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COBBLESTONE TIGER BEETLE SURVEY

09/13/95

**DOE-1465-95
DOE-FN EPAS
20
SURVEY**



Department of Energy
Fernald Environmental Management Project
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7160

SEP 13 1995

DOE-1465-95

Mr. James A. Saric, Remedial Project Director
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Region V - 5HRE-8J
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Chicago, IL 60604-3590

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, OH 45402-2911

Dear Mr. Saric and Mr. Schneider:

COBBLESTONE TIGER BEETLE SURVEY

Enclosed for your review is a revised report for the cobblestone tiger beetle (*Cicindela marginipennis*) survey conducted in June and July 1995 on the Great Miami River. This species is a category two candidate for federal listing and was found downstream from the Fernald property in 1988. The Whitewater River in Indiana, where populations of this species have been recorded, was used as a control river. This species was found in six locations downstream from the Fernald effluent pipe.

These survey results have been submitted to you to ensure that your agency has the latest information from Fernald and to obtain concurrence on the findings of this survey.

If you have any questions regarding this matter, please contact Pete Yerace at (513) 648-3161.

Sincerely,

Jack R. Craig
Fernald Remedial Action
Project Manager

FN:Yerace

Enclosure: As Stated

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Survey for the Cobblestone Tiger Beetle (*Cicindela marginipennis*)
on Sections of the Great Miami and Whitewater Rivers
for the Fernald Environmental Management Project

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15 July 1995

Survey for the Cobblestone Tiger Beetle (*Cicindela marginipennis*)
on Sections of the Great Miami and Whitewater Rivers
for the Fernald Environmental Management Project

Executive Summary: Two surveys of a 7.5-river mile section of the Great Miami River near the Fernald Environmental Management Project (FEMP) in Hamilton County, Ohio were conducted during June and July of 1995. A similar survey of a section of approximately 16 river miles of the Whitewater River in Franklin County, Indiana was conducted during this period. In addition, spot checks of historic localities and suitable, easily accessible sites in southeastern Indiana were made. Several areas of suitable habitat for the cobblestone tiger beetle (*Cicindela marginipennis*) was found on both of these survey areas. No cobblestone tiger beetles were found on the surveys of the Whitewater River on 15 June or the Great Miami River on 16 June. At least 39 individuals were observed at six sites on the Great Miami River on 11 July. At least 9 *C. marginipennis* were present at a locality, outside the formal survey area, on the Whitewater River in early July.

Introduction

Purpose

The purpose of this survey was to confirm the presence or absence and the approximate population size of the cobblestone tiger beetle in the Great Miami River downstream from the Fernald Environmental Management Project. This species was recorded in 1988 off-property in the Great Miami River approximately five river miles downstream from Fernald during a survey for the federally endangered Indiana bat (U.S. Department of Energy 1993). The Whitewater River watershed was incorporated into the survey as an independent control. Because more populations were known historically from the Whitewater River watershed, it was used to ensure that surveys of the lesser known section on the Great Miami River were being surveyed at times when the beetles were active at known sites in the entire region.

Status

The cobblestone tiger beetle is a category two candidate for federal listing. Its known populations are restricted to a narrow range of habitats on only a few river systems in eastern North America. Its restricted habitat on so few watersheds makes the species viability potentially vulnerable. In 1987 only 15 to 20 populations of this species were known nationally (Nature Conservancy 1992).

Current knowledge of this species' life history (e.g., factors influencing the timing of the beetle's adult activity (seasonally or diurnally), reproductive season, egg-laying and larval habitats, overwintering, relationships to food supply, behavior during high water periods, fecundity, survivorship, social behavior, etc.) is virtually non-existent. Without this information the health of populations and an evaluation of the potential negative impacts of many anthropogenic disturbances cannot be predicted with confidence. Without more information, determination of the species' candidacy relative to federal listing would be tenuous. The single

factor about which there can be little dispute is the species requirement for cobblestone habitats. Threats to the regeneration of these habitats are a clear problem for the species' viability (see discussion below). Habitat loss related to inundation from dam construction and or flood control is the greatest threat to the species.

Identification

The cobblestone tiger beetle is an easily recognized species. Its distinctive dark olive gray elytra (pair of hardened wing coverings that cover the "back" of a beetle's abdomen) with entire white margins broken by a few irregular indentations onto the olive gray, coupled with its conspicuous red abdomen, give it an appearance unlike that of any other tiger beetle in the region. It is approximately 12-14 mm in length, a length similar to most other species of *Cicindela* in the region. Illustrations of the species appearing in two references are presented in Figure 1.

One other species of tiger beetle, *Cicindela repanda*, is found frequently on moist sand and mud along rivers in southwestern Ohio and southeastern Indiana. Other species that would be expected on river bars in the Great Miami/ Whitewater River watersheds are: *C. formosa* (large, robust, pattern similar to *C. repanda*, on extensive areas of dry sand); *C. lepida* (small, pale, on extensive areas of dry sand); *C. duodecimguttata* (similar to *C. repanda*, moist soil in sparse vegetation in spring and fall); *C. punctulata* (small, all dark, abundant on open dry soils, usually away from water). Line drawings of the elytral patterns of these species are included in Figure 1. Graves and Brzoska (1991) list other species in the region.

Natural History of the Cobblestone Tiger Beetle

Distribution and Population Size:

The cobblestone tiger beetle is known from the medium-sized rivers of New England, southern Ohio, and southeastern Indiana. Scattered records exist from West Virginia, Alabama, and Mississippi (Boyd and Associates 1982).

In New England, it is found on the Connecticut River between Vermont and New Hampshire, on the Delaware River between New Jersey and Pennsylvania (Boyd 1978), and on the Susquehanna River in Pennsylvania (Leng 1902). In Ohio the beetle has been reported from the Little Miami River watershed in Clinton and Clermont counties, the Scioto River watershed in Hocking, Picaway and Ross counties, and the Great Miami River watershed in Hamilton and Butler counties (Blatchley 1910, Graves and Pearson 1973, Graves and Brozka 1991)

Blatchley (1910) in his review of *Cicindela* species from Indiana had no records for *C. marginipennis* but reported that because it had been "taken by Dury on a sand bar of the Little Miami River near Batavia Junction, Ohio, May 17. It therefore very probably occurs along the streams of the southeastern portion of Indiana."

Cicindela marginipennis was first discovered in the Great Miami/ Whitewater River watershed by Orland Blanchard (pers. comm.). He found a small population at a local gravel works in Richmond, Wayne County, Indiana in 1975 (Table 1). Subsequently, he located additional populations in Dearborn County, Indiana (1976) and Hamilton County, Ohio (1977) (Table 1). All of these records were from the Whitewater River watershed. Buskirk later located two additional populations along the Whitewater River in Franklin County, Indiana and one along the

Great Miami River in Hamilton Co., Ohio (Table 1). Knisley et al. (1987) report having collected *C. marginipennis* in Wayne, Franklin, and Dearborn counties, Indiana; however their records apply to sites discovered by Blanchard or Buskirk, not locations other than those listed in Table 1. Moreover, no other Indiana localities have been discovered outside the Whitewater River drainage. Cobblestone tiger beetle populations in the Miami/Whitewater River watershed are small to moderate in size (up to 40 individuals) (Buskirk, pers. obser.).

In 1988 during a Fernald survey of Indiana bat (*Myotis sodalis*) habitats with Jim Mills, Buskirk found a population of 30 to 40 *C. marginipennis* at a site on the Great Miami River (approx. two river miles west of New Baltimore, Hamilton County, Table 1). Graves and Brozka (1991) report the species from both Butler (Oxford) and Hamilton (Cincinnati) counties, but without specific localities or dates. These records are likely to be from the Great Miami River or its tributaries. In all Graves and Brozka (1991) mentioned only 7 localities for the species in Ohio.

A single record of a single individual collected in northeastern Mississippi (Graves and Pearson 1978) as well as reports from Alabama and West Virginia (Boyd and Associates 1982) suggest the cobblestone tiger beetle may be distributed through the connecting areas of Kentucky and Tennessee.

Habitats:

The cobblestone tiger beetle gets its name from its distinctive choice of habitat. It prefers areas of coarse gravel to fist-sized cobble on the bars along medium-sized rivers. In New Jersey, Boyd (1978) describes the preferred habitat as "rounded stones and small patches of sand on the upstream ends of islands in the middle of the upper Delaware River." Boyd (1978) reports that earlier New York and Pennsylvania records indicated the species was not restricted to mid-stream islands but that all of the recent New Jersey records were from islands. Dunn and Wilson (1979) described the habitat on the Connecticut River as "tightly packed cobblestones with scattered vegetation, which during spring runoff, are obviously under water for long periods of time." They found them in these habitats on the upstream end of a "cobble island, bar or spit." Knisley et al. (1987) characterize the species habitat in Indiana as "gravel bars on rivers." Blatchley (1910) said the Batavia Junction, Ohio locality was a "sand bar" but that early report is not likely to have been a discriminating description of the substrate. Blanchard (pers. comm.) found the beetle on flat, coarse gravel outwash with a wet (Wayne County) or dry (Dearborn County) silty matrix in gravel works away from, but within a few hundred meters of, the Whitewater River or its tributaries. His Hamilton County, Ohio site near Elizabethtown was a "gravel bar" at the side of the Whitewater River.

Buskirk's Franklin County, Indiana and Hamilton County, Ohio localities were on stream-side bars with greater than half-acre areas of open, unvegetated cobble. Often these cobble areas were intermixed with dry (typically) to moist (infrequently) sand and, in Hamilton County, Ohio, with mud-cracked sandy areas. He has observed the beetles most often on the cobble, often perched on tops of stones. Occasionally beetles have been located down to the moist sand at river's edge or out onto dry sand patches near cobble. Beetles are almost invariably found well above the normal, summer high-water levels, but on areas scoured clean of most vegetation and of much of their finer sediments by high spring floods.

Seasonal activity periods:

Tiger beetle species differ in their patterns of seasonal appearance as adults on the ground surface. Some are characterized as "spring-fall species" and are not often found during the

summer months. Others' peak activity occurs in a single summer event. However, for most species, larvae remain underground throughout the year.

The cobblestone tiger beetle is generally characterized as a "summer species" (Boyd, 1978, Knisley et al. 1987). In New Jersey the observed peak period of activity falls between 4 - 25 July, with earliest and latest dates reported being 14 May and 15 August (Boyd 1978). The single Mississippi record is 13 June (Graves and Pearson 1973).

In Ohio, the early date reported by Blatchley (1910) is 17 May on the Little Miami River.

Previous records for the Great Miami/ Whitewater River region are summarized in Table 1. Blanchard found cobblestone beetles in the northern Whitewater River watershed (Wayne County) as early as 14 June, after failing to find them on six visits to the site between 1 May and 8 June. Buskirk found at least 30 individuals at the site near Cedar Grove (Franklin County, IN) on 8 June. The latest record of the species' being active on the surface is 27 September at Cedar Grove. Hence, the range of dates on which *C. marginipennis* has been recorded in the Great Miami/ Whitewater River watershed is from 8 June to 27 September.

Methods

Coverage:

Potentially suitable habitats along sections of the Great Miami and Whitewater Rivers were surveyed during the summer of 1995. Suitable habitat was defined as areas greater than 0.1 acres of river side or island gravel bar with at least scattered pen patches of cobble-sized (primarily 2 to 25 cm approximate diameter) stones exposed.

The Great Miami River from river mile 25.5 (State Rte. 126 bridge, Ross, Ohio) to mile 18, was surveyed by canoe on 16 June and 11 July. On the Whitewater River a 16-mile section between Brookville and New Trenton was surveyed by canoe on 15 June. A shorter, 8-mile section between Brookville and State Route 1 was surveyed on 13 July. This section contained most of the potentially suitable sites discovered on the 15 June survey.

In addition to these canoe surveys, spot checks of suitable or previously occupied habitats were made in late June and early July. These checks included additional areas in the watershed that were not included during the canoe surveys: the west fork of the Whitewater River from NE Fayette County, IN to Brookville, IN; a historic site at a local gravel works in Richmond, Wayne County, IN; and easily accessible sites on the east fork of the Whitewater River in Wayne County, IN.

All survey sites that were canoed in 1995 are identified on topographic maps (Figures 2 and 3) and characterized in Table 2.

Survey techniques:

During their periods of activity, cobblestone tiger beetles can be easily discovered by slowly walking back and forth through potential habitat. The beetles usually flush one to three meters in front of the surveyor, fly off in a relatively straight line and land about five to eight meters away. Either the beetles are visible when they land or they will begin moving within a minute or two. A second technique that works well for detecting the beetles is for the observer to stand stationarily and wait for the beetles to start moving and foraging. Usually the beetles return to activity within a minute of "freezing" at the initial approach of the surveyor. Close-focusing

binoculars can be used to confirm identifications, but the practiced eye soon discriminates *C. marginipennis* from other insects (including *C. repanda*) on the bars and islands.

At most locations latitude and longitude were determined using a Magellan Trailblazer XL Global Positioning System receiver. The other locations were determined from topographic maps. This species distribution information will be useful for threatened and endangered species databases utilized by state and federal agencies such as the Ohio Department of Natural Resources and U.S. Fish and Wildlife Service. One of the primary reasons this species remains a candidate for listing is the lack of distribution data in the Midwest.

Results

Abundance and distribution:

In 1995 at least eight areas of potentially suitable habitat were located on the 7.5-mile survey section of the Great Miami River. Cobblestone Tiger Beetles were located at six of these sites. None were found during the 16 June survey but a total of at least 39 were observed on 11 July (Table 2). Two sites had moderately-sized populations (>15 individuals) present while four sites had only one or two.

Thirteen apparently suitable sites for *C. marginipennis* were located in the 16-mile section of the Whitewater River between Brookville, IN and New Trenton, IN on 15 June. No cobblestone tiger beetles were found on that survey. None were found during the subsequent survey on 13 July at nine locations upstream from Indiana State Route 1.

Cicindela marginipennis was found during spot checks of the Whitewater River only on a large cobble, gravel and sand bar on the east fork of the Whitewater River approximately 3.7 km west of Brookville: 3 July (nine individuals); 8 July (three individuals). This was the only population found on the Whitewater River watershed in 1995.

Habitat associations:

With the addition of six new localities the habitat associations of this species are clearer. It was found on both islands and streamside bars. It was only found in areas with some patches of dry cobblestones present above the recent high water levels. These patches were characterized by clean stones, those not encrusted or covered with dry silt, mud or salts. While a few cobblestone tiger beetles were observed on wet mud or sand, they were always near dry, clean cobble patches. Most beetles were observed foraging on the higher, drier cobble areas on islands or bars. In most situations these densely-packed stones were in a matrix of dry sand and they were often small (<1 to 4 m²) patches of open sand.

The Whitewater River site where cobblestone tiger beetles were observed was one of the areas known to hold a population in the past. It was the only historic site at which changes had not diminished the quality of the habitat for this beetle. Three of the Whitewater River watershed localities at which *C. marginipennis* had been discovered (Table 1) had undergone the following changes by 1995:

- Local gravel works, Wayne County, Indiana
- gravel flats taken over by willows and other vegetation.

Cedar Grove, Franklin County, Indiana

- cobble bar taken over by willows and other vegetation, only small patches of open habitat remain.

New Trenton, Dearborn County, Indiana

- in 1987 this area had become unsuitable due to increased vegetation, only a few areas of open gravel remained
- by 1995 the gravel works had been converted to a semi-trailer truck driving school practice area; habitat more open and gravel covered than in 1987, but greatly disturbed and compacted.

Elizabethtown, Hamilton County, Ohio

- this site was not revisited during 1995.

The historic locality for the cobblestone tiger beetle on the Great Miami River was approximately 2 miles west of New Baltimore, Hamilton County, OH. This was initially discovered on the 1988 Fernald survey for Indiana Bats conducted by Jim Mills (U.S.D.O.E. 1993). This habitat area was so changed that its exact location could not be determined in 1995. Either encroaching vegetation and/or a shift of the river's course had made the area unrecognizable (and unsuitable for cobblestone tiger beetles).

Discussion and Conclusions

The cobblestone tiger beetle was found in small to moderate numbers at six locations on the section of the Great Miami River surveyed between river miles 25.5 (Ohio State Route 126 bridge, Ross) and 18. This constitutes a significant increase in the known localities for this species nationally. No published reports indicate similar densities of habitats occupied by this species elsewhere in its range.

Two of the 1995 Great Miami River populations contained more than 15 observed individuals. Four had only one or two beetles detected. It is possible that some, particularly the sightings of singles or two, represent dispersing individuals and not breeding localities for the species. However, the confirmation of this speculation is outside the scope of this report.

The species was detected at only one site on the Whitewater River in Indiana in 1995 despite the presence of many areas of apparently suitable habitat. The factors accounting for the differences in apparent abundance between these watersheds cannot be determined at this time.

The absence of this species on the June survey at a time when populations have been active historically and a frequent detection in July suggest the timing of adult activity is not consistent from year to year. Without a better knowledge of this species' ecology and life history traits these apparent inconsistencies in the timing of the species' presence cannot be interpreted.

The preferred habitat of this species is clean (not mud, silt or salt-coated), densely-packed cobblestone patches with at most sparse low vegetation present. While it may be found on wet sand or mud near cobble patches it is most often observed in cobble intermixed with sandy matrix on the higher, drier portions of islands and bars. Its habitat is regenerated by periodic, scouring floods. This species is threatened by both long-term inundation of its habitat by water or the reduction in the regeneration of its habitat where flood control practices would moderate or prevent periods of scouring flooding. Without high velocity floods the fluvial processes structuring sediments (Ritter et al. 1995) would be expected to change the physical

characteristics of the habitats and vegetational succession would tend to take over current habitat. These changes would tend to make formerly occupied habitat sites unsuitable. Most known historic *C. marginipennis* localities in the Great Miami and Whitewater River watersheds have undergone habitat succession or modification and are no longer occupied by cobblestone tiger beetles. This suggests that there may be a relatively rapid rate of turnover in this species habitat.

Literature Cited

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Table 1. Historic observations of Cobblestone Tiger Beetles (*Cicindela marginipennis*) in the Great Miami and Whitewater River watersheds.

Lat./Long.	Map Location and Description of Locality	Date	# seen
Great Miami River:			
39 15.8N	OH: Hamilton Co., approx. 2 river miles WSW (downstream) of New Baltimore.	13-Jul-88	30
84 41.7W	approximate Cobble shore with mud-crack matrix in spots, W bank.		
Whitewater River:			
39 50.3N	IN: Wayne Co., Richmond, New Paris Pike	14-Jun-75	3 Blanchard per. comm.
84 49.1W		21-Jun-75	2
		1-May-76	0
		4-May-76	0
		16-May-76	0
		1-Jun-76	0
		6-Jun-76	0
		8-Jun-76	0
		26-Jun-76	6
		18-Jun-77	5
		21-Jun-77	?
		31-Jul-77	12
		28-Aug-77	1
		22-Sep-77	0
		28-Jul-87	0 Buskirk field notes
Franklin Co., approx. 3.7 km W of Brookville			
39 25.8N	IN: Franklin Co., approx. 3.7 km W of Brookville	23-Jun-87	3 Buskirk field notes
85 03.4W	gravel/cobble/sand bar on SW side of west fork of Whitewater River.	25-Jul-87	11
		23-Aug-87	5-6

Table 1 (cont.).

Lat./Long.	Map Location and Description of Locality	Date	# seen	Notes
39 21.5N 84 57.3W	IN: Franklin Co., approx. 1.6 km W of Cedar Grove gravel/cobble bar on east bank below and upstream of Rte 1 bridge.	8-Jun-87 23-Jun-87 13-Jul-87 2-Aug-87 23-Aug-87 13-Sep-87 27-Sep-87 1-May-88 11-Jun-88 24-Jun-89	30-40 1 1 2 12 8+ 2 0 5 0	Buskirk field notes " " " " " " " " " "
39 16.9N 84 52.5W	IN: Dearborn Co., approx. 1.5km WNW junct. Rte 46 and 52, SW of New Trenton. on west side of river road W of river, 0.3km N of Rte. 46 area of coarse gravel with water-deposited, dry silt	4-Jul-76 8-Jun-87 14-Jun-95	2 0 0	Blanchard per. comm. Buskirk field notes Buskirk pre-contract field observation
39 08.5N 84 47.3W	OH: Hamilton Co., 1.7 km NE of Elizabethtown west side of Whitewater River N of Rte. 50 bridge between Cleves and Elizabethtown, sandbar	30-Jun-77	1	Blanchard per. comm.

Table 2. Results of 1995 surveys for Cobblestone Tiger Beetles (*Cicindela marginipennis*) on the Great Miami and Whitewater River watersheds. Map locations are those given on figures 2 and 3.

Lat./Long.	Map Location and Description of Locality Loc.	Survey/Spot Check Date	# seen
Great Miami River			
	1 OH: Hamilton Co., approx. 3 km N. of New Baltimore There is a series of 3 islands at this site with beetles found only on the middle one (1b) and not on the northern (1a) or the southern (unmapped) ones.		
39 17.7N	1a OH: Hamilton Co., approx. 3.1 km N. of New Baltimore	15-Jun-95	0
84 39.9W	approx. river mile 24.0, across from Fernald outflow pipe Cobble island and bar on E bank, most covered with fine silt; little habitat above recent high water line	11-Jul-95	0
39 17.4N	1b OH: Hamilton Co., approx. 2.8 km NNE. of New Baltimore,	15-Jun-95	0
84 39.8W	approx. river mile 23.7, just below Fernald outflow pipe at point where pipeline crosses under river. Island with approx. 0.5 acres of cobble along ridge with sparse to dense vegetation.	11-Jul-95	17
39 17.3N	2 OH: Hamilton Co., approx. 2.6 km NNE. of New Baltimore,	15-Jun-95	0
84 39.3W	approximately river mile 23.2. Cobble and sand beach on inner (W) bank of bend in river. Area of suitable habitat approximately 0.1 acres.	11-Jul-95	1

Table 2 (cont.).

Lat./Long.	Map Location and Description of Locality Loc.	Survey/Spot Check Date	# seen
39 15.8N 84 40.5W	3 OH: Hamilton Co., approx. 0.7 km W. of New Baltimore bridge, approximately river mile 20.4. Approx. 0.2 acre island of flat cobble without sand matrix or vegetation.	15-Jun-95 11-Jul-95	0 2
39 15.8N 84 40.7W	4 OH: Hamilton Co., approx. 1 km W. of New Baltimore bridge, approximately river mile 20.1. Beach on E bank; approx. area 0.1 acres of cobble with patches of muddy sand.	15-Jun-95 11-Jul-95	0 1
39 15.8N 84 41.5W	5 OH: Hamilton Co., approx. 1.8 km W. of New Baltimore bridge, approximately river mile 19.7. Flat island of pure cobble just below rapids; no vegetation, no high ground; cobbles covered with fine silt.	11-Jul-95	0
39 15.7N 84 41.5W	6 OH: Hamilton Co., approx. 2.2 km W. of New Baltimore bridge, approximately river mile 19.4. Beach on E bank; approx. area 2 acres, but with less than 0.2 acres of clean cobble above silt and mud-covered areas. Area much disturbed by bulldozers.	15-Jun-95 11-Jul-95	0 2
39 14.8N 84 42.4W	7 OH: Hamilton Co., approx. 3.5 km N of Miamitown, approx. river mile 18.0. Beach on W bank; approx. area 0.2 acres with sloping clean cobblestones mixed with patches of dry sand and wet muddy silt.	15-Jun-95 11-Jul-95	0 16-20

Table 2 (cont.).

Lat./Long.	Map Location and Description of Locality Loc.	Survey/Spot Check Date	# seen
Whitewater River			
39 25.8N	IN: Franklin Co., approx. 3.7 km W of Brookville, extensive	3-Jul-95	9
85 03.4W	gravel/cobble/sand bar on SW side of west fork of Whitewater River.	8-Jul-95	3
39 24.6N	1 IN: Franklin Co., Morgan Canoe Livery	15-Jun-95	0
85 00.8W	north end of cobble bar just below campsite	13-Jul-95	0
39 24.5N	2 IN: Franklin Co., just above bridge S. of Morgan Canoe Livery	15-Jun-95	0
85 00.8W	south end of cobble/sand bar just upstream from bridge	13-Jul-95	0
39 24.3N	3 IN: Franklin Co., just below bridge S. of Morgan Canoe Livery	15-Jun-95	0
85 00.6W	moderate area of cobble island and bank below bridge	13-Jul-95	0
39 23.7N	4 IN: Franklin Co., approx. 2 km S of Brookville	15-Jun-95	0
85 00.6W	cobble bar on inside of river bend	13-Jul-95	0
39 23.6N	5 IN: Franklin Co., approx. 0.5 km E. of site 4	15-Jun-95	0
85 00.3W	cobble island in river	13-Jul-95	0
39 23.0N	6 IN: Franklin Co., approx. 2 km W. of Mound Haven	15-Jun-95	0
84 59.9W	cobble bar on inside of river bend	13-Jul-95	0
39 22.9N	7 IN: Franklin Co., approx. 1.5 km W. of Mound Haven	15-Jun-95	0
84 59.6W	cobble bar on W. bank of river	13-Jul-95	0

Table 2 (cont.).

Lat./Long. Loc.	Map Location and Description of Locality	Survey/Spot Check Date	# seen
39 23.0N 84 59.1W	8 IN: Franklin Co., approx. 0.75 km W. of Mound Haven small, wet gravel-sand island	15-Jun-95	0
39 23.1N 84 59.0W	9 IN: Franklin Co., approx. 0.25 km W. of Mound Haven extensive area of cobble on W. bank of river	15-Jun-95 13-Jul-95	0 0
39 22.8N 84 58.6W	10 IN: Franklin Co., approx. 0.3 km S. of Mound Haven extensive area of cobble on E. bank of river	15-Jun-95 13-Jul-95	0 0
39 21.5N 84 57.3W	11 IN: Franklin Co., approx. 1.6 km W of Cedar Grove gravel/cobble bar on east bank below and upstream of Rte 1 bridge.	11-Jun-95 15-Jun-95 3-Jul-95 8-Jul-95	0 0 0 0
39 21.3N 84 56.2W	12 IN: Franklin Co., approx. 0.75 km W of Cedar Grove mouth of tributary on E. bank of river	15-Jun-95	0
39 20.0N 84 55.2W	13 IN: Franklin Co., approx. 2 km SE. of Cedar Grove small area of cobble on W. bank of river	15-Jun-95	0
39 18.9N 84 54.2W	14 IN: Franklin Co., approx. .5 km NW. of New Trenton cobble island upstream from St. Peters Road bridge	15-Jun-95 8-Jul-95	0 0

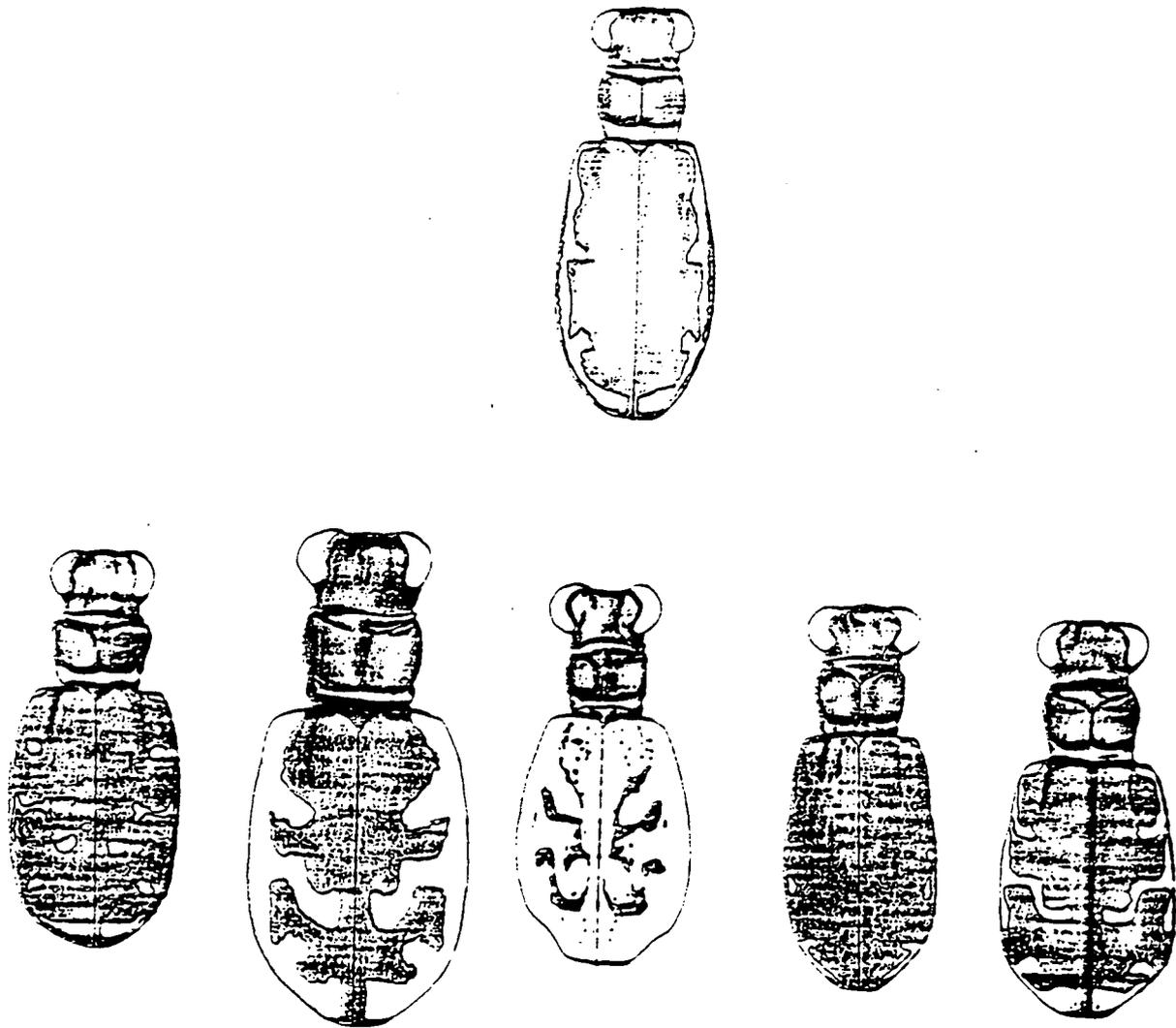


Figure 1. Six tiger beetles (*Cicindela*) that could be expected on open riparian bars in southwestern Ohio. *Cicindela marginipennis* is shown on the top; the specimen illustrated is from Clinton County, Ohio. In the second row from left to right respectively are *C. duodecimguttata*, *C. formosa*, *C. lepida*, *C. punctulata* and *C. repanda*. Illustrations taken from Graves and Pearson (1973).

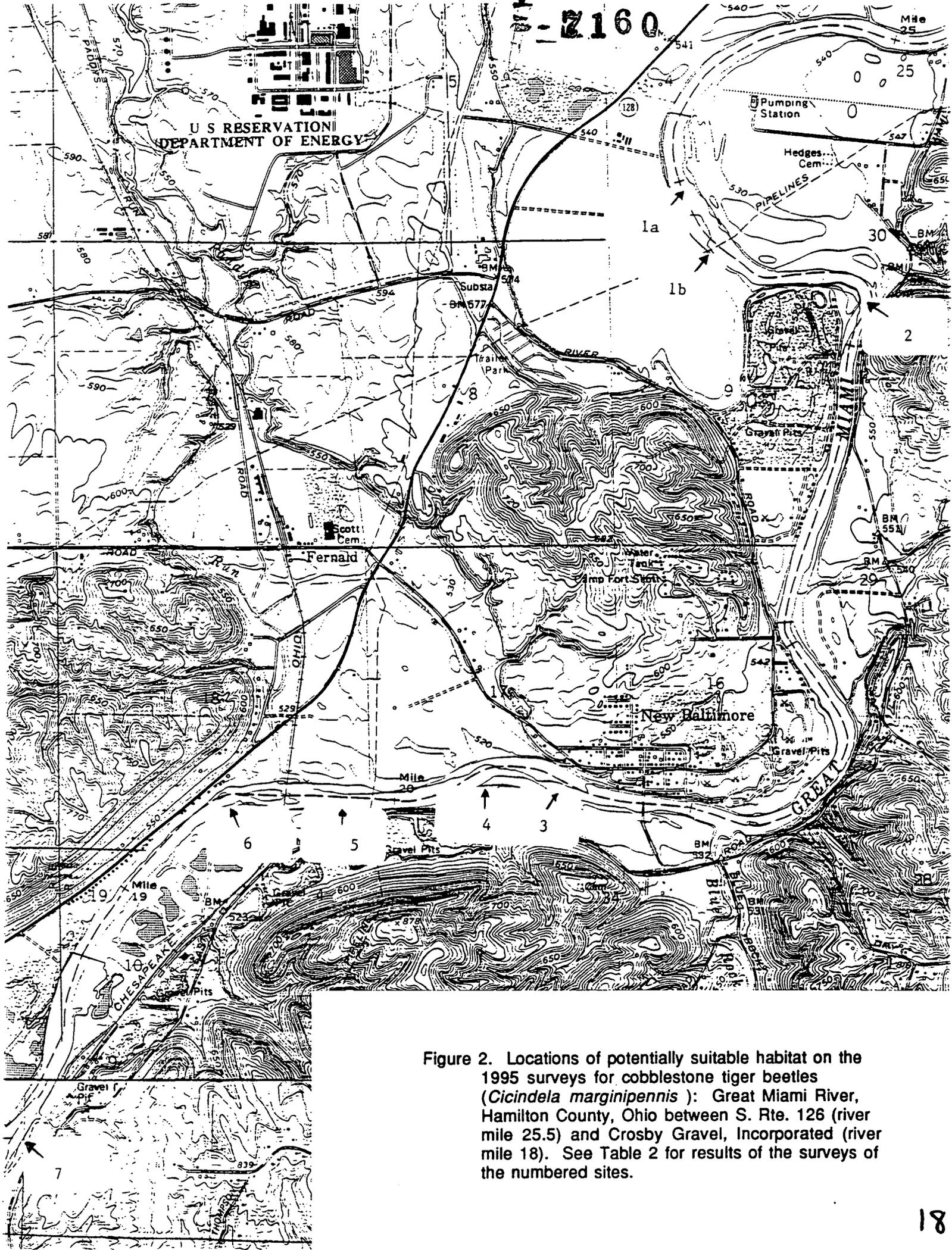


Figure 2. Locations of potentially suitable habitat on the 1995 surveys for cobblestone tiger beetles (*Cicindela marginipennis*): Great Miami River, Hamilton County, Ohio between S. Rte. 126 (river mile 25.5) and Crosby Gravel, Incorporated (river mile 18). See Table 2 for results of the surveys of the numbered sites.

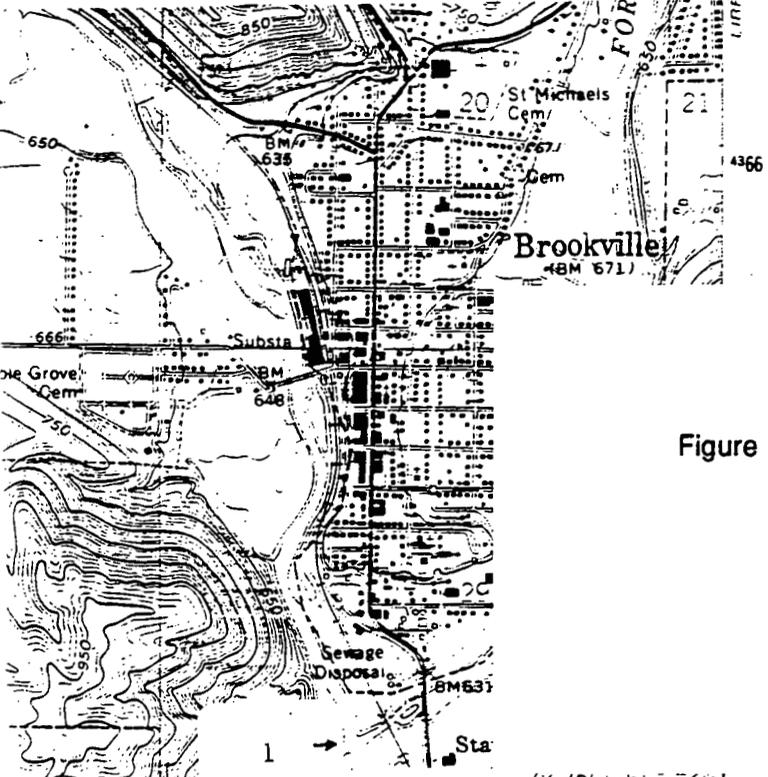


Figure 3. Locations of potentially suitable habitat on the 1995 surveys for cobblestone tiger beetles (*Cicindela marginipennis*): Whitewater River, Franklin County, Indiana, between Brookville and New Trenton. See Table 2 for results of the surveys of the numbered sites.

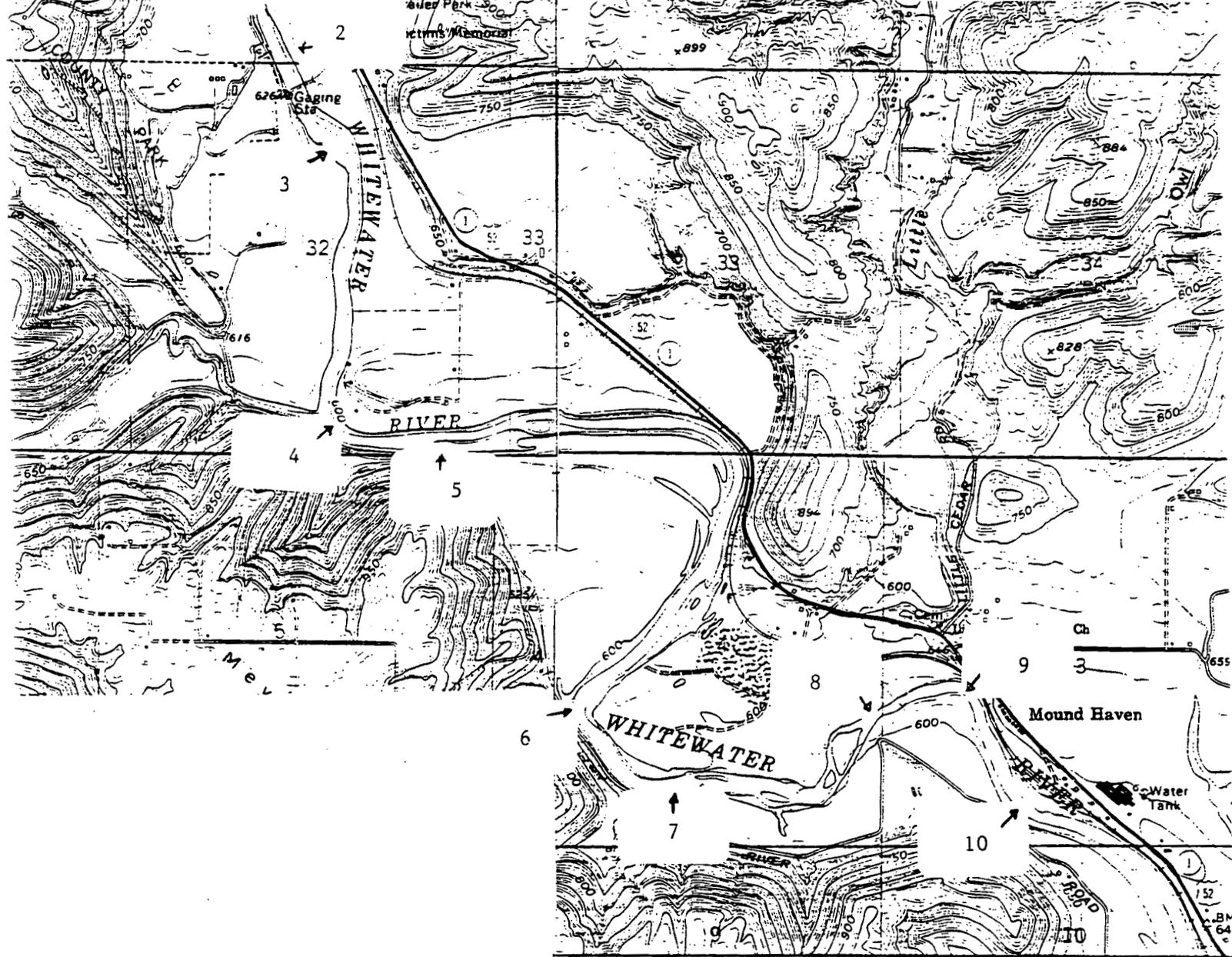


Figure 3 (continued 2 of 3). Locations of potentially suitable habitat on the 1995 surveys for cobblesone tiger beetles (*Cicindela marginipennis*): Whitewater River, Franklin County, Indiana, between Brookville and New Trenton. See Table 2 for results of the surveys of the numbered sites.

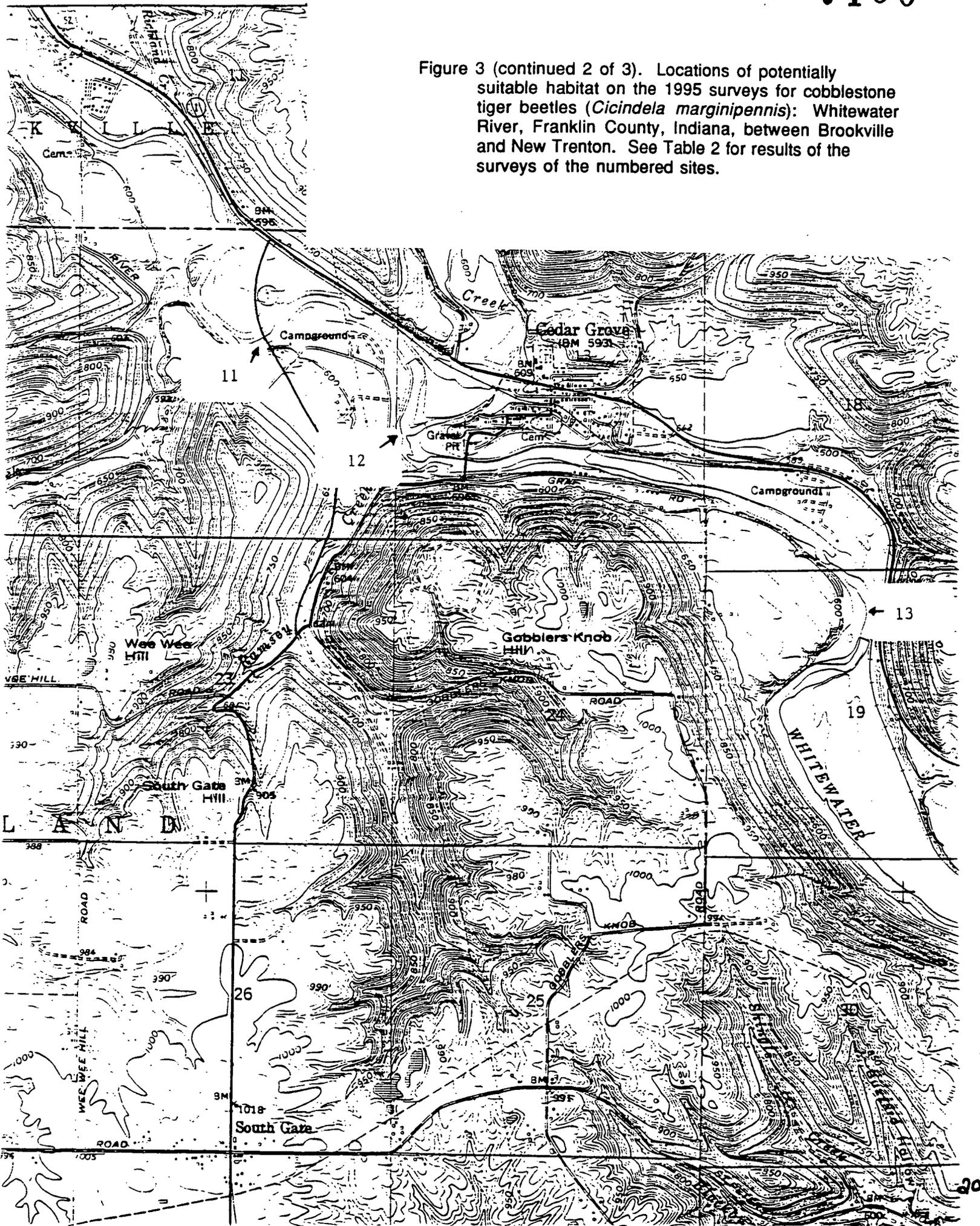


Figure 3 (continued 3 of 3). Locations of potentially suitable habitat on the 1995 surveys for cobblestone tiger beetles (*Cicindela marginipennis*): Whitewater River, Franklin County, Indiana, between Brookville and New Trenton. See Table 2 for results of the surveys of the numbered sites.

