

Resurveying known historical localities and searching new sites for the copper-bellied water snake
(*Nerodia erythrogaster neglecta*) in southeastern Illinois

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Project description and objectives

For a number of years, the Copper-bellied water snake was listed and protected as though threatened in Illinois, by both the Illinois Department of Natural Resources and the U.S. Fish and Wildlife Service. Recently, the cooperative agreement between these two agencies expired, leaving the true status of this subspecies in Illinois somewhat uncertain. For this reason, I proposed a status survey of this water snake to the IDNR which was accepted. All necessary permits were applied for and issued for this study. State and federal land was used, as well as public roadways and occasional private lands for which permission was obtained. Railroad tracks bordering wetlands were also used if no warning signs were present.

The goal of this project was to assess the current abundance and status of the Copper-bellied water snake in southeastern Illinois, to help determine whether or not this snake should continue to be legally protected in the state. In order to accomplish this, the following objectives were focused on:

- A. Searching areas of suitable habitat for this species, first in areas of known historical occurrence, and secondly in areas that had no previous records of copper-bellies. Searches were made visually, with occasional turning of natural cover. Snakes were caught by hand.
- B. Recording the age class, dorsal/ventral colors, locality and GPS location coordinates from each snake that was examined. Notes on habitat were occasionally recorded too when needed. Snakes that were unable to be caught and examined (observations) were recorded as observed along with the appropriate GPS coordinates. Caught snakes were handled and photographed carefully for no more than 15 minutes and were then released.
- C. To photograph as many snakes as possible, in order to assess a good range of color pattern variations in order to obtain a better understanding of the distribution of this water snake in Illinois.

Time frame of report

The state portion of this cooperative project was signed in November 2010. Because of the normal fall/winter hibernation period, fieldwork did not begin until April 9th 2011 and terminated on September 30th following the final expenditure of the state grant of \$9980.14. This grant was based on a special project funded by the Illinois Wildlife Preservation Fund. I would like to take the opportunity to thank Scott Ballard my supervisor, and Lamma Parrack, grants administrator for all their help in implementing this project. I would also like to thank the Department of Natural Resources for making this funding available for the project. No particular materials were used for this project.

Summary of project accomplishments

Introduction

In order to assess the general abundance and status of this snake, fieldwork was carried out from April 9-September 30 2011.

Materials and methods

There were no materials used for this study that were purchased with state or federal funds. I used a GPS unit, orange tape, rubber boots, flashlight and my own vehicle. I already had everything I needed. Snakes were mostly located by walking along the edge of, or wading in shallow water wetlands. Occasional specimens were found under logs or old railroad ties-especially juvenile snakes. Snakes were also found crossing roads through wetlands on warm nights-especially after rains. A number were found dead on the road and most were salvaged for eventual preservation in the herpetology collection of Southern Illinois University at Carbondale. I attempted to catch all live snakes seen, but this was not always possible because copper-bellies are adept at moving swiftly, swimming and diving! Caught snakes were handled for no more than fifteen minutes, during which time they were photographed, field notes taken (on color, age class, habitat etc.) and the GPS location noted. The snake was then released. Some locations were marked with orange tape in order to help visualize locations where snakes were caught, to make searching more comprehensive. Once I was used to an area I did not use tape much. I used a total of six search routes as follows, to cover locations in fourteen counties.

Route 1-Western and southern Johnson county. Also Pulaski County.

Route 2-Massac and southern Pope Counties.

Route 3A-East Johnson and western/central Pope Counties. I also visited eastern Pope and Hardin counties on occasion (I used to call that area Route 3B, but discontinued it as a regular route because of no historical records and limited access to suitable habitat. I will still occasionally search this area in the future).

Route 4-Saline, Gallatin and White Counties.

Route 5-Wabash, Edwards and Wayne Counties.

Route 6-Clay, Richland and Lawrence counties.

Results

Historical and new localities:

The copper-bellied water snake was historically known to occur in eleven counties and forty six localities of southeast Illinois at the beginning of this survey. Several other localities were initially listed but were not searched because the precise location is uncertain ("cypress swamp"), or because specimens found there were likely wandering vagrants that were at least a half mile from the nearest water source (1 mile W of Grantsburg, Johnson county). Also, a known location near Boaz (Massac county) could not be accessed, and Thorne Pond (Johnson county) appears to have been drained. During this portion of the survey, copper-bellies were confirmed as still present in Johnson, Pope, Massac, Saline, Gallatin, White, and Lawrence counties. So far, searches in Richland, Edwards, Wabash and Wayne counties have been unsuccessful. However there is still one year remaining for the federal portion of the project, and I confidently expect that this snake will be found in at least one or two of these counties. All four counties still have suitable habitat for this water snake, to a greater or lesser degree. Furthermore, I have newly recorded the copper-belly from Clay and Pulaski counties, making a total of thirteen counties where this form is known from. A prior record from Clay County was based on a locality error, and was incorrect. The location is actually in Wayne county, rather than Clay. It is quite likely that the copper-belly may occur in several additional counties in southeastern Illinois. Also, this snake has been recorded at twenty three new localities. Most of these are in Johnson, Pope, Massac and Saline counties. However, there are also additional records of locale, for Pulaski, Clay and Gallatin counties. All localities of occurrence (both historical and new), were covered in previous reports. Currently, a total of one hundred and nineteen snakes have been observed, caught/examined or found dead on roads.

Habits and habitat:

The copper-bellied water snake occurs most commonly in swamps, seasonally flooded bottomland forest and flooded ditches near or adjacent to the above habitats. Copper-bellies do not seem to be at all common in deepwater swamp habitats, but are quite frequent around shoreline and areas of shallow water. Sluggish muddy streams and rivers are also utilized, but few specimens have been found in such riparian areas to date. It is possible that fieldwork in the coming year may show that this snake is more common in such habitats-at least in some areas. Grassy banks seem to be an important microhabitat, likely because there is abundant hiding cover for frogs. Frogs are a favorite prey, particularly of adult snakes. On one occasion a Gallatin county specimen was found swallowing a Southern Leopard Frog (Rana sphenoccephala), and another from Deer Pond Nature Preserve (Johnson county) regurgitated a full grown Bullfrog (Rana catesbeiana) when caught and photographed. Occasional snakes bask on overhanging branches and on grassy shorelines, especially in the spring and fall. However I get the impression that basking is much less frequent in this species than with the midland water snake (Nerodia sipedon pleuralis), and diamondback water snake (Nerodia rhombifer)-two common species seen frequently in the range of the copper-belly. This is primarily a diurnal snake, although occasional

specimens are found crossing roads at night in summer and early fall in appropriate habitat-especially during rains. Juveniles and neonates are occasionally found under logs, and adults under old railroad ties. Gravid females were found in July and August, but no particular notes were made, since this project is a status and abundance survey. Neonates were found in August and September. I think it likely that western cottonmouths (Agkistrodon piscivorus leucostomus) prey on this species at least somewhat, since the cottonmouth is abundant at a number of sites in Johnson, Pope and Massac counties, where this water snake is common. As an additional indicator of habitat quality, suitable hibernation sites such as crayfish burrows, or upland west/southwest facing slopes are likely needed to aid in maintaining good populations of copper-bellied water snakes. At least some populations in Johnson, Pope and Saline counties probably use suitable rocky slopes for hibernacula, since these sites have appropriate slope aspects and are located beside extensive swamps. It is uncertain what hibernacula may be used in other areas of Illinois.

Color variations:

Like all subspecies of the Plainbelly water snake the copper-belly is defined entirely by color pattern (blackish dorsum with bright orange or reddish ventrals that are partially or mostly invaded by black pigment), so it is important to assess the primary color patterns and variations of Illinois specimens. Adult snakes have been mainly used in this assessment, since neonate and juvenile colors usually change upon reaching adulthood. However, juvenile coloration was also noted somewhat, since Blanford and Brandon (1996) and Sellers (1991) show that young copper-bellies have dorsal coloration that is somewhat distinctive from that of juvenile yellow-bellies. Young yellow-bellies tend to have alternating blotches and lateral bars that are largely separate, while juvenile copper-bellies tend to have a fusion or merging of these blotches and bars on the anterior of the body. I have noticed that this type of juvenile coloration in copper-bellies is quite widespread and generally prevalent, although occasional specimens exhibit some variation. For example, several specimens had only banding and no blotching on the anterior of the body, and one young-of-the-year had distinctly separated blotches and bars as in a yellow-belly. Generally speaking, most adult copper-bellies have ventrals that are some shade of orange, with black or partially black ventral sutures. Some specimens have yellow throats, as well as yellow on the first one third of the ventrals. Reportedly, some specimens have very orange red ventral patterns. So far, I have yet to see the latter color in any Illinois specimens, however I have only been able to examine seventy copper-bellies (out of one hundred nineteen snakes). Since I expect to find others, it is possible that I will eventually find this color morph represented. However it is interesting that Sellers (1991) states that specimens from the unglaciated part of the range (presumably including Illinois) normally have ventrals that are peach orange to brick red in color. So far, the following color variations have been noted. Forty six specimens range from light to medium orange in ventral color, with varying degrees of invasive black pigment extending from the sides of the dorsum, either partially or entirely onto the ventral sutures. Such black crosslines are either vaguely indicated or form solid black bands across the belly. Fifteen snakes have yellow ventrals, rather than orange as expected. Although many of these snakes came from western Johnson County (where intergradation with the yellow-belly water snake may be occurring), I have also recorded this color morph at least once from Saline, Massac and Pope counties. Another morph is a tendency towards yellowish orange ventral patterns. There are nine snakes

of this pattern type, which so far has been found mostly in Johnson county(six snakes), though also in Pope County (three snakes). So, approximately 65% of examined snakes have orange or predominately orange ventrals. Several specimens with yellow or yellowish orange ventrals had varying degrees of invasive black pigment. Almost all specimens have blackish or grayish black dorsums, although a few from western Johnson and Massac counties have noticeably grayish dorsal coloration. This too, may indicate intergradation between copper-bellies and yellow bellies, although gray dorsal coloration falls within the normal color patterns of copper-bellies as indicated by Sellers.

Discussion of general abundance and status:

Since the federal part of this project is still ongoing, the comments in this section are preliminary and based only on the fieldwork that has been done so far. In general I consider the copper-belly to be common at a number of localities in Johnson, Pope and Massac counties. This is also likely true in Pulaski County. However, I have only found two specimens there, but am not sure why, in view of quite extensive habitat. Maybe it was just bad luck. Johnson and Pulaski counties have a considerable amount of remaining wetland habitat, while Pope and Massac counties have a reasonable amount of much smaller, scattered wetlands. Much of the wetland is Bald cypress/Water tupelo swamp and also seasonally flooded bottomland hardwood forest. A number of roadside ditches are also utilized. I am uncertain of the abundance and status of this snake in Saline and Gallatin counties. Saline has some widely scattered suitable wetlands, however limited searching has turned up only a few specimens so far, and only one of these was collected at a historical locality. Also, some areas of the Saline River appear degraded, with little bottomland forest remaining. Although I have only found two specimens in Gallatin County, this county has quite a lot of remaining wetland-primarily bottomland forest with occasional oxbow lakes and the lower Saline River which has good forest cover in places. I think it quite possible that my searching thus far didn't produce much because of hot, dry weather with much lower water levels than normal last summer. I also tended to search Johnson, Massac, Pope and Pulaski counties more because 70% of the historical records are located in those counties. I observed this snake only once each in White and Clay counties so far, where search patterns were similar to the above counties, so I am not sure of the status of copper-bellies there. I do get the impression that the copper-belly is locally common at a minimum of two sites in Lawrence County, where there are a number of scattered, suitable wetlands. Most consist of a mosaic of bottomland hardwoods/roadside ditches/ponds, but also include one marsh (Chauncey Marsh Nature Preserve). Considerably more field time will be spent on searching the Saline and Wabash drainages in the coming year so as to more accurately determine the status of copper-bellies in those areas. On the whole, the Copper-bellied water snake seems secure to me in Johnson, Pope and Massac counties and probably Pulaski too. Over the rest of the distribution in Illinois, I believe the term status undetermined is the best description so far, since there are insufficient specimens and records to date, and further fieldwork is necessary to clarify the status of this snake further. At some point in the future, it would also be very useful and important to determine the status of copper-bellies in western Illinois, since there is a record from there, as well as a number of recent records for adjacent counties of Iowa.

Summary

Based on current information from this study, the Copper-bellied water snake is likely secure in three southernmost counties of Illinois, as well as probably secure in another county (Pulaski). Because of reasons already stated, I believe that it should be regarded as “status undetermined” in the remainder of its distribution in Illinois, until further information becomes available at the close of the following research year.

Species benefiting from this project

All of the species and specimens below have been, or shortly will be reported to Scott Ballard. These species have benefited considerably from the observations and records listed below.

1. Eastern Ribbon Snake (Thamnophis sauritus)

This snake is listed as threatened in Illinois. During the course of this project it was observed a number of times. Eight were observed alive and two were dead on the road in Johnson County. One was observed alive and another dead on a road in Pulaski county. One specimen was observed along a flooded ditch in Saline County.

2. Eastern Narrowmouth Toad (Gastrophryne carolinensis)

This small, smooth toad is listed as threatened in Illinois. During this project it was newly recorded from two localities in Pope County. One record was of a chorus of calling males and the second record was a single toad found under a log while searching for copper-bellies. Additionally, calling males were heard at two historic localities in Pope County.

3. Eastern Mud Turtle (Kinosternon subrubrum)

This is a fairly widespread but uncommon turtle in southernmost Illinois. Five were observed during this survey-two alive and three found dead on the road. The specimens were found in Johnson and Pope Counties.

4. Western Mud Snake (Farancia abacura)

Though widely distributed in the southern part of Illinois, this uncommon, reclusive snake is seldom encountered. A total of nine were seen-four alive and five dead on the road. All specimens were found in Johnson County.

Project expenditures paid by other funds

Wildlife Preservation Fund Total	\$9,980.14
U.S. Fish and Wildlife Service	\$25,000 (Remaining balance after 9-30-11 report \$22,307.92)
Total amount owed:	\$6,804.56 (\$4112.48 from WPF & \$2692.08 from USFW for report ending 9-30-11)

Literature Cited

1. Blanford Michael J and Brandon Ronald A. "Distribution and Diagnosis of the Copperbelly Watersnake(*Nerodia erythrogaster neglecta*) in Illinois". Final Report to the Illinois Department of Natural Resources. July 30 1996
2. Sellers Mark Ashley. "Final Report Of The Rangewide Status Survey Of The Northern Copperbelly Water Snake *Nerodia erythrogaster neglecta*(Conant). Submitted to Region 3 U.S. Fish and Wildlife Service, Office of Endangered Species, Federal Bldg, Fort Snelling, Twin Cities, MN. March 17 1991