

**Copperbelly Water Snake
Northern Population Segment**

(Nerodia erythrogaster neglecta)

**5-Year Review:
Summary and Evaluation**



**U.S. Fish and Wildlife Service
East Lansing Field Office
East Lansing, Michigan**

5-YEAR REVIEW

Species Reviewed: Copperbelly Water Snake (*Nerodia erythrogaster neglecta*)

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Cover photo courtesy of Omar Attum.

5-YEAR REVIEW
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Nerodia erythrogaster neglecta

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office: Region 3 (Midwest), Carlita Payne, 612-713-5339

Lead Field Office: East Lansing Field Office, Barbara Hosler, 517-351-6326

Cooperating Field Office(s):

Ohio Field Office, Angela Boyer, 614-416-8993

Bloomington Field Office, Scott Pruitt, 812-334-4261

1.2 Methodology used to complete the review

The U.S. Fish and Wildlife Service (Service) conducts status reviews of species on the List of Endangered and Threatened Wildlife and Plants (50 CFR 17.11 and 17.12) as required by section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*). The Service provided notice of this status review via the *Federal Register* (71 FR 32124) and requested new scientific or commercial data and information that may have a bearing on the classification of the copperbelly water snake (*Nerodia erythrogaster neglecta*) as a threatened species.

Biologists at the Service's East Lansing Field Office, in coordination with the cooperating field offices and the Midwest Regional Office, conducted this review. We reviewed past and recent literature, public comments, the final listing rule (62 FR 4183), and the recently issued Northern Population Segment of the Copperbelly Water Snake (*Nerodia erythrogaster neglecta*) Recovery Plan (USFWS 2008) upon which we relied heavily to prepare this 5-year review.

According to the requirements described in the Service's 2006 Interim 5-Year Review Guidance, peer review of a 5-year review is not necessary if the 5-year review results in a recommendation to change the status of the species because peer review will be conducted when the proposed rule to change the species status is issued. Due to the recommendation to change the copperbelly's status contained herein, we have not conducted a peer review at this time.

1.3 Background

1.3.1 FR Notice citation announcing initiation of this review:

71 FR 32124 (June 2, 2006)

1.3.2 Listing history:

Original Listing

FR notice: 62 FR 4183

Date listed: January 29, 1997

Entity listed: *Nerodia erythrogaster neglecta*, Michigan, Ohio, and Indiana north of 40° N. latitude (see Figure 1)

Classification: Threatened

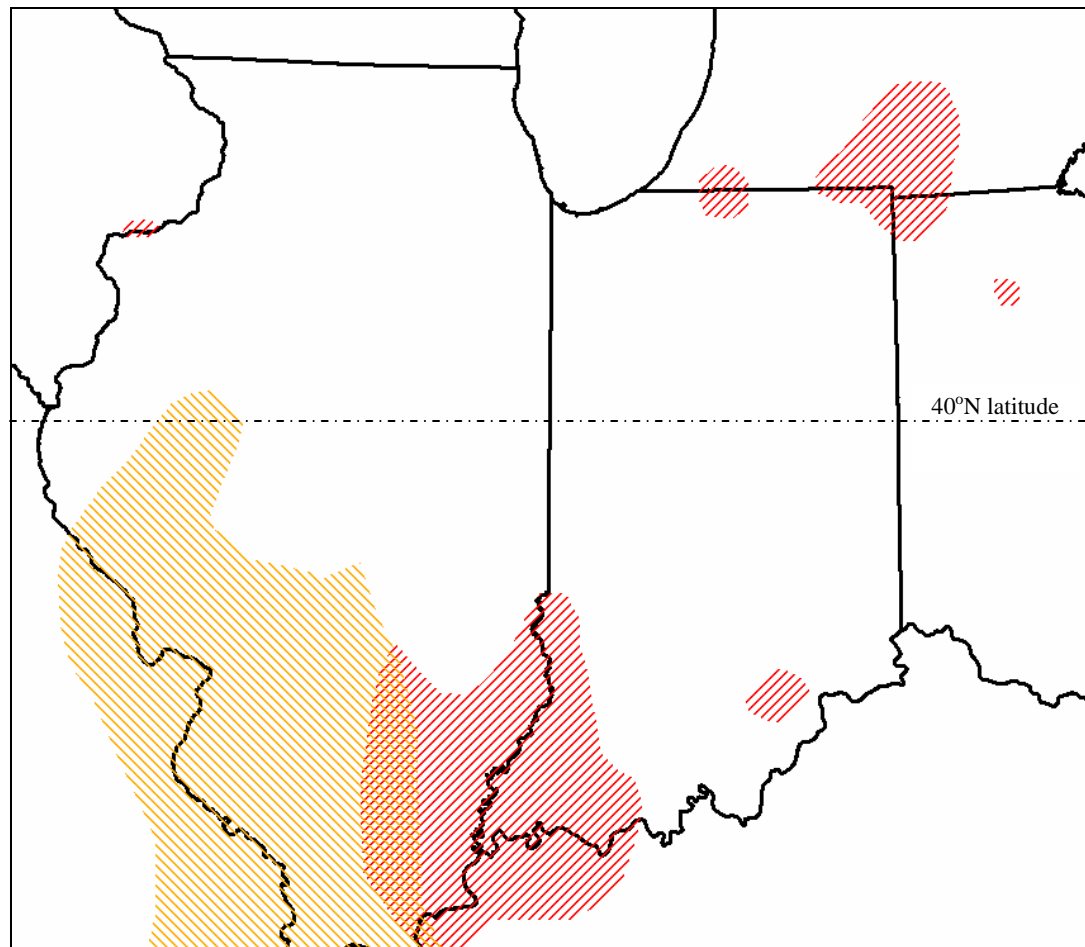


Figure 1. Historic distribution of the copperbelly water snake in the Midwest (six polygons with red hatching). To the northeast, north of the 40th North Parallel, are the isolated remaining copperbelly populations of the listed DPS. All known remaining populations of the DPS are within 15 miles of the intersection of Indiana, Michigan, and Ohio. Neither the southern populations nor the southeastern disjunct population near Seymour, Indiana, are federally listed, nor is the northwestern population along the Mississippi River in northwestern Illinois and eastern Iowa. Also shown (yellow hatching) is the Midwestern extension of the distribution of the yellowbelly water snake, the closest relative of the copperbelly, whose distribution continues south, and for which there is no Federal protection.

1.3.3 Associated rulemakings: none

1.3.4 Review History:

December 23, 2008: Northern Population Segment of the Copperbelly Water Snake (*Nerodia erythrogaster neglecta*) Recovery Plan

The notice of availability (73 FR 78822) summarized the species' status, distribution, threats, recovery objectives, and reclassification criteria.

1.3.5 Species' Recovery Priority Number at start of 5-year review: 3C, indicating that it is: (1) taxonomically, a subspecies; (2) facing a high degree of threat; (3) rated high in terms of recovery potential; and (4) in conflict with construction or other development project(s) or other forms of economic activity.

1.3.6 Recovery Plan

Name of plan: Northern Population Segment of the Copperbelly Water Snake (*Nerodia erythrogaster neglecta*) Recovery Plan

Date issued: December 23, 2008

Dates of previous revisions, if applicable: none

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate? Yes

2.1.2 Is the species under review listed as a DPS? Yes

2.1.3 Was the DPS listed prior to 1996? No

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy? No

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria? Yes

2.2.2 Adequacy of recovery criteria

2.2.2.1 Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat? Yes

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)? Yes

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

The copperbelly water snake will be considered for delisting when the following criteria are met:

Criterion 1. Multiple population viability is assured:

- a) Five geographically distinct populations have population sizes of more than 500 adults, with at least one population exceeding 1000 adults; or three populations must have a total population size of 3000 adults, with none less than 500, and
- b) These populations must persist at these levels for at least ten years.

Discussion

During extensive survey work in the 1980s, Sellers (1987a, 1987b, 1991) reported copperbellies from 16 sites within the range of what is now the northern population segment. Surveys during the ten years prior to listing in 1997 indicated eight local populations in this range, but at the time of listing, copperbelly water snakes were found in only five local populations: two populations within the area of the West Branch of St. Joseph River in Ohio and Michigan, a population in the area of the Clear Fork of the East Branch of St. Joseph River in Michigan, and two populations within the Fish Creek watershed of Indiana and Ohio (USFWS 1997). Despite repeated efforts to locate copperbellies at historic or new sites (Kingsbury et al. 2003, Lee et al. 2002, Lee et al. 2005, Lee et al. 2007), only four of these populations have been confirmed since the copperbelly's listing.

The largest remaining population occurs within the West Branch watershed on state-owned land in Ohio and on a privately-owned parcel that straddles the Ohio/Michigan state line (Kingsbury et al. 2003, Lee et al. 2007). Lee et al. (2007) documented the persistence of the two other copperbelly water snake occurrences in Michigan in the West Branch and Clear Fork watersheds. Of the two populations in the Fish Creek watershed, only a single copperbelly was observed at a site in northeastern Indiana bordering Ohio (Kingsbury et al. 2003).

Mark-recapture studies of copperbellies in selected northern Ohio areas resulted in an estimated population size of 101 snakes for northern Ohio (Kingsbury et al. 2003). Lee et al. (2007) conducted the most recent surveys (2005-2006) of

copperbelly water snakes at the Michigan/Ohio site and the two Michigan sites. From their survey data, Lee et al. (2007) used distance sampling to estimate the population size and density. This work produced a population estimate of 113 ± 27 individuals for these three populations.

For Factor E (Other Natural or Manmade Factors Affecting its Continued Existence), the final listing rule (62 FR 4183) identified small, isolated populations of copperbelly water snakes as vulnerable to stochastic events, such as weather extremes or fluctuations, and Criterion 1 addresses this factor. As noted, population levels have likely been in the hundreds for the last 10-15 years, well below the recovery goal of 3,000 adults. In addition, none of the extant populations meet the minimum population criterion of 500 adults. Criterion 1 has not been met.

Criterion 2. Sufficient habitat is conserved and managed:

- a) Wetland/upland habitat complexes sufficient to support the populations described in Criterion 1 are permanently conserved.
 - 1) A population of 1,000 adults will require at least five square miles of landscape matrix with a high density and diversity of shallow wetlands embedded in largely forested uplands.
 - 2) A population of 500 adults will require at least three square miles of the same type of habitat.
- b) Multiple (two or more) hibernacula for each population are permanently conserved. A minimum of two hibernacula will be available within one kilometer of all suitable summer habitat included above.

Discussion

The largest copperbelly population occurs on two properties on the Ohio/Michigan border, encompassing approximately 3,500 acres or 5.5 square miles (Camp Frontier 2010a; ODNR 2010a). One of these properties is a Wildlife Area owned by the state of Ohio; the other is privately-owned but is not permanently conserved. Although these two properties theoretically represent enough acreage to support 1,000 snakes, not all of this area is suitable for copperbellies. Portions of these sites include developed areas, roads and unsuitable habitat, and some parcels of the Wildlife Area are disconnected from the larger whole (Camp Frontier 2010b; ODNR 2010b). On-going efforts to restore and enhance wetlands and uplands at these sites have improved conditions for copperbellies, but more work is necessary for this area to support a population of 1,000 adults.

In 2008, the Michigan Department of Natural Resources received a Recovery Land Acquisition grant to obtain permanent conservation easements on 442 acres along the West Fork of the West Branch of St. Joseph River within the known copperbelly site (Stephen Beyer, Michigan Department of Natural Resources and Environment, pers. comm. 2010). Working in cooperation with The Nature Conservancy, securing these easements is in progress; however, this area represents less than one square mile.

Under a Preventing Extinction grant in 2006, ten restoration and enhancement projects in three states were completed by the Service's Partners for Fish and Wildlife (PFW) program (Jim Hudgins, U.S. Fish and Wildlife Service, pers. comm. 2008). These projects covered 19 wetland basins and restored 93 acres of wetlands, constituting a combination of forested, emergent, and scrub-shrub wetland types. In addition, six plantings of a mixture of hardwood trees were accomplished on 82.5 acres. Additional restoration of wetlands and establishment of surrounding upland forest are on-going. Under the PFW program, agreements with landowners for restorations are for 10 years and do not permanently conserve the property.

The loss of hibernation sites further contributes to the copperbelly's population decline. Telemetry work in 2001-2002 identified sixteen hibernacula that copperbellies use (John Roe, Indiana-Purdue University Fort Wayne, pers. comm. 2010). These hibernacula occur on state-owned land in Ohio and private land in Ohio and Michigan. The minimum number of hibernacula required under Criterion 2 appears to be met for the Ohio-Michigan population; however, use of these hibernacula by copperbellies has not been confirmed since 2002. Hibernacula for the other populations are not known.

Criterion 2 addresses Factor A (Present or threatened destruction, modification or curtailment of its habitat or range). Despite recent efforts and strides in restoring and permanently conserving habitat for the copperbelly water snake, not enough habitat exists or is permanently conserved to support the populations described in Criterion 1. The listing rule also indicated that legal provisions for protection and management of copperbelly water snake habitat at the state level were non-existent (Factor D – Inadequacy of Existing Regulatory Mechanisms). By requiring the permanent conservation of these habitat complexes, Criterion 2 also addresses Factor D. Criterion 2b has been partially met, but hibernacula for each population are not known or permanently protected. Criterion 2 has not been met.

Criterion 3. Significant threats due to lack of suitable management, adverse land features and uses, collection, and persecution have been reduced or eliminated:

- a) Habitat management and protection guidelines have been developed, distributed, and maintained.

- b) Adverse land features and uses, such as row crops, roads and accompanying traffic have been removed, minimized or managed within occupied Criterion 1 landscape complexes to the extent possible.
- c) A comprehensive education and outreach program, including persecution and collection deterrence, has been developed and implemented.

Discussion

Habitat management guidelines for private landowners are currently being developed. Completion and distribution is expected within the next year. An education and outreach program has not been developed.

As previously indicated, significant efforts have been made over the last several years to restore or enhance wetlands and forests within the range of the northern DPS of the copperbelly. Successful recovery, however, will rely not only on creating suitable wetland/forest complexes, but also linking those complexes to provide for metapopulation structure. The presence of barriers, such as row crops and roads, hinders these efforts. These threats have not been removed. Research to investigate the impact of barriers and mitigation measures is needed.

The final listing rule states the copperbelly is believed to be collected by amateur collectors and commercial dealers (Factor B – Overutilization for Commercial, Recreational, Scientific, or Educational Purposes). Criterion 3 addresses this factor and Factor E (Other Natural or Manmade Factors Affecting its Continued Existence). The listing rule states that copperbellies are vulnerable to predation during migration, especially when their migration routes are interrupted by roads, mowed areas, and farmland. By considering adverse land features that fragment habitat, disrupt copperbelly movements and migration, and increase their vulnerability to predation, Criterion 3b also addresses Factor A (Present or threatened destruction, modification or curtailment of its habitat or range) and Factor C (Disease or Predation). Criterion 3 has not been met.

The copperbelly water snake will be considered for reclassification from threatened to endangered status when either of the following criteria is met:

Criterion 1. There are no known populations of more than 500 adults.

Criterion 2. The cumulative population size is estimated at less than 1000 adults.

As previously noted, the most recent surveys (2005-2006) of copperbelly water snakes produced an estimate for the northern DPS of 113 ± 27 individuals (Lee et al. 2007). Lee et al. (2007) compared their results with data from past surveys and reported that fewer copperbelly water snakes were observed at several wetlands during 2005-2006 than had been found during previous surveys from

2001-2003. Based upon the best available information from the most recent surveys and population estimates, both Criteria 1 and 2 have been met.

2.3 Updated Information and Current Species Status

No new information is available. Refer to Section 2.2.3 for the current status of the copperbelly water snake.

2.4 Synthesis

Surveys during the ten years prior to listing in 1997 indicated eight local populations in the range of what is now the northern population segment; but by the time of listing, only five local populations persisted: two populations within the area of the West Branch of St. Joseph River in Ohio and Michigan, a population in the area of the Clear Fork of the East Branch of St. Joseph River in Michigan, and two populations within the Fish Creek watershed of Indiana and Ohio (USFWS 1997). The final listing rule identified habitat loss and fragmentation as the primary causes of the decline of the copperbelly water snake. The final listing rule also indicated small, isolated populations of copperbelly water snakes as vulnerable to stochastic events, such as weather extremes or fluctuations. Other threats addressed in the final listing rule include collection by amateur collectors and commercial dealers and a general dislike for snakes by humans (62 FR 4183).

Since listing the copperbelly water snake in 1997, we have achieved a better understanding of its habitat requirements and foraging movements. This improved knowledge, however, highlights the negative effects of habitat loss and fragmentation on the copperbelly. While many efforts to restore habitat for the copperbelly have been accomplished and continue to be pursued, landscape-level wetland and upland restoration to improve overall copperbelly populations has not been achieved. Furthermore, habitat connectivity to link small, isolated populations to reduce the threat of stochastic events has not been accomplished.

Although habitat loss and fragmentation remain the primary threat, climate change may constitute a significant new threat for the copperbelly water snake. According to the Intergovernmental Panel on Climate Change (IPCC) (2007), “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.” In the Great Lakes region, the climate will likely grow warmer and probably drier overall during the 21st century (Kling et al. 2003). Although average annual precipitation may increase slightly by the end of the century, seasonal precipitation cycles are predicted to become more extreme, with winter and spring rains increasing and summer rain decreasing by up to 50 percent. These projected declines in summer rainfall will cause drying of ephemeral wetlands, threatening the reproductive success of amphibians, such as wood frogs and salamanders

(Kling et al. 2003).

Copperbelly water snakes feed primarily on amphibians and are adapted to foraging in ephemeral wetlands that dry out in the summer months when copperbellies then shift to uplands (Kingsbury et al. 2003). The potential changes to ephemeral wetlands and amphibian populations, as discussed in Kling et al. (2003), may have consequences for the copperbelly, which relies on foraging for amphibians in ephemeral wetlands. We lack sufficient certainty to know specifically how climate change will affect this species.

The best available information indicates that the copperbelly water snake northern DPS population is in the low hundreds. In the most recent surveys (2005-2006), fewer copperbelly water snakes were observed at several wetlands than had been found during previous surveys in the 1980s and 1990s and by MNFI from 2001-2003. At its current level, the copperbelly water snake population meets both criteria set forth in the recovery plan for reclassification from threatened to endangered status.

As the recovery criteria have not been met, the known threats have not significantly diminished, climate change represents a new, uncertain threat, and the copperbelly population has declined since listing to its current level, which meets the criteria for reclassification, we recommend reclassifying the copperbelly water snake northern population segment from threatened to endangered. The copperbelly water snake northern population segment is in danger of extinction throughout all or a significant portion of its range.

3.0 RESULTS

3.1 Recommended Classification

Downlist to Threatened

Uplist to Endangered

Delist (*Indicate reasons for delisting per 50 CFR 424.11*):

Extinction

Recovery

Original data for classification in error

No change is needed

3.2 New Recovery Priority Number

No change is needed.

Brief Rationale: The recovery priority number for the copperbelly water snake is 3c, indicating that it is: (1) taxonomically, a subspecies; (2) facing a high degree

of threat; (3) rated high in terms of recovery potential; and (4) in conflict with construction or other development project(s) or other forms of economic activity.

Most of the land in the range of the northern DPS is privately owned. The primary form of economic activity in conflict with the copperbelly is agriculture. Row crops in particular do not provide suitable habitat and fragment remaining habitat. Residential development also removes and fragments habitat, but is not widespread in the copperbelly range. Although several projects (e.g., conservation easements, restoration grants) have resulted in either the protection or restoration of suitable habitat for the copperbelly water snake, the threat of habitat loss and fragmentation remains high. Many of these successful restoration and conservation projects are relatively recent (since 2006) events. Although it will require a substantial investment to work with private landowners to restore suitable habitat for the copperbelly, these efforts are ongoing and have been steadily increasing, creating a high potential for recovery.

3.3 Listing and Reclassification Priority Number

Reclassification (from Threatened to Endangered) Priority Number: 3

Brief Rationale: The reclassification priority number of 3 indicates: (1) the magnitude of threat is high; (2) the immediacy of threats is imminent; and (3) taxonomically, the copperbelly is a subspecies.

The reclassification priority number of 3 is justified because the copperbelly has already been identified as facing a high degree of threat (Criterion 1). The primary threat facing copperbellies, habitat loss and fragmentation, is an actual, known threat that has been well documented, most recently in the recovery plan (Criterion 2).

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Identify and conserve habitat complexes sufficient for recovery
 - Develop guidelines for habitat restoration and enhancement
 - Restore suitable wetlands and associated uplands for the copperbelly
 - Develop and implement habitat conservation programs (e.g., landowner contact, voluntary registration, and conservation agreements with landowners)
 - Prioritize properties for conservation easements and acquisition; purchase, protect, and/or manage these properties based on priority and availability
 - Develop landscape-level habitat characterization of copperbelly habitat

- Identify, assess, and reduce threats at known sites and focal management areas
 - Clarify the influence of roads on migration of individual snakes and the connectivity of subpopulations
 - Research and implement techniques to create road crossings for snakes to reduce road mortality and remove barriers to movement

- Improve baseline understanding of copperbelly water snake ecology
 - Clarify characteristics of high quality hibernacula
 - Clarify gestation site requirements

- Monitor known copperbelly water snake populations and their habitat
 - Develop standard techniques for estimating population size for copperbelly water snake populations
 - Monitor West Branch (OH, MI)
 - Monitor Clear Fork (MI)
 - Monitor Fish Creek (IN, OH)

- Develop and implement public education and outreach efforts
 - Develop and deliver educational presentations about the copperbelly water snake
 - Establish mechanisms for dissemination of information

5.0 REFERENCES

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5-YEAR REVIEW of *Nerodia erythrogaster neglecta*

Current Classification: Threatened

Recommendation resulting from the 5-Year Review

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change is needed


Appropriate Recovery Priority Number: 3c

Appropriate Listing/Reclassification Priority Number, if applicable: 3

Review Conducted by: Barbara Hosler

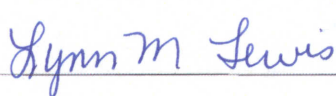
FIELD OFFICE APPROVAL:

Lead Acting Field Supervisor, Fish and Wildlife Service

Approve  Date 5/12/10
John V. Dingleidine

REGIONAL OFFICE APPROVAL:

Assistant Regional Director, Ecological Services, Fish and Wildlife Service, Midwest Region

Approve  Date 5/24/10