**Species Assessment and Listing Priority Assignment Form**

**Scientific Name:** *Pseudemys rubriventris*

**Common Name:** Northern Red-bellied Cooter

**Lead Region:** Region 5 (Northeast Region)

**Lead Region Contact:** USFWS contact?

**Lead Field Office Contact:** USFWS New England Field Office

**Information Current as of:** November 16, 2017

**Status/Action**

\_\_\_ Funding provided for a proposed rule. Assessment not updated.

\_\_\_ Species Assessment – determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

\_\_\_ New Candidate

 \_ Continuing Candidate

\_\_\_ Candidate Removal

\_\_\_ Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status

\_\_\_ Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species

\_\_\_ Range is no longer a U.S. territory

\_\_\_ Insufficient information exists on biological vulnerability and threats to support listing

\_\_\_ Taxon mistakenly included in past notice of review

\_\_\_ Taxon does not meet the definition of “species”

\_\_\_ Taxon believed to be extinct

\_\_\_ Conservation efforts have removed or reduced threats

\_\_\_ More abundant than believed, diminished threats, or threats eliminated.

**Petition Information**

\_\_ Non-Petitioned

\_\_ \_ Petitioned

90-Day Positive:

12-Month Positive:

Did the Petition request a reclassification?

**For Petitioned Candidate species:**

Is the listing warranted? If yes, see summary threats below.

To Date, has publication of the proposal to list been precluded by other higher priority listing?

Explanation of why precluded:

**Extent of Occurrence/Area of Occupancy**

**Historical States/Territories/Countries of Occurrence:**

**Countries:** United States

**States/US Territories**: DC, DE, MA, MD, NC, NJ, NY, PA, VA, WV

**US Counties:** incomplete information

**Current States/Counties/Territories/Countries of Occurrence:**

**Countries:** United States

**States/US Territories:** DC, DE, MA, MD, NC, NJ, PA, VA, WV (exotic in NY)

**US Counties:** Most county distributions were derived from USGS National Gap Analysis Program range data for northern red-bellied cooter (NRBC). Virginia counties were obtained from the Virginia Fish and Wildlife Information Service (VAFWIS) database. Listing does not imply confirmation of NRBC presence.

|  |  |
| --- | --- |
| **State/US Territory** | **Counties** |
| District of Columbia | all |
| Delaware | Kent, Newcastle, Sussex |
| Massachusetts | Barnstable, Bristol, Plymouth |
| Maryland | Allegany, Anne Arundel, Baltimore, Calvert, Caroline, Carroll, Cecil, Charles, Dorchester, Frederick, Garrett, Harford, Howard, Kent, Montgomery, Prince Georg’'s, Queen Ann’'s, Saint Mar’'s, Somerset, Talbot |
| North Carolina | Carteret, Chowan, Currituck, Dare, Gates, Hertford, Hyde, Pamlico, Pasquotank, Perquimans, Tyrrell, Washington |
| New Jersey | Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Hunterdon, Mercer, Middlesex, Monmouth, Ocean, Salem |
| Pennsylvania | Adams, Berks, Bucks, Chester, Delaware, Luzerne, Montgomery, Philadelphia, York |
| Virginia | Accomack, Albemarle , Arlington , Augusta , Caroline , Charles City, Chesapeake City, Chesterfield , Clarke, Culpeper, Dinwiddie, Essex, Fairfax, Fauquier, Fluvanna, Frederick, Gloucester, Goochland, Greene, Hanover, Henrico, Isle of Wight, James City, King and Queen, King George, King William, Lancaster, Loudoun, Louisa, Madison, Mathews, Middlesex, New Kent, Northampton, Northumberland, Orange, Page, Powhatan, Prince George, Prince William, Rappahannock, Richmond, Rockingham, Shenandoah, Southampton, Spotsylvania, Stafford, Suffolk City, Surry, Sussex, Virginia Beach City, Warren, Westmoreland, York |
| West Virginia | Berkeley, Grant, Hampshire, Harding, Jefferson, Mineral, Morgan, Pendleton |

**Land Ownership:**

ADD IN RECORDS FROM FEDERAL LANDS?

**Biological information:**

**Species Description:**

Most of the basic natural history research on the NRBC has been conducted on the Northern population found in eastern Massachusetts (Swarth 2003). The NRBC is a medium to large sized semi-aquatic basking turtle with mature female and male carapace sizes ranging from 250–350 mm and 180–300 mm, respectfully (Graham 1991, Conant and Collins 1991, Swarth 2003). Northern red-bellied cooters generally have a reddish cast over their bodies and plastron, with a diagnostic “arrowhead” marking on the top of their head. Their jaws have serrated edges with a notch on the upper jaw adjacent to cusps on both sides. Generally, females mature at age 15-20 years, whereas males are thought to mature at younger ages. Both sexes can live up to 50 years of age.

Female NRBCs lay 10–30 eggs in the ground near water in early summer, may maintain fidelity to previously-used nesting sites, and have been observed to nest multiple times during a season. Eggs may hatch in the fall of the laying year, or overwinter and hatch the following spring (Swarth 2003).

Much about the NRBC, particularly about those in its southern range, remains unknown. Lovich and Ennen (2013) ranked the prevalence of NRBC research found in peer-reviewed publications (up to 2006) as the 40th of 58 North American turtle species. While existing information on this species can be found in field guide texts, much of the available information comes from research conducted on the Northern population in Massachusetts.

**Taxonomy:**

|  |
| --- |
| Scientific Classification |
| Kingdom | Animalia |
| Subkingdom | Bilateria |
| Infrakingdom | Deuterostomia |
| Phylum | Chordata |
| Subphylum | Vertebrata |
| Infraphylum | Gnathostomata |
| Superclass | Tetrapoda |
| Class | Reptilia (Laurenti, 1768) |
| Order | Testudines (Batsch, 1788) |
| Suborder | Cryptodira (Cope, 1868) |
| Superfamily | Testudinoidea (Fitzinger, 1826) |
| Family | Emydidae (Rafinesque, 1815) |
| Subfamily | Deirochelyinae (Agassiz, 1857) |
| Genus | Pseudemys (Gray, 1856) |
| Species | *Pseudemys rubriventris* (Le Conte, 1830) |
| Common Names | Northern red-bellied turtle, Plymouth red belly turtle, eastern red belly turtle, red-bellied turtle, and American red-bellied turtle |

**Habitat / Life History:**

In its southern range (i.e., Southern population), the NRBC has been reported to utilize deep, slow-moving freshwater rivers and lake habitats with aquatic vegetation (Swarth 2003, Conant and Collins 1991, USFWS 2006). In contrast, NRBC from the Northern population are typically found in small coastal ponds (USFWS 2006). In Maryland, NRBC were not documented using small ponds adjacent to larger tidal areas. Basking was limited to areas where deeper water was immediately accessible either by proximity to the main channel or through tidal inundation (Swarth 2003). Northern red-bellied cooter may occasionally be found in the brackish regions of estuaries (Arndt 1975). NRBC’s have also been documented using commercial cranberry farms in the northern portion of the range (USFWS 2006), as these operations have the pond and cleared nesting cover preferred by the species.

Northern red-bellied cooters are omnivorous but predominantly feed on aquatic plants, particularly as adults. Milfoil (*Myriophyllum* spp.) is a favored forage (MA DNR 2016). They will also feed on a variety of animals including fish, worms, and crustaceans, particularly when juveniles.

**Historical Range / Distribution:**

In *North American Herpetology* volume 1 (1842) Holbrook states that NRBCs “[…] geographical range is very limited; as yet it has not been found north of the Delaware River, nor to the south of Chesapeake Bay. It is common in the Susquehanna and its tributaries, but is much more abundant in the Delaware [sic], especially in the neighborhood of Trenton.”

Babcock (1916) describes NRBC occurring in the Plymouth County region of Massachusetts, including references to earlier observations in this region. This species presumably occupied a continuous pre-colonial range from North Carolina to at least Massachusetts based on archeological evidence (Parris 1987, Waters 1962).

**Current Range Distribution:**

The current range for NRBC is divided, with the larger southern portion extending from central New Jersey south to northern North Carolina along the Atlantic Coastal Plain (Ernst and Lovich 2009, Browne et al. 1996). The northern range is located in eastern Massachusetts in the counties of Plymouth and Bristol. The NRBC also occurs in the Ridge-and Valley Region of the Potomac River basin, extending into West Virginia where the species is considered rare (Fisher 2007, Green and Pauley 1987).



Figure 1. Range of the northern red-bellied cooter (USGS National Gap Analysis Program).

**Population Estimates / Status:**

*Status:*

The Northern population of NRBC is presently listed as Endangered at the Federal level based on the designation of *P. rubriventris bangsi* as a distinct population segment. The International Union also lists this species as “Near Threatened” for the Conservation of Nature (IUCN; vanDijk 2011).

The Southern population is apparently more secure; however, the NRBC is listed as state threatened in Pennsylvania. It has been identified as a species of greatest conservation (SGCN) need in state wildlife action plans of Delaware, Pennsylvania, West Virginia, and the District of Columbia.

*Listing Status by state:*

|  |  |  |
| --- | --- | --- |
| **State** | **State Legal Classification** | **SGCN (2015)** |
| District of Columbia | NA | Yes |
| Delaware | None | Yes |
| Massachusetts | Endangered | Yes |
| New York | Exotic | No |
| Pennsylvania | Threatened  | Yes |
| New Jersey | None | No |
| Maryland | None | No |
| West Virginia  | None | Yes |
| Virginia | None | No |

**Distinct Population Segment (DPS):**

The USFWS determined that the northern segment of the population (designated as the *P. ruriventris bangsi*, or the Plymouth red belly turtle) met the both criteria one and two as a distinct population segment in the last 5-year review (USFWS 2007). This was based on the documented geographic separation between the northern and southern populations that prevents any exchange of genetic material (Haskell 1993 in USFWS 2007, and Bartron and Julian 2007).

Recent genetic studies of *Pseudemys* suggest that further categorization to subspecies is not warranted. Spinks et al. (2013) found little evidence supporting the current division of *Pseudemys* into recognized species/subspecies. Earlier research provided similar conclusions along both genetic (Browne et al. 1996) and morphometric (Iverson and Graham 1990) lines of inquiry.

In addition, hybridization between NRBC and other members of the *Pseudemys* genus is likely. Dillard (2017) found field specimens with morphometric characteristics of both NRBC and eastern river cooters (*Pseudemys concinna*) in three Virginia river systems.

**threats**

**A. The present or threatened destruction, modification, or curtailment of its habitat range:**

*Habitat Loss and Degradation-*

Habitat degradation for this species likely occurs at multiple spatial scales. Climate change and the resulting impacts from sea level rise are of major concern (Osland et al. 2015), in addition to other present issues. The riverine and coastal wetland habitats that NRBC occupies are threatened by development, changes in hydrology, invasive species, and pollution. These threats, acting individually or compounding through interaction, continue to affect aquatic species throughout the Northeast, including NRBC.

Local scale habitat loss has been addressed, largely from work completed on the Northern population. The quality of nesting habitat around ponds in the northern portion of its range have likely declined over the past several decades due to a combination of development, invasive species, and lack of fire (MA DNR 2016, USFWS 2006). Encroaching vegetation makes travel to and from nesting areas difficult and lack of regular fire may contribute to this stressor (MADNR 2016).

Basking habitat may also be limiting in some areas. Swarth (2003) noted that NRBC would use a variety of objects for basking and that availability and quality of these objects frequently changed due to flooding events. This would presumably be less of an issue for NRBC confined to pond environments in the Northern population than for the Southern population using coastal river systems.

Water quality is also an issue of concern as herbicides used in pond vegetation management and pesticides infiltration from adjacent land uses may be negatively affecting NRBC food sources and increasing chemical exposure (MA DNR 2016, USFWS 2006).

**B. Overutilization for commercial, recreational, scientific, or educational purposes:**

The NRBC was used a food resource by pre-colonial Americans as evidenced by archaeological discoveries from middens (Rhodin 1992). This species was further utilized by colonists and was commonly found in the markets of major metropolitan areas into the late 19th and early 20th century (Criswell 2012, Swartz 1961, Babcock 1916, Holbrook 1842). There is no evidence for a contemporary demand on NRBC as a food item specifically, but there is an increasing concern that the foreign demand for North American turtles could negatively affect some species if regulations are not enacted or enforced (Mali et al. 2014).

While the pet trade has been cited as a potential threat to rare turtle populations however, this issue was not specifically mentioned as a threat to the NRBC (Mitchell et al. 1999). The potential for illegal collections could certainly pose a threat to local populations particularly in the Northern portions of the range.

**C. Disease or Predation:**

Disease has not been mentioned in the literature as a major concern for NRBC. Shell rot (Ernst et al. 1999 as referenced in Swarth 2003) was noted as a problem for NRBC in the Rappahannock River, Virginia but this issue has not been suggested as a problem elsewhere.

For the Northern population, nest predation is high, mostly from mammalian predation on both eggs and hatchlings (MA DNR 2016). Predation of hatchlings by water snakes, bullfrogs, wading birds, and predatory fish (e.g., pickerel [*Esox spp.*] or largemouth bass [*Micropterus salmoides*]) is likely high (MD DNR 2016, USFWS 2006). The threat of high predation rates are magnified by the relatively long time for females to mature (USFWS 2006), and low recruitment rates (USFWS 2006). Nest predation is likely an issue for the NRBC throughout its range, as the most common predators (skunks, raccoons) are common are found throughout this region.

**D. The inadequacy of existing regulatory mechanisms:**

*State Statutes and Regulations-*

In addition to protections afforded by the Endangered Species Act, the NRBC is protected by state endangered species regulations in both Massachusetts and Pennsylvania. The *P. rubriventris bangsi* subspecies is listed as endangered in Massachusetts, and threatened in Pennsylvania.

*Other Regulations:*

Wetland protection regulations, at both the state and federal legislative levels, provide some protection for NRBC primary habitat. Section 404 of the Clean Water Act (1972) provides various protections against adverse impacts to wetlands including dredging, filling, altering hydrology, or other activities resulting in the loss of wetland function.

State-level wetland protections generally mirror the protections provided by federal authority. Actions that negatively affect wetland function are prohibited without review and permitting. This protection provides some control over NRBC habitat loss or degradation where applicable.

|  |  |
| --- | --- |
| **State** | **Protections and Regulations** |
| Massachusetts | Wetlands Protection Act (310 CMR 10.00) |
| New Jersey | Freshwater Wetlands Protection Act (N.J.A.C. 7:7A), Wetlands Act of 1970 N.J.S.A.13:9A-1et seq |
| Delaware | Wetlands Act of 1973 (7 Del. Code Chapter 66. Sec. 6601-6620), |
| Pennsylvania | Dam Safety and Encroachments Act and Dam Safety andWaterway Management Rules and Regulations (Title 25, Pennsylvania Code, Chapter 105) |
| Maryland | Tidal Wetlands Act. Environment Article, Ann. Code of Maryland, sec. 16-101-16-503; Non-tidal Wetlands Act. Environment Article Ann. Code of Maryland, sec. 5-901-5—911 |
| Virginia | Virginia Water Protection (VWP) Permit Program Regulation (9 VAC 25-210); Virginia Tidal Wetlands Act (Title 28.2, Chapter 13 of the Code of Virginia) |
| West Virginia | No specific legislation |

*Public Lands Protection -*

Although public lands can provide a high level of security for wildlife because of statutory provisions for long-term management, funding, and for guiding habitat management on those lands, the majority of NRBCs are presumed to inhabit waters adjacent to, or encompassed by, private lands. It is unlikely that there is much active management on these lands to promote NRBC habitat or population health.

**E. Other natural or manmade factors affecting its continued existence:**

*Human-related Factors*-

Damage (presumed) from boat propellers were noted on 11 of 78 turtles captured in New Jersey; however, all were thought to be from old injuries (Swarth 2003).

Mowing of fields in the fall and spring may coincide with hatching (Swarth 2003).

Road mortality during seasonal migrations may contribute to specific population declines (Criswell 2012), particularly for breeding females seeking suitable nesting areas.

*Genetic Diversity-*

Genetic diversity is a concern for the Northern population (Browne et al. 1996). In a 10-year mark-recapture study, no evidence of tutle emigration from capture locations was noted (Haskell et al. 1996, Graham unpublished data ref. in Browne et al. 1996).

*Competition from Invasive Species –*

Populations of NRBC confined to small wetland complexes may be subject to increased competition from exotic red-eared sliders (*Trachemys scripta elegans*). Pearson et al. (2013) found significant dietary overlap between these conspecifics in small wetlands where vegetation species richness was low, resulting in potential competition for food resources. Greater resource partitioning was observed between red-eared sliders and NRBC in larger more diverse wetland complexes.

**Summary of Threats:**

Of the five factors listed above, three pose significant threats to the NRBC, particularly for the Northern population. These are loss and degradation of habitat, competition from invasive species, and loss of genetic diversity.

Loss and degradation of habitat is a threat applicable to all populations of this species throughout its range. Changes in hydrology, shoreline development, and declining water quality likely negatively affect the quality and quantity of nesting and foraging habitat. These threats are not unique to the NRBC.

Competition from invasive species, both animal and plant, pose an acute threat to NRBC; particularly those occupying small ponds or wetland complexes. Direct competition from red-eared sliders for food and space can provide added stress to small populations. Degradation of specific habitat elements, such as nesting or feeding, from invasive plants are also a concern.

The third major threat of concern to NRBC is loss of genetic diversity. Small populations, such as the Northern population of NRBC, are susceptible to low heterogeneity without regular genetic exchange with other populations. This characteristic is already emerging at some ponds in the Northern population where no emigration or immigration has been documented between ponds and no genetic exchange with the Southern population is possible without intervention. Further, it is clear that this species is prone to hybridization with other species in the *Pseudemys* genus where their ranges overlap, or accidental introduction is possible.

**Conservation Measures Planned or Implemented:**

Most of the ongoing conservation effort centers on the Northern population. The state of Massachusetts continues to implement the head-starting program along with reintroductions of hatchlings to bolster genetic diversity (M. Jones, MA DNR, personal communication).

**Recommended Conservation Measures:**

*Habitat Conservation & Management*

Improvement of nesting and basking areas may be achieved by clearing encroaching vegetation surrounding ponds (MA DNR 2016). The Massachusetts Division of Fish and Wildlife provides an “Advisory Guidelines for Creating Turtle Nesting Habitat” in draft format (2009) with information for land managers on creating and improving nesting habitat for various turtle species with specific reference to NRBC but the degree to which guidance like this is adopted and practiced on the landscape is unknown.

Maintaining or restoring large, diverse wetland complexes may result in reduced competition between NRBC and the invasive red-eared slider (Pearson et al. 2013). Further, in situations where populations are limited to small ponds, the introduction of invasive species like the red-eared slider may outcompete NRBC juveniles placing additional stressors to these populations (Person et al. 2015). Introduction of these species should be prevented, or eradication measures taken, to prevent this competitive threat.

Threats and Actions

Loss of Nesting Habitat to Development

* **Action 1**: Consult with developers to protect nesting habitat and related travel routes through planning and proactive land protection.

Improve and Enhance Existing Habitat

* **Action 2**: Manage nest sites
* **Action 3**: Provide and maintain basking structures.
* **Action 4**: Install and maintain travel corridors to facilitate movement between populations or mitigate road crossings

Reduce Competition from Invasive Species

* **Action 5**: Remove invasive red-eared sliders where present, or take action to prevent introduction
* **Action 6**: Monitor and manage invasive plants that degrade nesting areas

*Population Management-*

Head-starting juveniles appears to have improved recruitment in the Northern range (MA DNR 2016). This process involves gathering eggs from the field and hatching them in a controlled laboratory setting. Hatchlings are reared in captivity for the first year, then are released at various sites throughout the range (Haskell et al. 1996). The head-starting effort in the Northern population has resulted in improved survival of nestlings and may, through time, lead to increased populations of breeding-aged adults. While available information suggests this practice is successful in increasing juvenile survival, there is not much information on if or when this will result in more breeding and nesting.

Threats and Actions

Low survival of nestlings

* **Action 7**: Continue head starting programs in Northern population

Low success rate for nests

* **Action 8**: Information useful for improving nesting success including habitat characteristics, predators, and location-specific data on emergence, incubation, overwintering, and hatchling success

*Monitoring & Research*

Little information is available on NRBC population status, age class distribution, density, reproductive success, and survival outside of the Northern population. Estimates for the Southern population are limited to specific locations and may not be representative of the overall range.

Further, much of what is known comes from NRBC’s from the Northern population and the ponds they inhabit. The Southern population is found in large riverine systems and far less research and monitoring has been completed in these environments.

Lack of information on Southern population

* **Action 9**: Collect baseline information on age class distribution, density, reproductive success, and survival of NRBC that supports long-term monitoring efforts
* **Action 10**: Critical habitat use and movement of NRBC in riverine systems including nesting, basking, hibernating, and foraging habitat utilization

**Recommended Conservation Measures:**

*Population Management-*

*Monitoring & Research-*

*Incentives & Influencing**-*

*Education & Outreach*

*Coordination with Other Entities**-*

*Rule and Permitting Intent-*

**For species that are being removed from candidate status:**

\_\_\_\_ Is the removal based in whole or in part on one or more individual conservation efforts that you

determined met the standards in the [Policy for Evaluation of Conservation Efforts When Making Listing Decisions](http://www.gpo.gov/fdsys/granule/FR-2003-03-28/03-7364/content-detail.html) (PECE)?

**Description of Monitoring:**

*PENNSYLVANIA*

The Pennsylvania Fish and Boat Commission monitors NRBC use of basking structures placed in lakes and other aquatic habitats. Distribution of NRBC is monitored, in part, through the Pennsylvania Amphibian and Reptile Survey (PARS; <https://paherpsurvey.org/>); a state-sponsored atlas survey of status and distribution of reptiles and amphibians throughout the state.

**Species Assessment/Listing Priority Assignment Form – Development:**

**Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:**

**Indicate which State(s) did not provide any information or comment:**

**State Coordination:**

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*Following Section for U.S. Fish and Wildlife Service Use Only*

**Priority Table**

|  |  |  |  |
| --- | --- | --- | --- |
| Magnitude | Immediacy | Taxonomy | Priority |
| High | Imminent | Monotypic genus | 1 |
| Species | 2 |
| Subspecies/Population | 3 |
| Non-Imminent | Monotypic genus | 4 |
| Species | 5 |
| Subspecies/Population | 6 |
| Moderate to Low | Imminent | Monotypic genus | 7 |
| Species | 8 |
| Subspecies/Population | 9 |
| Non-Imminent | Monotypic genus | 10 |
| Species | 11 |
| Subspecies/Population | 12 |

**Rationale for Change in Listing Priority Number:**

**Magnitude:**

**Imminence:**

\_\_\_\_ Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

**Emergency Listing Review**

\_\_\_\_ Is Emergency Listing Warranted?

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**Literature Cited:**

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