occurs and degree/type of impacts:
This species inhabits lakes, ponds, ditches, farm ponds.
Sources of information:
Gibbs et al., 2007.

3.6. Role of anthropogenic (human related) features in establishment (e.g. buildings, roads, agricultural fields, etc)

A. Requires anthropogenic disturbances to establish 0
B. May occasionally establish in undisturbed areas but can readily establish in areas with 2

natural or anthropogenic disturbances

C. Can establish independent of any known natural or anthropogenic disturbances 3

U. Unknown

Score 3

Documentation:
Identify anthropogenic features:

Sources of information:

3.7. Climate in native range (e.g., med. to high, ≥5, Climatch score; within 35 to 55 degree latitude; etc.)

A. Native range does not include climates similar to New York 0

B. Native range possibly includes climates similar to portions of New York 4

C. Native range includes climates similar to those in New York 8

U. Unknown

Score 4

Documentation:
Describe known climate similarities: Native at same latitude in Michigan. Present and native in the United States.
Sources of information:
Holman, 2012.

Total Possible 30

Section Three Total 24

4. DIFFICULTY OF CONTROL

4.1. Re-establishment potential, nearby propagule source, known vectors of re-introduction in vicinity (e.g. biological supplies, pets, game farms, zoos, shooting preserves, connecting corridors, mechanized transportation)

A. No known vectors/ propagule source for re-establishment following removal 0

B. Possible re-establishment from 1 vector/ propagule source following removal 1

C. Likely to re-establish from 2-3 vectors/ propagule sources following removal 2

D. Strong potential for re-establishment from 4 or more vectors/ propagule sources following removal 3

U. Unknown

Score 2

Documentation:
Identify source/ vectors:
Most popular pet trade turtle; no data on number of releases, but assumed to be very high. Even though only one source of re-introduction is mentioned (pet release), due to this propagule source being so high, we scored this as C: 2.
Sources of information:
Gibbs et al., 2007.

4.2. Status of monitoring and/ or management protocols for species

A. Standardized protocols appropriate to New York State are available 0

B. Scientific protocols are available from other countries, regions or states 1

C. No known protocols exist 2

U. Unknown

Score 0

Documentation:

Describe protocols:
Methods for mark recapture and telemetry used in studies of turtles is very well established.
Sources of information:
Ernst and Lovich, 2009.

4.3. Status of monitoring and/ or management resources (e.g. tools, manpower, travel, traps, lures, ID keys, taxonomic specialists, etc.)

A.	Established resources are available including commercial and/ or research tools	0
B.	Monitoring resources may be available (e.g. partnerships, NGOs, etc)	1
C.	No known monitoring resources are available	2
U.	Unknown	

Score: 0

Documentation:
Describe resources:
NYS DEC/volunteers. NYS has a well established network of ameteur and semi-professional herpetologists.
Sources of information:
NYS DEC Herp Atlas

4.4. Level of effort required.

A.	Management is not required (e.g., species does not persist without repeated human mediated action)	0
B.	Management is relatively easy and inexpensive; invasive species can be maintained at low abundance causing little or no ecological harm (e.g., 10 or fewer person-hours of manual effort can eradicate a local population in 1 year)	1
C.	Management requires a major short-term investment, and is logistically and politically challenging; eradication is difficult, but possible (e.g., 100 or fewer person-hours/year of manual effort, or up to 10 person-hours/ year for 2-5 years to suppress a local population)	2
D.	Management requires a major investment and is logistically and politically difficult; eradication may be impossible (e.g., more than 100 person-hours/ year of manual effort, or more than 10 person hours/year for more than 5 years to suppress a local population)	3
U.	Unknown	

Score: 2

Documentation:
Identify types of control methods and time required:
Turtle trapping using baited turtle traps is a well established protocol for capturing turtles, measured in trap nights. Removing a few reporductive females of this late matuirng species reduces population levels.
Sources of information:
Ernst and Lovich, 2009.

Total Possible	10
Section Four Total	4
Total for 4 sections Possible	100
Total for 4 sections	60

C. STATUS OF GENETIC VARIANTS AND HYBRIDS:

At the present time there is no protocol or criteria for assessing the invasiveness of genetic variants independent of the species to which they belong. Such a protocol is needed, and individuals with the appropriate expertise should address this issue in the future. Such a protocol

will likely require data on cultivar fertility and identification in both experimental and natural settings.

Genetic variants of the species known to exist: Yes, subspecies. T.s. scripta.

Hybrids (crosses between different parent species) should be assessed individually and separately from the parent species wherever taxonomically possible, since their invasiveness may differ from that of the parent species. An exception should be made if the taxonomy of the species and hybrids are uncertain, and species and hybrids can not be clearly distinguished in the field. In such cases it is not feasible to distinguish species and hybrids, and they can only be assessed as a single unit.

Hybrids of uncertain origin known to exist: No

References for species assessment:

Ernst, C. H., & Lovich, J. E. (2009). Turtles of the United States and Canada. Johns Hopkins University Press.

Gibbs, J. P., Breisch, A. R., Ducey, P. K., Johnson, G., & Bothner, R. (2007). The amphibians and reptiles of New York State: Identification, natural history, and conservation. Oxford University Press, USA.

Holman, J.A. (2012). The amphibians and reptiles of Michigan: a Quaternary and recent faunal adventure. Wayne State University Press, Detroit.

Lindsay, M.K. 2011. Effects of a Freshwater Turtle (Trachemys scripta elegans) on Ecosystem Functioning in Experimental Ponds. Thesis. Texas State University-San Marcos, Department of Biology. <https://digital.library.txstate.edu/handle/10877/3150>; [Accessed on January 25, 2013].

NYS DEC. Herp Atlas. http://www.dec.ny.gov/animals/7140.html

Citation: The New York Terrestrial Vertebrate Invasiveness Ranking Form is an adaptation of the New York Plant Invasiveness Ranking Form. The original plant form may be cited as: Jordan, M.J., G. Moore and T.W. Weldy. 2008. Invasiveness ranking system for non-native plants of New York. Unpublished. The Nature Conservancy, Cold Spring Harbor, NY; Brooklyn Botanic Garden, Brooklyn, NY; The Nature Conservancy, Albany, NY.

Acknowledgments: The New York Terrestrial Vertebrate Invasiveness Ranking Form incorporates components and approaches used in several other systems, cited in the references below. Valuable contributions by members of the Invasive Species Council and Invasive Species Advisory Committee were incorporated in revisions of this form. Members of the Office of Invasive Species Coordination's Four-tier Team, who coordinated the effort, included representatives of the New York State Department of Environmental Conservation* (Division of Fish, Wildlife and Marine Resources, Division of Lands and Forests, Division of Water); The Nature Conservancy; New York Natural Heritage Program; New York Sea Grant; Lake Champlain Sea Grant*; New York State Department of Agriculture and Markets (Division of Plant Industry and Division of Animal Industry); Cornell University (Department of Natural Resources and Department of Entomology); New York State Nursery and Landscape

Association; New York Farm Bureau; Brooklyn Botanic Garden; Pet Industry Joint Advisory Council*; Trout Unlimited; United States Department of Agriculture Animal and Plant Health Inspection Service* (Plant Protection and Quarantine and Wildlife Services); New York State Department of Transportation; State University of New York at Albany and Plattsburgh; and Cary Institute of Ecosystem Studies. Those organizations listed with an asterisk comprised the Terrestrial Vertebrate Working Group.

References for ranking form:

Bomford, M. 2008. Risk Assessment Models for Establishment of Exotic Vertebrates in Australia and New Zealand. Invasive Animals Cooperative Research Centre, Canberra.

Broken Screens: The Regulation of Live Animal Imports in the United States. 2007. Defenders of Wildlife, Washington, DC.

Cooperative Prevention of Invasive Wildlife Introduction in Florida. 2008. The Environmental Law Institute, Washington, DC.

Jordan, M.J., G. Moore and T.W. Weldy. 2008. Invasiveness ranking system for non-native plants of New York. Unpublished. The Nature Conservancy, Cold Spring Harbor, NY; Brooklyn Botanic Garden, Brooklyn, NY; The Nature Conservancy, Albany, New York.

Natural Resources Board Order No. IS-34-06, Invasive Species Identification, Classification and Control. 2008. Wisconsin Department of Natural Resources, Madison Wisconsin.

Preventing Biological Invasions: Best Practices in Pre-Import Risk Screening for Species of Live Animals in International Trade. 2008. Convention of Biological Diversity, Global Invasive Species Programme and Invasive Species Specialist Group of IUCN's Species Survival Commission. University of Notre Dame, Indiana.

Standard Methodology to Assess the Risks From Non-native Species Considered Possible Problems to the Environment. 2005. DEFRA.

Witmer, G., W. Pitt and K. Fagerstone. 2007. Managing Vertebrate Invasive Species. USDA National Wildlife Research Center Symposia, Fort Collins, Colorado.