

## CONSERVATION STATUS REVIEW OF THE SADDLED MADTOM, *NOTURUS (RABIDA) SP.* (SILURIFORMES: ICTALURIDAE) IN THE DUCK RIVER SYSTEM, TENNESSEE

DAVID J. EISENHOUR, BROOKS M. BURR, KENNETH M. COOK,  
AND CHRISTOPHER A. TAYLOR

*Department of Zoology, Southern Illinois University at Carbondale, Carbondale, IL 62901-6501 (DJE, BMB, KMC)*  
*Center for Biodiversity, Illinois Natural History Survey, Champaign, IL 61820 (CAT)*

**ABSTRACT**—Thirty-three localities in the Duck River system were sampled for the saddled madtom, *Noturus (Rabida) sp.* The species was collected from 12 localities in the Buffalo River subsystem and tributaries to the lower Duck River. One individual was collected in the mainstem of the Duck River, Marshall Co. Habitat critical to the species is found in small streams with clear water, dark gravel and slab-rock substrates, and abundant riffles. Examination of historical collection records indicates the saddled madtom has declined in abundance over the past 10-20 years. Reasons for its decline are unclear but may be the result of low summer flows during droughts in the late 1980s. Potential threats to the continued existence of the species include completion of the proposed Columbia Dam project, stream channelization, and agricultural runoff. We recommend that the saddled madtom continue to be listed as threatened in Tennessee but that federal protection is not warranted at this time.

The saddled madtom, *Noturus (Rabida) sp.*, an undescribed species of the *Noturus elegans* complex (Grady and LeGrande, 1992), occurs in the Duck River system and adjacent western tributaries of the Tennessee River in Hardin and Wayne counties, Tennessee. It is known historically from a number of localities in tributaries of the lower Duck and Buffalo rivers but only a few records from the mainstem Duck River in Bedford and Marshall counties. The species also is known from the lower arm of the Tennessee River drainage, historically occurring at five localities in the Indian Creek system and one locality in Rogers Creek (Horse Creek system). The saddled madtom has been considered "jeopardized" (Etnier and Starnes, 1991) or listed as "threatened" (Tennessee Wildlife Resources Agency, 1994) in Tennessee and was a C2 candidate for federal protection (United States Fish and Wildlife Service, 1994).

The elegant madtom, *N. elegans*, is considered to be the sister species to the saddled madtom (Grady and LeGrande, 1992). Taylor (1969), in his original description of *N. elegans*, noted that specimens from the Duck River system were more boldly patterned and had fewer mean anal rays than specimens from the Green-Barren River system (nominal *N. elegans*). Subsequent allozymic analysis revealed fixed allelic differences between *N. elegans* and the saddled madtom at seven loci (Grady, 1987; Grady and LeGrande, 1992). The taxonomic status of the saddled madtom has been reevaluated and J. M. Grady and B. M. Burr are preparing a species description. Taylor (1969) and Etnier and Starnes (1993) tentatively referred specimens from the upper Tennessee River drainage (Little Chucky Creek, Dunn Creek, Piney Creek, and Flint River) to *N. elegans*. Recent analyses of additional specimens from Little Chucky Creek indicates that these are morphologically (Burr and Eisenhour, 1994) and genetically (J. M. Grady, pers. comm.) distinct from *N. elegans* and the saddled madtom. We do not allocate the records from the upper Tennessee River drainage to the saddled madtom.

We present the results of a survey of the Duck River system to determine the present distribution and status of the saddled madtom. We

also include a description of the habitat critical to the species and identify potential threats to its survival.

### MATERIALS AND METHODS

Institutional abbreviations follow Leviton et al. (1985) and Leviton and Gibbs (1988), except that we have substituted OSUM as the preferred abbreviation for the Ohio State University Museum. Nine museum collections were accessed to compile a list of known historical localities (Appendix I). Thirty-three sites, including historical and new localities with potential suitable habitat, were sampled for the saddled madtom from 19 May to 2 November 1992 (Fig. 1). Tennessee county maps compiled and designed by C. J. Puetz were used to locate sampling sites. Localities chosen encompassed the historical range of the saddled madtom in the Duck River system. Additional sites were reconnoitered but not sampled because they appeared to lack habitat suitable for the species.

Sites were sampled with a 3.1- by 1.8-m seine using "set-and-kicks" for riffles and runs and "hauls" for pools (Jenkins and Burkhead, 1994). Stream width, depth, velocity, substrate type, and stream bank conditions were recorded at localities yielding the saddled madtom. Surface velocity was recorded by repeatedly timing a lemon over a given distance and was converted to mean water-column velocity by multiplying by 0.8 (Orth, 1983). Most specimens collected were vouchered and deposited at Southern Illinois University at Carbondale; others were released or escaped (Appendix II).

### RESULTS

*Distribution and Abundance*—We located 58 historical collections of the saddled madtom representing 33 localities (Appendix I). The most

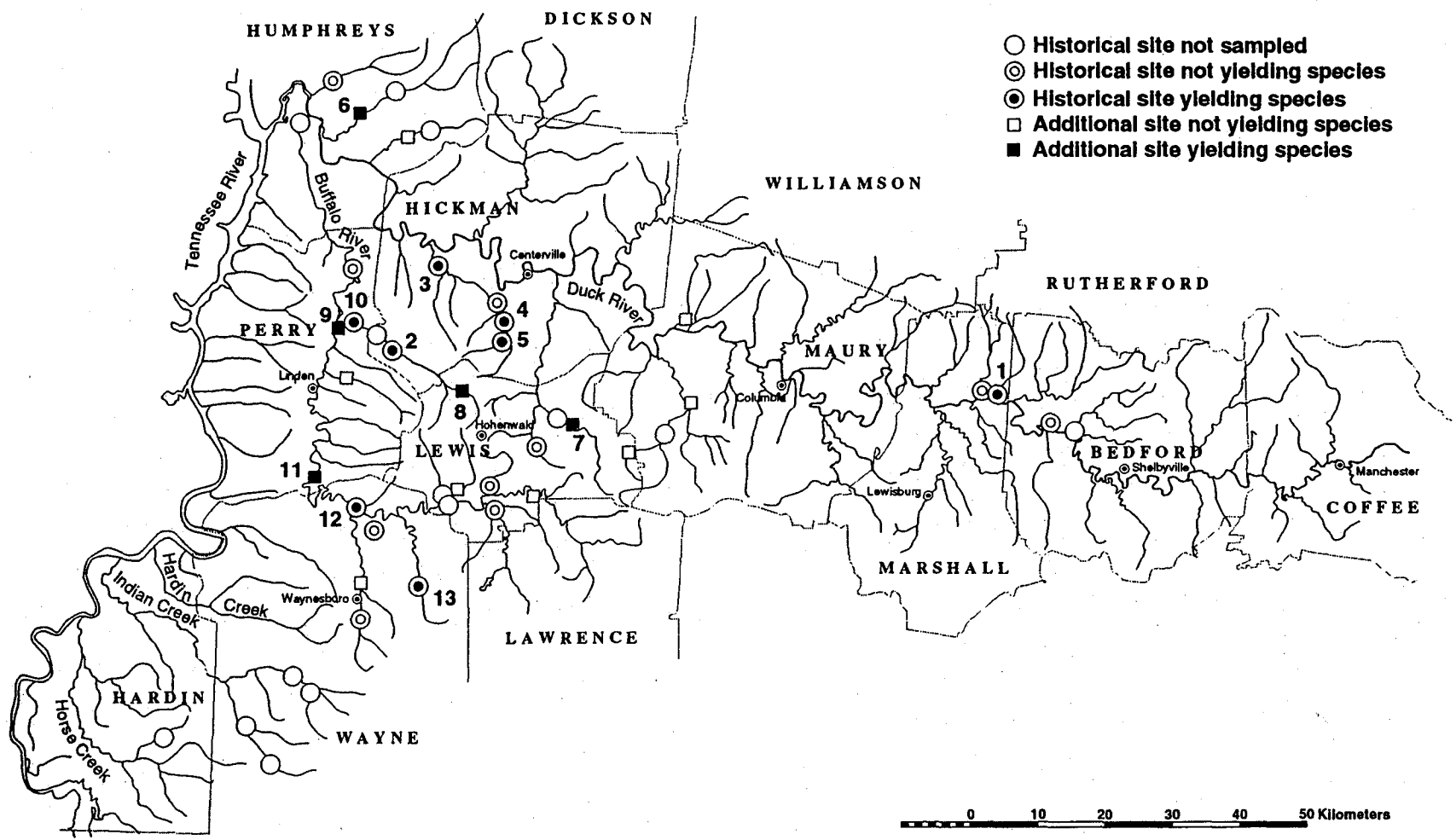


FIG. 1. Record stations for the saddled madtom in Tennessee. Precise locality information for numbered sites is given in Appendix II.

upstream historical locality for the species was the Duck River, 9.2 km NW of Shelbyville, Bedford Co., while the most downstream historical locality was Blue Creek at TN 13, Humphreys Co. Historical records for the saddled madtom in the Buffalo River subsystem are available from the Buffalo River just above its mouth to the Buffalo River at the mouth of Grinders Creek, Lewis Co.

The species was present at 13 of 33 sites visited in the Duck River system (Fig. 1, Appendix II). Only one specimen was collected from the Duck River mainstem. Five records were from small tributaries of the lower Duck River, and the remaining seven were from the Buffalo River subsystem. The maximum number of individuals collected at one site was six while the mean was 2.1 (Table 1). Several (16) historical collections of the saddled madtom are available from the Buffalo River subsystem in Lewis Co. However, no specimen was collected from this area in our survey, and suitable habitat did not appear to be present at additional historical localities reconnoitered (but not sampled) in the upper Buffalo River subsystem.

**Habitat and Ecology**—In this survey, all individuals were collected in gravel, cobble, or slab-rock substrates in riffle habitats with a mean depth of 0.2 m (range of 0.1–0.3 m) in streams averaging 13.6 m (range of 8–25 m) in width. Mean current readings from three capture sites ranged from 0.59 to 0.76 m/sec (grand mean = 0.66 m/sec). Table 1 provides more detailed habitat information for sites yielding specimens.

Riffles and runs typically are occupied during the daylight hours where individuals likely are buried deep among the interstices of gravel. Although our observations are limited, the species almost certainly ventures into pools to feed at night or during crepuscular periods. The small adult size ( $\leq 72$  mm standard length, SL) of the saddled madtom indicates it probably lives no longer than 2–3 years, as judged by life-history studies of similarly sized madtoms (Burr and Mayden, 1982; Dinkens, 1984; Mayden and Walsh, 1984). Preserved females contain mature oocytes from late May to late July; females are mature at sizes as small as 44 mm SL (Burr et al., 1993). In our survey, the saddled madtom frequently was associated with the largescale stoneroller (*Campostoma oligolepis*), rosyside dace (*Clinostomus funduloides*), Tennessee shiner (*Notropis leuciodus*), banded sculpin (*Cottus caroliniae*),

fantail darter (*Etheostoma flabellare*), saffron darter (*Etheostoma flavum*), and redline darter (*Etheostoma rufilineatum*).

## DISCUSSION

**Habitat**—In general, habitat critical for the saddled madtom includes second- and third-order streams with clear water, dark gravel and slab-rock substrates, and abundant riffles. Beyond habitat affinity, little is known of the ecology of the saddled madtom. Nesting habitat probably is similar to that of the closely related *N. elegans* which includes pools or slow raceways that contain slab rocks above and below riffles (Burr and Dimmick, 1981).

**Status**—Historical collections contain 540 specimens, or a mean of 9.3 individuals/collection. Excluding two very large historical collections (TU 89560,  $n = 81$ , and USNM 230594,  $n = 125$ ), the mean specimens per collection decreases to 6.0. The few sites from which we obtained specimens and the low number of specimens per site (mean = 2.1) indicate that either the species has been dramatically reduced in abundance and range over the past 10–20 years or our seasonal timing, collecting techniques, and efforts were less effective than those of previous collectors. The low densities of saddled madtoms indicated by our survey may result from most of our collections being made during daylight hours. Most madtoms are more vulnerable to standard collecting methods at night (Etnier and Starnes, 1993). However, without field notes from previous collections, it is impossible to know how many of the historical collections were made at night. In addition, B. M. Burr has collected saddled madtoms from several localities in the past 10 years during daylight and had little difficulty obtaining suitable numbers ( $> 10$ ). Therefore, we are inclined to support the idea that our efforts are representative and that the species has decreased in numbers over the past 10–20 years.

We were unable to identify any direct anthropogenic factors that may have reduced the range and abundance of the saddled madtom. Stream reaches in the areas sampled during this survey did not appear notably degraded. We speculate that severe drought conditions in the late 1980s may have reduced the size of many populations of the species.

TABLE 1. Summary of field observations at sites in Tennessee that yielded the saddled madtom. Numbered sites are shown in Fig. 1; precise locality information is given in Appendix II.

Site	Stream width (m)	Temperature (°C)	Depth at capture (m)	Substrate	Number caught	Set-and-kick attempts
1	20	24.0	0.15	Gravel	1	18
2						
22 May 1992	13	20.5	0.25	Fine gravel/slab rock	6	15
10 October 1992	13		1.00	Fine gravel/slab rock	1	40
3	15	19.5	0.20	Gravel	1	9
4	8	16.0	0.25	Gravel	3	12
5	5	16.5	0.15	Fine gravel	4	8
6	10	16.0	0.30	Gravel	1	20
7	11	24.0	0.15	Gravel/cobble	1	10
8	8	16.0	0.15	Gravel	2	8
9	25	25.0	0.25	Fine gravel	1	14
10	15	24.0	0.10	Fine gravel	1	10
11	20	26.0	0.30	Gravel	2	8
12	15	25.0	0.15	Gravel	3	12
13	12	16.5	0.20	Gravel	3	10

The saddled madtom probably has its spawning peak in June and July, similar to other related madtoms (Burr and Dimmick, 1981; Burr and Mayden, 1982). Low flows during the spawning period may have disrupted nesting and reduced recruitment, especially in smaller tributaries lacking permanent springs to maintain summer flows. Presently, the largest populations are in the Buffalo River subsystem where streams supplied by perennial springs are common.

*Threats*—The population in the mainstem of the Duck River would likely be extirpated by impoundment resulting from completion of the proposed Columbia Dam project. Populations in tributaries of the lower Duck River system would not be dramatically affected. A number of potential threats, including channelization, removal of riparian vegetation, and runoff from agricultural landuse (all common occurrences in eastern North American streams) could result in an overall decline in water quality. These potential threats have the greatest impact on small, high-quality streams, critical to the continued existence of the saddled madtom. In addition, the wide variety of complex organic chemicals added to streams may interfere with the highly developed olfactory sense of madtoms, disrupting behavioral patterns important for survival (Etnier and Jenkins, 1980).

During bridge construction, removal of nesting rocks and modification of the substrate in the immediate area can occur. Recent bridge construction was observed at several localities in the Buffalo River subsystem that historically contained saddled madtoms but lacked saddled madtoms and apparently suitable habitat during our survey. We speculate that bridge construction may have altered the local hydrology of the stream, eliminating habitat critical for the species. Although bridge construction impacts a relatively small area, it may result in the extirpation of small, disjunct populations and further fragmentation of the range of the species. Finally, some historical collections were excessive (TU 89650,  $n = 81$ , and USNM 230594,  $n = 125$ ), although it should be noted that saddled madtoms were present at both of these sites during our survey. We agree with Warren et al. (1994), who caution colleagues to show prudence when collecting rare fishes.

*Recommendations*—We recommend that the saddled madtom continue to be listed as "threatened" in Tennessee. Because of the documentation of at least 12 extant locations of the saddled madtom and the lack of identifiable threats to habitats critical to the species' continued survival, our judgment is that federal protection is unwarranted at this time. Management should include educating landowners of the importance of maintaining riparian vegetation and controlling erosion and agricultural waste along the streams with best agricultural management practices and educating those responsible for approving highway project permits. Research needs for the saddled madtom include: surveys of historical locations and adjacent streams containing suitable habitat outside of the Duck River system; autecological studies focusing on nesting habitats, nesting season, productivity of nests, survivorship, longevity, diet, and seasonal microhabitat utilization; identification of streams that harbor breeding populations and potential streams for transplantation studies; and long-term monitoring of population trends.

#### ACKNOWLEDGMENTS

This survey was supported by the United States Fish and Wildlife Service through the Tennessee Wildlife Resources Agency, Nongame and Endangered Species. We gratefully acknowledge the field assistance of R. G. Biggins and R. Hylton (United States Fish and Wildlife Service). P. W. Shute (Tennessee Valley Authority) provided locality records and other courtesies. J. M. Grady (University of New Orleans) shared original allozymic data on the saddled madtom. We wish to thank the following individuals for providing us with historical records of the species: B. R. Kuhajda and R. L. Mayden (University of Alabama Ichthyological Collection); K. S. Cummings and L. M. Page (Illinois

Natural History Survey); T. M. Cavender (Ohio State University Museum of Biological Diversity); J. T. Collins (University of Kansas); N. H. Douglas (Northeast Louisiana University); H. L. Bart (Tulane University); D. A. Etnier (The University of Tennessee); S. L. Jewett (National Museum of Natural History).

#### LITERATURE CITED

- BURR, B. M., AND W. W. DIMMICK. 1981. Nests, eggs, and larvae of the elegant madtom *Noturus elegans* from Barren River drainage, Kentucky (Pisces: Ictaluridae). *Trans. Kentucky Acad. Sci.*, 42:116-118.
- BURR, B. M., AND D. J. EISENHOUR. 1994. Status survey of the chunky madtom (Ictaluridae: *Noturus* sp.) in East Tennessee. Tennessee Wildl. Resources Agency, Nashville, Rept.
- BURR, B. M., AND R. L. MAYDEN. 1982. Life history of the brindled madtom *Noturus miurus* in Mill Creek, Illinois (Pisces: Ictaluridae). *Amer. Midland Nat.*, 107:25-41.
- BURR, B. M., C. A. TAYLOR, AND K. M. COOK. 1993. Status survey of the coppercheek darter, striated darter, and saddled madtom in the Duck River Drainage, Tennessee. Tennessee Wildl. Resources Agency, Nashville, Rept.
- DINKINS, G. R. 1984. Aspects of the life history of the smoky madtom, *Noturus baileyi* Taylor, in Citico Creek. MS thesis, Univ. Tennessee, Knoxville.
- ETNIER, D. A., AND R. E. JENKINS. 1980. *Noturus stanauli*, a new madtom catfish (Ictaluridae) from the Clinch and Duck rivers, Tennessee. *Bull. Alabama Mus. Nat. Hist.*, 5:17-22.
- ETNIER, D. A., AND W. C. STARNES. 1991. An analysis of Tennessee's jeopardized fish taxa. *J. Tennessee Acad. Sci.*, 66:129-133.
- . 1993. The fishes of Tennessee. Univ. Tennessee Press, Knoxville.
- GRADY, J. M. 1987. Biochemical systematics and evolution of the ictalurid catfish genus *Noturus* (Pisces, Siluriformes). PhD dissert., Southern Illinois Univ., Carbondale.
- GRADY, J. M., AND W. H. LEGRANDE. 1992. Phylogenetic relationships, modes of speciation, and historical biogeography of the madtom catfishes, genus *Noturus* Rafinesque (Siluriformes: Ictaluridae). Pp. 747-777 in *Systematics, historical ecology, and North American freshwater fishes* (R. L. Mayden, ed.). Stanford Univ. Press, Stanford, California.
- JENKINS, R. E., AND N. M. BURKHEAD. 1994. Freshwater fishes of Virginia. *Amer. Fish. Soc.*, Bethesda, Maryland.
- LEVITON, A. E., AND R. H. GIBBS, JR. 1988. Standards in herpetology and ichthyology. Standard symbolic codes for institution resource collections in herpetology and ichthyology. Supplement No. 1: additions and corrections. *Copeia*, 1988:280-282.
- LEVITON, A. E., R. H. GIBBS, JR., E. HEAL, AND C. E. DAWSON. 1985. Standards in herpetology and ichthyology: Part 1. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia*, 1985:802-832.
- MAYDEN, R. L., AND S. J. WALSH. 1984. Life history of the least madtom, *Noturus hildebrandi* (Siluriformes: Ictaluridae) with comparisons to related species. *Amer. Midland Nat.*, 112:349-368.
- ORTH, D. J. 1983. Aquatic habitat measurements. Pp. 61-84 in *Fisheries techniques* (L. A. Nielson and D. L. Johnson, eds.). *Amer. Fish. Soc.*, Bethesda, Maryland.
- TAYLOR, W. R. 1969. A revision of the catfish genus *Noturus* Rafinesque, with an analysis of higher groups in the Ictaluridae. *Bull. US Natl. Mus.*, 282:1-315.

- TENNESSEE WILDLIFE RESOURCES AGENCY. 1994. Endangered or threatened species and wildlife in need of management. Tennessee Wildl. Resources Agency, Proclamation Nos. 94-16 and 94-17, Nashville.
- UNITED STATES FISH AND WILDLIFE SERVICE. 1994. Endangered and threatened wildlife and plants; animal candidate review for listing as endangered or threatened species; proposed rule. Fed. Register, 59(219):58982-59028.
- WARREN, M. L., JR., B. M. BURR, AND C. A. TAYLOR. 1994. The relict darter, *Etheostoma chienense* (Percidae): status review of a Kentucky endemic. Trans. Kentucky Acad. Sci., 55:20-27.

## APPENDIX I

Summary of all known collections of the saddled madtom from Tennessee prior to this survey. Catalog numbers are followed in parentheses by the number of voucher specimens taken. Institutional abbreviations are: INHS = Illinois Natural History Survey; KU = University of Kansas; NLU = Northeast Louisiana University; OSUM = Ohio State University Museum of Biological Diversity; SIUC = Southern Illinois University at Carbondale; TU = Tulane University; UAIC = University of Alabama Ichthyological Collection; USNM = National Museum of Natural History; and UT = The University of Tennessee. DUCK RIVER SYSTEM. *Bedford Co.*: Duck River at end of unnumbered county road, 5.7 air miles NW Shelbyville, 2 air miles NW Elbethel, UT 48.299 (2) 20 May 1978; Duck River below county route bridge at Halls Mills, River Mile 203.3, OSUM 56034 (2) 14 July 1981, NLU 54277 (1) Spring 1981. *Hickman Co.*: Beaverdam Creek at TN 50, E edge Coble, USNM 201387 (5) no date, UT 48.304 (7) 13 September 1978, NLU 43090 (6) 15 April 1979, NLU 43265 (4) 17 April 1979, NLU 56496 (2) 1 April 1985; Beaverdam Creek 4 miles N Aetna, INHS 77596 (1) 3 September 1977; Beaverdam Creek at TN 48, just N Aetna, SIUC 15199 (16) 21 May 1987; tributary Beaverdam Creek off TN 48, 3 miles N Kimmins, SIUC 3635 (12) 6 September 1981; Brushy Fork Creek off TN 48, N Aetna, USNM 230594 (125) 29 November 1969; Cane Creek 9.7 air miles NE Linden, TN 100, TU 33085 (8) 14 July 1964; Cane Creek 1 mile S Pleasantville, INHS 77789 (5) 3 September 1977. *Humphreys Co.*: Blue Creek 2 miles S Waverly on TN 13, NLU 15691 (1) 29 March 1970; Buffalo River (the whirl), River Mile 1.3 at access to private home, gravel shoals and islands, UT 48.144 (10) 10 November 1973; Hurricane Creek S of McEwen, USNM 197396 (2) 13 August 1954; Hurricane Creek about 6 miles E County Road 6222, UT 48.119 (13) 20 September 1972; Tumbling Creek, USNM 197400 (1) no date; Tumbling Creek ca. 7 miles ENE Bucksport, SIUC 3357 (4) 27 April 1981. *Lewis Co.*: tributary to Big Swan Creek, 0.5 mile E Gordonsburg on TN 99, UT 48.336 (1) 3 June 1976, SIUC 5993 (2) 5 November 1982, INHS 61755 (1) 23 April 1986; Buffalo River at North Riverside, KU 20943 (4) 3 October 1978, NLU 28273 (14) 16 September 1973; Buffalo River at mouth Grinders Creek, NLU 33750 (6) 24-25 March 1976, NLU 35583 (1) 11-12 April 1977, INHS 79403 (1) 14 April 1978, NLU 52797 (1) 31 March 1983, NLU 54831 (1) 15 April 1984, NLU 56512 (2) 1 April 1985; Cane Creek on County Road 6179, UT 48.129 (1) 29 November 1969; Little Buffalo River at junction Riverside Road, approximately 2.5 miles E Riverside Community, NLU 28587 (14) 29 September 1973; Little Swan Creek in Meriweather Lewis National Monument, USNM 264581 (7) 16 March 1972; Little Swan Creek 200 m above Natchez Trace Parkway crossing, 6.5 air miles ESE Hohenwald, UT 48.343 (9) 10 March 1979; Rockhouse Creek 5/8 mile NW Riverside Community, NLU 28604 (10) 29 September 1973. *Marshall Co.*: Duck River at shoal ca. 2.3 river miles upstream from US 31A crossing, ca. 2.25 air miles SE Chapel

Hill, UT 48.313 (1) 5 November 1978; Duck River at Henry Horton State Park, River Mile 186.8, near Wilhoite Mills, OSUM 46912 (2) 1 May 1980, OSUM 56038 (1) 1 May 1980, NLU 50192 (13) 1 May 1980, OSUM 52515 (9) 9 June 1980, SIUC 11160 (1) 14 October 1980. *Maury Co.*: Big Bigby Creek above Stauffer Chemical Plant, UT 48.117 (1) 27 September 1972; Bigby Creek near Mt. Pleasant, USNM 197398 (2) no date. *Perry Co.*: Buffalo River 1 mile N Lobelville, INHS 27473 (1) 16 June 1979; Cane Creek at TN 50 bridge, NLU 28746 (35) 29 September 1973, NLU 43215 (10) 15 April 1979, NLU 56579 (15) 1 April 1985. *Wayne Co.*: Buffalo River 2.2 air miles below TN 13 bridge, UT 48.716 (3) 25 September 1990; Fortyeight Creek 7.5 miles E Waynesboro, US 64, TU 89650 (81) 30 July 1974, OSUM 34345 (1) 29 September 1974, SIUC 3599 (12) 6 September 1981; Green River S Waynesboro, off TN 13, INHS 82866 (4) 15 April 1978; Moccasin Creek 0.1 mile W Natural Bridge (north of US 64), UT 48.148 (9) 10 November 1973. INDIAN CREEK SYSTEM. *Wayne Co.*: Bear Creek at Lutts Community, UAIC 5048.02 (11) 11 March 1976; Indian Creek near confluence of Waterfall Creek, ca. 7 miles WNW Collinwood, UAIC 5052.05 (1) 11 March 1976; Indian Creek near 6228, 0.5 mile above Moser bridge, UT 48.499 (2) 17 March 1985; Weatherford Creek 3.5 miles up creek from Lutts Community, UAIC 5046.04 (15) 11 March 1976; Weatherford Creek at County Road 6277, UAIC 5669.02 (7) 11 March 1979. HORSE CREEK SYSTEM. *Hardin Co.*: Rogers Creek 5 miles SE Burnt Church on TN 203, INHS 61669 (1) 22 April 1986.

## APPENDIX II

Sites in Tennessee surveyed for the saddled madtom in 1992. Catalog numbers (followed in parentheses by number of voucher specimens taken) and complete locality information for sites yielding saddled madtom (site numbers corresponding to those referenced in Table 1 and Fig 1; all Duck River system). *Site 1*: Duck River at bend in Harris Road, 1 mile E Henry Horton State Park, Marshall Co., (1, specimen escaped) 20 May 1992. *Site 2*: Cane Creek off Cane Creek Road, 0.5 mile S Pleasantville, Hickman Co., SIUC 19677 (6) 22 May 1992, (1, specimen returned to stream) 10 October 1992. *Site 3*: Beaverdam Creek at TN 50 bridge at Coble, Hickman Co., SIUC 19741 (1) 22 May 1992. *Site 4*: Beaverdam Creek at TN 100W bridge, 5 miles SSW Centerville, Hickman Co., SIUC 20713 (3) 1 November 1992. *Site 5*: Brushy Fork Creek off Brushy Road, 1 mile W junction with TN 48, N of Aetna, Hickman Co., SIUC 20514 (4) 1 November 1992. *Site 6*: Hurricane Creek off Hurricane Creek Road, 6 miles S Waverly, Humphreys Co., SIUC 20496 (1) 2 November 1992. *Site 7*: Big Swan Creek at TN 99 bridge, Lewis Co., SIUC 20148 (1) 23 July 1992. *Site 8*: East Fork Cane Creek off Cane Road, 4.5 miles NNW Hohenwald, Lewis Co., SIUC 20801 (2) 1 November 1992. *Site 9*: Buffalo River 0.5 mile downstream TN 50 bridge, Perry Co., SIUC 20119 (1) 26 July 1992. *Site 10*: Cane Creek 5.5 miles SSE Lobelville, TN 50 bridge, Perry Co., SIUC 20289 (1) 26 July 1992. *Site 11*: Buffalo River at TN 13 bridge, Perry Co., SIUC 20182 (2) 25 July 1992. *Site 12*: Buffalo River at Mayberry Road, 1.5 miles ESE Little Hope, Wayne Co., SIUC 20254 (3) 25 July 1992. *Site 13*: Fortyeight Creek at US 64 crossing, 6 miles E Waynesboro, Wayne Co., SIUC 20830 (3) 1 November 1992.

Sites sampled that did not yield saddled madtoms (all in Duck River system). *Bedford Co.*: Duck River below county route bridge at Halls Mills, River Mile 203.3, 7 miles NW Shelbyville, 19 May 1992. *Marshall Co.*: Duck River at Henry Horton State Park, River Mile 186.8, near Wilhoite Mills, 20 May 1992 and 10 October 1992. *Maury Co.*: Big Bigby Creek at Canaan, 21 May 1992; Leipers Creek at TN 247 bridge, 1 mile NE Williamsport, 31 October 1992. *Hickman Co.*:

Beaverdam Creek at West Beaverdam Road, 5 miles SSW Centerville, 22 May 1992; Big Swan Creek at TN 50 bridge, 3 miles ESE Centerville, 1 November 1992. *Humphreys Co.*: Tumbling Creek at Tumbling Creek Road, 10 miles SSE Waverly, 23 May 1992; Blue Creek at Hwy. 13 bridge, 2 miles S Waverly, 2 November 1992. *Lewis Co.*: West Fork Big Bigby Creek at junction of West Fork Road and Bigby Creek Road, 3 miles WSW Mt. Joy, 23 July 1992; Little Swan Creek at Natchez Trace Parkway, 23 July 1992; Buffalo River at Napier Road, 2 miles N Napier, 23 July 1992; Buffalo River at mouth of Grinders Creek, 24 July 1992; Little Buffalo River at TN 99 bridge, 1 mile S Oak Grove, 24 July 1992;

Rockhouse Creek 4.5 miles S Hogenwald at junction Rockhouse Road and Rockhouse Railroad Road, 1 November 1992. *Perry Co.*: Buffalo River at Gilmer Bridge Road, N edge of Lobelville, 26 July 1992; Coon Creek at TN 100 bridge, 2 miles E Linden, 1 November 1992. *Wayne Co.*: Moccasin Creek at Moccasin Creek Road, 2.5 miles SE Little Hope, 25 July 1992; Green River at Waynesboro Water Treatment Plant, 25 July 1992; Green River at Mt. Hope Road bridge, 2 miles N Waynesboro, 25 July 1992; Fortyeight Creek at US 64 bridge, 7 miles E Waynesboro, 25 July 1992.