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Annotated Checklist of Amphibians and Reptiles Reported from Cedar Bog, Ohio

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ABSTRACT. **Thirty-one species of amphibians and reptiles have been reliably reported from Cedar Bog, Ohio including: 5 salamanders, 11 frogs and toads, 5 turtles, 1 lizard and 9 snakes, or approximately 40% of the total number of species reported for the state. Four of these species are classified as potentially threatened, endangered or of special interest in Ohio. Environmental changes due to dredging operations, maintenance of grass fields, and artificial impoundment construction appear to have been detrimental to some species while benefiting others.**

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INTRODUCTION

Cedar Bog has long been of interest to naturalists in Ohio, and a variety of faunal and floral surveys have been published regarding the site (King and Frederick 1974). In spite of this, little attention has been focused on the herpetofauna (amphibians and reptiles). Franks (1931) included 23 species of amphibians and reptiles in his list of vertebrates from Cedar Bog after nine summers of research, and Walker (1946) listed five species of frogs and toads that were represented by museum specimens from Cedar Bog. Later, Conant (1951) reported six species of reptiles. More recently, Environmental Control Corporation (ECC) (1973) reported 15 species of amphibians and reptiles at the site. Since the time of these studies, the character of the bog has changed dramatically due to habitat alteration and ecological succession, and several new species have been recorded. In this paper, we provide an annotated list of the amphibians and reptiles reported from Cedar Bog. In addition, we compare the present herpetofauna with that previously reported in an attempt to determine how habitat modifications have altered species composition and abundance.

METHODS AND MATERIALS

Cedar Bog is a relict boreal fen located in the Mad River Valley of Champaign County, Ohio, 8 km SSW of Urbana. The unique physical characteristics and cool microclimate of the preserve (Cedar Bog State Memorial, CBSM) produce conditions which sustain an unusual diversity of plant species within several well-defined microhabitats. Plant associations include: bog meadow, marl meadow, arbor vitae (white cedar) forest, swamp forest, hardwood forest, and shrub communities (Frederick 1974). Man-made habitats within CBSM include 98.5 ha of mowed fields, and a 0.2 ha farm pond that was built in 1945. More detailed descriptions of the site are given by Collins, S. et al. (1982), Forsyth (1974), and Frederick (1974).

During May and June of 1984-1985, intensive surveys were conducted to determine the status of spotted turtles (*Clemmys guttata*) at CBSM (Lovich 1985). A variety of collecting techniques were used, including visual searching, muddling (*sensu* Ernst 1976), and the use of terrestrial drift fences (Gibbons and Semlitsch 1981) with funnel traps similar to those shown in Fitch (1951). All amphibians and reptiles encountered during the study were identified, and their location within the preserve noted using the grid system shown in Figure 1 (from Frederick 1974). Records for earlier years were obtained from files maintained by the Ohio Historical Society and various museum collections. Museums and their acronyms are as follows: American Museum of Natural History-AMNH, Cincinnati Museum of Natural History-CNMNH, Cleveland Museum of Natural History-CLMNH, Cornell University-CU, Dayton Museum of Natural History-DMNH, Dayton Public Library Museum-DPLM, Florida State Museum-FSM, George Mason University-GMU, John Carroll University-JCU, Ohio Historical Society-OHS, Ohio State University Museum-OSUM, and University of Michigan Museum of Zoology-UMMZ. Numbers given for specimens at OSUM do not always match those reported by Conant (1951) and Walker (1946) since theirs are based on an earlier cataloguing system that is no longer in use.

In the accounts that follow, all known references to a species occurrence and relative abundance at CBSM are given along with our personal observations. Status definitions are as follows: **abundant**-species is seen regularly even by casual observers; **common**-species is no surprise when encountered but may require considerable search effort. Individuals may be localized or secretive; **rare**-species is seen so infrequently that concern exists for continued survival of population; and **unknown**-no data to indicate relative abundance of species.

Rare species with statewide legal status as determined by the Ohio Division of Wildlife (ODW) or the Ohio Department of Natural Resources, Division of Natural Areas and Preserves (DNAP) are defined as follows (status as of May 1983): **Special interest**-a species which is not endangered, threatened or potentially threatened, but should be monitored because existing information indicates at least one of the following: 1) in Ohio, it occurs in a limited geographic area; 2) it occurs in small numbers over a moderately widespread area of the state; 3) it is a highly mobile species which occasionally ranges into Ohio; 4) certain species characteristics or requirements make it especially sensitive to specific environmental or biologic pressures; or 5) it has been recorded in Ohio, but there is not sufficient information to determine a rarity status. **Potentially threatened**-a species which is likely to become threatened in the future if its population levels or habitat conditions decline for any reason. **Endangered**-a species which is in jeopardy of extirpation from the state, or whose habitat is jeopardized to the extent that the species could be eliminated as a reproducing entity in Ohio.

The number of museum specimens represented by a single catalog entry is given in parentheses. Specimens that we examined are designated with an asterisk. Common and scientific names follow Conant (1975) and Collins, J. et al. (1982).

RESULTS

A total of 34 species of amphibians and reptiles have been reported from Cedar Bog. Of these, the occurrence of three is questionable. The list includes 5 salamanders, 11 frogs and toads, 5 turtles, 1 lizard, and 9 snakes which may reasonably be assumed to have occurred at CBSM. Details for each species are given below.

AMPHIBIANS

SALAMANDERS

Ambystoma laterale (blue-spotted salamander). This species was reported by ECC (1973), but their record should be considered as highly questionable since *A. laterale* is known in Ohio only from the extreme northwestern corner of the state (Uzzell, 1964). It is possible that the specimen reported was *A. jeffersonianum,* or perhaps one of the triploid hybrids, *A. platineum* or *A.*

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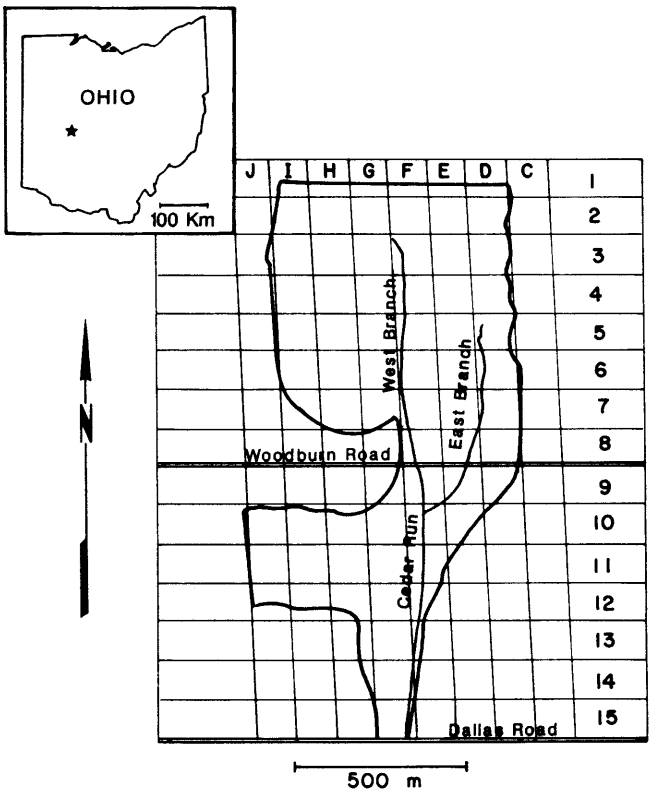

FIGURE 1. Map showing location of Cedar Bog State Memorial (star) and the grid system of Frederick (1974).

tremblayi (Conant, 1975; Uzzell, 1964). Further research will be required to determine whether members of this unusual species complex exist at CBSM.

STATUS-Unknown, occurrence questionable, endangered (ODW and DNAP)

Ambystoma tigrinum tigrinum (eastern tiger salamander). A single specimen was found dead in October, 1982 by TRJ.

STATUS-Unknown, potentially threatened (DNAP)

LOCALITIES-C5

MUSEUM SPECIMENS-OHS 15205*

Eurycea bislineata bislineata (northern two-lined salamander). Several specimens (adults and larvae) observed in small marl pools along boardwalk, 3 June 1985. This species was never collected in Cedar Run despite numerous searches.

STATUS-Unknown, may be localized

LOCALITIES-E6

MUSEUM SPECIMENS-CLMNH 2439; OHS 15206 (2)*; OSUM 1362, 1491

Eurycea longicauda longicauda (longtail salamander). Franks (1931) reported this species as uncommon in swamp forest and high bog shrub habitats.

STATUS-unknown

MUSEUM SPECIMENS-OSUM 354 (7)

Plethodon cinereus (redback salamander). Franks (1931) reported this species as uncommon in swamp forest and high bog shrub habitats. We found both redback and leadback color morphs under rotting logs in white cedar stands.

STATUS-Common

LOCALITIES-D7, 8; E8; F7

MUSEUM SPECIMENS-OHS 15164; OSUM 228 (6), 260, 423, 781, 1180 (2)

Pseudotriton ruber ruber (northern red salamander). Franks (1931) reported this species as uncommon in swamp forest and high bog shrub habitats. This record would be extralimital based on the range maps of Conant (1975) and Martof (1975).

STATUS-Unknown, occurrence questionable

Notophthalmus viridescens viridescens (red-spotted newt). Franks (1931) reported this species as uncommon in swamp forest and high bog shrub habitat.

STATUS-Unknown

FROGS AND TOADS

Bufo americanus americanus (eastern American toad). This species was reported by Franks (1931), Walker (1946) and ECC (1973). We found them throughout the preserve. Breeding starts in April.

STATUS-Abundant

LOCALITIES-D4; F6-8, 12, G7

MUSEUM SPECIMENS-DMNH 978, 2193, GMU 2701 (5)*; OSUM 851 (2)

Bufo woodhousei fowleri (Fowler's toad). Franks (1931) reported this species as abundant in the same habitat with *B. americanus*.

STATUS-Common

LOCALITIES-D4; F6-8, 12: G7

Acris crepitans blanchardi (Blanchard's cricket frog). This species was reported by Walker (1946). Franks (1931) may have been referring to this species when he erroneously listed *Acris gryllus*, a species that is not found in Ohio.

STATUS-Unknown

MUSEUM SPECIMENS-DMNH 2192; OSUM 67 (2), 1767 (2), 1845 (4)

Hyla crucifer crucifer (northern spring peeper). This species was not reported by Franks (1931). Males begin calling in April.

STATUS-Common

LOCALITIES-D5, E7-8; F8

MUSEUM SPECIMENS-CNMNH; H2878

Hyla chrysoscelis (gray treefrog). This species was reported by Franks (1931) and Walker (1946) as *H. versicolor*. These sibling species are morphologically virtually indistinguishable. Distributional data suggest the presence of only *H. chrysoscelis* in the vicinity of CBSM (Ralin and Selander 1979), although the two forms are often sympatric. Further research will be required to determine the exact identity of gray treefrogs at the preserve. A single specimen was observed by TRJ, 5 May 1983.

STATUS-Unknown

LOCALITIES-C5

MUSEUM SPECIMENS-OSUM 327

Pseudacris triseriata triseriata (western chorus frog). Franks (1931) reported this species to be abundant throughout wetter portions of the swamp.

STATUS-Unknown

LOCALITIES-E8; F8

MUSEUM SPECIMENS-CNMNH H2879; DMNH 2598; JCU 601; OHS 11636(2)

Rana catesbeiana (bullfrog). This species was first reported by ECC (1973). We heard one calling from the farm pond during the third week of May, 1985.

STATUS-Unknown

Rana clamitans melanota (green frog). Franks (1931) reported this species as common in larger ponds and along Cedar Run. We found them throughout the preserve.
STATUS-Common
LOCALITIES-D6; E8-9; F8
MUSEUM SPECIMENS-DMNH 2197, 2608-09

Rana palustris (pickerel frog). This species was reported by Franks (1931) and Walker (1946).
STATUS-Unknown
MUSEUM SPECIMENS-DMNH 2194-96; OSUM 1618(6), 1825

Rana pipiens (northern leopard frog). This species was reported by Franks (1931), Walker (1946) and ECC (1973). We found them frequently along Cedar Run.
STATUS-Common
LOCALITIES-D6,E4
MUSEUM SPECIMENS-OSUM 1634(3)

Rana sylvatica (wood frog). Franks (1931) reported: "This frog is not common in the swamp area."
STATUS-Unknown

REPTILES

TURTLES

Chelydra serpentina (snapping turtle). Surprisingly, this species is not listed by Franks (1931), Conant (1951) or ECC (1973). We observed two juveniles (<55mm) in the bog meadow and large adults in the farm pond.
STATUS-Unknown
LOCALITIES-C5; E3,4,6

Chrysemys picta marginata (midland painted turtle). This species was not observed by Franks (1931) or ECC (1973). We observed up to five individuals basking in the farm pond on numerous occasions.
STATUS-Apparently restricted to farm pond

Clemmys guttata (spotted turtle). This species was formerly very common at CBSM (Conant, 1951) but is now greatly reduced in numbers due to over-collecting, habitat destruction, and increased predation (Lovich 1985).
STATUS-Rare, endangered (ODW), potentially threatened (DNAP)
LOCALITIES-D5-7, E8, F8, G7
MUSEUM SPECIMENS-AMNH 120791-97*; CU 5837; DMNH 2263, 3194-200; FSM uncatalogued (1); OHS 15185-87*; OSUM 821*, 822, 856*, 859*, 862*, 866C(24)*, 867(4)*, 952, 1193(2)*; UMMZ 112221-230*

Emydoidea blandingii (Blanding's turtle). A juvenile in the AMNH collected by R. Conant in 1934 bears locality data for CBSM. Conant (pers. comm.) considers this record to be due to an earlier error in the field notes. However, disjunct populations in Ohio and Indiana may have been established by releasing captive specimens (Conant 1951, Minton 1968).
STATUS-Unlikely to be found at CBSM; potentially threatened (DNAP)
MUSEUM SPECIMENS-AMNH 120822 (locality data amended to "Ohio")

Terrapene carolina carolina (eastern box turtle). Franks (1931) reported a single specimen from "near the center of the swamp." Live specimens were seen in 1977 and 1985.
STATUS-Unknown
LOCALITIES-F9,G7
MUSEUM SPECIMENS-OHS 12498, OSUM 237

Sternotherus odoratus (stinkpot). Franks (1931) reported this species as "present in the swamp region, but not common."
STATUS-Unknown

LIZARDS

Eumeces fasciatus (five-lined skink). This species was not reported by Franks (1931), but Conant (1951) and MacMahon (1962) found them in wet areas of the bog. We observed adults and juveniles frequently along the boardwalk. Two females collected on 4 June 1985 contained 9 and 12 eggs and were 74.8 and 75.5 mm (snout-vent length) respectively.
STATUS-Common
LOCALITIES-E4-7; F8
MUSEUM SPECIMENS-DMNH 2654-59; DPLM 170-5.42; OHS 15207(3)*; OSUM 750

SNAKES

Clonophis kirtlandi (Kirtland's water snake). The only specimen known from CBSM was collected on 25 October 1972
STATUS-Unknown, special interest (DNAP)
MUSEUM SPECIMENS-OSUM 1895

Coluber constrictor (racer). Franks (1931) reported them in drier portions of the bog. This species was also observed by ECC (1973). Conant (1951) suggested that specimens at CBSM are intergrades between *C.c. constrictor* and *C.c. foxi.*
STATUS-Unknown
MUSEUM SPECIMENS-AMNH 121968-69

Diadophis punctatus edwardsi (northern ringneck snake). A single specimen was found under a board in the swamp forest by TRJ in May, 1986.
STATUS-Unknown
LOCALITIES-E8

Elaphe obsoleta obsoleta (black rat snake). Franks (1931) found them in "thickets and along fence rows. . ." A dead specimen, killed by an automobile, was found on Woodburn Road on 29 May 1985. Live specimens were observed occasionally.
STATUS-Common
LOCALITIES-D8; F8

Nerodia sipedon sipedon (northern water snake). Franks (1931) observed specimens basking on clumps of grass and along Cedar Run. We observed them frequently at the C5 pond and in Cedar Run.
STATUS-Common
LOCALITIES-C5; F9; Cedar Run at Dallas Road

Regina septemvittata (queen snake). Franks (1931) reported, "The queen snake is seldom seen anywhere in the bog except near the run."
STATUS-Unknown

Storeria dekayi (brown snake). This species was not reported by Franks (1931). Specimens collected in 1985 appear to be *S.d. dekayi,* but Conant (1951) and Duellman (1951) considered specimens from Ohio to be intergrades with *S.d. wrightorum.*
STATUS-Common
LOCALITIES-C5-7; G8
MUSEUM SPECIMENS-OHS 13353

Thamnophis sirtalis sirtalis (eastern garter snake). Franks (1931) found them in cultivated areas along

margin of swamp. We observed them throughout the preserve.
STATUS-Common
LOCALITIES-C5; F4,8; G8
MUSEUM SPECIMENS-OSUM 282

Sistrurus catenatus catenatus (eastern massasauga). The only venomous snake at CBSM. This species was not observed by Franks (1931), although he reported several killed yearly by area farmers. Most recent observations are west of the West Branch of Cedar Run. We found several in the bog meadow. Distribution and relative abundance of this species at CBSM were discussed by Laux and Tuke (1974).
STATUS-Common, potentially threatened (DNAP)
LOCALITIES-C5; D4,5; F8,9; G8,9; between CBSM and Mad River
MUSEUM SPECIMENS-DMNH 3124; OHS 12698 (3)*; 14783*, 15144*; OSUM 227 (5), 243 (8), 1906

DISCUSSION

Thirty-one species of amphibians and reptiles have been reliably reported from Cedar Bog. This suggests the presence of a relatively diverse herpetofauna, with approximately 40% of the species reported for the state as a whole by Conant (1975). Whether or not all of these species continue to survive at CBSM is unknown since habitat modifications have appreciably altered the site.

In the early part of this century, the Mad River and Cedar Run were dredged, resulting in a dramatic lowering of the water table at CBSM (Frederick 1967, Forsyth 1974) and the elimination of 15 species of fish (Cavender and Yoder 1974). As the drainage projects were completed, the size of the bog was reduced. By 1910, only about 243 ha remained of what was once a 2833 ha complex of wetlands (Dachnowski 1910). Ecological succession accelerated as a result of decreasing water levels, and allowed woody species such as northern white cedar to invade the bog meadow (Collins, S. et al. 1982), thus accelerating the drying trend. By 1979, the bog meadow area had been reduced to less than 2.5 ha (R. Glotzhober pers. comm.). Other changes included the construction of a farm pond in quadrant C5 in 1945, and more recently, long term maintenance of mowed fields around the preserve perimeter for agricultural or aesthetic purposes. Detailed accounts of habitat modifications at Cedar Bog are summarized in Environmental Control Corporation (1973).

The effects of these perturbations on amphibian and reptile populations at CBSM are difficult to assess since accurate data on species abundance over time are generally unavailable. However, it is clear that some species have been adversely affected, whereas others have possibly benefited. For example, records from the literature (Conant 1951) and museums (Lovich 1985) indicate that spotted turtles were extremely abundant at CBSM early in the century, and more than 20 could be collected in a single day. In contrast, from 1984-86 only five living specimens were located despite intensive search efforts. Although a variety of factors probably contributed to the observed decline (Lovich 1985), ecological succession and decreasing water levels are known to have adverse effects on spotted turtles (Ernst 1976) and other marsh-dwelling turtle species (Wilbur 1975).

The drying trend reported by Collins, S. et al. (1982) may have been beneficial to redback salamanders. This species is entirely terrestrial throughout its life and is commonly found in moist soil and under rotting logs. The scarcity of well drained soils in extensive marshes may explain why Franks (1931) found these salamanders to be uncommon. Our findings suggest a possible increase in the population, probably as a result of an increase in suitable habitat.

Several other species appear to have benefited from habitat modifications. Bullfrogs, snapping turtles, and painted turtles were all apparently absent from the bog's herpetofauna prior to construction of the farm pond (Franks 1931). The two turtles thrive in large permanent bodies of water and have increased throughout Ohio and elsewhere as a result of the practice of building artificial impoundments (Conant 1951, Christiansen 1981). The same situation has been reported for bullfrogs in Iowa (Christiansen 1981). In addition, bullfrogs were stocked in many streams and ponds by the Ohio Division of Conservation starting in 1937 (Walker 1946).

Management of fields on the western side of CBSM has been initiated to maintain suitable habitat for the massasauga (R. Glotzhober pers. comm.). Since this species is found in old-field seral stages at certain times of the year, the rate of succession is being carefully controlled in critical areas. Mowing and controlled burns are an important part of a management plan designed to sustain these endangered rattlesnakes.

The results of our study suggest that environmental changes over time at CBSM are reflected in the composition and relative abundance of the site's herpetofauna. Further research will be necessary to determine how continued management and change will affect the long-term survival of remaining species.

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