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**SURVEY OF THE THE FRESHWATER MUSSELS
(MOLLUSCA: UNIONIDAE)
OF THE WABASH RIVER DRAINAGE**

FINAL REPORT

Kevin S. Cummings, Christine A. Mayer, and Lawrence M. Page

**Center for Biodiversity
Technical Report 1992 (b)**

**Illinois Natural History Survey
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Prepared for

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Division of Fish and Wildlife
607 State Office Building
Indianapolis, Indiana
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**Study Funded by a Grant from the
Indiana Department of Natural Resources
Nongame and Endangered Species Wildlife Program**

**Endangered Species Act Project
E - 1, Study 1**

TABLE OF CONTENTS

	PAGE
LIST OF FIGURES	ii
LIST OF TABLES	iii
INTRODUCTION.....	2
METHODS.....	12
STUDY AREA.....	14
RESULTS & DISCUSSION.....	15
BASIN SUMMARIES	19
COMMERCIAL HARVEST PRESSURE & RECOMMENDATIONS	30
SPECIES ACCOUNTS	31
ACKNOWLEDGEMENTS	184
LITERATURE CITED.....	185
APPENDIX	190

LIST OF FIGURES

	PAGE
Figure 1. Collection sites in the Wabash River drainage, 1987-1991	13
Figure 2. Number of species collected per site in the Wabash, White, and Tippecanoe rivers, 1987-1991.....	22

LIST OF TABLES

	PAGE
Table 1. Freshwater mussels of the Wabash, White, and Tippecanoe rivers, Indiana, 1987-1991.....	3
Table 2. Freshwater mussels reported from the Wabash River, Indiana.....	5
Table 3. Freshwater mussels reported from the White River drainage, Indiana.....	7
Table 4. Freshwater mussels reported from the Tippecanoe River, Indiana.....	9
Table 5. Site by site listing of all mussel species collected in the lower Wabash River, 1987.....	20
Table 6. Site by site listing of all mussel species collected in the upper and middle Wabash River, 1988.....	24
Table 7. Site by site listing of all mussel species collected in the White River drainage, 1989-1991.....	26
Table 8. Site by site listing of all mussel species collected in the Tippecanoe River, 1987.....	29

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ABSTRACT

A survey was conducted to determine the distribution and status of freshwater mussels (Mollusca: Pelecypoda: Unionidae) in the Wabash, White, and Tippecanoe rivers and selected tributaries. Living mussels and shells of dead individuals were collected at 100 sites in the Wabash River drainage from 1987 through 1991: 53 sites in the Wabash River, 16 sites in the Tippecanoe River, and 31 sites in the White River and selected tributaries. Sixty-seven species of unionids were found, but only 49 were collected alive. This survey and an examination of the literature and museum records brings the total number of species recorded from the Wabash, White, and Tippecanoe rivers to 75. The three most abundant species found were *Leptodea fragilis* (Rafinesque, 1820), *Obovaria olivaria* (Rafinesque, 1820), and *Quadrula quadrula* (Rafinesque, 1820), which together accounted for 41% of the living mussels collected. Two federally endangered species, *Cyprogenia stegaria* (Rafinesque, 1820) and *Potamilus capax* (Green, 1832), and two federal candidate species, *Pleurobema clava* (Lamarck, 1819) and *Toxolasma lividus* (Rafinesque, 1831) were found living in the drainage. Two species listed as endangered in Indiana, *Plethobasus cyphus* (Rafinesque, 1820) and *Quadrula cylindrica* (Say, 1817), and three species of special concern, *Pleurobema cordatum* (Rafinesque, 1820), *Lampsilis fasciola* Rafinesque, 1820, and *Villosa lienosa* (Conrad, 1834) were also found alive. A comparison with past studies indicated that many species which were formerly widespread and abundant are now extinct, extirpated, endangered or drastically reduced in range.

INTRODUCTION

The documented decline in the North American mussel fauna over the last 100 years has prompted the federal government to provide protection for 43 species of mussels under the Endangered Species Act of 1973 (P.L. 93-205) (USFWS, 1991). Although federal listing as endangered is intended to protect species from further decline and to provide for recovery if possible, specific information concerning distribution is often lacking. The historical occurrence of rare, threatened, or endangered mussels, together with the present decline of the unionid fauna in North America, underscored the need to determine the status of mussels in the Wabash River drainage. Such information is vital for the protection of existing populations, particularly in areas where there is political or economic pressure for further alteration of habitats or exploitation of the fauna.

The Wabash River drainage in Indiana and Illinois historically supported a diverse and abundant mussel fauna. The freshwater mussels (Unionidae) of the Wabash River have been studied for over 170 years. Thomas Say published some of the first papers on North American mollusks which were based on specimens he collected in the Wabash River at New Harmony, Indiana. Seventy-five species of unionids have been reported from the Wabash River drainage by various authors (Stein, 1880; Call, 1894, 1896, 1897, 1900; Blatchley & Daniels, 1903; Daniels, 1903, 1914; Goodrich & van der Schalie, 1944; Meyer, 1974; Clark, 1976) (Tables 1-4). Few surveys on any of the headwater streams of the Wabash River have been published. However, available data from the literature (Call, 1900; Daniels, 1903; Goodrich & van der Schalie, 1944) and examination of specimens in museum collections indicated that many species which are listed as federally endangered or are candidates for listing were present at one time in these streams.

In their publication on the Mollusca of Indiana, Goodrich and van der Schalie (1944) listed 69 species from the Wabash River (Table 2). They based their paper on existing collections and stated that the amount of material available for charting the distribution of the mussels of the Wabash River was insufficient. They further stated "The ranges of distribution within such a stream would be more exact and perhaps more striking if one could collect with just such a mapping program in mind." A table (1944:262-263) based on records from various sources showed what they perceived to be the upstream to downstream distribution of freshwater mussels in the Wabash River. An examination of the table shows that the data were uneven and highly skewed with most of the species having been reported from the large cities located on the river, namely Lafayette, Terre Haute, and New Harmony.

Commercial shelling for pearl buttons around the turn of the century and in the early 1960's for the cultured pearl industry seriously depleted mussel populations and, in many instances, beds of commercially valuable species were extirpated (Krumholz et al., 1970). By the mid-1960's, a serious decline in the mussel fauna of the Wabash River was apparent and in 1967 the Indiana Department of Natural Resources (IDNR) issued

Table 1. Freshwater mussels (Unionidae) of the Wabash, White, and Tippecanoe rivers, Indiana, 1987-1991. Numbers represent individuals collected. Species listed alphabetically within subfamily.

Species	Tippecanoe	White	Wabash	TOTAL
Subfamily Cumberlandinae				
<i>Cumberlandia monodonta</i> (Say, 1829)			SF	SF
Subfamily Ambleminae				
<i>Amblema plicata</i> (Say, 1817)	154	76	161	391
<i>Cyclonaias tuberculata</i> (Rafinesque, 1820)	97	2	26	125
<i>Elliptio crassidens</i> (Lamarck, 1819)		17	6	23
<i>Elliptio dilatata</i> (Rafinesque, 1820)	36	159	D	195
<i>Fusconaia ebena</i> (Lea, 1831)		D	8	8
<i>Fusconaia flava</i> (Rafinesque, 1820)	81	91	44	216
<i>Fusconaia subrotunda</i> (Lea, 1831) FC, SE		WD	WD	WD
<i>Hemistena lata</i> (Rafinesque, 1820) FE			SF	SF
<i>Megalonaias nervosa</i> (Rafinesque, 1820)		32	6	38
<i>Plethobasus cicatricosus</i> (Say, 1829) FE			SF	SF
<i>Plethobasus cyphus</i> (Rafinesque, 1820) SE	10		1	11
<i>Pleurobema clava</i> (Lamarck, 1819) FC, SE	19	WD	WD	19
<i>Pleurobema cordatum</i> (Rafinesque, 1820) SC		1	D	1
<i>Pleurobema plenum</i> (Lea, 1840) FE, SE		WD	WD	WD
<i>Pleurobema rubrum</i> (Rafinesque, 1820) SE	SF	WD	WD	WD
<i>Pleurobema sintoxia</i> (Rafinesque, 1820)	118	D	3	121
<i>Quadrula cylindrica</i> (Say, 1817) SE	9	WD	1	10
<i>Quadrula metanevra</i> (Rafinesque, 1820)	6	1	94	101
<i>Quadrula nodulata</i> (Rafinesque, 1820)		2	10	12
<i>Quadrula pustulosa</i> (Lea, 1831)	205	29	140	374
<i>Quadrula quadrula</i> (Rafinesque, 1820)	39	101	339	479
<i>Tritogonia verrucosa</i> (Rafinesque, 1820)	7	74	85	166
<i>Unio merus tetralasmus</i> (Say, 1831)			D	D
Subfamily Anodontinae				
<i>Alasmidonta marginata</i> Say, 1818	41	26	11	78
<i>Alasmidonta viridis</i> (Rafinesque, 1820)	WD	4		4
<i>Anodonta grandis</i> Say, 1829	61	104	41	206
<i>Anodonta imbecillis</i> Say, 1829	10	6	137	153
<i>Anodonta suborbiculata</i> Say, 1831	5	D	1	6
<i>Anodontoides ferussacianus</i> (Lea, 1834)		15	D	15
<i>Arcidens confragosus</i> (Say, 1829)		9	1	10
<i>Lasmigona complanata</i> (Barnes, 1823)	84	65	55	204
<i>Lasmigona compressa</i> (Lea, 1829)	4	5		9
<i>Lasmigona costata</i> (Rafinesque, 1820)	51	34	17	102
<i>Simpsonaias ambigua</i> (Say, 1825) FC, SC		WD		WD
<i>Strophitus undulatus</i> (Say, 1817)	47	31	22	100
Subfamily Lampsillinae				
<i>Actinonaias ligamentina</i> (Lamarck, 1819)	117	21	131	269
<i>Cyprogenia stegaria</i> (Rafinesque, 1820) FE, SE	D	WD	1	1
<i>Ellipsaria lineolata</i> (Rafinesque, 1820)		D	D	D
<i>Epioblasma flexuosa</i> (Rafinesque, 1820) †			SF	SF
<i>Epioblasma obliquata</i> (Rafinesque, 1820) FE, SE			SF	SF
<i>Epioblasma propinqua</i> (Lea, 1857) †		WD	SF	WD
<i>Epioblasma rangiana</i> (Lea, 1839) FC, SE	WD	WD	WD	WD
<i>Epioblasma torulosa</i> (Rafinesque, 1820) FE, SE		WD	WD	WD
<i>Epioblasma triquetra</i> (Rafinesque, 1820) FC, SE	D	WD	SF	D
<i>Lampsilis cardium</i> Rafinesque, 1820	65	74	44	183

Table 1. continued.

Species	Tippecanoe	White	Wabash	TOTAL
<i>Lampsilis fasciola</i> Rafinesque, 1820 SC	5	1	6	12
<i>Lampsilis ovata</i> (Say, 1817)		SF	SF	SF
<i>Lampsilis siliquoidea</i> (Barnes, 1823)	34	76	11	121
<i>Lampsilis teres</i> (Rafinesque, 1820)		5	7	12
<i>Leptodea fragilis</i> (Rafinesque, 1820)	5	362	837	1204
<i>Ligumia recta</i> (Lamarck, 1819)	3	WD	18	21
<i>Obliquaria reflexa</i> Rafinesque, 1820		16	85	101
<i>Obovaria olivaria</i> (Rafinesque, 1820)		42	1114	1156
<i>Obovaria retusa</i> (Lamarck, 1819) FE		WD	WD	WD
<i>Obovaria subrotunda</i> (Rafinesque, 1820)	17	D	WD	17
<i>Potamilus alatus</i> (Say, 1817)	5	103	66	174
<i>Potamilus capax</i> (Green, 1832) FE, SE			9	9
<i>Potamilus ohioensis</i> (Rafinesque, 1820)		27	50	77
<i>Ptychobranchus fasciolaris</i> (Rafinesque, 1820)	131	3	WD	134
<i>Toxolasma lividus</i> (Rafinesque, 1831) FC	2	1	WD	3
<i>Toxolasma parvum</i> (Barnes, 1823)	1	D		1
<i>Truncilla donaciformis</i> (Lea, 1828)	D	22	37	59
<i>Truncilla truncata</i> Rafinesque, 1820	5	42	159	206
<i>Villosa fabalis</i> (Lea, 1831) FC, SC	WD	WD	WD	WD
<i>Villosa iris</i> (Lea, 1829)	24	D	WD	24
<i>Villosa lienosa</i> (Conrad, 1834) SC		2		2
NUMBER OF INDIVIDUALS	1498	1681	3784	6963
NUMBER OF SPECIES LIVE	33	37	37	49
NUMBER OF SPECIES DEAD	7	22	25	18
NUMBER OF SPECIES LIVE & DEAD	40	59	62	67

D = Fresh Dead
 WD = Weathered Dead
 SF = Sub-fossil

Abbreviations following species names are status designations as follows:

(†) = Extinct
 FE = Federally Endangered
 FC = Federal Candidate Species
 SE = Indiana State Endangered
 SC = Indiana Species of Special Concern

Table 2. Freshwater mussels (Unionidae) reported from the Wabash River, Indiana.
Species listed alphabetically within subfamily.

Species	Museum Records	Call 1900	Daniels 1906	G & V 1944	Meyer 1968*	Clark 1976**	This study 1987-88
Subfamily Cumberlandinae							
<i>Cumberlandia monodonta</i> (Say, 1829)	x	x	x	x			SF
Subfamily Ambleminae							
<i>Amblema plicata</i> (Say, 1817)	x	x	x	x	C	C	161
<i>Cyclonaias tuberculata</i> (Rafinesque, 1820)	x	x	x	x			26
<i>Elliptio crassidens</i> (Lamarck, 1819)	x	x	x	x		C	6
<i>Elliptio dilatata</i> (Rafinesque, 1820)	x	x	x	x			D
<i>Fusconaia ebena</i> (Lea, 1831)	x	x	x	x	R	R	8
<i>Fusconaia flava</i> (Rafinesque, 1820)	x	x	x	x	R		44
<i>Fusconaia subrotunda</i> (Lea, 1831) FC, SE	x		x	x			WD
<i>Hemistena lata</i> (Rafinesque, 1820) FE	x	x	x	x			SF
<i>Megaloniaias nervosa</i> (Rafinesque, 1820)	x	x	x	x	C	R	6
<i>Plethobasus cicatricosus</i> (Say, 1829) FE	x	x	x	x			SF
<i>Plethobasus cooperianus</i> (Lea, 1834) FE		x	x	x			
<i>Plethobasus cyphus</i> (Rafinesque, 1820) SE	x	x	x	x	R		1
<i>Pleurobema clava</i> (Lamarck, 1819) FC, SE	x	x	x	x			WD
<i>Pleurobema cordatum</i> (Rafinesque, 1820) SC	x	x	x	x	R	R	D
<i>Pleurobema plenum</i> (Lea, 1840) FE, SE	x	x	x	x			WD
<i>Pleurobema rubrum</i> (Rafinesque, 1820) SE	x	x	x	x			WD
<i>Pleurobema sintoxia</i> (Rafinesque, 1820)	x	x	x	x			3
<i>Quadrula cylindrica</i> (Say, 1817) SE	x	x	x	x			1
<i>Quadrula fragosa</i> (Conrad, 1835) FE	x	x	x	x			
<i>Quadrula metanevra</i> (Rafinesque, 1820)	x	x	x	x	R	RC	94
<i>Quadrula nodulata</i> (Rafinesque, 1820)	x	x	x	x		RC	10
<i>Quadrula pustulosa</i> (Lea, 1831)	x	x	x	x	A	A	140
<i>Quadrula quadrula</i> (Rafinesque, 1820)	x	x	x	x	A	A	339
<i>Tritogonia verrucosa</i> (Rafinesque, 1820)	x	x	x	x	C	U	85
<i>Unio merus tetralasmus</i> (Say, 1831)	x	x	x				D
Subfamily Anodontinae							
<i>Alasmidonta marginata</i> Say, 1818	x	x	x	x	R		11
<i>Alasmidonta viridis</i> (Rafinesque, 1820)	x	x					
<i>Anodonta grandis</i> Say, 1829	x	x	x	x	R		41
<i>Anodonta imbecillis</i> Say, 1829	x	x	x	x			137
<i>Anodonta suborbiculata</i> Say, 1831	x	x		x			1
<i>Anodontoides ferussacianus</i> (Lea, 1834)	x	x	x	x	R		D
<i>Arcidens confragosus</i> (Say, 1829)	x	x	x	x			1
<i>Lasmigona complanata</i> (Barnes, 1823)	x	x	x	x	C	R	55
<i>Lasmigona compressa</i> (Lea, 1829)	x	x	x	x	R		
<i>Lasmigona costata</i> (Rafinesque, 1820)	x	x	x	x	R		17
<i>Simpsonaias ambigua</i> (Say, 1825) FC, SC	x	x	x	x			
<i>Strophitus undulatus</i> (Say, 1817)	x	x	x	x	C		22
Subfamily Lampsillinae							
<i>Actinonaias ligamentina</i> (Lamarck, 1819)	x	x	x	x	A		131
<i>Cyprogenia stegaria</i> (Rafinesque, 1820) FE, SE	x	x	x	x	R		1
<i>Ellipsaria lineolata</i> (Rafinesque, 1820)	x	x	x	x			D
<i>Epioblasma flexuosa</i> (Rafinesque, 1820) †	x		x	x			SF
<i>Epioblasma obliquata</i> (Rafinesque, 1820) FE, SE	x		x	x			SF
<i>Epioblasma personata</i> (Say, 1829) †	x	x	x	x			
<i>Epioblasma propinqua</i> (Lea, 1857) †	x						SF
<i>Epioblasma rangiana</i> (Lea, 1839) FC, SE	x	x		x			WD
<i>Epioblasma sampsonii</i> (Lea, 1861) †	x	x	x	x			
<i>Epioblasma torulosa</i> (Rafinesque, 1820) FE, SE	x	x	x	x			WD

Table 2. continued.

Species	Museum Records	Call 1900	Daniels 1906	G & V 1944	Meyer 1968*	Clark 1976**	This study 1987-88
<i>Epioblasma triquetra</i> (Rafinesque, 1820) FC, SE	x	x	x	x			SF
<i>Lampsilis abrupta</i> (Say, 1831) FE, SE	x	x	x	x			
<i>Lampsilis cardium</i> Rafinesque, 1820	x	x	x	x	C	U	44
<i>Lampsilis fasciola</i> Rafinesque, 1820 SC	x	x	x	x			6
<i>Lampsilis ovata</i> (Say, 1817)	x	x	x	x			SF
<i>Lampsilis siliquoides</i> (Barnes, 1823)	x	x	x	x		U	11
<i>Lampsilis teres</i> (Rafinesque, 1820)	x	x	x	x	C	R	7
<i>Leptodea fragilis</i> (Rafinesque, 1820)	x	x	x	x	C	C	837
<i>Leptodea leptodon</i> (Rafinesque, 1820) FC	x	x	x	x			
<i>Ligunia recta</i> (Lamarck, 1819)	x	x	x	x			18
<i>Ligunia subrostrata</i> (Say, 1831)		x	x	x			
<i>Obliquaria reflexa</i> Rafinesque, 1820	x	x	x	x	R	A	85
<i>Obovaria olivaria</i> (Rafinesque, 1820)	x	x	x	x	A	RC	1114
<i>Obovaria retusa</i> (Lamarck, 1819) FE	x	x	x	x			WD
<i>Obovaria subrotunda</i> (Rafinesque, 1820)	x	x	x	x	R		WD
<i>Potamilus alatus</i> (Say, 1817)	x	x	x	x	C	R	66
<i>Potamilus capax</i> (Green, 1832) FE, SE	x	x	x	x		R	9
<i>Potamilus ohioensis</i> (Rafinesque, 1820)	x	x	x	x	R	C	50
<i>Ptychobranthus fasciolaris</i> (Rafinesque, 1820)	x	x	x	x			WD
<i>Toxolasma lividis</i> (Rafinesque, 1831) FC	x	x	x	x			WD
<i>Toxolasma parvum</i> (Barnes, 1823)	x	x	x	x			
<i>Toxolasma texasensis</i> (Lea, 1857)	x						
<i>Truncilla donaciformis</i> (Lea, 1828)	x	x	x	x		R	37
<i>Truncilla truncata</i> Rafinesque, 1820	x	x	x	x	R	R	159
<i>Villosa fabalis</i> (Lea, 1831) FC, SC	x	x	x				WD
<i>Villosa iris</i> (Lea, 1829)	x	x	x	x			WD
<i>Villosa lienosa</i> (Conrad, 1834) SC	x			x			
NUMBER OF INDIVIDUALS							3784
NUMBER OF SPECIES LIVE					28	22	37
NUMBER OF SPECIES DEAD							25
NUMBER OF SPECIES TOTAL (75)	73	69	69	69	28	22	62

x = Present.

*Meyer, 1968: A = Abundant, C = Common, R = Rare. Wabash River from Delphi to the mouth.

**Clark, 1976 = A = Abundant, C = Common, RC = Rather Common, U = Uncommon, R = Rare. Wabash River, Mt. Carmel to the mouth.

Cummings et al. 1987: D = Fresh Dead, WD = Weathered Dead, SF = Sub-fossil.

Abbreviations following species names are status designations as follows:

(†) = Extinct
 FE = Federally Endangered
 FC = Federal Candidate Species
 SE = Indiana State Endangered
 SC = Indiana Species of Special Concern

Table 3. Freshwater mussels (Unionidae) reported from the White River Drainage, Indiana.
Species listed alphabetically within subfamily.

Species	Museum Records	Call 1900	Daniels 1906	G & V 1944	Meyer 1967	This study 1989-91
Subfamily Ambleminae						
<i>Amblema plicata</i> (Say, 1817)	x	x	x	x	A	76
<i>Cyclonaias tuberculata</i> (Rafinesque, 1820)	x	x	x	x	R	2
<i>Elliptio crassidens</i> (Lamarck, 1819)	x			x	C	17
<i>Elliptio dilatata</i> (Rafinesque, 1820)	x	x	x	x		159
<i>Fusconaia ebena</i> (Lea, 1831)	x		x	x	C	D
<i>Fusconaia flava</i> (Rafinesque, 1820)	x	x	x	x	C	91
<i>Fusconaia subrotunda</i> (Lea, 1831) FC, SE	x					WD
<i>Hemistena lata</i> (Rafinesque, 1820) FE	x			x		
<i>Megalonaias nervosa</i> (Rafinesque, 1820)	x	x		x	C	32
<i>Plethobasus cyphus</i> (Rafinesque, 1820) SE	x			x	R	
<i>Pleurobema clava</i> (Lamarck, 1819) FC, SE	x	x		x		WD
<i>Pleurobema cordatum</i> (Rafinesque, 1820) SC	x			x		1
<i>Pleurobema plenum</i> (Lea, 1840) FE, SE	x			x		WD
<i>Pleurobema rubrum</i> (Rafinesque, 1820) SE	x			x		WD
<i>Pleurobema sintoxia</i> (Rafinesque, 1820)	x	x	x	x		D
<i>Quadrula cylindrica</i> (Say, 1817) SE	x	x	x			WD
<i>Quadrula fragosa</i> (Conrad, 1835) FE	x	x				
<i>Quadrula metanewra</i> (Rafinesque, 1820)	x	x	x	x	R	1
<i>Quadrula nodulata</i> (Rafinesque, 1820)	x	x		x		2
<i>Quadrula pustulosa</i> (Lea, 1831)	x	x	x	x	A	29
<i>Quadrula quadrula</i> (Rafinesque, 1820)	x	x		x	A	101
<i>Tritogonia verrucosa</i> (Rafinesque, 1820)	x	x	x	x		74
<i>Unio merus tetralasmus</i> (Say, 1831)	x					
Subfamily Anodontinae						
<i>Alasmidonta marginata</i> Say, 1818	x	x	x	x		26
<i>Alasmidonta viridis</i> (Rafinesque, 1820)	x	x	x			4
<i>Anodonta grandis</i> Say, 1829	x	x	x	x		104
<i>Anodonta imbecillis</i> Say, 1829	x	x	x	x		6
<i>Anodonta suborbiculata</i> Say, 1831	x		x	x		D
<i>Anodontoides ferussacianus</i> (Lea, 1834)	x	x		x		15
<i>Arcidens confragosus</i> (Say, 1829)	x			x		9
<i>Lasmigona complanata</i> (Barnes, 1823)	x	x	x	x	C	65
<i>Lasmigona compressa</i> (Lea, 1829)	x	x	x	x		5
<i>Lasmigona costata</i> (Rafinesque, 1820)	x	x	x	x		34
<i>Simpsonaias ambigua</i> (Say, 1825) FC, SC	x	x	x	x		WD
<i>Strophitus undulatus</i> (Say, 1817)	x	x	x	x		31
Subfamily Lampsillinae						
<i>Actinonaias ligamentina</i> (Lamarck, 1819)	x	x	x	x	C	21
<i>Cyprogenia stegaria</i> (Rafinesque, 1820) FE, SE	x	x	x	x		WD
<i>Ellipsaria lineolata</i> (Rafinesque, 1820)	x	x		x		D
<i>Epioblasma flexuosa</i> (Rafinesque, 1820) †	x					
<i>Epioblasma obliquata</i> (Rafinesque, 1820) FE, SE	x	x	x	x		
<i>Epioblasma personata</i> (Say, 1829) †	x			x		
<i>Epioblasma propinqua</i> (Lea, 1857) †	x					WD
<i>Epioblasma rangiana</i> (Lea, 1839) FC, SE	x		x	x		WD
<i>Epioblasma sampsonii</i> (Lea, 1861) †	x					
<i>Epioblasma torulosa</i> (Rafinesque, 1820) FE, SE	x	x		x		WD
<i>Epioblasma triquetra</i> (Rafinesque, 1820) FC, SE	x	x	x	x		WD
<i>Lampsilis abrupta</i> (Say, 1831) FE, SE		x		x		
<i>Lampsilis cardium</i> Rafinesque, 1820	x	x	x	x	C	74
<i>Lampsilis fasciola</i> Rafinesque, 1820 SC	x	x	x	x		1
<i>Lampsilis ovata</i> (Say, 1817)	x			x		SF

Table 3. continued.

Species	Museum Records	Call 1900	Daniels 1906	G & V 1944	Meyer 1967	This study 1989-91
<i>Lampsilis siliquoides</i> (Barnes, 1823)	x	x	x	x		76
<i>Lampsilis teres</i> (Rafinesque, 1820)	x		x	x		5
<i>Leptodea fragilis</i> (Rafinesque, 1820)	x		x	x	C	362
<i>Leptodea leptodon</i> (Rafinesque, 1820) FC	x					
<i>Ligumia recta</i> (Lamarck, 1819)	x	x	x	x		WD
<i>Ligumia subrostrata</i> (Say, 1831)	x	x		x		
<i>Obliquaria reflexa</i> Rafinesque, 1820	x	x	x	x	C	16
<i>Obovaria olivaria</i> (Rafinesque, 1820)	x	x		x	C	42
<i>Obovaria retusa</i> (Lamarck, 1819) FE	x	x	x	x		WD
<i>Obovaria subrotunda</i> (Rafinesque, 1820)	x	x	x	x	R	D
<i>Potamilus alatus</i> (Say, 1817)	x	x	x	x	C	103
<i>Potamilus capax</i> (Green, 1832) FE, SE	x					
<i>Potamilus ohioensis</i> (Rafinesque, 1820)	x					27
<i>Ptychobranhus fasciolaris</i> (Rafinesque, 1820)	x	x	x	x		3
<i>Toxolasma lividis</i> (Rafinesque, 1831) FC	x	x	x	x		1
<i>Toxolasma parvus</i> (Barnes, 1823)	x	x	x	x		D
<i>Truncilla donaciformis</i> (Lea, 1828)	x	x	x	x		22
<i>Truncilla truncata</i> Rafinesque, 1820	x	x	x	x	R	42
<i>Villosa fabalis</i> (Lea, 1831) FC, SC	x		x	x		WD
<i>Villosa iris</i> (Lea, 1829)	x	x	x	x		D
<i>Villosa lienosa</i> (Conrad, 1834) SC	x		x	x		2
NUMBER OF INDIVIDUALS						1681
NUMBER OF SPECIES LIVE						37
NUMBER OF SPECIES DEAD						22
NUMBER OF SPECIES LIVE AND DEAD (71)	70	47	43	60	19	59

x = Present.

Meyer, 1968: A = Abundant, C = Common, R = Rare.

Cummings et al. 1987-91: D = Fresh Dead, WD = Weathered Dead.

Abbreviations following species names are status designations as follows:

- (†) = Extinct
- FE = Federally Endangered
- FC = Federal Candidate Species
- SE = Indiana State Endangered
- SC = Indiana Species of Special Concern

Table 4. Freshwater mussels (Unionidae) reported from the Tippecanoe River, Indiana.
Species listed alphabetically within subfamily.

Species	Museum Records	Daniels 1906	This study 1987
Subfamily Ambleminiæ			
<i>Amblema plicata</i> (Say, 1817)	x	x	154
<i>Cyclonaias tuberculata</i> (Rafinesque, 1820)	x	x	97
<i>Elliptio crassidens</i> (Lamarck, 1819)	TW	x	
<i>Elliptio dilatata</i> (Rafinesque, 1820)	x	x	36
<i>Fusconaia ebena</i> (Lea, 1831)			
<i>Fusconaia flava</i> (Rafinesque, 1820)	x	x	81
<i>Fusconaia subrotunda</i> (Lea, 1831) FC, SE	x	x	
<i>Hemistena lata</i> (Rafinesque, 1820) FE	x	x	
<i>Megaloniais nervosa</i> (Rafinesque, 1820)	TW		
<i>Plethobasus cyphus</i> (Rafinesque, 1820) SE	x	x	10
<i>Pleurobema clava</i> (Lamarck, 1819) FC, SE	x	x	19
<i>Pleurobema cordatum</i> (Rafinesque, 1820) SC	x		
<i>Pleurobema plenum</i> (Lea, 1840) FE, SE	x	x	
<i>Pleurobema rubrum</i> (Rafinesque, 1820) SE	x	x	SF
<i>Pleurobema sintoxia</i> (Rafinesque, 1820)	x	x	118
<i>Quadrula cylindrica</i> (Say, 1817) SE	x	x	9
<i>Quadrula fragosa</i> (Conrad, 1835) FE			
<i>Quadrula metanevra</i> (Rafinesque, 1820)			6
<i>Quadrula nodulata</i> (Rafinesque, 1820)			
<i>Quadrula pustulosa</i> (Lea, 1831)	x	x	205
<i>Quadrula quadrula</i> (Rafinesque, 1820)	x		39
<i>Tritogonia verrucosa</i> (Rafinesque, 1820)	x		7
<i>Unio merus tetralasmus</i> (Say, 1831)			
Subfamily Anodontinae			
<i>Alasmidonta marginata</i> Say, 1818	x		41
<i>Alasmidonta viridis</i> (Rafinesque, 1820)	x	x	WD
<i>Anodonta grandis</i> Say, 1829	x	x	61
<i>Anodonta imbecillis</i> Say, 1829			10
<i>Anodonta suborbiculata</i> Say, 1831			5
<i>Anodontoides ferussacianus</i> (Lea, 1834)	x		
<i>Arcidens confragosus</i> (Say, 1829)			
<i>Lasmigona complanata</i> (Barnes, 1823)	x	x	84
<i>Lasmigona compressa</i> (Lea, 1829)	x	x	4
<i>Lasmigona costata</i> (Rafinesque, 1820)	x	x	51
<i>Simpsonaias ambigua</i> (Say, 1825) FC, SC	x		
<i>Strophitus undulatus</i> (Say, 1817)	x	x	47
Subfamily Lampsiliinae			
<i>Actinonaias ligamentina</i> (Lamarck, 1819)	x	x	117
<i>Cyprogenia stegaria</i> (Rafinesque, 1820) FE, SE	x		D
<i>Ellipsaria lineolata</i> (Rafinesque, 1820)		x	
<i>Epioblasma flexuosa</i> (Rafinesque, 1820) †			
<i>Epioblasma obliquata</i> (Rafinesque, 1820) FE, SE	x		
<i>Epioblasma personata</i> (Say, 1829) †			
<i>Epioblasma propinqua</i> (Lea, 1857) †			
<i>Epioblasma rangiana</i> (Lea, 1839) FC, SE	x		WD
<i>Epioblasma sampsonii</i> (Lea, 1861) †			
<i>Epioblasma torulosa</i> (Rafinesque, 1820) FE, SE			
<i>Epioblasma triquetra</i> (Rafinesque, 1820) FC, SE	x	x	D
<i>Lampsilis abrupta</i> (Say, 1831) FE, SE			
<i>Lampsilis cardium</i> Rafinesque, 1820	x	x	65
<i>Lampsilis fasciola</i> Rafinesque, 1820 SC	x	x	5
<i>Lampsilis ovata</i> (Say, 1817)	x		

Table 4. continued.

Species	Museum Records	Daniels 1906	This study 1987
<i>Lampsilis siliquoidea</i> (Barnes, 1823)	x	x	34
<i>Lampsilis teres</i> (Rafinesque, 1820)	x	x	
<i>Leptodea fragilis</i> (Rafinesque, 1820)	x	x	5
<i>Leptodea leptodon</i> (Rafinesque, 1820) FC			
<i>Ligumia recta</i> (Lamarck, 1819)	x	x	3
<i>Ligumia subrostrata</i> (Say, 1831)	x	x	
<i>Obliquaria reflexa</i> Rafinesque, 1820	x		
<i>Obovaria olivaria</i> (Rafinesque, 1820)	x		
<i>Obovaria retusa</i> (Lamarck, 1819) FE	x		
<i>Obovaria subrotunda</i> (Rafinesque, 1820)	x	x	17
<i>Potamilus alatus</i> (Say, 1817)			5
<i>Potamilus capax</i> (Green, 1832) FE, SE			
<i>Potamilus ohioensis</i> (Rafinesque, 1820)			
<i>Ptychobranchnus fasciolaris</i> (Rafinesque, 1820)	x	x	131
<i>Toxolasma lividis</i> (Rafinesque, 1831) FC	x	x	2
<i>Toxolasma parvum</i> (Barnes, 1823)	x		1
<i>Truncilla donaciformis</i> (Lea, 1828)	TW		D
<i>Truncilla truncata</i> Rafinesque, 1820	x	x	5
<i>Villosa fabalis</i> (Lea, 1831) FC, SC	x	x	WD
<i>Villosa iris</i> (Lea, 1829)	x	x	24
<i>Villosa lienosa</i> (Conrad, 1834) SC	TW		
NUMBER OF INDIVIDUALS			1498
NUMBER OF SPECIES LIVE			33
NUMBER OF SPECIES DEAD			7
NUMBER OF SPECIES TOTAL	52	36	40

x = Present.

TW = G. Thomas Watters (pers. comm.) 1991

Cummings et al. 1987: D = Fresh Dead, WD = Weathered Dead, SF = Sub-fossil

Abbreviations following species names are status designations as follows:

(†) = Extinct
 FE = Federally Endangered
 FC = Federal Candidate Species
 SE = Indiana State Endangered
 SC = Indiana Species of Special Concern

Discretionary Order No. 136 which restricted mussel harvesting methods to handpicking, short forks, tongs, and brails.

Because of the concern for the resource, IDNR contracted a survey of the Wabash, East Fork White River from Tunnelton to its confluence with the West Fork, and the White River proper in 1966-67. The results of this survey were the basis of a Masters Thesis by Meyer (1968) and papers by Krumholz et al. (1970) and Meyer (1974). In the 1966-67 study sampling sites were located approximately 10 miles apart and living mussels were collected with a crowfoot bar or brail and supplemented by hand collections at most of the sites (Meyer, 1968; 1974).

The results of the 1966-67 survey were not encouraging. Many of the species considered rare in 1944 were not found and others which were considered common or abundant during the 1940's were not collected at all (Krumholz et al., 1970; Meyer, 1968; 1974). Meyer (1968) found only 28 (40%) of the 69 species reported from the Wabash River by Goodrich and van der Schalie (1944) (Table 2). Krumholz et al. (1970) concluded that intensive harvesting of mussels was capable of seriously depleting populations. Also mentioned as factors responsible for the decline of the mussel fauna in the Wabash River drainage were pollution (industrial, domestic, and agricultural) and competition with the introduced Asian clam, *Corbicula fluminea*.

Clark (1976) resurveyed the lower Wabash River from Mt. Carmel to the Ohio River and collected 22 species of mussels (Table 2). Two species collected in the lower Wabash River by Meyer were not found in 1975; however, seven species not found in 1966-67 were present in 1975 (Clark, 1976). Although species richness in the lower Wabash River was greater in 1975 than in 1966-67, Clark (1976) expressed doubt as to whether the mussel population of the lower Wabash River was sufficiently large to support commercial shelling. One of the reasons given for the decline of the mussel fauna in the lower Wabash was the absence of suitable habitat. Substrate samples taken in 1975 indicated that very little of the bottom was composed of gravel and Clark (1976) cited dredging operations in this section of the river as the chief cause of habitat loss.

In 1987 the Indiana Department of Natural Resources, Division of Fish and Wildlife in conjunction with the U.S. Fish and Wildlife Service contracted with the Illinois Natural History Survey to conduct a follow-up survey of the mussels of the Wabash, White, and Tippecanoe rivers and selected tributaries. The objectives of the study were to collect data on the distribution and status of: 1) federally endangered species, 2) species proposed or candidates for federal listing as threatened or endangered, 3) state endangered species, 4) other mussel species inhabiting the Wabash River drainage.

METHODS

Freshwater mussels were systematically sampled at 100 sites in the Wabash, White, and Tippecanoe rivers and selected tributaries from 1987-1991 (Fig. 1). Collecting conditions were exceptional in 1988 and 1991 due to low water levels caused by the drought in those years. Sites were located approximately five to ten miles apart and were chosen because of accessibility and/or because historical data were available for a given location. Living mussels and valves of dead individuals were collected at each site. Collections were made by hand and quantified by sampling for four man-hours at each site, except in the lower Wabash River where hand collections were supplemented by use of a brail. Brailing in the lower Wabash consisted of three approximately 0.4 km (0.25 mi) runs at a site, on the left bank, center of the river, and right bank. An effort was made to sample all available habitats, but particular emphasis was placed on areas likely to support mussels (i.e., gravel bars, riffles, backwaters, etc.).

This report summarizes and in some cases slightly modifies the reports from the past studies (Cummings et al., 1987, 1988, 1991, Cummings and Berlocher, 1990). A list of the collection sites and maps showing their location is given in Appendix I. Because of the large area covered, the survey was broken into the three phases described below.

I. Lower Wabash and Tippecanoe rivers. The lower Wabash River is defined here as the Wabash River from the mouth of the White River at Mt. Carmel, Illinois, to the Ohio River. Twenty-seven sites were sampled in the lower Wabash from 16 June to 29 October 1987. Sixteen sites were sampled on the main stem of the Tippecanoe River from 2 June to 15 October 1987.

II. Upper and Middle Wabash River. The upper Wabash River is defined as that part of the Wabash from Huntington Reservoir to the mouth of the Tippecanoe River. The middle Wabash River is limited to the Wabash River from the Tippecanoe to the confluence with the White River. Twenty-six sites were sampled in the upper and middle Wabash River from 31 May to 23 September 1988. Five additional shoreline or shoal samples were made between sites 18 and 22. All were made near one of the timed sites (usually within a mile) and only dead shells were collected.

III. White River Drainage. Thirty-one sites were sampled in the White River and selected tributaries from 29 June 1989 to 29 August 1991. High water levels prevented sampling in the lower part of the drainage in late summer of 1989 and in most of 1990. Collecting conditions were exceptional in 1991 due to the low water levels in the spring and summer of that year. Streams surveyed included the White River proper, the West Fork White River and its tributary Big Kilbuck Creek, and the East Fork White River and its tributaries Sugar Creek, Flatrock River, Big Blue River, and Little Blue River.

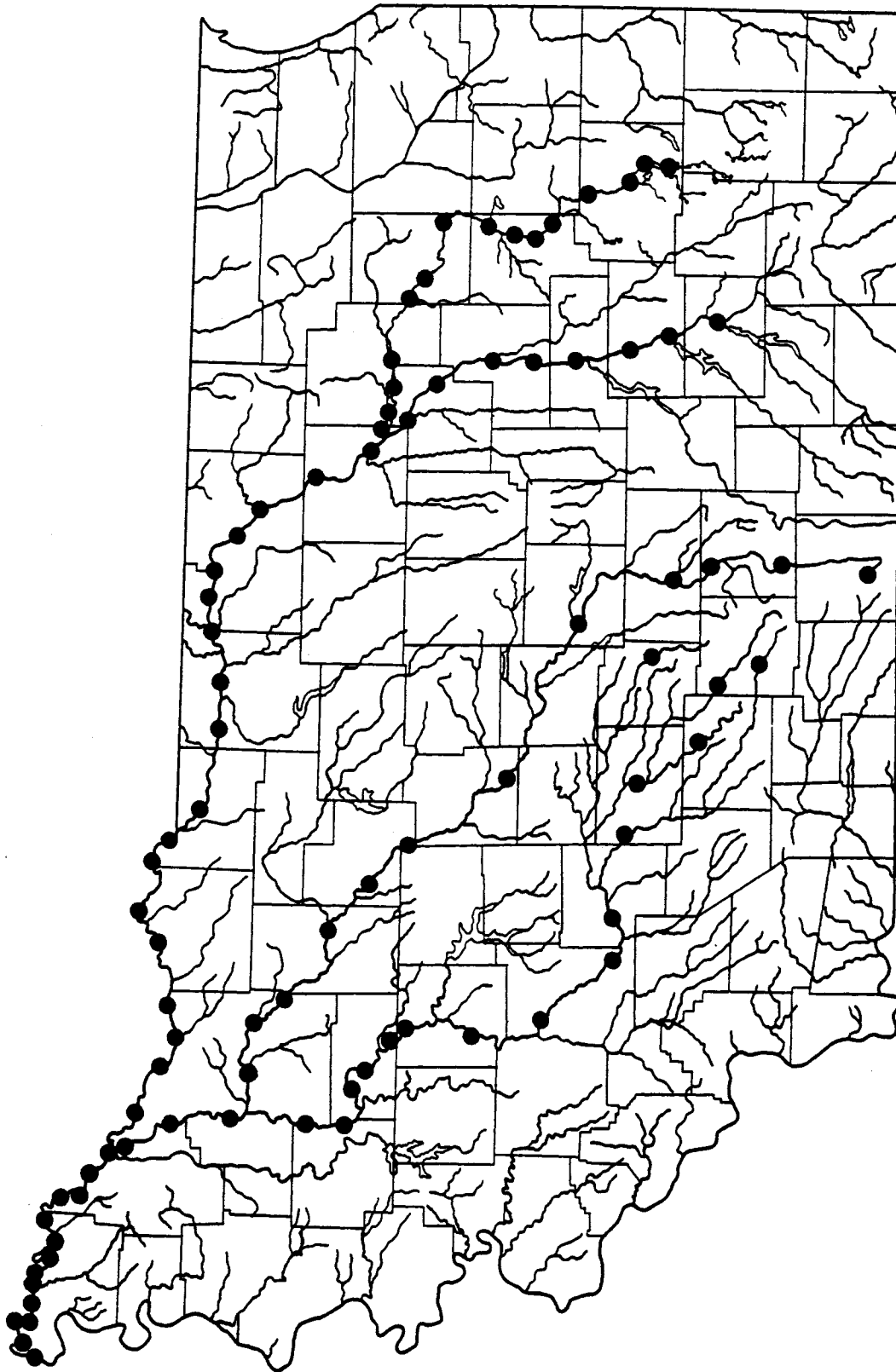


Figure 1. Collection sites in the Wabash River drainage, 1987-1991.

Mussels collected were designated as either live, fresh-dead, weathered-dead, or sub-fossil. Fresh-dead shells were those with the periostracum intact and little or no staining of the nacre. Weathered-dead shells generally had a chalky nacre and were separated from sub-fossil shells by having the periostracum at least partially intact. Weathered-dead and sub-fossil shells were occasionally grouped and referred to as relict shells in this report.

Vouchers of all species collected were retained and catalogued into the Mollusk Collection of the Illinois Natural History Survey (INHS), Champaign, Illinois. Historical data on the fauna were verified by examination of specimens in the following collections: Academy of Natural Science of Philadelphia (ANSP), Chicago Academy of Science (CHAS), Field Museum of Natural History, Chicago (FMNH), Museum of Comparative Zoology - Harvard University (MCZ), Ohio State University Museum of Zoology (OSUM), University of Illinois Museum of Natural History (UIMNH), University of Michigan Museum of Zoology (UMMZ), and the United States National Museum (USNM).

The nomenclature in this report follows a list prepared by the Committee on Scientific and Vernacular Names of Mollusks of the Council of Systematic Malacologists, American Malacological Union (Turgeon et al., 1988) except that subspecies are not recognized, and members of the *Pleurobema cordatum* complex are recognized following Stansbery (1983). In the individual species accounts, the species are listed alphabetically within each subfamily. A distribution map showing where living mussels and dead shells were found, a synonymy containing references to previously published works on Indiana mussels, and remarks on the past and current status is given for each species thought to have occurred in the study area.

STUDY AREA

The Wabash River drains 33,100 square miles in Indiana, Illinois, and Ohio. Topography of the basin is a flat to gently rolling prairie plain. Its headwaters arise in Mercer County, Ohio. The river generally flows west than south for 475 miles until it reaches the Ohio River. Major tributaries of the Wabash include Salamonie, Mississinewa, Eel, Tippecanoe, Vermilion, Embarras, White, Patoka, and Little Wabash rivers and Wildcat and Sugar creeks. Urban areas on the Wabash River include Huntington, Logansport, Lafayette, Terre Haute, Vincennes, Mt. Carmel, and New Harmony. Huntington Reservoir is the only impoundment on the main stem (Wabash River Coordinating Committee, 1971).

The White River is the largest tributary to the Wabash River and drains approximately 11,350 square miles in central and southern Indiana. It flows through a wide variety of physiogeographic areas. The two major tributaries of the White River are the East and West Forks. Major tributaries of the West Fork include Eel River, Eagle Creek, Fall Creek, White Lick Creek, and Big Kilbuck Creek. Large cities located on the West Fork are Indianapolis, Muncie, Anderson, and Noblesville. Major tributaries of the East Fork include Lost River, Salt Creek, Muscatatuck River, Sand Creek, Clifty Creek, Flatrock River, Big Blue River, and

Sugar Creek. The last two unite to form the Driftwood River. Major cities on the East Fork are Bloomington, Columbus, Bedford, and New Castle (Wabash River Coordinating Committee, 1971).

The Tippecanoe River is a medium-sized tributary of the Wabash River, draining approximately 1890 square miles of northern and west-central Indiana (Wright, 1932). It originates in Whitley and Noble counties and flows west-southwest for about 110 kilometers to its confluence with the Wabash River near the city of Lafayette in Tippecanoe County. The upper portion of the drainage is dotted with glacial lakes and wetlands, many of which have been developed for recreation. Two large impoundments (Lake Shafer and Lake Freeman) have been constructed on the lower portion of the river.

RESULTS & DISCUSSION

The results of the present survey compared and contrasted with past studies (Call, 1900; Daniels, 1903; Goodrich & van der Schalie, 1944; Meyer, 1968; 1974; Clark, 1976) indicated severe reductions in the distribution of mussels in the Wabash River drainage. Many of the species that were abundant in the past are now absent from the drainage and possibly the state.

This survey and an examination of the literature and museum records brings the total number of species recorded from the Wabash, White, and Tippecanoe rivers to 75 (Tables 1-4). Sixty-seven species of freshwater mussels were collected from 100 sites in the Wabash River drainage from 1987 to 1991 (Table 1, Figure 1). Of those 67 species, 49 were found alive and totaled 6963 individuals. For each drainage surveyed the total number of species followed by the number found alive, were as follows: Tippecanoe 40 (33), White 59 (37), and Wabash 62 (37) (Table 1). The five most abundant species were *Leptodea fragilis* (17.3%), *Obovaria olivaria* (16.6%), *Quadrula quadrula* (6.9%), *Amblema plicata* (5.6%), and *Quadrula pustulosa* (5.4%), which together made up just over half (51.8%) of the individuals found.

Eighteen species were found only as shells: *Cumberlandia monodonta*, *Fusconaia subrotunda*, *Hemistena lata*, *Plethobasus cicatricosus*, *Pleurobema plenum*, *Pleurobema rubrum*, *Unio merus tetralasmus*, *Simpsonaias ambigua*, *Ellipsaria lineolata*, *Epioblasma flexuosa*, *Epioblasma obliquata*, *Epioblasma propinqua*, *Epioblasma rangiana*, *Epioblasma torulosa*, *Epioblasma triquetra*, *Lampsilis ovata*, *Obovaria retusa*, and *Villosa fabalis*. All of the above except *E. lineolata*, *L. ovata*, and *U. tetralasmus* are considered extinct, extirpated, endangered, or candidates for federal listing by the U.S. Fish and Wildlife Service (1991) or the Indiana Department of Natural Resources (1990). Given the condition of the shells and lack of recent collection data, all of the above species except *E. lineolata*, *E. triquetra*, *F. subrotunda*, *S. ambigua*, *U. tetralasmus*, and *V. fabalis* are likely extirpated from the drainage and the state.

Eight additional species: *Plethobasus cooperianus*, *Quadrula fragosa*, *Epioblasma personata*, *Epioblasma sampsonii*, *Lampsilis abrupta*, *Leptodea leptodon*, and *Ligumia subrostrata*, have been reported as occurring

in the Wabash River drainage but were not found (living or dead) during this survey. All except *L. subrostrata* are presumed extirpated from Indiana. A summary of the special status species found alive in 1987-91 is given below.

FEDERALLY ENDANGERED SPECIES

Two federally endangered species, the fanshell, *Cyprogenia stegaria*, and the fat pocketbook, *Potamilus capax*, were found alive in this study. Both were found in the Wabash River proper, *C. stegaria* in the upper Wabash and *P. capax* in the lower Wabash. Only one live fanshell was found, but fresh-dead shells were present at the lowermost site (16) on the Tippecanoe River and it is likely that this species is still present there. Although no live or fresh-dead shells were found in our survey of the White River, conversations with local shellers suggested that this species may still be extant in the East Fork White River in Lawrence and Martin counties. In 1984, a live fanshell was found in the lower Wabash River. The mussel was estimated to be fairly old and, although considerable additional collecting has been done in the lower Wabash River in recent years, no other live fanshells have been found.

Although historically ranging upstream to at least the middle Wabash, *Potamilus capax* was not found (living or dead) above the confluence with the White River in this study. Subsequent sampling, specifically for *P. capax*, has added additional localities for the fat pocketbook in the lower Wabash River and this is one of the most commonly encountered mussels in its preferred habitat (Cummings et al., 1990).

FEDERAL CANDIDATE SPECIES

Nineteen live clubshells, *Pleurobema clava*, were found at four sites and fresh-dead shells were present at two additional localities in the Tippecanoe River in 1987. Although widely distributed in the Wabash River drainage in the past, this mussel has undergone a severe reduction in range and the Tippecanoe River population is perhaps the largest remaining in the Midwest.

The purple lilliput, *Toxolasma lividus*, was found living in the Little Blue River (East Fork White River Drainage) near Carthage in Knox County in 1989 and at two sites in the Tippecanoe River in 1987. In each case only a single individual was found, but this mussel is small (about 1 inch in length) and can be easily missed. Two live *T. lividus* were found in Sugar Creek (East Fork White River drainage) in 1990 and fresh-dead shells were present at three other sites in the creek (Harmon, 1990). Typically a small stream species, additional populations should be looked for in tributaries to the East Fork White and Tippecanoe rivers.

INDIANA ENDANGERED SPECIES

Two state endangered species, *Quadrula cylindrica* and *Plethobasus cyphus*, were found in the Tippecanoe and middle Wabash rivers in 1987-88. Ten live *P. cyphus* were found at six different sites and nine live *Q. cylindrica* were found at three sites in the Tippecanoe River in 1987. Only one individual of each

species was found during the rest of the study (both in the middle Wabash River), and the Tippecanoe River populations may be among the best remaining in the Midwest.

INDIANA SPECIES OF SPECIAL CONCERN

The wavy-rayed lampmussel, *Lampsilis fasciola*, was found living at five sites in this survey. Five wavy-rayed lampmussels were collected from three sites in the upper half of the Tippecanoe River in 1987. Six *L. fasciola* were found alive at site 5 in the upper Wabash River in 1988, and shells were present at two additional sites (1 and 9). A single live *L. fasciola* was found at site 13 on Sugar Creek (East Fork White River drainage) and shells were found at sites 2, 3, 14, 15, and 24 in the White River drainage. This species was also found alive just upstream of site 13 and fresh-dead shells were found at four additional sites in Sugar Creek in 1990 (Harmon, 1990).

A single individual of the Ohio pigtoe, *Pleurobema cordatum*, was found in the East Fork White River at site 24. Although still present in large numbers in the Ohio River in Illinois this mussel is nowhere near as common today as it was in the past. Conversations with local shellers indicated that this species is rare but still found in the lower East Fork White River.

Two live little spectaclecases, *Villosa lienosa*, were found at site 16 on the Little Blue River (East Fork White River drainage) in 1989-91. Shells were found at five other sites, all in the upper part of the basin. The little spectaclecase was also reported live from Sugar Creek (East Fork White River drainage) (Harmon, 1990), and additional populations should be looked for in the smaller streams of the White River system.

Aside from those species that are considered extinct, extirpated, endangered, or threatened, other mussels have experienced significant reductions in their ranges. Meyer (1968) pointed out that many of the species listed by Goodrich and van der Schalie (1944) were absent from areas where they were formerly abundant and that the ranges of *Cyclonaias tuberculata*, *Cyprogenia stegaria*, *Elliptio dilatata*, *Obovaria subrotunda*, *Pleurobema cordatum*, and *Quadrula cylindrica* had been severely reduced by 1966-67. Other species appear to have declined within the last 30 years. A few of the more obvious cases are given below. Maps depicting these changes are given with the species accounts.

Cyclonaias tuberculata - Formerly widespread in the Wabash River drainage, it has been almost eliminated from the lower part of the basin and is now largely restricted to the upper Wabash and Tippecanoe rivers.

Elliptio crassidens - Although shells were found throughout the entire length of the Wabash River in 1987-88, this mussel is now rare in the middle Wabash and East Fork White rivers.

Elliptio dilatata - Considered by past workers (Call, 1900; Goodrich & van der Schalie, 1944) to be one of the most common species in the state, the spike was found only as weathered-dead or sub-fossil shells at all but two sites in the Wabash and White rivers. Although the spike was the second most abundant species

found in the White River in 1989-91, all but five of the 159 mussels were collected from site 4. A similar situation exists in Illinois where this species has undergone a dramatic reduction in range and is now rare (Schanzle and Cummings, 1991).

Fusconaia ebena - Reported as common in the past, the ebonyshell is now rare in the middle and lower Wabash River. Found alive at only 4 sites in the entire drainage.

Pleurobema sintoxia - Formerly widespread in the drainage, this mussel is now restricted to upper Wabash and Tippecanoe rivers.

Lampsilis teres - Widespread and abundant in the past, the yellow sandshell is now rare in the middle and upper Wabash and West Fork White rivers.

Ligumia recta - Not found in the lower half of the basin in this survey, the black sandshell is now restricted to the upper Wabash and lower Tippecanoe rivers.

Obovaria subrotunda - Formerly widespread in the drainage, now found only in the Tippecanoe River.

Ptychobranchnus fasciolaris - Formerly widespread and common in the drainage, now restricted to the Tippecanoe River, Sugar Creek (White River drainage), and lower Brandywine Creek (Harmon, 1991).

Villosa iris - Formerly widespread and common in the smaller streams in Indiana, the rainbow is now sporadic and uncommon in the upper Tippecanoe River, Sugar Creek (Wabash River drainage) (Lewis, 1991), and Sugar Creek (East Fork White River drainage) (Harmon, 1990).

RECOMMENDED CHANGES IN STATUS

Due to the drastic reduction in distribution of many of the mussel species in the Wabash River drainage, changes in current status are suggested. These changes are based upon data collected during the current survey compared with historical information on the mussel fauna of the Wabash, White, and Tippecanoe rivers. Recommended changes in status for selected species are as follows.

Remove from the List Due To Extinction or Extirpation:

Plethobasus cicatricosus - White wartyback

Pleurobema plenum - Rough pigtoe

Epioblasma torulosa - Tuberculed blossom

Lampsilis abrupta - Pink mucket

List as Endangered:

Simpsonaias ambigua - Salamander mussel

Toxolasma lividus - Purple lilliput

Villosa fabalis - Rayed bean

List as Threatened:

Pleurobema cordatum - Ohio River pigtoe

Ellipsaria lineolata - Butterfly

Obovaria subrotunda - Round hickorynut
Ptychobranhus fasciolaris - Kidneyshell
Villosa lienosa - Little spectaclecase

List as Species of Special Concern:

Cyclonaias tuberculata - Purple wartyback
Elliptio crassidens - Elephant-ear
Elliptio dilatata - Spike
Fusconaia ebena - Ebonyshell
Pleurobema sintoxia - Round pigtoe
Quadrula nodulata - Wartyback
Lampsilis teres - Yellow sandshell
Ligumia recta - Black sandshell
Villosa iris - Rainbow

BASIN SUMMARIES

LOWER WABASH RIVER: Forty-five species were collected from 27 sites in the lower Wabash River, from the mouth of the White River at Mt. Carmel to the confluence with the Ohio River (Table 5, Fig. 2). Of those 45 species, 19 were collected live and totaled 143 individuals. The number of individuals per site ranged from zero to 36 and the number of live species ranged from zero to nine. The five most common species in order of abundance were *Obliquaria reflexa* (16.8%), *Leptodea fragilis* (15.4%), *Quadrula quadrula* (13.3%), *Quadrula pustulosa* (10.5%), and *Obovaria olivaria* (8.4%), which made up 64% of the individuals found. The remaining 14 species were represented by fewer than ten individuals each (Table 5).

In terms of species richness and abundances, our results from the lower Wabash River were similar to those of Clark (1976). Mussels considered common in the lower Wabash in 1966-67 (Meyer, 1968; 1974) but missing or rare from our collections included *Actinonaias ligamentina*, *Amblema plicata*, *Lampsilis cardium*, *Lampsilis teres*, *Lasmigona complanata*, and *Potamilus alatus* (Table 5). All but *A. plicata* were considered uncommon or rare by 1975 (Clark, 1976).

The low number of individuals collected in this survey indicated that the current mussel fauna of the lower Wabash has been drastically reduced when compared to historical data for the area. Although effectively closed to harvest due to the low economic return on investment of time spent, this stretch of the river should be closed by mandate by both Indiana and Illinois. As stated above, a federal and state endangered species, *Potamilus capax*, was found alive in the lower Wabash River during this study. The likelihood of misidentifying and inadvertently collecting *P. capax* in the lower Wabash is one reason given to support this closing.

Table 5. Site by site listing of all mussel species collected in the lower Wabash River, 1987.
(d = dead, wd = weathered dead, sf = sub-fossil)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Cumberlandia monodonta</i>	sf										sf			
<i>Amblema plicata</i>	d	wd	d	d	wd	d					wd	wd	1	
<i>Cyclonaias tuberculata</i>	d				sf									
<i>Elliptio crassidens</i>			d	sf	wd			sf			sf	sf	sf	
<i>Elliptio dilatata</i>			wd	wd				sf			sf			
<i>Fusconaia ebena</i>	wd		wd	d				wd			wd		4	1
<i>Fusconaia flava</i>	1	sf	d											
<i>Fusconaia subrotunda</i>		wd						sf						
<i>Megalonaias nervosa</i>			d		wd									
<i>Plethobasus cyphus</i>		sf									sf			
<i>Pleurobema clava</i>		sf	sf		sf			sf			sf			
<i>Pleurobema cordatum</i>	wd				wd			sf			sf	wd		
<i>Pleurobema rubrum</i>				sf	wd						sf			
<i>Quadrula cylindrica</i>	sf		wd					sf			sf			
<i>Quadrula metanevra</i>	wd	sf	d	d	d			sf			sf			
<i>Quadrula nodulata</i>	wd	d	1	d	1	d					sf			
<i>Quadrula pustulosa</i>	d	sf	d	d	1	d				N	sf		10	
<i>Quadrula quadrula</i>	2	sf	4	d	d	1				O	wd	2	2	
<i>Tritogonia verrucosa</i>	sf		d	d	d		1	d			sf	1	wd	
<i>Anodonta grandis</i>	d		d							M				
<i>Anodonta imbecillis</i>						d				U				
<i>Arcidens confragosus</i>										S			1	
<i>Lasmigona complanata</i>			1	1						S				
<i>Lasmigona costata</i>		wd	sf							E				
<i>Actinonaias ligamentina</i>										L	sf			
<i>Cyprogenia stegaria</i>		sf		sf	sf			sf		S	sf			
<i>Ellipsaria lineolata</i>														
<i>Epioblasma flexuosa</i>		sf						sf			sf			
<i>Epioblasma propinqua</i>								sf			sf			
<i>Epioblasma torulosa</i>		sf		sf	sf			sf			sf			
<i>Epioblasma triquetra</i>											sf			
<i>Lampsilis cardium</i>		d	wd	d	d	d		d			sf		sf	
<i>Lampsilis ovata</i>		sf			sf						sf			
<i>Lampsilis teres</i>	wd	sf	wd	sf	wd						wd			
<i>Leptodea fragilis</i>	2		d	10	d	d		d			d	4	2	1
<i>Ligumia recta</i>				sf							sf			
<i>Obliquaria reflexa</i>	d		7	d	1	d		wd	1		sf	1	12	1
<i>Obovaria olivaria</i>	d	sf	d	d	5		2	d	1				3	
<i>Obovaria retusa</i>	sf	sf			sf			sf			sf			
<i>Obovaria subrotunda</i>								wd			sf			
<i>Potamilus alatus</i>	1		1					d						d
<i>Potamilus capax</i>	wd	wd		wd		wd		sf			sf			wd
<i>Potamilus ohioensis</i>		d	d		d	d		d			d	d	d	
<i>Truncilla donaciformis</i>	d		1	d	d							wd		
<i>Truncilla truncata</i>	2		3	d	d			d			sf	d	1	1
INDIVIDUALS (LIVE)	8	0	18	11	8	1	3	0	2	0	0	8	36	4
SPECIES (LIVE)	5	0	7	2	4	1	2	0	2	0	0	4	9	4
SPECIES (DEAD)	17	20	18	20	20	9	0	23	0	0	32	6	6	0
SPECIES (TOTAL)	22	20	25	22	24	10	2	23	2	0	32	10	15	4

Table 5. continued.

Species	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
<i>Cumberlandia monodonta</i>														0
<i>Amblema plicata</i>			d		2								1	4
<i>Cyclonaias tuberculata</i>														0
<i>Elliptio crassidens</i>					sf									0
<i>Elliptio dilatata</i>					wd									0
<i>Fusconaia ebena</i>			wd		1									6
<i>Fusconaia flava</i>													wd	1
<i>Fusconaia subrotunda</i>														0
<i>Megaloniaias nervosa</i>													1	1
<i>Plethobasus cyphyus</i>														0
<i>Pleurobema clava</i>					wd									0
<i>Pleurobema cordatum</i>			d		sf									0
<i>Pleurobema rubrum</i>														0
<i>Quadrula cylindrica</i>														0
<i>Quadrula metanevra</i>							sf							0
<i>Quadrula nodulata</i>													2	4
<i>Quadrula pustulosa</i>	N		1		4	N		N			N	N		16
<i>Quadrula quadrula</i>	O		1		6	O		O			O	O	1	19
<i>Tritogonia verrucosa</i>			1		wd								1	4
<i>Anodonta grandis</i>	M		1			M		M			M	M		1
<i>Anodonta imbecillis</i>	U					U		U			U	U		0
<i>Arcidens confragosus</i>	S					S		S			S	S		1
<i>Lasmigona complanata</i>	S				1	S		S			S	S		3
<i>Lasmigona costata</i>	E					E		E			E	E		0
<i>Actinonaias ligamentina</i>	L					L		L			L	L		0
<i>Cyprogenia stegaria</i>	S					S	sf	S			S	S		0
<i>Ellipsaria lineolata</i>			d											0
<i>Epioblasma flexuosa</i>														0
<i>Epioblasma propinqua</i>														0
<i>Epioblasma torulosa</i>							sf							0
<i>Epioblasma triquetra</i>														0
<i>Lampsilis cardium</i>							sf							0
<i>Lampsilis ovata</i>														0
<i>Lampsilis teres</i>														0
<i>Leptodea fragilis</i>			d	1	2		d							22
<i>Ligumia recta</i>														0
<i>Obliquaria reflexa</i>					wd								1	24
<i>Obovaria olivaria</i>													1	12
<i>Obovaria retusa</i>														0
<i>Obovaria subrotunda</i>														0
<i>Potamilus alatus</i>					wd									2
<i>Potamilus capax</i>			sf	1			1		1	5			1	9
<i>Potamilus ohioensis</i>		1	d		1		1		2	1				6
<i>Truncilla donaciformis</i>														1
<i>Truncilla truncata</i>														7
INDIVIDUALS (LIVE)	0	1	4	2	17	0	2	0	3	6	0	0	9	143
SPECIES (LIVE)	0	1	4	2	7	0	2	0	2	2	0	0	8	19
SPECIES (DEAD)	0	0	7	0	7	0	5	0	0	0	0	0	1	26
SPECIES (TOTAL)	0	1	11	2	14	0	7	0	2	2	0	0	9	45

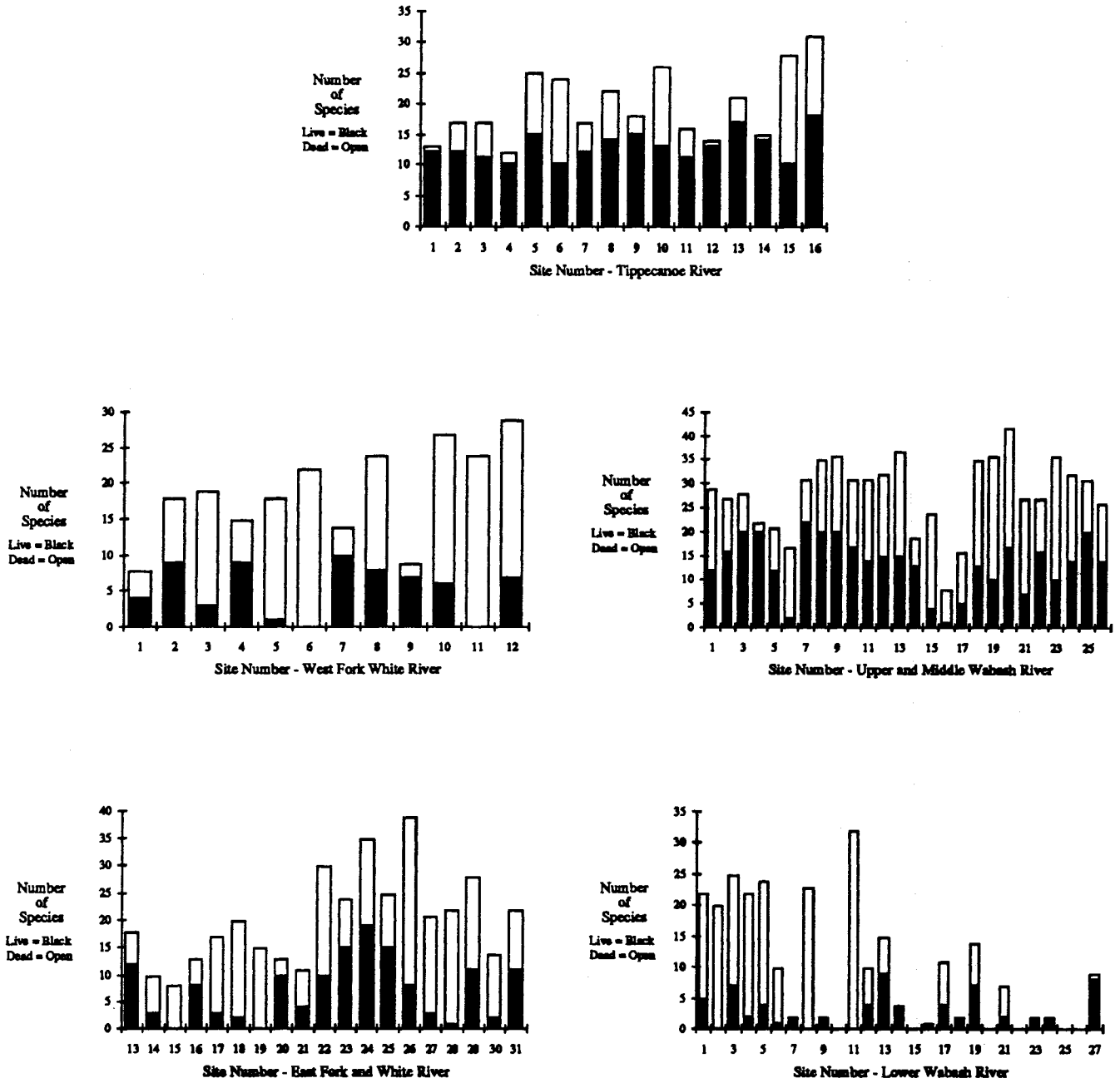


Figure 2. Number of species collected per site in the Wabash, White, and Tippecanoe rivers, 1987-1991.

UPPER AND MIDDLE WABASH RIVER: A total of 60 species was collected in the middle Wabash River from Huntington Reservoir to the confluence with the White River near Mt. Carmel (Table 6, Fig. 2). Of those 60 species, 35 were collected live and totaled 3641 individuals. The number of individuals per site ranged from one to 511 and the number of live species ranged from one to 22 (Table 6). The largest number of species (live and dead) recorded at one site was 38 (site 20). The five most common species in order of abundance were *Obovaria olivaria* (30.3%), *Leptodea fragilis* (22.4%), *Quadrula quadrula* (8.8%), *Amblema plicata* (4.3%), and *Truncilla truncata* (4.2%), which together made up nearly 70% of the mussels collected (Table 6).

Thirteen species, *Anodonta grandis*, *Anodonta imbecillis*, *Anodonta suborbiculata*, *Cyclonaias tuberculata*, *Elliptio crassidens*, *Lampsilis fasciola*, *Lampsilis siliquoidea*, *Ligumia recta*, *Pleurobema sintoxia*, *Potamilus ohioensis*, *Quadrula cylindrica*, *Quadrula nodulata*, and *Truncilla donaciformis*, were collected live in the Wabash River in 1988 but were not found in 1966-67 (Meyer, 1968; 1974). *Anodonta grandis*, *A. imbecillis*, *A. suborbiculata*, and *P. ohioensis* are most often found in quiet water (ponds, lakes, backwaters) with a soft substrate (usually mud, silt, or sand). These mussels are generally not taken on a brail and would be missed in hand collections if soft substrate areas were not sampled. *Elliptio crassidens*, *L. fasciola*, *P. sintoxia*, *Q. cylindrica*, and *Q. nodulata* were taken in small numbers in 1988 (Table 6) and could have been easily missed in 1966-67. The absence of *L. siliquoidea* and *L. recta* in the 1966-67 collections could be attributed to the upstream distribution of these species in the Wabash (see maps in species accounts) which were not sampled in the 1960's. The lack of *T. donaciformis* may be due to the fact that most of the collections were made by brail, which is not conducive to locating small species like the fawnsfoot.

WHITE RIVER: Fifty-nine species of freshwater mussels were collected in the White River drainage in 1989-91 (Table 7, Fig. 2). Of those 59 species, 37 (63%) were collected live and totaled 1681 individuals. This survey and an examination of the literature and museum records brings the total number of species recorded from the White River drainage to 71 (Table 3). The number of individuals per site ranged from zero (sites 6, 11, 15, and 19) to 281 (site 4), and the number of live species per site ranged from zero to 19 (site 24) (Table 7). The most widespread species in the drainage was *Lampsilis cardium* followed by *Lasmigona complanata*, *Leptodea fragilis*, *Quadrula quadrula*, and *Potamilus ohioensis*. All other species were found alive at fewer than 10 sites, and eight of the 37 species were found living at only one site (Table 7). The largest number of species recorded (both live and dead) at one site was 39 (site 26). The five most common species in order of abundance were *Leptodea fragilis* (21.5%), *Elliptio dilatata* (9.5%), *Anodonta grandis* (6.2%), *Potamilus alatus* (6.1%), and *Quadrula quadrula* (6.0%), which together made up nearly 50% of the live mussels collected (Table 7).

Table 6. Site by site listing of all mussel species collected in the upper and middle Wabash River, 1988.
(d = dead, wd = weathered dead, sf = sub-fossil)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<i>Amblema plicata</i>	wd	3	11	5	2	wd	21	35	31	8	6	5	1	4	d	
<i>Cyclonaias tuberculata</i>	11	wd	5	1		wd	4	4	1		sf	d	sf		wd	
<i>Elliptio crassidens</i>	wd	1						wd	d	sf	wd		wd			
<i>Elliptio dilatata</i>	wd	wd	wd		wd	wd	d	wd	wd		wd	wd	wd		sf	wd
<i>Fusconaia ebena</i>												1	wd			
<i>Fusconaia flava</i>	d	4	19	5	3	wd	3	4	4	1	wd		wd			
<i>Fusconaia subrotunda</i>									wd		sf		sf			
<i>Hemistena lata</i>																
<i>Megaloniais nervosa</i>												wd				
<i>Plethobasus cicatricosus</i>									sf							sf
<i>Plethobasus cyphus</i>																
<i>Pleurobema clava</i>	wd						sf	wd	wd		sf	wd	wd		sf	
<i>Pleurobema cordatum</i>			wd		wd			sf			sf		wd			
<i>Pleurobema plenum</i>								sf		sf			sf			
<i>Pleurobema rubrum</i>									wd	sf	sf	wd		sf	sf	
<i>Pleurobema sintoxia</i>	wd	wd	1					1	1		sf		wd	d	sf	
<i>Quadrula cylindrica</i>		wd						wd		1		sf				
<i>Quadrula metanevra</i>	wd	wd					3	15	19	10	11	12	1	2	wd	
<i>Quadrula nodulata</i>																
<i>Quadrula pustulosa</i>	d	1	9	2		1	18	11	30	10	3	16	2	6	wd	
<i>Quadrula quadrula</i>	1	5	19	8	1	wd	19	6	6	12	30	43	5	26	2	d
<i>Tritogonia verrucosa</i>	7	2	9	2		wd	3	4	1	1	wd	wd	1	1		
<i>Unio merus tetralasmus</i>																
<i>Alasmidonta marginata</i>	wd	4	2	1	1		3	d		wd						
<i>Anodonta grandis</i>	2	5	3	15	d		3	1		d		d	5	1	d	
<i>Anodonta imbecillis</i>	d		d	1						d	1	1	4	9		1
<i>Anodonta suborbiculata</i>																
<i>Anodontoides ferussacianus</i>					d											
<i>Lasmigona complanata</i>	1	1	3	2	1		2	1	d	3	2	1	2	2	d	
<i>Lasmigona costata</i>	1	wd	5	2	2	1	3		1	wd	2		d			
<i>Strophitus undulatus</i>	1	2	4	d	d	wd	8	3	1	2		1				
<i>Actinonaias ligamentina</i>	3	8	16	15	13	wd	7	12	10	13	14	6	1		wd	
<i>Cyrogonia stegaria</i>		wd	1				wd	sf	wd	sf	sf	wd	wd	sf		
<i>Ellipsaria lineolata</i>																
<i>Epioblasma flexuosa</i>													sf			
<i>Epioblasma obliquata</i>													sf			
<i>Epioblasma propinqua</i>													sf		sf	
<i>Epioblasma rangiana</i>								sf	wd							
<i>Epioblasma sampsonii</i>													sf			
<i>Epioblasma torulosa</i>								sf	sf			sf	wd		sf	
<i>Epioblasma triquetra</i>	wd	wd	wd		wd	wd	sf	sf	sf		sf	wd				
<i>Lampsilis cardium</i>	1	1	4	2	10		4	1	5	5	3	d	wd	wd	d	
<i>Lampsilis fasciola</i>	wd				6				d							
<i>Lampsilis ovata</i>																
<i>Lampsilis siliquoides</i>	d	sf		1	7	wd	2	d	1							
<i>Lampsilis teres</i>			d	2		wd			wd	d	wd	wd	d		d	wd
<i>Leptodea fragilis</i>	6	3	5	5	d	d	10	5	18	39	24	14	19	8	3	d
<i>Ligumia recta</i>	wd	5	3	1	2	wd	3	1	2	1	sf	wd				
<i>Obliquaria reflexa</i>												sf		1		
<i>Obovaria olivaria</i>		wd	1	2			6	37	15	110	31	26	25	8	7	
<i>Obovaria retusa</i>									wd	wd	sf	wd	wd	sf		
<i>Obovaria subrotunda</i>			wd				sf	wd	wd	wd	wd	wd	wd	wd	wd	
<i>Potamilus alatus</i>	1	2	4	3	3	d	1	3	2	8	d	6	17		d	d
<i>Potamilus ohioensis</i>							1	1	2	7	1	1	1		1	d
<i>Ptychobranhus fasciolaris</i>	wd						wd	wd		wd			wd			
<i>Toxolasma lividus</i>	wd						wd			sf						
<i>Truncilla donaciformis</i>			d				2	6	3	d	1	4	2	1	d	
<i>Truncilla truncata</i>	2	1	7	3	d	d	6	6	2	8	12	11	3	2	d	d
<i>Villosa fabalis</i>	wd	sf	wd	wd			sf	wd	sf							
<i>Villosa iris</i>					wd		wd									
INDIVIDUALS (LIVE)	37	48	131	78	51	2	132	157	155	239	141	148	89	71	13	1
SPECIES (LIVE)	12	16	20	20	12	2	22	20	20	17	14	15	15	13	4	1
SPECIES (DEAD)	17	11	8	2	9	15	9	15	16	14	17	17	22	6	20	7
SPECIES (TOTAL)	29	27	28	22	21	17	31	35	36	31	31	32	37	19	24	8

Table 6. continued.

Species	17	18	18S	19	19S	20	20S	21	21S	22	22S	23	24	25	26	Total
<i>Amblema plicata</i>		1		sf		2	sf	d		5	d	d	3	10	4	157
<i>Cyclonaias tuberculata</i>		sf		sf	sf	sf	wd	wd				sf	wd		sf	26
<i>Elliptio crassidens</i>		1		sf	sf	2	wd	d		sf		sf	sf	1	1	6
<i>Elliptio dilatata</i>		wd		sf	sf	sf	sf	wd				wd	wd	1	sf	2
<i>Fusconaia ebena</i>	wd	sf	d	sf		sf	wd					wd		d		43
<i>Fusconaia flava</i>	d			sf		sf						wd				
<i>Fusconaia subrotunda</i>		sf		sf	sf	sf	wd	sf	sf	sf		sf		sf	sf	0
<i>Hemistena lata</i>															sf	0
<i>Megaloniais nervosa</i>		wd		sf		wd	wd			wd			4	1		5
<i>Plethobasus cicatricosus</i>					sf											0
<i>Plethobasus cyphus</i>		sf			sf							sf	1	wd		1
<i>Pleurobema clava</i>		sf		sf		sf	wd	sf				sf	sf			0
<i>Pleurobema cordatum</i>		sf		sf	sf	sf	wd		sf	sf		sf	sf	sf	sf	0
<i>Pleurobema plenum</i>		sf				sf	wd	sf				sf				0
<i>Pleurobema rubrum</i>		sf	sf	sf	sf	sf	wd	wd	sf	sf		sf	sf		sf	0
<i>Pleurobema sinuoxia</i>	wd	sf				sf	wd	wd						sf		3
<i>Quadrula cylindrica</i>		sf			sf	sf	sf					sf	sf	sf		1
<i>Quadrula metanevra</i>		sf	d	d	sf	4	sf			2		1	sf	10	4	94
<i>Quadrula nodulata</i>														6		6
<i>Quadrula pustulosa</i>	d	1			d		wd	d		wd		d	1	11	2	124
<i>Quadrula quadrula</i>	1	23	d	14	wd	33	wd	2		33	d	2	3	20	6	320
<i>Tritogonia verrucosa</i>	1		wd	4		10	wd	1		7		d	2	22	3	81
<i>Uniommerus tetralasmus</i>					d											0
<i>Alasmidonta marginata</i>																11
<i>Anodonta grandis</i>	1				d	1				1	d	d	2			40
<i>Anodonta imbecillis</i>			d	10		9				25		5	67	4		137
<i>Anodonta suborbiculata</i>												1				1
<i>Anodontoides ferussacianus</i>																0
<i>Lasmigona complanata</i>		4		10		11	wd			3		d	1	2		52
<i>Lasmigona costata</i>																17
<i>Strophitus undulatus</i>																22
<i>Actinonaias ligamentina</i>	wd	4		2	wd	5	wd			1		wd	d	wd	1	131
<i>Cyprogenia stegaria</i>		sf		sf	sf	sf	sf	sf	sf	sf		sf	sf	sf	sf	1
<i>Ellipsaria lineolata</i>							wd									0
<i>Epioblasma flexuosa</i>						sf										0
<i>Epioblasma obliquata</i>																0
<i>Epioblasma propinqua</i>		sf	sf	sf	sf	sf	sf	sf	sf			sf	sf	sf		0
<i>Epioblasma rangiana</i>						sf							sf			0
<i>Epioblasma sampsonii</i>		sf					sf									0
<i>Epioblasma torulosa</i>		sf		sf	sf	sf	sf	sf	sf	sf		sf	sf		sf	0
<i>Epioblasma triquetra</i>																0
<i>Lampsilis cardium</i>		1						1		3				3	d	44
<i>Lampsilis fasciola</i>																6
<i>Lampsilis ovata</i>		sf	sf			sf	sf	sf				sf			sf	0
<i>Lampsilis siliquoidea</i>																11
<i>Lampsilis teres</i>	wd	2	wd	sf	wd	1	d	d		sf	d	wd	sf	2		7
<i>Leptodea fragilis</i>	4	237		45		43		13		249	d	8	5	34	18	815
<i>Ligumia recta</i>						sf	wd									18
<i>Obliquaria reflexa</i>				d		5		2		6		4	3	18	22	61
<i>Obovaria olivaria</i>	1	185	d	40		326		6		144		23	15	56	38	1102
<i>Obovaria retusa</i>		sf	wd	sf	sf	sf	wd	sf	sf			wd	sf	sf		0
<i>Obovaria subrotunda</i>		sf	wd				wd					sf				0
<i>Potamilus alatus</i>	d	2		2	d	4				2		1	wd	2	1	64
<i>Potamilus ohioensis</i>	d			d		4	d	1		9	d	9	4	1	1	44
<i>Pychobranchus fasciolaris</i>	wd			sf	sf	sf	wd	sf		sf					sf	0
<i>Toxolasma lividus</i>																0
<i>Truncilla donaciformis</i>	d	2	d	1		4		d		3		2	d	3	2	36
<i>Truncilla truncata</i>	d	1		1		9	wd	d		18		d	3	39	18	152
<i>Villosa fabalis</i>																0
<i>Villosa iris</i>																0
INDIVIDUALS (LIVE)	8	464	0	129	0	473	0	26	0	511	0	56	114	246	121	3641
SPECIES (LIVE)	5	13	0	10	0	17	0	7	0	16	0	10	14	20	14	35
SPECIES (DEAD)	11	20	13	19	22	21	32	19	7	11	6	26	18	11	12	25
SPECIES (TOTAL)	16	33	13	29	22	38	32	26	7	27	6	36	32	31	26	60

Table 7. Site by site listing of all mussel species collected in the White River drainage, 1989-1991.
(d = dead, wd = weathered dead, sf = sub-fossil)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<i>Amblema plicata</i>		1	wd	wd	wd	d	wd	wd		wd	wd	wd	26			
<i>Cyclonaias tuberculata</i>						wd										
<i>Elliptio crassidens</i>																
<i>Elliptio dilatata</i>	wd	wd	wd	154	wd	wd		wd		sf	wd	sf	5		wd	
<i>Fusconaia ebena</i>												wd				
<i>Fusconaia flava</i>	wd	7	wd	32	wd	wd		wd		wd	wd	wd	1	wd	wd	46
<i>Fusconaia subrotunda</i>							wd			wd						
<i>Megalonaias nervosa</i>								wd								
<i>Pleurobema clava</i>		wd	wd	wd	wd	wd		wd		sf	wd	wd				
<i>Pleurobema cordatum</i>												wd				
<i>Pleurobema plenum</i>																
<i>Pleurobema rubrum</i>						wd		wd		wd	wd	wd				
<i>Pleurobema sintoxia</i>	wd					wd					wd					
<i>Quadrula cylindrica</i>						wd		wd		sf	sf	sf				
<i>Quadrula metanevra</i>										sf	sf	sf				
<i>Quadrula nodulata</i>												d				
<i>Quadrula pustulosa</i>								wd		wd	wd	d				
<i>Quadrula quadrula</i>							9	2	1	1	wd	1				
<i>Tritogonia verrucosa</i>						wd		wd			wd	wd				
<i>Alasmidontia marginata</i>		23	d	wd	sf								3			
<i>Alasmidontia viridis</i>	2		wd										wd	d	sf	2
<i>Anodonta grandis</i>	41	wd	d	31	d	d	1						2			3
<i>Anodonta imbecillis</i>			d	5	d								d			
<i>Anodonta suborbiculata</i>																
<i>Anodontoides ferussacianus</i>	15		wd										d	d	d	d
<i>Arcidens confragosus</i>																
<i>Lasmigona complanata</i>			1	5	d	sf	1	3	d	1	d	d				1
<i>Lasmigona compressa</i>		1		wd									1	1		d
<i>Lasmigona costata</i>		15	1	5	wd	wd							2	wd		2
<i>Simpsonaias ambigua</i>																
<i>Strophitus undulatus</i>		5	wd	21	d	wd							2	1		d
<i>Actinonaias ligamentina</i>		4	wd		d	sf	wd	wd		sf						sf
<i>Cyprogenia stegaria</i>										sf	sf	sf				
<i>Ellipsaria lineolata</i>																
<i>Epioblasma propinqua</i>																
<i>Epioblasma rangiana</i>		sf	wd			wd										
<i>Epioblasma torulosa</i>										sf	wd	sf				
<i>Epioblasma triquetra</i>																
<i>Lampsilis cardium</i>		1	1	12	1	sf	1	3	1	6	wd	4	2	wd		
<i>Lampsilis fasciola</i>		wd	wd										1	d	wd	
<i>Lampsilis ovata</i>						sf				sf	sf					
<i>Lampsilis siliquoidea</i>	24	10	d	16	wd	wd	wd	wd				sf	14	2	d	9
<i>Lampsilis teres</i>							3	wd	d	wd	wd	2				
<i>Leptodea fragilis</i>						wd	10	28	9	6	d	11				
<i>Ligumia recta</i>						wd		wd								
<i>Obliquaria reflexa</i>										sf		d				
<i>Obovaria olivaria</i>							4	10	2	15	wd	9				
<i>Obovaria retusa</i>										wd	wd	wd				
<i>Obovaria subrotunda</i>					wd	sf		wd		wd	wd	wd				
<i>Potamilus alatus</i>						sf		d		d		d				
<i>Potamilus ohioensis</i>							6	3	2	2	d	5				
<i>Ptychobranchnus fasciolaris</i>		wd	wd					wd		wd	wd	sf	3		sf	
<i>Toxolasma lividus</i>	wd	wd											wd			1
<i>Toxolasma parvus</i>				d	wd											d
<i>Truncilla donaciformis</i>							1	2	1	d	sf	3				
<i>Truncilla truncata</i>							2	2	1	sf		d				
<i>Villosa fabalis</i>		wd			sf											
<i>Villosa iris</i>		wd	wd	wd	wd								d			d
<i>Villosa lienosa</i>					wd								wd	d		2
INDIVIDUALS (LIVE)	82	67	3	281	1	0	38	53	17	31	0	35	62	4	0	66
SPECIES (LIVE)	4	9	3	9	1	0	10	8	7	6	0	7	12	3	0	8
SPECIES (DEAD)	4	9	16	6	17	22	4	16	2	21	24	22	6	7	8	5
SPECIES (TOTAL)	8	18	19	15	18	22	14	24	9	27	24	29	18	10	8	13

Table 7. continued.

Species	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
<i>Amblema plicata</i>		wd	wd			6	25	5	10	2	wd	wd	wd	wd	1	76
<i>Cyclonaias tuberculata</i>							wd	1	1		wd	wd				2
<i>Elliptio crassidens</i>						wd	1	14	1	d	1	wd	wd			17
<i>Elliptio dilatata</i>	wd	d				wd	wd	wd	wd	d	wd	wd	wd			159
<i>Fusconaia ebena</i>						wd		wd		wd		wd	wd		d	0
<i>Fusconaia flava</i>	d	d	wd	4	sf	wd		1	wd	wd	wd	wd				91
<i>Fusconaia subrotunda</i>						wd	wd	wd	sf	wd	wd	wd	wd	sf		0
<i>Megalonaias nervosa</i>						22	2	5	3				wd	wd		32
<i>Pleurobema clava</i>	sf	wd				wd	sf	wd		wd			sf		wd	0
<i>Pleurobema cordatum</i>						wd			1	wd	wd	wd	wd	sf		1
<i>Pleurobema plenum</i>									wd	wd						0
<i>Pleurobema rubrum</i>			wd			wd		wd		wd	wd		sf			0
<i>Pleurobema sintoxia</i>										d			sf			0
<i>Quadrula cylindrica</i>	sf	sf						sf		wd			sf			0
<i>Quadrula metanevra</i>								sf	1	d		wd	wd			1
<i>Quadrula nodulata</i>												2			wd	2
<i>Quadrula pustulosa</i>		wd	wd	1	1	8	d	8	7	3	wd	wd	1	wd	wd	29
<i>Quadrula quadrula</i>						32	3	8	27	3	wd	wd	5	wd	9	101
<i>Tritogonia verrucosa</i>		sf		23	d	3	20	5	17	1	wd		4	wd	1	74
<i>Alasmidonta marginata</i>	d	d														26
<i>Alasmidonta viridis</i>	wd															4
<i>Anodonta grandis</i>	wd						3	17	wd		1				5	104
<i>Anodonta imbecillis</i>		d				d	1	d								6
<i>Anodonta suborbiculata</i>			d				d									0
<i>Anodontoides ferussacianus</i>	d															15
<i>Arcidens confragosus</i>						1	2	2		d					4	9
<i>Lasmigona complanata</i>	d		wd	5		1	4	5	2	d	d		1	wd	35	65
<i>Lasmigona compressa</i>	2	d														5
<i>Lasmigona costata</i>	1	1	sf	4		3										34
<i>Simpsonaias ambigua</i>		wd								wd						0
<i>Strophitus undulatus</i>	wd	wd		2						wd		wd				31
<i>Actinonaias ligamentina</i>		wd		16		wd			1	wd	wd	wd			wd	21
<i>Cyprogenia stegaria</i>			sf		wd	wd		wd	wd	wd	wd	wd			wd	0
<i>Ellipsaria lineolata</i>							d	wd		wd	wd					0
<i>Epioblasma propinqua</i>								wd							wd	0
<i>Epioblasma rangiana</i>										wd						0
<i>Epioblasma torulosa</i>						sf				wd			sf		wd	0
<i>Epioblasma triquetra</i>			wd						sf	wd						0
<i>Lampsilis cardium</i>	d	1	d	13	17	d	3	4	2	1	1					74
<i>Lampsilis fasciola</i>								wd								1
<i>Lampsilis ovata</i>																0
<i>Lampsilis siliquoidea</i>	1	d	wd			sf										76
<i>Lampsilis teres</i>			wd	wd	wd	sf		wd				wd	wd	wd	wd	5
<i>Leptodea fragilis</i>			wd	36	18	1	117	16	d	wd	wd	wd	105	2	3	362
<i>Ligumia recta</i>								wd		wd						0
<i>Obliquaria reflexa</i>					1	d	1	3	3	2	wd	wd	3	wd	3	16
<i>Obovaria olivaria</i>									wd	d		wd	1		1	42
<i>Obovaria retusa</i>										wd		wd				0
<i>Obovaria subrotunda</i>			sf	wd	d	wd		wd		wd			wd			0
<i>Potamilus alatus</i>					d	3	58	33	1	1	d	1	6	wd	d	103
<i>Potamilus ohioensis</i>			wd	2				1		d			4	1	1	27
<i>Ptychobranchnus fasciolaris</i>	wd	sf				wd	wd	wd		d		wd	sf			3
<i>Toxolasma lividus</i>		wd								wd						1
<i>Toxolasma parvus</i>						wd										0
<i>Truncilla donaciformis</i>				wd	d	d	7	6	2	d			sf	d	wd	22
<i>Truncilla truncata</i>						d	18	7	4	2	wd	wd	4	wd	2	42
<i>Villosa fabalis</i>																0
<i>Villosa iris</i>	wd	d														0
<i>Villosa lienosa</i>	d	d														2
INDIVIDUALS (LIVE)	4	2	0	106	37	80	265	142	82	15	3	1	136	3	65	1681
SPECIES (LIVE)	3	2	0	10	4	10	15	19	15	8	3	1	11	2	11	37
SPECIES (DEAD)	14	18	15	3	7	20	9	16	10	31	18	21	17	12	11	22
SPECIES (TOTAL)	17	20	15	13	11	30	24	35	25	39	21	22	28	14	22	59

In 1989-91, the East and West Forks of the White River showed significant differences with respect to the mussel fauna. The East Fork White River (sites 13-28) had 56 species (33 live and 23 dead). The West Fork White River (sites 1-12) had 51 species, only 22 of which were found alive. The average number of mussels collected per site was 54.3 for the East Fork compared to 50.7 for the West Fork. Both had 19 species in common; however, of the top 10 most abundant species in each fork, only three (*Leptodea fragilis*, *Fusconaia flava*, and *Lampsilis cardium*) were shared between them. All but three species (*Anodontooides ferussacianus*, *Lampsilis teres*, and *Obovaria olivaria*) found living in the West Fork were also living in the East Fork. Conversely, 14 species living in the East Fork were not found alive in the West Fork. The most notable absences from the West Fork were *Potamilus alatus* (which ranked second in abundance in the East Fork), *Tritogonia verrucosa*, and *Megaloniais nervosa*. Substrate composition may account for some of the differences between the basins. Substrate in the West Fork White River consists largely of shifting sand and gravel while that of the East Fork is firm sand, gravel, and cobble.

TIPPECANOE RIVER: A total of 1498 live mussels representing 33 species was collected from 16 sites in the Tippecanoe River in 1987. An additional seven species were represented by dead shells only. This survey and an examination of the literature and museum records brings the total number of species recorded from the Tippecanoe River to 56 (Table 4). The number of individuals at a site ranged from 34 to 210 and the number of live species from 10 to 18 (Table 8, Fig. 2). The five most abundant species were *Quadrula pustulosa* (13.7%), *Amblema plicata* (10.3%), *Ptychobranhus fasciolaris* (8.7%), *Pleurobema sintoxia* (7.9%), and *Actinonaias ligamentina* (7.8%), which together composed nearly half (49%) of the living mussels collected.

Seven species were found only in the lower part of the river below the dam at Lake Shafer (Table 8). Whether the dam and reservoir act as a barrier to these species is unknown, but no evidence of these mussels was found upstream. Eight species, *Fusconaia flava*, *Lampsilis fasciola*, *Obovaria subrotunda*, *Plethobasus cyphus*, *Pleurobema clava*, *Ptychobranhus fasciolaris*, *Quadrula cylindrica*, and *Strophitus undulatus*, were found in the middle and upper portion of the river and live individuals were either not found below Lake Shafer or were greatly reduced in number.

Overall the number of live species collected was high, and the Tippecanoe River has one of the most diverse assemblages of freshwater mussels in the Midwest. Many of the species found in the Tippecanoe are considered rare or endangered in the Midwest or throughout their range (Parmalee, 1967; Stansbery, 1970; 1971). Three of the species found, *Quadrula cylindrica*, *Plethobasus cyphus*, and *Pleurobema clava*, are on the Indiana state endangered list and *P. clava* is a candidate for listing at the federal level. Four species, *Obovaria subrotunda*, *Pleurobema clava*, *Toxolasma parvus*, and *Villosa iris*, were found only in the Tippecanoe River in this study. Other mussels doing relatively well in the Tippecanoe but very poorly represented in the other streams in the drainage included *Cyclonaias tuberculata*, *Pleurobema sintoxia*, and *Ptychobranhus fasciolaris* (Table 1).

Table 8. Site by site listing of all mussel species collected in the Tippecanoe River, 1987.
(d = dead, wd = weathered dead, sf = sub-fossil)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
<i>Amblema plicata</i>	96	wd	wd		d	wd	wd	wd	wd	wd	wd	5	38	5	5	5	154
<i>Cyclonaias tuberculata</i>			8		6	d	12	5	12	5	4	4	6	20	12	3	97
<i>Elliptio dilatata</i>	20	8			2	d	1	2	d	d			1	2	wd	d	36
<i>Fusconaia flava</i>	14	23	8	5	9	8	5	3	1	d	2				wd	3	81
<i>Plethobasus cyphus</i>					2	d	2	1	2	2				wd		1	10
<i>Pleurobema clava</i>		3	9	wd	6	d	d	wd	1	wd					wd	wd	19
<i>Pleurobema rubrum</i>								sf									0
<i>Pleurobema sintoxia</i>	4	15	26		18	8	8	12	6	6	10			1	1	3	118
<i>Quadrula cylindrica</i>						d		wd	2	4	3				wd	d	9
<i>Quadrula metanevra</i>														1	d	5	6
<i>Quadrula pustulosa</i>				3	8	11	11	10	21	10	35	65	9	7	7	8	205
<i>Quadrula quadrula</i>										2		35	2				39
<i>Tritogonia verrucosa</i>												6	1			wd	7
<i>Alasmidonta marginata</i>		d	4		4	6	8	10	d	6	3				d	d	41
<i>Alasmidonta viridis</i>					wd	wd				wd							0
<i>Anodonta grandis</i>	6			6	d	d			1	d		24	17		2	5	61
<i>Anodonta imbecillis</i>		d		2	1	1				2		1	2		d	1	10
<i>Anodonta suborbiculata</i>													5				5
<i>Lasmigona complanata</i>				4				1	1	d		53	25			wd	84
<i>Lasmigona compressa</i>		2	d	2	d	d											4
<i>Lasmigona costata</i>		1	5		4	1	7	7	6	6	2	5	3	3	1	wd	51
<i>Strophitus undulatus</i>	14	7	3	1	4	2	1	7	1	4	2		d		d	1	47
<i>Actinonaias ligamentina</i>					11	4	13	27	25	8	15	2	2	5	3	2	117
<i>Cyprogenia stegaria</i>															wd	d	0
<i>Epioblasma rangiana</i>	wd	wd	wd	wd	wd	wd		wd		wd	wd						0
<i>Epioblasma triquetra</i>												d				d	0
<i>Lampsilis cardium</i>	1	10	12	10	d	wd	3	12	3	3	d	6	1	1	1	2	65
<i>Lampsilis fasciola</i>	1	3	wd		1	wd		wd		wd					wd	wd	5
<i>Lampsilis siliquoidea</i>	4	5	1	5	2							2	14		1	wd	34
<i>Leptodea fragilis</i>													3	1	d	1	5
<i>Ligumia recta</i>			wd							wd			1	1	wd	1	3
<i>Obovaria subrotunda</i>					6	3	4	2	1	d	1				wd		17
<i>Potamilus alatus</i>													3	1	wd	1	5
<i>Ptychobranchus fasciolaris</i>	21	53	33		d	2	wd	2	5	4	3	2		4	d	2	131
<i>Toxolasma lividus</i>	1	d	d		d	d	d	d		d	d		d		d	1	2
<i>Toxolasma parvus</i>				1									d				1
<i>Truncilla donaciformis</i>																d	0
<i>Truncilla truncata</i>													wd	3	1	1	5
<i>Villosa fabalis</i>					wd					wd					wd		0
<i>Villosa iris</i>	1	22	1		d	d	wd	d		d	wd				wd	wd	24
INDIVIDUALS (LIVE)	183	152	110	39	84	46	75	101	88	62	80	210	133	55	34	46	1498
SPECIES (LIVE)	12	12	11	10	15	10	12	14	15	13	11	13	17	14	10	18	33
SPECIES (DEAD)	1	5	6	2	10	14	5	8	3	13	5	1	4	1	18	13	7
SPECIES (TOTAL)	13	17	17	12	25	24	17	22	18	26	16	14	21	15	28	31	40

COMMERCIAL HARVEST PRESSURE & RECOMMENDATIONS

The low water conditions in 1988 and 1991, combined with the exponential increase in the price of shells being offered by commercial buyers (approximately \$0.95/lb. in 1988, \$1.20/lb. in 1991), substantially increased the collection effort by musselors in those years. The number of commercial licenses issued nearly doubled from an 1988-90 average of 508 to 950 in 1991 (Flatt et al., 1992). The vast majority of the persons observed in john boats on the river in 1988 and 1991 were involved in collecting mussels.

Many of the shellers were interviewed and allowed us to examine their catches. In these interviews it became clear that species concepts differed greatly from sheller to sheller resulting in inaccurate reports to the IDNR. Commercial regulations need to be revised to protect rare species and properly manage the harvest. The following recommendations are offered regarding commercial harvest of freshwater mussels in Indiana.

1. Adopt the proposed administrative rule change to close the commercial mussel harvest indefinitely to allow recovery of mussel populations where continual commercial pressure has severely depleted mussel stocks. Collect data on sustainable yields for targeted species and determine if harvest could resume on a limited basis without seriously affecting the resource.
2. If harvest is reinstated, train a crew of field biologists in mussel identification to conduct yearly creel surveys like those done for commercial and sport fishing. These creel surveys should be done at a minimum in those counties where harvest pressure is the greatest (for example Lawrence and Martin counties).

SPECIES ACCOUNTS

In the following accounts, all species known to have inhabited the Wabash, White, and Tippecanoe rivers are discussed with respect to their historical and present distribution in the drainage. The species accounts are arranged alphabetically within each subfamily. For each species a citation of the original description is given followed by the type locality and deposition of types if known. A short synonymy of names applied to each species in Indiana is given for use in locating information from earlier works for those not familiar with the nomenclature. The synonymy is followed by sections on status, a list of other common names, a brief description of habitat, and remarks. The remarks include statements on the status and distribution of each species relative to past published works (Call, 1900; Daniels, 1903; Goodrich and van der Schalie, 1944; Meyer, 1968, 1974; Clark, 1976). A map showing the location of live (solid circles) and dead shells (open circles) is given for each species. Because of the proximity of some of the sites in the lower Wabash River, a single dot on the map in the lower Wabash River may represent more than one locality. Triangles are used to depict the location of those species known historically from the drainage but not encountered in this survey. A line drawing of each species copied from Burch (1975) or Call (1900) has been added to the maps.

Cumberlandia monodonta (Say, 1829)

Spectaclecase

ORIGINAL DESCRIPTION: *Unio monodonta* Say, 1829. Descriptions of some new terrestrial and fluviatile shells of North America. The Disseminator of Useful Knowledge, New Harmony II. p. 293.

TYPE LOCALITY: Falls of the Ohio [River, Louisville, Kentucky].

SYNONYMY:

Unio monodontus Say
Stein 1880:466.

Margaritana monodonta (Say)
Call 1894:153; 1896:141; 1897:251; 1900:526; Daniels
1903:650.

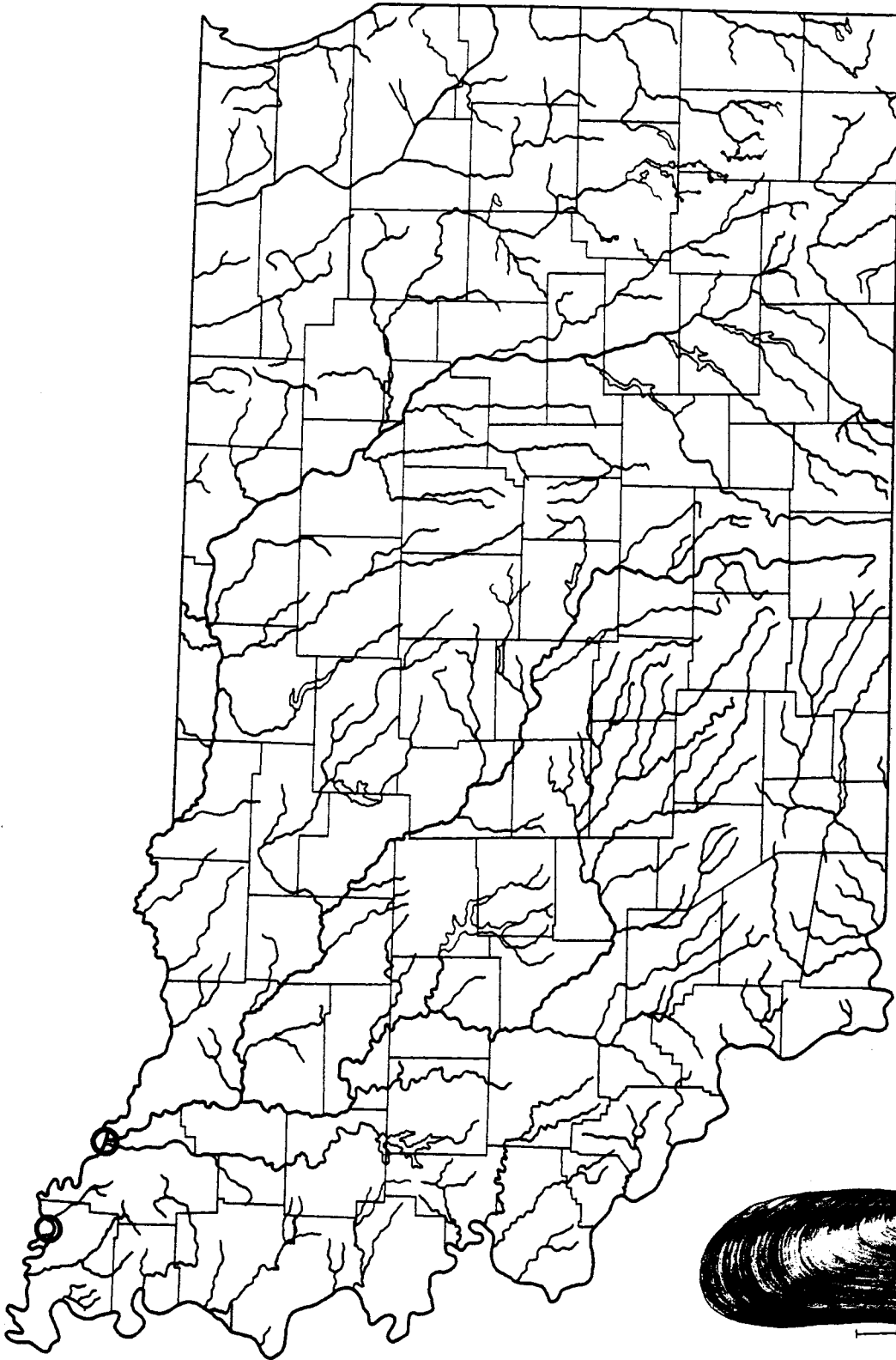
Cumberlandia monodonta (Say)
Goodrich & van der Schalie 1944:305; Parmalee 1967:25; Clark
1976:4

STATUS: Federal candidate (Category 2a).

OTHER COMMON NAMES: Spectacle case pearly mussel, spectacle case.

HABITAT: Found in medium to large streams in firm mud around vegetation or among boulders in areas of reduced flow.

REMARKS: Reported from the Wabash River but said to be uncommon by Call (1900). Goodrich and van der Schalie (1944) noted this species only from the Grand Chains region in the lower Wabash River. It was not reported from either the 1966-67 or 1975 surveys (Meyer, 1974; Clark, 1976) and the only evidence of the spectaclecase in this survey was sub-fossil shells found at two sites in the lower Wabash River in 1987. This mussel has not been collected in Indiana in nearly 50 years and it is most likely extirpated from the Wabash River drainage.



Cumberlandia monodonta (Say, 1829)
spectaclecase

Amblema plicata (Say, 1817)

Threeridge

ORIGINAL DESCRIPTION: *Unio plicata* Say, 1817. Article "Conchology" in William Nicholson. The American Edition of the British Encyclopedia, or Dictionary of Arts and Sciences. Vol. II, B-E. Samuel A. Mitchell and Horace Ames, Philadelphia, no pagination.

TYPE LOCALITY: Lake Erie. Type presumably lost.

SYNONYMY:

- Unio plicatus* Lesueur
Stein 1880:462; Call 1894:155; 1896:145; 1897:252; 1900:446.
- Unio undulatus* Barnes
Stein 1880:462; Call 1894:155; 1896:146; 1897:252; 1900:445;
Kirsch 1896:54.
- Quadrula plicata* (Say)
Daniels 1903:651.
- Quadrula undulata* (Barnes)
Daniels 1903:651; Wilson & Clark 1912:44.
- Amblema costata* (Rafinesque)
Goodrich & van der Schalie 1944:306; Parmalee 1967:26; Meyer
1974:21; Clark 1976:4.
- Amblema peruviana* (Lamarck)
Goodrich & van der Schalie 1944:306; Parmalee 1967:27; Meyer
1974:21; Clark 1976:4.
- Amblema plicata* (Rafinesque)
Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Common.

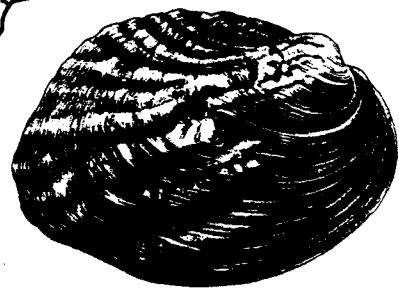
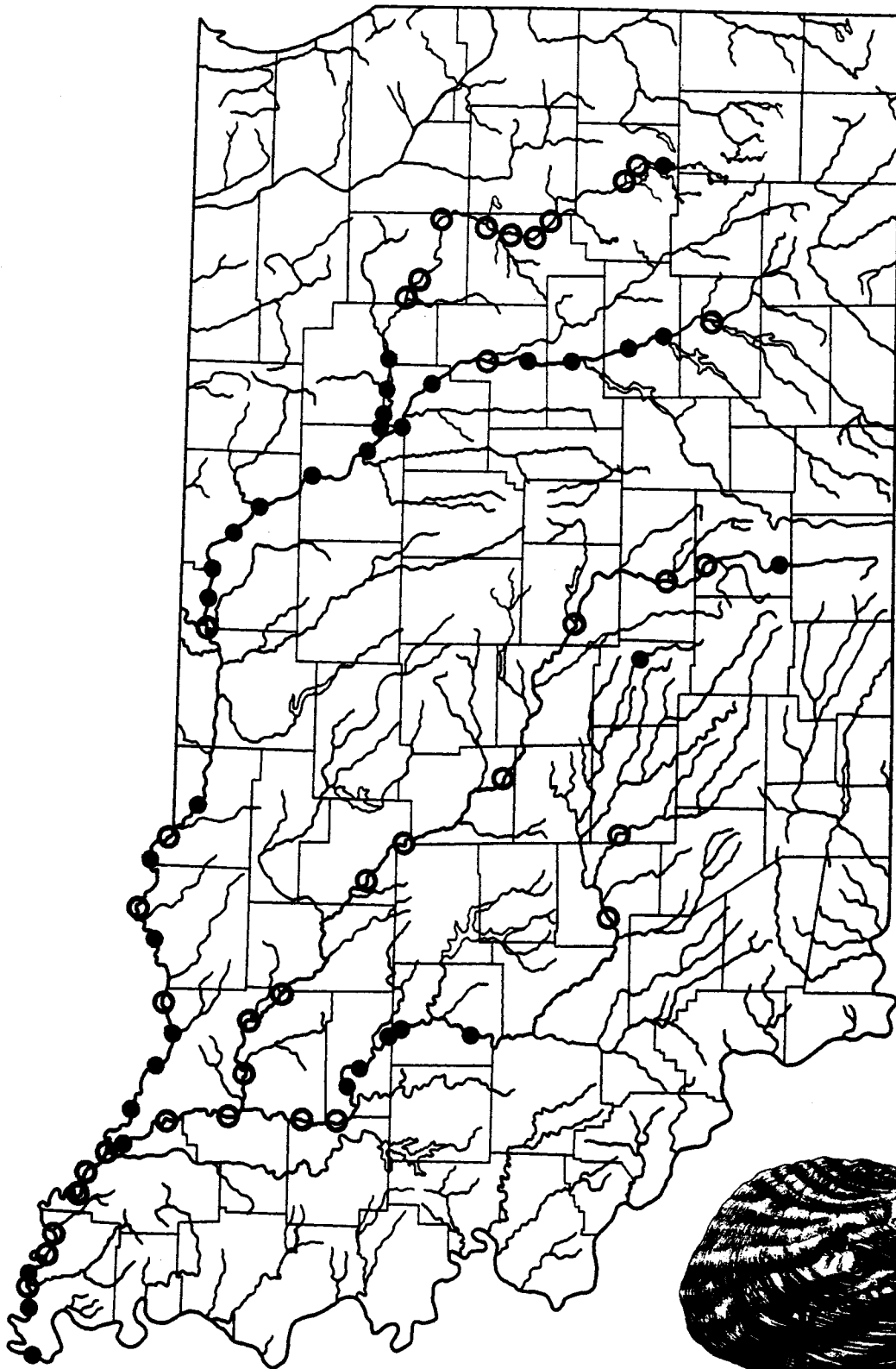
OTHER COMMON NAMES: Blue-point, purple tip.

HABITAT: Found in medium to large rivers and impoundments in mud, sand, or gravel.

REMARKS: Reported as widespread and common in Indiana by Call (1900). Goodrich and van der Schalie (1944) noted that this commercially important species is found state wide, but is less common in the larger streams of the state. The threeridge was found to be common in the Wabash River in 1966-67 and 1975 (Meyer, 1968; 1974; Clark, 1976). *Amblema plicata* was common in the present survey and it ranked fourth in order of abundance for all species collected (Table 2). It was present at almost every site sampled in the middle and upper Wabash River in 1988, and was the dominant species found at site 9 near Lafayette.

The threeridge was reported to be abundant in the White River in 1966-67 (Meyer, 1968). Although it ranked seventh in order of abundance for all species collected in the White River in 1989-91, live threeridges were found at only 8 of the 23 sites where shells were present. *Amblema plicata* was most common in the lower East Fork and was the dominant species taken at site 13 in Sugar Creek.

The threeridge was the second most abundant mussel found in the Tippecanoe River in 1987. Shells of *A. plicata* were found at almost every site sampled on the river. Although it was the dominant species collected from site 1, it was not found alive again until site 12 below Lake Shafer.



Amblema plicata (Say, 1817)
three-ridge

Cyclonaias tuberculata (Rafinesque, 1820)

Purple wartyback

ORIGINAL DESCRIPTION: *Obliquaria tuberculata* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 308.

TYPE LOCALITY: Ohio and adjacent rivers. Lectotype ANSP 20215 from the Ohio River (Johnson & Baker, 1973).

SYNONYMY:

Unio graniferus Lea

Stein 1880:462; Call 1894:154; 1896:144; 1897:252; 1900:488.

Unio verrucosus Barnes

Stein 1880:462; Call 1894:156; 1896:146; 1897:252; 1900:491.

Unio verrucosus purpureus Hildreth

Stein 1880:462.

Unio tuberculatus Conrad

Stein 1880:462.

Quadrula granifera (Lea)

Daniels 1903:652.

Quadrula tuberculata (Rafinesque)

Daniels 1903:652; Wilson & Clark 1912:40.

Cyclonaias tuberculata (Rafinesque)

Goodrich & van der Schalie 1944:306; Parmalee 1967:27; Meyer 1974:22; Clark 1976:4; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Common in the Tippecanoe River, uncommon to rare in the Wabash and White rivers.

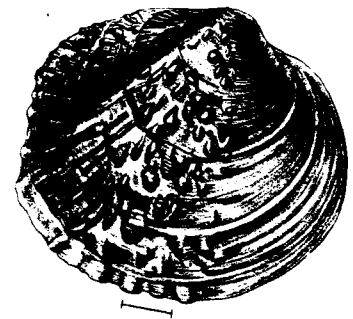
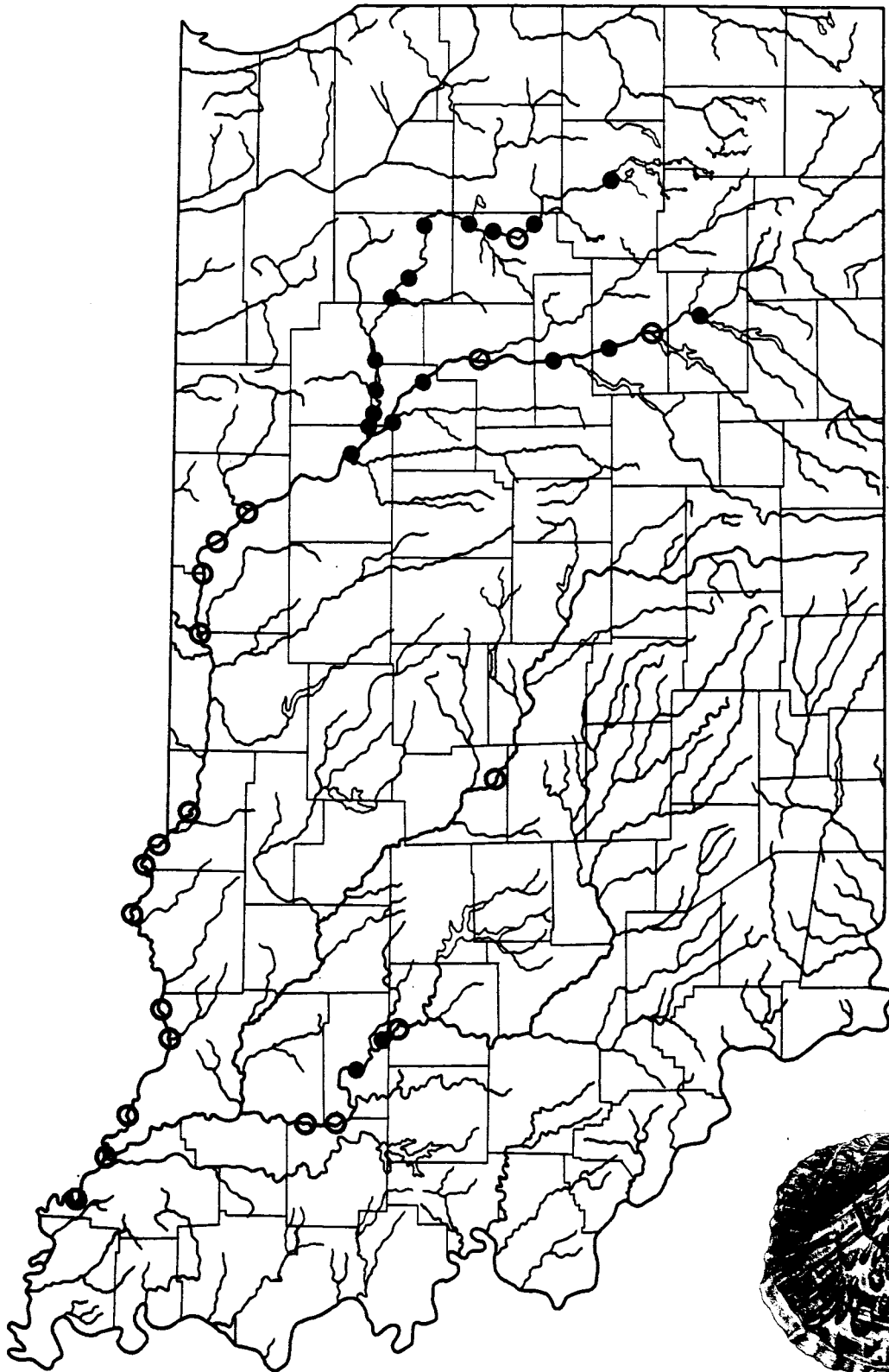
OTHER COMMON NAMES: Purple pimple-back, Missouri mapleleaf.

HABITAT: Found in medium to large rivers in gravel.

REMARKS: Call (1900) reported this species under two names but said both were common in the Wabash River. It was not found in the Wabash River in either 1966-67 or 1975 (Meyer 1968; 1974; Clark 1976). This mussel was widely distributed throughout the Wabash River drainage in historical times but has undergone a severe reduction in range in this century. Relatively common in the upper Wabash River, no live purple wartybacks were found below Lafayette.

Listed as rare in the 1966-67 survey of the White River (Meyer, 1968). Two purple wartybacks were found alive at two of five sites where shells were found in the lower East Fork White River in 1989-91.

The purple wartyback was common in the Tippecanoe River in 1987. Ninety-seven individuals were found at 12 of the 16 sites surveyed and it ranked sixth in order of abundance for all species in the river. It was especially common at site 14 and was the dominant species at that station.



Cyclonaias tuberculata (Rafinesque, 1820)
purple wartyback

Elliptio crassidens (Lamarck, 1819)

Elephant-ear

ORIGINAL DESCRIPTION: *Unio crassidens* var. b Lamarck, 1819. Histoire Naturelle des Animaux sans Vertebres. Vol. 6, p. 71.

TYPE LOCALITY: Lake Erie [erroneous]; lectotype, Paris Museum, selected by Johnson (1969), type locality restricted to the Ohio River at Cincinnati.

SYNONYMY:

Unio crassidens Lamarck

Call 1894:153; 1896:143; 1897:251; 1900:509; Daniels
1903:650.

Elliptio crassidens (Lamarck)

Goodrich & van der Schalie 1944:307; Parmalee 1967:29; Meyer
1974:22; Clark 1976:4; Weilbaker et al. 1985:689; Cummings &
Berlocher 1990:87.

STATUS: Uncommon.

OTHER COMMON NAMES: Mule's ear, blue ham.

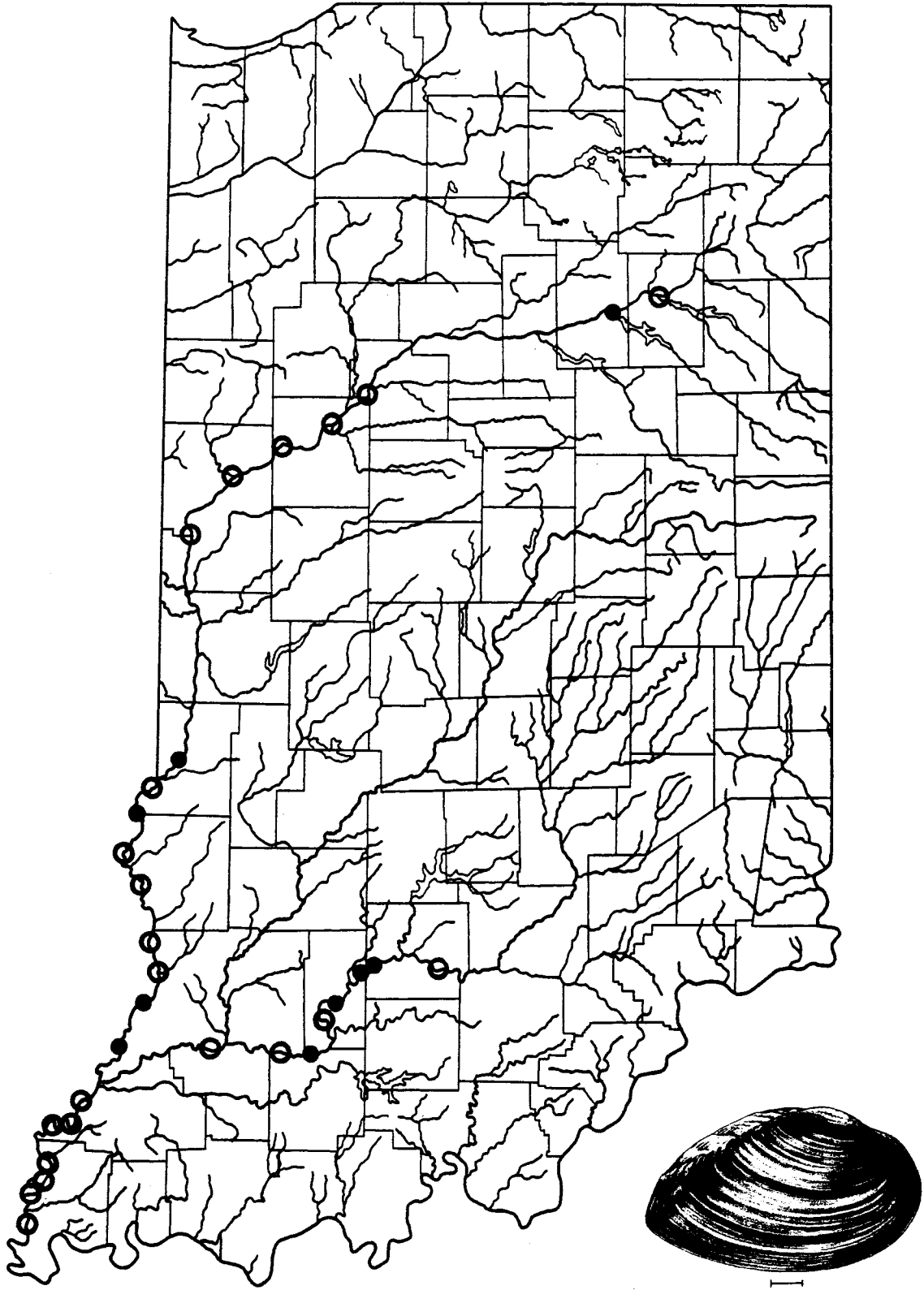
HABITAT: Found in large rivers in mud, sand, or fine gravel.

REMARKS: Historical records include the Wabash and Ohio rivers (Call, 1900) and the larger rivers that drain the southern portion of the state (Goodrich and van der Schalie, 1944). Not collected in the Wabash in 1966-67 (Meyer, 1968; 1974), it was listed as common in the lower Wabash in 1975 (Clark, 1976). Spot collecting in the lower Wabash in 1984-85 yielded two live individuals, one from 1.5 miles east of Maunie and another from Mt. Carmel. In 1987, only shells were found at eight sites in the lower Wabash. In 1988, shells of the elephant-ear were found throughout the Wabash River and live *E. crassidens* were present at sites 2, 18, 20, 25, and 26. This mussel was never abundant when found and was represented by a single specimen at each site except 20 where two individuals were collected.

The elephant-ear was listed as common in the East Fork White River in 1966-67 (Meyer, 1968). In 1989-91, shells of *E. crassidens* were found at eight sites, seven in the East Fork and one in the White River below the confluence of the East and West Forks. Conversations with shellers revealed that this species was locally abundant in the East Fork and was being harvested and sold commercially.

Reported by Daniels (1903) in the Tippecanoe River, no *E. crassidens* were found there in 1987.

Weathered-dead shells were found in the Tippecanoe River in 1991 (T. Watters, pers. comm.).



Elliptio crassidens (Lamarck, 1819)
elephant-ear

Elliptio dilatata (Rafinesque, 1820)

Spike

ORIGINAL DESCRIPTION: *Unio dilatata* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 297.

TYPE LOCALITY: [Ohio River]. Lectotype ANSP 20248a from the Kentucky River (Johnson & Baker, 1973).

SYNONYMY:

- Unio gibbosus* Barnes
Stein 1880:465; Call 1894:154; 1896:143; 1897:252; 1900:450;
Kirsch 1896:55; Daniels 1903:650; Wilson & Clark 1912:45.
- Unio arctior* Lea
Call 1894:153; 1897:251.
- Elliptio dilatatus* (Rafinesque)
Goodrich & van der Schalie 1944:306; Parmalee 1967:29; Meyer
1974:22; Clark 1976:4.
- Elliptio dilatata* (Rafinesque)
Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Uncommon to rare.

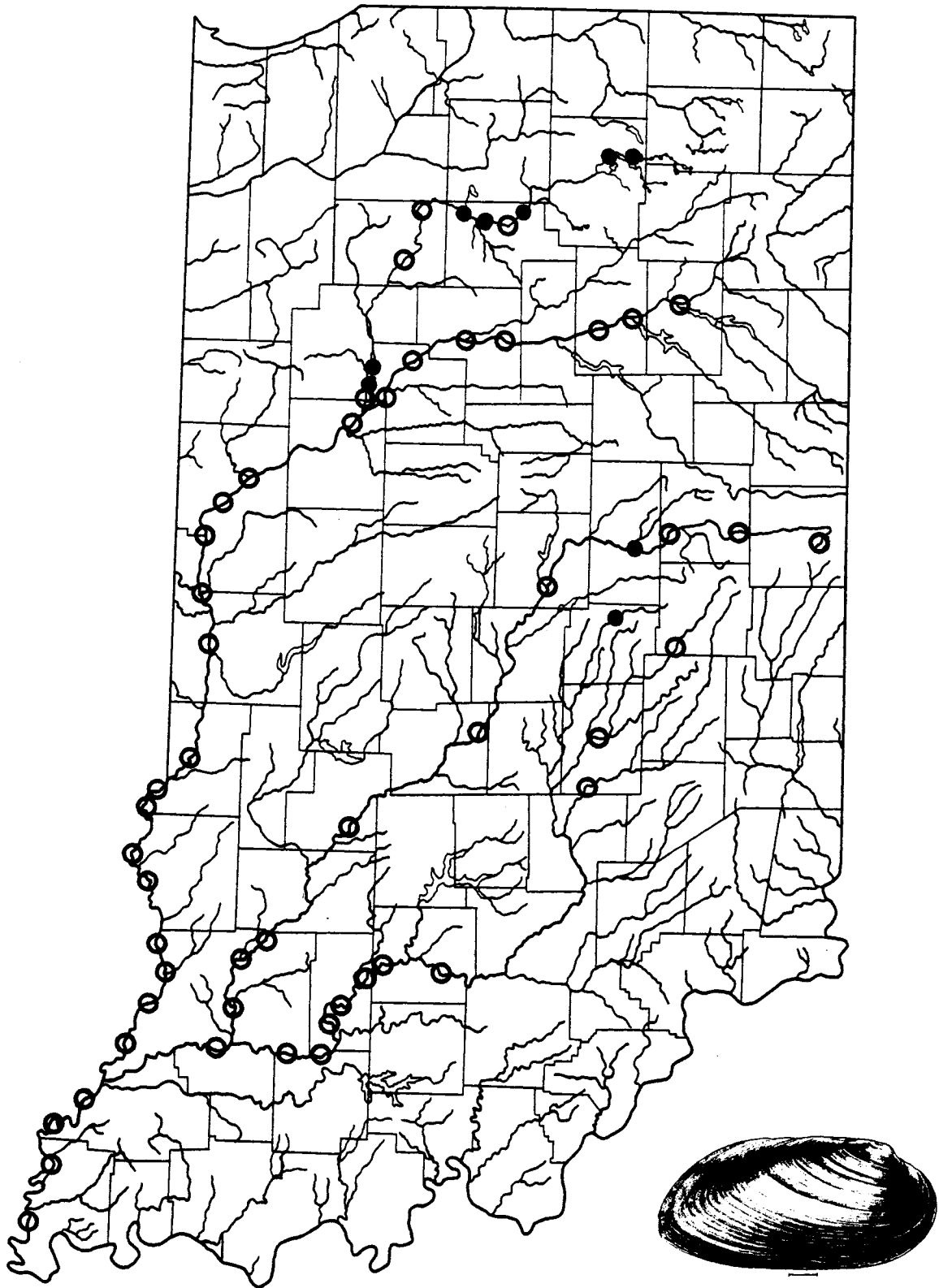
OTHER COMMON NAMES: Lady-finger.

HABITAT: Found in small to large streams in mud, sand, or fine gravel.

REMARKS: Call (1900) noted that the spike was one of the most abundant species in the larger streams of the state. Likewise, Goodrich and van der Schalie (1944) reported this mussel as among the most common in Indiana. However, by 1966-67 only weathered-dead shells were collected from the East Fork of the White River near Shoals (Meyer, 1968; 1974), and Clark (1976) did not list this species from the lower Wabash River in 1975. Although present at most of the sites sampled in the Wabash River in 1987-88, only weathered-dead or sub-fossil shells were found and it is possible that this species is now extirpated from the Wabash River below Huntington Reservoir.

Although numerically abundant in the White River in 1989-91 (ranking second), populations of the spike were concentrated and live mussels were found at only two of the 22 sites where shells were found. Only weathered-dead or sub-fossil shells were present at most sites and this species has undergone a pronounced reduction in range in the White River drainage.

Elliptio dilatata is doing much better in the Tippecanoe River than in the Wabash or White rivers. The spike was found at seven of the sixteen sites sampled and was common in the headwaters at sites 1 and 2. It was the third most abundant species found at site 1 and ranked fifteenth overall for the river. Given the widespread historical range of this mussel in Indiana and its present day decline, this species should be classified as a Species of Special Concern in Indiana.



Elliptio dilatata (Rafinesque, 1820)
spike

Fusconaia ebena (I. Lea, 1831)

Ebonysshell

ORIGINAL DESCRIPTION: *Unio ebenus* I. Lea, 1831. Observations on the naiades, and descriptions of new species of that and other families. Transactions of the American Philosophical Society. Vol. IV New Series. p. 84, pl. IX, fig. 14.

TYPE LOCALITY: Ohio River.

SYNONYMY:

Unio ebenus Lea

Stein 1880:465; Call 1894:154; 1896:143; 1897:251; 1900:503;

Kirsch 1896:55.

Quadrula ebenus (Lea)

Daniels 1903:652.

Quadrula ebena (Lea)

Wilson & Clark 1912:41.

Fusconaia ebenus (Lea)

Goodrich & van der Schalie 1944:307; Parmalee 1967:31; Meyer

1974:22; Clark 1976:4.

STATUS: Rare.

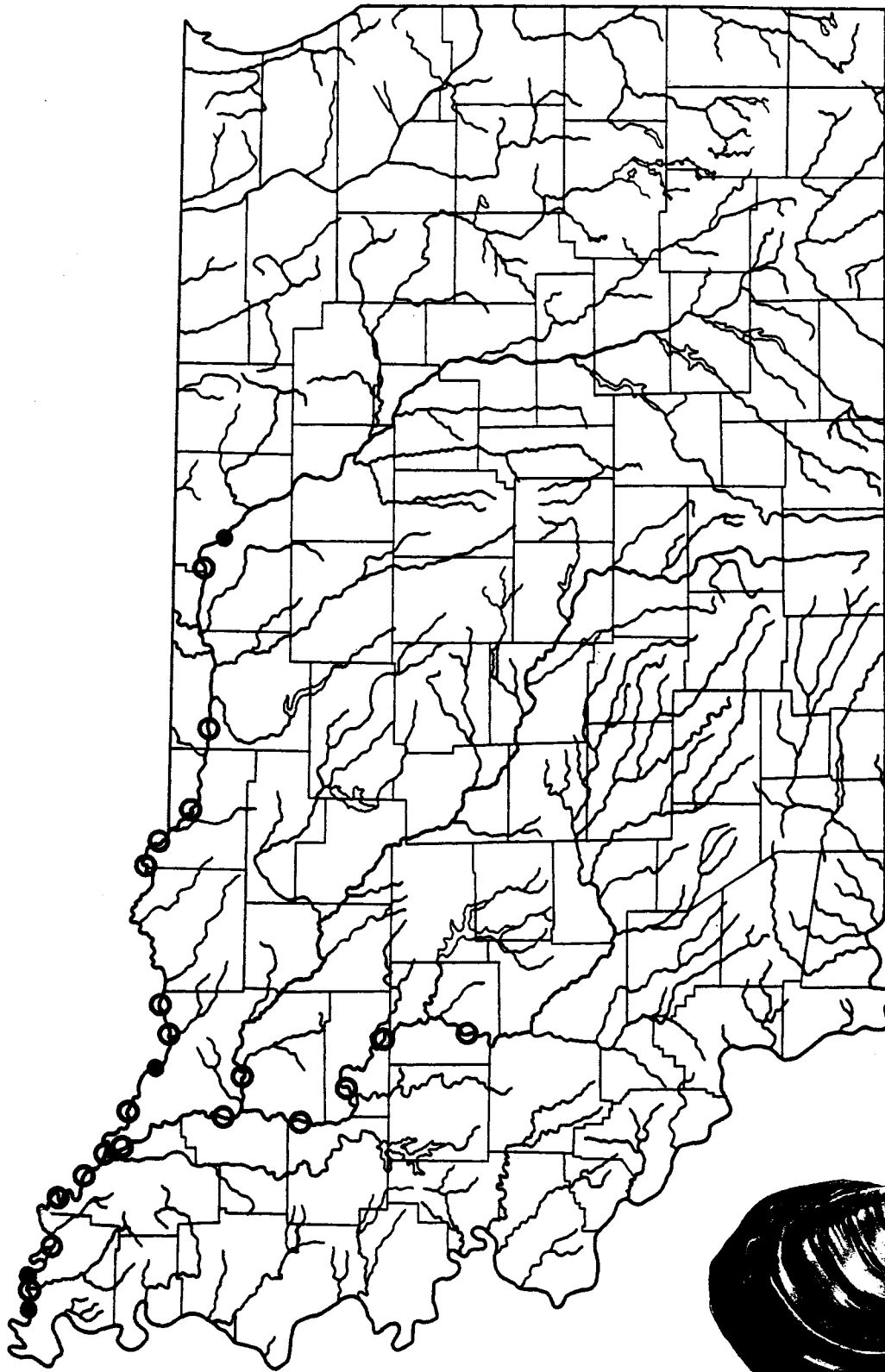
OTHER COMMON NAMES: None.

HABITAT: Found in large rivers in mud, sand, or gravel.

REMARKS: The ebonysshell was reported from the Wabash River at Terre Haute by Call (1900) and Grand Chain in Posey County by Daniels (1903). Goodrich and van der Schalie (1944) noted its presence in the large streams of Indiana and mentioned the Wabash River at New Harmony specifically. *Fusconaia ebena* was reported as rare in the Wabash by Meyer (1968; 1974) and Clark (1976). Six individuals were found at three sites in the lower Wabash River in 1987. Only two live ebony shells were found at sites 12 and 25 in the middle Wabash River in 1988. The presence of relict shells at numerous stations below site 12 attests to its former abundance in the river.

In 1966-67, *F. ebena* was reported as common in the White River (Meyer, 1968; 1974). No live ebony shells were found in 1991, but a fresh-dead shell was collected at site 31 near the mouth of the White River. This formerly widespread species has undergone a marked reduction in the Wabash River drainage and should be listed as a Species of Special Concern in Indiana.

Not found in the Tippecanoe River in 1987.



Fusconaia ebena (I. Lea, 1831)
ebonyshell

Fusconaia flava (Rafinesque, 1820)

Wabash pigtoe

ORIGINAL DESCRIPTION: *Obliquaria flava* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles. p. 305, pl. LXXXI, figs. 13 and 14.

TYPE LOCALITY: Small tributaries of the Kentucky River, Salt River, and Green River. Lectotype ANSP 20230, from small creeks in Kentucky (Johnson & Baker, 1973).

SYNONYMY:

- Unio flavus* Conrad
Stein 1880:463.
- Unio rubiginosus* Lea
Stein 1880:463; Call 1894:155; 1896:146; 1897:252; 1900:505;
Kirsch 1896:55.
- Unio trigonus* Lea
Stein 1880:463; Call 1894:155; 1896:146; 1897:252; 1900:504.
- Quadrula trigona* (Lea)
Daniels 1903:652; Wilson & Clark 1912:42.
- Quadrula rubiginosa* (Lea)
Daniels 1903:652; Wilson & Clark 1912:42.
- Fusconaia undata* (Barnes)
Goodrich & van der Schalie 1944:307; Parmalee 1967:32; Meyer
1974:22; Clark 1976:4.
- Fusconaia flava* (Rafinesque)
Goodrich & van der Schalie 1944:307; Parmalee 1967:31; Clark
1976:4; Weilbaker et al. 1985:689; Cummings & Berlocher
1990:87.

STATUS: Common.

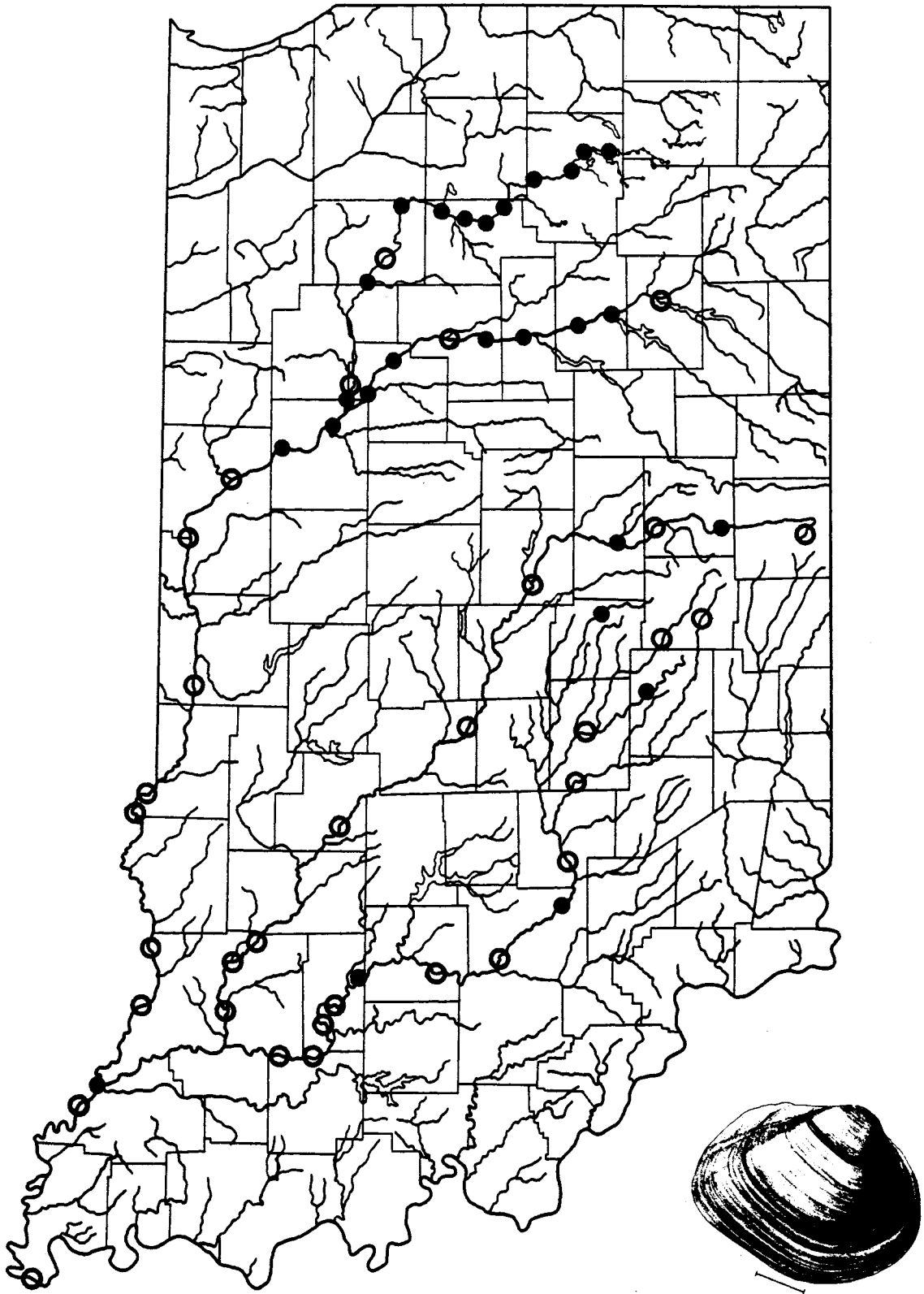
OTHER COMMON NAMES: Pig-toe.

HABITAT: Usually found in small or medium streams in mixed sand and gravel.

REMARKS: This highly variable mussel has two forms (compressed in headwaters, *flava*, and inflated in large rivers, *undata*) and has been listed under various names in the literature. Reported as common by Call (1900) and others (Daniels, 1903; Goodrich & van der Schalie, 1944), it was listed as rare in the Wabash River by Meyer (1968; 1974) and Clark (1976). *Fusconaia flava* was common in the Wabash River above Lafayette, but was not present live below site 10 (Black Rock, Tippecanoe County) except at the confluence of the White River where one individual was found.

Fusconaia flava was listed as common in the White River in 1966-67 (Meyer, 1968; 1974). It was the most widespread species in the White River in 1989-91 based on the total number of sites at which shells were found. However, live *F. flava* were present at only six sites in the White River drainage.

Listed from the Tippecanoe River by Daniels (1903), *F. flava* was widespread and common in 1987. It was found at 11 of 16 sites, mostly in the upper half of the river and ranked eighth in order of abundance for all species found.



Fusconaia flava (Rafinesque, 1820)
Wabash pigtoe

Fusconaia subrotunda (I. Lea, 1831)

Long-solid

ORIGINAL DESCRIPTION: *Unio subrotundus* I. Lea, 1831. Observations on the naiades, and descriptions of new species of that and other families. Transactions of the American Philosophical Society. Vol. IV New Series. p. 117, pl. XVIII, fig. 45.

TYPE LOCALITY: Ohio.

SYNONYMY:

- Unio subrotundus* Lea
Stein 1880:465.
- Unio politus* Conrad
Stein 1880:465.
- Unio kirtlandianus* Lea
Stein 1880:465.
- Quadrula subrotunda* (Lea)
Daniels 1903:652.
- Fusconaia subrotunda* (Lea)
Goodrich & van der Schalie 1944:307; Parmalee 1967:87; Meyer
1974:22; Clark 1976:4; Cummings & Berlocher 1990:87.
- Fusconaia maculata* (Rafinesque)
Weilbaker et al. 1985:689.

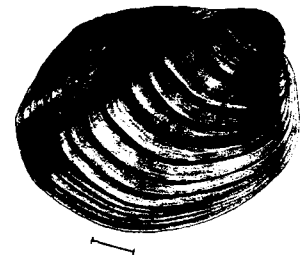
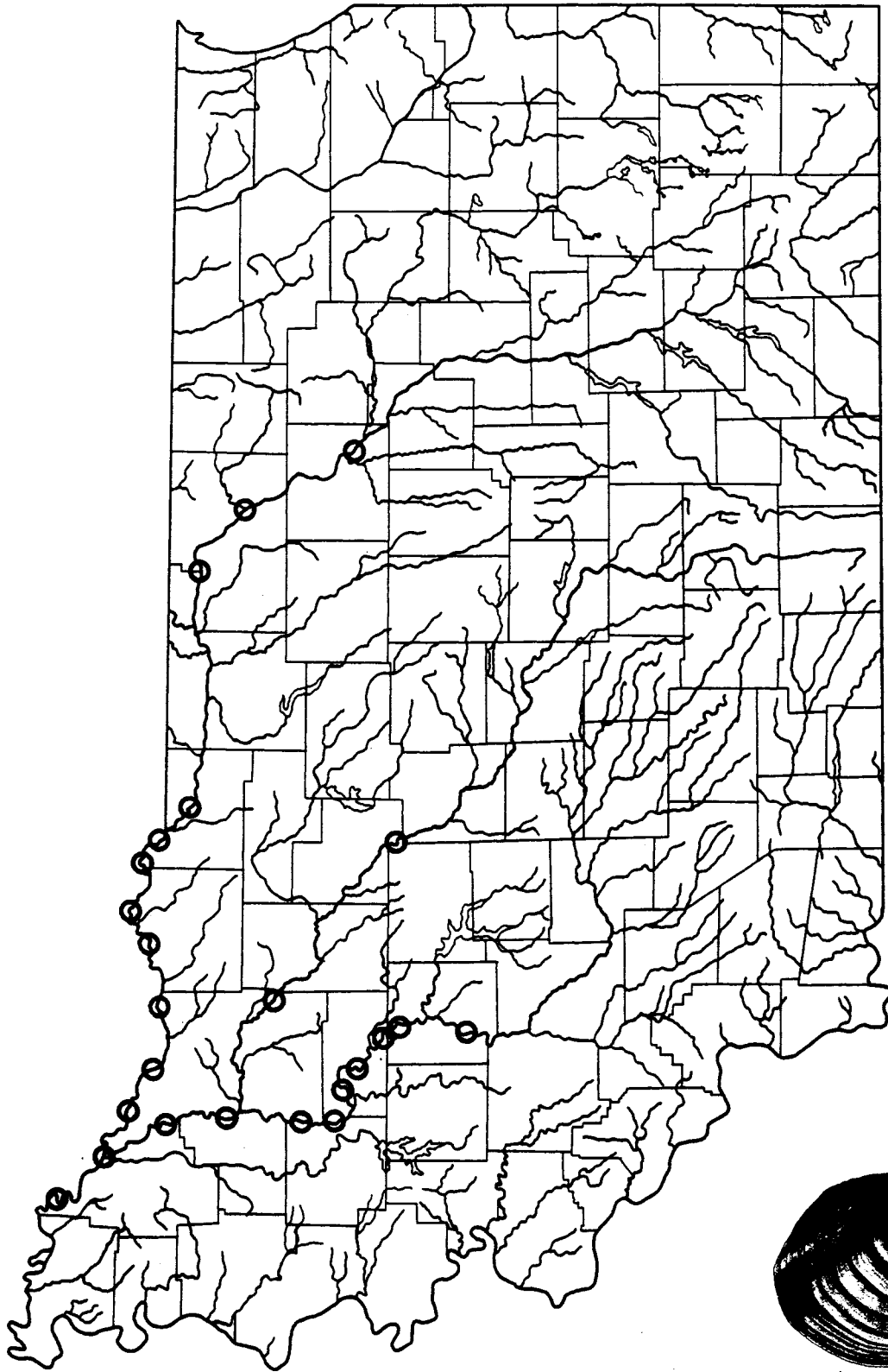
STATUS: Endangered in Indiana.

OTHER COMMON NAMES: Round-solid, pigtoe.

HABITAT: Reportedly found in large rivers in gravel.

REMARKS: Daniels (1903) reported the long-solid from the Wabash River at New Harmony and the Tippecanoe River in Carroll County. No *F. subrotunda* were collected in the Wabash or White rivers in 1966-67 (Meyer, 1968; 1974) or 1975 (Clark, 1976). Like many of the preceding species, *F. subrotunda* was formerly common in the Wabash River drainage. Large numbers of weathered-dead or sub-fossil shells of this mussel were found on the exposed shoals throughout the lower part of the Wabash River in 1987. Relict shells were found at 11 of 26 sites surveyed in the middle Wabash River in 1988, and 11 of 31 sites in the White River in 1989-91. The long-solid is very rare in Indiana and the only known individuals reported live in the last 30-40 years were found in Sugar Creek (Wabash River drainage) in 1991 (Lewis, 1991). Additional populations should be looked for in other tributaries to the middle Wabash River.

Not found in the Tippecanoe River in 1987, weathered-dead shells were found in 1991 (T. Watters, pers. comm.).



Fusconaia subrotunda (I. Lea, 1831)
long-solid

Hemistena lata (Rafinesque, 1820)

Cracking pearlymussel

ORIGINAL DESCRIPTION: *Anodonta lata* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 317, pl. LXXXII, figs. 17 and 18.

TYPE LOCALITY: Kentucky River. Lectotype ANSP 20227, from the Kentucky River (Johnson & Baker, 1973).

SYNONYMY:

Margaritana dehiscens (Say)
Stein 1880:466.

Anodonta dehiscens (Say)
Call 1894:153; 1896:141; 1897:251; 1900:533.

Lastena lata (Rafinesque)
Daniels 1903:649; Goodrich & van der Schalie 1944:308; Parmalee
1967:87; Meyer 1974:23; Clark 1976:4.

Hemistena lata (Rafinesque)
Cummings & Berlocher 1990:87.

STATUS: Federally Endangered. Extirpated in Indiana.

OTHER COMMON NAMES: None.

HABITAT: Reportedly found in medium to large rivers in mud or gravel (Call, 1900).

REMARKS: Noted to be rare in the Wabash River in 1900 (Call, 1900). Goodrich and van der Schalie (1944) listed *H. lata* from the Ohio, Wabash, White, and Tippecanoe rivers in Indiana, but noted that it was rare throughout its range. No specimens were found in the Wabash or White rivers by Meyer (1968; 1974) or Clark (1976) and only a single sub-fossil valve of this species was collected in the Wabash River near St. Francisville in 1988. Extirpated from nearly all of its former range, this species still survives in the Powell, Green, and Clinch rivers in Kentucky and Tennessee (Stansbery, 1970; Bogan & Parmalee, 1983).

The cracking pearlymussel was not found in the present survey of the White River. A specimen collected from the West Fork White River at Indianapolis by L.E. Daniels in February of 1908 (UMMZ 107885) documents its former presence in the drainage.

Reported in the Tippecanoe River by Daniels (1903), this species was not found in 1987. This mussel is presumed extirpated from the Wabash River drainage and the state.



Hemistena lata (Rafinesque, 1820)
cracking pearlymussel

Megalonaias nervosa (Rafinesque, 1820)

Washboard

ORIGINAL DESCRIPTION: *Unio nervosa* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles. p. 296, pl. LXXX, figs. 8, 9, and 10.

TYPE LOCALITY: Falls of the Ohio River.

SYNONYMY:

Unio heros Say

Call 1894:154.

Unio multiplicatus Lea

Stein 1880:462; Call 1894:154; 1896:144; 1897:252; 1900:448.

Quadrula heros (Say)

Daniels 1903:651.

Megalonaias gigantea (Barnes)

Goodrich & van der Schalie 1944:308; Parmalee 1967:33; Meyer 1974:23; Clark 1976:4.

Magnonaias nervosa (Rafinesque)

Weilbaker et al. 1985:689.

STATUS: Uncommon, but may be locally abundant.

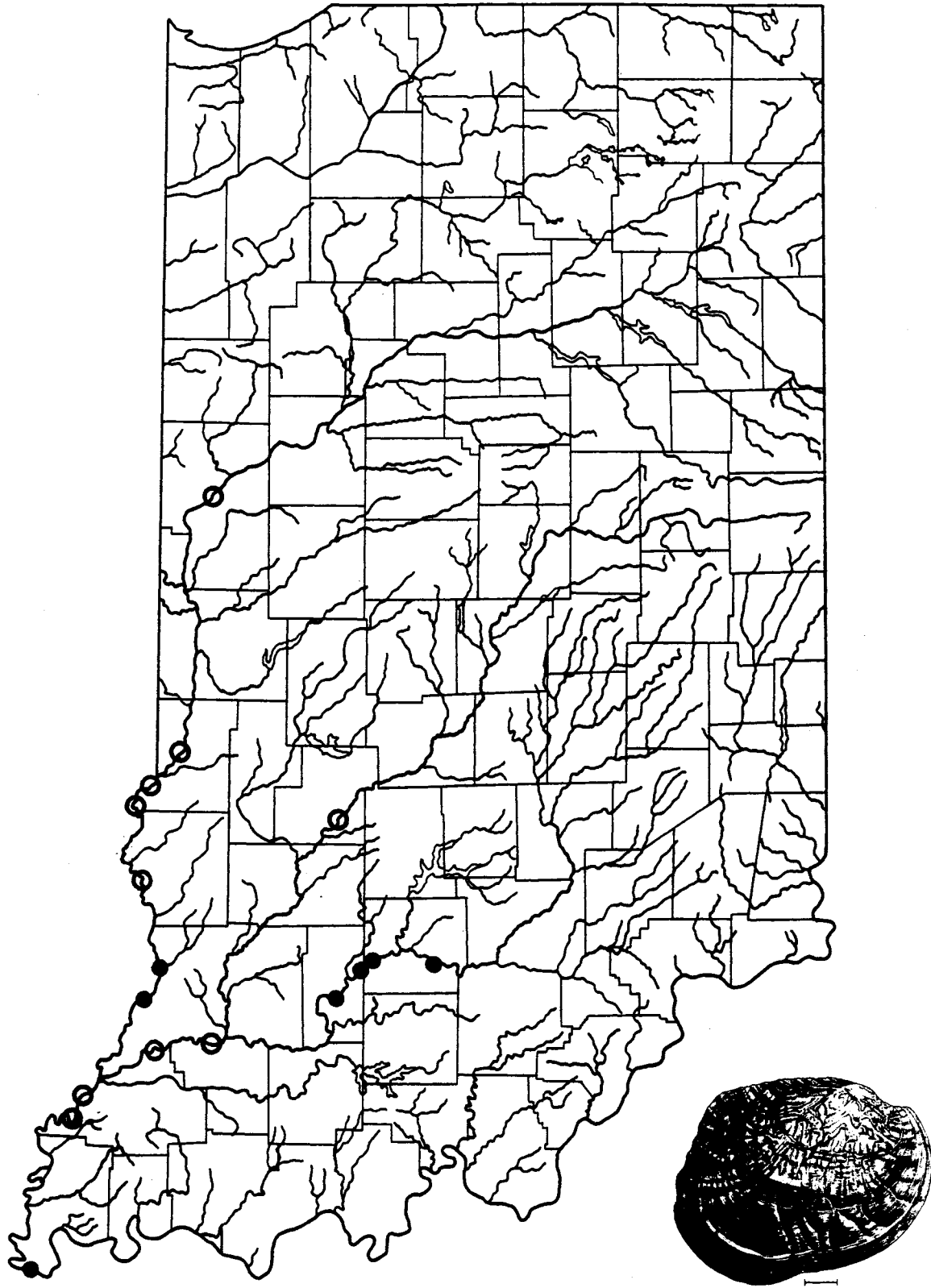
OTHER COMMON NAMES: Boards.

HABITAT: Found in medium to large streams in mud, sand, or gravel.

REMARKS: The largest freshwater mussel in Indiana, the washboard was reported as common in the Wabash and Ohio rivers by Call (1900). Meyer (1974) noted collecting a few individuals in the middle Wabash River in 1966-67 but did not find it below Mt. Carmel. Considered rare in the lower Wabash by Clark (1976). One *M. nervosa* was taken in the lower Wabash near the Ohio River in 1987 and five were found at two sites in the middle Wabash in 1988. Although it still makes up 16% of the commercial harvest in Indiana (Stefanavage, 1990), the washboard is clearly not as abundant in the Wabash as it is in the Mississippi River where it is common.

Meyer (1974) also listed *M. nervosa* as common in the East Fork White River in 1966-67. The washboard was found alive at four sites in the lower East Fork White River (Lawrence and Martin counties) in 1989-91.

Not found in the Tippecanoe River in 1987, weathered-dead shells were collected in the lower part of the river in 1991 (T. Watters, pers. comm.).



Megaloniais nervosa (Rafinesque, 1820)
washboard

Plethobasus cicatricosus (Say, 1829)

White wartyback

ORIGINAL DESCRIPTION: *Unio cicatricosus* Say, 1829. Descriptions of some new terrestrial and fluviatile shells of North America. The Disseminator of Useful Knowledge, New Harmony II. p. 292.

TYPE LOCALITY: Wabash [River, New Harmony, Posey County, Indiana]. Neotype Senckenberg Museum 4320 (Haas, 1930).

SYNONYMY:

Unio cicatricosus Say

Stein 1880:463; Call 1894:153; 1896:142; 1897:251.

Unio varicosus Lea

Stein 1880:463; Call 1894:155; 1896:146; 1897:252; 1900:499.

Pleurobema cicatricosa (Say)

Daniels 1903:651.

Plethobasus cicatricosus (Say)

Goodrich & van der Schalie 1944:308; Parmalee 1967:88; Meyer 1974:23; Clark 1976:5.

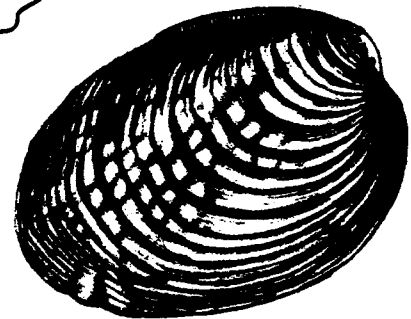
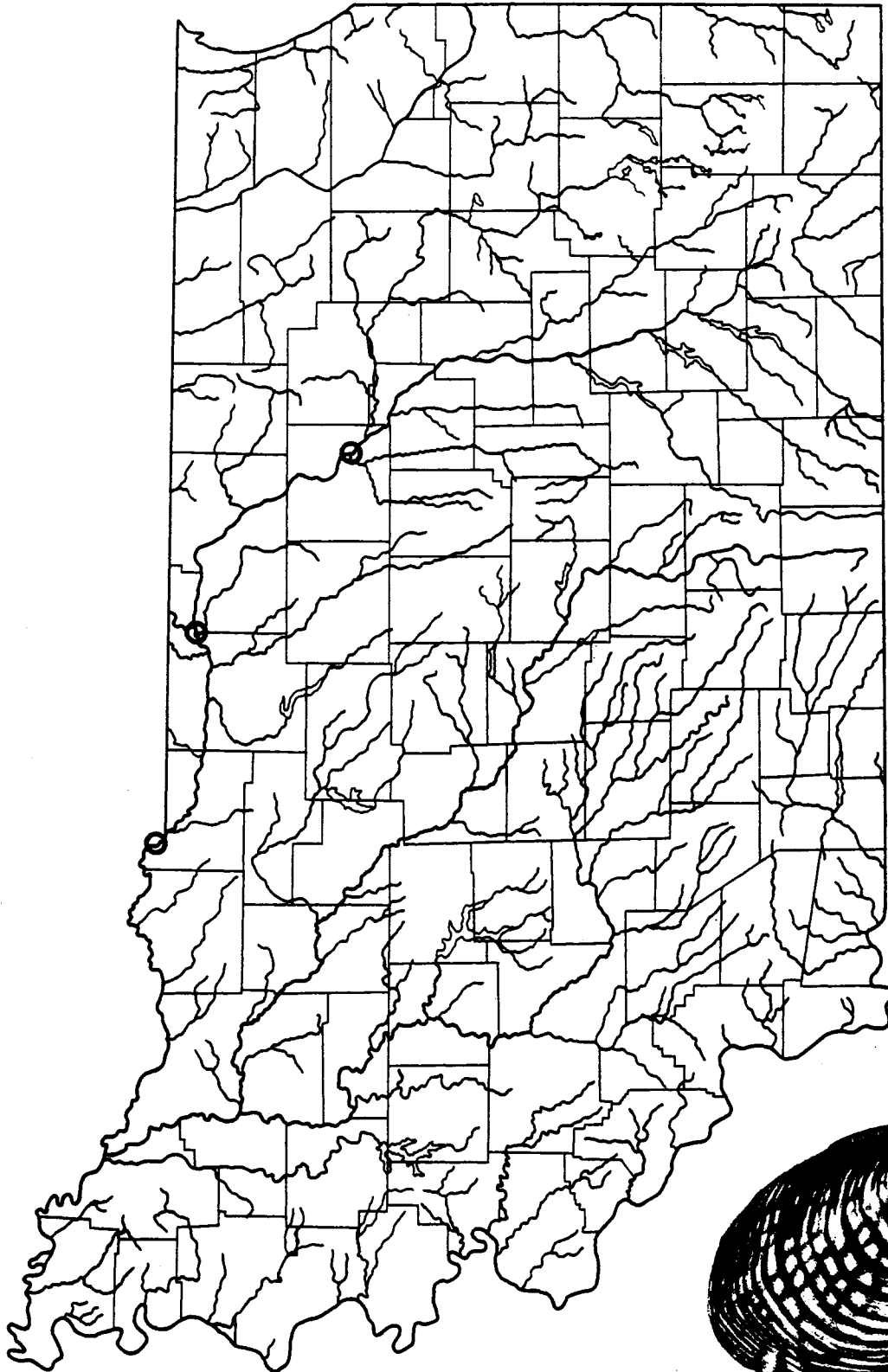
STATUS: Federally Endangered. Extirpated in Indiana.

OTHER COMMON NAMES: None.

HABITAT: Reportedly found in large rivers in clean gravel.

REMARKS: Reported from the Wabash and Ohio rivers in Indiana by Call (1900). Noted to be rare in the state and found only in the Wabash by Goodrich & van der Schalie (1944). The white wartyback was not collected in the Wabash and White rivers in 1966-67 or 1975 (Meyer, 1968; 1974; Clark, 1976). No living or dead shells were found in the lower Wabash River in 1987 and only three sub-fossil shells were collected from widely scattered sites in the middle Wabash in 1988.

Not found in the White or Tippecanoe rivers in this study. *Plethobasus cicatricosus* is most likely extirpated from Indiana and is known to exist only in the Tennessee River below Wilson Dam in Alabama (Stansbery, 1970).



Plethobasus cicatricosus (Say, 1829)
white wartyback

Plethobasus cyphus (Rafinesque, 1820)

Sheepnose

ORIGINAL DESCRIPTION: *Obliquaria cyphya* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales Générales des Sciences Physiques, Bruxelles V. p. 305.

TYPE LOCALITY: Falls of the Ohio River. Lectotype ANSP 20239, from the Ohio River (Johnson & Baker, 1973).

SYNONYMY:

Unio asopus Green

Stein 1880:463; Call 1894:153; 1896:142; 1897:251.

Unio cyphus Rafinesque

Call 1900:496.

Pleurobema asopus (Green)

Daniels 1903:651.

Pleurobema asopa (Green)

Wilson & Clark 1912:44.

Plethobasus cyphus (Rafinesque)

Goodrich & van der Schalie 1944:308; Parmalee 1967:35; Meyer 1974:23; Clark 1976:5; Cummings & Berlocher 1990:87.

STATUS: Endangered in Indiana.

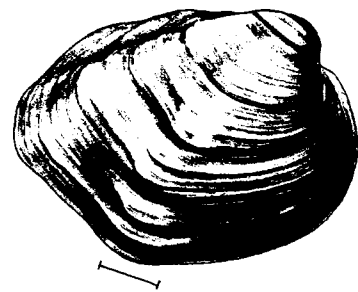
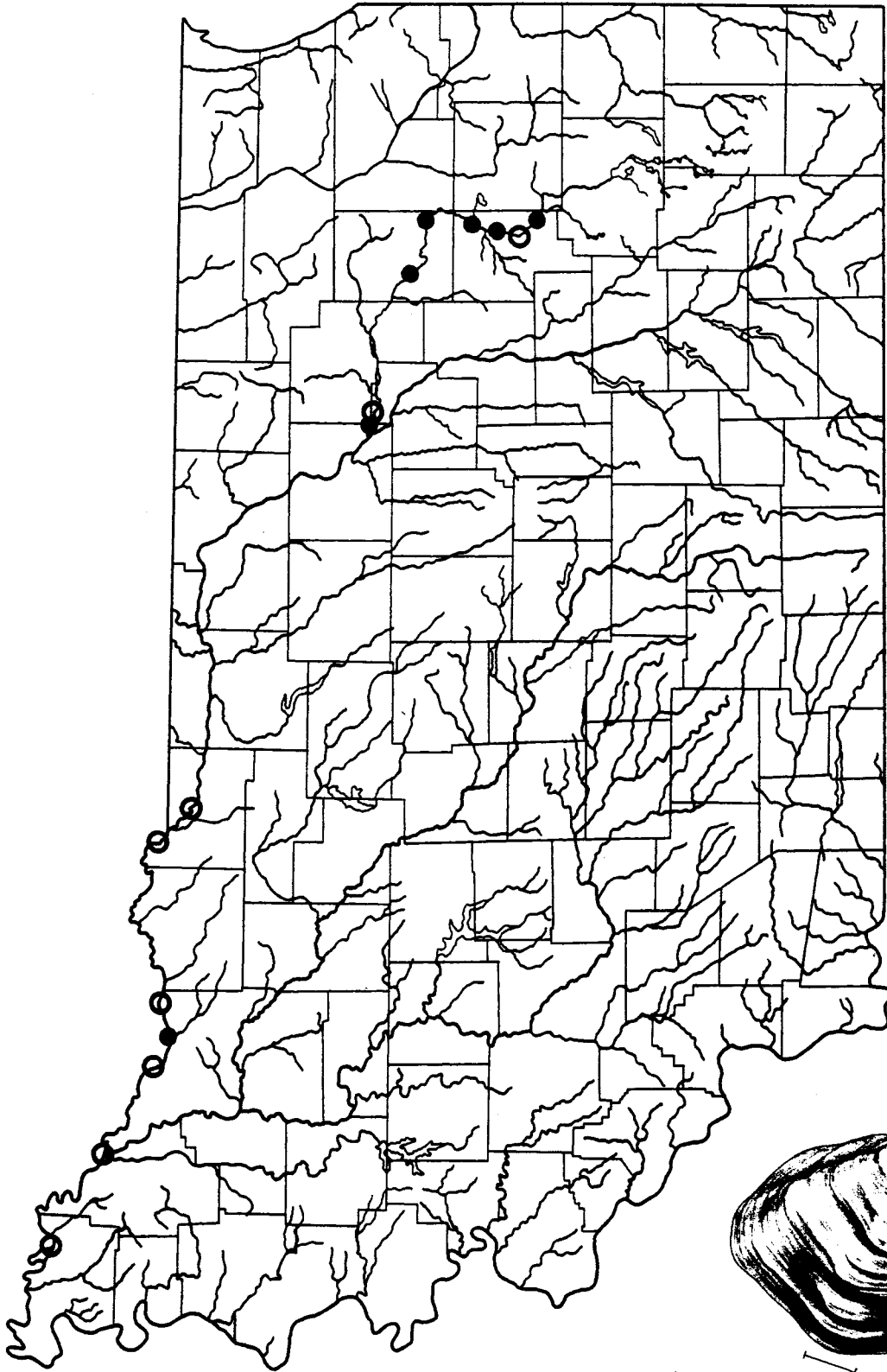
OTHER COMMON NAMES: Bullhead.

HABITAT: Found in medium to large rivers in clean gravel.

REMARKS: Call (1900) reported the sheepnose as common in the deeper waters of the Wabash and Ohio rivers in Indiana. However, *P. cyphus* was considered rare in Indiana by Goodrich & van der Schalie (1944). The sheepnose was not collected in the lower Wabash in 1966-67 or 1975 (Meyer, 1968; 1974; Clark, 1976). Six live individuals were found in the Wabash River upstream of Lafayette in the vicinity of Delphi in June of 1966 (Meyer, 1968). Likely extirpated from the lower Wabash River, one live sheepnose was found in the middle Wabash River southeast of Russellville in September 1988. Relict shells were found at four additional sites from Terre Haute to Vincennes.

Listed from the White River by Goodrich and van der Schalie (1944) the sheepnose was considered rare in the White River by 1966-67 (Meyer, 1968). Meyer found three individuals in the East Fork White River, two about 11 miles upstream of Shoals, and one a few miles south of Bedford. No live or dead *P. cyphus* were found in the White River 1989-91.

Reported from the Tippecanoe River by Daniels (1903), this species is still present in the river today. Ten live individuals of *P. cyphus* were found at six sites in the Tippecanoe River in 1987, and it was most common in the mid-portion of the river (sites 5-10). Endangered in Missouri (Buchanan, 1980; Oesch, 1984) and Illinois (IESPB, 1991), the Tippecanoe population may be the largest remaining in the Midwest.



Plethobasus cyphus (Rafinesque, 1820)
sheepnose

Pleurobema clava (Lamarck, 1819)

Clubshell

ORIGINAL DESCRIPTION: *Unio clava* Lamarck, 1819. Histoire Naturelle des Animaux sans Vertebres. Vol. 6, p. 74.

TYPE LOCALITY: Lake Erie [erroneous].

SYNONYMY:

Unio clavus Lamarck
Stein 1880:464; Call 1894:153; 1896:142; 1897:251; 1900:506.
Unio patulus Lea
Stein 1880:464.
Unio mytiloides Lea
Call 1894:154; 1896:144; 1897:252.
Pleurobema clava (Lamarck)
Daniels 1903:651; Wilson & Clark 1912:44; Goodrich & van der
Schalie 1944:308; Parmalee 1967:88; Meyer 1974:23; Clark
1976:5; Weilbaker et al. 1985:689; Cummings & Berlocher
1990:87.

STATUS: Federal candidate for listing. Endangered in Indiana.

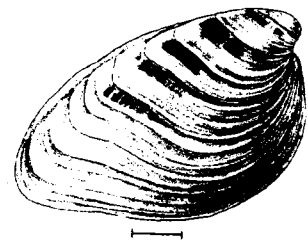
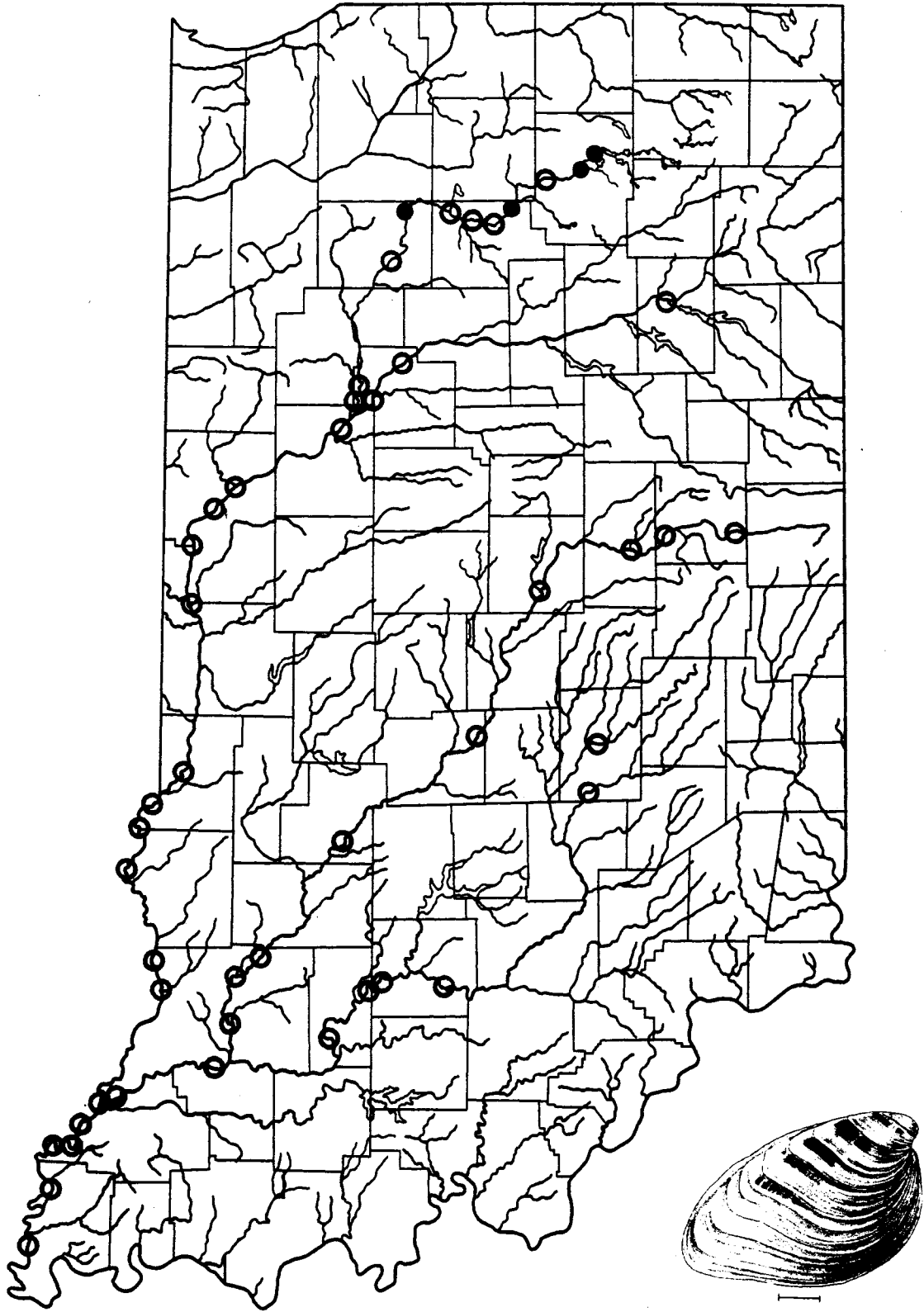
OTHER COMMON NAMES: Northern clubshell.

HABITAT: Found in medium to large rivers in mixed sand and gravel.

REMARKS: Reported from the Wabash and White rivers among others by Call (1900). The clubshell was noted to be widely scattered in the smaller streams of the state by Goodrich & van der Schalie (1944). It was not collected in the Wabash River in 1966-67 or 1975 (Meyer, 1968; 1974; Clark, 1976). At one time widely distributed and common in the Wabash River, only weathered-dead and sub-fossil shells of *P. clava* were found at 20 sites throughout the Wabash River in 1987-88.

The clubshell was not found in the White River in 1966-67 (Meyer, 1968; 1974). Only weathered-dead and sub-fossil shells were found at 17 sites throughout the drainage in 1989-91. Although not collected alive in Sugar Creek (White River drainage) (Harmon, 1990), the condition of shells found indicated that the clubshell may still survive there and in other tributaries of the East Fork in east central Indiana. This species is most likely extirpated from the East and West Forks of the White River and the Wabash River proper.

Reported from the Tippecanoe River by Daniels (1903), 19 living *P. clava* were found at four sites and fresh dead shells were found at two other sites in 1987. The clubshell ranked eighteenth out of 34 species collected live in the Tippecanoe and was the fourth most common species collected at site 3. The population in the Tippecanoe River is perhaps the largest remaining in the Midwest and should be closely monitored to ensure its survival.



Pleurobema clava (Lamarck, 1819)
clubshell

Pleurobema cordatum (Rafinesque, 1820)

Ohio pigtoe

ORIGINAL DESCRIPTION: *Obovaria cordata* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p 312, pl. LXXXII, figs. 6 and 7.

TYPE LOCALITY: Ohio River. Lectotype ANSP 20221 (Johnson & Baker, 1973).

SYNONYMY:

Unio obliquus Lamarck

Stein 1880:463; Call 1896:144; 1897:252; 1900:501.

Unio solidus Lea

Stein 1880:463; Call 1896:145; 1897:252; 1900:504.

Quadrula obliqua (Lamarck)

Daniels 1903:652.

Quadrula solida (Lea)

Daniels 1903:652.

Pleurobema cordatum (Rafinesque)

Goodrich & van der Schalie 1944:309 [in part]; Parmalee 1967:35

[in part]; Meyer 1974:24 [in part]; Clark 1976:5; Weillbaker et al.

1985:689; Cummings & Berlocher 1990:87.

STATUS: Indiana Species of Special Concern.

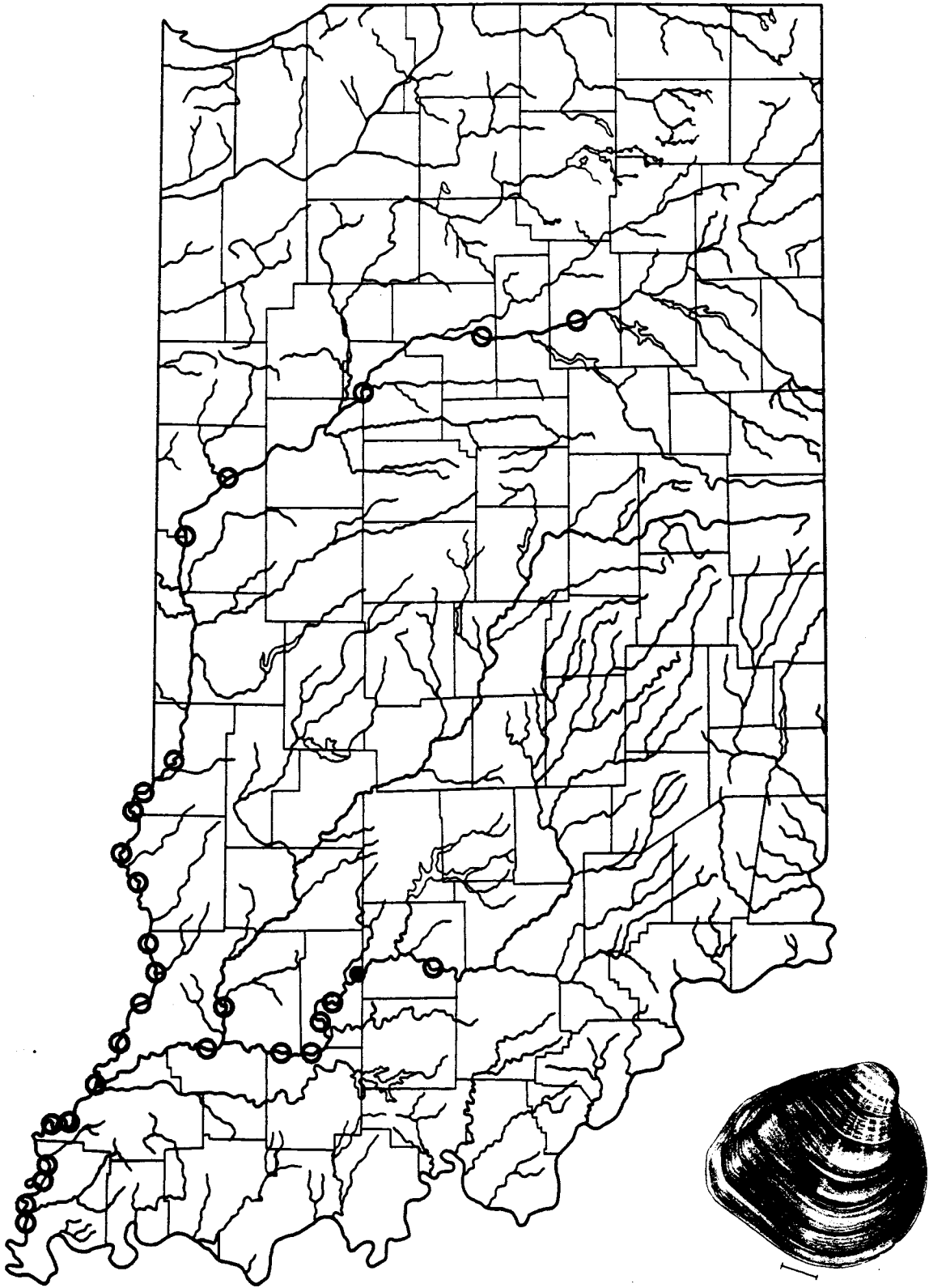
OTHER COMMON NAMES: Pigtoe.

HABITAT: Found in large rivers in gravel and sand.

REMARKS: The Ohio pigtoe was lumped together with the other members of this species complex by both Call (1900) and Goodrich and van der Schalie (1944). However, they regarded the form *P. cordatum* to occur only in the larger rivers in the southern portion of the state. Meyer (1968; 1974) noted that this species was rare in the lower Wabash in 1966-67 and did not find any evidence of it above New Harmony. Clark (1976) also reported that this mussel was rare in the lower Wabash in 1975. Only weathered-dead shells of the *P. cordatum* were found in the Wabash River in 1987-88.

Meyer (1968; 1974) did not find this species in his survey of the White River in 1966-67. In 1989-91, weathered-dead shells of the Ohio pigtoe were found throughout the lower part of the drainage, but only one live mussel was encountered (site 24). Still present in the Ohio River, this species is exceedingly rare in the lower Wabash and White rivers, and should be listed as a Species of Special Concern in Indiana.

Not found in the Tippecanoe River in 1987, weathered-dead shells were found in 1991 (T. Watters, pers. comm.).



Pleurobema cordatum (Rafinesque, 1820)

Ohio pigtoe

Pleurobema plenum (I. Lea, 1840)

Rough pigtoe

ORIGINAL DESCRIPTION: *Unio plenus* I. Lea, 1840. Description of new fresh water and land shells. Transactions of the American Philosophical Society. p. 286.

TYPE LOCALITY: Ohio River near Cincinnati [Hamilton County] Ohio.

SYNONYMY:

Unio plenus Lea

Stein 1880:464; Call 1894:155; 1896:145; 1897:252.

Quadrula plena (Lea)

Daniels 1903:652.

Pleurobema cordatum (Rafinesque)

Goodrich & van der Schalie 1944:309 [in part]; Parmalee 1967:35
[in part].

Pleurobema plenum (Lea)

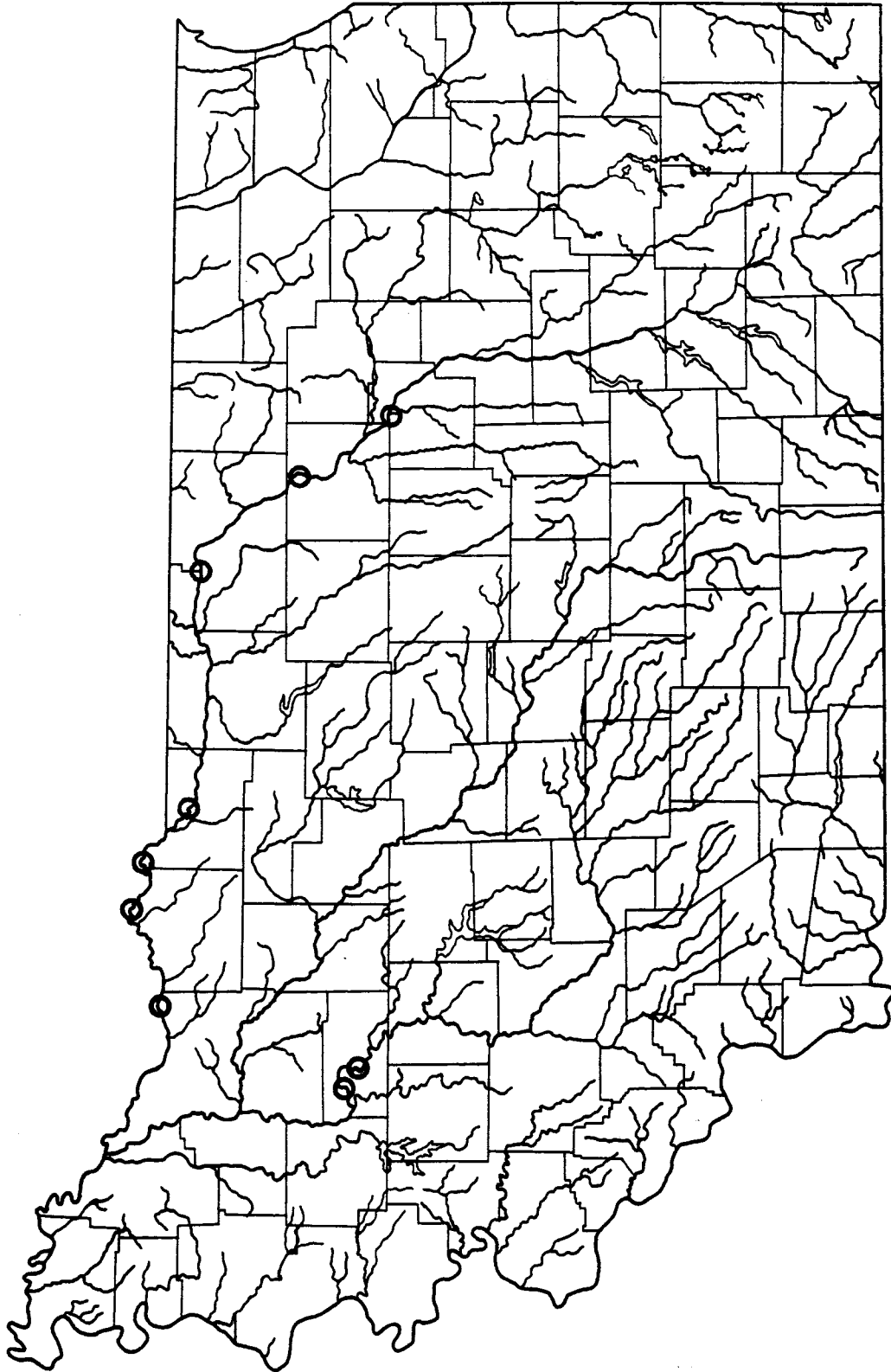
Cummings & Berlocher 1990:87.

STATUS: Federally Endangered. Extirpated in Indiana.

OTHER COMMON NAMES: Pigtoe.

HABITAT: Found in medium to large rivers in gravel.

REMARKS: A member of the *P. cordatum* species complex, the rough pigtoe was not treated as a separate species by Goodrich and van der Schalie (1944), Meyer (1974), or Clark (1976). Reported from the Tippecanoe by Daniels (1903), *P. plenum* was not found there in 1987. Apparently widespread in historical times, *P. plenum* was represented by weathered-dead or sub-fossil shells only and it is most likely extirpated from the Wabash River drainage and the state.



Pleurobema plenum (I. Lea, 1840)
rough pigtoe

Pleurobema rubrum (Rafinesque, 1820)

Pyramid pigtoe

ORIGINAL DESCRIPTION: *Obliquaria rubra* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales Générales des Sciences Physiques, Bruxelles V. p. 314.

TYPE LOCALITY: Kentucky River. Lectotype ANSP 20237 (Johnson & Baker, 1973).

SYNONYMY:

Unio pyramidatus Lea

Stein 1880:464; Call 1894:155; 1897:252.

Unio mytiloides Rafinesque

Stein 1880:464. [?]

Quadrula pyramidata (Lea)

Daniels 1903:652.

Pleurobema cordatum pyramidatum (Lea)

Parmalee 1967:35.

Pleurobema cordatum (Rafinesque)

Goodrich & van der Schalie 1944:308 [in part]; Clark 1976:4;

Weilbaker et al. 1985:689.

Pleurobema rubrum (Rafinesque)

Cummings & Berlocher 1990:87.

STATUS: Federal candidate for listing. Endangered in Indiana.

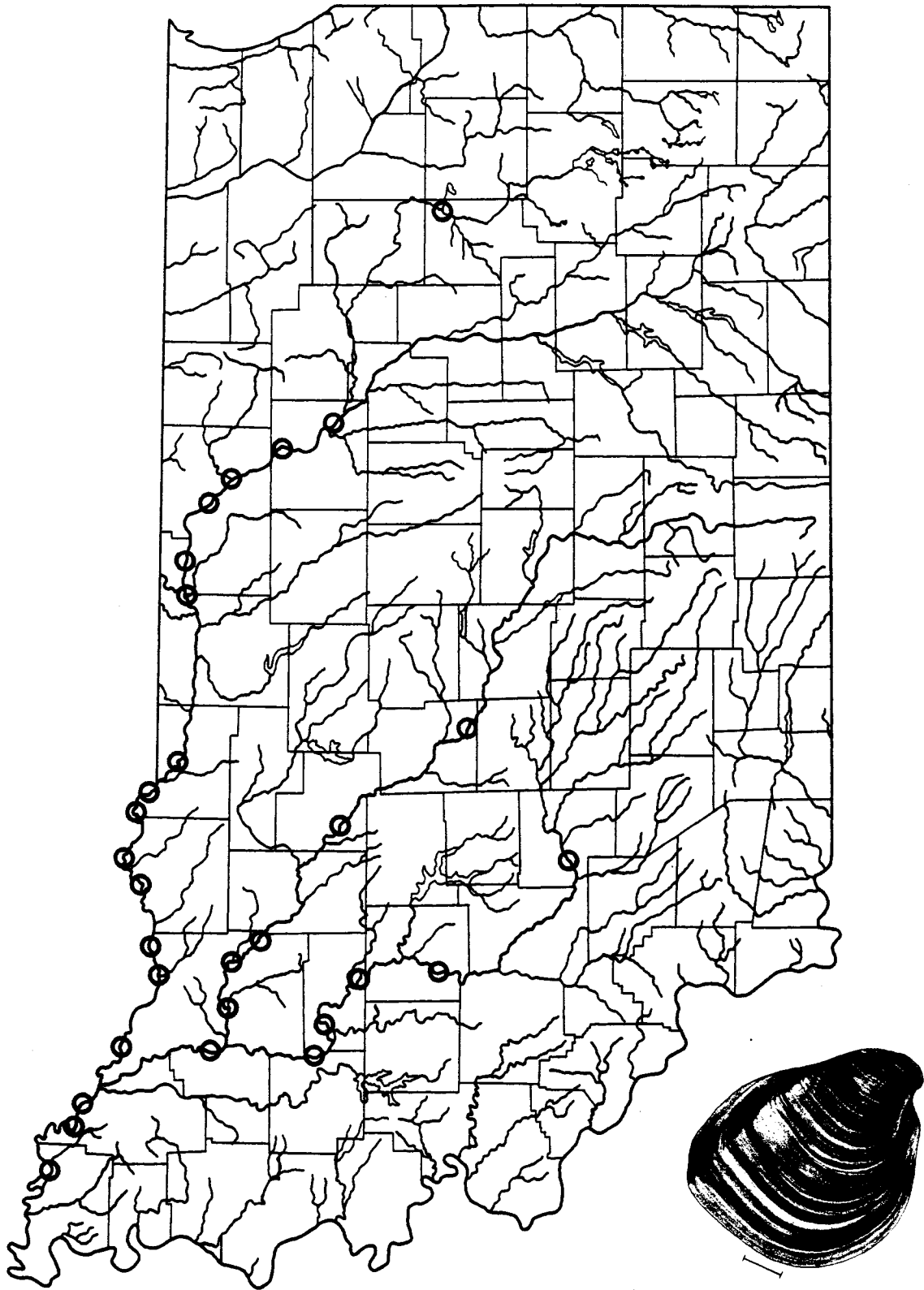
OTHER COMMON NAMES: Pink pigtoe.

HABITAT: Found in medium to large rivers in sand or gravel.

REMARKS: A member of the *P. cordatum* species complex, *P. rubrum* was considered as part of that species by most previous workers (Goodrich & van der Schalie, 1944; Meyer, 1974; Clark, 1976). The pyramid pigtoe was not collected live in the Wabash River in 1987 or 1988 but relict shells were found at many sites.

No living *P. rubrum* were found in the White River in 1989-91. However, an examination of a commercial shellers catch near Hayesville contained a very old individual that approximated *P. rubrum*. Because the individual was retained by the sheller, no positive identification could be made. If not extirpated, this species could be gone as a reproducing population in Indiana.

Reported by Daniels (1903) from the Tippecanoe River, a sub-fossil shell of *P. rubrum* was found at DeLong in 1987. Two weathered-dead shells of the pyramid pigtoe were collected by W. Haag from the Tippecanoe River at the Rt. 35 bridge in fall of 1987 (INHS 4708).



Pleurobema rubrum (Rafinesque, 1820)
pyramid pigtoe

Pleurobema sintoxia (Rafinesque, 1820)

Round pigtoe

ORIGINAL DESCRIPTION: *Obliquaria sintoxia* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 310.

TYPE LOCALITY: Ohio River. Lectotype ANSP 20208 (Johnson & Baker, 1973).

SYNONYMY:

- Unio coccineus* Lea
Kirsch 1896:55.
- Unio solidus* Lea
Kirsch 1896:55.
- Quadrula coccinea* (Conrad)
Wilson & Clark 1912:41.
- Pleurobema cordatum* (Rafinesque)
Goodrich & van der Schalie 1944:309 [in part].
- Pleurobema sintoxia* (Rafinesque)
Cummins & Berlocher 1990:87.

STATUS: Common in the Tippecanoe River. Rare in the Wabash and White rivers.

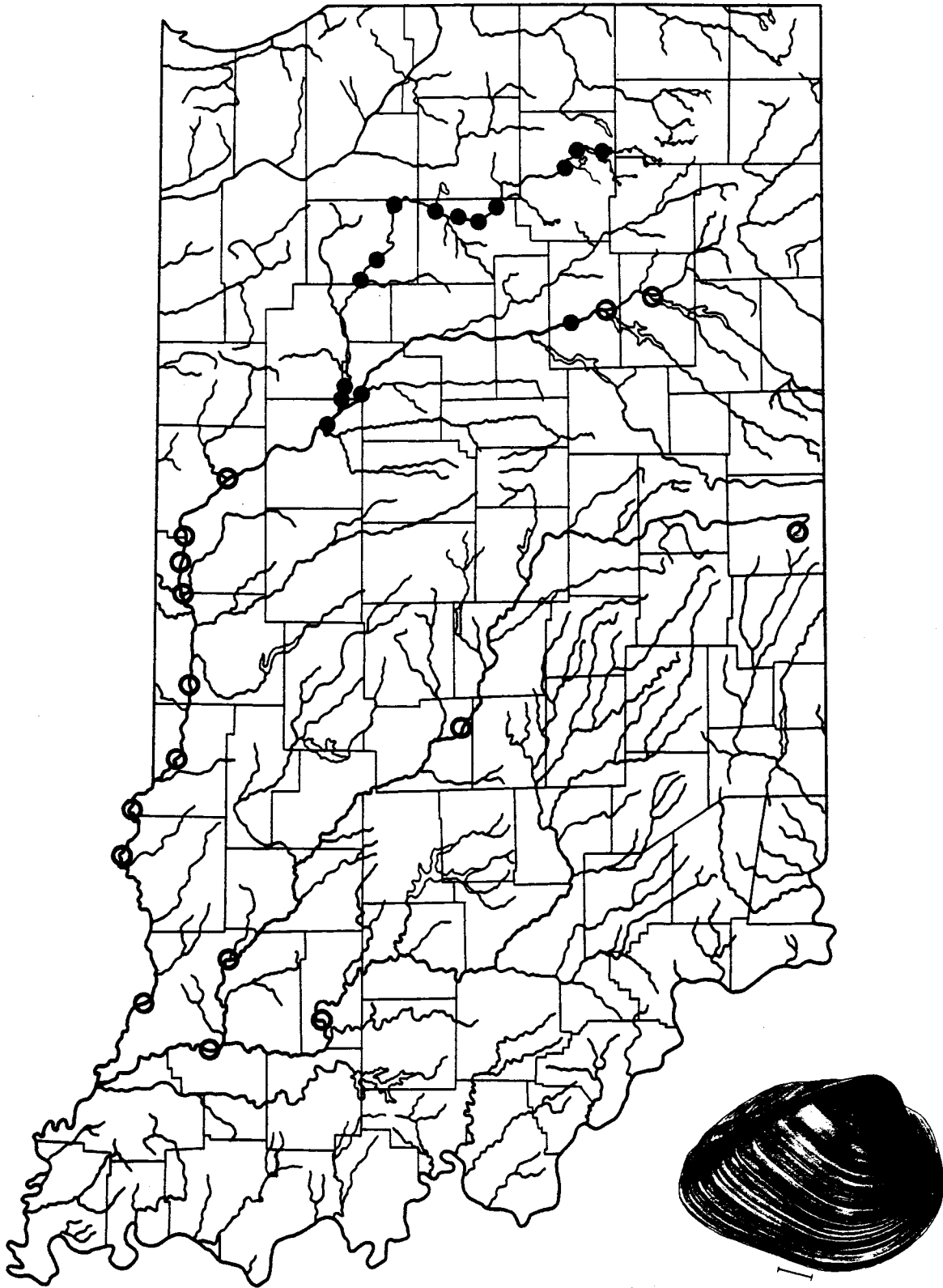
OTHER COMMON NAMES: Solid pigtoe, bullnose.

HABITAT: Found in medium to large rivers in mud, sand, or gravel.

REMARKS: Earlier workers reported *P. sintoxia* as common throughout the state, but noted that it was most common in medium-sized streams and the headwaters of large rivers (Call, 1900; Goodrich & van der Schalie, 1944). Like many other species, *P. sintoxia* appears to have been more widespread and common in the Wabash and White rivers in former times.

The round pigtoe was not collected in the lower Wabash River in 1975 (Clark, 1976) or 1987, and only three live individuals were found in the middle and upper Wabash in 1988. No live *P. sintoxia* were found in the White River in 1966-67 (Meyer, 1968; 1974) or 1989-91.

Pleurobema sintoxia was the fourth most abundant species found in the Tippecanoe River in 1987. One hundred eighteen live individuals were collected from 13 sites throughout the drainage. Two of the three sites where this species was not found (sites 12 & 13) were below the reservoir spillways.



Pleurobema sintoxia (Rafinesque, 1820)
round pigtoe

Quadrula cylindrica (Say, 1817)

Rabbitsfoot

ORIGINAL DESCRIPTION: *Unio cylindricus* Say, 1817. Article "Conchology" in William Nicholson. The American Edition of the British Encyclopedia, or Dictionary of Arts and Sciences. Vol. II, B-E. Samuel A. Mitchell and Horace Ames, Philadelphia, no pagination. pl. 4, fig. 3.

TYPE LOCALITY: Wabash River. Neotype Senckenberg Museum 4310 (Haas, 1930).

SYNONYMY:

Unio cylindricus Say

Stein 1880:463; Call 1894:153; 1896:143; 1897:251; 1900:468;

Kirsch 1896:54.

Quadrula cylindricus (Say)

Daniels 1903:651.

Quadrula cylindrica (Say)

Goodrich & van der Schalie 1944:309; Parmalee 1967:36; Meyer

1974:24; Clark 1976:5; Cummings & Berlocher 1990:87.

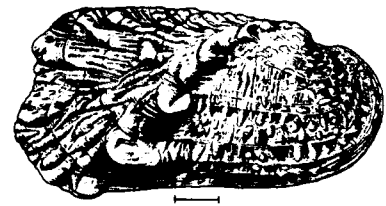
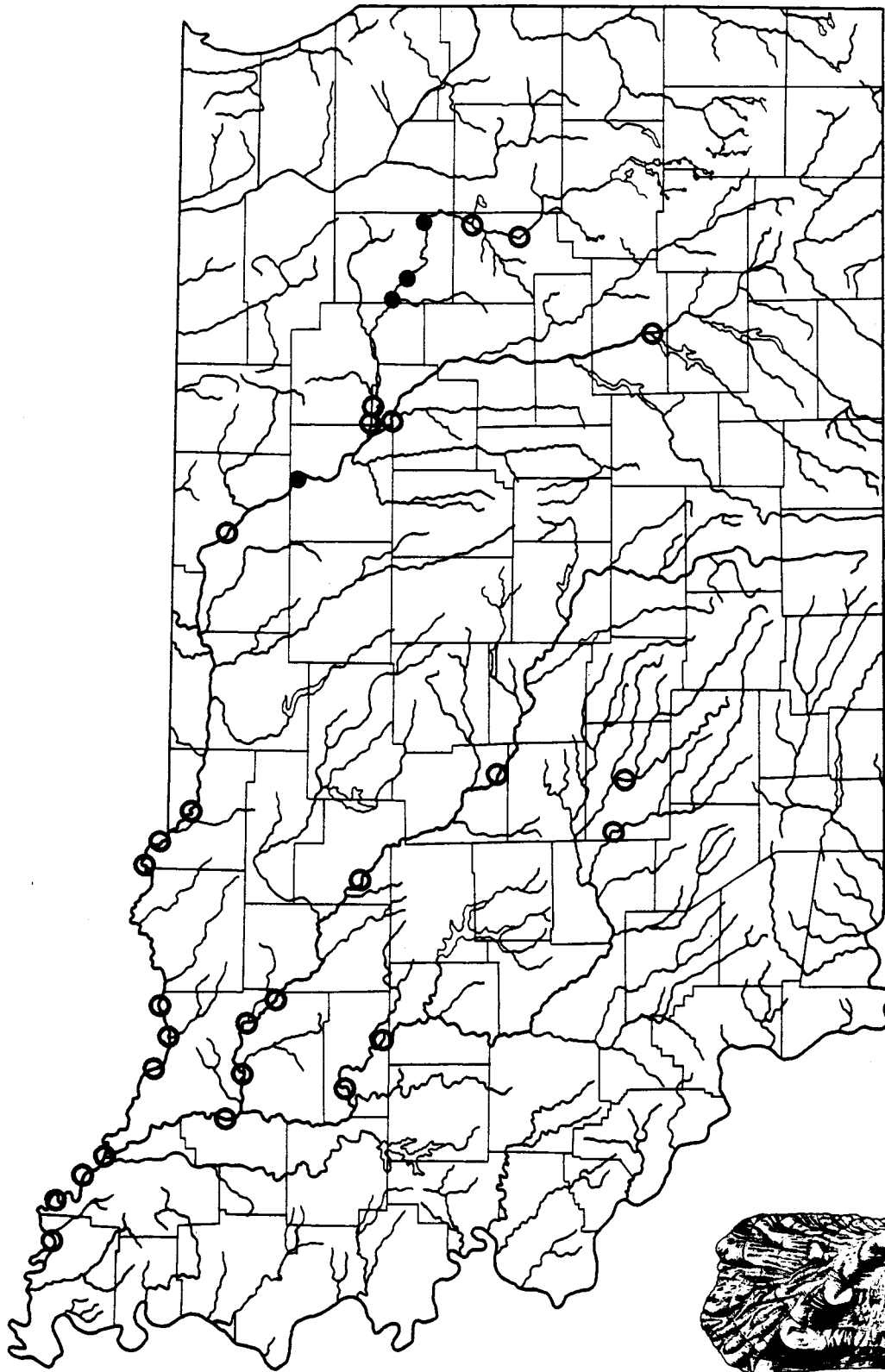
STATUS: Endangered in Indiana.

OTHER COMMON NAMES: Cob-shell.

HABITAT: Found in medium to large rivers in sand and gravel.

REMARKS: Reported to be common in the Wabash and White rivers by Call (1900), the rabbitsfoot was not collected alive in the Wabash or White rivers in 1966-67 or 1975 (Meyer, 1968; 1974; Clark, 1976). A single old shell was found in the Wabash River about one mile upstream of Hutsonville, Indiana in July 1966 (Meyer, 1968). In the present survey only one live individual was found in the middle Wabash River (Collier's Island) south of Lafayette, Indiana. Formerly widespread in the drainage, numerous relict shells were observed on exposed shoals and banks throughout the basin.

Reported as common in the Tippecanoe River in 1903 (Daniels), nine live individuals of *Q. cylindrica* were found at sites 9, 10, and 11 in 1987 and shells were found at sites 6, 8, 15, and 16. This once common species has been drastically reduced throughout its range and it should be seriously considered for federal threatened or endangered status. The Tippecanoe River may have one of the last relatively large populations remaining in the Midwest.



Quadrula cylindrica (Say, 1817)
rabbitsfoot

Quadrula fragosa (Conrad, 1835)

Winged mapleleaf

ORIGINAL DESCRIPTION: *Unio fragosus* Conrad, 1835. Monography of the family Unionidae or naiades of Lamarck, (fresh water bivalve shells) of North America. No. 1. p. 12, pl. VI, fig. 2.

TYPE LOCALITY: Scioto River, Ohio. Type lost (Johnson & Baker, 1973).

SYNONYMY:

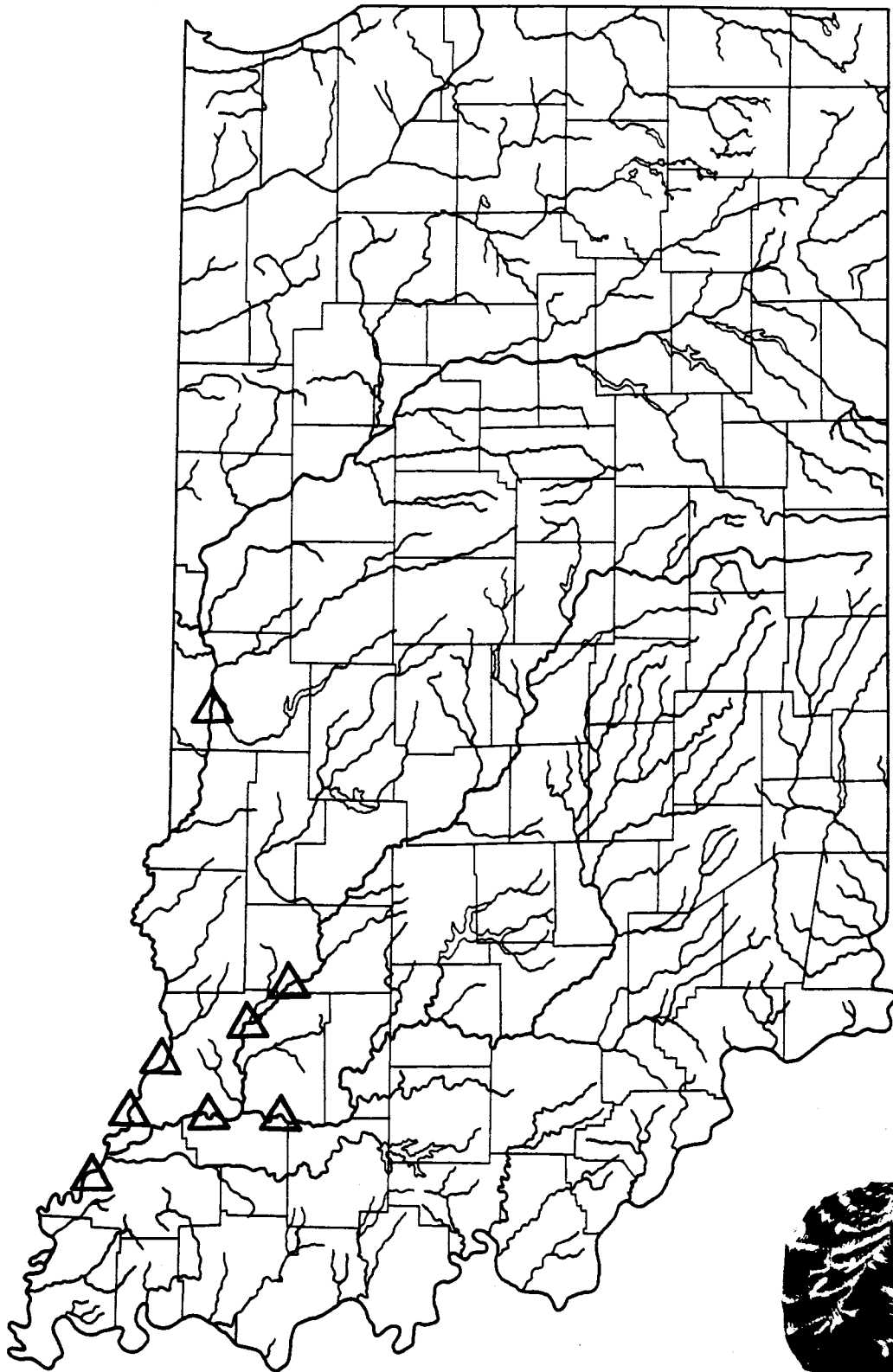
Unio fragosus Conrad
Stein 1880:462; Call 1894:154; 1896:143; 1897:252; 1900:490.
Quadrula fragosa (Conrad)
Daniels 1903:651.

STATUS: Federally Endangered.

OTHER COMMON NAMES: Warty-back.

HABITAT: Reportedly found in medium to large streams in gravel.

REMARKS: Very difficult to distinguish from the mapleleaf and often considered as part of that species by earlier workers. *Quadrula fragosa* was listed from the West Fork White River (Call, 1897) and the Wabash and Ohio rivers (Call, 1900). A specimen from the White River from the Charles M. Wheatley Collection, now at the Academy of Natural Sciences in Philadelphia (127514), is referable to this species. No evidence of this mussel was found in the Wabash or White rivers by Meyer (1968; 1974), Clark (1976), or in the present survey.



Quadrula fragosa (Conrad, 1835)
winged mapleleaf

Quadrula metanevra (Rafinesque, 1820)

Monkeyface

ORIGINAL DESCRIPTION: *Obliquaria metanevra* Rafinesque, 1820. Monographie des coquilles bivalves fluviales de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales Générales des Sciences Physiques, Bruxelles V. p. 305, pl. LXXXI, figs. 15 and 16.

TYPE LOCALITY: Kentucky River. Neotype ANSP 20238a from the Ohio River (Johnson & Baker, 1973).

SYNONYMY:

Unio metanevrus (Rafinesque)

Stein 1880:462; Call 1894:154; 1896:144; 1897:252; 1900:467.

Unio wardii Lea

Stein 1880:462.

Quadrula metanevra wardii (Lea)

Daniels 1903:651.

Quadrula metanevra (Rafinesque)

Daniels 1903:651; Wilson & Clark 1912:43; Goodrich & van der Schalie 1944:309; Parmalee 1967:39; Meyer 1974:24; Clark 1976:5; Weillbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Uncommon.

OTHER COMMON NAMES: Monkey-faced mussel, knobbed rockshell.

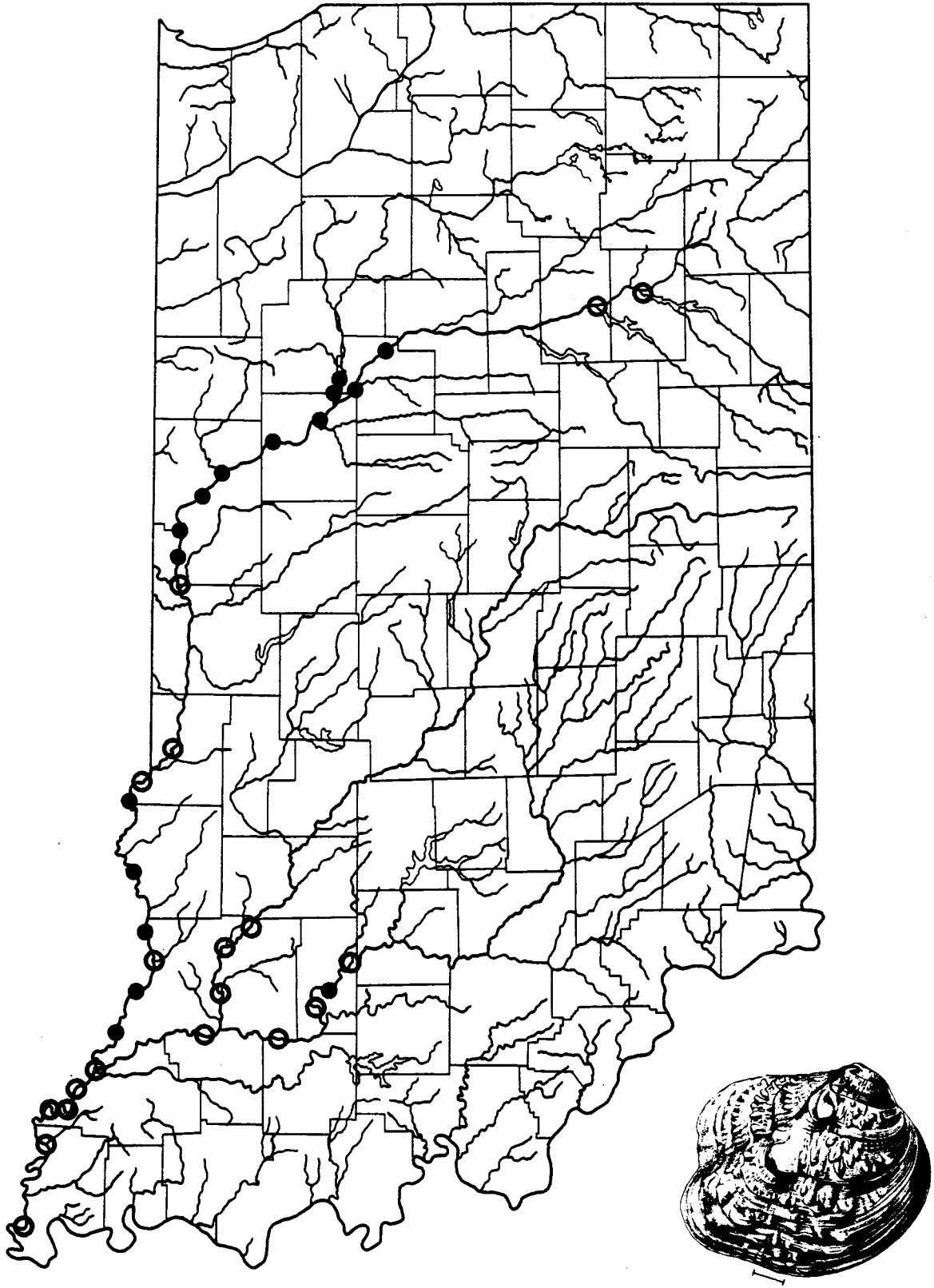
HABITAT: Found in medium to large rivers in mixed sand and gravel.

REMARKS: Reported as common in the Wabash and White rivers by Call (1900) and Goodrich and van der Schalie (1944). The monkeyface was listed as common in the upper and middle sections of the Wabash and rare in the lower Wabash and White rivers in 1966-67 (Meyer, 1974). Clark (1976) noted that this species was rather common in his collections in the lower Wabash in 1975.

Quadrula metanevra was found as relict shells only from eight sites in the lower Wabash in 1987 and should be considered rare or extirpated in this portion of the drainage. In 1988, *Q. metanevra* was found throughout the middle and upper Wabash River but was most common from Logansport to Perrysville. A large midden made up almost entirely of this species was found near Battleground just above the confluence with the Tippecanoe River.

Quadrula metanevra was present at eight sites in the lower White River drainage in 1991 but only one live mussel was found.

The monkeyface was found only in the lower part of the Tippecanoe River below the reservoirs in 1987.



Quadrula metanevra (Rafinesque, 1820)
monkeyface

Quadrula nodulata (Rafinesque, 1820)

Wartyback

ORIGINAL DESCRIPTION: *Obliquaria nodulata* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 307, pl. LXXXI, figs. 17 and 18.

TYPE LOCALITY: Kentucky River. Lectotype ANSP 20225a (Johnson & Baker, 1973).

SYNONYMY:

Unio pustulatus Lea

Stein 1880:462; Call 1894:155; 1896:145; 1897:252; 1900:486.

Quadrula pustulata (Lea)

Daniels 1903:651.

Quadrula nodulata (Rafinesque)

Goodrich & van der Schalie 1944:309; Parmalee 1967:39; Meyer 1974:24; Clark 1976:5; Cummings & Berlocher 1990:87.

STATUS: Rare.

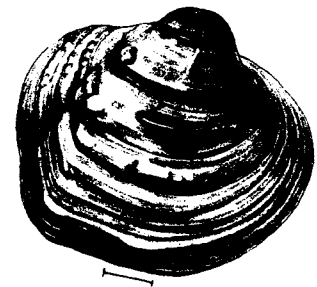
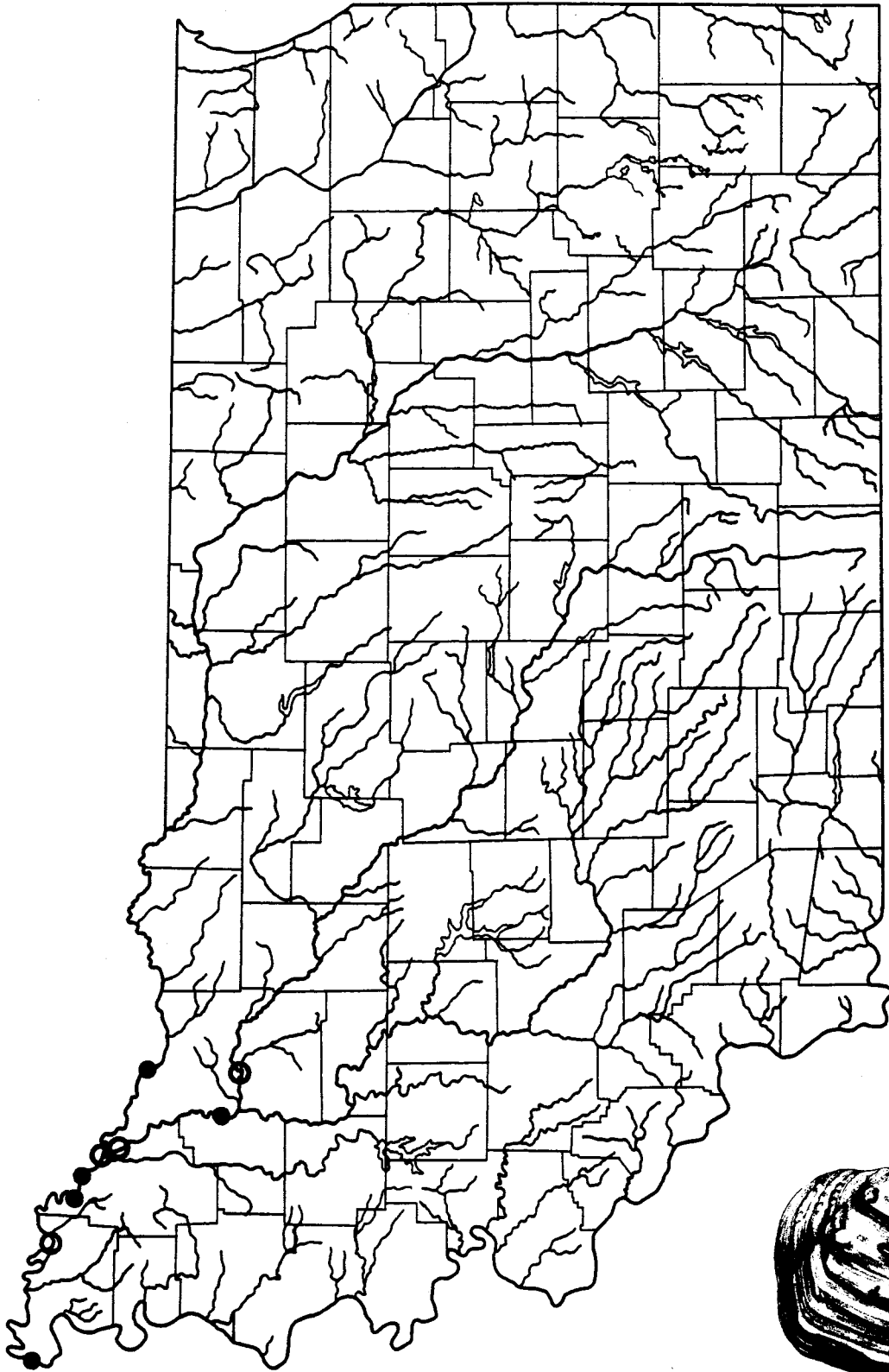
OTHER COMMON NAMES: Two-horned pocketbook, winged pimpleback, pimpleback.

HABITAT: Found in large rivers in sand or gravel.

REMARKS: Reported to be fairly common in the Wabash River by Call (1900), this species was not collected there in 1966-67 (Meyer, 1974). Clark (1976) reported the wartyback to be rather common in the lower Wabash River in 1975. Only five live *Q. nodulata* were found at three sites in the lower Wabash River in 1987. Six individuals were present (all near Vincennes) in the middle Wabash 1988. Although few living wartybacks were collected, this species was abundant in muskrat middens in the lower Wabash in 1987.

Reported to be fairly common in the White River by Call (1900), this species was not found in 1966-67 (Meyer, 1968). Only two live individuals were found in the White River near Petersburg in 1989-91. This mussel is apparently restricted to the lower Wabash and White rivers and should be listed as a Species of Special Concern in Indiana.

Not found in the Tippecanoe River in 1987.



Quadrula nodulata (Rafinesque, 1820)
wartyback

Quadrula pustulosa (I. Lea, 1831)

Pimpleback

ORIGINAL DESCRIPTION: *Unio pustulosus* I. Lea, 1831. Observations on the naiades, and descriptions of new species of that and other families. Transactions of the American Philosophical Society. Vol. IV New Series. p. 76, pl. VII, fig. 7.

TYPE LOCALITY: Ohio. Syntypes ANSP 43058 from Ohio (Johnson & Baker, 1973).

SYNONYMY:

- Unio bullatus* Conrad
Stein 1880:462.
- Unio dorfeuillianus* Lea
Call 1894:154; 1897:251.
- Unio pustulosus* Lea
Stein 1880:462; Call 1894:155; 1896:145; 1897:252; 1900:487.
- Unio verrucosus albus* Say
Stein 1880:462.
- Quadrula pustulosa* (Lea)
Daniels 1903:651; Wilson & Clark 1912:43; Goodrich & van der Schalie 1944:309; Parmalee 1967:40; Meyer 1974:24; Clark 1976:5; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Common.

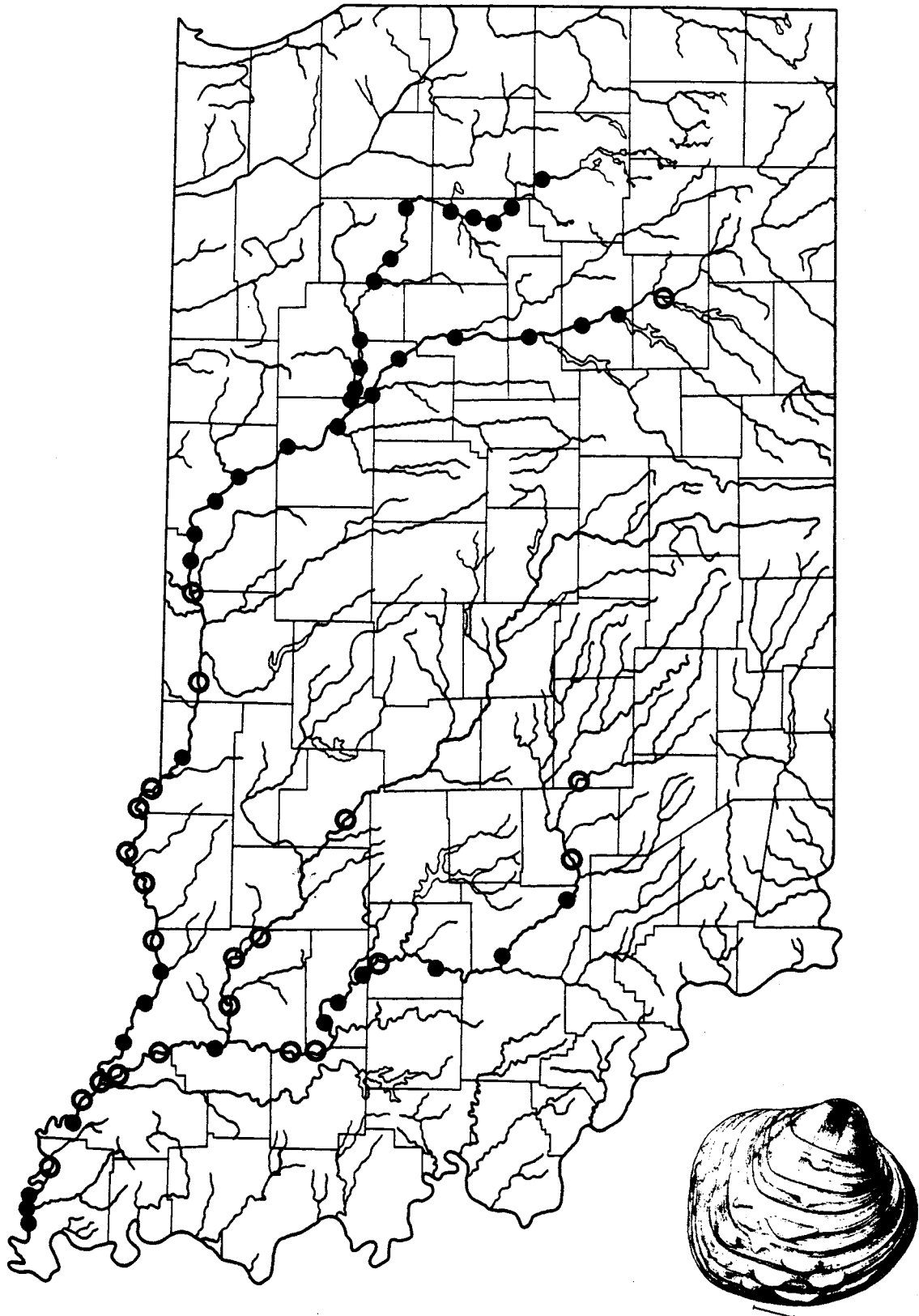
OTHER COMMON NAMES: Warty-back.

HABITAT: Found in medium to large rivers in mud, sand, or gravel.

REMARKS: A widespread and common species in Indiana (Call, 1900; Goodrich & van der Schalie, 1944), the pimpleback was reported as abundant in the Wabash in 1966-67 and 1975 (Meyer, 1968; 1974; Clark, 1976). Although *Q. pustulosa* was collected live at only four sites in the lower Wabash River in 1987, it was rather common in shell piles along the shore. The pimpleback ranked eighth in order of abundance in the upper and middle Wabash River in 1988 and was common until site 14 where it declined until site 25.

Reported as abundant in the White River in 1966-67 (Meyer, 1968), the pimpleback ranked seventeenth in order of abundance in 1989-91, with 29 live mussels found at seven sites in the lower half of the drainage.

Listed as common in the Tippecanoe River by Daniels (1903), *Q. pustulosa* was the most abundant species found there in 1987. Two hundred-five individuals were collected from 13 sites in the river. It was most common below the Lake Shafer spillway and was the dominant species collected from that site.



Quadrula pustulosa (I. Lea, 1831)
pimpleback

Quadrula quadrula (Rafinesque, 1820)

Mapleleaf

ORIGINAL DESCRIPTION: *Obliquaria quadrula* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales Générales des Sciences Physiques, Bruxelles V. p. 307.

TYPE LOCALITY: Ohio River. Neotype ANSP 20224, Salt River Kentucky (Johnson & Baker, 1973).

SYNONYMY:

- Unio asperrimus* Lea
Stein 1880:462; Call 1894:153; 1896:142; 1897:251.
- Unio lachrymosus* Lea
Stein 1880:462; Call 1894:154; 1897:252; 1900:489.
- Unio quadratus* Say
Stein 1880:462.
- Quadrula lachrymosa* (Lea)
Daniels 1903:651; Wilson & Clark 1912:43.
- Quadrula quadrula* (Rafinesque)
Goodrich & van der Schalie 1944:310; Parmalee 1967:43; Meyer 1974:24; Clark 1976:5; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Common.

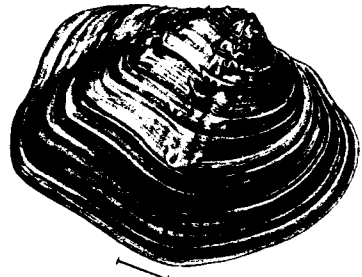
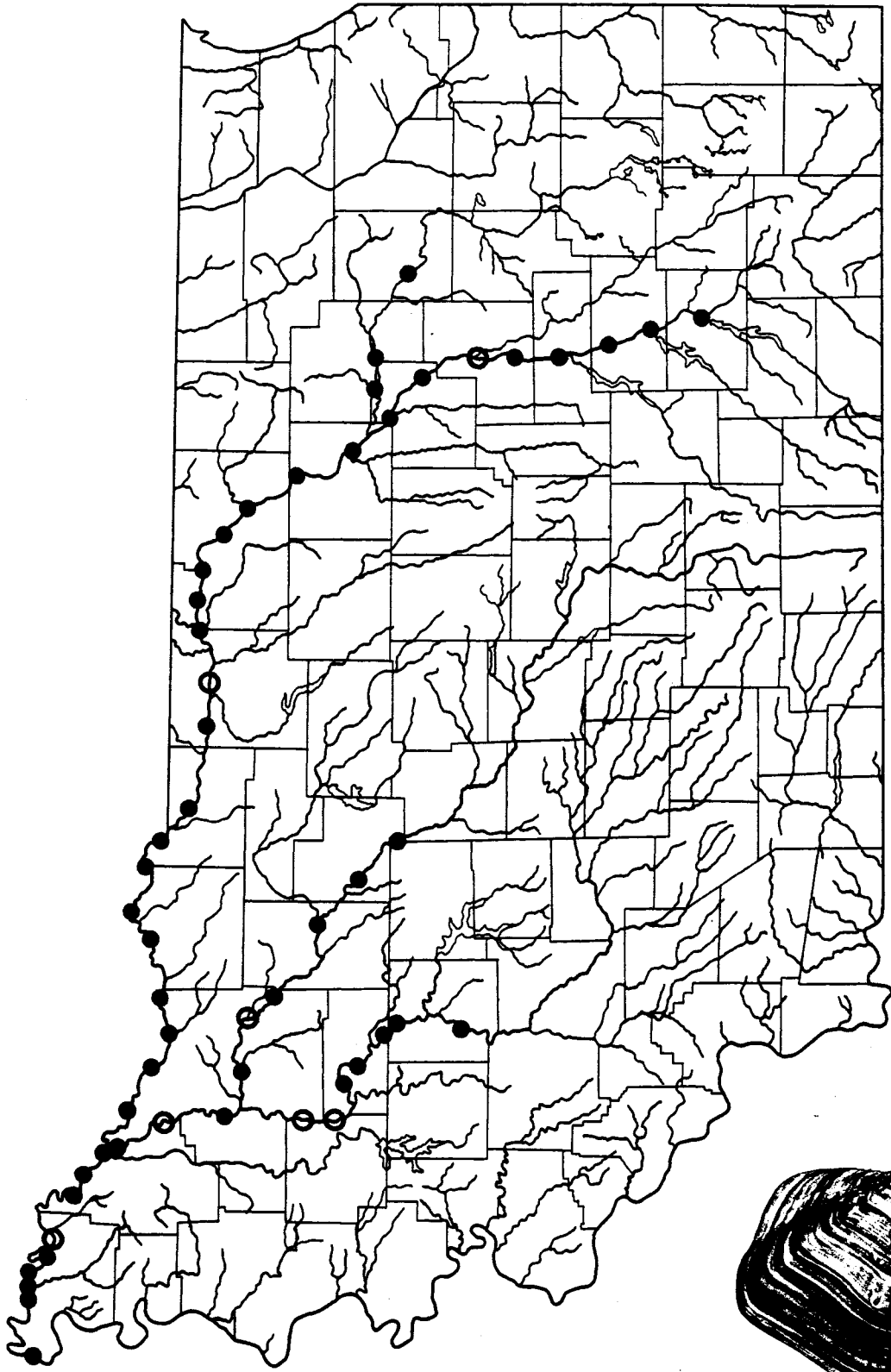
OTHER COMMON NAMES: Stranger.

HABITAT: Found in medium to large rivers and reservoirs in mud, sand, or gravel.

REMARKS: The mapleleaf was reported as widespread and common throughout Indiana (Call, 1900; Goodrich & van der Schalie, 1944) and was listed as abundant in the Wabash in 1966-67 and 1975 (Meyer, 1974; Clark, 1976). In the present survey, *Q. quadrula* was the third most common species encountered and was found alive or as fresh dead shells at almost every site in the Wabash River.

Considered abundant in the White River in 1966-67 (Meyer, 1968; 1974). In 1989-91, *Q. quadrula* was the fifth most abundant species found in the White River drainage and accounted for 6% of the live mussels collected.

In the Tippecanoe River, *Q. quadrula* was found at three sites and was common only below the Lake Shafer spillway. This species adapts well to a lake habitat (Parmalee, 1967) and may be common in lakes Shafer and Freeman.



Quadrula quadrula (Say, 1829)
mapleleaf

Tritogonia verrucosa (Rafinesque, 1820)

Pistolgrip

ORIGINAL DESCRIPTION: *Obliquaria verrucosa* Rafinesque, 1820. Monographie des coquilles bivalves fluviales de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 304, pl. LXXXI, figs. 10, 11, and 12.

TYPE LOCALITY: Ohio River. Lectotype ANSP 20235a (Johnson & Baker, 1973).

SYNONYMY:

Unio tuberculatus Barnes

Stein 1880:463; Call 1894:155; 1896:146; 1897:252; 1900:465.

Tritogonia tuberculatus (Barnes)

Daniels 1903:649.

Tritogonia verrucosa (Rafinesque)

Goodrich & van der Schalie 1944:310; Parmalee 1967:43; Meyer 1974:24; Clark 1976:5; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Common.

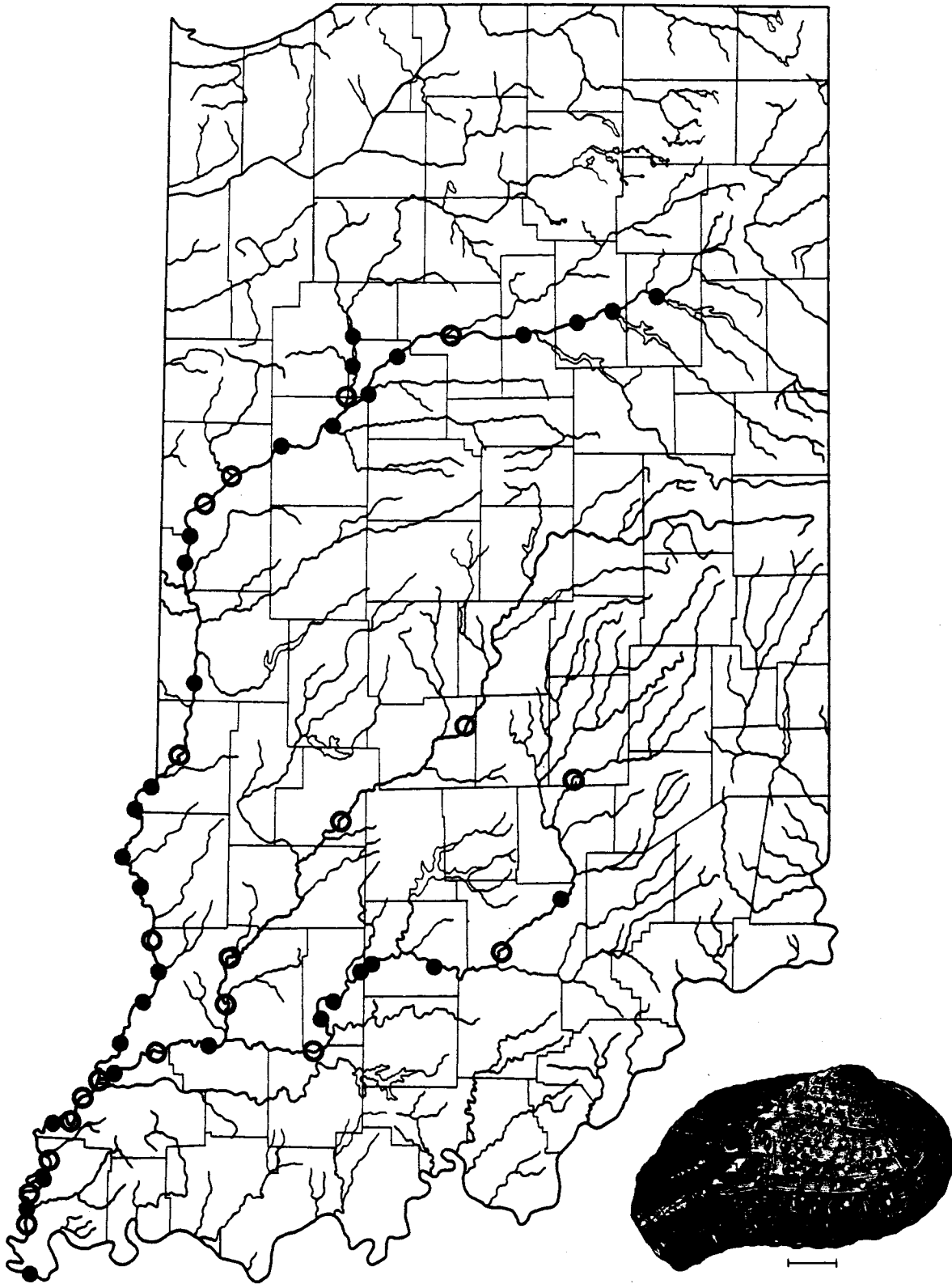
OTHER COMMON NAMES: Buckhorn, peanut, turkey wing.

HABITAT: Found in medium to large rivers in mud, sand, or gravel.

REMARKS: Reported from the larger rivers of southern Indiana (Goodrich and van der Schalie, 1944), the pistolgrip was not collected in the Wabash River below Vincennes in 1966-67 (Meyer, 1974). Clark (1976) listed the pistolgrip as uncommon in his collections in the lower Wabash in 1975. In 1987, this species was found live at four sites in the lower Wabash and was uncommon in this part of the river. The pistolgrip was reported as common in the middle and upper Wabash in 1966-67 (Meyer, 1974). In 1988, *T. verrucosa* was found alive throughout the middle and upper Wabash and it ranked tenth in order of abundance.

The pistolgrip was not found in the White River in 1966-67 (Meyer, 1968; 1974). In 1989-91, *Tritogonia verrucosa* ranked ninth in order of abundance and was found alive at 8 of 16 sites in the East Fork and White River proper.

The pistolgrip was found alive in the lower part of the Tippecanoe River at sites 12 and 13 below the spillways.



Tritogonia verrucosa (Rafinesque, 1820)
pistolgrip

Unio merus tetralasmus (Say, 1831)

Pondhorn

ORIGINAL DESCRIPTION: *Unio tetralasmus* Say, 1831. American conchology, or descriptions of the shells of North America. September 1831. Vol. III. pl. 23.

TYPE LOCALITY: Bayou St. John, near New Orleans. Type presumably lost.

SYNONYMY:

Unio camptodon Say

Call 1894:153; 1896:142; 1897:251.

Unio tetralasmus Say

Call 1900:517; Daniels 1903:650.

Unio tetralasmus sayi Ward

Daniels 1903:650.

Unio merus tetralasmus (Say)

Goodrich & van der Schalie 1944:310; Parmalee 1967:44; Meyer 1974:24; Cummings & Berlocher 1990:87.

STATUS: Uncommon.

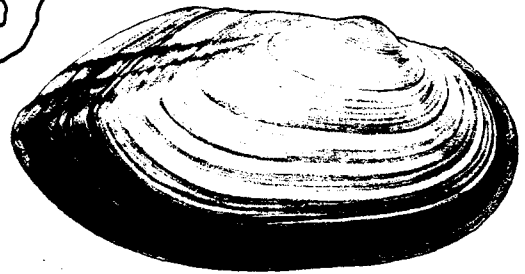
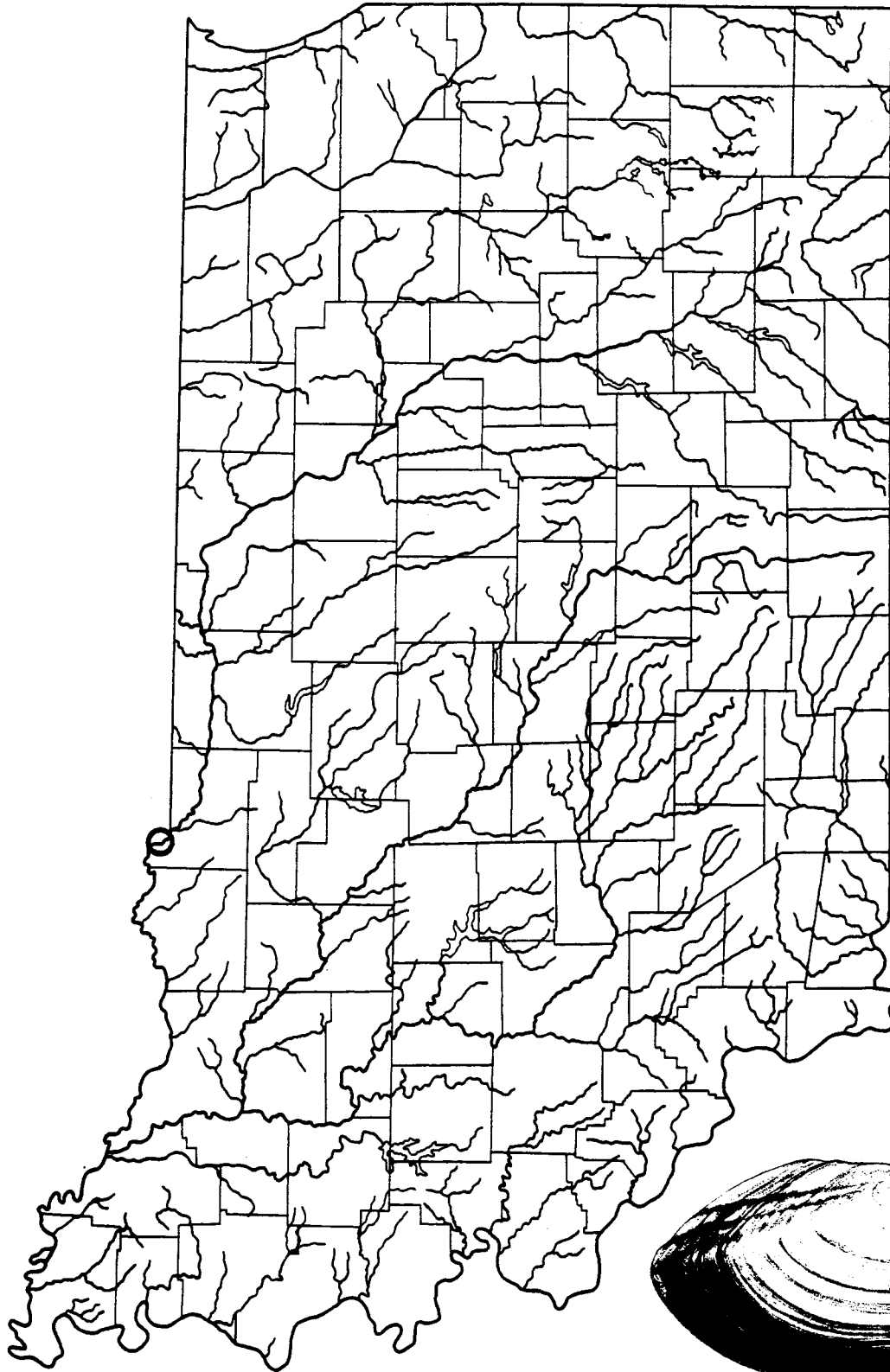
OTHER COMMON NAMES: Horn shell.

HABITAT: Found in ponds, small creeks, and the headwaters of larger streams in mud, sand, or gravel.

REMARKS: Reported from the Wabash River by Call (1900), this species was considered rare in Indiana by 1944 (Goodrich & van der Schalie). The pondhorn was not found living in the Wabash River in 1966-67, 1975, or the present survey (Meyer, 1974; Clark, 1976). In 1988, one relict shell of this mussel was collected downstream of Terre Haute at shore site 19. This species is usually found in headwater streams or ponds, and its absence in the Wabash River is not particularly surprising.

The only known records for the pondhorn in the White River drainage are from Montour's Pond, Wheatland, Knox County (UMMZ 73096) collected by L.E. Daniels around the turn of the century and a specimen labeled White River, Indiana (FMNH 68032) from the J. Zetek Collection. No evidence of this species was found in the White River drainage in the present survey.

Not found in the Tippecanoe River in 1987.



Uniomerus tetralasmus (Say, 1831)
pondhorn

Alasmidonta marginata Say, 1818

Elktoe

ORIGINAL DESCRIPTION: *Alasmidonta marginata* Say 1818. Description of a new genus of fresh water bivalve shells. Journal of the Academy of Natural Sciences of Philadelphia. Vol. I. p. 459.

TYPE LOCALITY: Scioto River. Type presumably lost (Clarke, 1981).

SYNONYMY:

- Margaritana marginata* (Say)
Stein 1880:466; Call 1894:153; 1896:141; 1897:251; 1900:521.
- Unio (Margaritana) marginatus* Say
Kirsch 1896:55.
- Alasmodonta truncata* Say ???
Stein 1880:466.
- Alasmidonta truncata* B.H. Wright
Daniels 1903:650; Wilson & Clark 1912:45.
- Alasmidonta marginata* Say
Goodrich & van der Schalie 1944:310; Parmalee 1967:45; Meyer 1974:21; Clark 1976:4; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.
- Alasmidonta (Decurambis) marginata* (Say)
Clarke 1981:57.

STATUS: Common.

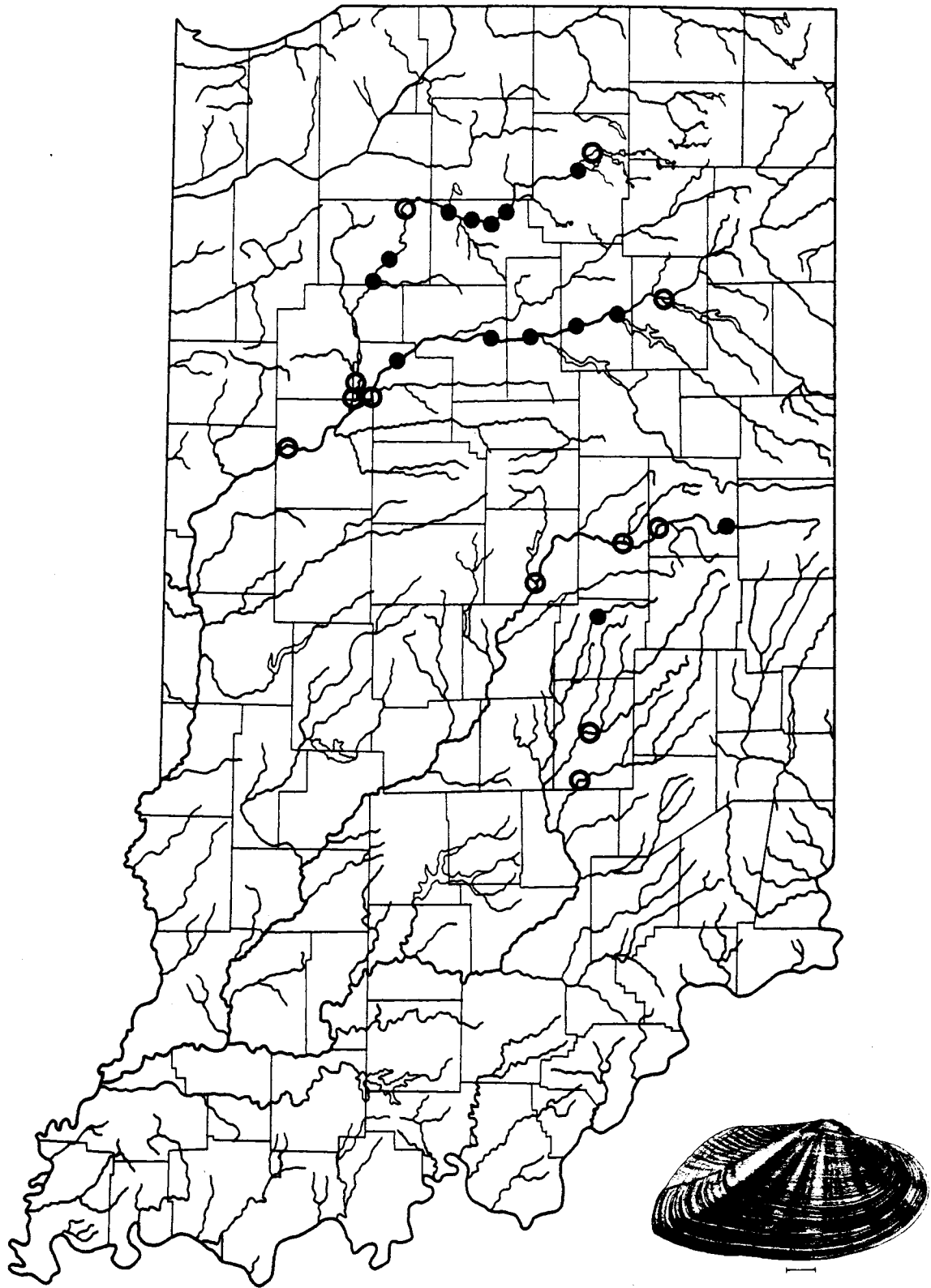
OTHER COMMON NAMES: None.

HABITAT: Typically found in small to medium streams in sand or gravel.

REMARKS: The elktoe was reported from every river basin in Indiana by Call (1900). Goodrich and van der Schalie (1944) found it to be common in headwaters throughout the state. It was not collected in the lower Wabash River in 1966-67 (Meyer, 1968; 1974), 1975 (Clark, 1976), or during the present survey. One individual was found in the middle Wabash River a few miles downstream from Americus by Meyer in 1966. The elktoe was found living at five sites in the upper Wabash River in 1988.

Not collected in the White River in 1966-67 (Meyer 1968; 1974). Shells of *A. marginata* were generally distributed in the upper part of the basin in 1989-91, but it was found living at only two sites. It was the most abundant species present at site 2 on the upper West Fork, and was also found living at site 13 on Sugar Creek.

The elktoe was collected from seven sites on the Tippecanoe River and ranked thirteenth in order of abundance with a total of 41 individuals collected.



Alasmidonta marginata Say, 1818
elktoe

Alasmidonta viridis (Rafinesque, 1820)

Slippershell mussel

ORIGINAL DESCRIPTION: *Unio viridis* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 293.

TYPE LOCALITY: Ohio River and Kentucky River and small rivers adjacent to the Kentucky River. Neotype USNM 8626a from Cincinnati, Ohio (Clarke, 1981).

SYNONYMY:

- Margaritana deltoidea* (Lea)
Stein 1880:466; Call 1900:519.
- Unio deltoidea* Lea
Kirsch 1896:55.
- Margaritana calceola* (Lea)
Stein 1880:466.
- Alasmidonta calceola* (Lea)
Wilson & Clark 1912:45.
- Alasmidonta calceolus* (Lea)
Goodrich & van der Schalie 1944:310; Parmalee 1967:44.
- Alasmidonta (Pressodonta) viridis* (Rafinesque)
Clarke 1981:17.
- Alasmidonta viridis* (Rafinesque)
Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

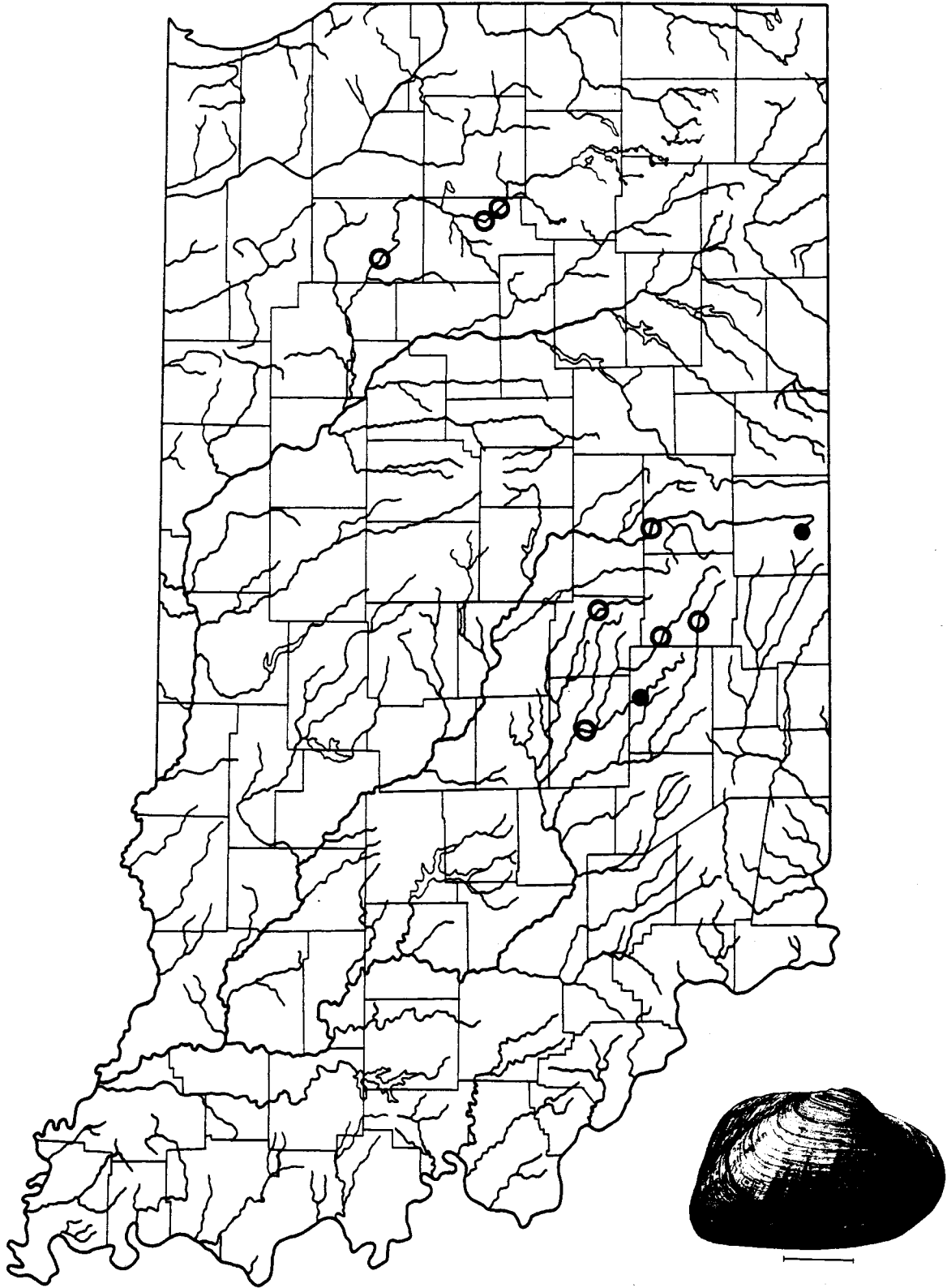
STATUS: Rare.

OTHER COMMON NAMES: None.

HABITAT: Found in creeks and small streams in sand or mixed sand and gravel.

REMARKS: Reported by Call (1900) as widely distributed in Indiana including the Wabash and White rivers. Goodrich and van der Schalie (1944) noted it to be common in creeks all over the state, occasionally found in larger streams. Not collected in the Wabash or White rivers by Meyer (1968) or Clark (1976). The slippershell was rare in our collections in the Wabash River drainage in 1989-91.

This mussel was found living at only two sites, one in the upper Wabash and one in the Little Blue River (West Fork White River drainage). The slippershell is typically found in very small streams and its rarity in the Wabash, White, and Tippecanoe rivers is not surprising. This mussel has been found living in Sugar and Brandywine Creeks (both East Fork White River drainage) and Sugar Creek (Wabash River drainage) since 1990 (Harmon, 1990; 1991; Lewis, 1991), and additional surveys in some of the smaller drainages in Indiana will likely turn up other populations.



Alasmidonta viridis (Rafinesque, 1820)
slippershell mussel

Anodonta grandis Say, 1829

Giant floater

ORIGINAL DESCRIPTION: *Anodonta grandis* Say, 1829. Descriptions of some new terrestrial and fluviatile shells of North America. The Disseminator of Useful Knowledge, New Harmony. Vol. II. p. 341.

TYPE LOCALITY: Fox River of the Wabash [White County, Illinois]. Neotype Senckenberg Museum 4300 (Haas, 1930).

SYNONYMY:

- Anodonta grandis* Say
Stein 1880:466; Call 1894:152; 1896:141; 1897:251; 1900:531; Daniels 1903:649;
Wilson & Clark 1912:46; Parmalee 1967:47; Meyer 1974:21; Weilbaker et al. 1985:689
Cummings & Berlocher 1990:87.
- Anodonta decora* Lea
Stein 1880:466; Call 1894:152; 1897:251.
- Anodonta ovata* Lea
Kirsch 1896:54.
- Anodonta footiana* Lea
Call 1894:152; 1896:140; 1897:251; 1900:535; Kirsch 1896:55.
- Anodonta plana* Lea
Call 1894:152; 1897:251.
- Anodonta salmonia* Lea
Call 1894:152; 1896:141; 1897:251; 1900:534.
- Anodonta grandis footiana* Lea
Daniels 1903:649.
- Anodonta kennicottii* Lea
Daniels 1903:649.
- Anodonta corpulenta* Cooper
Daniels 1903:649; Goodrich & van der Schalie 1944:311; Parmalee 1967:47; Clark 1976:4.

STATUS: Common.

OTHER COMMON NAMES: Floater, stout floater, papershell, hogshell, slopbucket.

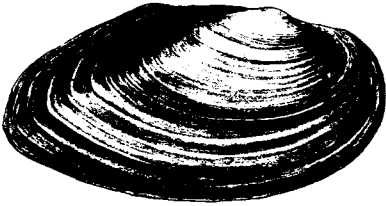
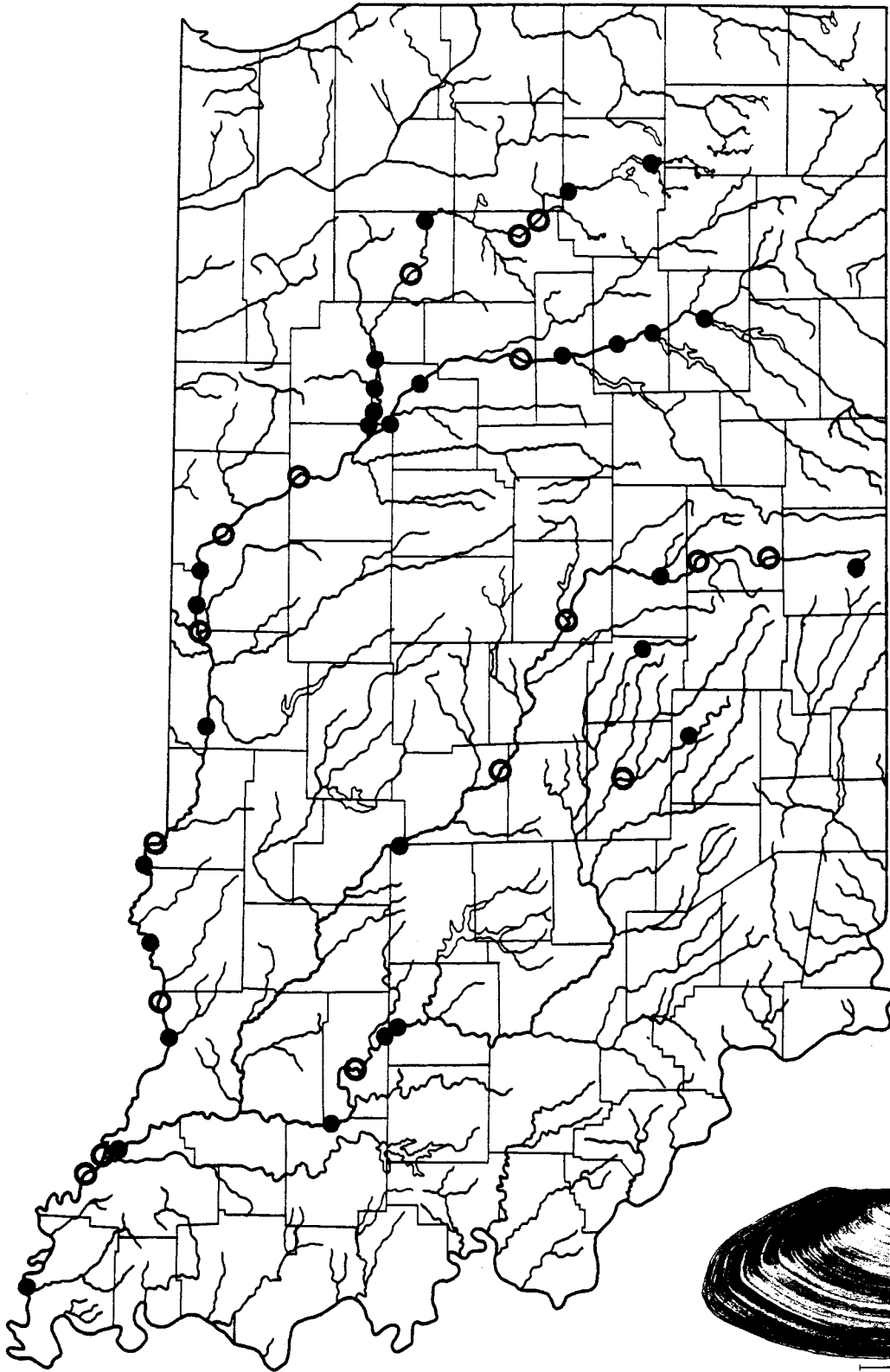
HABITAT: Found in mud and sand in ponds, lakes, or streams in areas with little or no current.

REMARKS: Call (1900) reported this mussel as abundant in ponds along the Wabash and Ohio rivers and from northern Indiana. Goodrich and van der Schalie (1944) referred to *A. grandis* as one of the most common species in the state. Only two individuals were found in the lower Wabash in 1966-67, and this mussel was not listed from the lower Wabash River in 1975 (Meyer, 1968; 1974; Clark, 1976).

Anodonta grandis was widespread and relatively common in the Wabash River drainage in 1987-91. Although only one giant floater was found alive in the lower Wabash River in 1987, it was found living at 12 sites in the middle and upper Wabash River in 1988.

The giant floater was not collected in the White River in 1966-67 (Meyer, 1968). This species was found alive at nine of 15 sites in the drainage in 1989-91, but was common only at sites 1, 4, and 24.

Sixty-one individuals were found at seven sites in the Tippecanoe River in 1987, but most were collected in the lower part of the river.



Anodonta grandis Say, 1829
giant floater

Anodonta imbecillis Say, 1829

Paper pondshell

ORIGINAL DESCRIPTION: *Anodonta imbecillis* Say, 1829. Descriptions of some new terrestrial and fluviatile shells of North America. The Disseminator of Useful Knowledge, New Harmony, Vol. II. No. 23. p. 355.

TYPE LOCALITY: Wabash River. Neotype Senckenberg Museum 4301 (Haas, 1930).

SYNONYMY:

Anodonta imbecillis Say
Stein 1880:466; Call 1894:152; 1896:141; 1897:251; 1900:527;
Daniels 1903:649; Wilson & Clark 1912:47; Goodrich & van der
Schalie 1944:311; Parmalee 1967:48; Meyer 1974:22; Clark
1976:4; Cummings & Berlocher 1990:87.
Anodonta incerta Lea
Stein 1880:466.

STATUS: Common.

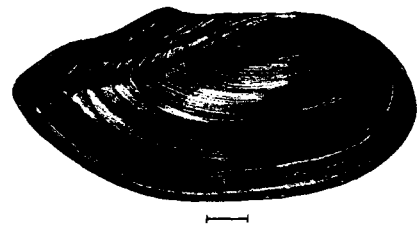
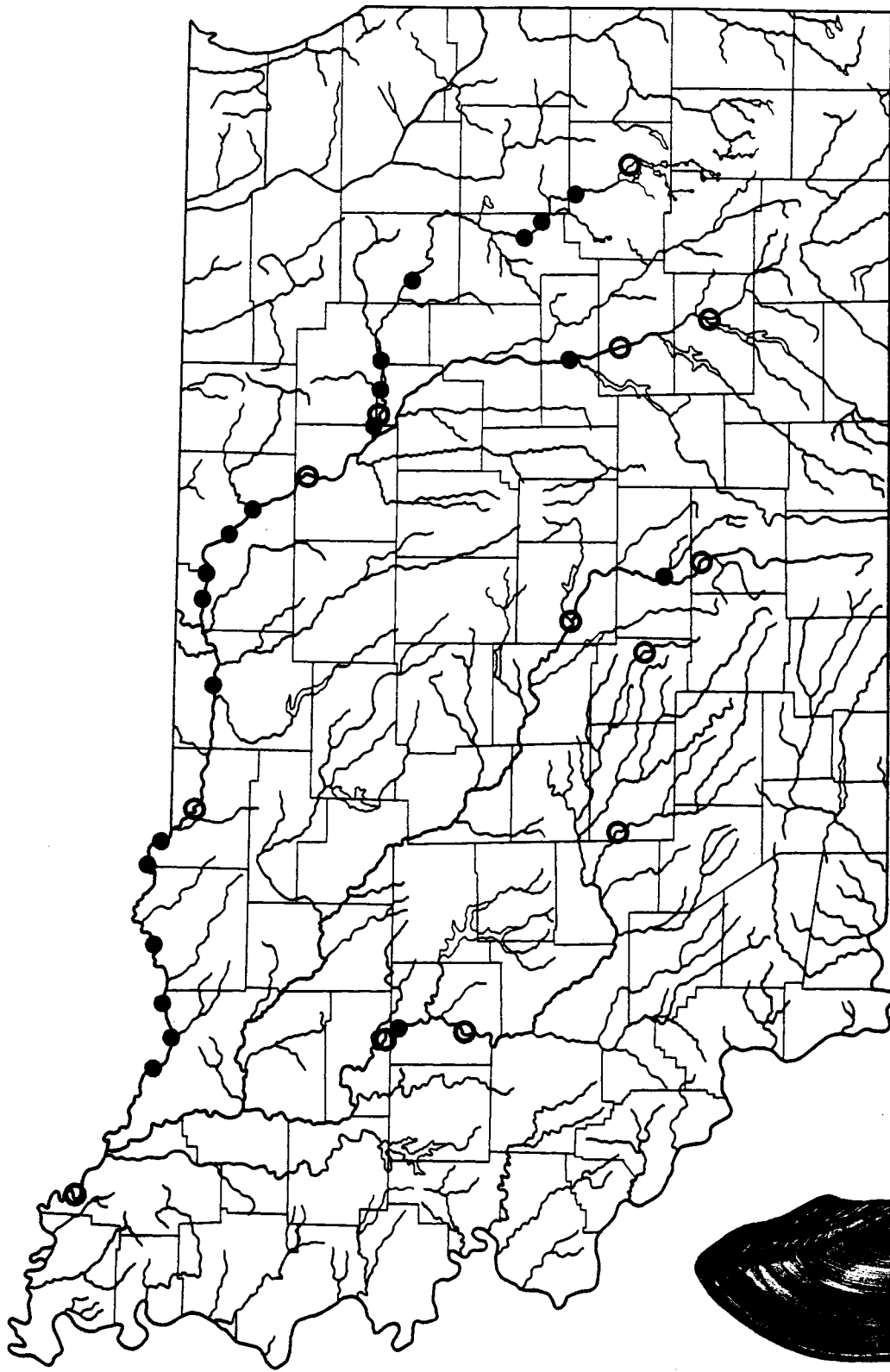
OTHER COMMON NAMES: Paper-shell, paper floater.

HABITAT: Found in ponds or sluggish mud-bottomed pools of creeks and rivers.

REMARKS: Reported to be very common in Indiana in the Wabash and White rivers among others (Call, 1900). Goodrich and van der Schalie (1944) noted that the paper pondshell was found in nearly all of the drainages in Indiana, but that it was sporadic in distribution and, like other thin-shelled species, was usually found in the outlets of lakes, muddy banks, etc. Neither Meyer (1968; 1974) nor Clark (1976) found evidence of this species in the Wabash River. A single valve was collected in the lower Wabash River in Gibson County, Indiana, in 1987. *Anodonta imbecillis* was common in the middle Wabash River in 1988 and was the dominant species collected at site 24. It was almost always found in mud and silt along the banks and was the most common species found in this habitat.

Meyer (1968) did not collect *A. imbecillis* in the White River 1966-67. The paper pondshell was rare in the White River drainage in 1989-91, with only six individuals found at two widely separated localities in the basin.

Nine individuals of the paper pondshell were found alive at seven sites in the Tippecanoe River in 1987. This species was also represented as shells at sites 2 and 15, and may be found in suitable habitat throughout the drainage.



Anodonta imbecillis Say, 1829
paper pondshell

Anodonta suborbiculata Say, 1831

Flat floater

ORIGINAL DESCRIPTION: *Anodonta suborbiculata* Say, 1831. The Disseminator of Useful Knowledge, New Harmony. January 29, 1831.

TYPE LOCALITY: Ponds near the Wabash [River, near New Harmony, Posey County, Indiana]. Type presumably lost (Johnson & Baker, 1973).

SYNONYMY:

Anodonta suborbiculata Say

Stein 1880:466; Call 1894:152; 1896:141; 1897:251; 1900:532;
Daniels 1903:649; Goodrich & van der Schalie 1944:311; Parmalee
1967:48; Meyer 1974:22; Clark 1976:4; Cummings & Berlocher
1990:87.

STATUS: Rare.

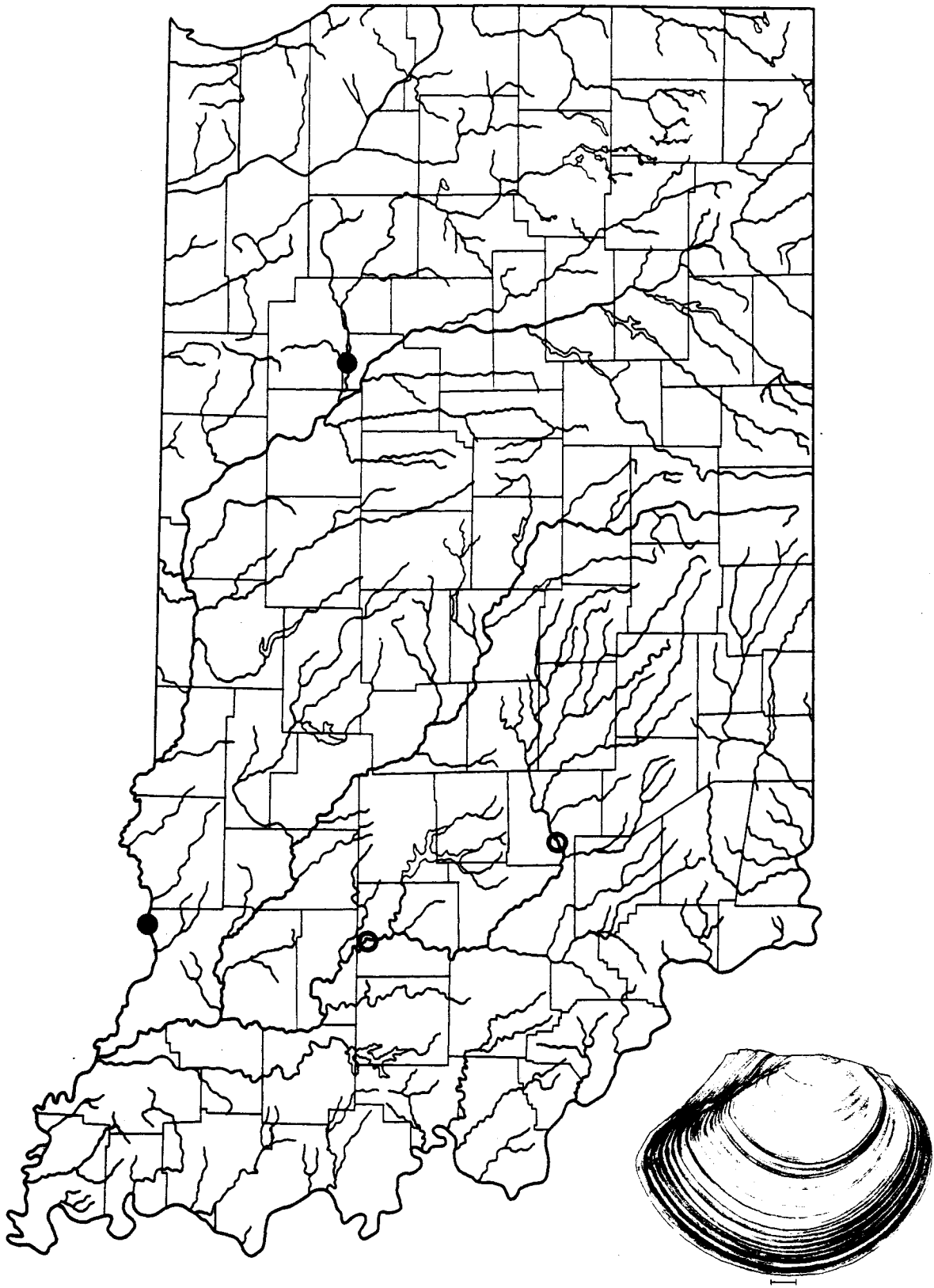
OTHER COMMON NAMES: Heel-splitter.

HABITAT: Found in mud or sand in the backwaters of large rivers, sloughs, floodplain lakes, or oxbows.

REMARKS: The flat floater was thought by Call (1900) to be limited to the muddy bayous, backwaters, and oxbow lakes along the Wabash River. It was not collected in the Wabash or White rivers in 1966-67 (Meyer, 1968) or the lower Wabash River by Clark (1976). In 1988, only one live individual of this species was found in the middle Wabash River at site 23.

No live flat floaters were found in the White River 1989-91, but fresh-dead shells were collected at two sites (19 and 23) and *A. suborbiculata* is most likely still present in the drainage.

Five flat floaters were found in the Tippecanoe River in a small backwater area just below Oakdale Dam at the Lake Freeman spillway in 1987. Typically a species of sloughs, oxbows, and floodplain lakes, the flat floater will probably turn up in those rarely collected habitats in Indiana. Probably always uncommon to rare in the Wabash, White, and Tippecanoe rivers.



Anodonta suborbiculata Say, 1831
flat floater

Anodontoides ferussacianus (I. Lea, 1834)

Cylindrical papershell

ORIGINAL DESCRIPTION: *Anodonta ferussaciana* Lea, 1834. Observations on the naiades; and descriptions of new species of that, and other families. Transactions of the American Philosophical Society. Vol. V New Series. p. 45, pl. VI, fig. 15.

TYPE LOCALITY: Ohio River, near Cincinnati, [Hamilton County, Ohio]. Figured holotype USNM 86520 (Johnson & Baker, 1973).

SYNONYMY:

Unio (Anodonta) ferussacianus Lea
Kirsch 1896:55.

Unio (Anodonta) ferussaciana Lea
Kirsch 1896:55.

Anodonta subcylindracea Lea
Call 1900:530.

Anodontoides ferussacianus (Lea)
Wilson & Clark 1912:46; Goodrich & van der Schalie 1944:311;
Parmalee 1967:51; Meyer 1974:22; Clark 1976:4.

STATUS: Rare.

OTHER COMMON NAMES: Cylinder.

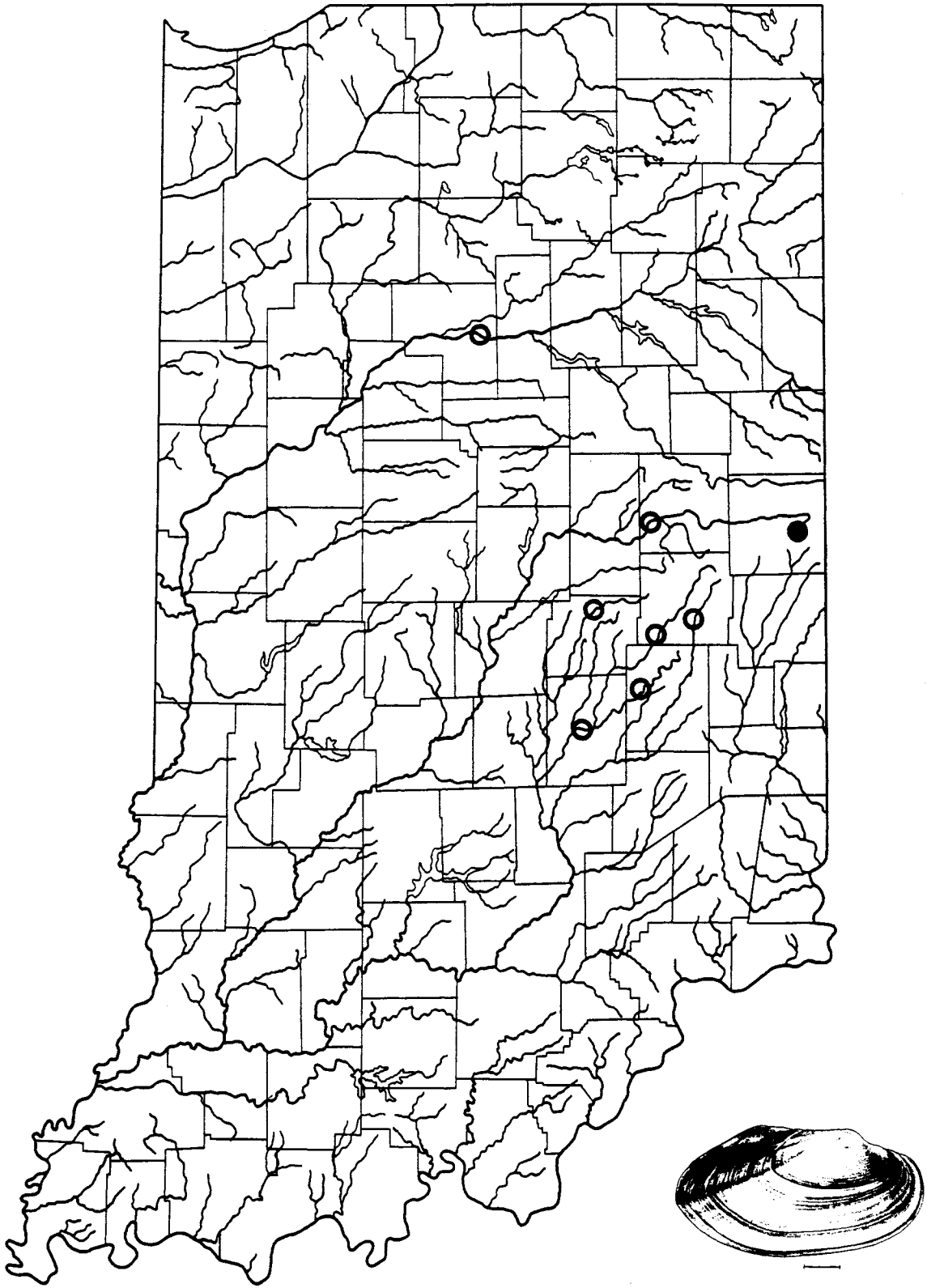
HABITAT: Found in mud or sand in small creeks and the headwaters of larger streams.

REMARKS: Call (1900) reported this mussel from the Wabash and White rivers in Indiana but did not give specific locality data. Goodrich and van der Schalie (1944) described the distribution of *A. ferussacianus* as state wide in creeks and headwaters and listed Lafayette specifically. No cylindrical papershells were found in 1966-67, 1976, or the present survey of the lower Wabash River. Two individuals were found in the middle and upper Wabash in 1966-67 (Meyer, 1968). Only one fresh-dead shell was found at site 5 in the upper Wabash in 1988.

The cylindrical papershell was not collected in the White River survey of 1966-67 (Meyer, 1968).

Typically a small stream species, shells of *A. ferussacianus* were generally distributed in the upper part of the White River drainage and 15 live individuals were found at site 1.

A re-examination of the specimens referred to as *A. ferussacianus* from the Tippecanoe River in the 1987 report have been identified as *Anodonta imbecillis*. Although no verified records exist for *A. ferussacianus* in the Tippecanoe, it undoubtedly occurs in the smaller creeks and tributaries of that drainage. This species is typically found in very small streams and its rarity in the Wabash, White, and Tippecanoe rivers is not surprising. This mussel has been found living in Sugar and Brandywine creeks (East Fork White River drainage) and Sugar and Wildcat creeks (Wabash River drainage) since 1990 (Harmon, 1990; 1991; Henschen, 1990; Lewis, 1991). Surveys in some of the smaller streams in Indiana will undoubtedly turn up additional populations.



Anodontoides ferussacianus (I. Lea, 1834)
cylindrical papershell

Arcidens confragosus (Say, 1829)

Rock pocketbook

ORIGINAL DESCRIPTION: *Alasmodonta confragosa* Say, 1829. Descriptions of some new terrestrial and fluviatile shells of North America. The Disseminator of Useful Knowledge, New Harmony. Vol. II. p. 339.

TYPE LOCALITY: Fox River, an arm of the Wabash [White County, Illinois]. Type presumably lost (Clarke, 1981).

SYNONYMY:

Margaritana confragosa (Say)

Stein 1880:466; Call 1894:152; 1896:141; 1897:251; 1900:520.

Arcidens confragosus (Say)

Daniels 1903:650; Goodrich & van der Schalie 1944:311; Parmalee 1967:51; Meyer 1974:22; Clark 1976:4.

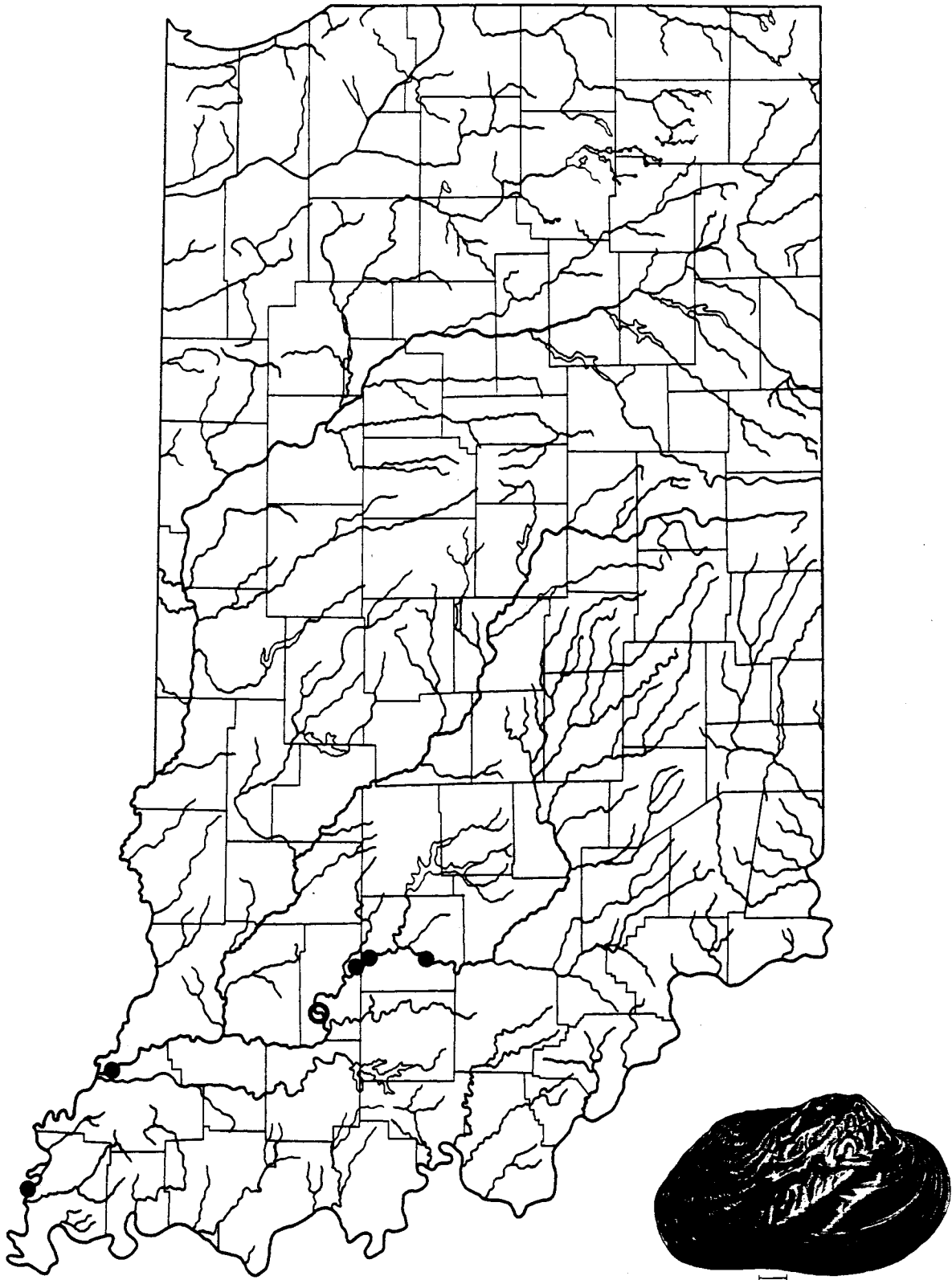
STATUS: Rare.

OTHER COMMON NAMES: Rock-shell, bastard, queen, black pocketbook, Grandmaw.

HABITAT: Found in large rivers in mud or mixed sand and mud in slow flowing water.

REMARKS: Call (1900) noted *A. confragosus* as being limited to, but common in, the Wabash River in Indiana. Daniels (1903) listed the Wabash River at Lafayette, Terre Haute, New Harmony, and ponds in Posey County as sites for this species in Indiana. Reported by Goodrich and van der Schalie (1944) to be limited to the lower portions of the Wabash and White rivers. The rock pocketbook was not collected in the Wabash or White rivers in 1966-67 or 1975 (Meyer 1968; 1974; Clark 1976). In the present survey, living *A. confragosus* were found in the lower Wabash River at Mink Island, Posey County in 1987, and at four of five sites in the lower East Fork and White River proper in 1991.

Not found in the Tippecanoe River in 1987.



Arcidens confragosus (Say, 1829)
rock-pocketbook

Lasmigona complanata (Barnes, 1823)

White heelsplitter

ORIGINAL DESCRIPTION: *Alasmodonta complanata* Barnes, 1823. On the genera *Unio* and *Alasmodonta*: with introductory remarks. The American Journal of Science and Arts. Vol. VI, pp. 278-279, pl. 13, fig. 22.

TYPE LOCALITY: Fox River [Wisconsin]. Type presumably lost (Clarke, 1985).

SYNONYMY:

- Margaritana complanata* (Barnes)
Stein 1880:466; Call 1894:152; 1896:141; 1897:251; 1900:522.
- Symphynota complanata* (Barnes)
Daniels 1903:650; Wilson & Clark 1912:46.
- Lasmigona complanata* (Barnes)
Goodrich & van der Schalie 1944:312; Parmalee 1967:52; Meyer 1974:23; Clark 1976:4; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.
- Lasmigona (Lasmigona) complanata complanata* (Barnes)
Clarke 1985:25.

STATUS: Common.

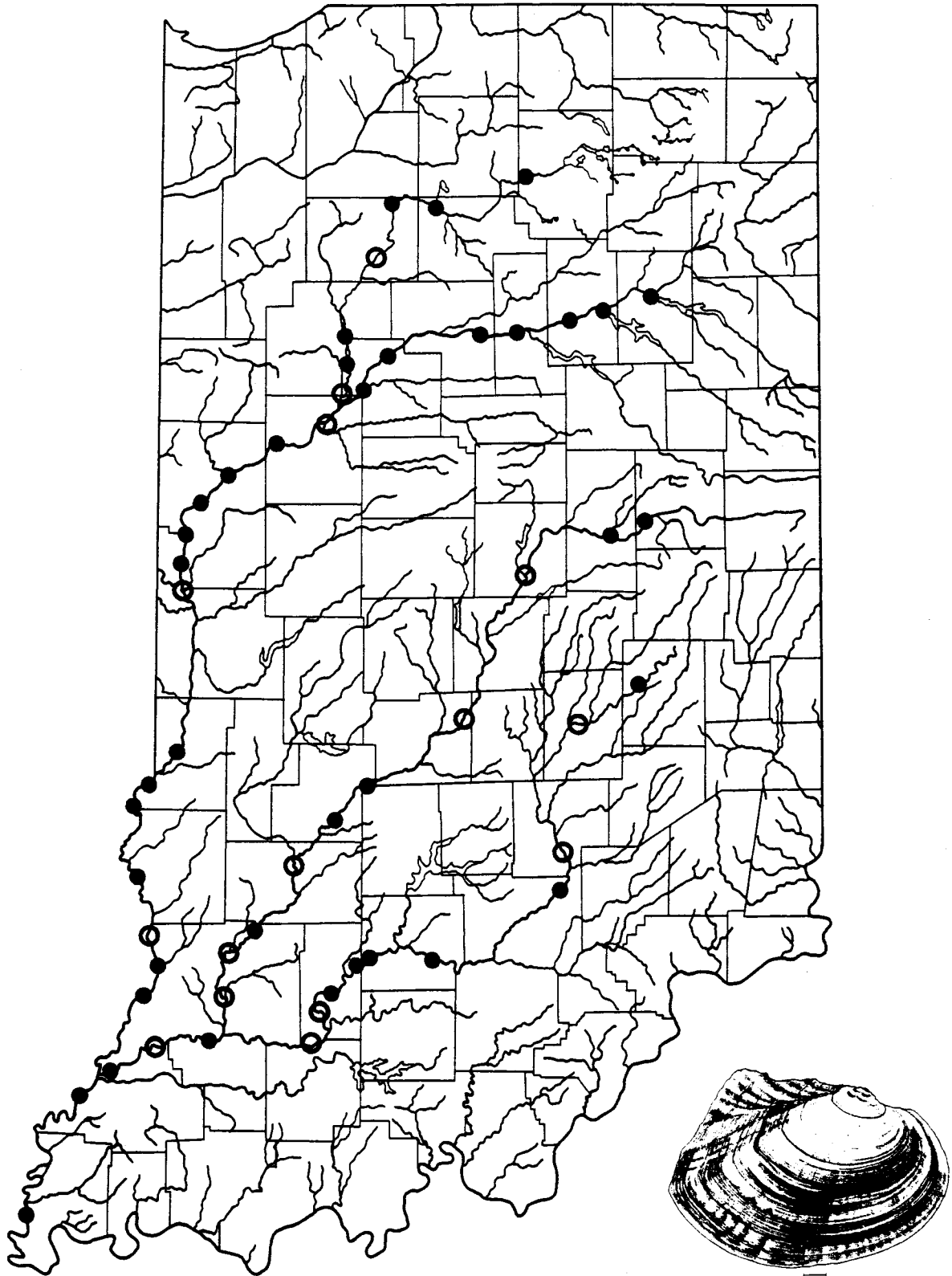
OTHER COMMON NAMES: Hatchet-back, elephant-ear, razorback, pancake.

HABITAT: Found in a wide variety of habitats from small creeks to large rivers in mud, sand, or gravel.

REMARKS: Call (1900) and Goodrich and van der Schalie (1944) reported this species as common throughout Indiana. The white heelsplitter was common in the collections made in the Wabash in 1966-67 (Meyer, 1968; 1974), but was considered rare in the lower Wabash in 1975 (Clark, 1976). One of the most common and widely distributed mussels in Indiana, *L. complanata* was found live at three sites in the lower Wabash River in 1987 and 18 of 26 sites in the middle and upper Wabash River in 1988.

The white heelsplitter was also common in the collections made in the White River in 1966-67 (Meyer, 1968; 1974). It was found live at 13 of 23 sites sampled in the White River drainage in 1989-91.

The white heelsplitter was common throughout the Tippecanoe River and was abundant in quiet water areas below both spillways (Lake Shafer & Lake Freeman). Seventy-eight individuals were collected from these two sites and *L. complanata* ranked seventh in order of abundance for all species found in the Tippecanoe River in 1987.



Lasmigona complanata (Barnes, 1823)
white heelsplitter

Lasmigona compressa (I. Lea, 1829)

Creek heelsplitter

ORIGINAL DESCRIPTION: *Symphynota compressa* I. Lea, 1829. Description of a new genus of the family of naiades, including eight species, four of which are new; also the description of eleven new species of the genus *Unio* from the rivers of the United States: with observations on some of the characters of the naiades. Transactions of the American Philosophical Society. Vol. III New Series. p. 450, pl. XII, fig. 22.

TYPE LOCALITY: [Yellow Creek, near Cincinnati, Hamilton County], Ohio and Norman's Kill, near Albany, [Albany County, New York]. Figured holotype USNM 83961 from the former locality (Johnson & Baker, 1973; Clarke, 1985).

SYNONYMY:

- Unio pressus* Lea
Stein 1880:461; Call 1894:155; 1896:145; 1897:252; 1900:459;
Kirsch 1896:55.
- Symphynota compressa* Lea
Daniels 1903:650; Wilson & Clark 1912:46.
- Lasmigona compressa* (Lea)
Goodrich & van der Schalie 1944:312; Parmalee 1967:52; Meyer
1974:23; Clark 1976:4; Cummings & Berlocher 1990:87.
- Lasmigona (Platynaias) compressa* (Lea)
Clarke 1985:40.

STATUS: Rare.

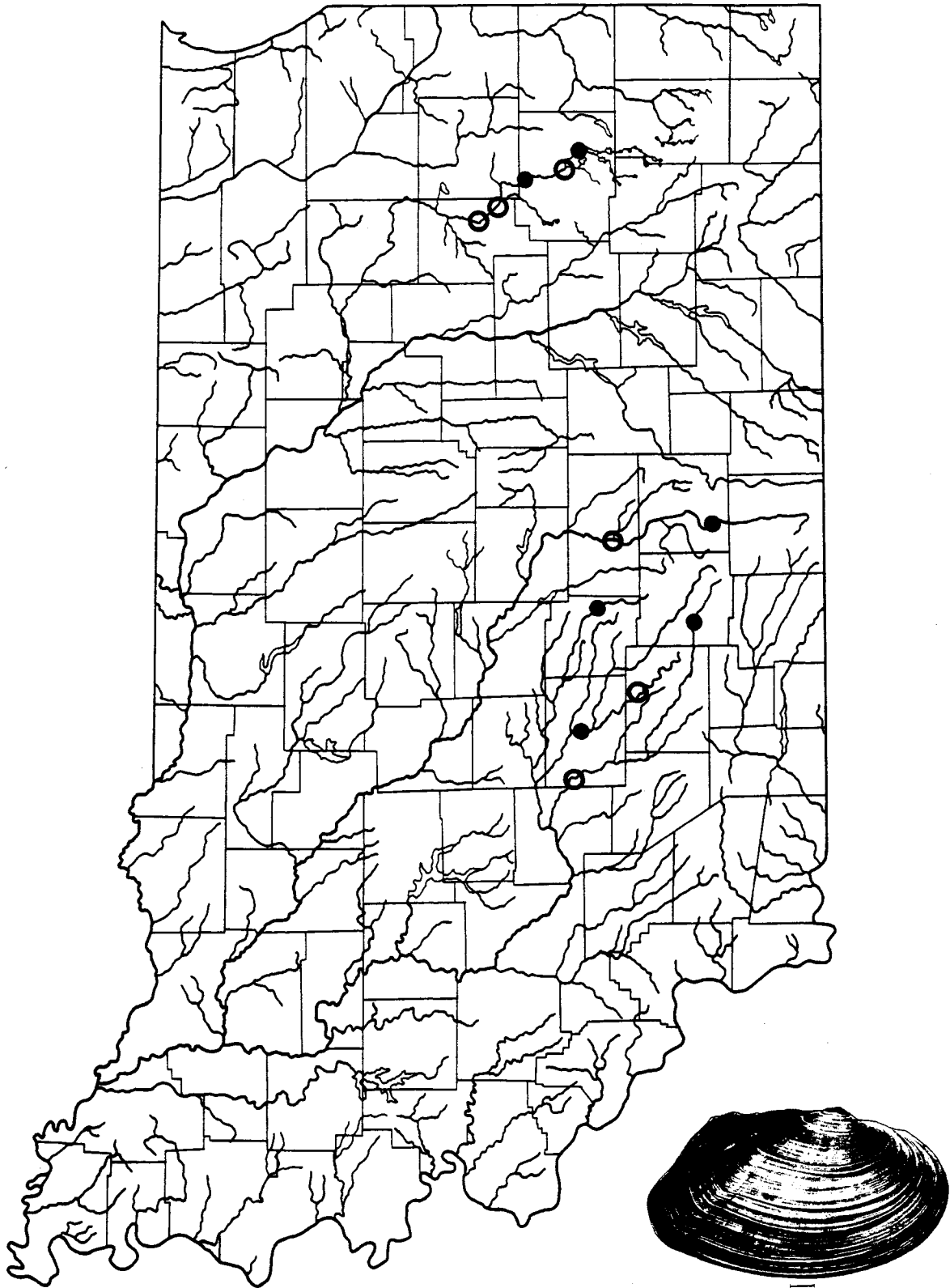
OTHER COMMON NAMES: None.

HABITAT: Usually found in creeks and the headwaters of large rivers in sand or fine gravel.

REMARKS: Both Call (1900) and Goodrich and van der Schalie (1944) reported *Lasmigona compressa* as widespread in Indiana. It was not collected in the lower Wabash River in 1966-67 or 1975 (Meyer, 1968; 1974; Clark, 1976). One individual was taken on a crowfoot bar in the upper Wabash River at Americus in 1966. This mussel was not found in the Wabash River in 1989-91. As its common name implies, the creek heelsplitter is typically found in creeks and its absence in the Wabash River proper was not unexpected.

The creek heelsplitter was not reported in the White River in 1966-67 (Meyer, 1968; 1974). *Lasmigona compressa* was found alive at four of seven sites in the upper part of the White River drainage in 1989-91.

Reported by Daniels (1903) from the Tippecanoe River, four individuals were found in the upper part of the basin in 1987. This mussel has been found living in Sugar and Brandywine Creeks (East Fork White River drainage) and Sugar Creek (Wabash River drainage) since 1990 (Harmon, 1990; 1991; Lewis, 1991). As with *Alasmidonta viridis* and *Anodontoides ferussacianus*, surveys in some of the smaller drainages in Indiana will likely turn up additional populations.



Lasmigona compressa (I. Lea, 1829)
creek heelsplitter

Lasmigona costata (Rafinesque, 1820)

Fluted-shell

ORIGINAL DESCRIPTION: *Alasmidonta costata* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles. p. 318, pl. LXXXII, figs. 15 and 16.

TYPE LOCALITY: Kentucky River. Type presumably lost (Clarke, 1985).

SYNONYMY:

Margaritana rugosa (Barnes)

Stein 1880:466; Call 1900:524.

Unio (Margaritana) rugosus Barnes

Kirsch 1896:55.

Symphynota costata (Rafinesque)

Daniels 1903:650; Wilson & Clark 1912:46.

Lasmigona costata (Rafinesque)

Goodrich & van der Schalie 1944:312; Parmalee 1967:53; Meyer 1974:23; Clark 1976:4; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

Lasmigona (Lasmigona) costata (Rafinesque)

Clarke 1985:12.

STATUS: Common in its preferred habitat.

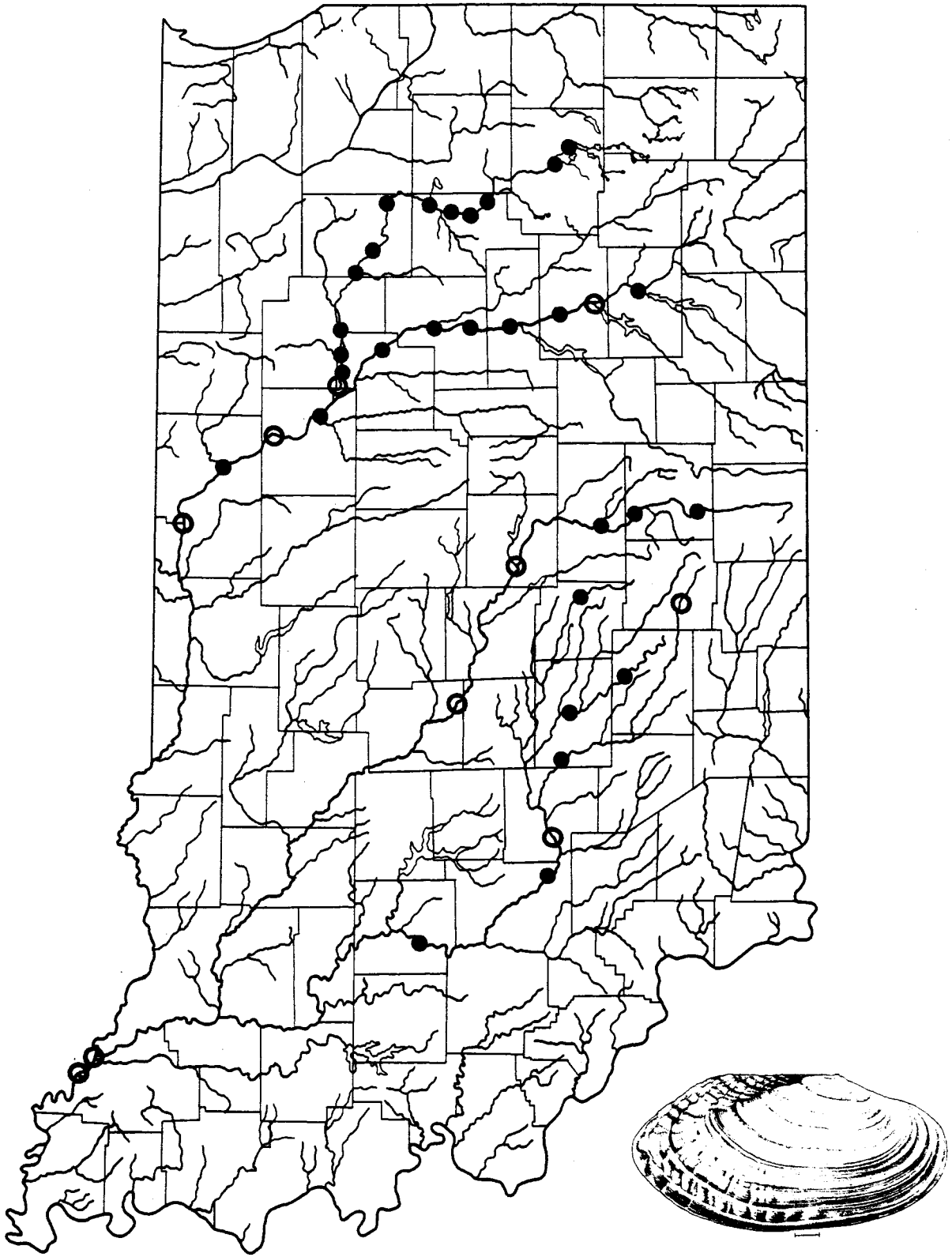
OTHER COMMON NAMES: None.

HABITAT: Found in medium streams in mixed mud and sand or fine gravel.

REMARKS: Both Call (1900) and Goodrich and van der Schalie (1944) noted that this species was widespread in Indiana. The fluted-shell was not found alive in the lower Wabash in 1966-67 or 1975 or the present survey (Meyer, 1968; 1974; Clark, 1976). It was reported as rare in the middle and upper Wabash in 1966-67. The fluted-shell was common in the upper Wabash in 1988, and it was found alive at eight of the first 11 sites.

Lasmigona costata was not found in the White River in 1966-67 (Meyer, 1968; 1974). In 1989-91, the fluted-shell was widespread and common in the upper White River drainage and was collected alive at nine of the 13 sites where shells were found.

Reported from the Tippecanoe River drainage by Daniels (1903), this mussel was common in the river in 1987. It was collected from every site but three and ranked eleventh in abundance with 51 individuals collected.



Lasmigona costata (Rafinesque, 1820)
fluted-shell

Simpsonaias ambigua (Say, 1825)

Salamander mussel

ORIGINAL DESCRIPTION: *Alasmodonta ambigua* Say, 1825. Descriptions of some new species of freshwater and land shells of the United States. Journal of the Academy of Natural Sciences of Philadelphia. Vol. V, p. 131.

TYPE LOCALITY: Northwest Territory. Type presumably lost (Clarke, 1985).

SYNONYMY:

Margaritana hildrethiana Lea

Stein 1880:466; Call 1894:153; 1896:141.

Hemilastena ambigua (Say)

Daniels 1903:650.

Simpsoniconcha ambigua (Say)

Goodrich & van der Schalie 1944:312; Parmalee 1967:90; Meyer 1974:24; Clark 1976:5.

Simpsonaias ambigua (Say)

Clarke 1985:61; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Federal Candidate for listing.

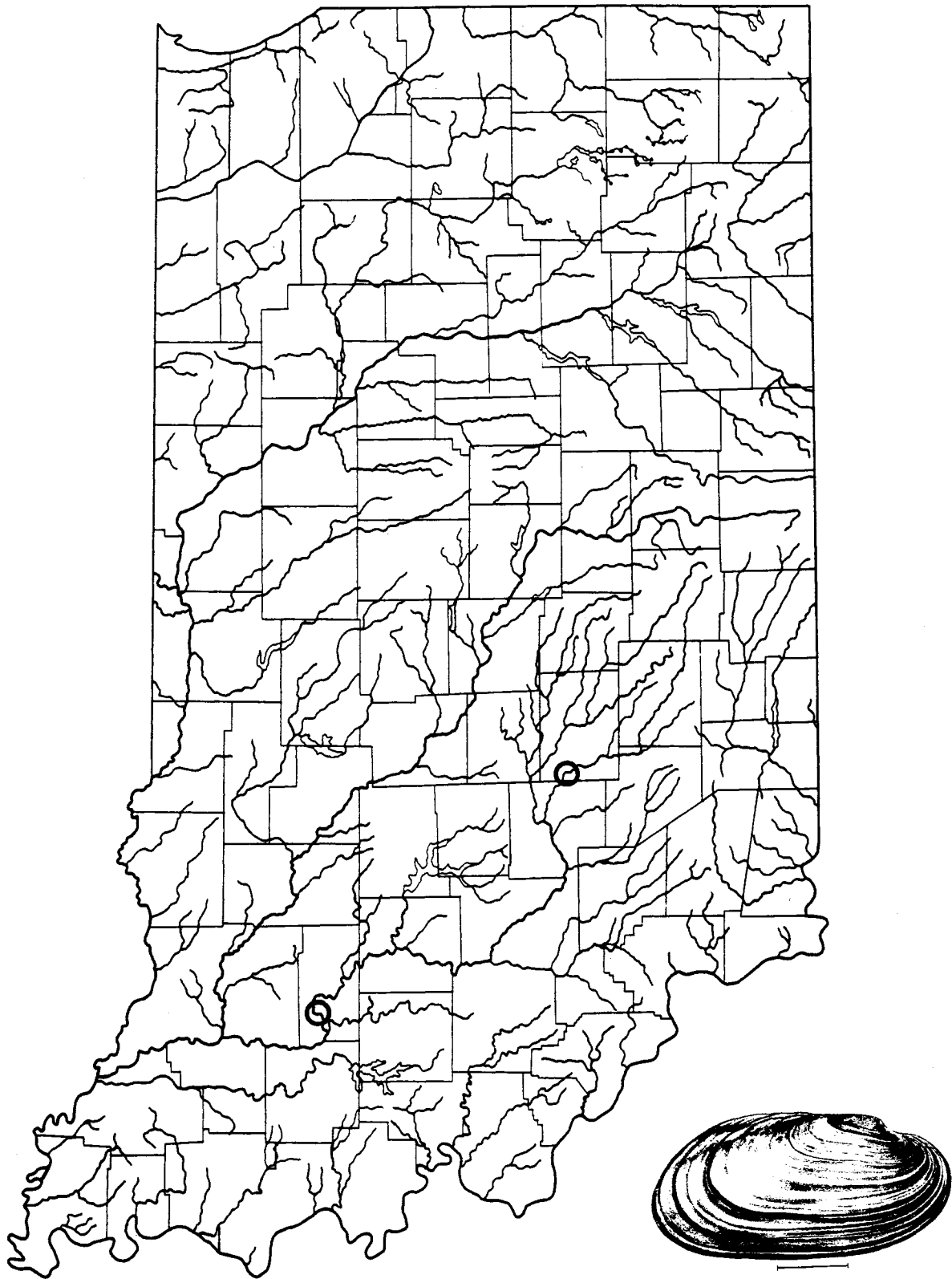
OTHER COMMON NAMES: Simpson's shell.

HABITAT: Found in small to large rivers in mud, sand, or gravel under flat stones.

REMARKS: The salamander mussel is sporadic in distribution and is known from streams in both the Ohio and Great Lakes drainages in Indiana, including the Wabash and Tippecanoe rivers (Clarke, 1985). It was considered rare by Stansbery (1970), but he noted that, due to its habitat (under limestone slabs), its rarity may be more perceived than real. *Simpsonaias ambigua* was not found in 1966-67, 1975, or the present survey of the Wabash River (Meyer, 1968; 1974; Clark, 1976), and it may be extirpated from the Wabash River proper. Fresh-dead shells of *S. ambigua* were found in an animal midden in Sugar Creek in 1991 (Lewis, 1991) and this species likely still occurs in the drainage.

Reported from the White River by Call (1900) and Goodrich and van der Schalie (1944). Meyer (1968; 1974) did not find this species in his survey of the White River in 1966-67. Weathered-dead shells of the salamander mussel were found at two widely separated sites (Flat Rock River and East Fork White River) in the White River drainage in 1989-91. Other known sites for this species in the basin include Sugar Creek (East Fork White River drainage) (Harmon, 1990), Deer Creek, Putnam County (UMMZ uncat.), East Fork White River, Jackson County (UMMZ 107851), Martin County (OSUM 12011), Walnut Creek, Putnam County (MCZ 6353, OSUM 17633), and the West Fork White River, Monroe County (OSUM 27788).

Although reported by Clarke (1985) from the Tippecanoe River, this species was not found in 1987.



Simpsonaias ambigua (Say, 1825)
salamander mussel

Strophitus undulatus (Say, 1817)

Squawfoot

ORIGINAL DESCRIPTION: *Anodonta undulata* Say, 1817. Article "Conchology" in William Nicholson. The American Edition of the British Encyclopedia, or Dictionary of Arts and Sciences. Vol. II, B-E. Samuel A. Mitchell and Horace Ames, Philadelphia, no pagination. pl. 3, fig. 6.

TYPE LOCALITY: Not given.

SYNONYMY:

- Anodonta undulata* Say
Call 1896:141; 1897:251.
- Anodonta edentula* (Say)
Call 1894:152; 1896:140; 1897:251; 1900:529.
- Unio* (*Anodonta*) *edentulus* Say
Kirsch 1896:55.
- Anodonta pavonia* Lea
Call 1894:152; 1896:141; 1897:251.
- Anodonta shaefferiana* Lea
Call 1894:152; 1897:251.
- Anodonta wardiana* Lea
Call 1894:152; 1896:141; 1897:251; 1900:528.
- Strophitus edentulus* (Say)
Daniels 1903:649; Wilson & Clark 1912:48.
- Strophitus edentulus pavonius* (Lea)
Daniels 1903:649.
- Strophitus rugosus* (Swainson)
Goodrich & van der Schalie 1944:312; Parmalee 1967:56; Meyer 1974:24; Clark 1976:5.
- Strophitus undulatus* (Say)
Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Common.

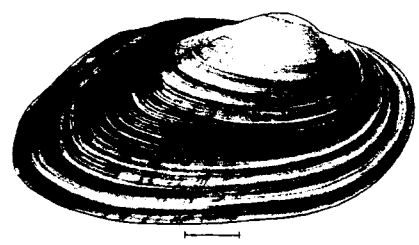
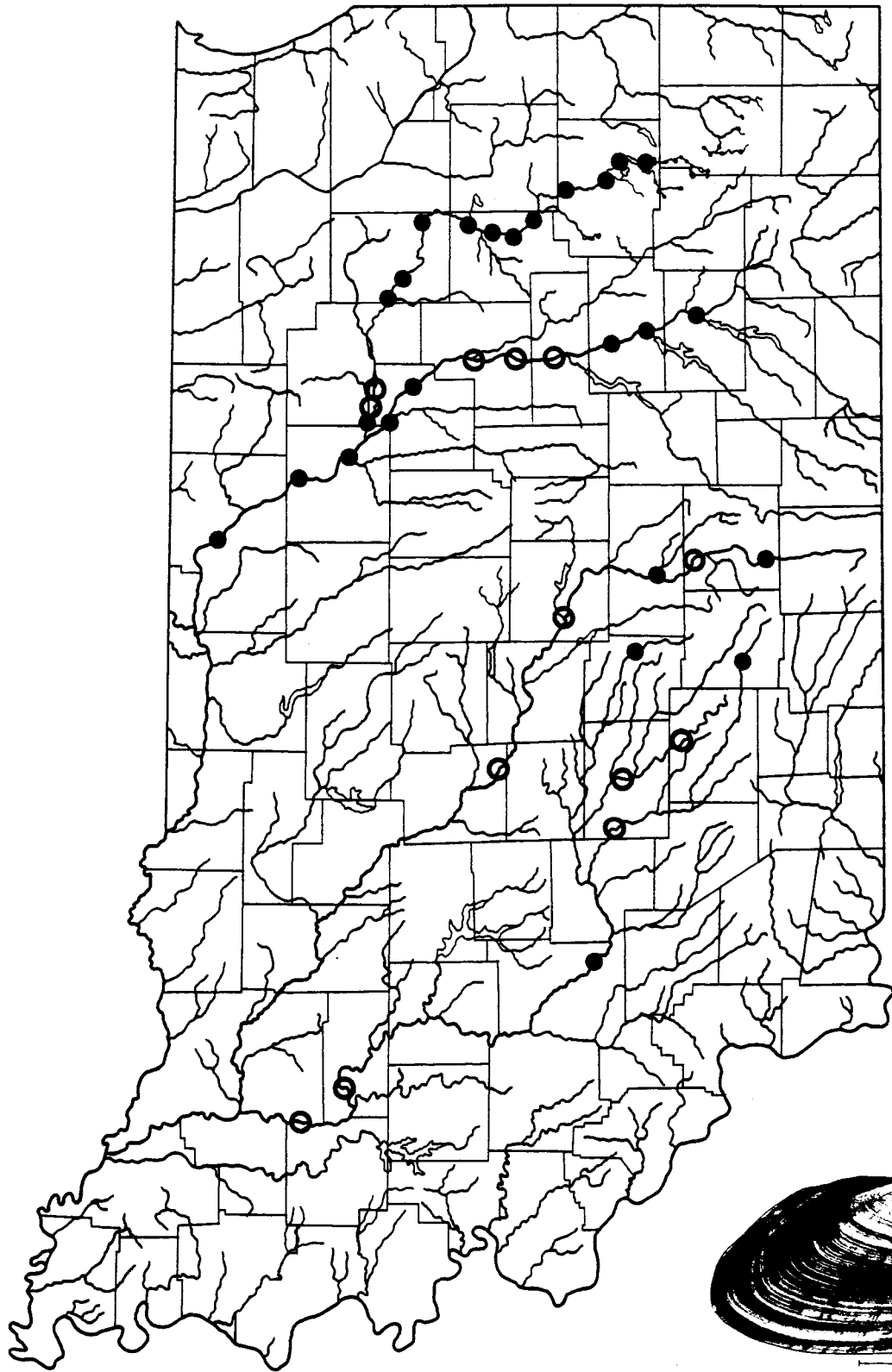
OTHER COMMON NAMES: Strange floater, sloughfoot.

HABITAT: Found in creeks and small to medium rivers in mud, sand, or gravel.

REMARKS: The squawfoot was reported as common throughout Indiana but was most abundant in small streams and rare in large rivers (Call, 1900; Goodrich and van der Schalie, 1944). *Strophitus undulatus* was not collected in the lower Wabash in 1966-67, 1975, or in the present survey, but was considered common in the middle and upper Wabash River in 1966-67 (Meyer, 1968; 1974; Clark, 1976). The squawfoot was widely distributed in the upper Wabash River in 1988, but was not found below Fountain, Indiana.

The squawfoot was not found in the White River in 1966-67 (Meyer, 1968; 1974). Thirty-one *S. undulatus* were found alive at five of 13 sites, all in the upper half of the White River drainage in 1989-91.

Strophitus undulatus was reported by Daniels (1903) from Tippecanoe Lake. This mussel was found at almost every site in the Tippecanoe in 1987 but was most common in the upper two-thirds of the river.



Strophitus undulatus (Say, 1817)
squawfoot

Actinonaias ligamentina (Lamarck, 1819)

Mucket

ORIGINAL DESCRIPTION: *Unio ligamentina* Lamarck, 1819. Histoire Naturelle des Animaux sans Vertebres. Vol. 6, p. 72.

TYPE LOCALITY: Ohio River.

SYNONYMY:

- Unio ligamentinus* Lamarck
Stein 1880:464; Call 1894:154; 1896:144; 1897:252; 1900:483;
Kirsch 1896:55.
- Lampsilis ligamentinus* (Lamarck)
Daniels 1903:647; Wilson & Clark 1912:49.
- Actinonaias carinata* (Barnes)
Goodrich & van der Schalie 1944:313; Parmalee 1967:56; Meyer
1974:21; Clark 1976:4; Weillbaker et al. 1985:689.
- Actinonaias ligamentina* (Lamarck)
Cummings & Berlocher 1990:87.

STATUS: Common.

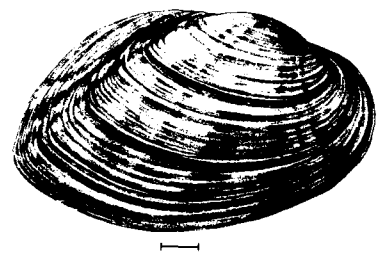
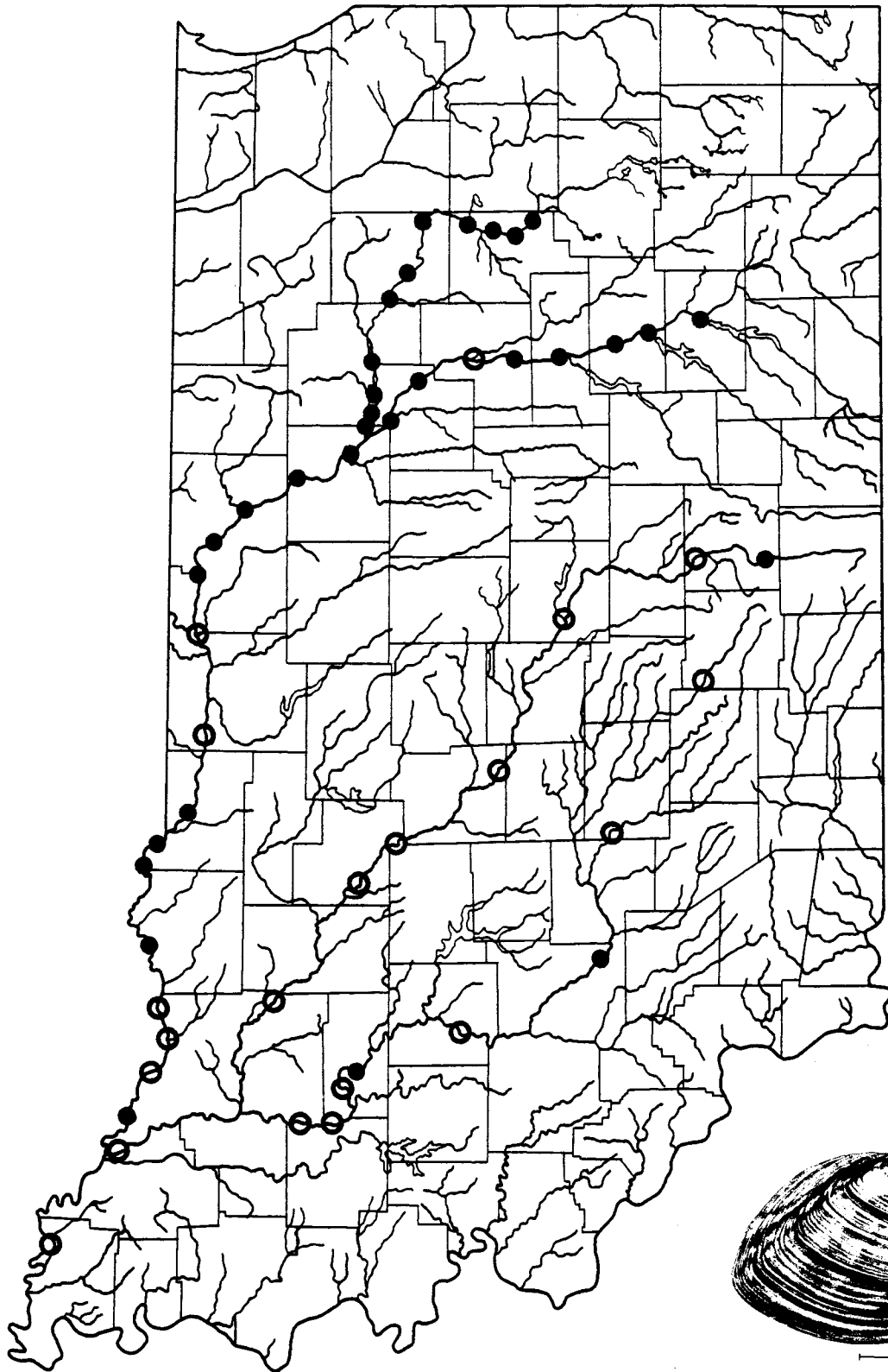
OTHER COMMON NAMES: Grass mucket, brass mucket, steamboat mucket.

HABITAT: Found in medium to large rivers in sand and gravel.

REMARKS: The mucket was noted by Call (1900) to be abundant all over Indiana, especially the Wabash River. Goodrich and van der Schalie (1944) noted that this species was found in large rivers in all of the major drainage systems in Indiana. It was reported to be common in the lower Wabash and abundant in the upper and middle Wabash River in 1966-67 (Meyer, 1968; 1974), but was not found in the lower Wabash in 1975 (Clark, 1976). In the present survey *A. ligamentina* was absent from the lower Wabash but common in the upper and middle sections of the river.

The mucket was reported as common in the White River in 1966-67 (Meyer, 1968; 1974). In 1989-91, *A. ligamentina* ranked 21st in overall abundance and, although widely represented by shells, it was found living at only three widely separated localities in the drainage.

The mucket was common throughout the Tippecanoe River in 1987. It was most common at sites 8 and 9 and was the dominant species collected at those localities. *Actinonaias ligamentina* ranked fifth in order of abundance for all species collected from the Tippecanoe River.



Actinonaias ligamentina (Lamarck, 1819)
mucket

Cyprogenia stegaria (Rafinesque, 1820)

Fanshell

ORIGINAL DESCRIPTION: *Obovaria stegaria* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 312, pl. LXXXII, figs. 4 and 5.

TYPE LOCALITY: Ohio River. Lectotype ANSP 20241 (Johnson & Baker, 1973).

SYNONYMY:

Unio stegarius Conrad

Stein 1880:463.

Unio irroratus Lea

Stein 1880:463; Call 1894:154; 1896:144; 1897:252; 1900:485.

Cyprogenia irrorata (Lea)

Daniels 1903:649; Goodrich & van der Schalie 1944:313; Parmalee 1967:61; Meyer 1974:22; Clark 1976:4.

Cyprogenia stegaria (Rafinesque)

Cummings & Berlocher 1990:87.

STATUS: Federally Endangered.

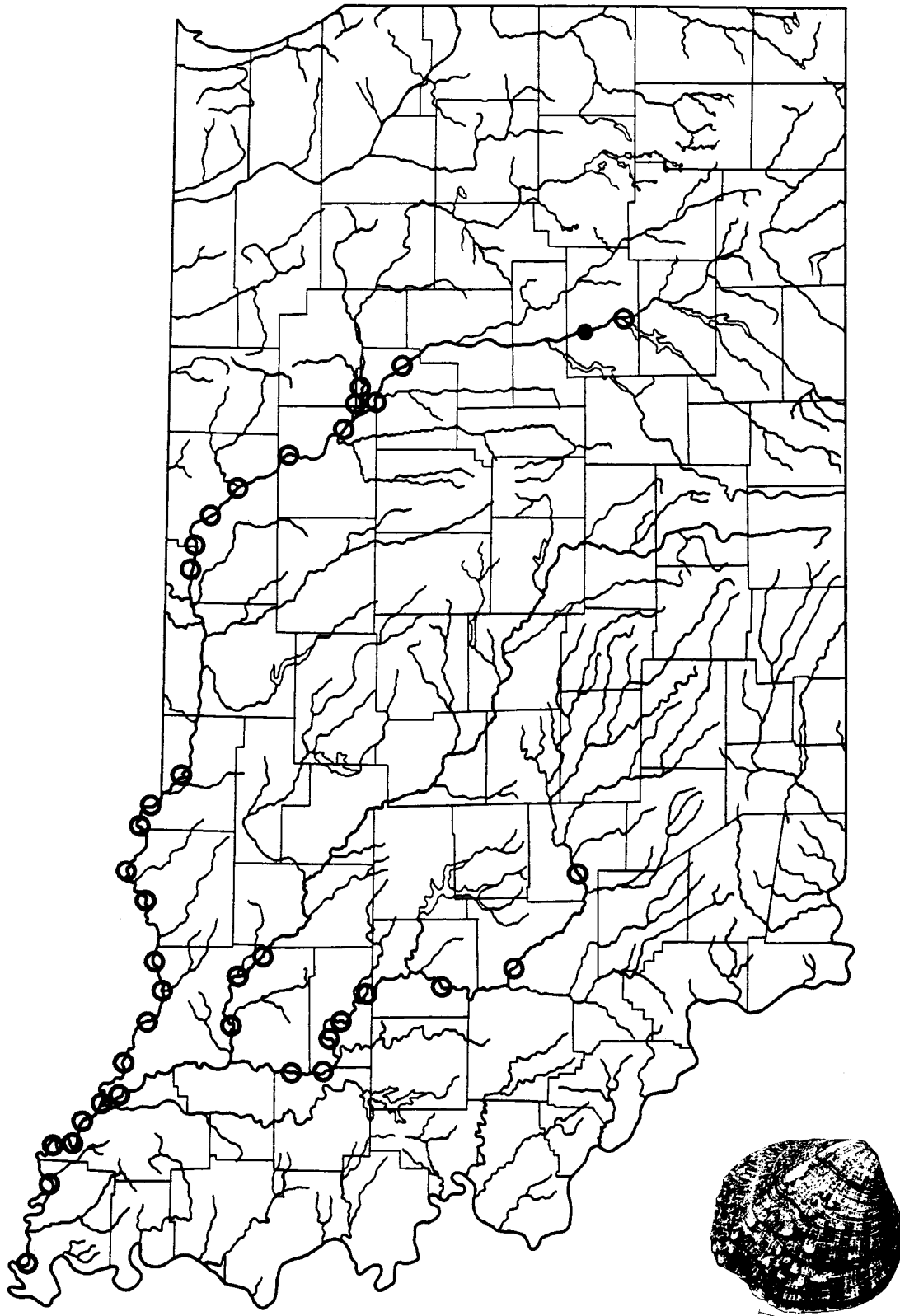
OTHER COMMON NAMES: Eastern fanshell, Ohio fanshell, ringed wartyback.

HABITAT: Found in medium to large rivers in gravel riffles.

REMARKS: Reported by Call (1900) to be numerous in the Wabash and White rivers. Goodrich and van der Schalie (1944) noted it to be a large river species confined to the Ohio, Wabash, and White rivers in Indiana. One live fanshell was found in the middle Wabash River south of Hutsonville in July 1966, and valves were collected from the banks of the river at Vincennes in August 1966 (Meyer, 1968). No live fanshells were found in the lower Wabash in 1975 (Clark, 1976). Previous to this study, one *C. stegaria* was found in the lower Wabash River near Maunie, White County, Illinois, in 1984. Only sub-fossil shells were found in the lower Wabash River in 1987. One live *C. stegaria* was found in a riffle in the upper Wabash River at Wabash, Wabash County, Indiana in 1988.

No live *C. stegaria* were found in the White River in 1966-67 (Meyer, 1968). The fanshell was represented by relict shells at 12 sites in the present survey. Although no live or fresh-dead fanshells were found in 1989-91, fresh-dead shells were found at Hindostan Falls in Martin County in 1985 (INHS 2001). This species has also been reported as living in the East Fork White River in Lawrence County by commercial shellers.

Two valves of this species were found in the lower Tippecanoe River in 1987. Both were in fairly good shape (periostracum intact, little staining of the nacre) and the fanshell may still exist in the lower reaches of the Tippecanoe.



Cyprogenia stegaria (Rafinesque, 1820)
fanshell

Ellipsaria lineolata (Rafinesque, 1820)

Butterfly

ORIGINAL DESCRIPTION: *Obliquaria lineolata* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 303.

TYPE LOCALITY: Falls of the Ohio River [Louisville, Jefferson County, Kentucky]. Lectotype ANSP 20242 from the Ohio River (Johnson & Baker, 1973).

SYNONYMY:

Unio securis Lea

Stein 1880:463; Call 1894:155; 1896:146; 1897:252.

Unio lineolatus Rafinesque

Stein 1880:463; Call 1900:469.

Plagiola securis (Lea)

Daniels 1903:648.

Plagiola lineolata (Rafinesque)

Goodrich & van der Schalie 1944:318; Parmalee 1967:80; Meyer 1974:23; Clark 1976:4.

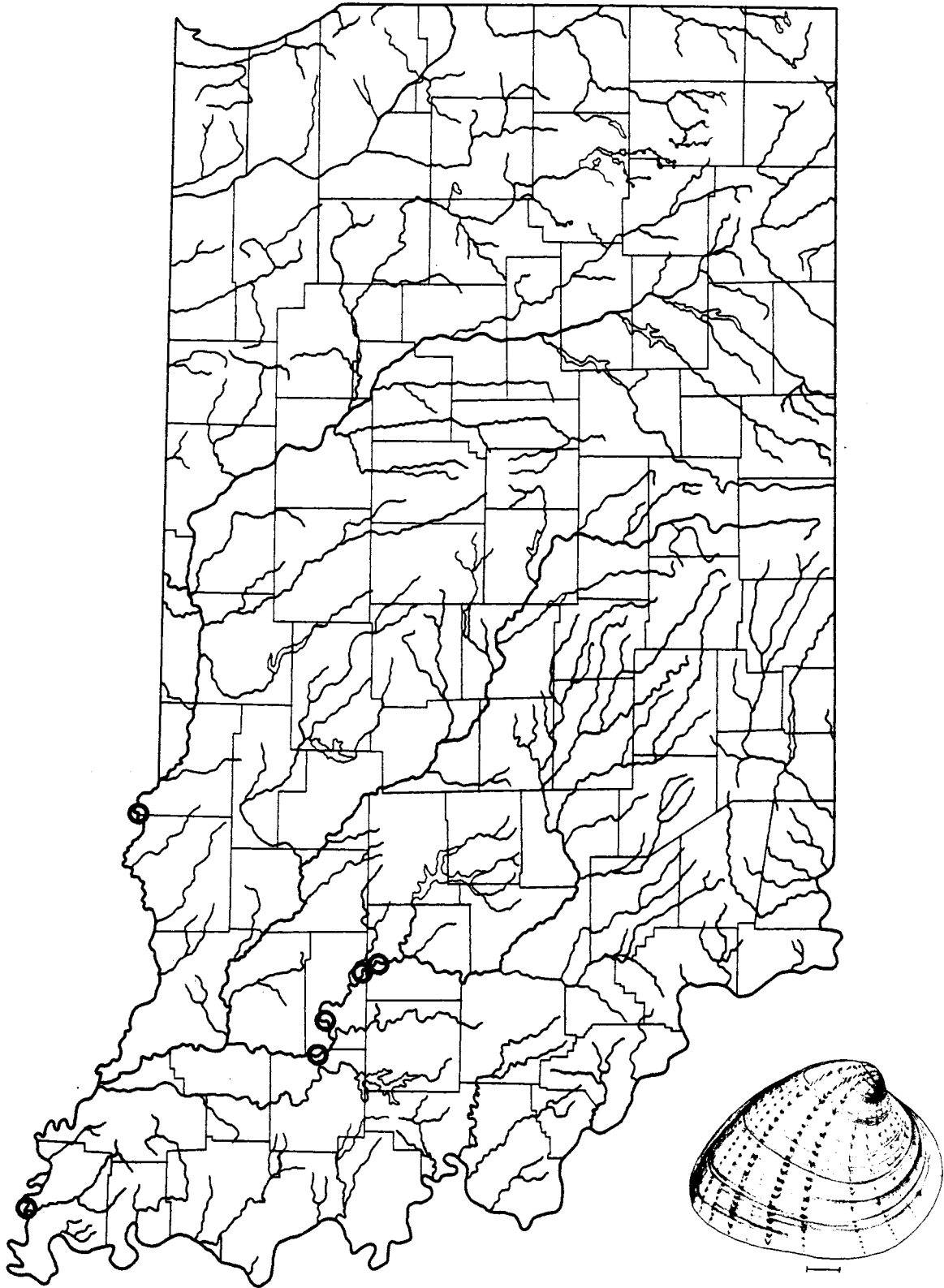
STATUS: Rare.

OTHER COMMON NAMES: None.

HABITAT: Found in large rivers in mud, sand, or gravel.

REMARKS: Reported by Call (1900) as abundant in the Wabash River. Noted by Goodrich and van der Schalie (1944) to be confined primarily to the larger rivers of the state. The butterfly was not collected alive in the 1966-67, 1975, or present surveys of the Wabash or White rivers (Meyer, 1968; 1974; Clark, 1976). Weathered-dead shells were found at two sites in the middle and lower Wabash River in 1987-88, and at four sites in the East Fork White River in 1989-91. A large, obviously old individual was observed in the catch of a commercial sheller in the East Fork White River near Hayesville in 1990. This species has not been found alive in the Wabash River in recent times and should be listed as threatened in Indiana.

Not found in the Tippecanoe River in 1987.



Ellipsaria lineolata (Rafinesque, 1820)
butterfly

Epioblasma flexuosa (Rafinesque, 1820)

Leafshell

ORIGINAL DESCRIPTION: *Obliquaria flexuosa* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 306.

TYPE LOCALITY: Kentucky, Salt, and Green rivers. Lectotype ANSP 20249 from the Kentucky River (Johnson & Baker, 1973).

SYNONYMY:

- Unio foliatus* Hildreth
Stein 1880:462; Call 1894:154; 1897:251; 1900:510.
- Truncilla foliata* (Hildreth)
Daniels 1903:646.
- Dysnomia flexuosa* (Rafinesque)
Goodrich & van der Schalie 1944:314; Meyer 1974:22; Clark
1976:4.
- Dysnomia foliata* (Hildreth)
Parmalee 1967:90.
- Plagiola (Epioblasma) flexuosa* (Rafinesque)
Johnson 1978:283.

STATUS: Extinct.

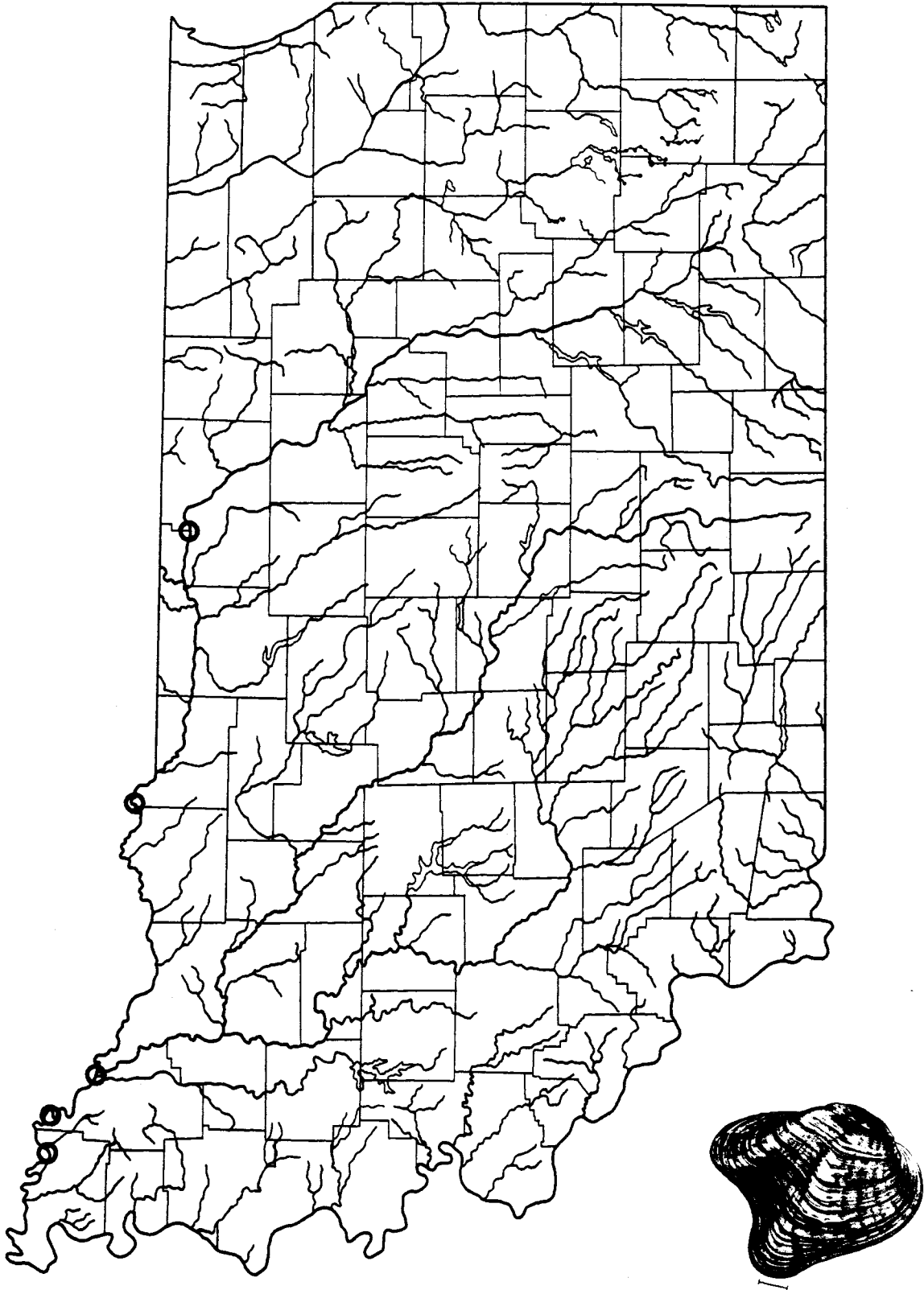
OTHER COMMON NAMES: None.

HABITAT: Reportedly found in the Ohio River in mud (Call, 1900).

REMARKS: Stated by Call (1900) to be extremely rare in Indiana, the only specimens observed having come from the Ohio River. Goodrich and van der Schalie (1944) noted this unique mussel from the Ohio River and the Wabash River in Posey County, Indiana. No mention of the leafshell was reported by either Meyer (1968; 1974) or Clark (1975). Sub-fossil shells of *E. flexuosa* were collected at five sites in the Wabash River in 1987-88, extending the range of this species as far north as Covington, Indiana.

A specimen of *E. flexuosa* labeled "White River" without additional locality data is in the collection of the U.S. National Museum (USNM 84049). No evidence of this species was found in the White River drainage in our survey.

Not reported from the Tippecanoe river. This mussel has not been collected alive anywhere within its former range in at least 50 years and is presumed extinct (Stansbery, 1971; Turgeon et al., 1988).



Epioblasma flexuosa (Rafinesque, 1820)
leafshell

Epioblasma obliquata (Rafinesque, 1820)

Catspaw

ORIGINAL DESCRIPTION: *Obliquaria obliquata* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 309.

TYPE LOCALITY: Kentucky River. Lectotype ANSP 20226 (Johnson & Baker, 1973).

SYNONYMY:

- Unio pectitus* Conrad
Conrad 1854:297.
- Unio sulcatus* Lea
Stein 1880:464; Call 1894:155; 1896:146; 1897:252; 1900:476.
- Unio ridibundus* Say
Stein 1880:464; Call 1896:146.
- Truncilla sulcata* (Lea)
Daniels 1903:646; Wilson & Clark 1912:51.
- Dysnomia sulcata* (Lea)
Goodrich & van der Schalie 1944:314; Parmalee 1967:90; Meyer
1974:22; Clark 1976:4;
- Plagiola (Pilea) obliquata* (Rafinesque)
Johnson 1978:278.
- Epioblasma obliquata* (Rafinesque)
Cummings & Berlocher 1990:87.

STATUS: Federally Endangered. Extirpated in Indiana.

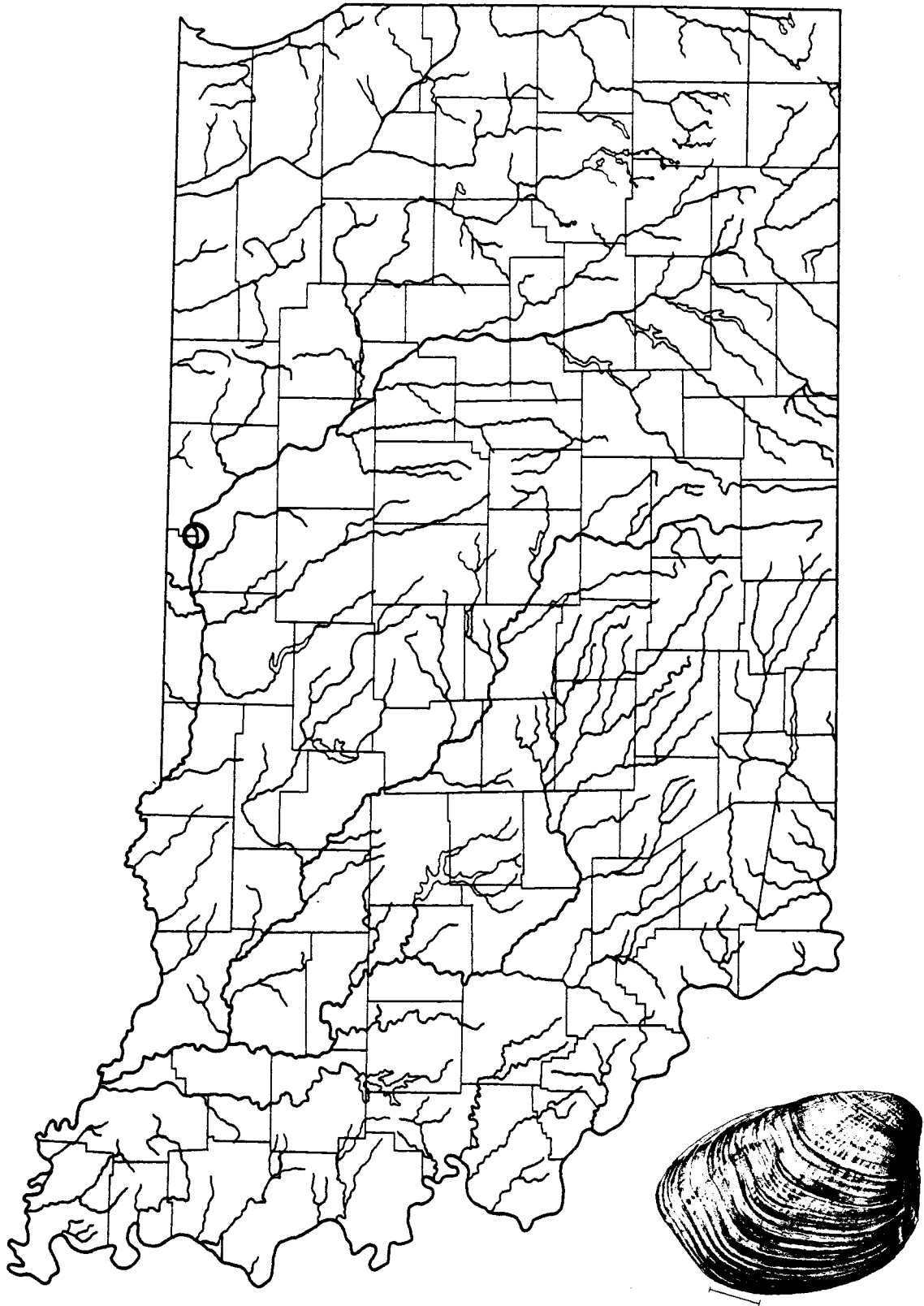
OTHER COMMON NAMES: Pewee.

HABITAT: Reportedly found in medium to large rivers in gravel riffles (USFWS, 1990).

REMARKS: Reported from the Wabash and Ohio rivers and less commonly in the White River by Call (1900). The catspaw was noted as rare in Indiana by Goodrich & van der Schalie (1944), with records from the Ohio, Wabash, White, and Maumee rivers. This species was not collected in the Wabash River in 1966-67 or 1975 (Meyer, 1968; 1974; Clark, 1976). In the present survey, one sub-fossil shell was found in the Wabash River at Covington, and the catspaw is presumed extirpated from the Wabash River drainage.

Epioblasma obliquata was known from the East Fork White River at Rockford, Jackson County (ANSP 125935) and the West Fork White River at Indianapolis, Marion County, Indiana (UMMZ 91402). Most likely extirpated from the White River drainage, the last remaining population of this mussel occurs only in the St. Josephs River drainage in northwestern Ohio (USFWS, 1990).

Not found in the Tippecanoe River in 1987. However, a relict shell was found at the Rt. 35 bridge in Pulaski County in late summer 1988 (OSUM 29779).



Epioblasma obliquata (Rafinesque, 1820)
catspaw

Epioblasma personata (Say, 1829)

Round combshell

ORIGINAL DESCRIPTION: *Unio personatus* Say, 1829. Descriptions of some new terrestrial and fluviatile shells of North America. The Disseminator of Useful Knowledge, New Harmony II. p. 309.

TYPE LOCALITY: Wabash River. Neotype MCZ 25763 from the Cumberland River, Tennessee (Johnson & Baker, 1973).

SYNONYMY:

Unio personatus Say

Stein 1880:463; Call 1894:155; 1897:252; 1900:474.

Unio pileus Lea

Call 1894:155.

Truncilla personata (Say)

Daniels 1903:646.

Dysnomia personata (Say)

Goodrich & van der Schalie 1944:314; Parmalee 1967:92; Meyer 1974:22; Clark 1976:4.

Plagiola (Pilea) personata (Say)

Johnson 1978:276.

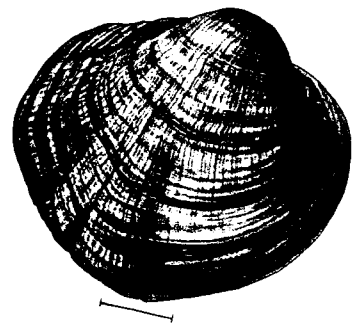
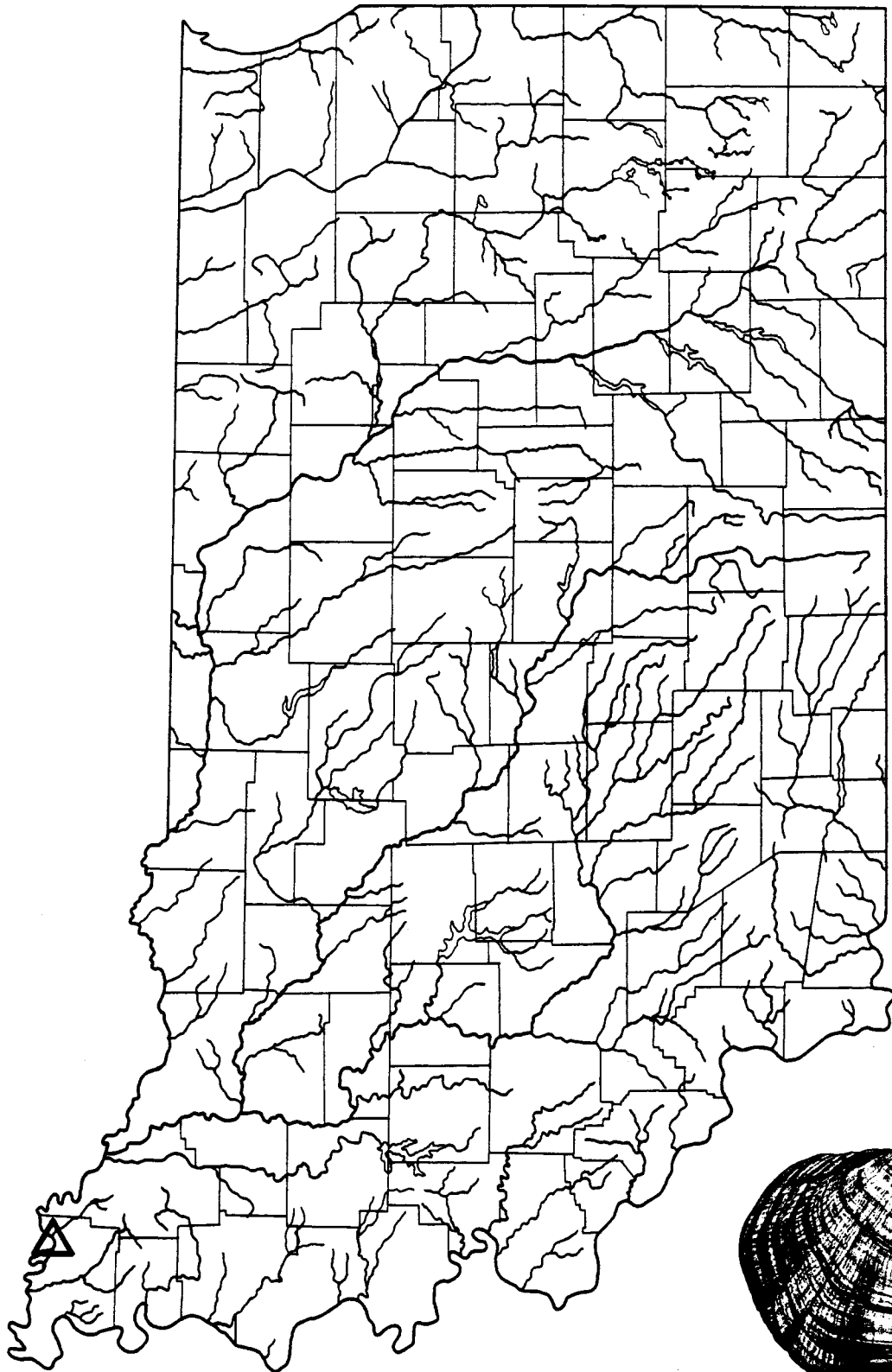
STATUS: Extinct.

OTHER COMMON NAMES: None.

HABITAT: Unknown.

REMARKS: This mussel was reported to be very rare in Indiana as early as 1899 (Call, 1900). Goodrich and van der Schalie (1944) noted that the round combshell was rare in Indiana and was found only in the lower Wabash and White rivers and specifically listed it from New Harmony. It was not collected in the Wabash River drainage in 1966-67, 1975, or the present study (Meyer, 1968; 1974; Clark, 1976).

A specimen of *E. personata* labeled "White River" without additional locality data is in the collection of the University of Michigan Museum of Zoology (UMMZ 45). No evidence of this species was found in the White River drainage in our survey. The round combshell has not been collected alive anywhere within its former range in at least 50 years and it is presumed extinct (Stansbery, 1971; Turgeon et al., 1988).



Epioblasma personata (Say, 1829)
round combshell

Epioblasma propinqua (I. Lea, 1857)

Tennessee riffleshell

ORIGINAL DESCRIPTION: *Unio propinquus* I. Lea, 1857. Description of six new species of Uniones from Alabama. Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. IX New Series. p. 83.

TYPE LOCALITY: [Tennessee River], Florence, [Lauderdale Co.], Tuscumbia, [Colbert Co.], Alabama. Holotype USNM 84332.

SYNONYMY:

Plagiola (Torulosa) propinqua (Lea)
Johnson 1978:266.

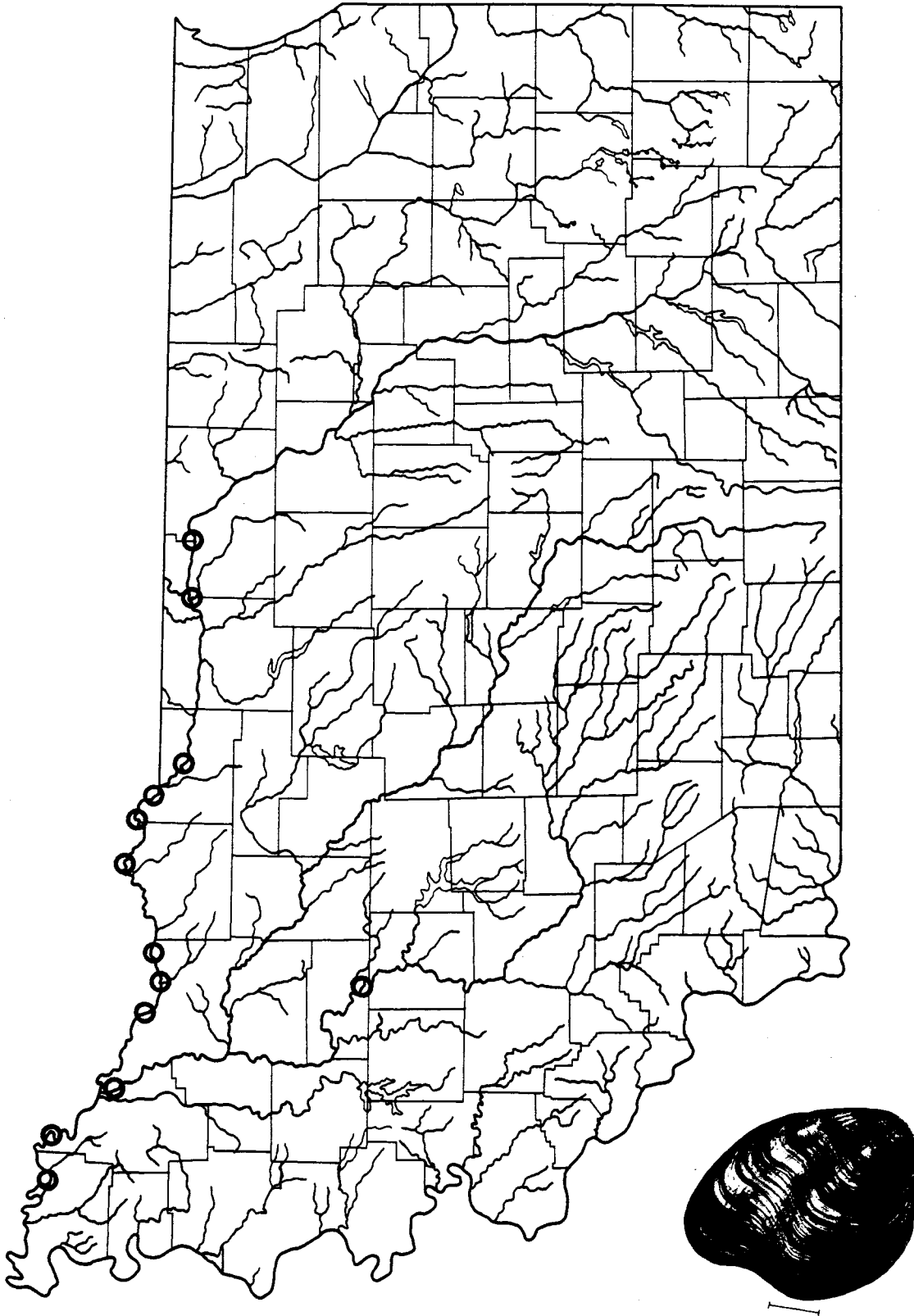
STATUS: Extinct.

OTHER COMMON NAMES: None.

HABITAT: Unknown.

REMARKS: Specimens of the Tennessee riffleshell collected from the lower Wabash River at New Harmony are in the collections of the University of Michigan Museum of Zoology and the Museum of Comparative Zoology at Harvard (Johnson, 1978). Sub-fossil shells of *E. propinqua* were found at 11 sites in the Wabash River in 1987-88.

Reported from the White River by Johnson (1978). Two sub-fossil shells referable to this species were found at two sites in the White River in 1989-91. The shells collected in 1987-88 were previously referred to as *E. sampsonii* (Cummings et al., 1988). The Wabash River specimens were compared to others identified as *E. propinqua* and *E. sampsonii* and it seems that two forms (species?) formerly inhabited the drainage. No live records of the Tennessee riffleshell have been substantiated in Indiana over 100 years and this species is now considered extinct (Turgeon et al., 1988).



Epioblasma propinqua (I. Lea, 1857)
Tennessee riffleshell

Epioblasma rangiana (I. Lea, 1839)

Northern riffleshell

ORIGINAL DESCRIPTION: *Unio rangianus* I. Lea, 1839. Description of new freshwater and land shells. Transactions of the American Philosophical Society. Vol. VI New Series. p. 95, pl. XVIII, fig. 56.

TYPE LOCALITY: Ohio River, near Cincinnati and near Poland, Ohio.

SYNONYMY:

- Unio rangianus* Lea
Stein 1880:464; Call 1894:155; 1897:252.
- Truncilla perplexa rangiana* (Lea)
Daniels 1903:646.
- Truncilla (Pilea) perplexa rangiana* (Lea)
Baker 1922:155.
- Dysnomia perplexa rangiana* (Lea)
Clark 1976:4.
- Plagiola (Torulosa) torulosa* (Say)
Johnson 1978:261 [in part].
- Epioblasma rangiana* (Lea)
Cummings & Berlocher 1990:87.

STATUS: Federal candidate. Endangered in Indiana.

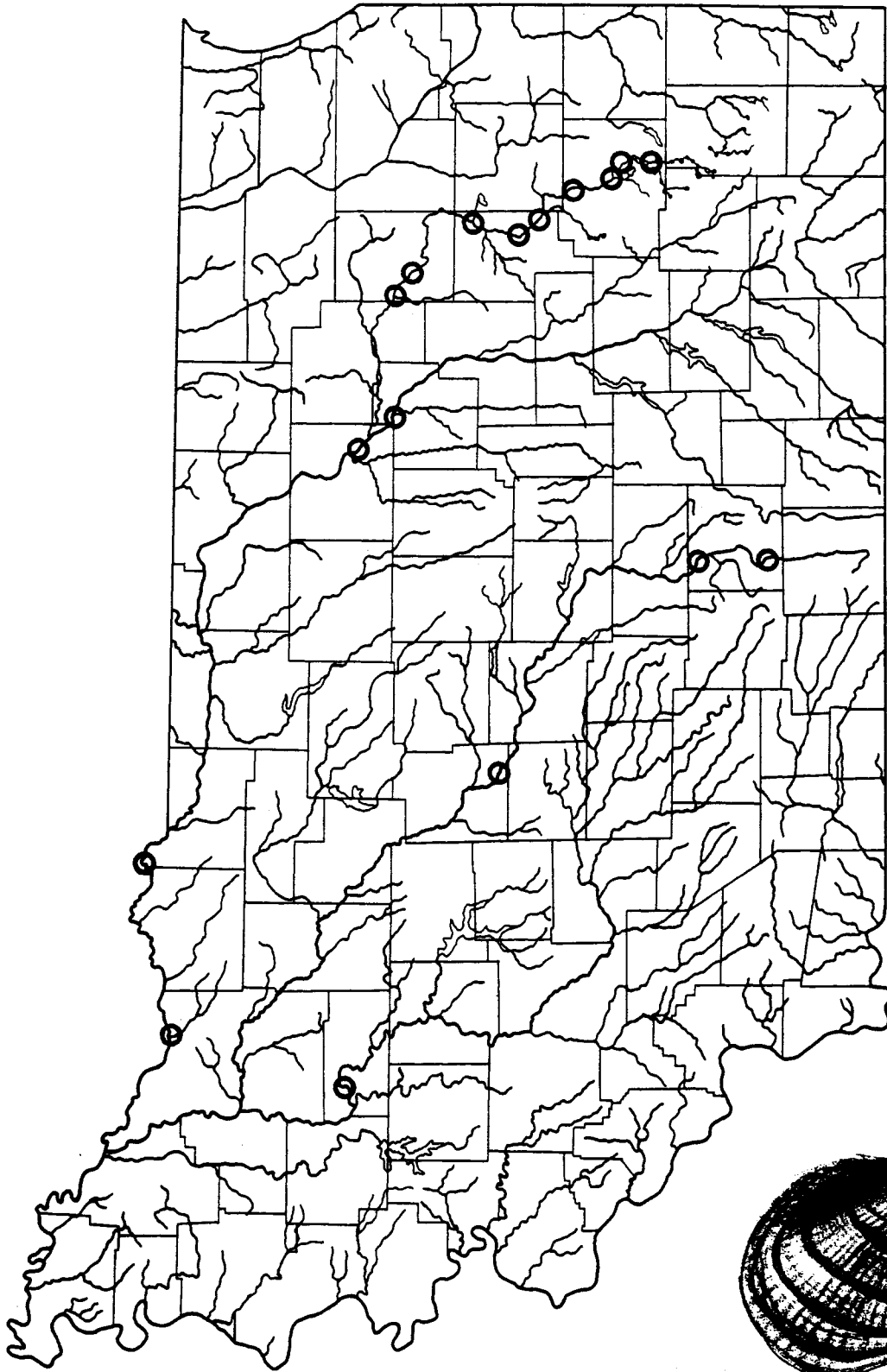
OTHER COMMON NAMES: None.

HABITAT: Reportedly found in medium to large streams in gravel riffles.

REMARKS: Call (1900) reported this species as being abundant in the Wabash River but did not give any specific localities. Goodrich and van der Schalie (1944) noted that this species was well represented in the Wabash River and gave Lafayette as a locality for *Epioblasma rangiana*. It was not collected in either the 1966-67 or 1975 surveys of the Wabash River (Meyer, 1968; 1974; Clark, 1976). Relict shells were found at widely scattered sites in 1988, and this species is presumed extirpated from the Wabash River proper and possibly the entire drainage.

Daniels (1903) listed the White River for *Epioblasma rangiana*. Goodrich and van der Schalie (1944) noted that this species was well represented in the White River, but it was not found in the 1966-67 survey (Meyer, 1968; 1974). Only weathered-dead and sub-fossil shells were found at widely scattered sites in 1989-91, and this species is presumed extirpated from the White River drainage.

Daniels (1903) listed *Epioblasma rangiana* as occurring in the Tippecanoe River. Weathered-dead and sub-fossil shells were found throughout the Tippecanoe River in 1987. While most appeared to have been dead for some time, a few still had some of the periostracum intact and there is an outside chance that this mussel is still extant in the river.



Epioblasma rangiana (I. Lea, 1839)
northern riffleshell

Epioblasma sampsonii (I. Lea, 1861)

Wabash riffleshell

ORIGINAL DESCRIPTION: *Unio sampsonii* I. Lea, 1861. Descriptions of eleven new species of the genus *Unio* from the United States. Proceedings of the Academy of Natural Sciences of Philadelphia. December 1861. p. 392.

TYPE LOCALITY: Wabash River, New Harmony, [Posey County], Indiana. Holotype USNM 84802.

SYNONYMY:

Unio sampsonii Lea
Stein 1880:464; Call 1894:155; 1897:252.
Truncilla sampsonii (Lea)
Daniels 1903:646.
Dysnomia sampsoni (Lea)
Goodrich & van der Schalie 1944:314; Parmalee 1967:92; Meyer
1974:22; Clark 1976:4.
Plagiola (Torulosa) sampsoni (Lea)
Johnson 1978:265.

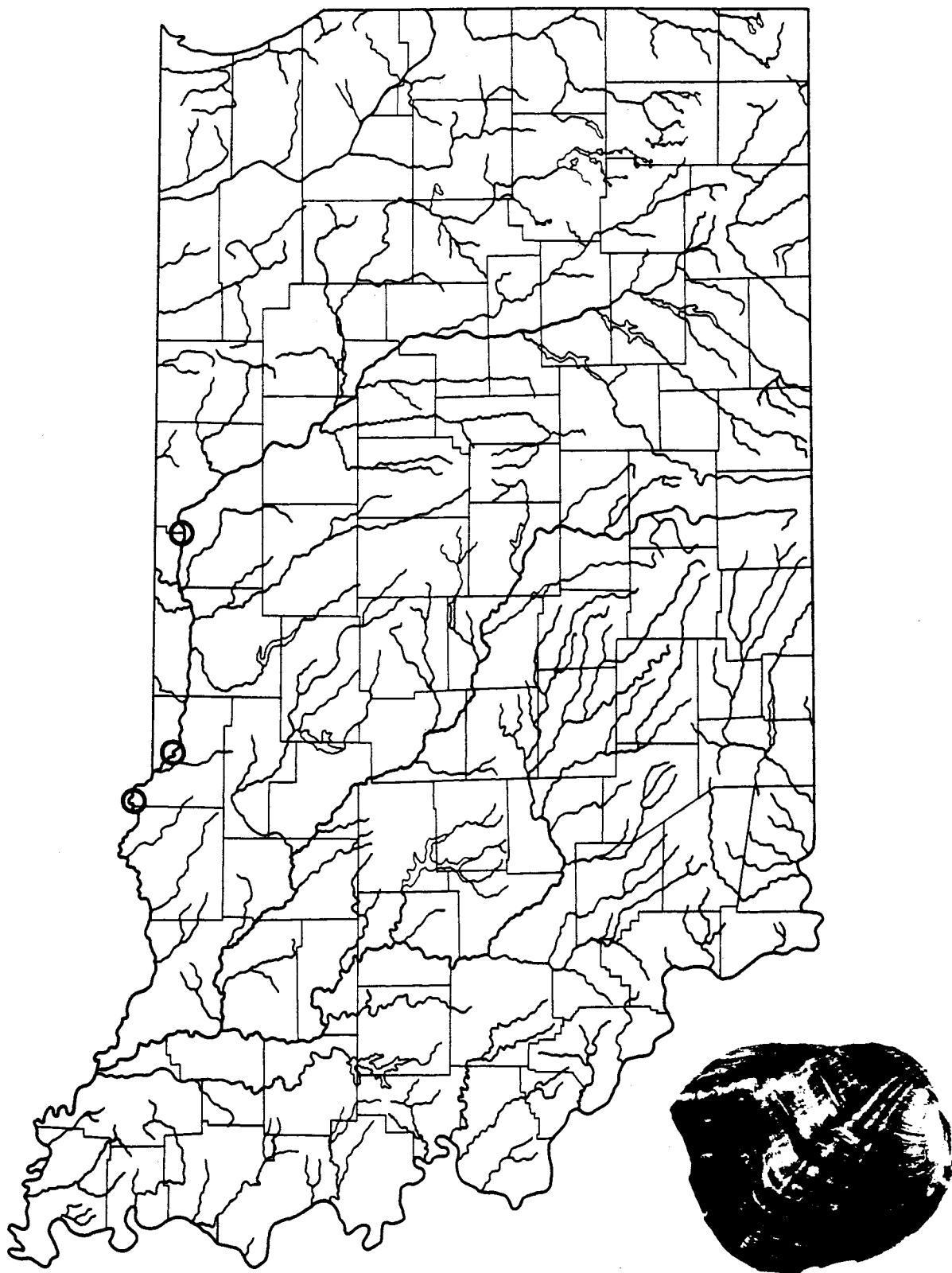
STATUS: Extinct.

OTHER COMMON NAMES: None.

HABITAT: Unknown.

REMARKS: The Wabash riffleshell was described by Isaac Lea from the lower Wabash in 1861. *Epioblasma sampsonii* was not found in the 1966-67 or 1975 surveys of the Wabash or White rivers (Meyer, 1968; 1974; Clark, 1976). Some confusion exists with regard to the taxonomic status and relationship of this species to *Epioblasma propinqua*, *E. rangiana*, and *E. torulosa*. Most of the relict shells collected in the middle Wabash River and referred to in our report of 1988 were assigned to this species but later moved to *E. propinqua*. Three lots of sub-fossil shells from the middle Wabash River are referable to *E. sampsonii*.

A specimen of *E. sampsonii* labeled "White River" without additional locality data is in the collection of the University of Michigan Museum of Zoology (UMMZ 90638). No evidence of this species was found in the White River drainage in our survey. As with many of the species in this genus, the Wabash riffleshell has not been found living anywhere in at least the last 50 years and it is presumed extinct (Stansbery, 1971; Turgeon et al., 1988).



Epioblasma sampsonii (I. Lea, 1861)
Wabash riffleshell

Epioblasma torulosa (Rafinesque, 1820)

Tubercled blossom

ORIGINAL DESCRIPTION: *Amblema torulosa* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales Générales des Sciences Physiques, Bruxelles V. p. 314, pl. LXXXII, figs. 11 and 12.

TYPE LOCALITY: Ohio and Kentucky rivers. Figured holotype ANSP 20218 from the Kentucky River (Johnson & Baker, 1973).

SYNONYMY:

Unio perplexus Lea

Stein 1880:463; Call 1894:155; 1896:145; 1897:252; 1900:475
[in part].

Truncilla perplexa (Lea)

Daniels 1903:646.

Dysnomia perplexa (Lea)

Goodrich & van der Schalie 1944:314; Parmalee 1967:62; Meyer
1974:22.

Plagiola (Torulosa) torulosa (Say)

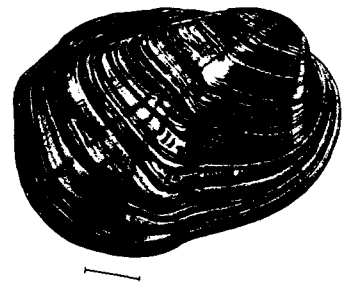
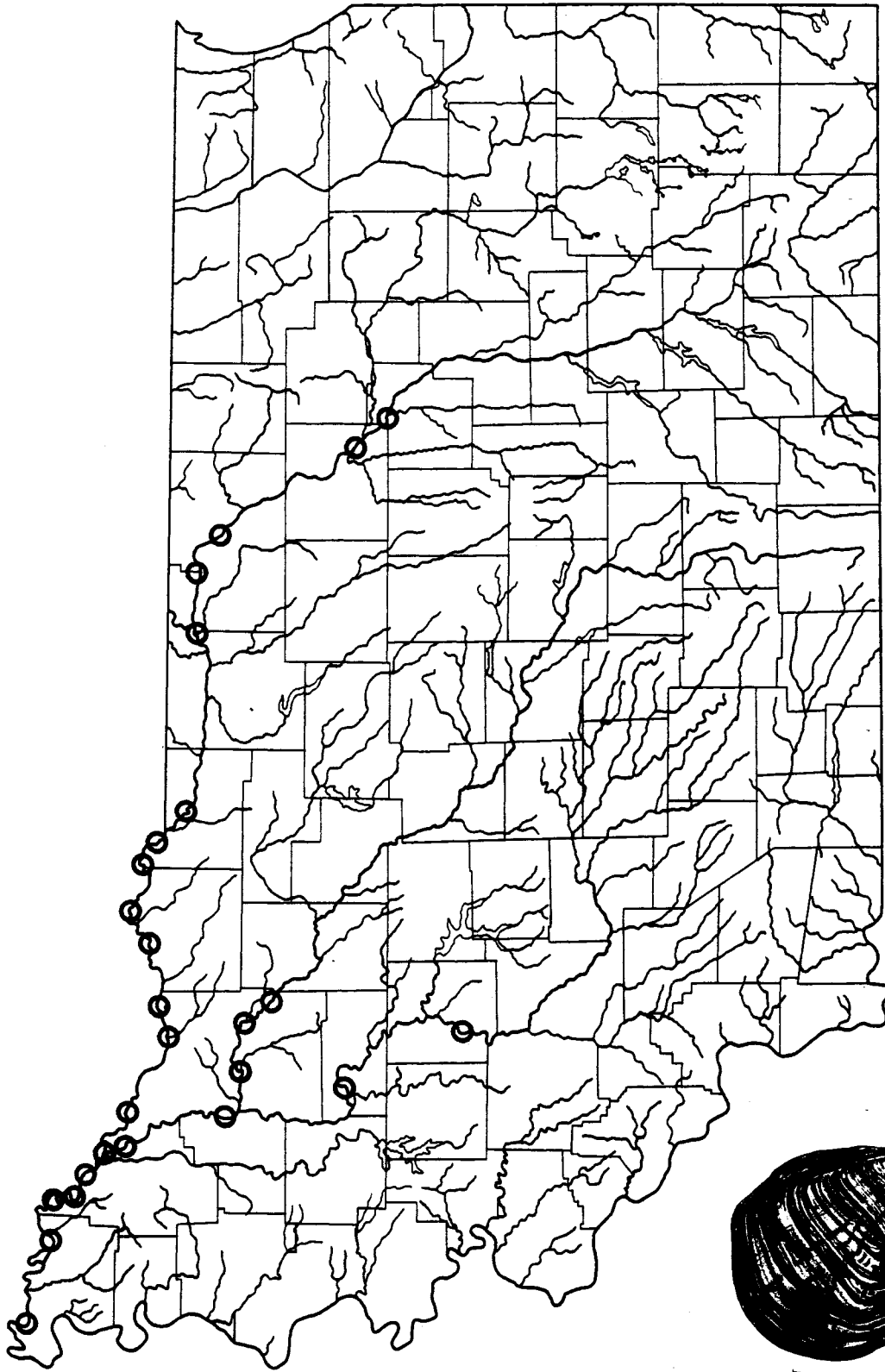
Johnson 1978:261 [in part].

STATUS: Federally Endangered. Extirpated in Indiana.

OTHER COMMON NAMES: None.

HABITAT: Reportedly found in larger rivers in coarse sand and gravel in a good current (Parmalee, 1967).

REMARKS: Call (1900) reported this species as abundant in the Wabash River but did not give specific locality information. Daniels (1903) listed the Wabash River at New Harmony for this mussel. Reported from the Wabash River at Lafayette by Goodrich and van der Schalie (1944). The tubercled blossom was not collected in either the 1966-67 or 1975 surveys of the Wabash River (Meyer, 1968; 1974; Clark, 1976). Although sub-fossil shells were abundant at many of the sites in the Wabash and White rivers in 1987-1991, no live or fresh-dead shells were found. No live *E. torulosa* have been seen in many years and this mussel is almost certainly extirpated from the Wabash River drainage and the state.



Epioblasma torulosa (Rafinesque, 1820)
tubercled blossom

Epioblasma triquetra (Rafinesque, 1820)

Snuffbox

ORIGINAL DESCRIPTION: *Truncilla triqueter* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales Générales des Sciences Physiques, Bruxelles V. p. 300, pl. LXXXI, figs. 1, 2, 3, and 4.

TYPE LOCALITY: Falls of the Ohio River [Louisville, Jefferson County, Kentucky]. Lectotype ANSP 20231 (Johnson & Baker, 1973).

SYNONYMY:

- Unio triangularis* Barnes
Stein 1880:463; Call 1894:155; 1896:146; 1897:252; 1900:473.
- Unio formosus* Lea
Stein 1880:463.
- Truncilla triquetra* (Rafinesque)
Daniels 1903:646.
- Dysnomia triquetra* (Rafinesque)
Goodrich & van der Schalie 1944:314; Parmalee 1967:62; Meyer
1974:22; Clark 1976:4.
- Plagiola (Truncilliopsis) triquetra* (Rafinesque)
Johnson 1978:248.
- Epioblasma triquetra* (Rafinesque)
Cummings & Berlocher 1990:87.

STATUS: Federal Candidate. Endangered in Indiana.

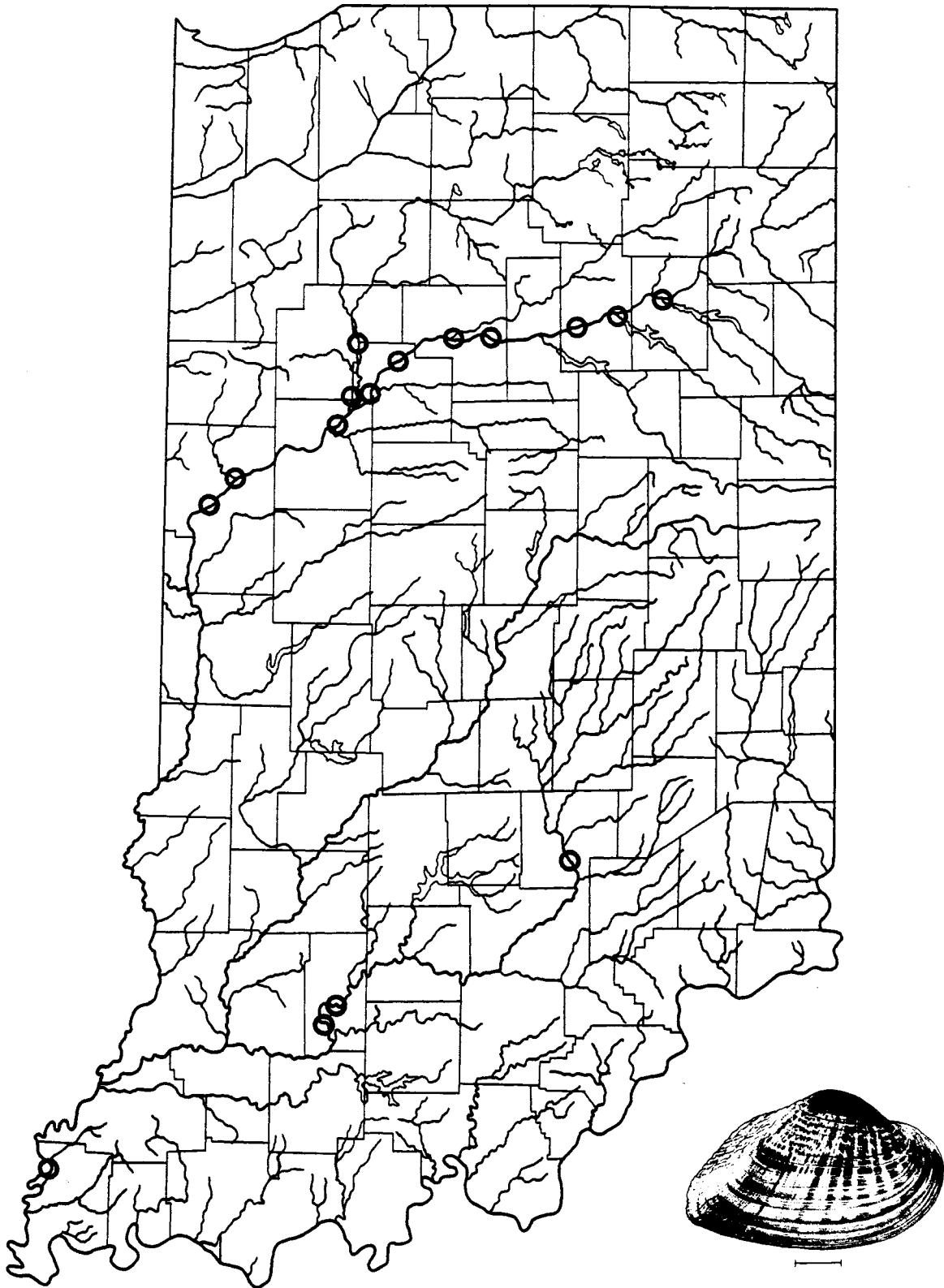
OTHER COMMON NAMES: None.

HABITAT: Found in medium to large rivers in clear gravel riffles.

REMARKS: Reported as abundant by Call (1900) in the Wabash and White rivers, and specifically listed from Indianapolis. Daniels (1903) lists the Tippecanoe, White, and Wabash rivers, among others, as localities for this species. Goodrich and van der Schalie (1944) noted that *E. triquetra* is seldom found in large numbers and usually was found in medium to large rivers, including the Wabash and White rivers. It was not collected in the Wabash River in 1966-67 or 1975 (Meyer, 1968; 1974; Clark, 1976). Relict shells were found at 10 of the first 12 stations sampled in the middle and upper Wabash River in 1988 and at one site in the lower Wabash in 1987.

Epioblasma triquetra was not collected in the 1966-67 survey of the White River (Meyer, 1968; 1974). Only relict shells of the snuffbox were found at three sites in the East Fork in 1989-91. A single live *E. triquetra* was found in Sugar Creek (East Fork White River drainage) in 1990. Fresh-dead shells were collected from seven additional sites in Sugar Creek and one on Buck Creek in the same year (Harmon, 1990).

Fresh-dead shells of *E. triquetra* were found at sites 12 and 16 in the lower Tippecanoe River in 1987, and the snuffbox may eventually turn up in the Tippecanoe River upon further investigation. This mussel is likely extirpated from the Wabash and White River proper, but still exists in some of their tributaries that maintain good water quality.



Epioblasma triquetra (Rafinesque, 1820)
snuffbox

Lampsilis abrupta (Say, 1831)

Pink mucket

ORIGINAL DESCRIPTION: *Unio abruptus* Say, 1831. American conchology, or descriptions of the shells of North America. April 1831. Vol. II, pl. 17.

TYPE LOCALITY: Wabash [River]. Type presumably lost.

SYNONYMY:

Unio abruptus Say

Stein 1880:464; Call 1894:153; 1897:251.

Unio orbiculatus Hildreth

Stein 1880:464; Call 1894:154; 1896:145; 1897:252; 1900:492.

Lampsilis orbiculatus (Hildreth)

Daniels 1903:647.

Lampsilis orbiculata (Hildreth)

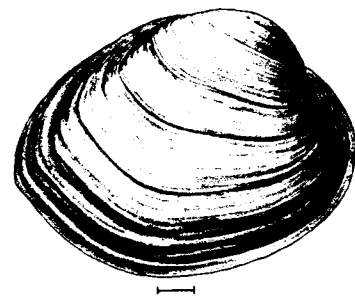
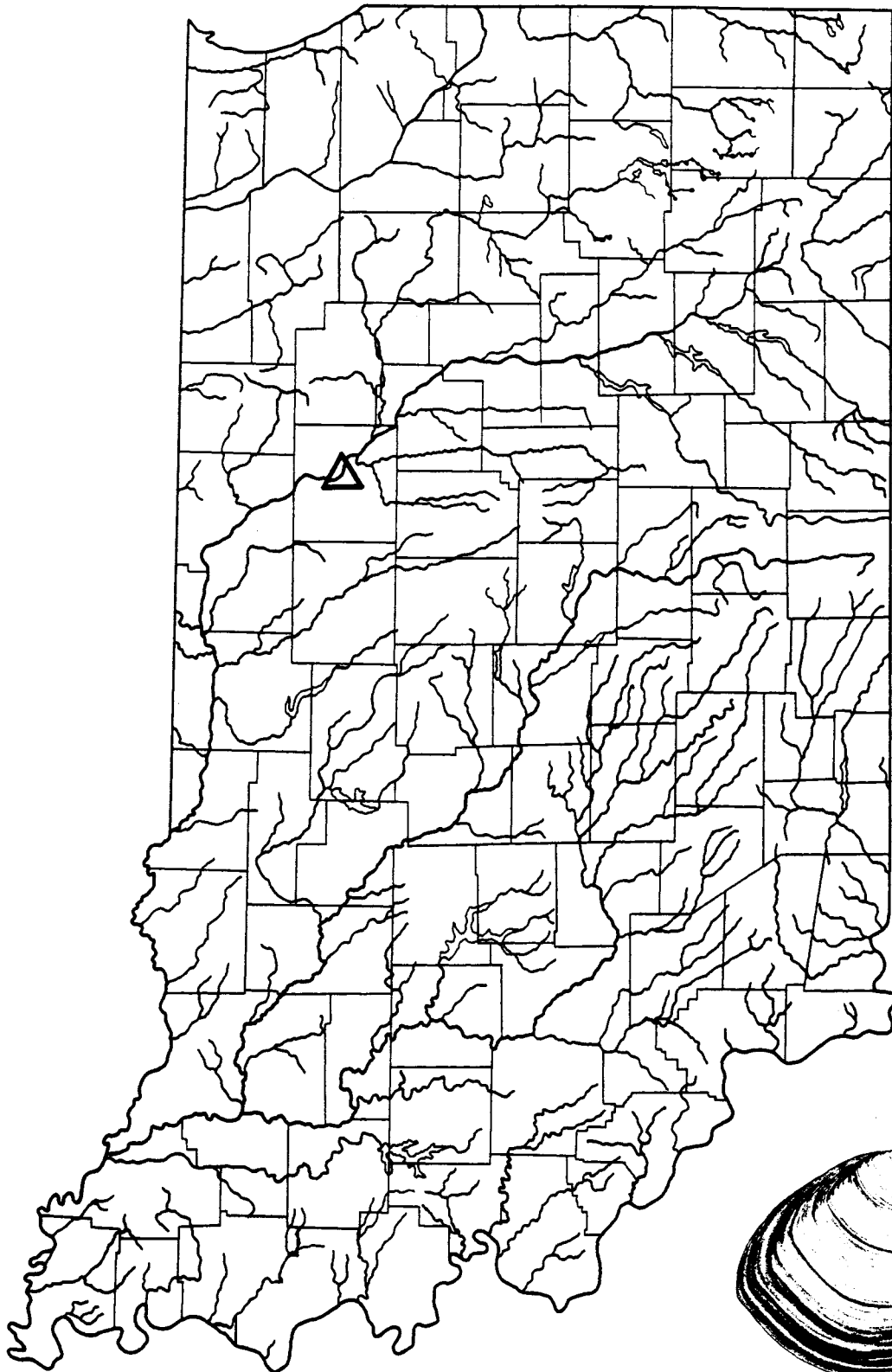
Goodrich & van der Schalie 1944:315; Parmalee 1967:67; Meyer 1974:23; Clark 1976:4.

STATUS: Federally endangered.

OTHER COMMON NAMES: Ohio mucket.

HABITAT: Reportedly found in large rivers in gravel or sand.

REMARKS: Call (1900) and Goodrich and van der Schalie (1944) reported this species from the Wabash and White rivers. A specimen of *L. abrupta* collected by L.E. Daniels in 1897 from the Wabash River at Lafayette is in the collection of the University of Michigan Museum of Zoology (86343). The pink mucket was not found in the 1966-67, 1975, or the present survey, and it is likely extirpated from the drainage (Meyer, 1968; 1974; Clark, 1976).



Lampsilis abrupta (Say, 1831)
pink mucket

Lampsilis cardium Rafinesque, 1820

Plain pocketbook

ORIGINAL DESCRIPTION: *Lampsilis cardium* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 298, pl. LXXX, figs. 16, 17, 18, and 19.

TYPE LOCALITY: [Ohio River]. Lectotype ANSP 20210 no locality given (Johnson & Baker, 1973).

SYNONYMY:

Unio occidentalis Lea

Stein 1880:464; Call 1894:154; 1896:145.

Unio ventricosus Barnes

Stein 1880:464; Call 1894:156; 1896:146; 1900:480; Kirsch 1896:54.

Lampsilis ventricosus (Barnes)

Wilson & Clark 1912:51.

Lampsilis ventricosa (Barnes)

Goodrich & van der Schalie 1944:316; Parmalee 1967:70; Meyer 1974:23; Clark 1976:4; Weilbaker et al. 1985:690.

Lampsilis cardium (Rafinesque)

Cummings & Berlocher 1990:87.

STATUS: Common.

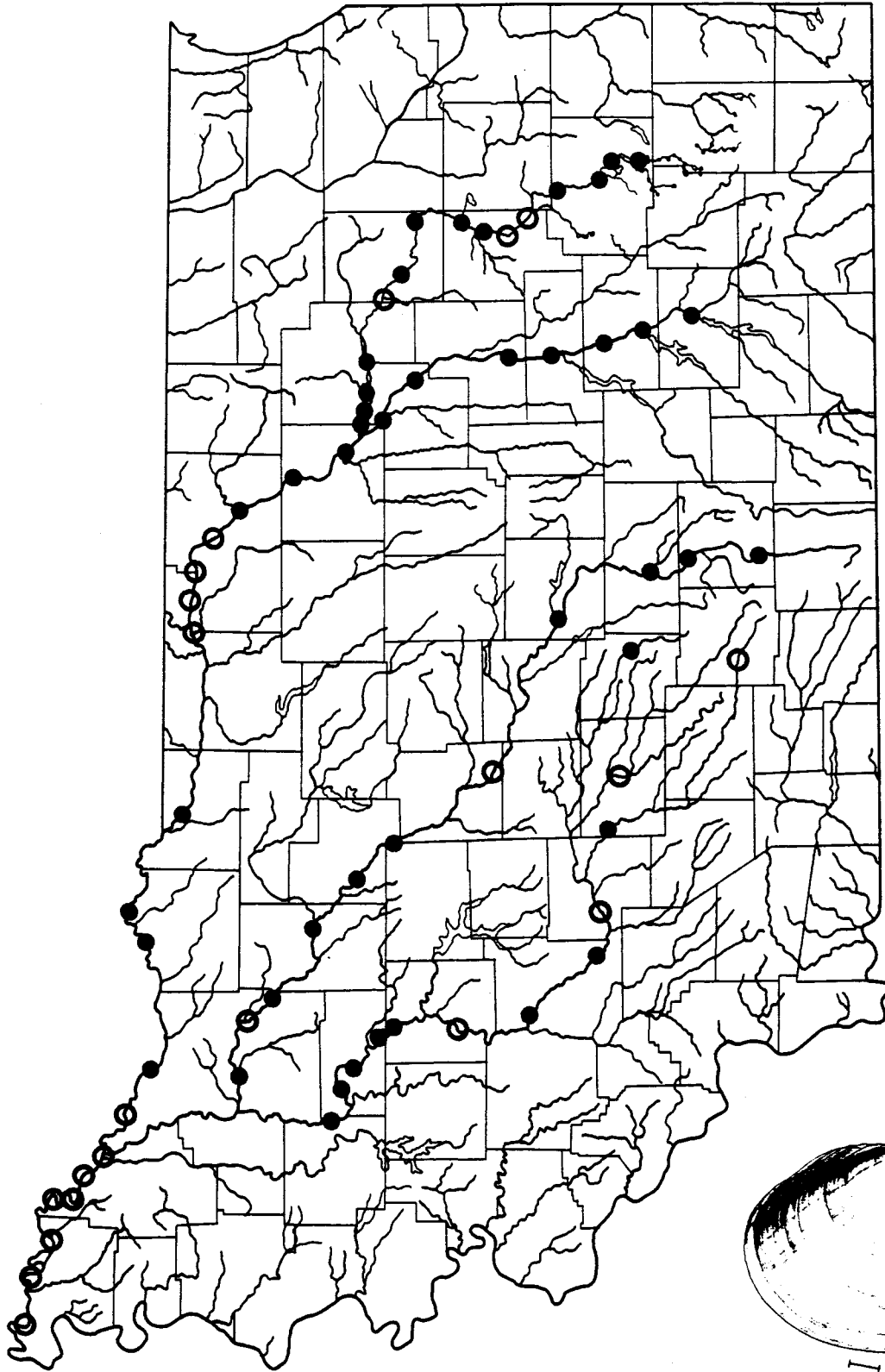
OTHER COMMON NAMES: Pocketbook, grandmaw.

HABITAT: Found in small to large rivers in mud, sand, or gravel.

REMARKS: Earlier workers (Call, 1900; Daniels, 1903; Goodrich and van der Schalie, 1944) have reported the plain pocketbook as common state wide. Considered as common throughout the Wabash River in 1966-67 (Meyer, 1968; 1974), but uncommon in the lower Wabash by 1975 (Clark, 1976). The plain pocketbook was not found alive in the lower Wabash River in 1987. *Lampsilis cardium* was relatively common in the middle and upper Wabash River and was found alive at 14 sites in 1988.

The plain pocketbook was reported to be common in the White River in 1966-67 (Meyer, 1968; 1974). In 1989-91, *L. cardium* was found living at 18 of the 23 sites where shells were present, and was one of only a few species found living at sites 3, 5, 14, 18, 21, and 27.

This mussel was also common in the Tippecanoe River in this study. Sixty-five individuals were collected from 13 sites and *L. cardium* ranked ninth in order of abundance for all species found. It was most abundant in the middle and upper portions of the river, but was found at nearly every site sampled.



Lampsilis cardium Rafinesque, 1820
plain pocketbook

Lampsilis fasciola Rafinesque, 1820

Wavy-rayed lampmussel

ORIGINAL DESCRIPTION: *Lampsilis fasciola* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 299.

TYPE LOCALITY: Kentucky. Type supposedly in the Paris Museum but not located (Johnson & Baker, 1973).

SYNONYMY:

Unio multiradiatus Lea

Stein 1880:464; Call 1894:154; 1896:144; 1897:252; 1900:479;
Kirsch 1896:55.

Lampsilis multiradiatus (Lea)

Daniels 1903:647; Wilson & Clark 1912:50.

Lampsilis fasciola Rafinesque

Goodrich & van der Schalie 1944:315; Parmalee 1967:65; Meyer
1974:22; Clark 1976:4; Weilbaker et al. 1985:690; Cummings &
Berlocher 1990:87.

STATUS: Species of Special Concern in Indiana.

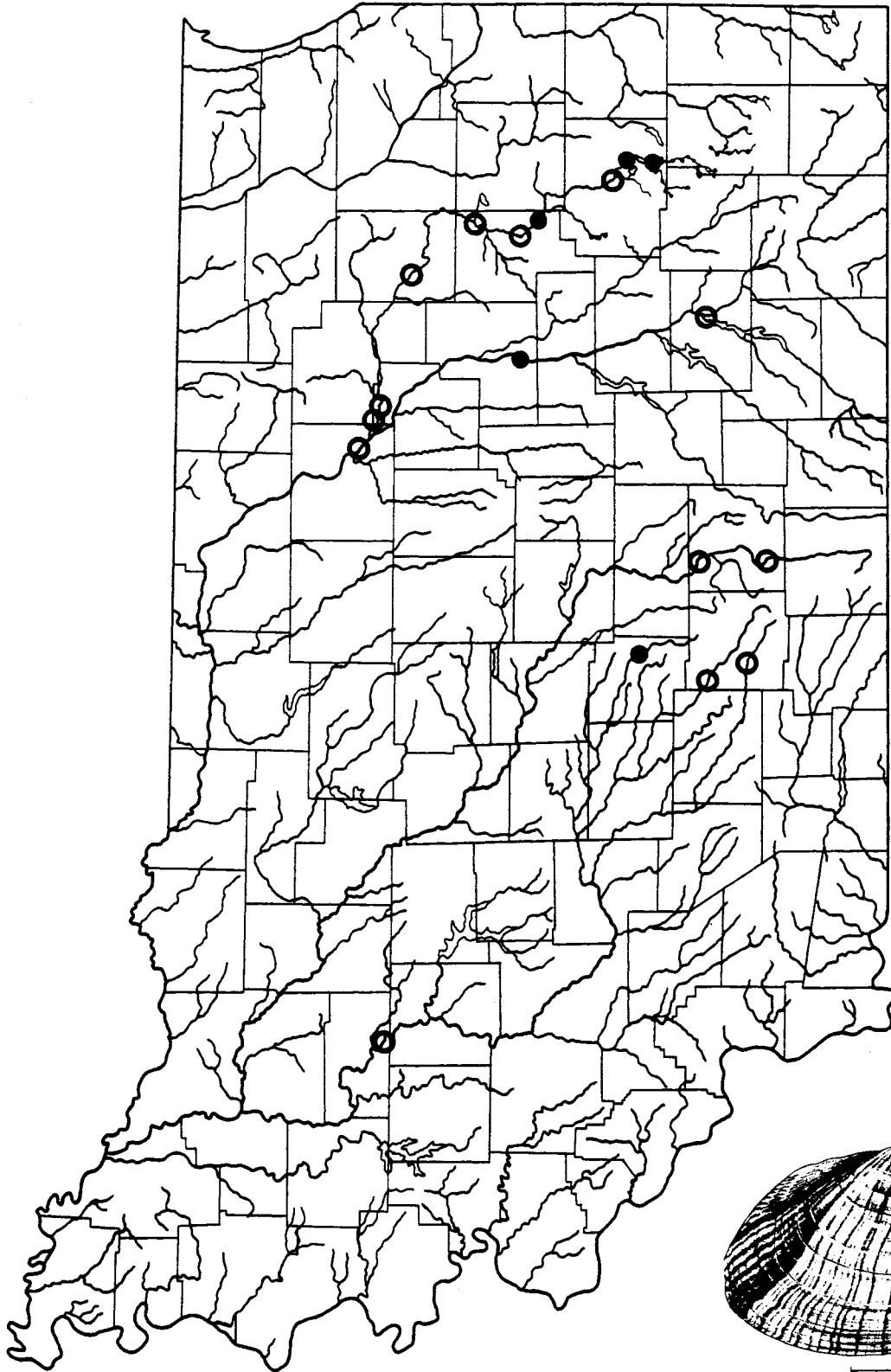
OTHER COMMON NAMES: Wavy-lined lampmussel.

HABITAT: Found in medium streams in coarse sand or gravel.

REMARKS: Call (1900) reported this mussel as abundant in the Wabash River. Goodrich and van der Schalie (1944) noted that *L. fasciola* was a small stream species and that it was relatively rare in the large rivers of the state. Not found in the Wabash River in 1966-67 (Meyer, 1968; 1974) or the lower Wabash River in 1975 (Clark, 1976). Six live *L. fasciola* were found in the upper Wabash River in 1988.

Call (1900) reported the wavy-rayed lampmussel from the White River. Not found in 1966-67 (Meyer, 1968; 1974). Only one live *L. fasciola* was found in Sugar Creek (East Fork White River drainage) in 1989-91.

Reported by Daniels (1903) from the Tippecanoe River, the wavy-rayed lampmussel was collected from three sites in the upper half of the river in 1987. Currently a Species of Special Concern in Indiana, *L. fasciola* may warrant listing as threatened or endangered in the future.



Lampsilis fasciola Rafinesque, 1820
wavy-rayed lampmussel

Lampsilis ovata (Say, 1817)

Pocketbook

ORIGINAL DESCRIPTION: *Unio ovatus* Say, 1817. Article "Conchology" in William Nicholson. The American Edition of the British Encyclopedia, or Dictionary of Arts and Sciences. Vol. II, B-E. Samuel A. Mitchell and Horace Ames, Philadelphia, no pagination. pl. 2, fig. 7.

TYPE LOCALITY: Ohio River and its tributary streams. Neotype Senckenberg Museum 4338 (Haas, 1930).

SYNONYMY:

Unio ovatus Say

Stein 1880:463; Call 1894:155; 1897:252.

Unio subovatus Lea

Call 1894:155; 1896:146; 1897:252; 1900:481.

Lampsilis ovatus (Say)

Daniels 1903:647.

Lampsilis ovata (Say)

Goodrich & van der Schalie 1944:315; Parmalee 1967:70; Clark 1976:4.

Lampsilis ventricosa (Barnes)

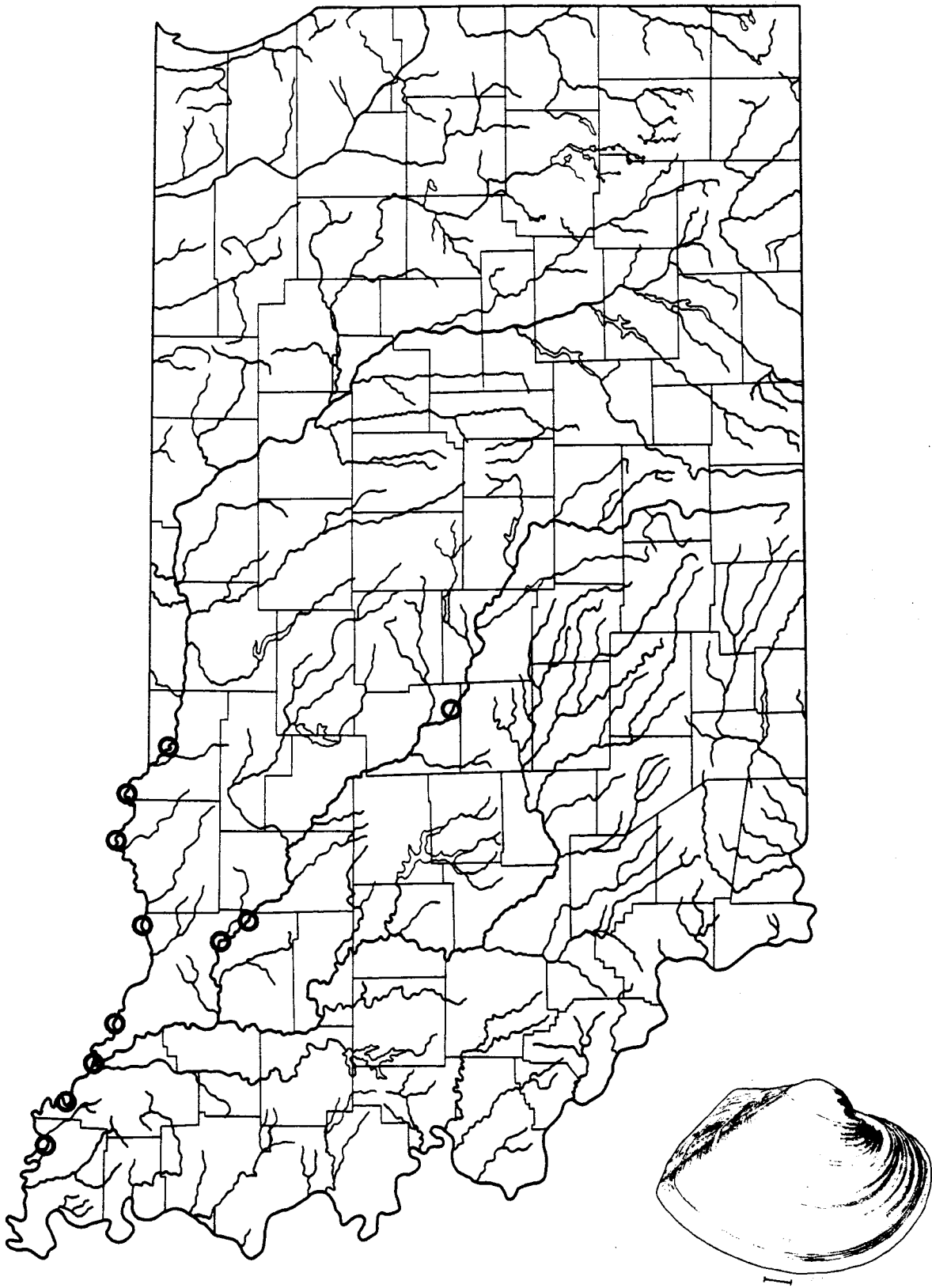
Meyer 1974:23 [in part].

STATUS: Extirpated in Indiana.

OTHER COMMON NAMES: Sharp-ridged pocketbook, southern pocketbook, grandmaw.

HABITAT: Found in large rivers in coarse sand and gravel.

REMARKS: The pocketbook was reported from the Wabash and White rivers by both Call (1900) and Goodrich and van der Schalie (1944). This species was treated under *L. ventricosa* by Meyer (1974) in 1966-67 and thus the total number of *L. ovata* collected is unknown. Clark (1976) reported *L. ovata* as uncommon in the lower Wabash by 1975. In the present study, the pocketbook was collected as relict shells only, and it is probably extirpated from the Wabash River drainage.



Lampsilis ovata (Say, 1817)
pocketbook

Lampsilis siliquoidea (Barnes, 1823)

Fatmucket

ORIGINAL DESCRIPTION: *Unio siliquoideus* Barnes, 1823. On the genera *Unio* and *Alasmodonta*: with introductory remarks. The American Journal of Science and Arts. Vol. VI. p. 269, pl. 13, fig. 15.

TYPE LOCALITY: Wisconsin River.

SYNONYMY:

- Unio siliquoideus* Barnes
Stein 1880:464.
- Unio distans* Anthony
Call 1894:153; 1897:251.
- Unio luteolus* Lamarck
Stein 1880:464; Call 1894:154; 1896:144; 1897:252; 1900:478;
Kirsch 1896:54.
- Lampsilis luteolus* (Lamarck)
Daniels 1903:647; Wilson & Clark 1912:50.
- Lampsilis siliquoidea* (Barnes)
Goodrich & van der Schalie 1944:315; Parmalee 1967:68; Meyer
1974:23; Clark 1976:4; Cummings & Berlocher 1990:87.
- Lampsilis radiata luteola* (Lamarck)
Weilbaker et al. 1985:690.

STATUS: Common.

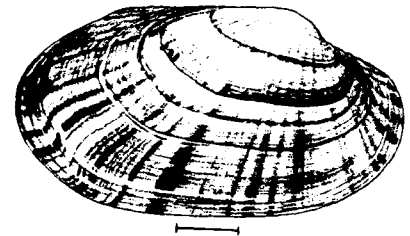
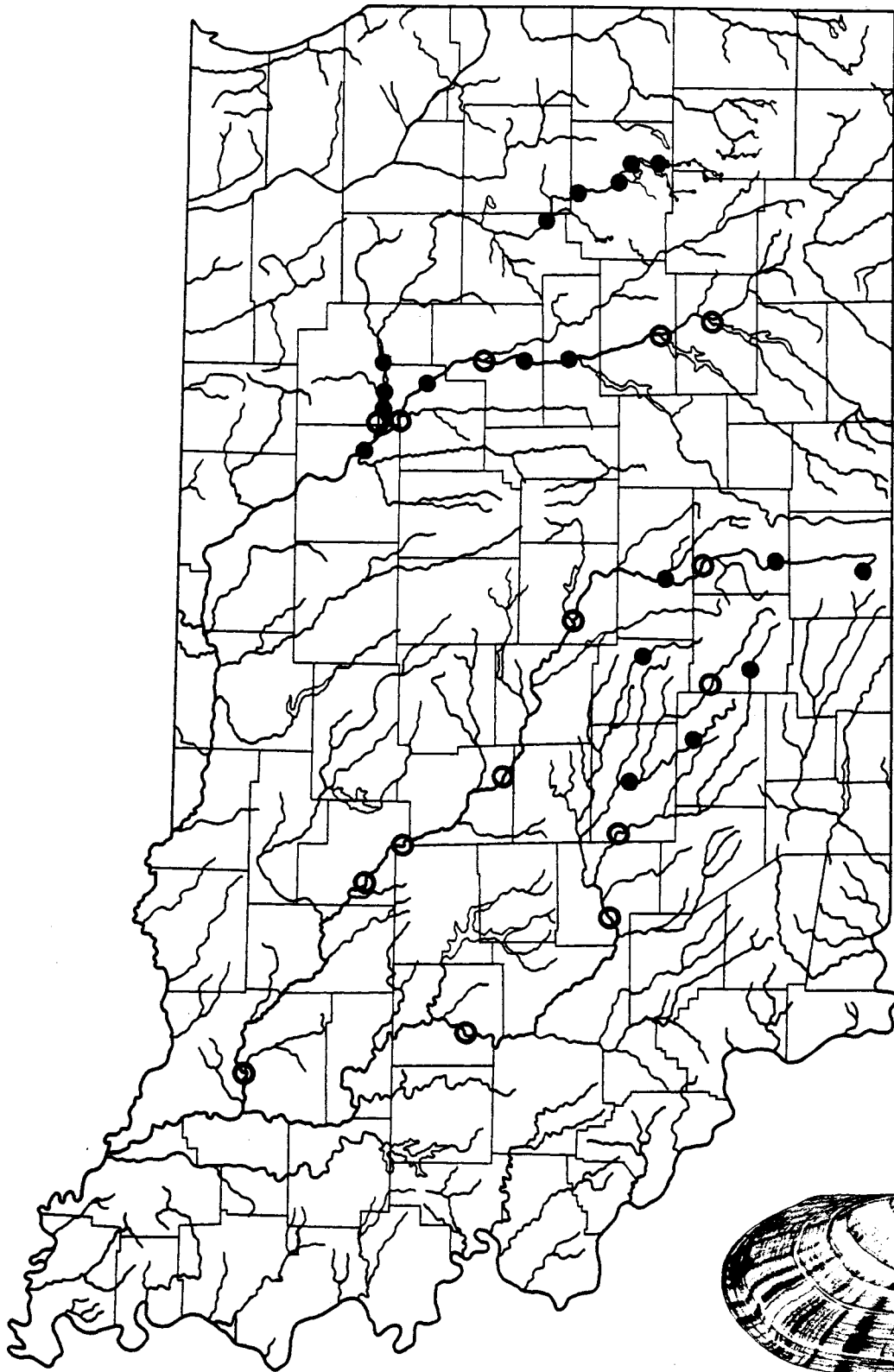
OTHER COMMON NAMES: Black mucket, pug-nose mucket, grass mucket.

HABITAT: Found in lakes and small to medium streams, rarely in large rivers.

REMARKS: Early workers (Call, 1900; Daniels, 1903; Goodrich and van der Schalie, 1944) listed this mussel as common throughout Indiana. No live *L. siliquoidea* were found in the Wabash River in 1966-67, or the lower Wabash in 1975 (Meyer, 1968; 1974; Clark, 1976). In the current study, *L. siliquoidea* was present at eight of the first nine sites sampled in the upper Wabash in 1988, but was not found below Lafayette.

The fatmucket was not collected in the White River in 1966-67 (Meyer, 1968; 1974). In 1989-91, *L. siliquoidea* was common in the upper half of the drainage and was found living at seven of the 16 sites where shells were present.

In the Tippecanoe River, 34 fatmuckets were collected from half of the sites sampled in 1987. Most of the individuals came from below the spillway at Oakdale Dam or from the upstream section of the river (sites 1-5). *Lampsilis siliquoidea* ranked sixteenth in order of abundance for all species collected in the Tippecanoe.



Lampsilis siliquoidea (Barnes, 1823)
fatmucket

Lampsilis teres (Rafinesque, 1820)

Yellow sandshell

ORIGINAL DESCRIPTION: *Unio teres* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 321.

TYPE LOCALITY: Wabash River. The type was figured by Conrad (1836), but subsequently lost (Johnson & Baker, 1973).

SYNONYMY:

Unio teres Rafinesque

Stein 1880:465; Call 1900:452.

Unio anodontoides Lea

Stein 1880:465; Call 1894:153; 1896:142; 1897:251.

Lampsilis fallaciosus (Simpson)

Daniels 1903:647; Wilson & Clark 1912:49.

Lampsilis anodontoides (Lea)

Daniels 1903:647; Goodrich & van der Schalie 1944:315; Parmalee 1967:64; Meyer 1974:22; Clark 1976:4.

Lampsilis anodontoides fallaciosa (Smith)

Clark 1976:4.

Lampsilis teres (Rafinesque)

Cummings & Berlocher 1990:87.

STATUS: Rare.

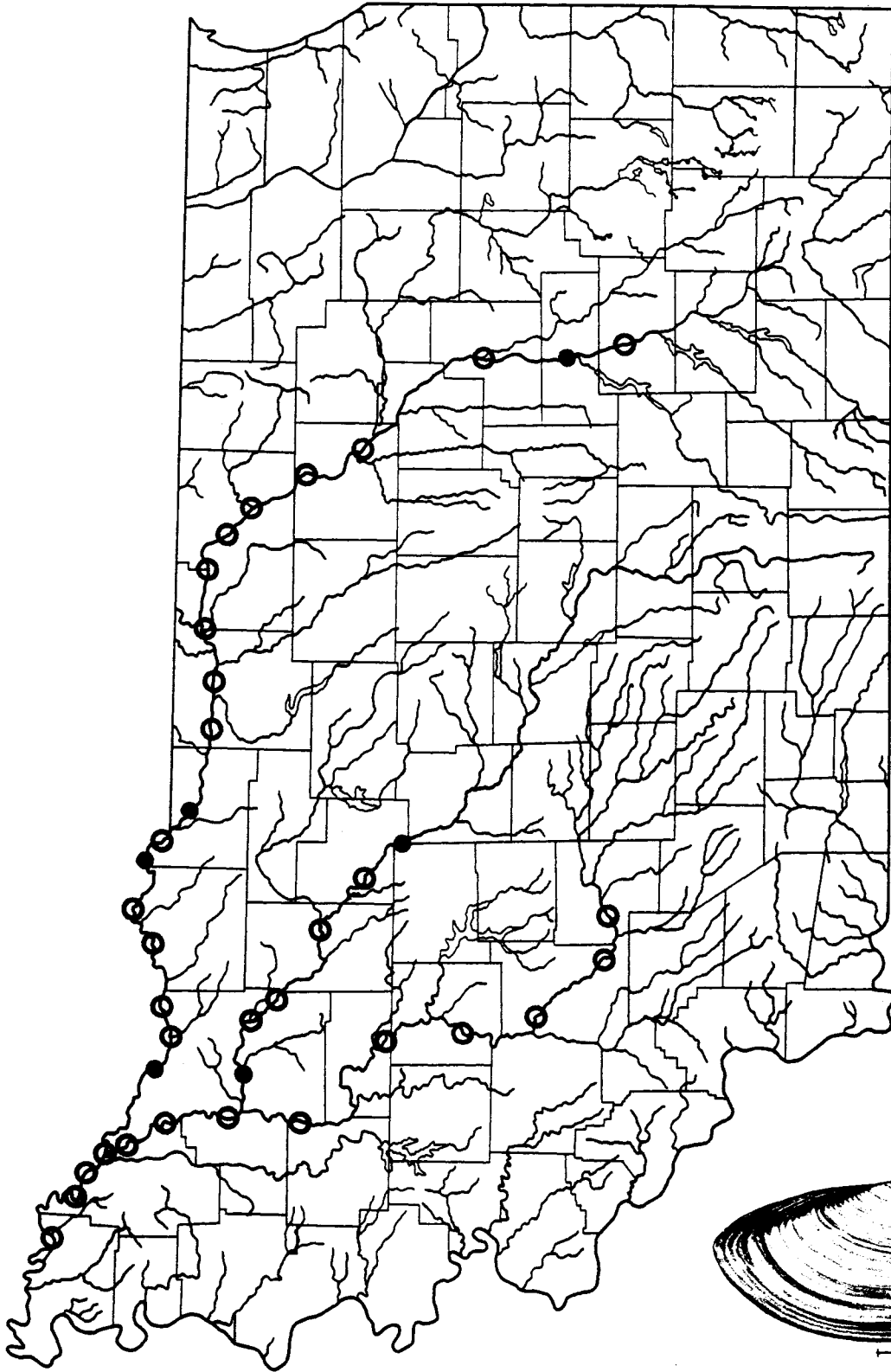
OTHER COMMON NAMES: Slough sandshell, banana shell, bankclimber, sand clam, creeper, luster shell.

HABITAT: Found in medium to large streams in mud or fine gravel.

REMARKS: Reported as abundant in the Wabash and Ohio rivers by Call (1900). Goodrich and van der Schalie (1944) noted that the yellow sandshell inhabits medium to large streams that flow into the Ohio River. It was reported as common in the Wabash in 1966-67, but most abundant between Terre Haute and Mt. Carmel (Meyer, 1968; 1974). The yellow sandshell was considered rare in the lower Wabash River by 1975 (Clark, 1976). Only relict shells of *L. teres* were found in the lower Wabash in 1987, and this species is likely extirpated there. Seven live *L. teres* were found at widely separated sites in the middle and upper Wabash in 1988 and numerous relict shells were found throughout the river. Conversations with commercial shellers revealed that this once abundant species was rarely encountered today.

The yellow sandshell was not reported from the White River in 1966-67 (Meyer, 1968; 1974). Only two live *L. teres* were collected in the West Fork White River in 1989-91 and, like the Wabash River, numerous relict shells of this species were found throughout the river.

Daniels (1903) lists the Tippecanoe River in Carroll County as a location for *L. teres*. No *L. teres* were found in the Tippecanoe River in 1987, but it was found living downstream of the last site in the river in 1991 (T. Watters, pers. comm.). Given the drastic reduction in range, the yellow sandshell should be listed as a Species of Special Concern in Indiana.



Lampsilis teres (Rafinesque, 1820)
yellow sandshell

Leptodea fragilis (Rafinesque, 1820)

Fragile papershell

ORIGINAL DESCRIPTION: *Unio fragilis* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales Générales des Sciences Physiques, Bruxelles V. p. 295.

TYPE LOCALITY: [Ohio River] Lectotype ANSP 20209 from creeks in Kentucky (Johnson & Baker, 1973).

SYNONYMY:

Unio gracilis Barnes

Stein 1880:461; Call 1894:154; 1896:143; 1897:252; 1900:464.

Lampsilis gracilis (Barnes)

Daniels 1903:648;.

Leptodea fragilis (Rafinesque)

Goodrich & van der Schalie 1944:316; Parmalee 1967:72; Meyer 1974:23; Clark 1976:4; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Common.

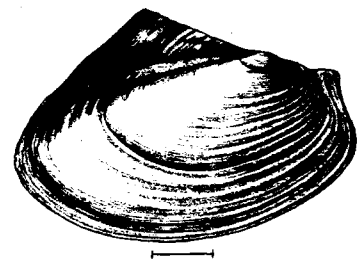
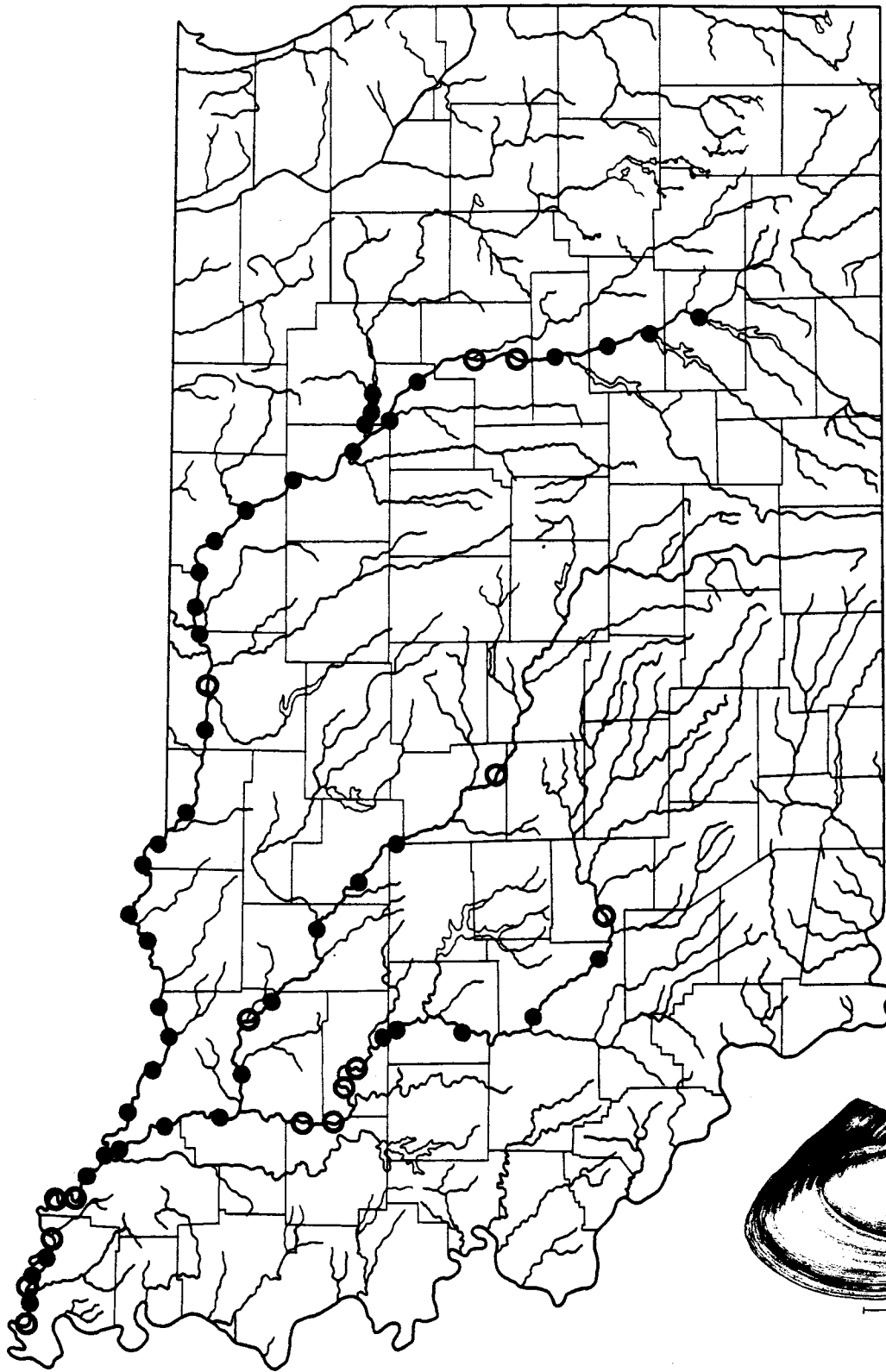
OTHER COMMON NAMES: Papershell, cottonmouth.

HABITAT: Found in medium to large rivers in mud, sand, or gravel.

REMARKS: All of the earlier workers (Call, 1900; Daniels, 1903; Goodrich & van der Schalie, 1944; Meyer, 1968; 1974; Clark, 1976) considered this species to be common. The fragile papershell is one of the most abundant mussels in the Wabash River. It is widespread and common in many of the southern tributaries of the Wabash River in Illinois (i.e., Embarras, Little Wabash, and Saline rivers). It ranked second in order of abundance in the Wabash in 1987-88 and accounted for 22% of the live mussels found.

Leptodea fragilis ranked first in order of abundance in the White in 1989-91, was the dominant species found at nine sites, and accounted for 22% of the live mussels collected in the entire White River drainage.

The fragile papershell is somewhat less common in the northern portion of the Wabash drainage. Records are lacking for the Vermilion and Little Vermilion rivers in Illinois. Only five individuals of this species were found in the Tippecanoe River in 1987, all below the Oakdale Dam.



Leptodea fragilis (Rafinesque, 1820)
fragile papershell

Leptodea leptodon (Rafinesque, 1820)

Scaleshell

ORIGINAL DESCRIPTION: *Unio leptodon* Rafinesque, 1820. Monographie des coquilles bivalves fluviales de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 295, pl. LXXX, figs. 5, 6, and 7.

TYPE LOCALITY: Ohio River. Neotype ANSP 20214 from the Kentucky River (Johnson & Baker, 1973).

SYNONYMY:

- Unio tenuissimus* Lea
Stein 1880:465; Call 1894:155; 1896:146; 1897:252; 1900:463.
- Unio velum* Say
Stein 1880:465.
- Unio leptodon* Conrad
Stein 1880:465.
- Lampsilis leptodon* (Rafinesque)
Daniels 1903:648.
- Lampsilis blatchleyi* Daniels
Daniels 1903:648.
- Leptodea blatchleyi* (Daniels)
Goodrich & van der Schalie 1944:316; Meyer 1974:23;
Clark 1976:4.
- Leptodea leptodon* (Rafinesque)
Goodrich & van der Schalie 1944:316; Parmalee 1967:92; Meyer
1974:23; Clark 1976:4.

STATUS: Federally Endangered.

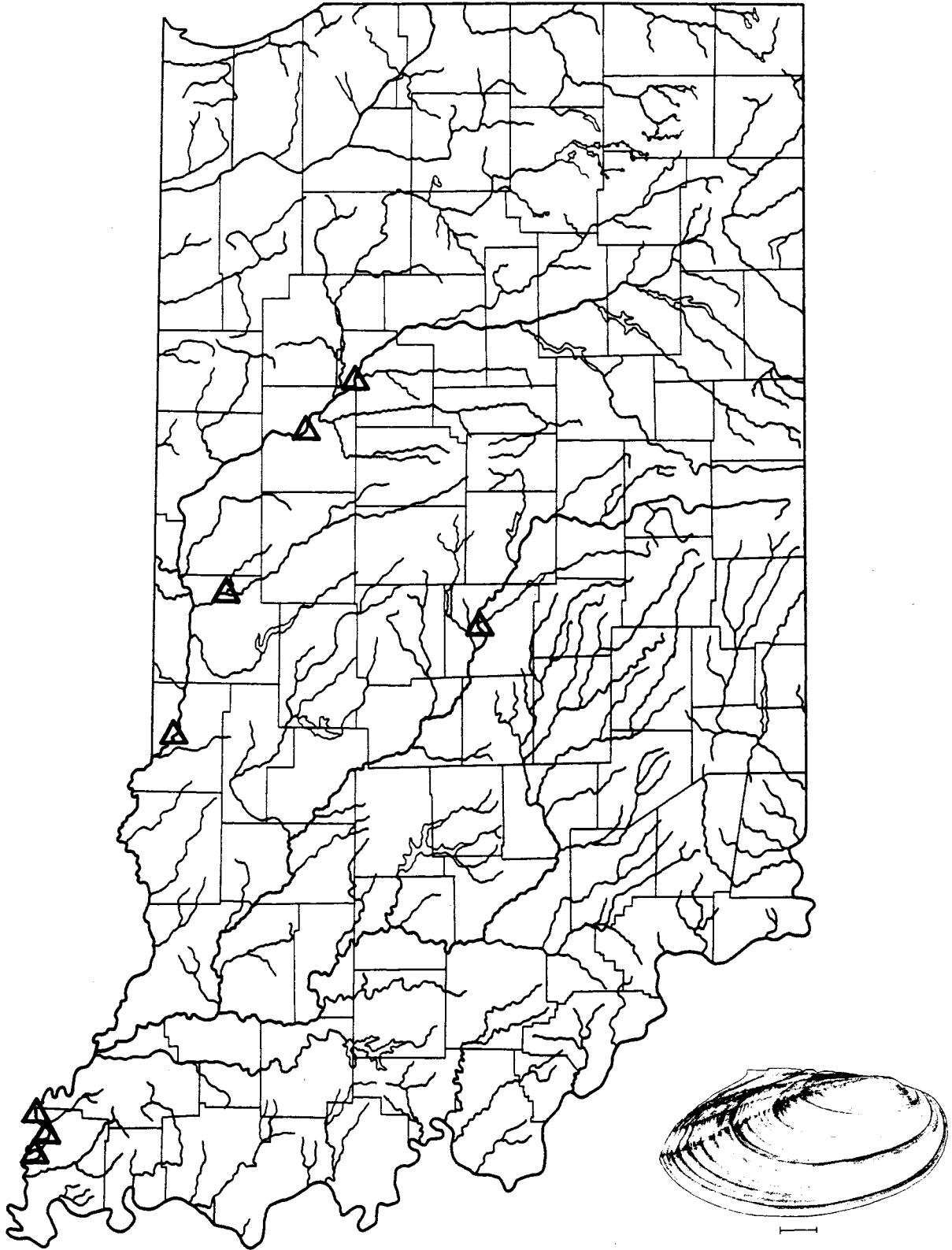
OTHER COMMON NAMES: Narrow papershell.

HABITAT: Reportedly found in large rivers in mud.

REMARKS: Call (1900) described the habitat of the scaleshell as the muddy bottoms of the Ohio and Wabash rivers, and said that while common there, it was nowhere abundant. Goodrich and van der Schalie (1944) noted that *L. leptodon* was rare and confined to the lower Wabash and Ohio rivers. Specimens of the scaleshell are known from various localities in the Wabash River including Delphi, Lafayette, Terre Haute, Grayville, and Grand Chain. This species was not found in the Wabash River in 1966-67, 1975, or the present survey (Meyer, 1968; 1974; Clark, 1976).

The scaleshell was not found in the White River drainage in either 1966-67 or 1989-91 (Meyer, 1968; 1974). Its former presence in the drainage is represented by a specimen labeled "canal in Indianapolis" (no date) in the collection of the Museum of Comparative Zoology at Harvard University (196926).

Not found in the Tippecanoe River in 1987. The scaleshell has not been reported in Indiana in many years and is probably extirpated from the Wabash River drainage and the state.



Leptodea leptodon (Rafinesque, 1820)
scaleshell

Ligumia recta (Lamarck, 1819)

Black sandshell

ORIGINAL DESCRIPTION: *Unio recta* Lamarck, 1819. Histoire Naturelle des Animaux sans Vertebres. Vol. 6, p. 74.

TYPE LOCALITY: Lake Erie.

SYNONYMY:

Unio arquatus Conrad

Conrad 1854:297; Call 1894:153.

Unio rectus Lamarck

Stein 1880:465; Call 1894:155; 1896:146; 1897:252; 1900:451.

Lampsilis rectus (Lamarck)

Daniels 1903:647; Wilson & Clark 1912:49.

Ligumia recta latissima (Rafinesque)

Goodrich & van der Schalie 1944:317; Clark 1976:4.

Ligumia recta (Lamarck)

Parmalee 1967:74; Meyer 1974:23; Weilbaker et al. 1985:690;
Cummings & Berlocher 1990:87.

STATUS: Uncommon.

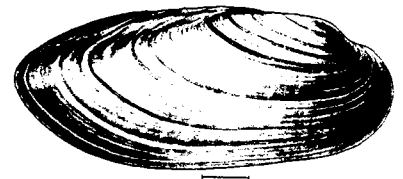
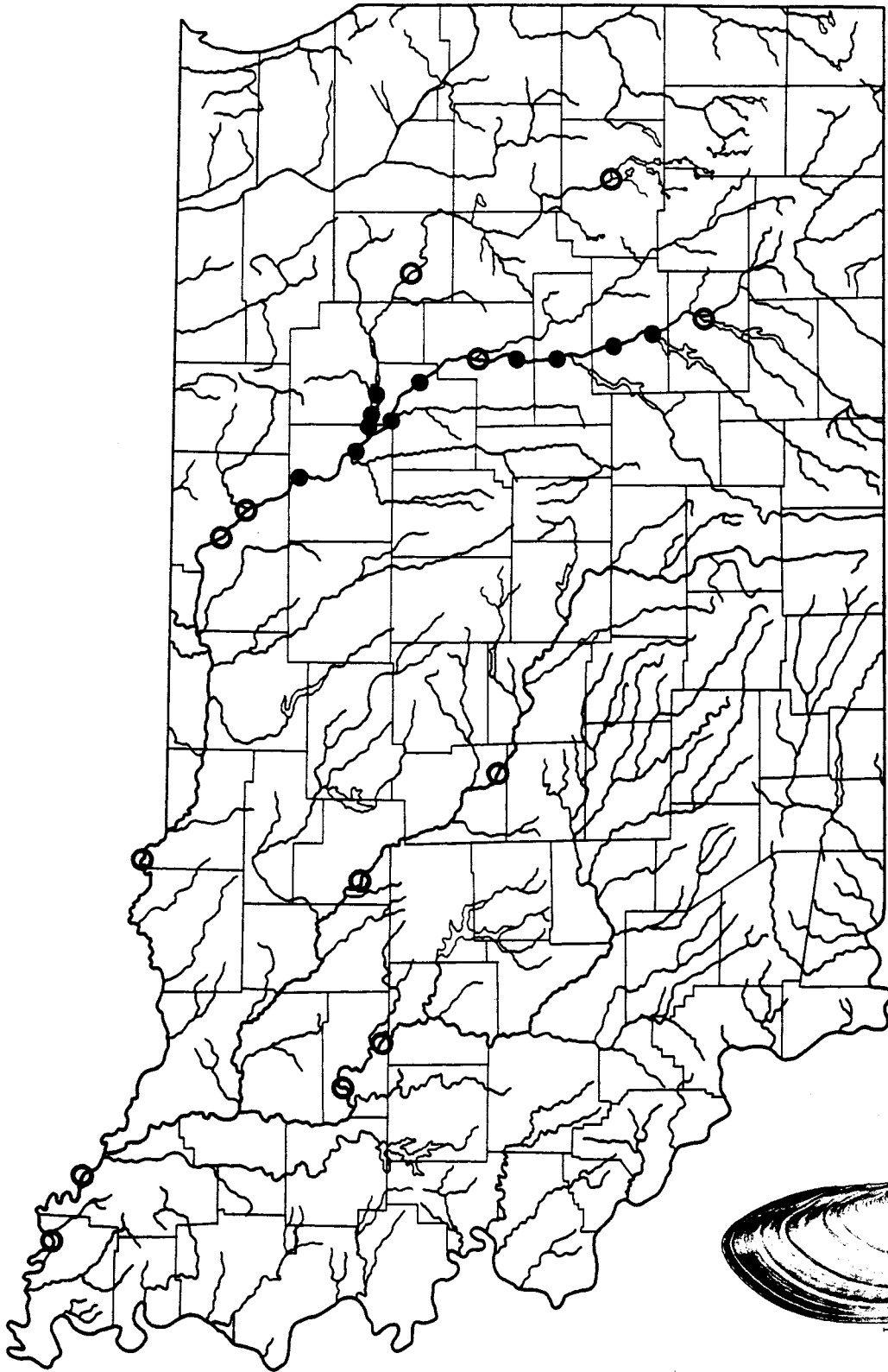
OTHER COMMON NAMES: Long John, honest John, lady's slipper, black sand mussel.

HABITAT: Found in medium to large streams in gravel.

REMARKS: Reported as common in the Wabash and Ohio rivers by Call (1900). Goodrich and van der Schalie (1944) reported this species from all of the major drainages in the state and noted that it was generally associated with large rivers. However, neither Meyer (1968; 1974) nor Clark (1976) found evidence of this species in their surveys of the Wabash River. Only two sub-fossil shells of *L. recta* were found in the lower Wabash River in 1987. *Ligumia recta* was widespread in the upper Wabash in 1988, but only weathered-dead shells were collected below site 12.

Meyer (1968; 1974) found no evidence of this species in the 1966-67 survey of the White River. *Ligumia recta* was represented only by relict shells at four sites in the middle of the drainage in 1989-91.

Three live individuals of *L. recta* were collected from sites 13, 14, and 16 in the lower Tippecanoe River in 1987.



Ligumia recta (Lamarck, 1819)
black sandshell

Ligumia subrostrata (Say, 1831)

Pondmussel

ORIGINAL DESCRIPTION: *Unio subrostratus* Say, 1831. The Disseminator of Useful Knowledge, New Harmony. January 15, 1831.

TYPE LOCALITY: Wabash River. Type presumably lost.

SYNONYMY:

Unio nasutus Say

Stein 1880:465; Call 1894:154; 1897:252; Kirsch 1896:55.

Unio subrostratus Say

Call 1894:155; 1896:146; 1897:252; 1900:457; Kirsch 1896:54.

Lampsilis subrostratus (Say)

Daniels 1903:647; Wilson & Clark 1912:49.

Ligumia subrostrata (Say)

Goodrich & van der Schalie 1944:317; Parmalee 1967:75;

Cummings & Berlocher 1990:87.

STATUS: Rare.

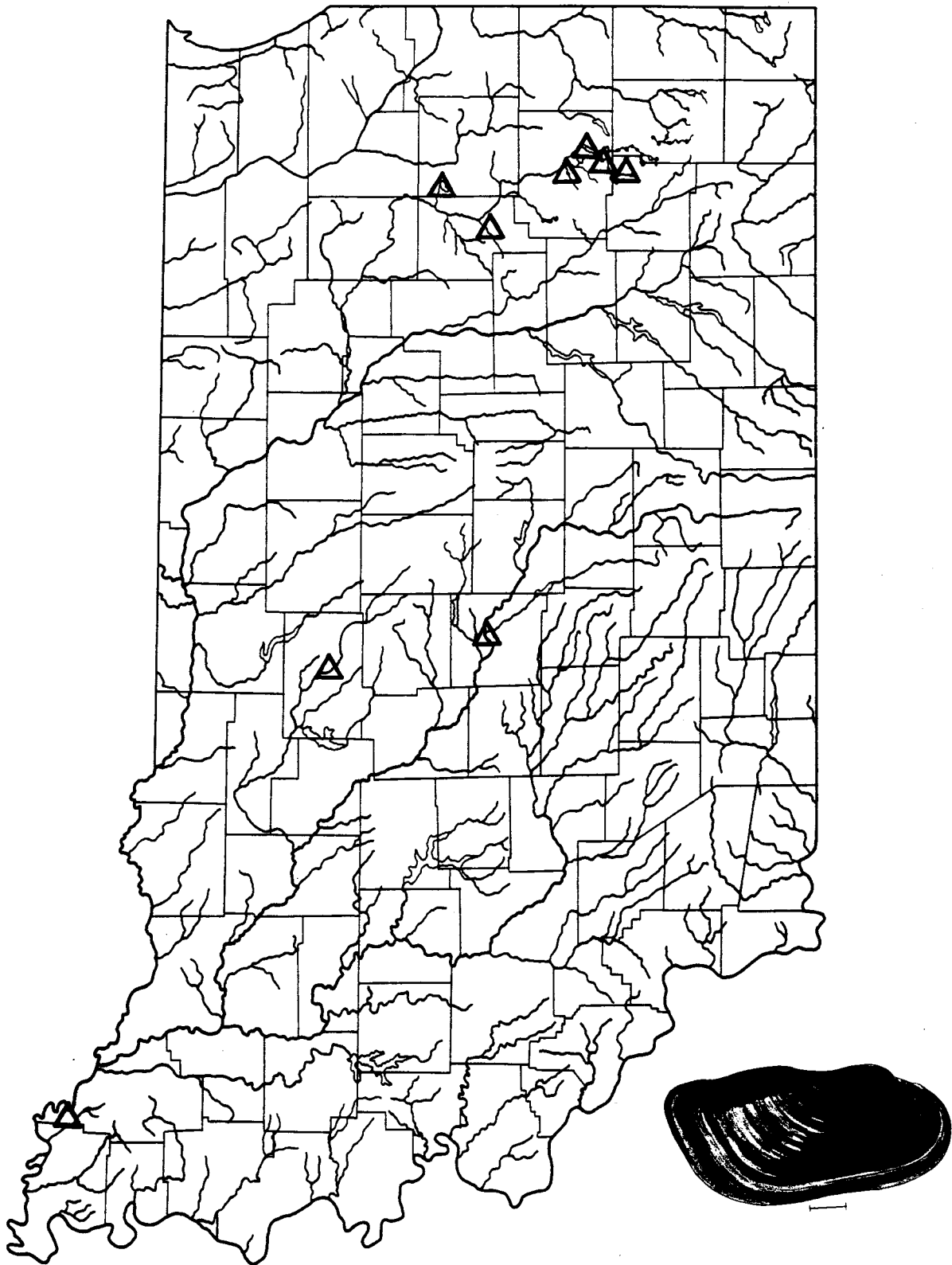
OTHER COMMON NAMES: Western pondmussel, common pondmussel, western sandshell.

HABITAT: Found in ponds, creeks, and small rivers in mud or mixed sand and mud.

REMARKS: As its common name implies, *L. subrostrata* is typically a pond or lake species which occasionally occupies backwater habitats in medium to large rivers. Reported by Goodrich and van der Schalie (1944) from the Wabash River drainage in Indiana. It was not collected from the Wabash or White rivers in 1966-67, 1975, or the present survey (Meyer 1968; 1974; Clark 1975). This species has been found in bottomland lakes and sloughs adjacent to the Wabash and Ohio rivers in Illinois and it may be found in those habitats in Indiana upon further investigation.

Reported by Daniels (1903) from Tippecanoe Lake, *L. subrostrata* was not collected in the river in 1987.

Based on museum records, this species is present in tributaries to the Tippecanoe, White, and lower Wabash rivers.



Ligumia subrostrata (Say, 1831)
pondmussel

Obliquaria reflexa Rafinesque, 1820

Threehorn wartyback

ORIGINAL DESCRIPTION: *Obliquaria reflexa* Rafinesque, 1820. Monographie des coquilles bivalves fluviales de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 306.

TYPE LOCALITY: Kentucky and at Letart's Rapids [Ohio River, Meigs County, Ohio]. Lectotype ANSP 20206a from Letart Falls (Johnson & Baker, 1973).

SYNONYMY:

Unio cornutus Barnes

Stein 1880:462; Call 1894:153; 1896:142; 1897:251; 1900:466.

Unio reflexus Conrad

Stein 1880:462.

Obliquaria reflexa Rafinesque

Daniels 1903:649; Goodrich & van der Schalie 1944:318; Parmalee 1967:77; Meyer 1974:23; Clark 1976:4; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Common.

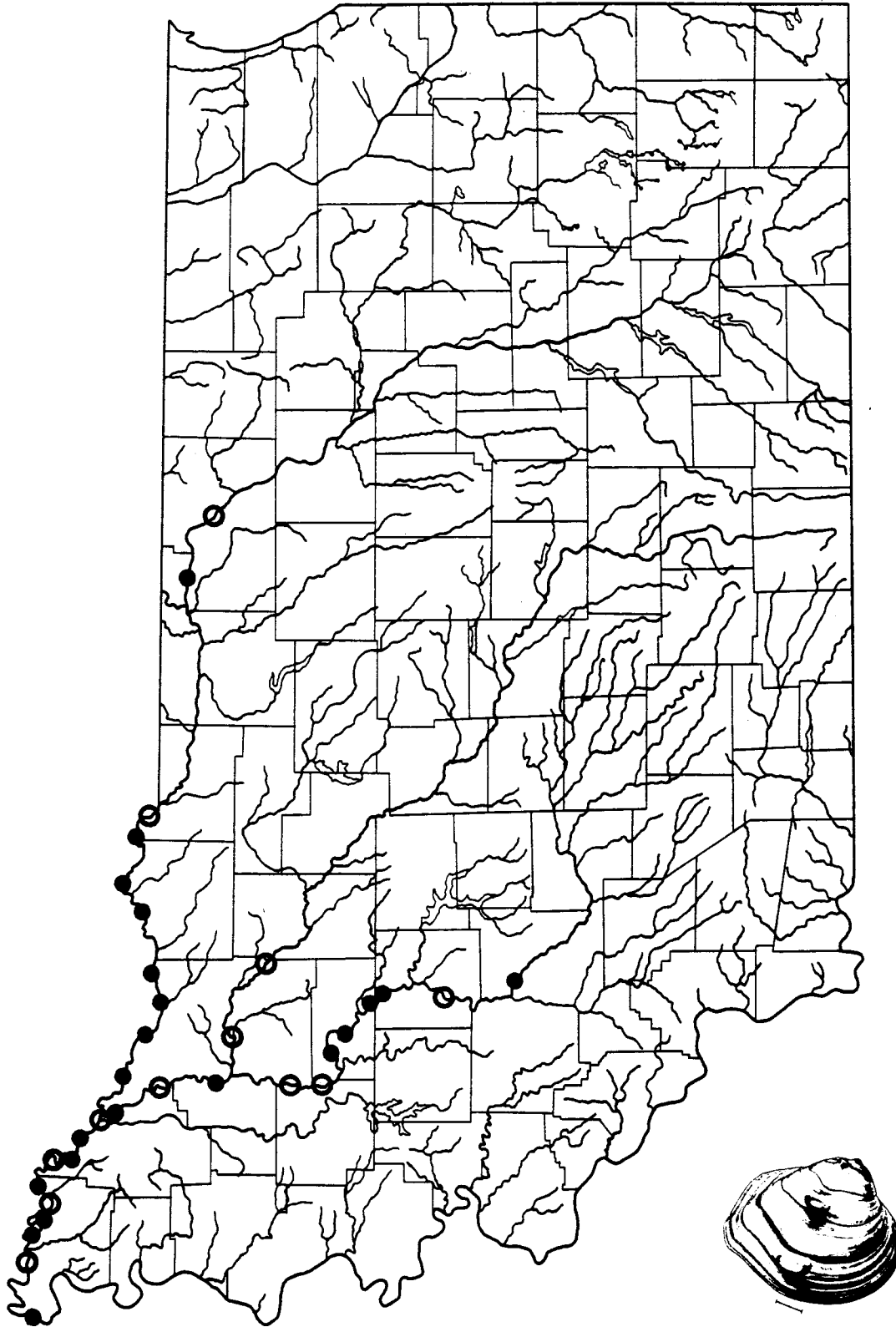
OTHER COMMON NAMES: Three-horned shell, three dot, three knot, hornyback.

HABITAT: Found in large rivers in sand and fine gravel.

REMARKS: The threehorn wartyback was reported by Call (1900) to be one of the most common mussels in Indiana, occurring wherever unionids were found. However, Goodrich and van der Schalie (1944) stated that it was found mainly in large rivers in small numbers. Meyer (1968; 1974) considered *O. reflexa* to be rare throughout the Wabash River in 1966-67, but Clark (1976) listed it as abundant in the lower Wabash by 1975. In the present survey, the threehorn wartyback was common in the Wabash River below Terre Haute and was the most common species found below the mouth of the White. During low water, fresh-dead shells of this species were seen by the hundreds in middens along the shore.

Meyer (1968; 1974) considered *O. reflexa* to be common in the White River in 1966-67. In 1989-91, the three horn wartyback was common in the lower East Fork and White River proper but was not found alive in the West Fork.

Not found in the Tippecanoe River in 1987.



Obliquaria reflexa Rafinesque, 1820
threehorn wartyback

Obovaria olivaria (Rafinesque, 1820)

Hickorynut

ORIGINAL DESCRIPTION: *Amblema olivaria* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales Générales des Sciences Physiques, Bruxelles V. p. 314.

TYPE LOCALITY: Kentucky River. Lectotype ANSP 20251a (Johnson & Baker, 1973).

SYNONYMY:

Unio ellipsis Lea

Stein 1880:464; Call 1894:154; 1896:143; 1897:251; 1900:495.

Obovaria ellipsis (Lea)

Daniels 1903:648; Wilson & Clark 1912:48.

Obovaria olivaria (Rafinesque)

Goodrich & van der Schalie 1944:318; Parmalee 1967:78; Meyer 1974:23; Clark 1976:4; Cummings & Berlocher 1990:87.

STATUS: Common.

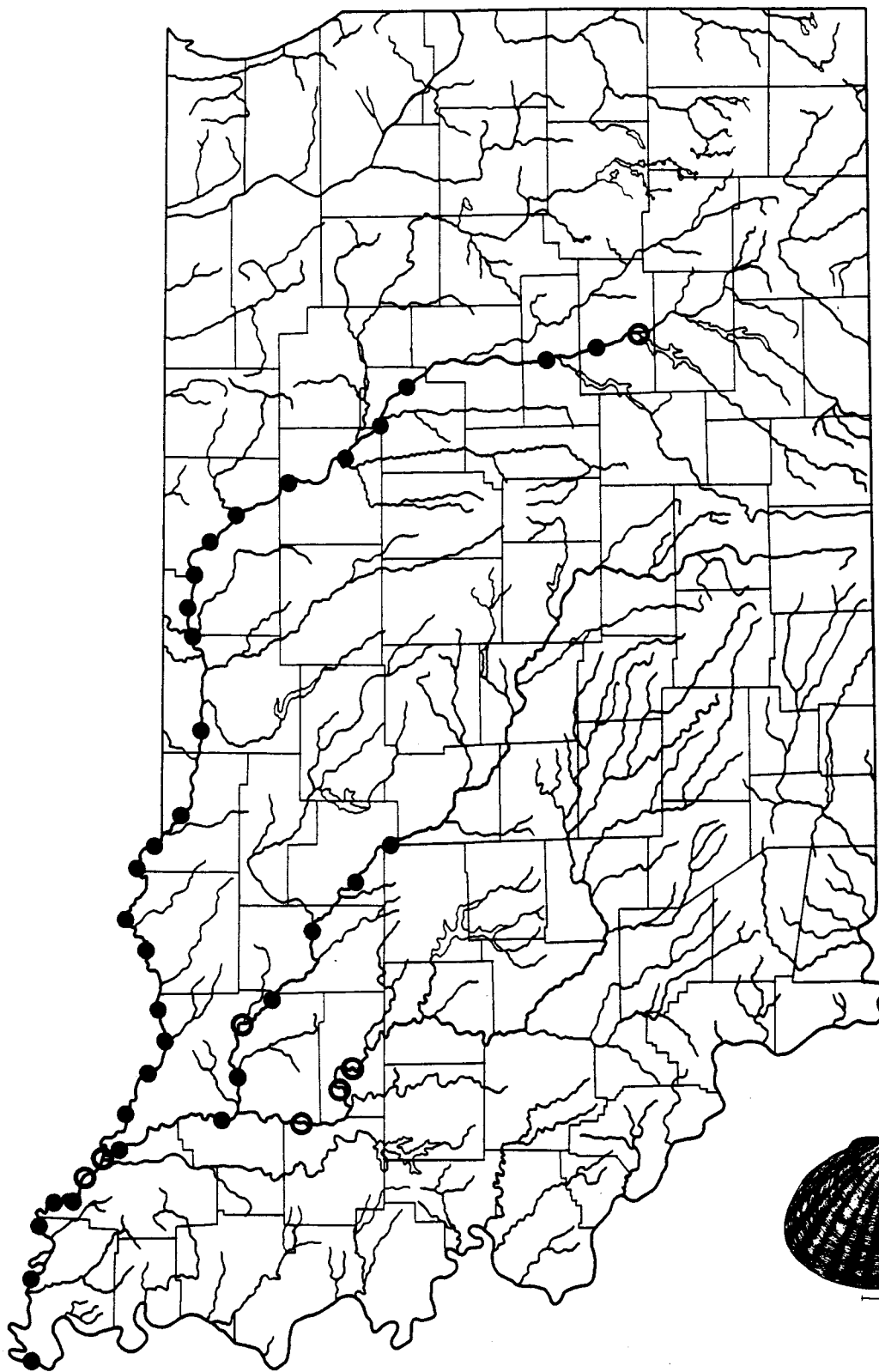
OTHER COMMON NAMES: Eggshell, chestnut shell, glassyback.

HABITAT: Found in large rivers in sand or mixed sand and gravel.

REMARKS: The hickorynut is a large river species and was reported to be abundant in the Wabash and Ohio rivers by Call (1900), and common in the Wabash and White rivers by Goodrich & van der Schalie (1944). Meyer (1968; 1974) noted that *O. olivaria* was abundant in the Wabash River in 1966-67, and Clark (1968) listed it as rather common in the lower Wabash in 1975. This species was the fifth most abundant species found in the lower Wabash in 1987 and fresh-dead shells were common along the shore. The hickorynut was the most abundant species found in the middle and upper Wabash in 1988 and accounted for 30% of all live mussels collected. More live hickorynuts were collected at site 20 (326) than the combined total for 34 species throughout the river.

Meyer (1968; 1974) reported *O. olivaria* as common in the White River in 1966-67. This mussel was found alive at seven of 11 sites in the West Fork and White River proper, but was not collected alive in the East Fork.

Not found in the Tippecanoe River in 1987, weathered-dead shells were found in the lower Tippecanoe River in 1991 (T. Watters, pers. comm.).



Obovaria olivaria (Rafinesque, 1820)
hickorynut

Obovaria retusa (Lamarck, 1819)

Ring pink

ORIGINAL DESCRIPTION: *Unio retusa* Lamarck, 1819. Histoire Naturelle des Animaux sans Vertebres. Vol. 6, p. 72.

TYPE LOCALITY: Nova Scotia [erroneous].

SYNONYMY:

Unio retusus Lamarck

Stein 1880:465; Call 1894:155; 1896:146; 1900:494.

Unio torsa Rafinesque

Stein 1880:465.

Obovaria retusa (Lamarck)

Daniels 1903:648; Goodrich & van der Schalie 1944:318; Parmalee 1967:94; Meyer 1974:23; Clark 1976:4; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Federally Endangered. Extirpated in Indiana.

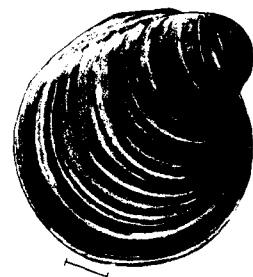
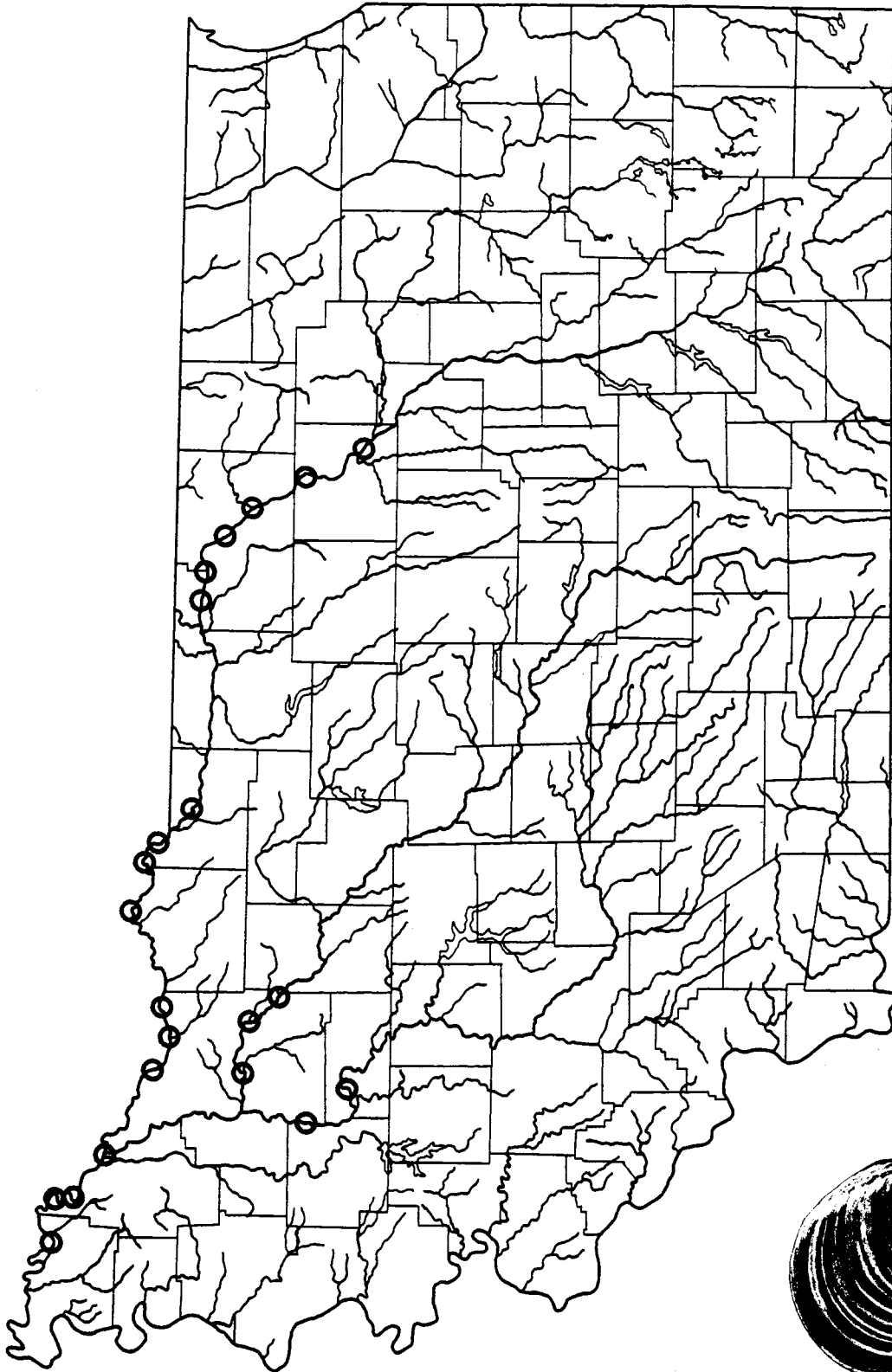
OTHER COMMON NAMES: Golf stick.

HABITAT: Reportedly found in large rivers in gravel riffles.

REMARKS: Noted by Call (1900) to be fairly common in most of the larger streams of the state. Goodrich and van der Schalie (1944) listed its range in Indiana as the Wabash River below Lafayette and the lower White River. Not collected alive in the Wabash River in 1966-67, 1975, or the present survey (Meyer, 1968; 1974; Clark, 1976). Relict shells of the ring pink were found at 17 sites in the Wabash below the mouth of the Tippecanoe River in 1987-88.

Not collected in the White River survey of 1966-67 (Meyer, 1968), weathered-dead shells of the ring pink were found at five sites in lower East and West Forks in 1989-91.

Not collected from the Tippecanoe River in 1987. At one time common in Indiana, no live *O. retusa* have been found in the Wabash River drainage in well over 50 years. This mussel is likely extirpated from Indiana.



Obovaria retusa (Lamarck, 1819)
ring pink

Obovaria subrotunda (Rafinesque, 1820)

Round hickorynut

ORIGINAL DESCRIPTION: *Obliquaria subrotunda* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales Générales des Sciences Physiques, Bruxelles V. p. 308, pl. LXXXI, figs. 21, 22, and 23.

TYPE LOCALITY: Ohio River and tributaries. Neotype ANSP 20254 from the Kentucky River (Johnson & Baker, 1973).

SYNONYMY:

Unio circulus Lea

Stein 1880:465; Call 1894:153; 1896:142; 1897:251; 1900:493;
Kirsch 1896:55.

Unio lens Lea

Stein 1880:465; Call 1894:154; 1896:144; 1897:252.

Unio subrotundus Lea

Call 1894:155.

Obovaria circulus (Lea)

Daniels 1903:648.

Obovaria lens (Lea)

Daniels 1903:648.

Obovaria subrotunda (Rafinesque)

Goodrich & van der Schalie 1944:318; Parmalee 1967:78; Meyer
1974:23; Clark 1976:4; Weilbaker et al. 1985:689; Cummings &
Berlocher 1990:87.

STATUS: Rare.

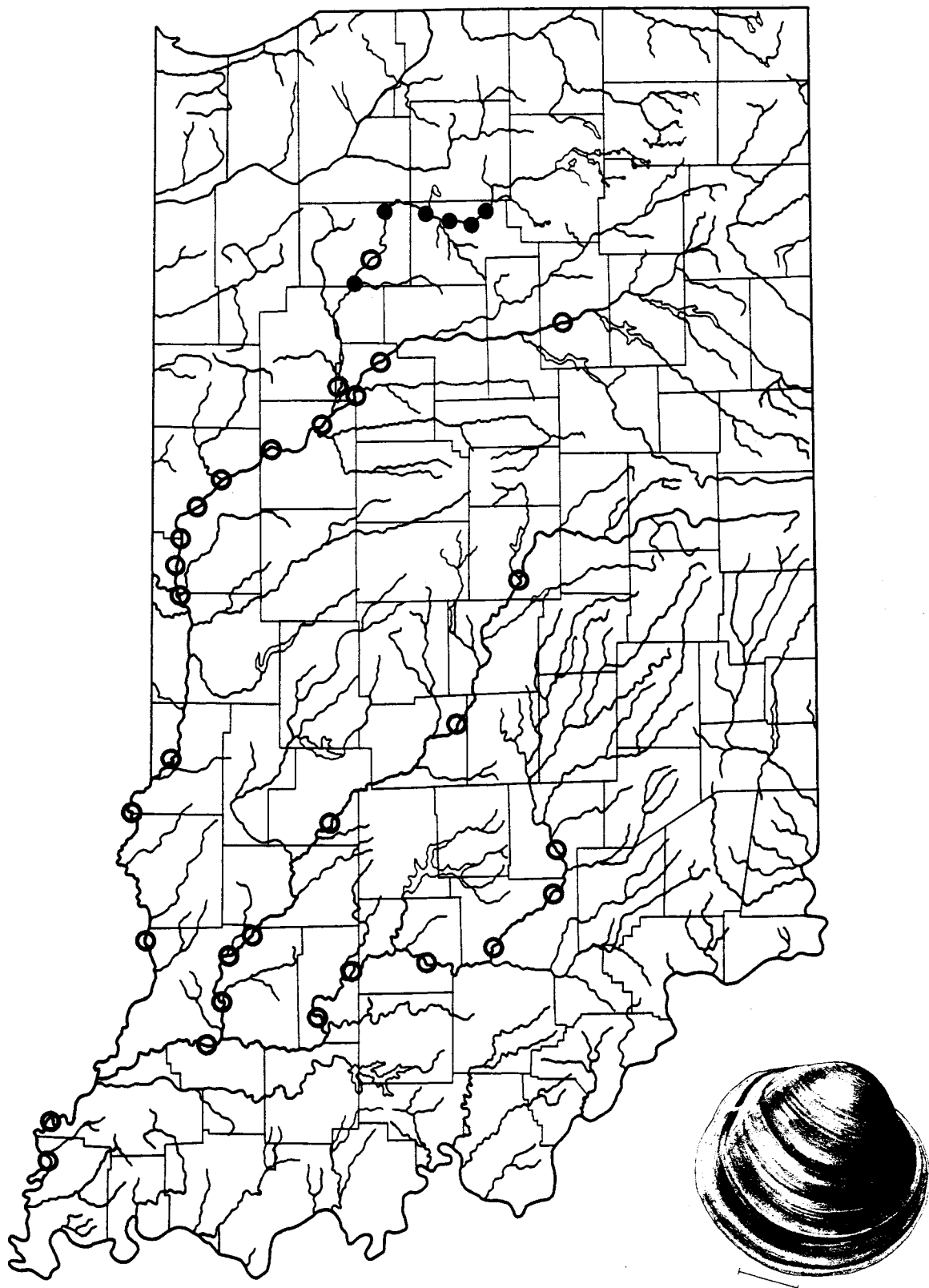
OTHER COMMON NAMES: None.

HABITAT: Found in medium and large streams in mixed sand and gravel.

REMARKS: Both Call (1900) and Goodrich and van der Schalie (1944) reported the round hickorynut as occurring in the White River and as numerous in the lower Wabash River. It was not found in the lower Wabash in 1966-67, 1975, or the present survey (Meyer, 1968; 1974; Clark, 1976). This mussel was considered rare in the upper Wabash by Meyer (1968; 1974) with a few individuals found in the vicinity of Lafayette. No live *O. subrotunda* were collected in the middle and upper Wabash in 1988 and it is probably gone from the Wabash River proper. Relict shells were common indicating its former abundance in the drainage.

The round hickorynut was considered rare in the White River by Meyer (1968) with a few live mussels collected in East Fork between Tunnelton and Hayesville in July of 1967. No live *O. subrotunda* were collected in the White River drainage in 1989-91, but relict shells were found throughout the basin.

Reported by Daniels (1903) in the Tippecanoe River, seventeen live *O. subrotunda* were found at six sites in the mid-portion of the drainage in 1987. This mussel is listed as endangered in Illinois and should be listed as threatened in Indiana.



Obovaria subrotunda (Rafinesque, 1820)
round hickorynut

Potamilus alatus (Say, 1817)

Pink heelsplitter

ORIGINAL DESCRIPTION: *Unio alatus* Say, 1817. Article "Conchology" in William Nicholson. The American Edition of the British Encyclopedia, or Dictionary of Arts and Sciences. Vol. II, B-E. Samuel A. Mitchell and Horace Ames, Philadelphia, no pagination. Pl 4, fig. 2.

TYPE LOCALITY: Lake Erie. Type reported to be at ANSP is presumably lost (Johnson & Baker, 1973). Neotype Senckenberg Museum 4349 (Haas, 1930).

SYNONYMY:

Unio alatus Say

Stein 1880:461; Call 1894:153; 1896:142; 1900:461.

Lampsilis alatus (Say)

Daniels 1903:648; Wilson & Clark 1912:48.

Proptera alata (Say)

Goodrich & van der Schalie 1944:319; Parmalee 1967:81; Meyer 1974:24; Clark 1976:5.

Potamilus alatus (Say)

Weilbaker et al. 1985:690; Cummings & Berlocher 1990:87.

STATUS: Common.

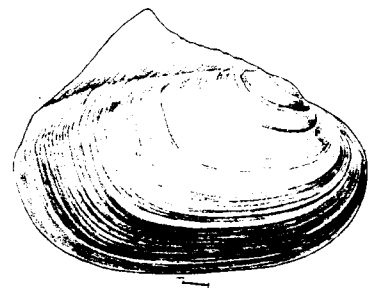
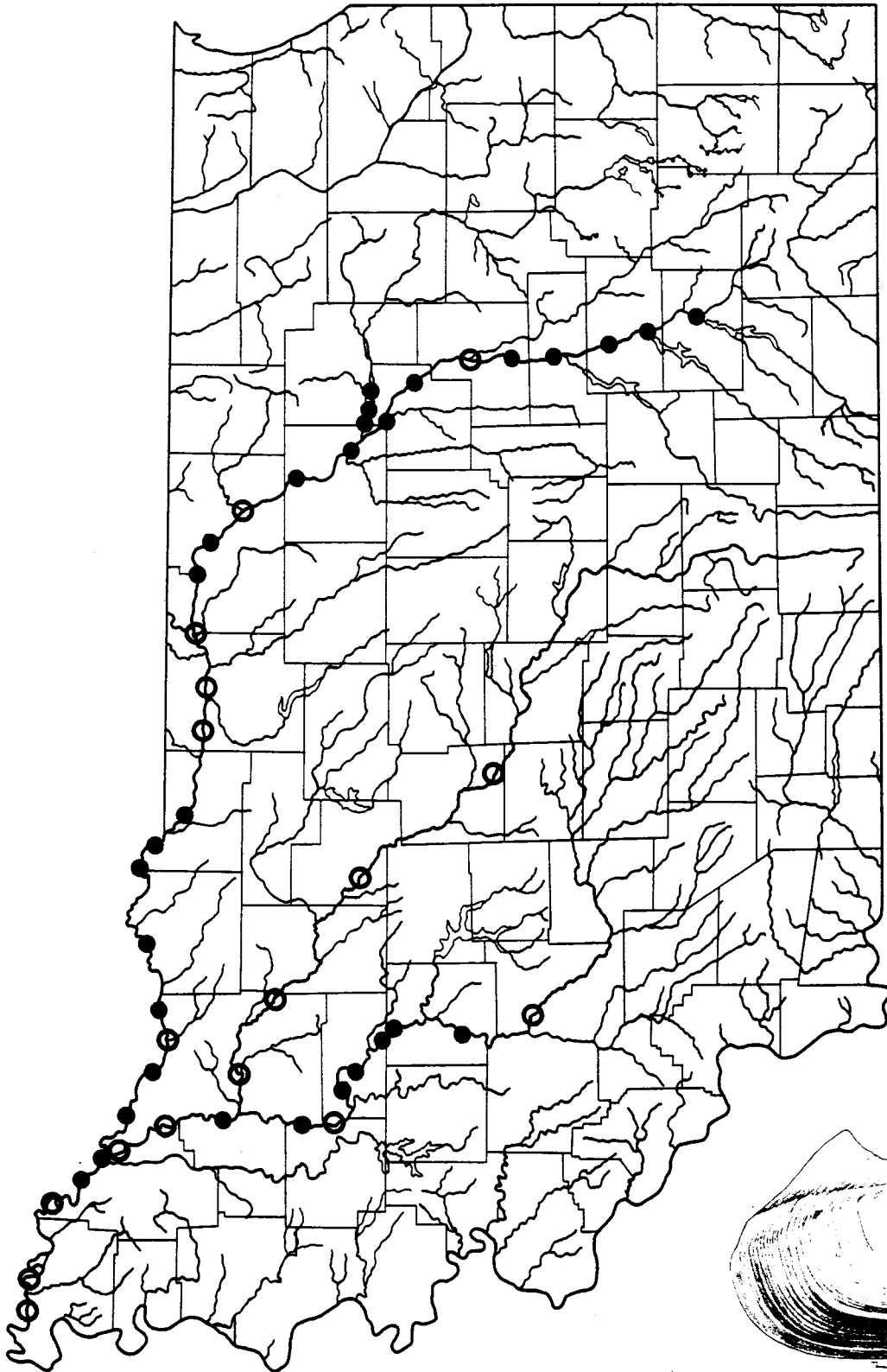
OTHER COMMON NAMES: Pancake, pink hatchet-back, purple heelsplitter.

HABITAT: Found in medium to large rivers in mud and mixed mud and sand.

REMARKS: Reportedly common in the Wabash and White rivers in 1944 (Goodrich & van der Schalie) and 1966-67 (Meyer, 1968; 1974), this species was listed as rare in the lower Wabash in 1975 (Clark, 1976). Only two live individuals were found in the lower Wabash River in 1987. The pink heelsplitter was present in almost every collection in the middle and upper Wabash River in 1988. Usually found in mud or sand, this mussel appears to be doing well in the river today.

Reported by Meyer (1968) as common throughout the White River. *Potamilus alatus* was common in the White River drainage in 1989-91. Live pink heelsplitters were found at seven sites and it ranked fourth in abundance for all species found.

In the Tippecanoe River, the pink heelsplitter was found live at three sites, all in the lower part of the river (below the reservoirs).



Potamilus alatus (Say, 1817)
pink heelsplitter

Potamilus capax (Green, 1832)

Fat pocketbook

ORIGINAL DESCRIPTION: *Unio capax* Green, 1832. Cabinet of Natural History and American Rural Sports. Vol. 2, p. 290.

TYPE LOCALITY: [Mississippi River] Falls of St. Anthony [Minneapolis, Hennipin County, Minnesota]. Type presumably lost (Johnson, 1980).

SYNONYMY:

Unio capax Green
Stein 1880:464; Call 1894:153; 1896:142; 1897:251; 1900:482.
Lampsilis capax (Green)
Daniels 1903:647.
Proptera capax (Green)
Goodrich & van der Schalie 1944:319; Parmalee 1967:83; Meyer
1974:24; Clark 1976:5.

STATUS: Federally Endangered.

OTHER COMMON NAMES: Pocketbook, grandmaw.

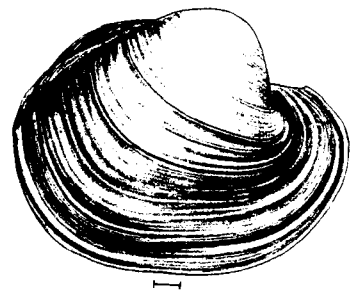
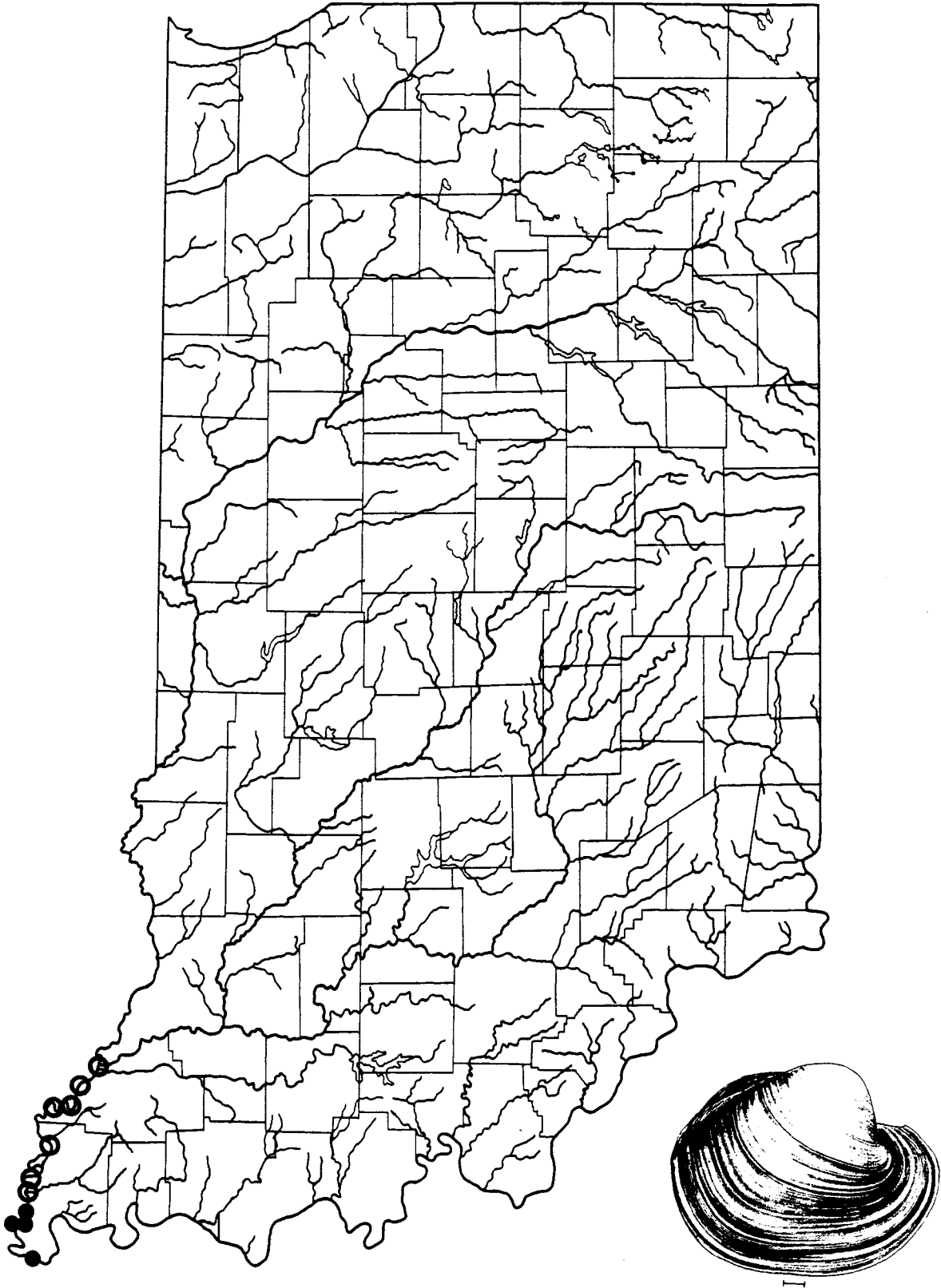
HABITAT: Found in large rivers in mixed silt, mud, and sand.

REMARKS: Call (1900) stated that *P. capax* was "by no means a common shell in Indiana" and listed the Wabash and Ohio rivers as localities. The fat pocketbook was considered rare in the lower Wabash and Ohio rivers by Goodrich & van der Schalie (1944), and *P. capax* was not found in the Wabash or White rivers in 1966-67 (Meyer, 1968; 1974). Two live fat pocketbooks were found in the lower Wabash near New Harmony and Mackey Island in 1975 (Clark, 1976).

Two live fat pocketbooks were found at the Old Dam, south of New Harmony in 1984. Nine live *P. capax* were found in the lower Wabash River in 1987. All were collected in water 10 to 12 feet deep in mixed silt, mud, and sand. Ahlstedt & Jenkinson (1987) reported collecting *P. capax* in similar habitat in the St. Francis River drainage, Arkansas. Both juveniles and adults were found and it appeared that a reproducing population was present. Subsequent sampling in the lower Wabash River has turned up additional sites and it appears to be doing well in some areas in the lower Wabash River (Cummings et al., 1990, and unpublished data).

Records of *P. capax* in the Wabash River above the mouth of the White River are rare. Two specimens dated 17 September 1966 were collected at Vincennes, Knox County, Indiana (FMNH 168823). No evidence of this species was found in middle or upper Wabash River in 1988.

No live or dead *P. capax* were found in the White River in 1966-67 (Meyer, 1968; 1974) or in the present survey. Historical records for the fat pocketbook in the White River drainage are available from Gibson (UMMZ 67825), Pike (INHS 9590), Knox (OSUM 38794), and Owen counties (USNM 308866).



Potamilus capax (Green, 1832)
fat pocketbook

Potamilus ohioensis (Rafinesque, 1820)

Pink papershell

ORIGINAL DESCRIPTION: *Anodonta ohioensis* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 316.

TYPE LOCALITY: Ohio River and tributaries. Type presumably lost (Johnson & Baker, 1973).

SYNONYMY:

- Unio laevisimus* Lea
Stein 1880:461; Call 1894:154; 1897:252; 1900:462.
- Lampsilis laevisimus* (Lea)
Daniels 1903:648.
- Leptodea laevisima* (Lea)
Goodrich & van der Schalie 1944:316; Parmalee 1967:74; Meyer
1974:23; Clark 1976:4.
- Potamilus ohioensis* (Rafinesque)
Weilbaker et al. 1985:690.

STATUS: Common.

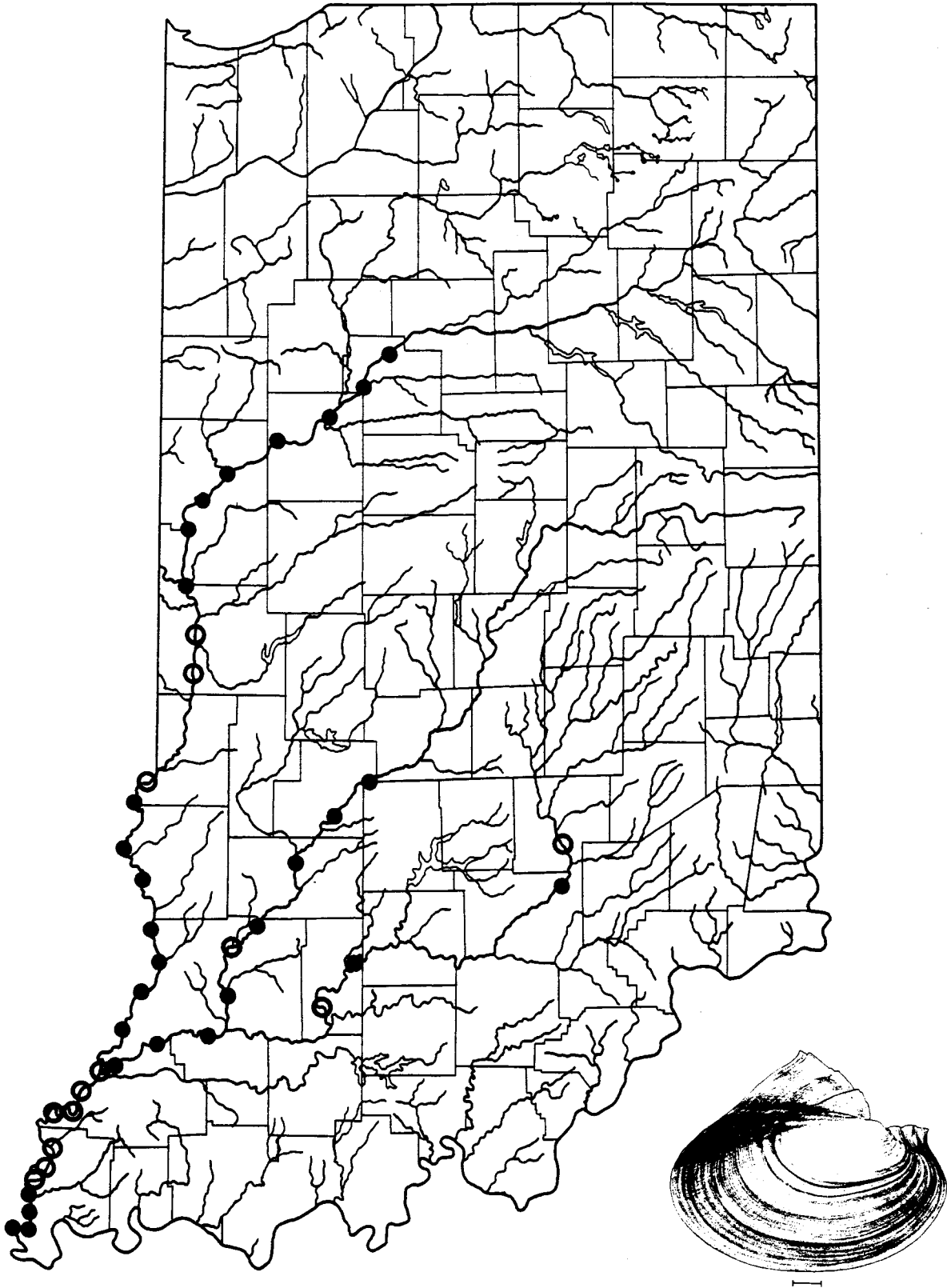
OTHER COMMON NAMES: Papershell, fragile heelsplitter.

HABITAT: Found in medium to large rivers in mud or mixed mud and sand.

REMARKS: Reported as rare in the Ohio and lower Wabash rivers in Indiana by Goodrich and van der Schalie (1944). Only one specimen was collected in the lower Wabash in 1966-67 (Meyer, 1968; 1974). However, Clark (1976) reported this species as common in the lower Wabash in 1975. In 1987, six live pink papershells were found and numerous fresh-dead shells were present on exposed shoals and river banks in the lower Wabash. *Potamilus ohioensis* is usually associated with quiet waters in mud and sand, which may account for its widespread occurrence in the increasingly silty lower Wabash River. In 1988, the pink papershell was present at nearly every location in the middle Wabash River below Lafayette.

No live individuals of *P. ohioensis* were found in the White River in 1966-67 (Meyer, 1968; 1974). In 1989-91 the pink papershell was widely distributed in the lower half of the drainage and found living at 10 of 13 sites where shells were found. This species was collected in mud or sand in pools with other thin-shelled species.

Not found in the Tippecanoe River in 1987.



Potamilus ohioensis (Rafinesque, 1820)
pink papershell

Ptychobranhus fasciolaris (Rafinesque, 1820)

Kidneyshell

ORIGINAL DESCRIPTION: *Obliquaria fasciolaris* Rafinesque, 1820. Monographie des coquilles bivalves fluviales de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales G n rales des Sciences Physiques, Bruxelles V. p. 303.

TYPE LOCALITY: Ohio, Wabash, and Kentucky rivers. Lectotype ANSP 20253 from the Kentucky River (Johnson & Baker, 1973).

SYNONYMY:

Unio camelus Lea

Call 1894:153; 1896:142.

Unio phaseolus Hildreth

Stein 1880:465; Call 1894:153; 1896:145; 1900:454; Kirsch 1896:54.

Unio planulatus Lea

Stein 1880:465.

Ptychobranhus phaseolus (Hildreth)

Daniels 1903:649; Wilson & Clark 1912:48.

Ptychobranhus fasciolaris (Rafinesque)

Goodrich & van der Schalie 1944:319; Parmalee 1967:83; Meyer 1974:24; Clark 1976:5; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Common in the Tippecanoe. Rare in the White and Wabash rivers.

OTHER COMMON NAMES: None.

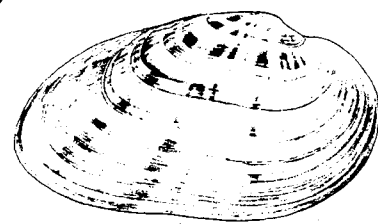
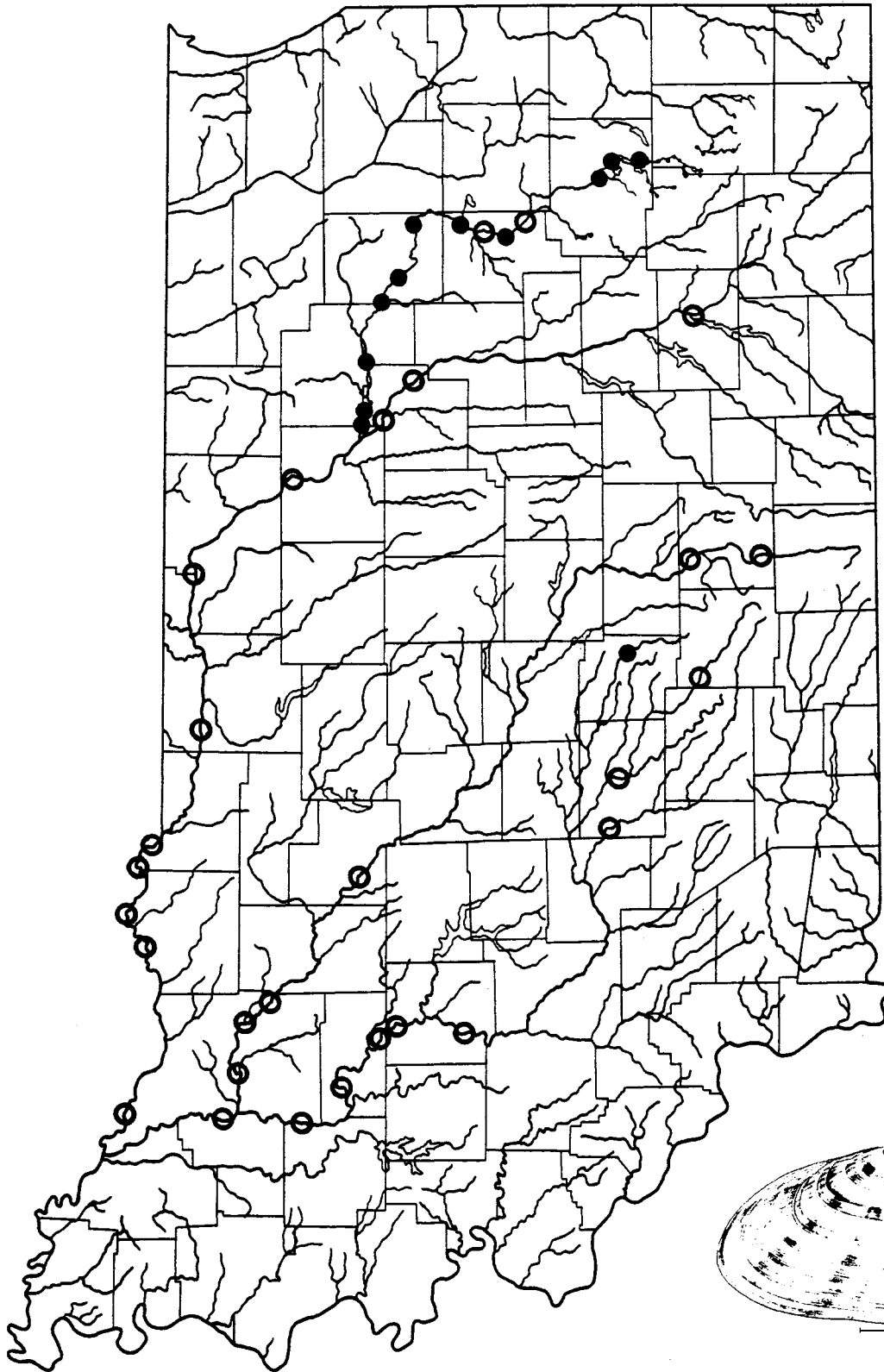
HABITAT: Found in medium to large rivers in gravel.

REMARKS: Reported by Call (1900) to be abundant in the Wabash River. Goodrich and van der Schalie (1944) noted that this species was usually found in small streams and was rare in large rivers. Not collected alive in the Wabash River in 1966-67, 1975, or the present survey (Meyer, 1968; 1974, Clark, 1976).

Not found in the 1966-67 survey of the White River (Meyer, 1968; 1974). Only three live kidneyshells were found in Sugar Creek in 1989-91. At one time common in the White River, relict shells were found at 15 sites in the drainage.

Reported by Daniels (1903) from the Tippecanoe River, *P. fasciolaris* was widespread and common in the river in 1987. The kidneyshell was found throughout the river but was most abundant in the upper half and was the dominant species found at sites 2 and 3. This species ranked third in abundance overall with 132 individuals found.

Widespread and common in historical times the kidneyshell may be extirpated from the Wabash and White rivers. Given the drastic reduction of this species in the drainage, *P. fasciolaris* should be listed as threatened in Indiana.



Ptychobranthus fasciolaris (Rafinesque, 1820)
kidneyshell

Toxolasma lividus (Rafinesque, 1831)

Purple lilliput

ORIGINAL DESCRIPTION: *Unio lividus* Rafinesque, 1831. Continuation of a Monograph of the Bivalve Shells of the River Ohio, and other Rivers of the Western States. Containing 46 Species, from No. 76, to No. 121. Including an Appendix on some Bivalve Shells of the Rivers of Hindostan, with a supplement of the Fossil Bivalve Shells of the Western States, and the Tulosites, a new Genus of Fossils. Philadelphia. p. 2.

TYPE LOCALITY: Rockcastle River [Kentucky].

SYNONYMY:

Unio glans Lea

Stein 1880:465; Call 1894:154; 1896:143; 1897:252; 1900:514.

Lampsilis glans (Lea)

Daniels 1903:648; Wilson & Clark 1912:48.

Carunculina glans (Lea)

Goodrich & van der Schalie 1944:313; Parmalee 1967:59; Meyer 1974:22; Clark 1976:4.

Toxolasma lividus (Rafinesque)

Cummings & Berlocher 1990:87.

STATUS: Federal Candidate for listing.

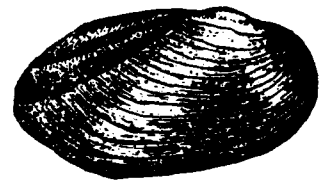
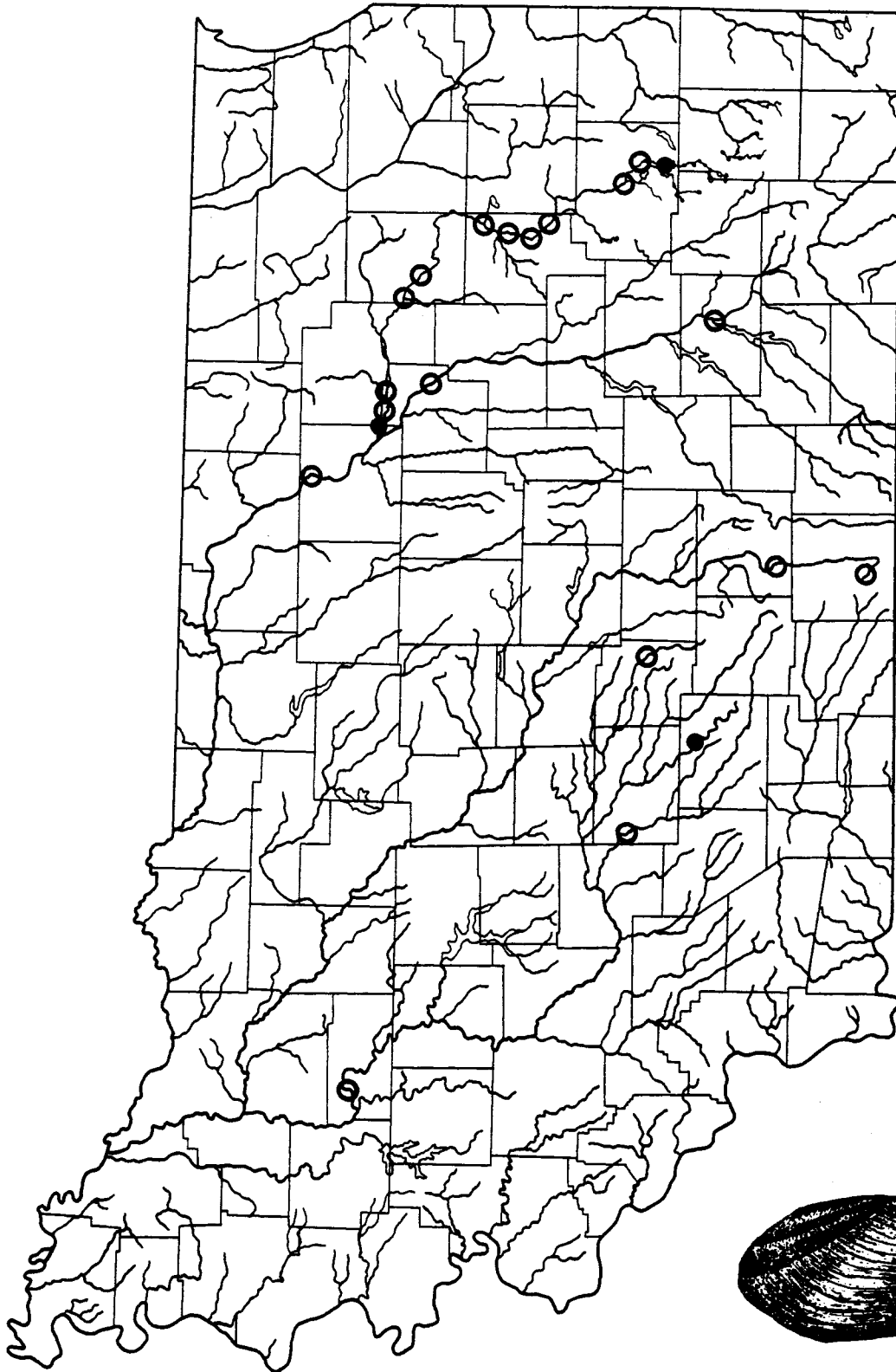
OTHER COMMON NAMES: Little purple.

HABITAT: Found in lakes and small to medium streams in gravel.

REMARKS: Although reported from the Wabash and White rivers by Goodrich and van der Schalie (1944), this species is characteristic of small to medium high gradient streams and was not collected live in the Wabash in 1966-67, 1975, or the present survey (Meyer, 1968; 1974; Clark, 1976). Weathered-dead shells were found at three sites in the middle and upper Wabash River in 1988.

The purple lilliput was not collected in the White River in 1966-67 (Meyer, 1968). One live *T. lividus* was found at site 16 in the Little Blue River (East Fork White River drainage) in 1989. Shells were found at five other sites, four of which were in the upper half of the drainage. This species was also found living in Sugar Creek in 1990 (Harmon, 1990).

The purple lilliput was present throughout the Tippecanoe River, but was found alive only at the extreme upper and lower ends. Given the small size of this mussel and the presence of fresh-dead shells at many of the sites, it is probably more widespread in the Tippecanoe River than our collections indicate. Stansbery (1970) regarded *T. lividus* as on the verge of extinction. Although not currently listed in Indiana, *Toxolasma lividus* should be listed as endangered in the next revision of the list.



Toxolasma lividus (Rafinesque, 1831)
purple lilliput

Toxolasma parvus (Barnes, 1823)

Lilliput

ORIGINAL DESCRIPTION: *Unio parvus* Barnes, 1823. On the genera *Unio* and *Alasmodonta*: with introductory remarks. The American Journal of Science and Arts. Vol. VI, pp. 174-175, pl. 13, fig. 18.

TYPE LOCALITY: Fox River.

SYNONYMY:

- Unio parvus* Barnes
Stein 1880:464; Call 1894:155; 1896:145; 1897:252; 1900:512.
- Lampsilis parvus* (Barnes)
Daniels 1903:648.
- Carunculina parva* (Barnes)
Goodrich & van der Schalie 1944:313; Parmalee 1967:59; Meyer
1974:22; Clark 1976:4.
- Toxolasma parvus* (Barnes)
Cummings & Berlocher 1990:87.

STATUS: Rare.

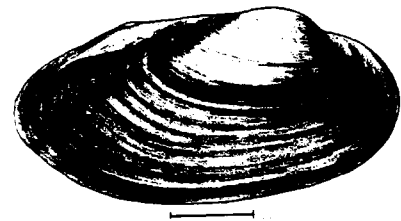
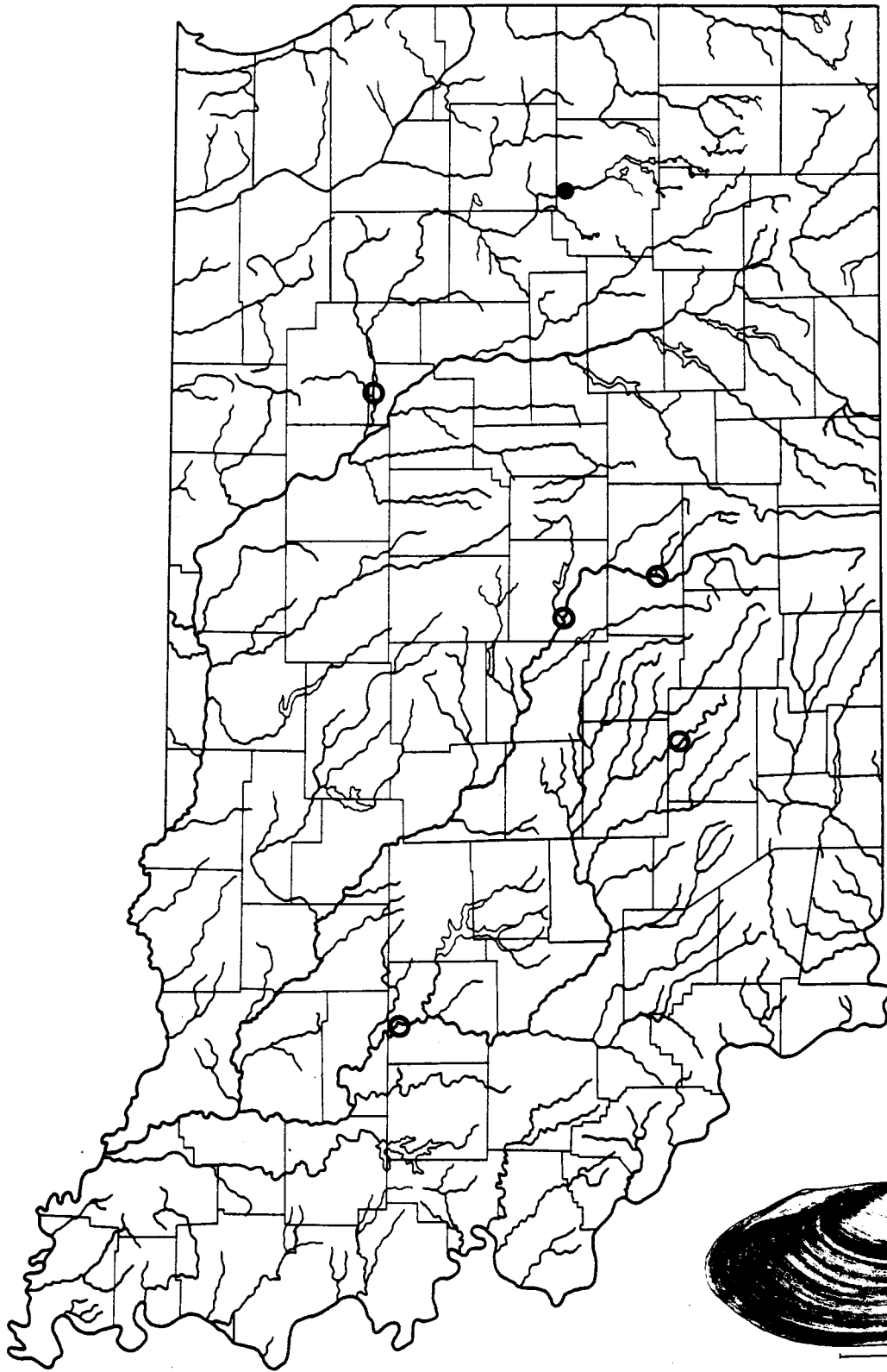
OTHER COMMON NAMES: None.

HABITAT: Found in small to medium streams and ponds in mud, sand, or fine gravel.

REMARKS: Reported as widely distributed throughout the rivers of Indiana, but most common in the headwaters of streams that drain into the Ohio (Goodrich and van der Schalie, 1944). Unlike the purple lilliput, which inhabits gravel-bottomed streams with good current, *T. parvus* is often found in lakes and quiet water areas in streams. Although reported from the lower Wabash River at New Harmony (Goodrich & van der Schalie, 1944), *T. parvus* is most often found in smaller rivers. It was not found in the Wabash River in 1966-67, 1975, or the present survey (Meyer, 1968; 1974; Clark, 1976).

Not found alive in the White River in 1966-67 (Meyer, 1968; 1974). In 1989-91, shells of the lilliput were present at four sites and it most likely is still extant in the smaller streams and lakes in the drainage.

The lilliput was collected at two sites in the Tippecanoe River in 1987, but was live only at site 4. Its apparent rarity may be due to its small size or to its preference for lower gradient streams.



Toxolasma parvus (Barnes, 1823)
lilliput

Toxolasma texasensis (I. Lea, 1857)

Texas lilliput

ORIGINAL DESCRIPTION: *Unio texasiensis* I. Lea, 1857. Description of eight new species of naiades from various parts of the United States. Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. IX New Series. March 1857. p. 84.

TYPE LOCALITY: Dewitt County, Texas.

SYNONYMY:

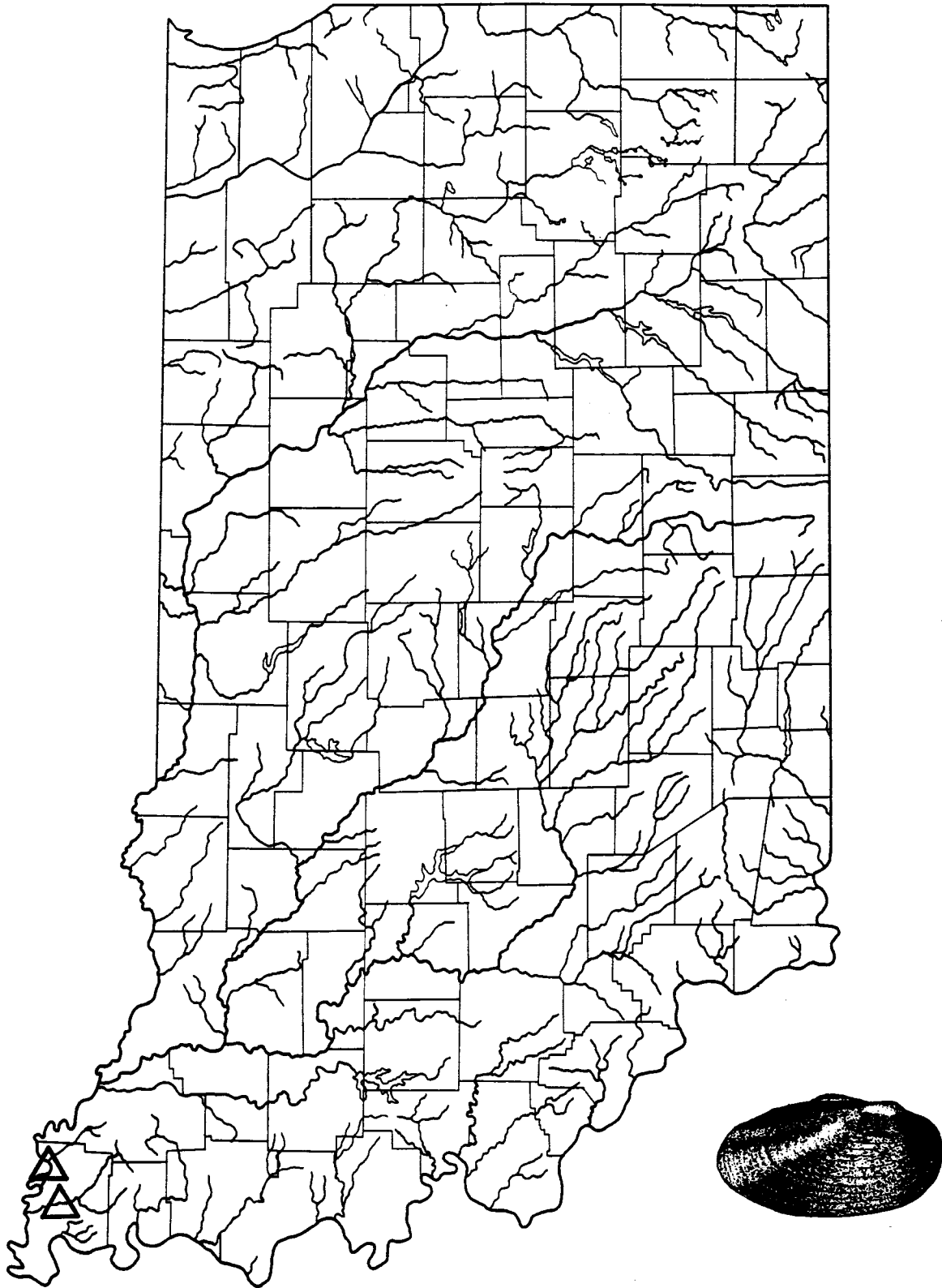
Lampsilis texasensis (Lea)
Baker 1906:67.
Carunculina texasensis (Lea)
Parmalee 1967:60.

STATUS: Rare.

OTHER COMMON NAMES: None.

HABITAT: Found in small streams in mud, sand, or fine gravel.

REMARKS: Considered by Call (1896) to be a distinct species, *T. texasensis* was not thought to range north of Texas and Louisiana. No Texas lilliputs were found in this or any previous study of the Wabash River. This mussel is found in a few of the coastal plain streams in southern Illinois and museum records are available for tributaries to the Wabash River in Posey County, Indiana. Additional collecting in the smaller drainages of the lower Wabash and Ohio rivers may turn up extant populations.



Toxolasma texasensis (I. Lea, 1857)

Texas lilliput

Truncilla donaciformis (I. Lea, 1828)

Fawnsfoot

ORIGINAL DESCRIPTION: *Unio donaciformis* I. Lea, 1828. Description of six new species of the genus *Unio*, embracing the anatomy of the oviduct of one of them, together with some anatomical observations on the genus. Transactions of the American Philosophical Society. Vol. III New Series, pp. 267-268, pl. IV, fig. 3.

TYPE LOCALITY: Ohio. Figured holotype USNM 84457 (Johnson & Baker, 1973).

SYNONYMY:

- Unio donaciformis* Lea
Stein 1880:463; Call 1894:154; 1896:143; 1897:251; 1900:472.
- Unio zig-zag* Lea
Stein 1880:463; Call 1894:156; 1897:252.
- Plagiola donaciformis* (Lea)
Daniels, 1903:648.
- Truncilla donaciformis* (Lea)
Goodrich & van der Schalie 1944:319; Parmalee 1967:85; Meyer
1974:24; Clark 1976:5; Weilbaker et al. 1985:689; Cummings &
Berlocher 1990:87.

STATUS: Common.

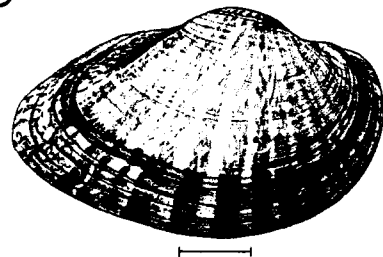
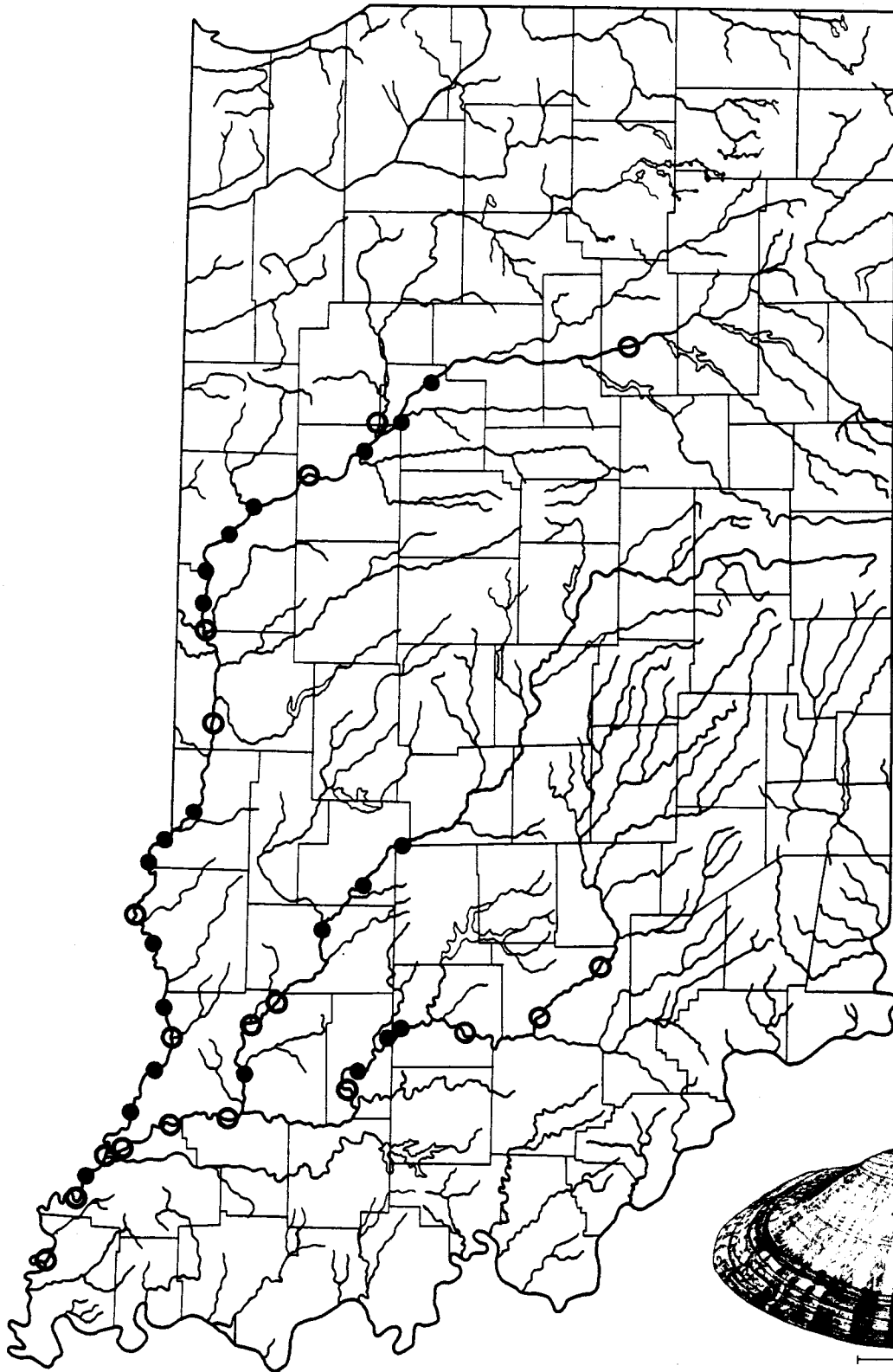
OTHER COMMON NAMES: Little pocketbook.

HABITAT: Found in large rivers in mud and mixed sand and gravel.

REMARKS: The fawnsfoot was reported as relatively rare in Indiana, but present in the Ohio, Wabash, and White rivers (Goodrich and van der Schalie, 1944). It was not collected in the Wabash River in 1966-67 (Meyer, 1968; 1974) and was listed as rare in the lower Wabash in 1975 (Clark, 1976). Although only one live individual of *T. donaciformis* was found in the lower Wabash River in 1987, it was common in collections made at Mt. Carmel in 1984-85. The fawnsfoot was common in the middle and upper Wabash River in 1988 and was present at every site except one from station 7 downstream.

The fawnsfoot was not collected in the White River in 1966-67 (Meyer, 1968; 1974). In 1989-91, *T. donaciformis* was found alive at seven of 16 sites where shells were present, all in the lower half of the drainage.

Reported from the Tippecanoe River by Daniels (1903), fresh-dead shells of the fawnsfoot were collected at the furthest downstream site in the river (site 16) in 1987. Additional sampling in the lower Tippecanoe River will probably turn up live *T. donaciformis*.



Truncilla donaciformis (I. Lea, 1828)
fawnsfoot

Truncilla truncata Rafinesque, 1820

Deertoe

ORIGINAL DESCRIPTION: *Truncilla truncata* Rafinesque, 1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes. Annales Générales des Sciences Physiques, Bruxelles V. p. 301.

TYPE LOCALITY: [Ohio River]. Lectotype ANSP 20217 from the Falls of the Ohio River (Johnson & Baker, 1973).

SYNONYMY:

Unio elegans Lea

Stein 1880:463; Call 1894:154; 1896:143; 1897:251; 1900:471.

Unio truncatus Say

Stein 1880:463.

Plagiola elegans (Lea)

Daniels 1903:648.

Truncilla truncata Rafinesque

Goodrich & van der Schalie 1944:319; Parmalee 1967:86; Meyer 1974:24; Clark 1976:5; Weilbaker et al. 1985:689; Cummings & Berlocher 1990:87.

STATUS: Common.

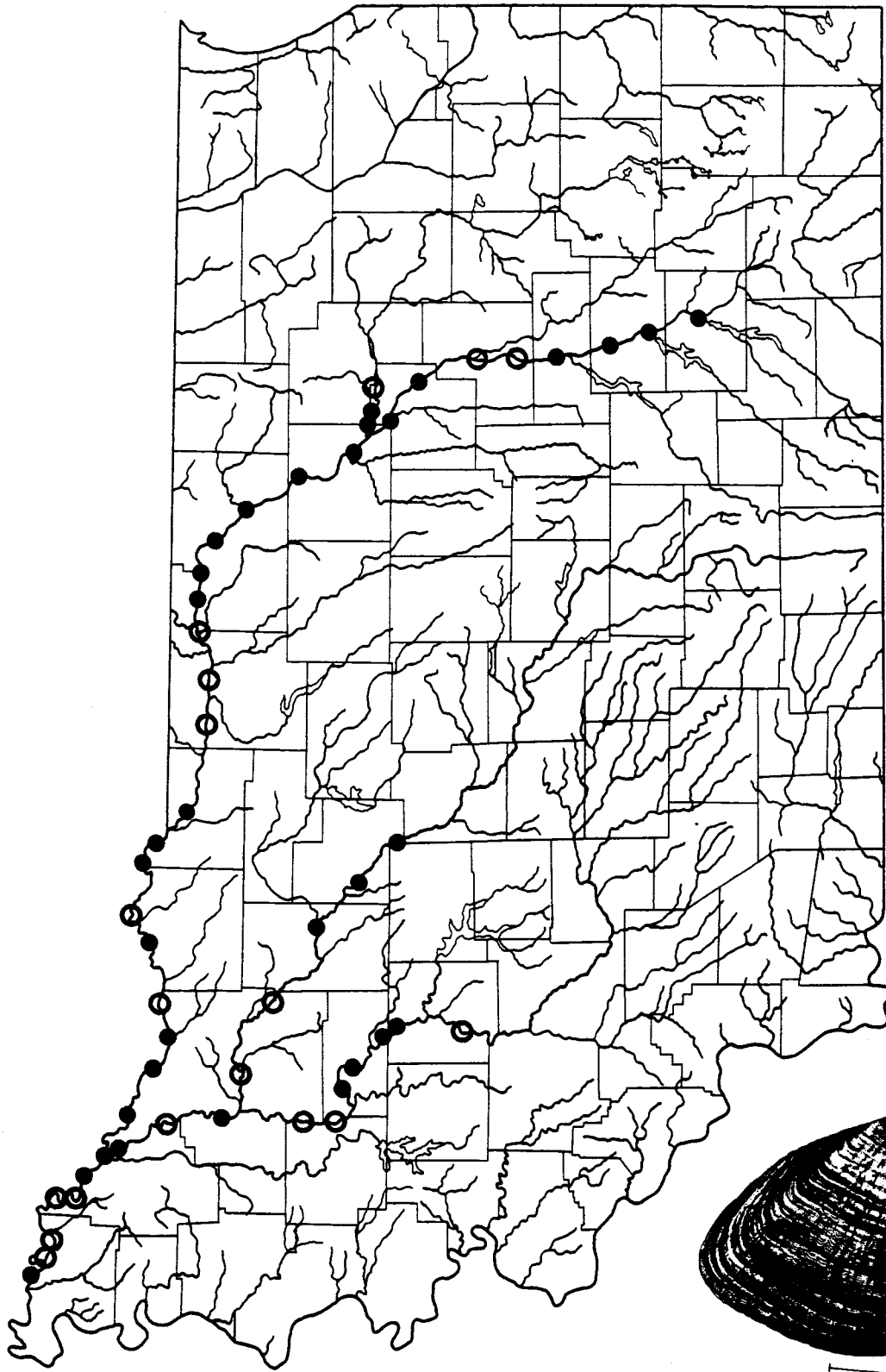
OTHER COMMON NAMES: Deerhorn.

HABITAT: Found in medium to large rivers in sand or mixed sand and gravel.

REMARKS: The deertoe was reported to be abundant in the White and Wabash rivers by Call (1900). *Truncilla truncata* was listed as rare in the lower Wabash in 1966-67 and 1975 (Meyer, 1968; 1974; Clark, 1976). While only seven live specimens were collected in the lower Wabash in 1987, numerous fresh-dead shells were found on the shoals and in middens along shore, suggesting that this species is still relatively common in this part of the river. The deertoe was common in collections made in the middle and upper Wabash River in 1988, and was one of only three species found at every site sampled. It ranked fifth in order of abundance for the river as a whole and was live at 19 of the 26 sites sampled in 1988.

The deertoe was reported to be abundant in the White River by Call (1900), but was found to be rare by 1966-67 (Meyer, 1968; 1974). *Truncilla truncata* was relatively common in collections made in the White River in 1989-91. This relatively small mussel is not usually picked up on a crowfoot bar and its rarity in the 1966-67 survey may be attributable to sampling inefficiency. The deertoe was found alive at nine of 15 stations and ranked twelfth in order of abundance for the White River drainage.

Reported by Daniels (1903) from the Tippecanoe River, live *T. truncata* were collected only in the downstream section of the river at sites 14, 15, and 16.



Truncilla truncata Rafinesque, 1820
deertoe

Villosa fabalis (I. Lea, 1831)

Rayed bean

ORIGINAL DESCRIPTION: *Unio fabalis* I. Lea, 1831. Observations on the naiades, and descriptions of new species of that and other families. Transactions of the American Philosophical Society. Vol. IV New Series, p. 86, pl. X, fig. 16.

TYPE LOCALITY: Ohio River. Figured holotype USNM 85270a (Johnson & Baker, 1973).

SYNONYMY:

Unio fabalis Lea

Stein 1880:464; Call 1894:154; 1896:143; 1897:251; 1900:458.

Micromya fabalis (Lea)

Daniels 1903:646; Goodrich & van der Schalie 1944:317.

Micromya fabale (Lea)

Wilson & Clark 1912:51.

Villosa (= *Micromya*) *fabalis* (Lea)

Parmalee 1967:94.

Villosa fabalis (Lea)

Cummings & Berlocher 1990:87.

STATUS: Federal candidate for listing.

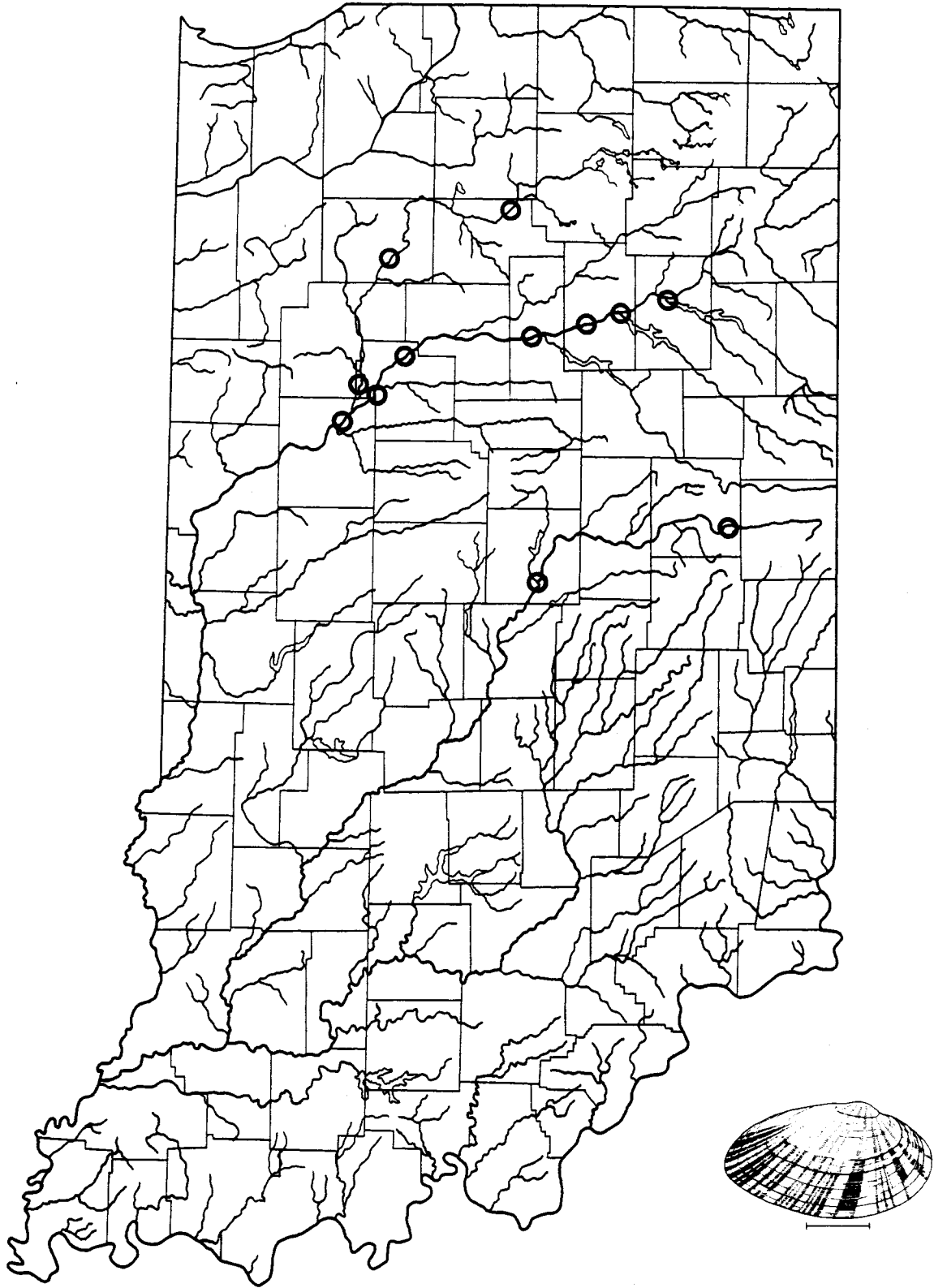
OTHER COMMON NAMES: Bean shell.

HABITAT: Found in lakes and streams of all sizes in sand and gravel.

REMARKS: *Villosa fabalis* was considered to be common in the Wabash and White rivers and Tippecanoe Lake by Call (1900) and was reported from the Tippecanoe River by Daniels (1903). It was not found alive in the Wabash River in 1966-67, 1975, or in the present survey (Meyer, 1968; 1974; Clark, 1976). Relict shells were found at seven sites in the Wabash River upstream of Lafayette in 1988.

The rayed bean was not found in the White River in 1966-67 (Meyer, 1968; 1974). Weathered-dead shells were found at two sites in 1989-91, both of which were located in the upper portion of the West Fork.

Only relict shells of *V. fabalis* were found at three widely separated sites in the Tippecanoe River in 1987. However, a live rayed bean was found at site 16 in 1991 (T. Watters, pers. comm.). As it is frequently associated with lakes, *V. fabalis* may occur in the natural lakes in the upstream portion of the drainage. Presently listed as a Species of Special Concern in Indiana, this mussel should be listed as endangered.



Villosa fabalis (I. Lea, 1831)
rayed bean

Villosa iris (I. Lea, 1829)

Rainbow

ORIGINAL DESCRIPTION: *Unio iris* I. Lea, 1829. Description of a new genus of the family of naiades, including eight species, four of which are new; also the description of eleven new species of the genus *Unio* from the rivers of the United States: with observations on some of the characters of the naiades. Transactions of the American Philosophical Society. Vol. III New Series. p. 439, pl. XI, fig. 18.

TYPE LOCALITY: Ohio.

SYNONYMY:

Unio iris Lea

Call 1894:154; 1896:144; 1897:252; 1900:456; Kirsch 1896:55.

Unio novi-eboraci Lea

Stein 1880:465.

Lampsilis iris (Lea)

Daniels 1903:647; Wilson & Clark 1912:49.

Micromya iris (Lea)

Goodrich & van der Schalie 1944:317; Parmalee 1956:186; Clark 1976:4.

Villosa (= *Micromya*) *iris* (Lea)

Parmalee 1967:75.

Villosa iris (Lea)

Weilbaker et al. 1985:690; Cummings & Berlocher 1990:87.

STATUS: Rare.

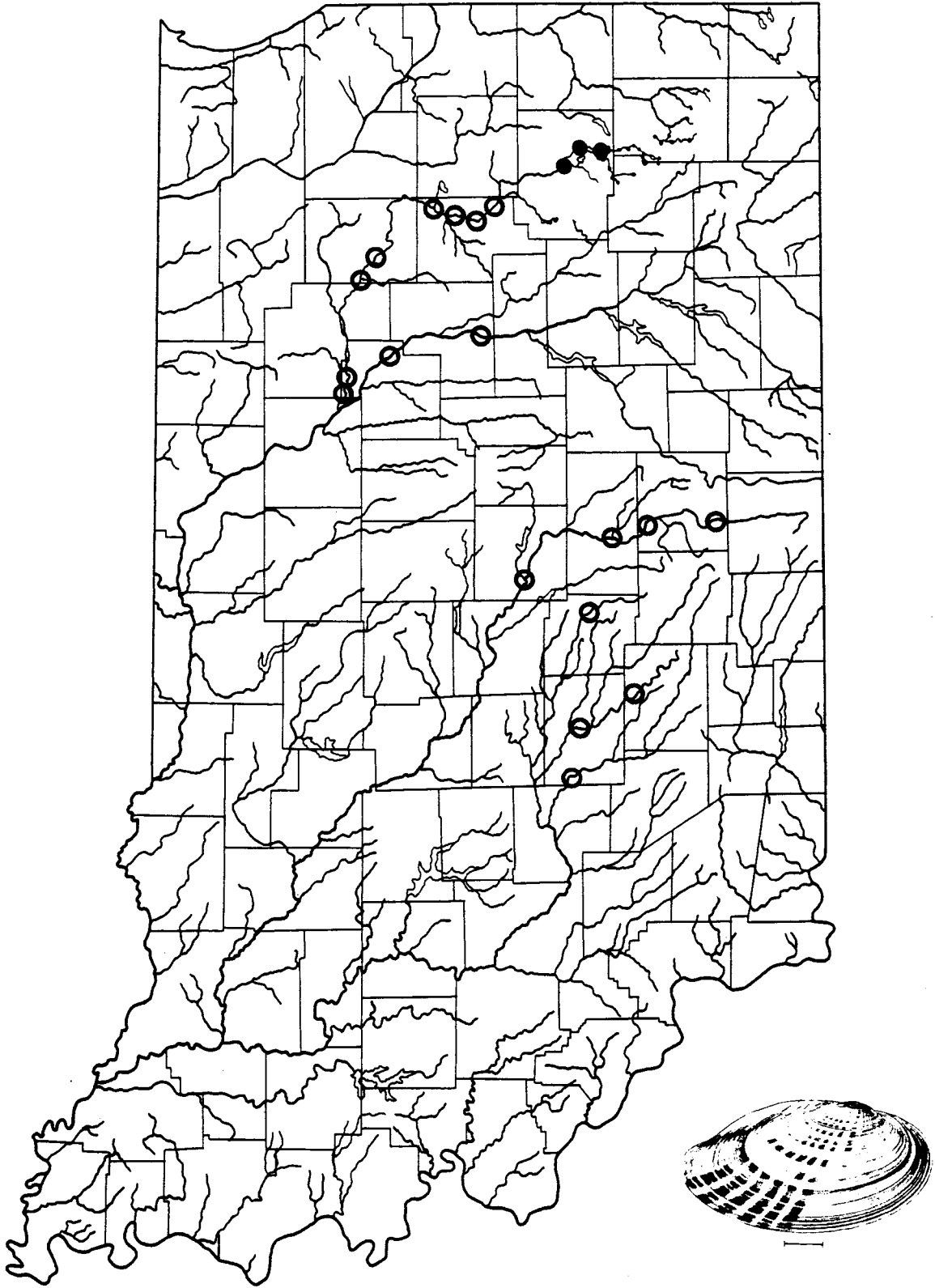
OTHER COMMON NAMES: Rainbow shell.

HABITAT: Found in small to medium streams in coarse sand or gravel.

REMARKS: Reported to be widely distributed in the smaller streams of Indiana and listed from the Wabash River at Lafayette and Terre Haute by Goodrich and van der Schalie (1944). The rainbow was not collected in the 1966-67 survey of the White or Wabash rivers (Meyer, 1968; 1974). Only weathered shells of this species were collected at two upstream sites (Lockport & Lewisburg) in the Wabash in 1988. Typically a species of small streams, it appears to be declining throughout Illinois and Indiana. In a recent survey of the Eel River only shells were found at 12 sites (Henschen, 1987).

Relict shells of *V. iris* were collected from eight sites in the in the upper half of the White River drainage in 1989-91. It was found alive in Sugar Creek (East Fork White River drainage) in 1990 (Harmon, 1990).

A total of 24 individuals of *V. iris* were collected from the upper Tippecanoe River in 1987, and it was the third most abundant species found at site 2. Widely distributed in former times, this species should be listed as a Species of Special Concern in Indiana.



Villosa iris (I. Lea, 1829)
rainbow

Villosa lienosa (Conrad, 1834)

Little spectaclecase

ORIGINAL DESCRIPTION: *Unio lienosus* Conrad, 1834. Description of some new species of fresh water shells from Alabama, Tennessee, &c. American Journal of Science and Arts. Vol. XXV, p. 339, pl. I, fig. 4.

TYPE LOCALITY: Small streams in South Alabama. Syntypes ANSP 9747 (Johnson & Baker, 1973).

SYNONYMY:

- Unio nigerrimus* Lea
Stein 1880:464; Call 1896:144.
- Lampsilis lienosus* (Conrad)
Daniels 1903:647.
- Lampsilis nigerrimus* (Lea)
Daniels 1903:647.
- Micromya lienosa* (Conrad)
Goodrich & van der Schalie 1944:317.
- Villosa* (= *Micromya*) *lienosa* (Conrad)
Parmalee 1967:76; Meyer 1974:24.
- Villosa lienosa* (Conrad)
Weilbaker et al. 1985:690; Cummings & Berlocher 1990:87.

STATUS: Species of Special Concern in Indiana.

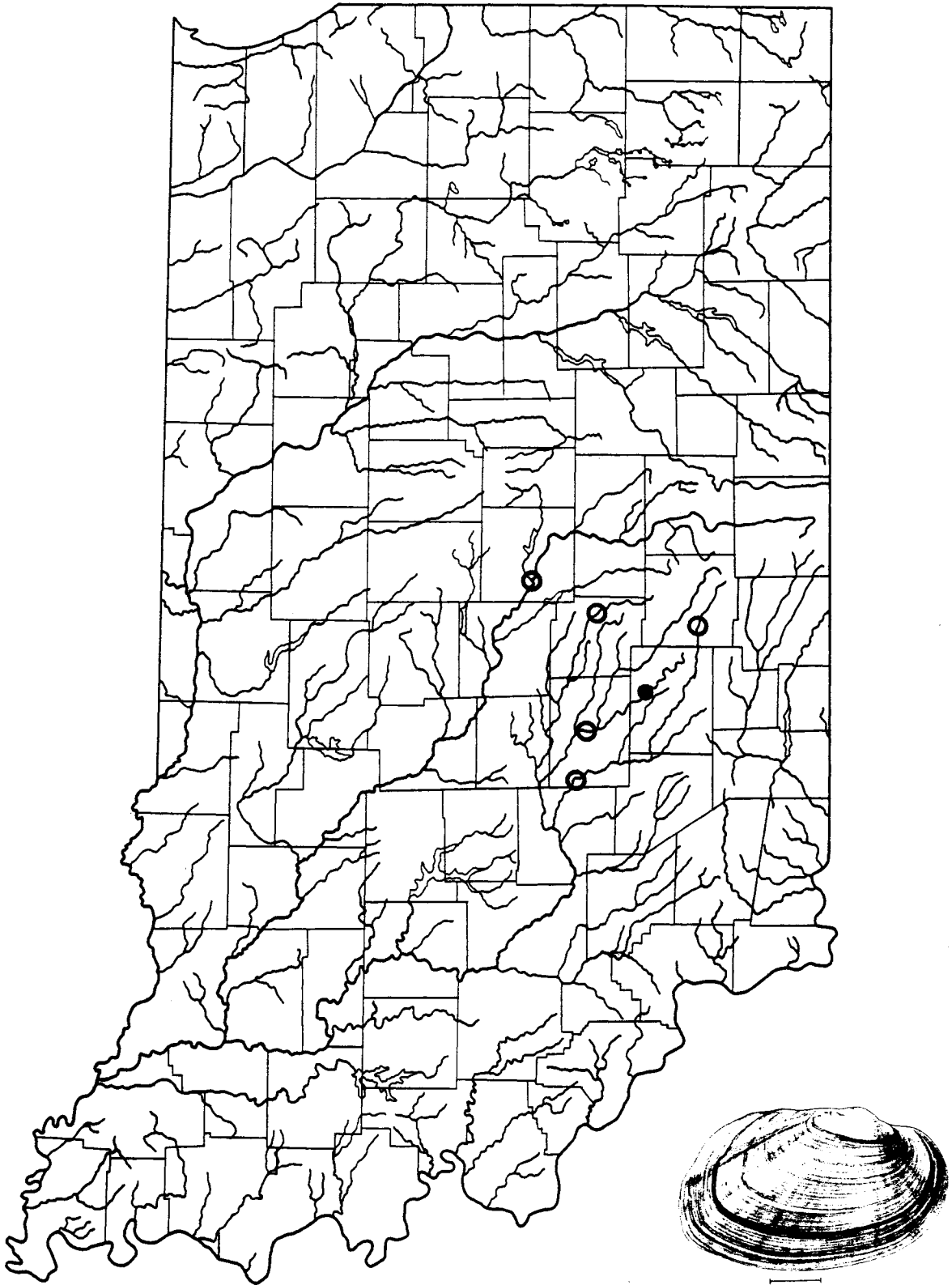
OTHER COMMON NAMES: Black creek shell.

HABITAT: Found in small clear streams in coarse sand or gravel.

REMARKS: Although reported from the Wabash and White rivers in southern Indiana (Goodrich & van der Schalie, 1944), the little spectaclecase is usually found in small streams. *Villosa lienosa* was not collected in the Wabash or White rivers in 1966-67, 1975, or the present survey (Meyer, 1968; 1974; Clark, 1976).

Two live *V. lienosa* were found at site 16 on the Little Blue River (East Fork White River drainage) in 1989-91, and shells were found at five other sites, all in the upper part of the basin. Also reported live from Sugar Creek (Harmon, 1990), additional populations should be looked for in the smaller streams of the upper East Fork drainage.

Although not collected in the Tippecanoe River in 1987, a highly eroded shell of *V. lienosa* was found at site 5 in 1991 (T. Watters, pers. comm.). This species is known from the Vermilion and Little Vermilion river drainages in Illinois and additional populations may turn up in other tributaries of the middle and upper Wabash River upon further investigation.



Villosa lienosa (Conrad, 1834)
little spectaclecase

Species of Doubtful Occurrence

Venustaconcha ellipsiformis (Conrad, 1836)

Ellipse

ORIGINAL DESCRIPTION: *Unio ellipsiformis* Conrad, 1836. Monography of the family Unionidae or naiades of Lamarck, (fresh water bivalve shells) of North America. p. 60, pl. XXXIV, fig. 1.

TYPE LOCALITY: Michigan.

SYNONYMY:

Unio spatulatus Lea

Call 1894:155; 1897:252; 1900:455.

Lampsilis ellipsiformis (Conrad)

Daniels 1903:647; Wilson & Clark 1912:48.

Actinonaias ellipsiformis (Conrad)

Goodrich & van der Schalie 1944:313; Parmalee 1967:57.

STATUS: Rare.

OTHER COMMON NAMES: None.

HABITAT: Found in clear, small to medium streams in gravel riffles.

REMARKS: Although figured and reported from the Wabash and White rivers by Call (1900:349), voucher specimens from the Wabash River drainage are rare. Goodrich and van der Schalie (1944) stated that this species was restricted to the northwestern portion of the state in the St. Joseph River and the headwaters of the Kankakee. A specimen referable to this species collected from the West Fork White River at Indianapolis by Stange (date unknown) is in the collection of the Field Museum of Natural History (9385). No evidence of this species was found in 1966-67, 1975, or the present survey (Meyer, 1968; 1974; Clark, 1976).

Plethobasus cooperianus (I. Lea, 1834)

Orange-foot pimpleback

ORIGINAL DESCRIPTION: *Unio cooperianus* I. Lea, 1834. Observations on the naiades; and descriptions of new species of that, and other families. Transactions of the American Philosophical Society. Vol. V New Series. p. 61, pl. VIII, fig. 21.

TYPE LOCALITY: Ohio River.

SYNONYMY:

Unio cooperianus Lea
Stein 1880:462; Call 1894:153; 1896:142; 1897:251; 1900:485.
Quadrula cooperiana (Lea)
Daniels 1903:651.
Plethobasus cooperianus (Lea)
Goodrich & van der Schalie 1944:308; Parmalee 1967:88; Meyer
1974:23; Clark 1976:6.

STATUS: Federally Endangered.

OTHER COMMON NAMES: Orange-footed pearly mussel.

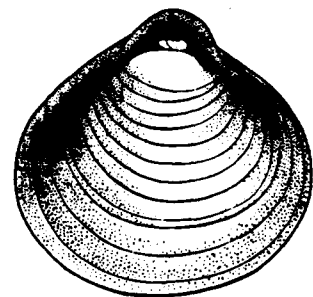
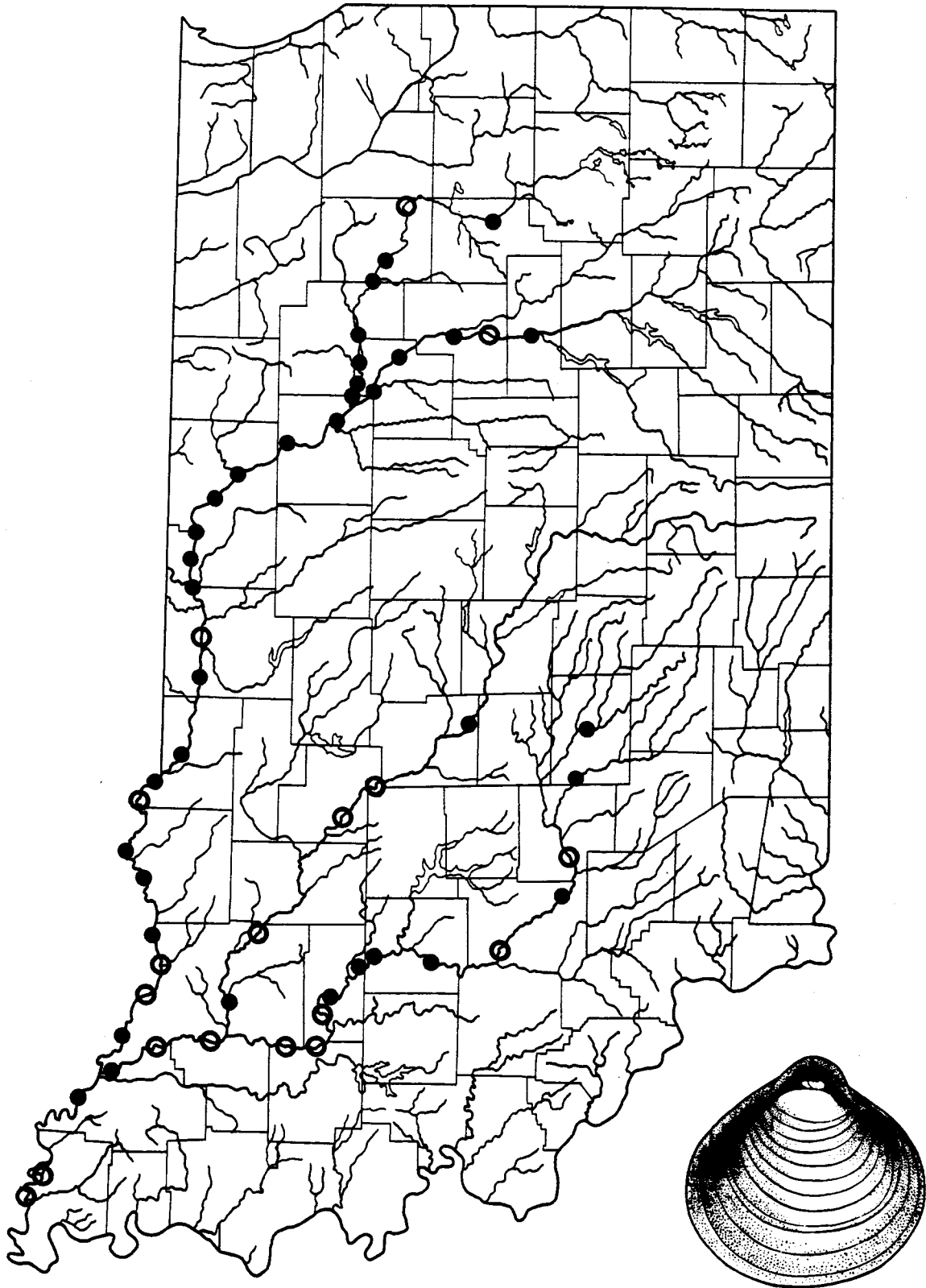
HABITAT: Found in large rivers in gravel or mixed sand and gravel.

REMARKS: Reported as common in the Wabash and Ohio rivers by Call (1900), the orange-foot pimpleback was considered rare in lower Wabash and Ohio rivers by Goodrich & van der Schalie (1944). No verification of this mussel having ever occurred in either the Wabash or White rivers could be found in any of the collections examined. No evidence of *Plethobasus cooperianus* was found in 1966-67, 1975, or the present survey of the Wabash or White rivers (Meyer, 1968; 1974; Clark, 1976). Most likely extirpated from the Wabash River drainage (if in fact it ever occurred there), a population of the orange-foot pimpleback exists in the Ohio River in Illinois and may occur in the Ohio River in Indiana.

Corbicula fluminea (Müller, 1774)

Asian clam

REMARKS: Although not part of the unionid fauna, voucher specimens of the introduced Asian clam, *Corbicula fluminea*, were collected to document the occurrence and distribution of this species in the Wabash River drainage. Considered to be widespread throughout North America, actual records of this species in Indiana are rare (Counts, 1986). The Asian clam was found throughout the study area. This species was also found to be common in collections made in Sugar and Brandywine creeks (East Fork White River drainage) and it likely occurs in all of the major drainages in Indiana.



Corbicula fluminea (Müller, 1774)

Asian clam

ACKNOWLEDGEMENTS

This study was supported by a grant from Region 3 of the U.S. Fish and Wildlife Service and the Indiana Department of Natural Resources, Division of Fish and Wildlife. For patience and understanding of the forces of nature and other courtesies we are grateful to Chris Iverson, Bob Anderson, and Katy Gremillion-Smith (IDNR) and Ron Refsnider (USFWS). For assistance in the field, lab, and office we are grateful to Butch Atwood, Jeanine Berlocher, Ray Fisher, Les Frankland, Arnold "Bill" Fritz, Barbara Kasprovicz, Mike Retzer, Bob Schanzle, John Sherrod, Mina Tynan, Mark Wetzel, Mary Lou Williamson, and Angie Young. Thanks to Tom Watters and Wendall Haag for data on the Tippecanoe River and Stan Fulkerson (IDNR) and Steve Jenkins for providing information and lively discussion on mussels of the East Fork White River.

We want to thank the following curators and their staff for allowing us access to collection under their care: Dr. A. Bogan (ANSP), R. Vasile (CHAS), the late Dr. A. Solem and M. Baker (FMNH), Dr. S. P. Kool and R. I. Johnson (MCZ), Dr. D. H. Stansbery and K. G. Borror (OSUM), Dr. T. Uzzell (UIMNH), Dr. J. B. Burch and D. J. Eernisse (UMMZ), and Dr. R. Hershler (USNM). Special thanks to Dr. David H. Stansbery (OSU) for his patience, aid in identifications, opinions, and thought-provoking discussion on unionids of the Wabash, particularly members of the genera *Epioblasma* and *Pleurobema*.

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APPENDIX

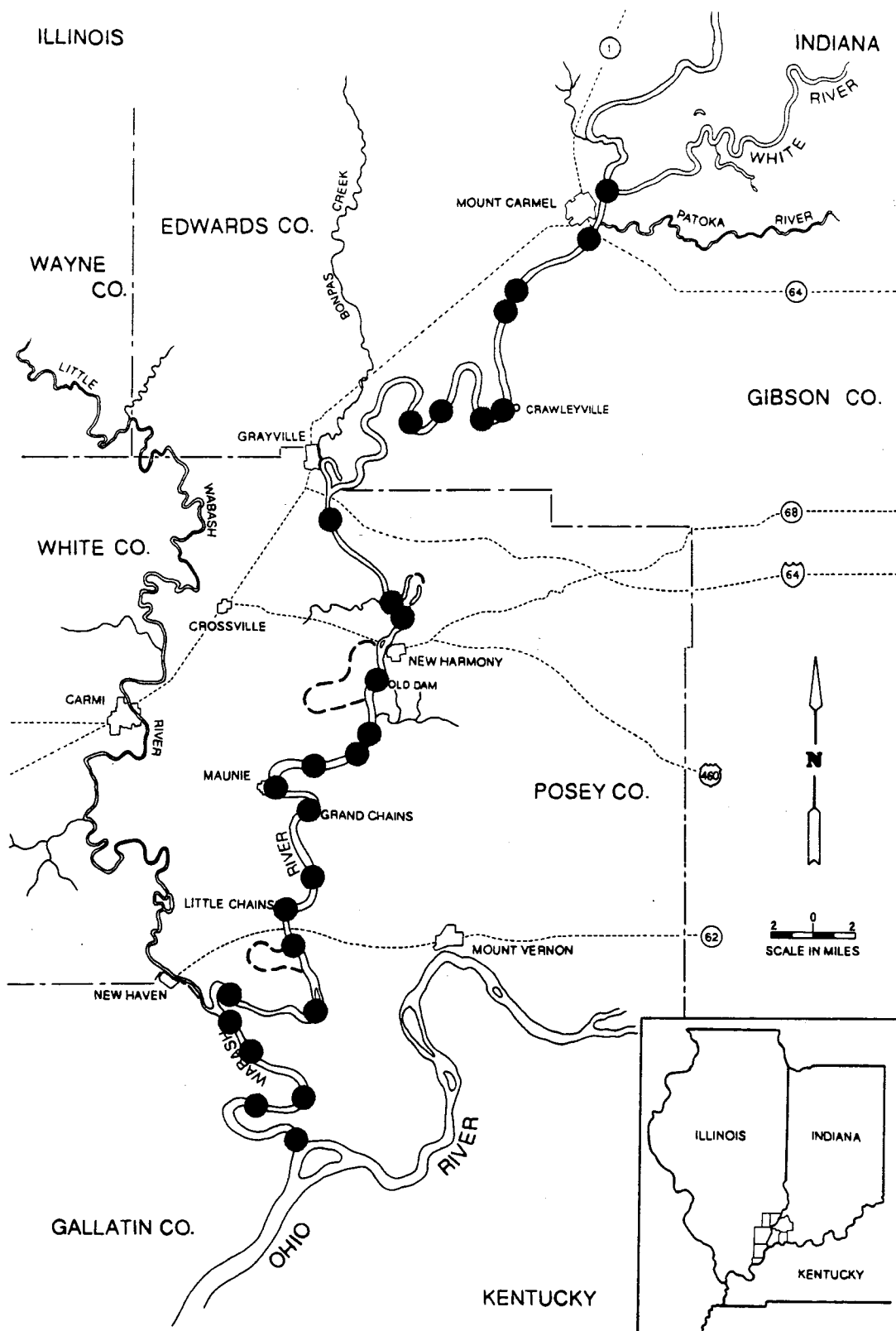
Collection Sites in the Wabash River Drainage 1987-1991

Collection sites in the lower Wabash River, 1987. B = brail sample, H = hand collected.

SITE #	LOCATION	METHOD
1.	Wabash River, Mt. Carmel, Wabash County, Illinois. T1S, R12W, sec. 21. 23 September 1987.	B, H
2.	Wabash River, 0.25 mi S Mt. Carmel at NW end of Patoka Island, Wabash County, Illinois. T1S, R12W, sec. 28. 28 October 1989.	B, H
3.	Wabash River, Rochester, Wabash County, Illinois. T2S, R13W, sec. 14. 23 September 1987.	B, H
4.	Wabash River, 1.5 mi S Rochester, Wabash County, Illinois. T2S, R13W, sec. 23. 28 October 1987.	B, H
5.	Wabash River, 0.5 mi S Crawleyville, Gibson County, Indiana. T3S, R13W, sec. 10. 29 October 1987.	B, H
6.	Wabash River, 1 mi SW Crawleyville at Jimtown, Gibson County, Indiana. T3S, R13W, sec. 10. 29 October 1987.	B, H
7.	Wabash River, 10 river miles upstream of Grayville above Schuh Bend, Wabash County, Illinois. T3S, R13W, sec. 18. 24 June 1987.	B
8.	Wabash River, 8 mi WNW Grayville just downstream Schuh Bend, Gibson County, Indiana. T3S, R13W, sec. 7. 23 June 1987.	B, H
9.	Wabash River, 3 mi S Grayville just below mouth of French Creek, White County, Illinois. T4S, R14W, sec. 4. 16 June 1987.	B
10.	Wabash River, 0.7 mi N New Harmony just N of Bull Island, White County, Illinois. T4S, R14W, sec. 24. 16 June 1987.	B
11.	Wabash River, 1 mi N New Harmony just S of Bull Island, White County, Illinois. T4S, R14W, sec. 25. 23 June 1987.	H
12.	Wabash River, 1 mi S New Harmony at Old Dam, Posey County, Indiana. T5S, R14W, sec. 11. 23 September 1987.	B, H
13.	Wabash River, upstream end of Mink Island, Posey County, Indiana. T5S, R14W, sec. 22/23. 17 July 1987.	B, H
14.	Wabash River, downstream end of Mink Island at pipeline crossing, White County, Illinois. T5S, R14W, sec. 27. 17 July 1987.	B
15.	Wabash River, upstream end of Twin Sister Island, Posey County, Indiana. T5S, R14W, sec. 33. 17 July 1987.	B
16.	Wabash River, Maunie, White County, Illinois. T5S, R10E, sec. 36. 16 July 1987.	B
17.	Wabash River, 2 mi E Maunie at Grand Chain Rapids, Posey County, Indiana. T6S, R14W, sec. 8. 16 July 1987.	B, H

Lower Wabash River, continued.

18. Wabash River, 0.5 mi SE Rising Sun at mouth of Big Creek, Posey County, Indiana. T6S, R14W, sec. 20. 16 July 1987. B
 19. Wabash River, 4.5 mi NE New Haven at Little Chains, White County, Illinois. T6S, R11E, sec. 31. 16 July 1987. B
 20. Wabash River, 5 mi E New Haven, N of Greathouse Island, Posey County, Indiana. T7S, R14W, sec. 7. 16 July 1987. B
 21. Wabash River, 5.5 mi E New Haven, S of Greathouse Island, Posey County, Indiana. T7S, R14W, sec. 20. 16 July 1987. B, H
 22. Wabash River, 1.5 mi E New Haven, Posey County, Indiana. T7S, R15W, sec. 22. 15 July 1987. B
 23. Wabash River, below mouth of Little Wabash River, Gallatin County, Illinois. T7S, R10E, sec. 27. 15 July 1987. B
 24. Wabash River, 3.5 mi SW New Haven, Posey County, Indiana. T8S, R10E, sec. 2. 14 July 1987. B
 25. Wabash River, 8 mi SW New Haven, Posey County, Indiana. T8S, R14W, sec. 18. 14 July 1987. B
 26. Wabash River, Mackeys Island, Posey County, Indiana. T8S, R10E, sec. 13. 14 July 1987. B
 27. Wabash River, at confluence with Ohio River, Gallatin County, Illinois. T8S, R11E, sec. 19. 14 July 1987. B
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Collection sites in the lower Wabash River, 1987.

Collection sites in the upper and middle Wabash River, 1988. Each site was sampled for four man-hours.

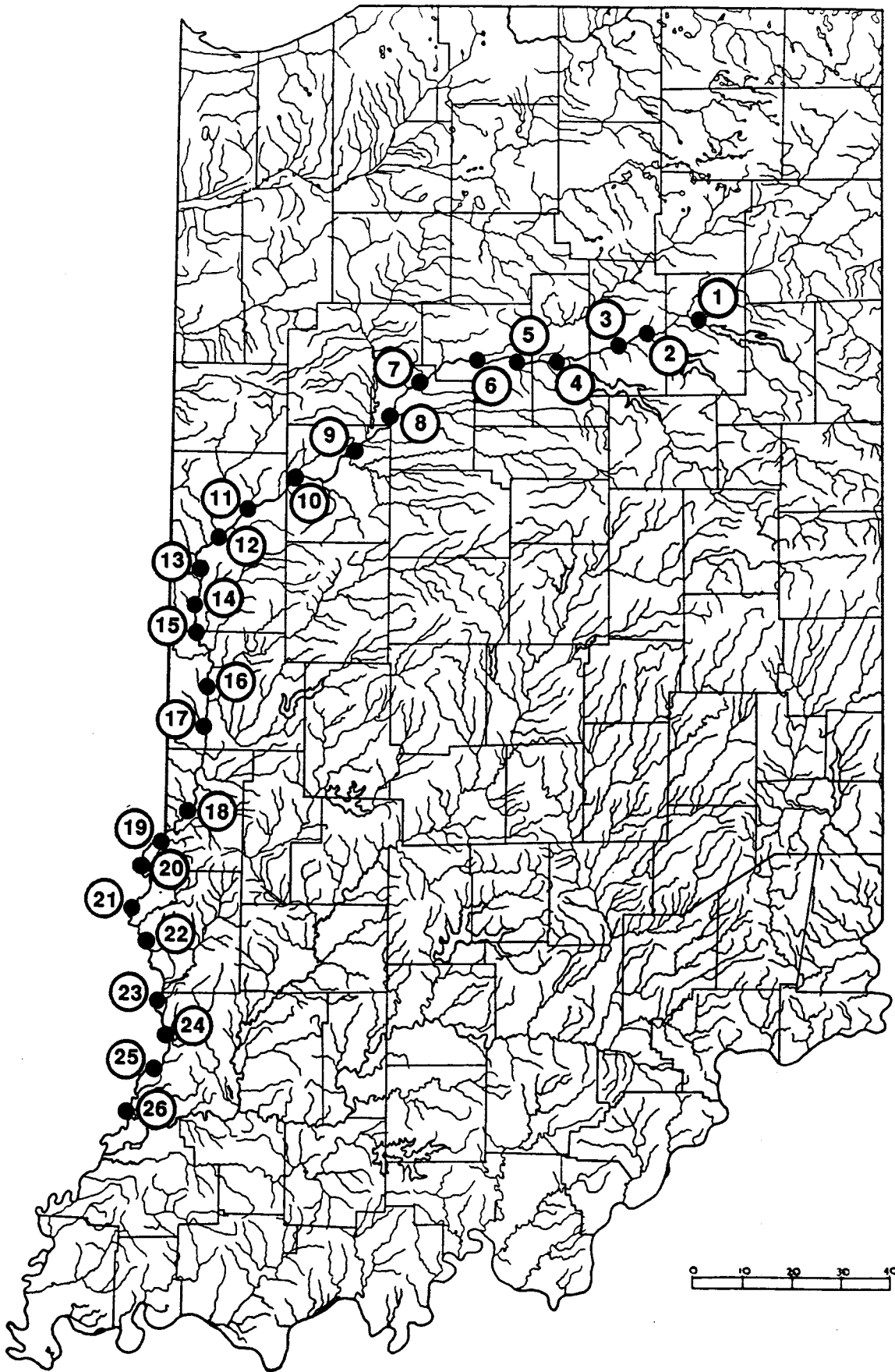
SITE #	LOCATION
1.	Wabash River, 1.25 mi downstream Huntington Reservoir dam at bridge, Huntington County, Indiana. T28N, R9E, sec. 27. 7 June 1988.
2.	Wabash River, 4 mi E Lagro at county road 100N, Wabash County, Indiana. T28N, R8E, sec. 32. 7 June 1988.
3.	Wabash River, Wabash at old bridge upstream of R.R. bridge, Wabash County, Indiana. T27N, R6E, sec. 14. 8 June 1988.
4.	Wabash River, Peru at Rt. 21 bridge, Miami County, Indiana. T27N, R4E, sec. 12. 8 June 1988.
5.	Wabash River, Lewisburg, Cass County, Indiana. T27N, R3E, sec. 7. 8 June 1988.
6.	Wabash River, Logansport at 18th Street bridge, Cass County, Indiana. T27N, R2E, sec. 31. 9 June 1988.
7.	Wabash River, 0.5 mi S Lockport at mouth of Rock Creek, Carroll County, Indiana. T25N, R7W, sec. 19. 13 June 1988.
8.	Wabash River, 1 mi SW Delphi at Bicycle Bridge Road, Carroll County, Indiana. T25N, R2W, sec. 30. 13 June 1988.
9.	Wabash River, 1 mi SE Battle Ground, Tippecanoe County, Indiana. T24N, R4W, sec. 25. 14 June 1988.
10.	Wabash River, 1 mi NE Black Rock at Colliers Island, downstream of Granville bridge, Tippecanoe County, Indiana. T22N, R6W, sec. 3 & 10. 14 June 1988.
11.	Wabash River, 0.5 mi S Attica, Fountain County, Indiana. T21N, R7W, sec. 6. 1 June & 22 September 1988.
12.	Wabash River, 2 mi SW Fountain, Fountain County, Indiana. T20N, R8W, sec 6. 31 May & 22 September 1988.
13.	Wabash River, Covington, Warren County, Indiana. T20N, R9W, sec. 35. 31 May 1988. (2 man-hours) Wabash River, 2.5 mi NW Covington, Warren County, Indiana. T20N, R9W, sec. 21. 21 September 1988. (2 man-hours)
14.	Wabash River, 2 mi S Perrysville at mouth of Jordan Creek, Vermillion County, Indiana. T18N, R9W, sec. 9/10. 1 June & 23 September 1988.
15.	Wabash River, 1 mi W Lodi, Vermillion County, Indiana. T17N, R9W, sec. 3. 19 July 1988.
16.	Wabash River, Montezuma, Parke County, Indiana. T16N, R9W, sec. 35. 19 July 1988.
17.	Wabash River, Clinton, Vermillion County, Indiana. T14N, R9W, sec. 14. 19 July 1988.
18.	Wabash River, SW of Terre Haute, 150 yds. downstream of I-70 bridge, Vigo County, Indiana. T12N, R9W, sec. 32. 31 August 1988.

Upper and Middle Wabash River, continued.

19. Wabash River, 4 mi N Vigo at Illinois/Indiana State Line, Vigo County, Indiana. T11N, R10W, sec. 33. 2 September 1988.
 20. Wabash River, 0.75 mi NE Darwin at island, Clark County, Illinois. T10N, R11W, sec. 23. 2 September 1988.
 21. Wabash River, 1 mi E York, Clark County, Illinois. T8N, R11W, sec. 3. 7 September 1988.
 22. Wabash River, 2 mi S Merom at Eagle Island, Sullivan County, Indiana. T7N, R10W, sec. 19. 1 September 1988.
 23. Wabash River, 2 mi SE Heathsville near Johnsons Cutoff, Crawford County, Illinois. T5N, R10W, sec. 16. 9 September 1988.
 24. Wabash River, 2.25 mi SE Russellville, Lawrence County, Illinois. T4N, R10W, sec. 15. 9 September 1988.
 25. Wabash River, Vincennes, 1 mi S Lincoln Memorial Bridge, Knox County, Indiana. T3N, R10W, sec. 1. 9 September 1988.
 26. Wabash River, 2.25 mi S St. Francisville, Knox County, Indiana. T2N, R11W, sec. 33. 9 September 1988.
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Supplemental collection sites in the upper and middle Wabash River, 1988.

SITE #	LOCATION
18s.	Wabash River, 2 mi S West Terre Haute, Vigo County, Indiana. T11N, R9W, sec. 6. 31 August 1988.
19s.	Wabash River, 1.75 mi NW Hutton, Clark County, Illinois. T10N, R10W, sec. 5. 2 September 1988.
20s.	Wabash River, 0.75 mi SE Darwin, Clark County, Illinois. T10N, R11W, sec. 26. 7 September 1988.
21s.	Wabash River, Riverview, Sullivan County, Indiana. T9N, R11W, sec. 24. 7 September 1988.
22s.	Wabash River, Merom, Sullivan County, Indiana. T7N, R10W, sec. 7. 1 September 1988.



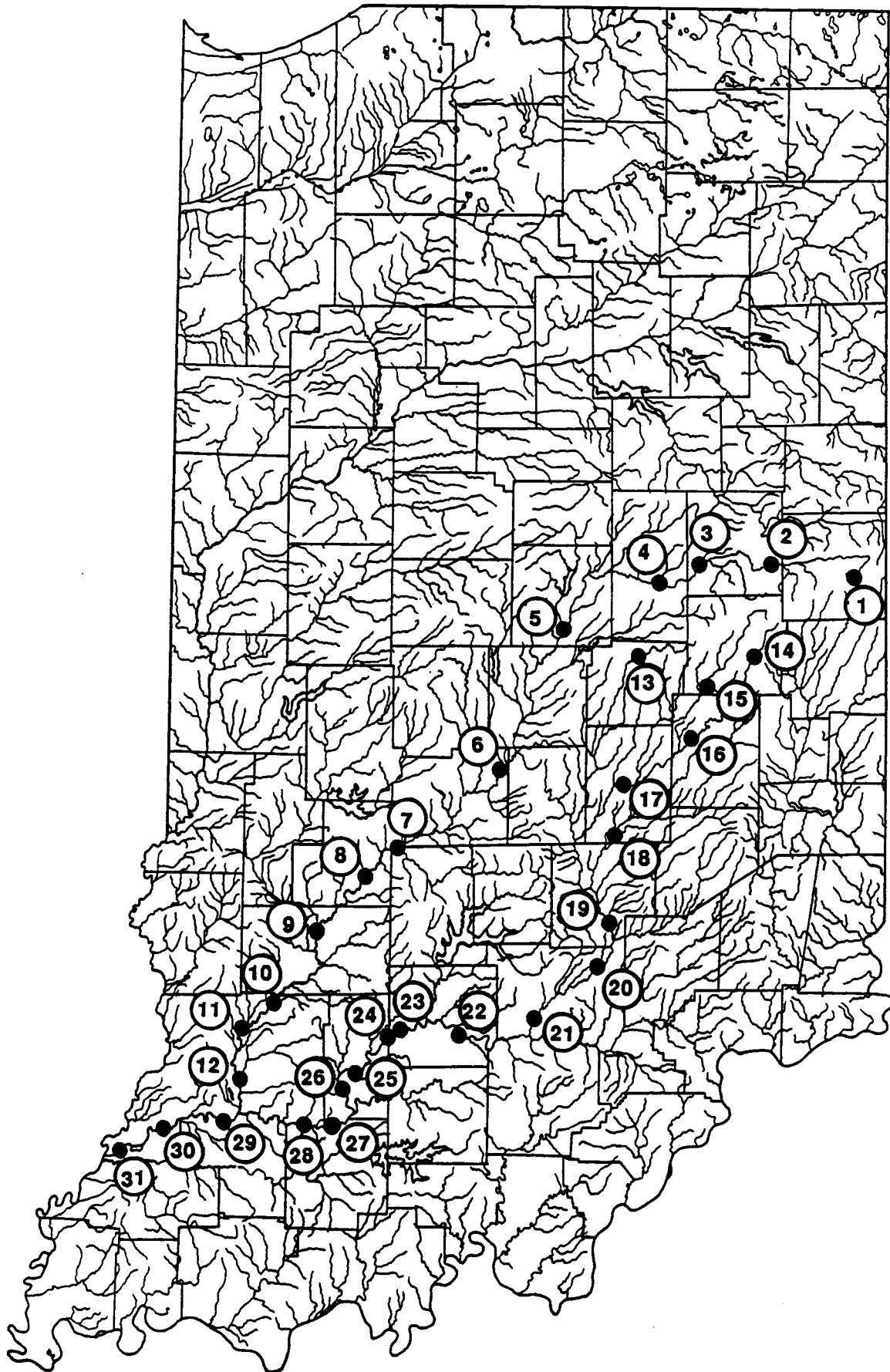
Collection sites in the upper and middle Wabash River, 1988.

Collection sites in the White River and tributaries, 1989-1991. Each site was sampled for four man-hours.

SITE #	LOCATION
1.	West Fork White River, 3.5 mi WSW Winchester at county roads 300E & 100S, Randolph County, Indiana. T20N, R14E, sec. 35/36. 30 June 1989.
2.	West Fork White River, Smithfield, Delaware County, Indiana. T20N, R11E, sec. 22. 29 June 1989.
3.	West Fork White River, 2 mi SW Yorktown, Delaware County, Indiana. T20N, R9E, sec. 20. 29 June 1989.
4.	Big Kilbuck Creek, Anderson at confluence with the West Fork White River, Madison County, Indiana. T19N, R7E, sec. 12. 7 July 1989.
5.	West Fork White River, Noblesville at Rt. 32 bridge, Hamilton County, Indiana. T19N, R4E, sec. 36. 9 August 1989.
6.	West Fork White River, Bluffs at Rt. 144 bridge, Morgan County, Indiana. T13N, R2E, sec. 13. 9 August 1989.
7.	West Fork White River, Gosport, Owen County, Indiana. T11N, R2W, sec. 32. 26 July 1991.
8.	West Fork White River, Spencer, Owen County, Indiana. T10N, R3W, sec. 21/28. 26 July 1991.
9.	West Fork White River, 1 mi E Worthington at Rt. 157 bridge, Greene County, Indiana. T8N, R5W, sec. 21. 25 July 1991.
10.	West Fork White River, 2 mi NW Elnora, Knox/Daviess counties, Indiana. T5N, R6W, sec. 5/6. 25 July 1991.
11.	West Fork White River, Edwardsport, Knox/Daviess counties, Indiana. T4N, R7W, sec. 6. 14 September 1990.
12.	West Fork White River, Maysville upstream Rt. 50/150 bridge, Knox/Daviess counties, Indiana. T3N, R8W, sec. 36. 27 August 1991.
13.	Sugar Creek, Eden at Rt. 9 bridge, Hancock County, Indiana. T17N, R7E, sec. 20. 7 July 1989.
14.	Flatrock River, 2 mi SE New Castle, Henry County, Indiana. T17N, R10E, sec. 36. 30 June 1989.
15.	Big Blue River, Knightstown, at confluence with Buck Creek, Henry County, Indiana. T16N, R9E, sec. 27. 6 July 1989.
16.	Little Blue River, 3 mi SE Carthage, Rush County, Indiana. T15N, R9E, sec. 34. 6 July 1989.
17.	Big Blue River, Shelbyville at Sunset Park, Shelby County, Indiana. T13N, R7E, sec. 31. 10 August 1989.
18.	Flatrock River, Flatrock, Shelby County, Indiana. T11N, R6E, sec. 26. 10 August 1989.

White River and tributaries, continued.

19. East Fork White River, 1 mi SE Azalia, Bartholomew County, Indiana. T8N, R6E, sec. 4.
11 September 1990.
 20. East Fork White River, Rockford, Jackson County, Indiana. T6N, R6E, sec. 7.
11 September 1990 & 22 July 1991.
 21. East Fork White River, Medora at Rt. 235 bridge, Jackson County, Indiana. T4N, R3E, sec. 1/2.
23 July 1991.
 22. East Fork White River, 1 mi W Buddha, Lawrence County, Indiana. T4N, R1E, sec. 8.
12 September 1990.
 23. East Fork White River, Williams, below dam, Lawrence County, Indiana. T4N, R2W, sec. 8.
12 September 1990 & 23 July 1991.
 24. East Fork White River, 1 mi E Mt. Olive downstream of covered bridge, Lawrence County, Indiana.
T4N, R2W, sec. 7. 23 July 1991.
 25. East Fork White River, Shoals, Martin County, Indiana. T3N, R3W, sec. 30. 24 July 1991.
 26. East Fork White River, Hindostan Falls, Martin County, Indiana. T2N, R4W, sec. 10.
10 and 13 September 1990 & 24 July 1991.
 27. East Fork White River, 1 mi E Haysville, DuBois County, Indiana. T1N, R4W, sec. 21.
13 September 1990
 28. East Fork White River, Portersville, DuBois County, Indiana. T1N, R5W, sec. 21.
13 September 1990.
 29. White River, 1 mi NW Petersburg, Pike County, Indiana. T1N, R8W, sec. 16. 28 August 1991.
 30. White River, Hazleton, Gibson County, Indiana. T1N, R10W, sec. 28. 28 August 1991.
 31. White River, 3.5 mi ENE Mt. Carmel, Kelly's Ripple at island, Knox County, Indiana.
T1S, R11W, sec 18. 29 August 1991.
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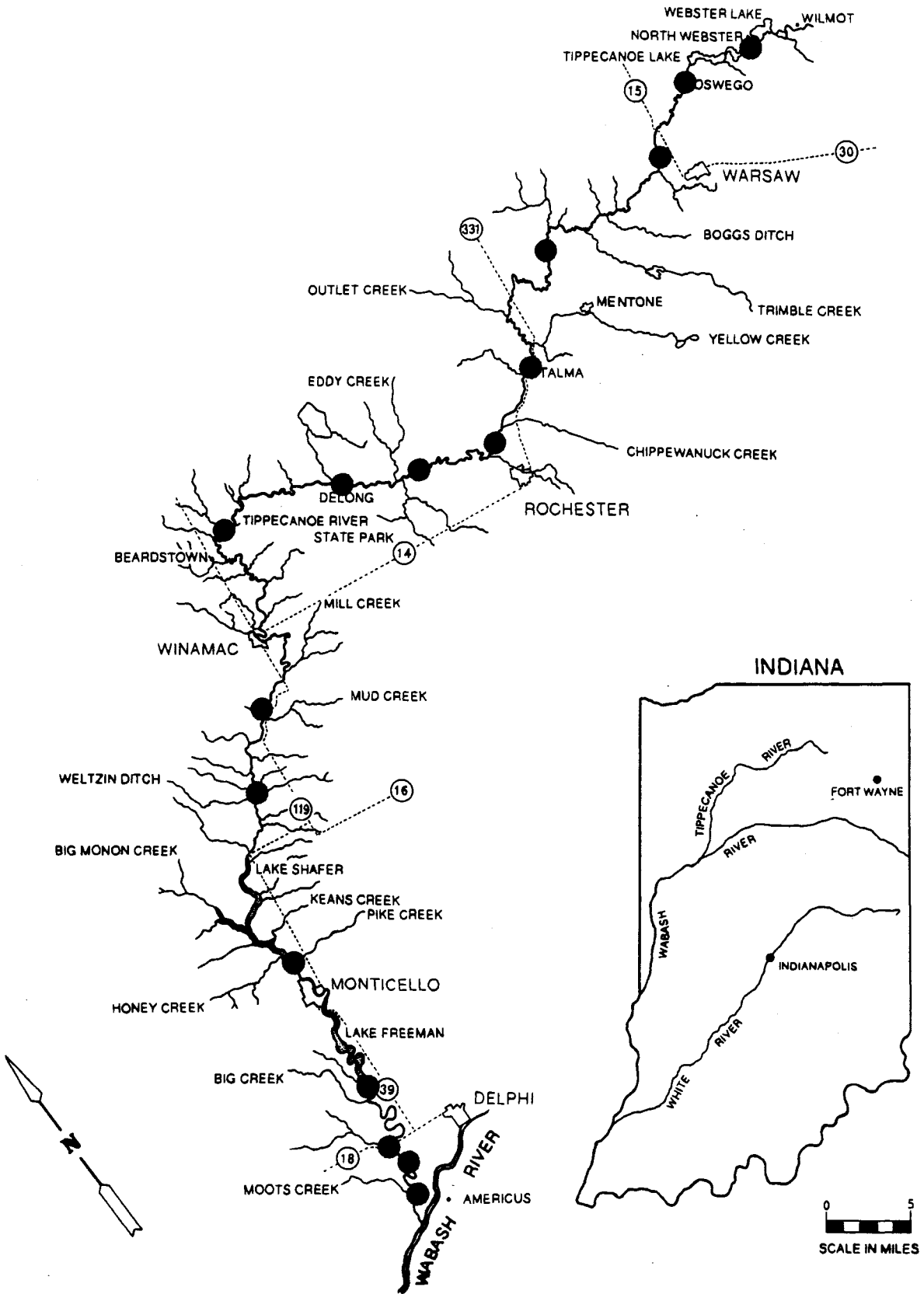


Collection sites in the White River and tributaries, 1989-91.

Collection sites in the Tippecanoe River, 1987. Each site was hand sampled for 4 man-hours.

SITE #	LOCATION
1.	Tippecanoe River, 0.5 mi SW North Webster at county road 750E bridge, Kosciusko County, Indiana. T33N, R7E, sec. 15. 27 July 1987.
2.	Tippecanoe River, 1 mi SW Oswego, Kosciusko County, Indiana. T33N, R6E, sec. 14. 27 July 1987.
3.	Tippecanoe River, 1 mi N Warsaw at county road 300N bridge, Kosciusko County, Indiana. T33N, R6E, sec. 30. 27 July 1987.
4.	Tippecanoe River, 2 mi S Etna Green at Ind. Rt. 19 bridge, Kosciusko County, Indiana. T32N, R4E, sec. 10. 28 July 1987.
5.	Tippecanoe River, Talma, Fulton County, Indiana. T31N, R3E, sec. 12. 2 June & 25 July 1987.
6.	Tippecanoe River, 3 mi N Rochester at Rt. 31 bridge, Fulton County, Indiana. T31N, R3E, sec. 29. 26 July 1987.
7.	Tippecanoe River, 2 mi N Pershing, Fulton County, Indiana. T31N, R2E, sec. 21. 29 July 1987.
8.	Tippecanoe River, Delong at Fulton County bridge #7, Fulton County, Indiana. T31N, R1E, sec. 9. 28 July 1987.
9.	Tippecanoe River, Tippecanoe River State Park, Pulaski County, Indiana. T31N, R1W, sec. 19. 29 July 1987.
10.	Tippecanoe River, 1.5 mi NE Pulaski, Pulaski County, Indiana. T29N, R2W, sec. 3. 25 July 1987.
11.	Tippecanoe River, 4 mi E Lakeside, Pulaski County, Indiana. T29N, R3W, sec. 30. 29 July 1987.
12.	Tippecanoe River, Norway below Lake Shafer spillway, White County, Indiana. T27N, R3W, sec. 21. 29 July 1987.
13.	Tippecanoe River, Lake Freeman spillway (Oakdale Dam), Carroll County, Indiana. T26N, R3W, sec. 34. 15 October 1987.
14.	Tippecanoe River, Springboro at Ind. Rt. 18 bridge, 5 mi W Delphi, Carroll County, Indiana. T25N, R3W, sec. 21. 30 July 1987.
15.	Tippecanoe River, 5 mi SW Delphi on North Road bridge, Carroll County, Indiana. T25N, R3W, sec. 33. 15 October 1987.
16.	Tippecanoe River, 1 mi N Americus, Tippecanoe County, Indiana. T24N, R3W, sec. 9. 30 July 1987.

TIPPECANOE RIVER



Collection sites in the Tippecanoe River, 1987.