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FRESHWATER MUSSELS (MOLLUSCA: BIVALVIA: UNIONIDAE) OF THE UPPER--ETC(U)
SEP 80 S L FULLER
UNCLASSIFIED 79-24F-VOL-2 NL

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FINAL REPORT

Freshwater Mussels (Mollusca: Bivalvia: Unionidae) of the Upper Mississippi River Observations at Selected Sites within the 9-Foot Navigation Channel Project for the St. Paul District, United States Army Corps of Engineers, 1977-1979

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FINAL REPORT

(6) Freshwater Mussels (Mollusca: Bivalvia: Unionidae) of the Upper Mississippi River: Observations at Selected Sites Within the 9-Foot Navigation Channel Project for the St. Paul District, United States Army Corps of Engineers, 1977-1979.

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19th and the Parkway Philadelphia, PA 19103

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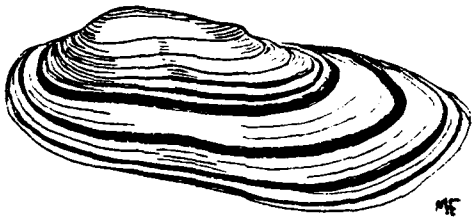

Black Sandshell

Ligumia recta (Lamarck)

REPORT ORGANIZATION AND AVAILABILITY

Report Organization

Under United States Army Corps of Engineers Contract No. DACW 37-78-C-0133, this report is issued in two volumes: Volume I, Text, and Volume II, Appendices. Several sections are included in both parts: Title Page; Report Organization and Availability (the present section); Table of Contents; Correlation of Rivers, Pools, and Sites with Exhibits; and Additions and Corrections. Several other sections occur only in Volume I: Bibliography, Glossary, and Index. The Bibliography covers the entire report; the other two sections, Volume I only. The Glossary is essentially restricted to Volume I because the terminology used only in Appendix E is defined in its introduction.

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CORRELATION OF RIVERS, POOLS, AND SITES WITH EXHIBITS

The Site exhibits, in Appendix B, portray the collecting location, date(s) and effort for each Site. The Taxa exhibits, in Appendix C, specify which mussel taxa were found at each site, pool, and river in the present study and in other studies. The Map exhibits, in Appendix D, locate collection Sites and mussel beds on maps and/or navigation charts of the study area.

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40. Beef Slough	38	136	201, 225
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43. Head of Island 42 Bank Repair	40	139	201, 226
44. West Newton	41	140	201, 227
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49. Island 58 Bank Repair	45	145	202, 230
50. Fountain City	45	145	202, 230
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Site Number and Name	Exhibit Number		
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78. Head of Twin Island Bank Repair	68	172	205, 240
79. Below Twin Island	69	173	205, 240
80. Battle Island	70	174	205, 241
81. DeSoto	71	175	205, 242
82. Above Indian Camp Light	72	176	205, 243
83. Mouth of Hummingbird Slough Bank Repair	72	176	205, 243
84. Indian Camp Light	73	177	205, 243
85. Lansing Upper Light	74	178	205, 243
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APPENDICES

Appendix A

Classification and Nomenclature of Mussels and Glochidial Hosts

This Appendix provides classifications and scientific and common names for Upper Mississippi River mussels and known hosts of their glochidia.

Exhibit 1a

Systematic List of Mussels with Their Common Names

In the following phylogenetic list of known Upper Mississippi River freshwater mussels, family-group and tribal taxa are those of Davis and Fuller (1980), and the suprafamilial classification is Newell's (1965). The common names are those used by Fuller (1978b).

Phylum MOLLUSCA
Class Bivalvia
Subclass Palaeoheterodonta
Order Unionoida
Family Unionidae
Subfamily Margaritiferinae
Cumberlandia monodonta (Say), Spectacle Case
Subfamily Lampsilinae
Tribe Amblemini
Quadrula (*Orthonymus*) *metanevra* (Rafinesque), Monkeyface
Q. fragosa (Conrad), False Mapleleaf
Q. (*Q.*) *quadrula* Rafinesque, Mapleleaf
Q. (*Bullata*) *nodulata* (Rafinesque), Wartyback
Q. (*B.*) *pustulosa* (Lea), Pimpleback
Tritogonia verrucosa (Rafinesque), Buckhorn
Cyclonaias tuberculata (Rafinesque), Purple Pimpleback
Fusconaia flava (Rafinesque), Pigtoe
F. ebena (Lea), Ebony Shell
Megalonaias gigantea (Barnes), Washboard
Amblema plicata (Say), Threeridge
Tribe Elliptionini
Plethobasus cyphyus (Rafinesque), Bullhead
Pleurobema rubrum (Rafinesque), Pink Pigtoe
P. sintoxia (Rafinesque), Round Pigtoe
Elliptio crassidens (Lamarck), Elephant Ear
E. dilatata (Rafinesque), Spike
Tribe Lampsilini
"Subtribe Mesogenae"
Obliquaria reflexa Rafinesque, Threehorn
"Subtribe Heterogenae"
Proptera alata (Say), Pink Heelsplitter
P. laevissima (Lea), Pink Papershell
P. purpurata (Lamarck), Purple Pocketbook
P. capax (Green), Fat Pocketbook
Leptodea fragilis (Rafinesque), Fragile Papershell
L. leptodon (Rafinesque), Narrow Papershell
Ellipsaria lineolata (Rafinesque), Butterfly
Truncilla truncata (Rafinesque), Deertoe
T. donaciformis (Lea), Fawnfoot
Obovaria olivaria (Rafinesque), Hickorynut
Actinonaias carinata (Barnes), Mucket
A. ellipsiformis (Conrad), Ellipse

Ligumia recta (Lamarck), Black Sandshell
L. subrostrata (Say), Western Pondmussel
Carunculina parva (Barnes), Lilliput
Lampsilis teres (Rafinesque), Yellow Sandshell
L. higginsi (Lea), Higgins' Eye
L. radiata siliquoidea (Barnes), Fat Mucket
L. ovata ventricosa (Barnes), Pocketbook
Plagiola (Truncillopsis) triquetra (Rafinesque), Snuffbox
Subfamily Anodontinae
Arcidens confragosus (Say), Rockshell
Lasmigona (Pterosyna) complanata (Barnes), White Heelsplitter
L. (L.) costata (Rafinesque), Fluted Shell
L. (Platynaias) compressa (Lea), Creek Heelsplitter
Alasmidonta (Decurambis) marginata (Say), Elktoe
A. (Pressodon) viridis (Rafinesque), Slippershell
Simpsoniconcha ambigua (Say), Salamander Mussel
Anodontoides ferussacianus (Lea), Cylinder
Anodonta (Utterbackia) suborbiculata Say, Flat Floater
A. (U.) imbecillis Say, Paper Floater
A. (Pyganodon) grandis Say, Giant Floater
Strophitus undulatus (Say), Strange Floater

NOTE: Davis and Fuller (1980) favor the following adjustments in nomenclature:

1. *Cumberlandia* is genetically no farther from *Margaritifera* than the members of that genus are from one another. Suggested result: *Margaritifera monodonta*.

2. *Quadrula (Orthonymus) metanevra* is genetically so far from other *Quadrula* that raising *Orthonymus* to generic status is warranted. Suggested result: *Orthonymus metanevrus*.

3. *Megalonaias* is genetically very closely allied to *Amblema* (and *Plectomerus*). Suggested result: *Amblema gigantea*.

Buchanan (1979a) recently placed *Actinonaias ellipsiformis* in *Venustaconcha*. Regardless of whether or not this particular adjustment proves warranted, the correct genus for this species has not been demonstrated to the Principal Investigator's satisfaction.

Exhibit 1b

Systematic List of Fishes (with Their Common Names) that Host Glochidia of UMR Mussels

The following list provides the classification and standardized scientific and common names according to Bailey et al. (1970) of fishes that have been identified and/or implicated as glochidial hosts of UMR freshwater mussels. Names at and above family rank are in a phylogenetic sequence, but genera and species names are alphabetized.

Omitted from the list is the one relevant host that is not a fish: *Necturus m. maculosus* (Rafinesque), the Mudpuppy, which is a salamander (Vertebrata: Amphibia).

Phylum CHORDATA
Subphylum Vertebrata
Class Agnatha
Order Petromyzontiformes
Family Petromyzontidae
Petromyzon marinus Linnaeus, Sea Lamprey
Class Osteichthyes
Order Acipenseriformes
Family Acipenseridae
Scaphirhyncus platorhynchus (Rafinesque) Shovelnose Sturgeon
Order Semionotiformes
Family Lepisosteidae
Lepisosteus osseus (Linnaeus), Longnose Gar
L. platostomus Rafinesque, Shortnose Gar
L. spatula Lacépède, Alligator Gar
Order Amiiformes
Family Amiidae
Amia calva Linnaeus, Bowfin
Order Anguilliformes
Family Anguillidae
Anguilla rostrata (Lesueur), American Eel
Order Clupeiformes
Family Clupeidae
Alosa chrysochloris (Rafinesque), Skipjack Herring
Dorosoma cepedianum (Lesueur), Gizzard Shad
Order Salmoniformes
Family Esocidae
Esox lucius Linnaeus, Northern Pike
Order Cypriniformes
Family Cyprinidae
Cyprinus carpio Linnaeus, Carp
Hybognathus hankinsoni Hobbs, Brassy Minnow
Nocomis biguttatus (Kirtland), Hornyhead Chub
Notemigonus chrysoleucas (Mitchill), Golden Shiner

Notropis ardens (Cope), Rosefin Shiner
N. cornutus (Mitchill), Common Shiner
N. heterolepis Eigenmann and Eigenmann, Blacknose Shiner
Phoxinus eos (Cope), Northern Redbelly Dace
Pimephales notatus (Rafinesque), Bluntnose Minnow
P. promelas Rafinesque, Fathead Minnow
Rhinichthys atratulus (Hermann), Blacknose Dace
Semotilus atromaculatus (Mitchill), Creek Chub
Family Catostomidae
Carpiodes velifer (Rafinesque), Highfin Carpsucker
Catostomus commersoni (Lacépède), White Sucker
Hypentelium nigricans (Lesueur), Northern Hog Sucker
Moxostoma macrolepidotum (Lesueur), Shorthead Redhorse
Order Siluriformes
Family Ictaluridae
Ictalurus melas (Rafinesque), Black Bullhead
I. natalis (Lesueur), Yellow Bullhead
I. nebulosus (Lesueur), Brown Bullhead
I. punctatus (Rafinesque), Channel Catfish
Noturus gyrinus (Mitchill), Tadpole Madtom
Pylodictis olivaris (Rafinesque), Flathead Catfish
Order Atheriniformes
Family Cyprinodontidae
Fundulus zebrinus Jordan and Gilbert, Rio Grande Killifish
Order Gasterosteiformes
Family Gasterosteidae
Culaea inconstans (Kirtland), Brook Stickleback
Order Perciformes
Family Percichthyidae
Morone chrysops (Rafinesque), White Bass
Family Centrarchidae
Ambloplites rupestris (Rafinesque), Rock Bass
Lepomis cyanellus Rafinesque, Green Sunfish
L. gibbosus (Linnaeus), Pumpkinseed
L. gulosus (Cuvier), Warmouth
L. humilis (Girard), Orangespotted Sunfish
L. macrochirus Rafinesque, Bluegill
L. megalotis (Rafinesque), Longear Sunfish
Micropterus dolomieui Lacépède, Smallmouth Bass
M. salmoides (Lacépède), Largemouth Bass
Pomoxis annularis Rafinesque, White Crappie
P. nigromaculatus (Lesueur), Black Crappie
Family Percidae
Etheostoma exile (Girard), Iowa Darter
E. nigrum Rafinesque, Johnny Darter
Perca flavescens (Mitchill), Yellow Perch
Stizostedion canadense (Smith), Sauger
S. v. vitreum (Mitchill), Walleye
Family Sciaenidae
Aplodinotus grunniens Rafinesque, Freshwater Drum
Family Cottidae
Cottus bairdi Girard, Mottled Sculpin

Appendix B

Sites and Sampling (Exhibits 2-89)

The field personnel indicated by their initials in the Exhibits may be identified according to the following legend.

EA	-- Edward Ambrogio	MM	-- Melanie Miller
TDB	-- Thomas D. Barnes	KLM	-- Kenneth L. Myers
DJB	-- Daniel J. Bereza	WLN	-- William L. Nichols
RFB	-- Richard F. Berry	JAN	-- John A. Nosek
LC	-- Loralee Clark	JHP	-- James H. Peck
JME	-- James M. Engel	JLP	-- James L. Peterson
RAF	-- Raymond A. Faber	DHS	-- Daniel H. Snyder
DF	-- Dona Finley	SDS	-- Steven D. Swanson
MLBF	-- Mary Lue B. Fuller	RLT	-- Roger L. Thomas
SLHF	-- Samuel L.H. Fuller	SJT	-- Sandra J. Thomas
RCH	-- Robert C. Halvorsen	KET	-- Katherine E. Trapp
GJJ	-- Gerald J. Janer	TAW	-- Todd A. Weber
RJJ	-- Roy J. Johannes	RJW	-- Robert J. Whiting
KLJ	-- Kenneth L. Johnson	MAW	-- Martha A. Whitson
DJL	-- David J. Langowski	JPW	-- John P. Wolflin
LAL	-- Larry A. Linse		

The area of the riverbed examined at a given Site is an approximation that was worked out in the following way. Field observations had indicated that the average length of a brail drag is about 500 feet. The length of an Academy brail is 10 feet. Therefore, the area of streambed that was covered by a single brail run is about 5,000 square feet. Multiplication of this product by the total number of brail runs gives the total area brailed at the Site.

Numbers of brail runs at certain Sites surveyed early in the field work are marked by an asterisk (*). These figures are minima only, because the Principal Investigator had not recognized the usefullness of accurately recording totals of negative runs.

Exhibit 2

1. Cargill 2. Petersons Bar
3. Route I-35W Bridge

Mussel data, Exhibit 91 ; Map(s), Exhibit(s) 197,207

Pool(s): not applicable Date(s): 5 August 1977

Locality: Minnesota River, RM 10.5-12.9, Bloomington, Hennepin County, Minnesota.

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 15* ; total, 15*

Number of square feet brailed: 75,000

* Minimum

Exhibit 3

4. Stillwater

Mussel data, Exhibit 93 ; Map(s), Exhibit(s) 199,208

Pool(s): not applicable Date(s): 7 August 1978

Locality: St. Croix River, RM 22.8-24.5, Stillwater, Washington County, Minnesota.

Collector(s): DJB, WLN, RLT, TAW

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 12 ; negative, 49 ; total, 61

Number of square feet brailed: 305,000

Exhibit 4

5. Hudson

Mussel data, Exhibit 94 ; Map(s), Exhibit(s) 199,209

Pool(s): not applicable Date(s): 8-13 August, 14-15 September 1977; 14-19 July 1978

Locality: St. Croix River, RM 15.9-18.1, Hudson, St. Croix County, Wisconsin.

Collector(s): EA,DJB,RFB,JME,DF,SLHF,RCH,DJL,WLN,SDS,RLT,TAW,RJW,JPW

Collecting technique(s): brailing, pollywogging, diving

Brail runs: positive, 49 ; negative, 55 ; total, 104

Number of square feet brailed: 520,000

Exhibit 5

6. Catfish Bar

Mussel data, Exhibit 95 ; Map(s), Exhibit(s) 199,210

Pool(s): not applicable Date(s): 1,2 August 1978

Locality: St. Croix River, RM 10.8-12.2, about 0.6 miles NE Afton, Washington County, Minnesota.

Collector(s): DJB, MLBF, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 14 ; negative, 67 ; total, 81

Number of square feet brailed: 405,000

Exhibit 6

7. Kinnickinnic

Mussel data, Exhibit 96 ; Map(s), Exhibit(s) 199,211

Pool(s): not applicable Date(s): 19,20 July 1978

Locality: St. Croix River, RM 5.8-6.2, about 4.7 miles SSE Afton, Washington County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 17 ; total, 26

Number of square feet brailed: 130,000

Exhibit 7

8. SOO Line Railroad Bridge

Mussel data, Exhibit 100 ; Map(s), Exhibit(s) 196,212

Pool(s): Upper Saint Anthony Falls (USAF) Date(s): 2 August 1977

Locality: Mississippi River, RM 855.8-857.6, Minneapolis, Hennepin County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 10* ; total, 10*

Number of square feet brailed: 50,000

* Minimum

Exhibit 8

9. Broadway and Plymouth Avenues Bridges

Mussel data, Exhibit 101 ; Map(s), Exhibit(s) 196,212

Pool(s): USAF * Date(s): 2 August 1977

Locality: Mississippi River, RM 853.8-855.7, Minneapolis, Hennepin County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 6 ; total, 6

Number of square feet brailed: 30,000

* Upper Saint Anthony Falls

Exhibit 9

10. Lake Street Bridge

Mussel data, Exhibit 104 ; Map(s), Exhibit(s) 196,213

Pool(s): 1 Date(s): 1 August 1977

Locality: Mississippi River, RM 849.1-850.6, St. Paul, Ramsey County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 10 ; total, 10

Number of square feet brailed: 50,000

Exhibit 10

11. St. Paul Daymark 849.1

Mussel data, Exhibit 105 ; Map(s), Exhibit(s) 196,213

Pool(s): 1 Date(s): 1 August 1977

Locality: Mississippi River, RM 847.8-849.1, St. Paul, Ramsey County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 5 ; total, 5

Number of square feet brailed: 25,000

Exhibit 11

12. Locks and Dam 1 Upper Approach Construction

Mussel data, Exhibit 106 ; Map(s), Exhibit(s) 196,198,213

Pool(s): 1 and 2 Date(s): 2-3 August 1977

Locality: Mississippi River, RM 846.2-847.8, St. Paul, Ramsey County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 6 ; negative, 14 ; total, 20

Number of square feet brailed: 100,000

Exhibit 12

13. Smith Avenue ("High") Bridge

Mussel data, Exhibit 108 ; Map(s), Exhibit(s) 198,214

Pool(s): 2 Date(s): 31 July 1977

Locality: Mississippi River, RM 839.2-840.6, St. Paul, Ramsey County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 6 ; total, 6

Number of square feet brailed: 30,000

Exhibit 13

14. Robinsons Rocks

Mussel data, Exhibit 109 ; Map(s), Exhibit(s) 198,215

Pool(s): 2 Date(s): 28 July 1977

Locality: Mississippi River, RM 825.0-826.6, about 3 miles S St. Paul Park, Washington County, Minnesota

Collector(s): EA, RFB, SLHF, RLT, RJW

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 12 ; total, 12

Number of square feet brailed: 60,000

Exhibit 14

15. Nininger

Mussel data, Exhibit 110 ; Map(s), Exhibit(s) 198,216

Pool(s): 2 Date(s): 29 July 1977

Locality: Mississippi River, RM 816.6-818.7, about 3 miles NE Hastings, Dakota County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 14 ; total, 14

Number of square feet brailed: 70,000

Exhibit 15

16. Vermillion River

Mussel data, Exhibit 112 ; Map(s), Exhibit(s) 199,216

Pool(s): 3 Date(s): 1,10 August 1978

Locality: Mississippi River, RM 812.9-813.5, about 1.8 miles W Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 18 ; total, 18

Number of square feet brailed: 90,000

Exhibit 16

17. Hastings Small Boat Harbor

Mussel data, Exhibit 113 ; Map(s), Exhibit(s) 199,216

Pool(s): 3 Date(s): 28 July 1978

Locality: Mississippi River, RM 812.9-813.4, Hastings, Dakota County, Minnesota

Collector(s): DJB, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 11 ; total, 11

Number of square feet brailed: 55,000

Exhibit 17

18. Prescott

Mussel data, Exhibit 114 ; Map(s), Exhibit(s) 199,217

Pool(s): 3 Date(s): 23 July 1978

Locality: Mississippi River, RM 809.2-811.8, Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 11 ; negative, 56 ; total, 67

Number of square feet brailed: 335,000

Exhibit 18

19. Pine Coulee

Mussel data, Exhibit 115 ; Map(s), Exhibit(s) 199,217

Pool(s): 3 Date(s): 1 August 1978

Locality: Mississippi River, RM 809.3-809.8, about 1.2 miles SE Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 6 ; negative, 13 ; total, 19

Number of square feet brailed: 95,000

Exhibit 19

20. Truedale Slough

Mussel data, Exhibit 116 ; Map(s), Exhibit(s) 199,217

Pool(s): 3 Date(s): 24 July 1978

Locality: Mississippi River, RM 807.7-808.7, about 3.0 miles SE Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 29 ; total, 38

Number of square feet brailed: 190,000

Exhibit 20

21. Four Mile Island

Mussel data, Exhibit 117 ; Map(s), Exhibit(s) 199,217

Pool(s): 3 Date(s): 25 July 1978

Locality: Mississippi River, RM 806.7-807.7, about 4.0 miles SE Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 22 ; total, 27

Number of square feet brailed: 135,000

Exhibit 21

22. Big River

Mussel data, Exhibit 118 ; Map(s), Exhibit(s) 199,218

Pool(s): 3 Date(s): 26 July, 9 August 1978

Locality: Mississippi River, RM 803.9-806.1, about 6.2 miles SE Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 33 ; total, 42

Number of square feet brailed: 210,000

Exhibit 22

23. Morgan Coulee, 24. Coulters Island

Mussel data, Exhibit 119 ; Map(s), Exhibit(s) 199,219

Pool(s): 3 Date(s): 28,29 July 1978

Locality: Mississippi River, RM 800.8-803.0, about 1.8 miles NW Diamond Bluff, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 10 ; negative, 60 ; total, 70

Number of square feet brailed: 350,000

Exhibit 23

25. Diamond Bluff

Mussel data, Exhibit 120 ; Map(s), Exhibit(s) 199,219

Pool(s): 3 Date(s): 30 July 1978

Locality: Mississippi River, RM 798.9-800.5, Diamond Bluff, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 17 ; negative, 26 ; total, 43

Number of square feet brailed: 215,000

Exhibit 24

26. Above Trenton

Mussel data, Exhibit 122 ; Map(s), Exhibit(s) 200,220

Pool(s): 4 Date(s): 11,12 August 1978

Locality: Mississippi River, RM 794.9-796.4, about 1 mile WNW Trenton, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing, pollywogging, scraping

Brail runs: positive, 7 ; negative, 31 ; tot ., 38

Number of square feet brailed: 190,000

Exhibit 25

27. Trenton

Mussel data, Exhibit 123 ; Map(s), Exhibit(s) 200,220

Pool(s): 4 Date(s): 12 August 1978

Locality: Mississippi River, RM 793.7-794.9, Trenton, Pierce County, Wisconsin

Collector(s): DJB, WLN

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 13 ; negative, 20 ; total, 33

Number of square feet brailed: 165,000

Exhibit 26

28. Cannon River

Mussel data, Exhibit 124 ; Map(s), Exhibit(s) 200,220

Pool(s): 4 Date(s): 16 August 1978

Locality: Mississippi River, RM 791.6-793.7, about 1.0 mile NW Red Wing, Goodhue County, Minnesota

Collector(s): SLHF, KLJ, WLN

Collecting technique(s): brailing

Brail runs: positive, 4 ; negative, 14 ; total, 18

Number of square feet brailed: 90,000

Exhibit 27

29. Red Wing Commercial and Small Boat Harbors

Mussel data, Exhibit 125 ; Map(s), Exhibit(s) 200,220

Pool(s): 4 Date(s): 20 August 1978

Locality: Mississippi River, RM 791.2-791.6, Red Wing, Goodhue County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 1 ; negative, 11 ; total, 12

Number of square feet brailed: 60,000

Exhibit 28

30. Red Wing Highway Bridge

Mussel data, Exhibit 126 ; Map(s), Exhibit(s) 200,221

Pool(s): 4 Date(s): 19 August 1978

Locality: Mississippi River, RM 789.2-791.2, Red Wing, Goodhue County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing, pollywogging, scraping

Brail runs: positive, 18 ; negative, 30 ; total, 48

Number of square feet brailed: 240,000

Exhibit 29

31. Bay City Small Boat Harbor

Mussel data, Exhibit 127 ; Map(s), Exhibit(s) 200,222

Pool(s): 4 Date(s): 20 August 1978

Locality: Mississippi River, RM 786.4, Bay City, Pierce County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 4 ; total, 4

Number of square feet brailed: 20,000

Exhibit 30

32. Bay City Commercial and Recreational Sites

Mussel data, Exhibit 128 ; Map(s), Exhibit(s) 200,222

Pool(s): 4 Date(s): 20 August 1978

Locality: Mississippi River, RM 786.2, Bay City, Pierce County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 2 ; negative, 3 ; total, 5

Number of square feet brailed: 25,000

Exhibit 31

33. Wacouta Point

Mussel data, Exhibit 129 ; Map(s), Exhibit(s) 200,222

Pool(s): 4 Date(s): 21,22 August 1978

Locality: Mississippi River, RM 783.2-785.4, about 5.0 miles E Red Wing, Goodhue County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing, scraping

Brail runs: positive, 21 ; negative, 41 ; total, 62

Number of square feet brailed: 310,000

Exhibit 52

34. Lake City Small Boat Harbor

Mussel data, Exhibit 130 ; Map(s), Exhibit(s) 200,223

Pool(s): 4 Date(s): 18 September 1977, 24 August 1978

Locality: Mississippi River, RM 772.4-772.8, Lake City, Wabasha County, Minnesota

Collector(s): EA, DJB, RAF, MLBF, SLHF, KLF, LAL, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 42 ; total, 51

Number of square feet brailed: 255,000

Exhibit 53

35. Reads Landing

Mussel data, Exhibit 131 ; Map(s), Exhibit(s) 201,224

Pool(s): 4 Date(s): 21-22, 29 September 1977

Locality: Mississippi River, RM 760.6-763.8, Reads Landing, Wabasha County, Minnesota

Collector(s): EA, DJB, SLHF, RCH, RLT

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 6 ; negative, 67 ; total, 73

Number of square feet brailed: 365,000

Exhibit 34

36. Wabasha Small Boat Harbor

Mussel data, Exhibit 132 ; Map(s), Exhibit(s) 201,224

Pool(s): 4 Date(s): 26 August 1978

Locality: Mississippi River, RM 760.5, Wabasha, Wabasha County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 7 ; total, 12

Number of square feet brailed: 60,000

Exhibit 35

37. Crats Island Bank Repair

Mussel data, Exhibit 133 ; Map(s), Exhibit(s) 201,224

Pool(s): 4 Date(s): 26 August 1978

Locality: Mississippi River, RM 759.2, about 1.0 miles E Wabasha, Wabasha County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 9 ; total, 9

Number of square feet brailed: 45,000

Exhibit 36

38. Teepeeota Point

Mussel data, Exhibit 134 ; Map(s), Exhibit(s) 201,225

Pool(s): 4 Date(s): 20 September 1977

Locality: Mississippi River, RM 757.0-758.4, about 2 miles SE Wabasha, Wabasha County, Minnesota

Collector(s): EA, DJB, RCH, RLT

Collecting technique(s): brailing

Brail runs: positive, 13 ; negative, 38 ; total, 51

Number of square feet brailed: 255,000

Exhibit 37

39. Grand Encampment

Mussel data, Exhibit 135 ; Map(s), Exhibit(s) 201,225

Pool(s): 4 Date(s): 19 September 1977

Locality: Mississippi River, RM 754.6-757.0, about 3.5 miles SE Wabasha, Wabasha County, Minnesota

Collector(s): EA, DJB, SLHF, RCH, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 31 ; total, 40

Number of square feet brailed: 200,000

Exhibit 38

40. Beef Slough

Mussel data, Exhibit 136 ; Map(s), Exhibit(s) 201,225

Pool(s): 4 Date(s): 27 August 1978

Locality: Mississippi River, RM 753.9-754.6, about 1.3 miles NW Alma, Buffalo County, Wisconsin

Collector(s): SLHF, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 6 ; negative, 11 ; total, 17

Number of square feet brailed: 85,000

Exhibit 39

41. Locks and Dam 4 Lower Approach

Mussel data, Exhibit 138 ; Map(s), Exhibit(s) 201,226

Pool(s): 5 Date(s): 27 August 1978

Locality: Mississippi River, RM 752.3-752.8, Alma, Buffalo County, Wisconsin

Collector(s): KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 8 ; negative, 9 ; total, 17

Number of square feet brailed: 85,000

Exhibit 40

42. Mule Bend, 43. Head of Island 42 Bank Repair

Mussel data, Exhibit 139 ; Map(s), Exhibit(s) 201,226

Pool(s): 5 Date(s): 28 August 1978

Locality: Mississippi River, RM 748.3-749.6, about 2.0 miles S Alma, Buffalo County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 4 ; negative, 29 ; total, 33

Number of square feet brailed: 165,000

Exhibit 41

44. West Newton

Mussel data, Exhibit 140 ; Map(s), Exhibit(s) 201,227

Pool(s): 5 Date(s): 23-26 September 1977

Locality: Mississippi River, RM 746.6-748.3, about 3.5 miles SSE Alma, Buffalo County, Wisconsin

Collector(s): EA, DJB, RCH, RLT

Collecting technique(s): brailing

Brail runs: positive, 67 ; negative, 22 ; total, 89

Number of square feet brailed: 445,000

Exhibit 42

45. Weaver Bottoms Complex

Mussel data, Exhibit 141 ; Map(s), Exhibit(s) 201,228

Pool(s): 5 Date(s): 25-28 September 1977

Locality: Mississippi River, RM 741.0-746.6, Minneiska, Winona County, Minnesota

Collector(s): EA, DJB, RLT

Collecting technique(s): brailing

Brail runs: positive, 64 ; negative, 48 ; total, 112

Number of square feet brailed: 560,000

Exhibit 43

46. Locks and Dam 5 Culvert Construction

Mussel data, Exhibit 142 ; Map(s), Exhibit(s) 201,202,229

Pool(s): 5 and 5A Date(s): 26, 28 September 1977

Locality: Mississippi River, RM 740.4-740.6, about 3 miles SE Buffalo, Buffalo County, Wisconsin

Collector(s): DJB

Collecting technique(s): pollywogging, scraping

Exhibit 44

47. Locks and Dam 5 Lower Approach

Mussel data, Exhibit 144 ; Map(s), Exhibit(s) 202,229

Pool(s): 5A Date(s): 28 August 1978

Locality: Mississippi River, RM 737.6-738.0, about 4.6 miles NW Fountain City, Buffalo County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 3 ; negative, 6 ; total, 9

Number of square feet brailed: 45,000

Exhibit 45

48. Island 58, 49. Island 58 Bank Repair, 50. Fountain City

Mussel data, Exhibit 145 ; Map(s), Exhibit(s) 202,230

Pool(s): 5A Date(s): 30 August; 1, 2 September 1978

Locality: Mississippi River, RM 733.0-735.4, about 1.2 miles NW Fountain City, Buffalo County, Wisconsin

Collector(s): KLJ, KLM, WLN, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 12 ; negative, 47 ; total, 59

Number of square feet brailed: 295,000

Exhibit 46

51. Fountain City Service Base

Mussel data, Exhibit 146 ; Map(s), Exhibit(s) 202,230

Pool(s): 5A Date(s): 2 September 1978

Locality: Mississippi River, RM 733.4, about 0.5 miles NW Fountain City, Buffalo County, Wisconsin

Collector(s): KLJ, WLN, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 8 ; total, 8

Number of square feet brailed: 40,000

Exhibit 47

52. Fountain City Small Boat Harbor

Mussel data, Exhibit 147 ; Map(s), Exhibit(s) 202,230

Pool(s): 5A Date(s): 2 September 1978

Locality: Mississippi River, RM 732.9, Fountain City, Buffalo County, Wisconsin

Collector(s): KLJ, WLN, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 2 ; negative, 2 ; total, 4

Number of square feet brailed: 20,000

Exhibit 48

53. Betsy Slough, 54. Betsy Slough Bank Repair,
55. Wilds Bend

Mussel data, Exhibit 148 ; Map(s), Exhibit(s) 202,230

Pool(s): 5A Date(s): 3 September 1978

Locality: Mississippi River, RM 729.8-732.0, about 2.0 miles SE Fountain City, Buffalo County, Wisconsin

Collector(s): KLJ, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 34 ; total, 39

Number of square feet brailed: 195,000

Exhibit 49

56. Locks and Dam 5A Upper Approach

Mussel data, Exhibit 149 ; Map(s), Exhibit(s) 202,231

Pool(s): 5A Date(s): 29, 31 August 1978

Locality: Mississippi River, RM 728.5-729.0, about 2.5 miles NW Winona, Winona County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 3 ; negative, 9 ; total, 12

Number of square feet brailed: 60,000

Exhibit 50

57. Locks and Dam 5A Lower Approach

Mussel data, Exhibit 151 ; Map(s), Exhibit(s) 202,231

Pool(s): 6 Date(s): 31 August, 1 September 1978

Locality: Mississippi River, RM 728.0-728.5, about 2.6 miles NW Winona, Winona County, Minnesota

Collector(s): KLJ, KLM, WLN, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 1 ; negative, 13 ; total, 14

Number of square feet brailed: 70,000

Exhibit 51

58. Winona Commercial Harbor and Small Boat Harbors

Mussel data, Exhibit 152 ; Map(s), Exhibit(s) 202,232

Pool(s): 6 Date(s): 5 September 1978

Locality: Mississippi River, RM 726.1-726.2, Winona, Winona County, Minnesota

Collector(s): KLJ, MLBF, WLN, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 1 ; negative, 21 ; total, 22

Number of square feet brailed: 110,000

Exhibit 52

59. Winona Lower Railroad Bridge

Mussel data, Exhibit 153 ; Map(s), Exhibit(s) 202,232

Pool(s): 6 Date(s): 6 September 1978

Locality: Mississippi River, RM 723.2-724.2, Winona, Winona County, Minnesota

Collector(s): KLJ, WLN, RLT, SJT

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 10 ; negative, 19 ; total, 29

Number of square feet brailed: 145,000

Exhibit 53

60. Gravel Point

Mussel data, Exhibit 154 ; Map(s), Exhibit(s) 202,232

Pool(s): 6 Date(s): 7-9 September 1978

Locality: Mississippi River, RM 721.7-723.2, about 1.5 miles SE Winona, Winona County, Minnesota

Collector(s): TDB, LC, SLHF, GJJ, RJJ, KLJ, WLN, JAN, RLT, TAW

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 15 ; negative, 15 ; total, 30

Number of square feet brailed: 150,000

Exhibit 54

61. Locks and Dam 6 Lower Approach

Mussel data, Exhibit 156 ; Map(s), Exhibit(s) 203,233

Pool(s): 7 Date(s): 13 September 1978

Locality: Mississippi River, RM 713.6-714.2, Trempealeau, Trempealeau County, Wisconsin

Collector(s): KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 5 ; total, 14

Number of square feet brailed: 70,000

Exhibit 55

62. Richmond Island

Mussel data, Exhibit 157 ; Map(s), Exhibit(s) 203,233

Pool(s): 7 Date(s): 14 September 1978

Locality: Mississippi River, RM 711.2-713.0, about 2.0 miles SE Trempealeau, Trempealeau County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 16 ; negative, 36 ; total, 52

Number of square feet brailed: 260,000

Exhibit 56

63. Queens Bluff

Mussel data, Exhibit 158 ; Map(s), Exhibit(s) 203,233

Pool(s): 7 Date(s): 15 September 1978

Locality: Mississippi River, RM 710.0-710.7, about 4.0 miles SE Trempealeau, Trempealeau County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 14 ; negative, 5 ; total, 19

Number of square feet brailed: 95,000

Exhibit 57

64. Locks and Dam 7 Upper Approach

Mussel data, Exhibit 159 ; Map(s), Exhibit(s) 203,234

Pool(s): 7 Date(s): 17 September 1978

Locality: Mississippi River, RM 703.1-703.6, about 3.0 miles N La Crescent, Houston County, Minnesota

Collector(s): MLBF, KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 11 ; negative, 4 ; total, 15

Number of square feet brailed: 75,000

Exhibit 58

65. La Crosse Railroad Bridge

Mussel data, Exhibit 161 ; Map(s), Exhibit(s) 204,235

Pool(s): 8 Date(s): 18, 19 September 1978

Locality: Mississippi River, RM 699.0-700.4, about 1.0 mile E La Crescent, Houston County, Minnesota

Collector(s): KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 13 ; negative, 25 ; total, 38

Number of square feet brailed: 190,000

Exhibit 59

66. Hingen Island Bank Repair

Mussel data, Exhibit 162 ; Map(s), Exhibit(s) 204,236

Pool(s): 8 Date(s): 22 September 1978

Locality: Mississippi River, RM 696.0-696.3, about 0.8 mile SW La Crosse, La Crosse County, Wisconsin

Collector(s): KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 1 ; total, 6

Number of square feet brailed: 30,000

Exhibit 60

67. Sand Slough, 68. Sand Slough Bank Repair

Mussel data, Exhibit 163 ; Map(s), Exhibit(s) 204,236

Pool(s): 8 Date(s): 20, 21 September 1978

Locality: Mississippi River, RM 694.1-695.0, about 1.5 miles S La Crosse, La Crosse County, Wisconsin

Collector(s): KLJ, WLN, JHP, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 20 ; total, 29

Number of square feet brailed: 145,000

Exhibit 61

69. Root River

Mussel data, Exhibit 164 ; Map(s), Exhibit(s) 204,237

Pool(s): 8 Date(s): 22 September 1978

Locality: Mississippi River, RM 692.7-693.5, about 2.5 miles SW La Crosse, La Crosse County, Wisconsin

Collector(s): KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 2 ; negative, 19 ; total, 21

Number of square feet brailed: 105,000

Exhibit 62

70. Picayune Island

Mussel data, Exhibit 165 ; Map(s), Exhibit(s) 204,237

Pool(s): 8 Date(s): 12 June 1979

Locality: Mississippi River, RM 691.1-692.4, about 2.0 miles N Brownsville, Houston County, Minnesota

Collector(s): EA, MLBF, RLT

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 27 ; total, 32

Number of square feet brailed: 160,000

Exhibit 63

71. Above Brownsville

Mussel data, Exhibit 166 ; Map(s), Exhibit(s) 204,237

Pool(s): 8 Date(s): 2-3 October 1977

Locality: Mississippi River, RM 689.8-691.2, about 2 miles N Brownsville, Houston County, Minnesota

Collector(s): EA, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 34 ; negative, 24 ; total, 58

Number of square feet brailed: 290,000

Exhibit 64

72. Brownsville

Mussel data, Exhibit 167 ; Map(s), Exhibit(s) 204,238

Pool(s): 8 Date(s): 15 August 1977

Locality: Mississippi River, RM 685.4-689.8, Brownsville, Houston County, Minnesota

Collector(s): EA, SLHF, RLT, RJW

Collecting technique(s): brailing

Brail runs: positive, 29 ; negative, 9 ; total, 38

Number of square feet brailed: 190,000

Exhibit 65

[illegible]

Mussel [illegible]

Pool(s): [illegible]

Locality: Mississippi River, RM [illegible], about [illegible] mile S Stoddard, Vernon County, Wisconsin

Collector(s): EA, KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 11 ; negative, 13 ; total, 24

Number of square feet brailed: 120,000

Exhibit 66

74. Warners Landing

Mussel data, Exhibit 169 ; Map(s), Exhibit(s) 204,239

Pool(s): 8 Date(s): 15, 17 June 1979

Locality: Mississippi River, RM 682.8-683.9, about 2.0 miles S Stoddard, Vernon County, Wisconsin

Collector(s): EA, SLHF, KLJ, RLT, TAW

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 22 ; negative, 11 ; total, 33

Number of square feet brailed: 165,000

Exhibit 67

75. Island 126, 76. Head of Island 126 Bank Repair

Mussel data, Exhibit 171 ; Map(s), Exhibit(s) 205,240

Pool(s): 9 Date(s): 21 June 1979

Locality: Mississippi River, RM 677.2-678.4, about 0.5 miles S Genoa, Vernon County, Wisconsin

Collector(s): KLJ, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 6 ; negative, 21 ; total, 27

Number of square feet brailed: 135,000

Exhibit 68

77. Twin Island,
78. Head of Twin Island Bank Repair

Mussel data, Exhibit 172 ; Map(s), Exhibit(s) 205,240

Pool(s): 9 Date(s): 21-22 June 1979

Locality: Mississippi River, RM 675.7-676.6, about 3.0 miles S Genoa, Vernon County, Wisconsin

Collector(s): EA, KLJ, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 4 ; negative, 26 ; total, 30

Number of square feet brailed: 150,000

Exhibit 69

79. Below Twin Island

Mussel data, Exhibit 173 ; Map(s), Exhibit(s) 205,240

Pool(s): 9 Date(s): 22 June 1979

Locality: Mississippi River, RM 675.7-676.6, about 4.0 miles S Genoa, Vernon County, Wisconsin

Collector(s): EA, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 2 ; negative, 18 ; total, 20

Number of square feet brailed: 100,000

Exhibit 70

80. Head of Battle Island

Mussel data, Exhibit 174 ; Map(s), Exhibit(s) 205, 241

Pool(s): 9 Date(s): 23 June 1979

Locality: Mississippi River, RM 670.7-672.0, about 1.0 mile S Victory, Vernon County, Wisconsin

Collector(s): EA, MLBF, TAW

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 28 ; total, 37

Number of square feet brailed: 185,000

Exhibit 71

81. DeSoto

Mussel data, Exhibit 175 ; Map(s), Exhibit(s) 205,242

Pool(s): 9 Date(s): 24 June 1979

Locality: Mississippi River, RM 667.2-668.6, DeSoto, Vernon County, Wisconsin

Collector(s): EA, KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 10 ; negative, 24 ; total, 34

Number of square feet brailed: 170,000

Exhibit 72

82. Above Indian Camp Light, 83. Mouth of Hummingbird Slough Bank Repair

Mussel data, Exhibit 176 ; Map(s), Exhibit(s) 205,243

Pool(s): 9 Date(s): 9-10 October 1977
24 June 1979

Locality: Mississippi River, RM 666.0-667.0, DeSoto, Vernon County, Wisconsin

Collector(s): EA, SLHF, KLJ, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 13 ; negative, 23 ; total, 36

Number of square feet brailed: 180,000

Exhibit 73

84. Indian Camp Light

Mussel data, Exhibit 177 ; Map(s), Exhibit(s) 205, 243

Pool(s): 9 Date(s): 10-12 October 1977

Locality: Mississippi River, RM 664.9-666.0, about 2 miles SW DeSoto, Vernon County, Wisconsin

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 21 ; total, 30

Number of square feet brailed: 150,000

Exhibit 74

85. Lansing Upper Light

Mussel data, Exhibit 178 ; Map(s), Exhibit(s) 205, 243

Pool(s): 9 Date(s): 11-12 October 1977

Locality: Mississippi River, RM 662.4-664.9, Lansing, Allamakee County, Iowa

Collector(s): EA, RLT

Collecting technique(s): brailing

Brail runs: positive, 18 ; negative, 36 ; total, 54

Number of square feet brailed: 270,000

Exhibit 75

86. Lansing Small Boat Harbor

Mussel data, Exhibit 179 ; Map(s), Exhibit(s) 205, 243

Pool(s): 9 Date(s): 25 June 1979

Locality: Mississippi River, RM 663.5, Lansing, Allamakee County, Iowa

Collector(s): EA, RLT

Collecting technique(s): brailing

Brail runs: positive, 1 ; negative, 2 ; total, 3

Number of square feet brailed: 15,000

Exhibit 76

87. Atchafalaya

Mussel data, Exhibit 180 ; Map(s), Exhibit(s) 205, 244

Pool(s): 9 Date(s): 26 June 1979

Locality: Mississippi River, RM 660.0-660.7, about 3.0 miles SE Lansing, Allamakee County, Iowa

Collector(s): EA, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 8 ; negative, 16 ; total, 24

Number of square feet brailed: 120,000

Exhibit 77

88. Crooked Slough Cut

Mussel data, Exhibit 181 ; Map(s), Exhibit(s) 205, 245

Pool(s): 9 Date(s): 27 June 1979

Locality: Mississippi River, RM 653.3-654.2, about 2.0 miles NW Lynxville, Crawford County, Wisconsin

Collector(s): KLJ, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 12 ; negative, 14 ; total, 26

Number of square feet brailed: 130,000

Exhibit 78

89. Locks and Dam 9 Upper Approach

Mussel data, Exhibit 182 ; Map(s), Exhibit(s) 205,246

Pool(s): 9 Date(s): 28 June 1979

Locality: Mississippi River, RM 648.0-648.4, about 2.5 miles SW Lynxville, Crawford County, Wisconsin

Collector(s): EA, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 3 ; total, 8

Number of square feet brailed: 40,000

Exhibit 79

90. Locks and Dam 9 Lower Approach

Mussel data, Exhibit 184 ; Map(s), Exhibit(s) 206,246

Pool(s): 10 Date(s): 14 October 1978

Locality: Mississippi River, RM 647.5-647.9, about 2.2 miles NE Harpers Ferry, Allamakee County, Iowa

Collector(s): KLJ, WLN, TAW

Collecting technique(s): brailing

Brail runs: positive, 7 ; negative, 3 ; total, 10

Number of square feet brailed: 50,000

Exhibit 80

91. Hay Point Bank Repair

Mussel data, Exhibit 185 ; Map(s), Exhibit(s) 206,246

Pool(s): 10 Date(s): 5-6 October 1977

Locality: Mississippi River, RM 644.8-646.8, about 5 miles SW Lynxville, Crawford County, Wisconsin

Collector(s): EA, SLHF, JLP, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 44 ; negative, 31 ; total, 75

Number of square feet brailed: 375,000

Exhibit 81

92. Jackson Island

Mussel data, Exhibit 186 ; Map(s), Exhibit(s) 206, 247

Pool(s): 10 Date(s): 13 October 1978

Locality: Mississippi River, RM 643.5-644.7, about 2.0 miles SSE Harpers Ferry, Allamakee County, Iowa

Collector(s): KLJ, WLN, TAW

Collecting technique(s): brailing

Brail runs: positive, 23 ; negative, 9 ; total, 32

Number of square feet brailed: 160,000

Exhibit 82

93. Mississippi Gardens

Mussel data, Exhibit 187 ; Map(s), Exhibit(s) 206, 247

Pool(s): 10 Date(s): 20 October 1978

Locality: Mississippi River, RM 642.4-643.4, about 5.0 miles N Prairie du Chien, Crawford County, Wisconsin

Collector(s): KLJ, WLN, TAW

Collecting technique(s): brailing

Exhibit 83

94. Prairie du Chien East Channel

Mussel data, Exhibit 188 ; Map(s), Exhibit(s) 206,248

Pool(s): 10 Date(s): 27,28,29,30 September 1978

Locality: Mississippi River (East Channel), RM 633.3-635.8, Prairie du Chien, Crawford County, Wisconsin

Collector(s): KLJ, MLBF, MM, WLN, KET, RLT, MAW

Collecting technique(s): brailing

Brail runs: positive, 41 ; negative, 5 ; total, 46

Number of square feet brailed: 230,000

Exhibit 84

95. Prairie du Chien Commercial and Small Boat Harbors

Mussel data, Exhibit 189 ; Map(s), Exhibit(s) 206, 248

Pool(s): 10 Date(s): 8 October 1978

Locality: Mississippi River, RM 635.2-635.5, Prairie du Chien, Crawford County, Wisconsin

Collector(s): MLBF, KLJ, WLN

Collecting technique(s): brailing

Exhibit 85

96. McGregor

Mussel data, Exhibit 190 ; Map(s), Exhibit(s) 206, 248

Pool(s): 10 Date(s): 19 October 1978

Locality: Mississippi River, RM 633.2-633.5, McGregor, Clayton County, Iowa

Collector(s): MLBF, SLHF, KLJ, WLN, DHS, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 12 ; total, 17

Number of square feet brailed: 85,000

Exhibit 86

97. Wyalusing Bend Light

Mussel data, Exhibit 191 ; Map(s), Exhibit(s) 206, 249

Pool(s): 10 Date(s): 10 October 1978

Locality: Mississippi River, RM 628.6-629.4, about 1.5 miles N Wyalusing, Grant County, Wisconsin

Collector(s): KLJ, WLN, TAW

Collecting technique(s): brailing

Brail runs: positive, 10 ; negative, 12 ; total, 22

Number of square feet brailed: 110,000

Exhibit 87

98. Wyalusing

Mussel data, Exhibit 192 ; Map(s), Exhibit(s) 206, 249

Pool(s): 10 Date(s): 9 October 1978

Locality: Mississippi River, RM 626.9-628.0, Wyalusing, Grant County, Wisconsin

Collector(s): KLJ, WLN, TAW

Collecting technique(s): brailing

Brail runs: positive, 18 ; negative, 19 ; total, 37

Number of square feet brailed: 185,000

Exhibit 88

99. McMillan Island

Mussel data, Exhibit 193 ; Map(s), Exhibit(s) 206,250

Pool(s): 10 Date(s): 30 June, 1 July 1979

Locality: Mississippi River, RM 618.1-619.6, about 2.0 miles NE Guttenburg, Clayton County, Iowa

Collector(s): EA, MLBF, KLJ, RLT, SJT, TAW

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 26 ; negative, 17 ; total, 43

Number of square feet brailed: 215,000

Exhibit 89

100. Locks and Dam 10 Upper Approach

Mussel data, Exhibit 194 ; Map(s), Exhibit(s) 206, 251

Pool(s): 10 Date(s): 30 June 1979

Locality: Mississippi River, RM 615.1-616.0, Guttenburg, Clayton County, Iowa

Collector(s): EA, KLJ, TAW

Collecting technique(s): brailing

Brail runs: positive, 3 ; negative, 5 ; total, 8

Number of square feet brailed: 40,000

Appendix C

Past and Present Mussel Presence/Absence and Proportional Data

Exhibits 90-194

The legend below explains the symbolism used in the following Exhibits.

LEGEND

An "x" indicates presence; no symbol, absence. An "x" without a superscript indicates Academy 1977-1979 field collecting data. An "x" with a superscript indicates the presence of the given taxon within the given period of time; the superscript (see Superscripts, below) refers to the (non-Academy) source of the record.

The column to the left of the names of taxa consists of records of living mussels collected in 1977-1979. (The identity of the source is indicated by the presence or absence of superscripts, as described above.) Columns A, J, T, and % refer to living mussels collected by the Academy in 1977-1979.

Column Headings

A - Adult specimen(s)

J Juvenile specimen(s) (i.e., mussels bysally attached to the brail)

T - Total of A and J

% - The proportion expressed as percentage that the specimens of the given taxon are of all mussels collected at the given site.

R - Recent presence records (i.e., for the period during or since the Finke (1966) survey in 1965)*

H - Historical occurrence records (i.e., for the period prior to 1965)**

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* An "x" without a superscript in the "R" column denotes 1977-1979 discovery by the Academy of recently dead mussel shells.

** An "x" without a superscript in the "H" column denotes 1977-1979 discovery by the Academy of long-dead shells.

Superscript

A -- Grier and Mueller (1922-1923)
B -- Baker (1903)
D -- Dawley (1947)
E -- Ellis' (1931a, 1931b) records, synopsized by van der Schalie and van der Schalie (1950)
F -- Finke (1966)
G -- Gale (1969)
H -- M.E. Havlik (Malacological Consultants, La Crosse, Wisconsin, personal communication)
I -- Coker (1919)
J -- D.D. Williams (1978)
L -- L. Halversen (Wabasha, Minnesota, personal communication)
M -- Marking and Bills (1977)
N -- National Biocentric (1977)
P -- Perry (1979) [i.e., "Perry (1978)" in Fuller (1978b)]
Q -- Shimek (1888)
R -- National Biocentric (1979e)
S -- Fuller (1977) [i.e., "Fuller (1977a)" in Fuller (1978b)]
T -- T.M. Freitag (Rock Island District, USACE, personal communication)
U -- Grier (1922)
V -- Havlik and Stansbery (1978)
W -- WDNR 1977-1980 UMR mussel survey
Z -- S.D. Hinz (Iowa-Illinois Gas and Electric Company, Davenport, Iowa, personal communication)
AA -- Morrison (1959)
BB -- Baker (1905)
CC -- Fuller (1979c)

The letter "x" is not used as a superscript, in order to avoid confusion with its use to indicate presence of a [illegible]. The other 25 letters of the English alphabet have been used, however, in Fuller (1978b) and/or the present report. Because the 25 have been exhausted, "double-lettering" (e.g., "AA") has been introduced. Certain letters (e.g., "C") that were used in Fuller (1978b), but whose corresponding references (Davis and Cawley, 1975, in this instance) are not needed in this report, have not been reassigned to another reference, in order to avoid confusion between the Academy's earlier report (i.e., Fuller, 1978b) and this one.

EXHIBIT 90

Study Area

Site data: Exhibit(s) 2-89

Map(s): Exhibit(s) 195

		A	J	T	%	R	H
	Cumberlandia monodonta						X[B]
X	*Quadrula metanevra*	20		20	0.2	X[F]	X[E]
X	*Q. quadrula*	149		149	1.4	X[F]	X[E]
X	*Q. nodulata*	75		75	0.7		X[E]
X	*Q. pustulosa*	615		615	6.0	X[F]	X[E]
X	*Tritogonia verrucosa*	15		15	0.1	X[F]	X[E]
X[W]	*Cyclonaias tuberculata*						X[E]
X	*Fusconaia flava*	761	2	763	7.4	X[F]	X[E]
X	*F. ebena*	1		1	<0.1	X[F]	X[E]
X	*Megalonaias gigantea*	66		66	0.6	X[F]	X[E]
X	*Amolema plicata* [1]	4353	11	4364	42.3	X[F]	X[E]
X[R]	*Plethobasus cyphyus*					X[T]	X[E]
X	*Pleurobema cordatum* [2]	13		13	0.1	X[H]	X[E]
X	*Elliptio crassidens*	4		4	<0.1		X[E]
X	*E. dilatata*	165		165	1.6	X[F]	X[E]
X	*Obliquaria reflexa*	407		407	3.9	X[F]	X[E]
X	*Proptera alata*	81		81	0.8	X[F]	X[E]
X	*P. laevissima*	76	26	102	1.0	X[F]	X[E]
	P. capax [3]						X[E]
	P. purpurata [4]						
X	*Leptodea fragilis*	48	47	95	0.9	X[F]	X[E]
	L. leptodon						X[V]
X	*Ellipsaria lineolata*	1		1	<0.1	X[F]	X[E]
X	*Truncilla truncata*	71	2	73	0.7	X[F]	X[E]
X	*T. donaciformis*	1533	715	2248	21.8	X[Z]	X[E]
X	*Obovaria olivaria*	150		150	1.5	X[F]	X[E]
X	*Actinonaias carinata*	4		4	<0.1	X[Z]	X[E]
	A. ellipsiformis						X[E]

		A	J	T	%	R	H
X	*Ligumia recta*	15	2	17	0.2	X^F	X^E
	L. subrostrata						X^A
X	*Carunculina parva*	57	311	368	3.6		X^E
X	*Lampsilis teres*	7		7	0.1	X^F	X^E
X	*L. higginsi*	10		10	0.1	X^F	X^E
X	*L. radiata siliquoidea*	58		58	0.6	X^F	X^E
X	*L. ovata ventricosa*	271	5	276	2.7	X^F	X^E
	Plagiola triquetra						X^A
X	*Arcidens confragosus*	20		20	0.2	X^Z	X^E
X	*Lasmigona complanata*	17		17	0.2	X^Z	X^E
	L. costata					X^H	X^D
	L. compressa *						
	Alasmidonta marginata						X^E
	A. viridis						X^A
	Simpsoniconcha ambigua						X^E
	Anodontoides ferussacianus *						
X^H	*Anodonta suborbiculata*						
X	*A. imbecillis*	14	3	17	0.2	X^H	X^E
X	*A. grandis*	94	1	95	0.9	X^F	X^E
X	*Strophitus undulatus*	11		11	0.1	X^F	X^E
35		4182	1126	10307	100.0	31	44

Notes:

Throughout much of the study area *Arcidens pileata* were so numerous that many were returned uncounted into the riverbed and are therefore not recorded in this appendix or elsewhere in this report.

* Records of "*Plethobasus cyphyus*" may represent *P. rubrum* and/or *P. cooperianus*. This may raise by 1 any of the taxa totals (current, R, and/or H).

* The most recent record of the Endangered *Propsera capax* alive in the St. Paul District UMR is Morrison's (1959).

* No record of this species' occurrence in the study area has been found. Because it has been observed in the UMR within the nearby Rock Island and/or St. Louis District(s) (Fuller, 1978b), it is listed here in order to provide space for possible future records.

EXHIBIT 91

Minnesota River

(1. Cargill, 2. Petersons Bar, 3. Route I-35W Bridge)

Site data: Exhibit(s) 2

Map(s): Exhibit(s) 197, 207

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						X^D
Q. nodulata						
Q. pustulosa						X^D
Tritogonia verrucosa						X^D
Cyclonaias tuberculata						
Fusconaia flava						X^D
F. ebena						
Megalonaias gigantea						X^D
Amblema plicata						X^D
Plethobasus cyphyus						X^D
Pleurobema cordatum						X^D
Elliptio crassidens						X^D
E. dilatata						X^D
Obliquaria reflexa						X^D
Proptera alata						X^D
P. laevissima						X^D
P. capax						
P. purpurata						
Leptodea fragilis						X^D
L. leptodon						
Ellipsaria lineolata						X^D
Truncilla truncata						X^D
T. donaciformis						X^D
Obovaria olivaria						X^D
Actinonaias carinata						X^D
A. ellipsiformis						

	A	J	T	%	R	H
Ligumia recta						X^D
L. subrostrata						
Carunculina parva						X^D
Lampsilis teres						X^D
L. higginsi						X^D
L. radiata siliquoidea						X^D
L. ovata ventricosa						X^D
Plagiola triquetra						X^D
Arcidens confragosus						X^D
Lasmigona complanata						X^D
L. costata						X^D
L. compressa						
Alasmidonta marginata						X^D
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						X^D
Anodonta suborbiculata						
A. imbecillis						X^D
A. grandis						X^D
Strophitus undulatus						
0	0	0	0		0	32

Notes:

EXHIBIT 92

St. Croix River

Site data: Exhibit(s) 3-6

Map(s): Exhibit(s) 199

		A	J	T	%	R	H
	Cumberlandia monodonta						
X	*Quadrula metanevra*	2		2	0.1		
X	*Q. quadrula*	2		2	0.1		
	Q. nodulata						
X	*Q. pustulosa*	61		61	3.0		X^D
X	*Tritogonia verrucosa*	15		15	0.7		X^D
	Cyclonaias tuberculata						X^D
X	*Fusconaia flava*	263	1	264	13.1		X^D
X^J	*F. ebena*						
	Megalonaias gigantea						X^D
X	*Amblema plicata*	1198		1198	59.3		X^D
	Plethobasus cyphyus						X^D
X	*Pleurobema cordatum*	9		9	0.4		
X	*Elliptio crassidens*	4		4	0.2		
X	*E. dilatata*	90		90	4.5		X^D
X	*Obliquaria reflexa*	40		40	2.0		X^D
X	*Proptera alata*	28		28	1.4		X^D
X	*P. laevissima*		3	3	0.1		X^D
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	3	4	7	0.3		X^D
	L. leptodon						
X	*Ellipsaria lineolata*	1		1	<0.1		
X	*Truncilla truncata*	5		5	0.2		X^D
X	*T. donaciformis*	18	6	24	1.2		
X	*Obovaria olivaria*	2		2	0.1		X^D
X	*Actinonaias carinata*	2		2	0.1		X^D
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						X[D]
	L. subrostrata					?X	
	Carunculina parva						X[D]
	Lampsilis teres						
X	*L. higginsi*	10		10	0.5		X[D]
X	*L. radiata siliquoidea*	41		41	2.0		X[D]
X	*L. ovata ventricosa*	178	1	179	8.9		X[D]
	Plagiola triquetra						
	Arcidens confragosus						
X	*Lasmigona complanata*	13		13	0.6		X[D]
X[J]	*L. costata*					X	
	L. compressa						
X[J]	*Alasmidonta marginata*						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	<0.1	X	X[D]
X	*A. grandis*	14		14	0.7		X[D]
X	*Strophitus undulatus*	5		5	0.2		X[D]
28		2005	15	2020	100.0	?3	25

Notes:

EXHIBIT 93

4. Stillwater

Site data: Exhibit(s) 3

Map(s): Exhibit(s) 199, 208

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	2.7		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	17		17	45.9		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	9		9	24.3		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	1		1	2.7		
	Proptera alata						
X	*P. laevissima*		3	3	8.1		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*		2	2	5.4		
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	1		1	2.7		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	2.7		
X	*A. grandis*	2		2	5.4		
	Strophitus undulatus						
9		32	5	37	100.0	0	0

Notes:

EXHIBIT 94

5. Hudson

Site data: Exhibit(s) 4

Map(s): Exhibit(s) 199, 209

		A	J	T	%	R	H
	Cumberlandia monodonta						
X	*Quadrula metanevra*	2		2	0.1		
X	*Q. quadrula*	2		2	0.1		
	Q. nodulata						
X	*Q. pustulosa*	59		59	3.1		X^D
X	*Tritogonia verrucosa*	15		15	0.8		X^D
	Cyclonaias tuberculata						X^D
X	*Fusconaia flava*	215	1	216	11.3		X^D
X^J	*F. ebena*						
	Megalonaias gigantea						X^D
X	*Amblema plicata*	1172		1172	61.1		X^D
	Plethobasus cyphyus						
X	*Pleurobema cordatum*	9		9	0.5		
X	*Elliptio crassidens*	4		4	0.2		
X	*E. dilatata*	83		83	4.3		
X	*Obliquaria reflexa*	34		34	1.8		X^D
X	*Proptera alata*	28		28	1.5		X^D
X^J	*P. laevissima*						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	2	2	4	0.2		X^D
	L. leptodon						
X	*Ellipsaria lineolata*	1		1	0.1		
X	*Truncilla truncata*	5		5	0.3		X^D
X	*T. donaciformis*	17	5	22	1.1		
X	*Obovaria olivaria*	1		1	0.1		
X	*Actinonaias carinata*	2		2	0.1		
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						X[D]
	L. subrostrata					?X	
	Caruncula parva						
	Lampsilis teres						
X	*L. higginsi*	10		10	0.5		X[D]
X	*L. radiata siliquoidea*	40		40	2.1		X[D]
X	*L. ovata ventricosa*	178	1	179	9.3		
	Plagiola triquetra						
	Arcidens confragosus						
X	*Lasmigona complanata*	13		13	0.7		X[D]
	L. costata					X	
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta subcirculata						
J	*A. imbecillis*					X	
	A. grandis	12		12	0.6		X[D]
	Strophitus undulatus	5		5	0.3		X[D]
		[illegible]		1918	100.0	?3	16

Notes:

EXHIBIT 95

6. Catfish Bar

Site data: Exhibit(s) 5

Map(s): Exhibit(s) 199, 210

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	2.7		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	22		22	59.5		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	3		3	8.1		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
X	*E. dilatata*	5		5	13.5		
X	*Obliquaria reflexa*	3		3	8.1		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1		1	2.7		
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*		1	1	2.7		
X	*Obovaria olivaria*	1		1	2.7		
	Actinonaias carinata						
	A. ellipsiformis						

	A	J	T	S	R	H
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis						
A. grandis						
Utrophitus undulatus						
8		50	1	57		

Notes:

EXHIBIT 96

7. Kinnickinnic

Site data: Exhibit(s) 6

Map(s): Exhibit(s) 199, 211

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	9		9	32.1		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	14		14	50.0		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
X	*E. dilatata*	2		2	7.1		
X	*Obliquaria reflexa*	2		2	7.1		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Cameralina parva						
	Lampsilis teres						
	L. higginsi						
X	*L. radiata siliquoidea*	1		1	3.6		
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha orbiqua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
5		28		28	100.0	0	0

Notes:

EXHIBIT 97

Black River[1]

Site data: Exhibit(s)

Map(s): Exhibit(s) 203, 204

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	100		100	4.6		
	Q. nodulata						
X	*Q. pustulosa*	31		31	1.4		
X	*Tritogonia verrucosa*	1		1	<0.1		X
	Cyclonaias tuberculata						
X	*Fusconaia flava*	59		59	2.7		
	F. ebena						X
	Megalonaias gigantea						
X	*Amblema plicata*	1683		1683	76.9		
	Plethobasus cyphyus						
	Pleurobema cordatum[2]						X
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	119		119	5.4		
X	*Proptera alata*	35		35	1.6		
X	*P. laevissima*	2		2	0.1		
	P. capax						
	P. purpurata						
	Lampsilis fragilis	16		16	0.7		
	L. [illegible]						
	[illegible] lineolata						X
	[illegible] truncata	24		24	1.1		
	[illegible]	60		60	2.7		
	[illegible]					?X	?X
	[illegible]						X
	[illegible]						

	A	J	T	%	R	H
X ***Ligumia recta***	1		1	<0.1	X	
L. subrostrata						
X ***Carunculina parva***	1		1	<0.1		
Lampsilis teres						
L. higginsi						X
X ***L. radiata siliquoidea***	1		1	<0.1		
X *L. ovata ventricosa*	25		25	1.1		
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata					X	
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridic						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
X *A. imbecillis*	2		2	0.1	X	
X *A. grandis*	29		29	1.3		
Strophitus undulatus						
17[1]	2189[1]	0	2189[1]	100.0	24	27

Notes:

[1] All data are from Havlik (1978a). They do not figure in the cumulative total for the study area (Exhibit 90).

[2] See Exhibit 90, note 2. Havlik (1978a) found an equivocal *Pleurobema* that she called "Round Pigtoe". This is the vernacular name for *P. sintoxia* that is used by D.H. Stansbery (OSU, personal communication), who verified Havlik's taxonomic identifications.

EXHIBIT 98

Upper Mississippi River

Site data: Exhibit(s) 7-89

Map(s): Exhibit(s) 195

		A	J	T	%	R	H
	Cumberlandia monodonta						X[BB]
X	*Quadrula metanevra*	18		18	0.2	X[F]	X[E]
X	*Q. quadrula*	147		147	1.8	X[F]	X[E]
X	*Q. nodulata*	75		75	0.9	X[Z]	X[E]
	Q. pustulosa	554		554	6.7	X[F]	X[E]
	Tritogonia verrucosa					X[F]	X[E]
X[W]	*Cyclonaias tuberculata*						X[E]
X	*Fusconaia flava*	498	1	499	6.0	X[F]	X[E]
X	*F. ebena*	1		1	<0.1	X[F]	X[E]
X	*Megalonaias gigantea*	66		66	0.8	X[F]	X[E]
X	*Amblema plicata*	3155	11	3166	38.2	X[F]	X[E]
X[R]	*Plethobasus cyphyus*					X[T]	X[E]
X	*Pleurobema cordatum* [1]	4		4	<0.1	X[H]	X[E]
X	*Elliptio crassidens*						X[E]
X	*E. dilatata*	75		75	0.9	X[F]	X[E]
X	*Obliquaria reflexa*	367		367	4.4	X[F]	X[E]
X	*Proptera alata*	53		53	0.6	X[F]	X[E]
X	*P. laevissima*	76	23	99	1.2	X[F]	X[E]
	P. capax [2]						X[E]
	P. purpurata						
X	*Leptodea fragilis*	45	43	88	1.1	X[F]	X[E]
	L. leptodon						X[V]
X	*Ellipsaria lineolata*					X[F]	X[E]
X	*Truncilla truncata*	66	2	68	0.8	X[F]	X[E]
X	*T. donaciformis*	1515	709	2224	26.8	X[Z]	X[E]
X	*Obovaria olivaria*	148		148	1.8	X[F]	X[E]
X	*Actinonaias carinata*	2		2	<0.1	X[Z]	X[E]
	A. ellipsiformis						X[E]

		A	J	T	%	R	H
X	*Ligumia recta*	15	2	17	0.2	X[F]	X[E]
	L. subrostrata						X[I]
X	*Carunculina parva*	57	311	368	4.4	X[G]	X[E]
X	*Lampsilis teres*	7		7	0.1	X[F]	X[E]
X[3]	*L. higginsi*					X[F]	X[E]
X	*L. radiata siliquoidea*	17		17	0.2	X[F]	X[E]
X	*L. ovata ventricosa*	93	4	97	1.2	X[F]	X[E]
	Plagiola triquetra						X[A]
X	*Arcidens confragosus*	20		20	0.2	X[Z]	X[E]
X	*Lasmigona complanata*	4		4	<0.1	X[Z]	X[E]
X[T]	*L. costata*					X[H]	X[D]
	L. compressa					X[P]	
	Alasmidonta marginata						X[E]
	A. viridis						X[A]
	Simpsoniconcha ambigua						X[E]
X[N]	*Anodontoides ferussacianus*						
X[T]	*Anodonta suborbiculata*					X[T]	X[I]
X	*A. imbecillis*	13	3	16	0.2	X[H]	X[E]
X	*A. grandis*	80	1	81	1.0	X[F]	X[E]
X	*Strophitus undulatus*	6		6	0.1	X[F]	X[E]
57[3]		7177	1110	8287	100.0	35	43

Notes:

[1] See Exhibit 90, note 1.

[2] See Exhibit 90, note 3.

[3] A living *Lampsilis higginsi* was recovered by the Academy late in the 1978 season from the Prairie du Chien East Channel bed during brailing to determine whether low water temperature was beginning to inhibit mussels' response to the brail. This brailing was not part of the formal sampling and its results are not otherwise reported.

EXHIBIT 99

Upper St. Anthony Falls Pool

Site data: Exhibit(s) 7,8

Map(s): Exhibit(s) 196

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

	A	J	T	%	R	H
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis						
A. grandis						
Strophitus undulatus						

Notes:

EXHIBIT 100

8. SOO Line Railroad Bridge

Site data: Exhibit(s) 7

Map(s): Exhibit(s) 196, 212

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

	A	J	T	%	R	H
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta cataracta						
A. imbecillis						
A. grandis						
Strophitus undulatus						

Notes:

EXHIBIT 101

9. Broadway Avenue and Plymouth Avenue Bridges

Site data: Exhibit(s) 8

Map(s): Exhibit(s) 196, 212

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

	A	J	T	%	R	H
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis						
A. grandis						
Strophitus undulatus						

Notes:

EXHIBIT 102[1]

Lower St. Anthony Falls Pool

Site data: Exhibit(s) None

Map(s): Exhibit(s) 196

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

A J T S R H

Ligumia [illegible]
L. subro[illegible]
Carunculi[illegible]
Lampsilis

L. hig[illegible]
L. ra[illegible]
[illegible]

[illegible]

[illegible]
L. im[illegible]
L. gran[illegible]
Strophitus [illegible]

Notes:

1. No sampling was conducted in this Pool.

EXHIBIT 103

Pool 1

Site data: Exhibit(s) 9-11

Map(s): Exhibit(s) 196

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						X
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						X
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

	A	J	T	S	R	H
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
[illegible] confragosus						
[illegible] complanata						
[illegible]						
[illegible]						
[illegible] *marginata*						
[illegible]						
[illegible] *ferus* [illegible]						
[illegible] *borbicula*						
[illegible]						
[illegible]						
Strophitus undulatus						
[illegible]	0	0	0		0	5

Notes:

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EXHIBIT 104

10. Lake Street Bridge

Site data: Exhibit(s) 9

Map(s): Exhibit(s) 196, 213

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

	A		T	R	
Ligumia r					
L. subro					
Carunculi					
Lampsili					
L. higgi					
L. radi					
L. ovat					
Plagi					
[illegible]					
[illegible]					
[illegible]					
[illegible]					
[illegible]					
[illegible]					
[illegible]					
[illegible]					
[illegible]					
[illegible]					
[illegible]					
Stroph					
	0	(	0	0	0

Notes:

EXHIBIT 105

11. St. Paul Daymark 849.1

Site data: Exhibit(s) 10

Map( ): Exhibit(s) 196, 213

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

ata
ata
a parva
eres

siliquoid
ntricosa
liquetra

ffraqoeue
mplano

ungin

ha ovi
fonus

orbicula
is

ondulatus

Notes:

EXHIBIT 106

12. Locks and Dam 1 Upper Approach Construction[1]

Site data: Exhibit(s) 11

Map(s): Exhibit(s) 196, 198, 213

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	5.0		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	2		2	10.0		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1		1	5.0		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	4		4	20.0		
	T. donaciformis						
	Obovaria olivaria						
X	*Actinonaias carinata*	2		2	10.0		
	A. ellipsiformis						

		A	J	T	%	R	H
X	*Ligumia* [illegible]	1		1	5.0		
	L. subrostrata						
	Carunculina [illegible]						
	Lampsilis [illegible]						
	L. higginsi						
X	*L. radiata* [illegible]	3		3	15.0		
X	*L. ovata* [illegible]	4		4	20.0		
	Plagiola [illegible]						
	Arcidens [illegible]						
	Lasmigona						
	L. costata						
	L. complanata						
	Alasmidonta [illegible]						
	A. viridis						
	Simpsonaias [illegible]						
	Anodontoides [illegible]						
	Anodonta [illegible]						
	A. imbecillis						
	A. grandis						
X	*Strophitus undulatus*	2		2	10.0		
9[1]		20[1]	0	20[1]	100.0	0	0

Notes:

[1] All living mussels recovered from areas formally designated as "Locks and Dam 1 Upper Approach Construction" were actually brailed from the part of this Site *below* the locks and dam, i.e., the lower approach, in Pool 2. The data are therefore attributed to this Site but in Pool summaries they are attributed to Pool 2.

EXHIBIT 107

Pool 2[1]

Site data: Exhibit(s) 11-14

Map(s): Exhibit(s) 198

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						X^D
	Q. quadrula						X^D
	Q. nodulata						
	Q. pustulosa						X^D
	Tritogonia verrucosa						X^D
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	5.0		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	2		2	10.0		X
	Plethobasus cyphyus						
	Pleurobema cordatum						X
	Elliptio crassidens						
	E. dilatata						X^D
	Obliquaria reflexa						
	Proptera alata						X^D
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1		1	5.0		X
	L. leptodon						
	Ellipsaria lineolata						X^D
X	*Truncilla truncata*	4		4	20.0		X^D
	T. donaciformis						
	Obovaria olivaria						?X
X	*Actinonaias carinata*	2		2	10.0		X^D
	A. ellipsiformis						

[illegible]

[illegible]

See note 1, Exhibit 106.

EXHIBIT 108

Smith Avenue ("High") Bridge

Site data: Exhibit(s) 12

Map(s): Exhibit(s) 198, 214

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

EXHIBIT 109

Robinsons Rocks

Site data: Exhibit(s) 13

Map(s): Exhibit(s) 198, 215

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

Notes

EXHIBIT 110

15. Nininger

Site data: Exhibit(s) 14

Map(s): Exhibit(s) 198, 216

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

	A	J	T	S	R	H
Ligumia [illegible]						
L. sub[illegible]						
Carunc[illegible]						
Lampsi[illegible]						
L. hig[illegible]						
L. radi[illegible]						
L. ova[illegible]						
Plagi[illegible]						
Arc[illegible]						
Lasm[illegible]						
L. [illegible]						
L. [illegible]						
Alasmi[illegible]						
A. vi[illegible]						
Simp[illegible]						
Anod[illegible]						
Anod[illegible]						
A. [illegible]						
A. [illegible]						
Strop[illegible]						
0	0	0	0		0	0

Notes:

EXHIBIT 111

Pool 3

Site data: Exhibit(s) 15-23

Map(s): Exhibit(s) 199

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	25		25	17.6		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	55		55	38.7		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	28		28	19.7		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
X	*E. dilatata*	5		5	3.5		
X	*Obliquaria reflexa*	21		21	14.8		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1		1	0.7		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	2		2	1.4		
X	*T. donaciformis*	2		2	1.4		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

	A	J	T	%	R	D
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. [illegible]dis						
[illegible]iconcha ambigua						
[illegible]oides ferussaclanus						
[illegible] suborbiculata						
X *A. [illegible]illis*	1		1	0.[illegible]		
X *A. [illegible]dis*	1		1	0.7		
X *Strophitus undulatus*	1		1	0.7		
11	142	0	142	100.0	[illegible]	0

Notes:

EXHIBIT 112

16. Vermillion River

Site data: Exhibit(s) 15

Map(s): Exhibit(s) 199, 216

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia nasuta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
0		0	0	0		0	0

Notes:

EXHIBIT 113

17. Hastings Small Boat Harbor

Site data: Exhibit(s) 16

Map(s): Exhibit(s) 199, 216

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

	A	J	T	C	R	H
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis						
A. grandis						
Strophitus undulatus						
0	0	0	0		0	0

Notes:

EXHIBIT 114

18. Prescott

Site data: Exhibit(s) 17

Map(s): Exhibit(s) 119, 217

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	3		3	11.1		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	9		9	33.3		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	7		7	25.9		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
X	*E. dilatata*	4		4	14.8		
X	*Obliquaria reflexa*	3		3	11.1		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A ellipsiformis						

	Ligumia [illegible]						
	L. subro[illegible]						
	Caruncul[illegible]						
	Lampsilis [illegible]						
	L. higgins[illegible]						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	1		1	3.7		
	Strophitus undulatus						
6		27	0	27	100.0	0	0

Notes:

EXHIBIT 115

19. Pine Coulee

Site data: Exhibit(s) 18

Map(s): Exhibit(s) 199, 217

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	3		3	33.3		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	3		3	33.3		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	2		2	22.2		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A					
	[illegible] recta						
	[illegible]strata						
	[illegible]ina parva						
	[illegible]illis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
X	*Strophitus undulatus*	1		1	11.1		
4		9	0	9	100.0	0	0

Notes:

EXHIBIT 116

20. Truedale Slough

Site data: Exhibit(s) 19

Map(s): Exhibit(s) 199, 217

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	4		4	17.4		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	12		12	52.2		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	2		2	8.7		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	4		4	17.4		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1		1	4.3		
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
5		23	0	23	100.0	0	0

Notes:

EXHIBIT 117

21. Four Mile Island

Site data: Exhibit(s) 20

Map(s): Exhibit(s) 199, 217

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	2		2	11.8		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	10		10	58.8		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	3		3	17.6		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	2		2	11.8		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
4		17	0	17	100.0	0	0

Notes:

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
4		17	0	17	100.0	0	0

Notes:

EXHIBIT 118

22. Big River

Site data: Exhibit(s) 21

Map(s): Exhibit(s) 199, 218

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	7		7	22.6		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	16		16	51.6		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	3		3	9.7		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
X	*E. dilatata*	1		1	3.2		
X	*Obliquaria reflexa*	2		2	6.5		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1		1	3.2		
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	3.2		
	A. grandis						
	Strophitus undulatus						
7		31	0	31	100.0	0	0

Notes:

EXHIBIT 119

23. Morgan Coulee, 24. Coulters Island

Site data: Exhibit(s) 22

Map(s): Exhibit(s) 199, 219

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	7.7		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	7.7		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	6		6	46.2		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	5		5	38.5		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
4		13	0	13	100.0	0	0

Notes:

EXHIBIT 120

25. Diamond Bluff

Site data: Exhibit(s) 23

Map(s): Exhibit(s) 199, 219

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	5		5	22.7		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	7		7	31.8		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	4		4	18.2		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	3		3	13.6		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1		1	4.5		
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	2		2	9.1		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

	A	T	P	H		
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis						
A. grandis						
Strophitus undulatus						
	22	0	22	100.0	0	0

Notes:

EXHIBIT 121

Pool 4

Site data: Exhibit(s) 24-38

Map(s): Exhibit(s) 200,201

		A	J	T	%	R	H
	Cumberlandia monodonta						
X	*Quadrula metanevra*	2		2	0.6		X^E
X	*Q. quadrula*	1		1	0.3		X^D
	Q. nodulata						
X	*Q. pustulosa*	21		21	6.4	X^F	X^E
	Tritogonia verrucosa						X^E
X^W	*Cyclonaias tuberculata*[1]						X^E
X	*Fusconaia flava*	40		40	12.2	X^F	X^E
	F. ebena						X^E
	Megalonaias gigantea						X^E
X	*Amblema plicata*	82	3	85	26.0	X^F	X^E
X^R	*Plethobasus cyphyus*[1]						X^E
X	*Pleurobema cordatum*[2]	1		1	0.3		X^E
	Elliptio crassidens						X^E
X	*E. dilatata*	4		4	1.2	X^F	X^E
X	*Obliquaria reflexa*	18		18	5.5		X^E
X	*Proptera alata*	2		2	0.6	X^F	X^E
X	*P. laevissima*	35	19	54	16.5		X^E
	P. capax[3]						X^E
	P. purpurata						
X	*Leptodea fragilis*	14	11	25	7.6	X^F	X^E
	L. leptodon						
	Ellipsaria lineolata					X^F	X^E
X	*Truncilla truncata*	6	2	8	2.4		X^E
X	*T. donaciformis*	7	40	47	14.4		X^E
X	*Obovaria olivaria*	4		4	1.2		X^E
X^R	*Actinonaias carinata*						X^E
	A. ellipsiformis						X^E

		A	J	T	S	R	H
X	*Ligumia recta* [4]					X^F	X^F
	L. subrostrata						
X	*Carunculina parva*	1	3	4	1.2		X^F
	Lampsilis teres					X^F	X^E
	L. higginsi						X^D
X	*L. radiata siliquoidea*	1		1	0.3	X^F	X^E
X	*L. ovata ventricosa*	4	1	5	1.5	X^F	X^E
	Plagiola triquetra						[illegible]
	Arcidens confragosus						X^D
	Lasmigona complanata						X^E
	L. costata						X^D
	L. compressa						
	Alasmidonta marginata						X^E
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						X^{AA}
	Anodonta suborbiculata						
X	*A. imbecellis*	2	2	4	1.2		X^D
X	*A. grandis*	1		1	0.3	?X^F	X^E
	Strophitus undulatus						X^E
25		246	81	327	100.0	12?	58

Notes:

[1] See Exhibit 132, note 1.

[2] See Exhibit [illegible], note 2.

[3] This is the only record of this species [illegible] the St. St. Paul District in recent [illegible].

[4] See Exhibit [illegible], note [illegible].

Note that in [illegible] recorded species [illegible] 183[illegible]. Note, also, that [illegible] partially [illegible].

EXHIBIT 122

26. Above Trenton

Site data: Exhibit(s) 24

Map(s): Exhibit(s) 200, 220

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	7		7	30.4		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	5		5	21.7		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
X	*P. laevissima*		5	5	21.7		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*		4	4	17.4		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1		1	4.3		
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

	A	J	T	%	R	H
Ligumia recta						
L. subrostrata						
Quadrula parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Obliquaria reflexa						
Anodonta cataracta						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsonias ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis	1		1	4.5		
A. grandis						
Strophitus undulatus						
	14	9	23	100.0	0	0

Notes:

EXHIBIT 123

27. Trenton

Site data: Exhibit(s) 25

Map(s): Exhibit(s) 200, 220

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	1		1	1.0		
	Q. nodulata						
X	*Q. pustulosa*	9		9	8.9		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	18		18	17.8		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	24		24	23.8		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	7		7	6.9		
X	*Proptera alata*	2		2	2.0		
X	*P. laevissima*	25		25	24.8		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	3		3	3.0		
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	6		6	5.9		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
X	*L. radiata siliquoidea*	1		1	1.0		
X	*L. ovata ventricosa*	1		1	1.0		
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecellis						
X	*A. grandis*	1		1	1.0		
	Strophitus undulatus						
12		101	0	101	100.0	0	0

Notes:

EXHIBIT 124

28. Cannon River

Site data: Exhibit(s) 26

Map(s): Exhibit(s) 200,220

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	8.3		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	2		2	16.7		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	8		8	66.7		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1		1	8.3		
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

Ligumia nasuta						
L. subrostrata						
Lasmigona parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis						
A. grandis						
Strophitus undulatus						
	1	0	12	100.0	0	0

Notes:

EXHIBIT 125

29. Red Wing Commercial and Small Boat Harbors

Site data: Exhibit(s) 27

Map(s): Exhibit(s) 200,220

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	50.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	1		1	50.0		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

	A	J	T	[illegible]	R	[illegible]
Ligumia recta						
L. subrostrata						
Cannaulina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecellis						
A. grandis						
Strophitus undulatus						
2	2	0	2	100.0	0	0

Notes:

EXHIBIT 126

30. Red Wing Highway Bridge

Site data: Exhibit(s) 28

Map(s): Exhibit(s) 200,221

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	2		2	5.6		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	5	2	7	19.4		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	7		7	19.4		
	Proptera alata						
X	*P. laevissima*	1	3	4	11.1		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	5	6	11	30.6		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1	2	3	8.3		
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecellis*		2	2	5.6		
	A. grandis						
	Strophitus undulatus						
7		21	15	36	100.0	0	0

Notes:

EXHIBIT 127

31. Bay City Small Boat Harbor

Site data: Exhibit(s) 29

Map(s): Exhibit(s) 200, 222

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

		A	J	I	S	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
0		0	0	0		0	0

Notes:

EXHIBIT 128

32. Bay City Commercial and Recreational Site

Site data: Exhibit(s) 30

Map(s): Exhibit(s) 200, 222

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
	Amblema plicata						
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
X	*P. laevissima*	1	2	3	100.0		
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

Liguria [illegible]
L. subrostrata
Carunculina [illegible]
Lampsilis teres

L. higginsi
L. radiata siliquoidea
L. ovata [illegible]
Plagiola [illegible]

Arcidens [illegible]
Lasmigona [illegible]
L. costata
L. compressa

Alasmidonta marginata
A. viridis
Simpsoniconcha [illegible]
Anodontoides [illegible]

Anodonta suborbiculata
A. imbecillis
A. gracilis
Strophitus undulatus

Notes:

EXHIBIT 129

33. Wacouta Point

Site data: Exhibit(s) 31

Map(s): Exhibit(s) 200, 222

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	2		2	4.9		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	8	1	9	22.0		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
X	*P. laevissima*	8	8	16	39.0		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	6		6	14.6		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	3		3	7.3		
X	*T. donaciformis*		3	3	7.3		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

[illegible] [illegible]ata
[illegible] [illegible]ata
[illegible] [illegible] parv[illegible]
[illegible] [illegible]ea

[illegible]
[illegible] siliqu[illegible]
[illegible] [illegible]a contric[illegible]
[illegible] triquetr[illegible]

[illegible] confrag[illegible]
[illegible] compla[illegible]
[illegible] [illegible]ata
[illegible] [illegible]pressa

[illegible]dента margina[illegible]
A. [illegible]
[illegible]concha amb[illegible]
[illegible]dontoides feruss[illegible]

[illegible]donta suborbicul[illegible]
A. [illegible]lis
A. [illegible]ndia
[illegible] undulat[illegible]

[illegible]

EXHIBIT 130[1]

34. Lake City Small Boat Harbor

Site data: Exhibit(s) 32

Map(s): Exhibit(s) 200, 223

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						X[D]
	Q. quadrula						X[D]
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						X[D]
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	16.7		X[D]
	F. ebena						X[D]
	Megalonaias gigantea						X[D]
X	*Amblema plicata*	3		3	50.0		X[D]
	Plethobasus cyphyus						
	Pleurobema cordatum						X[D]
	Elliptio crassidens						X[D]
X	*E. dilatata*	1		1	16.7		X[D]
	Obliquaria reflexa						X[D]
	Proptera alata						X[D]
X	*P. laevissima*		1	1	16.7		X[D]
	P. capax						
	P. purpurata						
	Leptodea fragilis						X[D]
	L. leptodon						
	Ellipsaria lineolata						X[D]
	Truncilla truncata						X[D]
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
X	*Ligumia recta*[2]					X[D]
	L. subrostrata					
	Carunculina parva					X[D]
	Lampsilis teres					X[D]
	L. higginsi					
	L. radiata siliquoidea					X[D]
	L. ovata ventricosa					X[D]
	Plagiola triquetra					
	Arcidens confragosus					
	Lasmigona complanata					X[D]
	L. costata					X[D]
	L. compressa					
	Alasmidonta marginata					
	A. viridis					
	Simpsoniconcha ambigua					
	Anodontoides ferussacianus					
	Anodonta suborbiculata					
	A. imbecillis					X[D]
	A. grandis					X[D]
	Strophitus undulatus					X[D]
5		5	1	6	100.0	0	26

Notes:

[1] Like some of Dawley's (1947) records, many of Morrison's (1959) records (Exhibit 121) come from near the Lake City Small Boat Harbor Site.

[2] The single 1977 living specimen of this species from this Site (Fuller, 1978b) was inadvertently omitted from this Exhibit.

EXHIBIT 131

35. Reads Landing

Site data: Exhibit(s) 33

Map(s): Exhibit(s) 201, 224

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa					x	
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
x	*Fusconaia flava*	1		1	6.3	x^{L}	
	F. ebena						
	Megalonaias gigantea						
x	*Amblema plicata*	6		6	37.5	x^{S}	
	Plethobasus cyphyus						
	Pleurobema cordatum					x	
	Elliptio crassidens						
x	*E. dilatata*	2		2	12.5	x^{L}	
	Obliquaria reflexa					x^{L}	
	Proptera alata					x^{L}	
	P. laevissima					x^{L}	
	P. capax						
	P. purpurata						
	Leptodea fragilis					x^{L}	
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata					x^{L}	
x	*T. donaciformis*		6	6	37.5	x^{S}	
	Obovaria olivaria					x	
	Actinonaias carinata					x^{L}	
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta					x[L]	
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea					x[L]	
x	*L. ovata ventricosa*		1	1	6.3	x[S]	
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis					x[L]	
	A. grandis					x[L]	
	Strophitus undulatus					x[L]	
5		9	7	16	100.0	19	0

Notes:

EXHIBIT 132

36. Wabasha Small Boat Harbor

Site data: Exhibit(s) 34

Map(s): Exhibit(s) 201, 224

		A	J	T	%	R	H
	Cumberlandia monodonta						
X	*Quadrula metanevra*	2		2	11.8		
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	2		2	11.8		
	Tritogonia verrucosa						
X[W]	*Cyclonaias tuberculata*[1]						
X	*Fusconaia flava*	3		3	17.6		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	6		6	35.3		
X[R]	*Plethobasus cyphyus*[1]						
X[R]	*Pleurobema cordatum*[2]						
	Elliptio crassidens						
X	*E. dilatata*	1		1	5.9		
X[R]	*Obliquaria reflexa*						
X[R]	*Proptera alata*						
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*		1	1	5.9		
	L. leptodon						
	Ellipsaria lineolata						
X[R]	*Truncilla truncata*						
X[R]	*T. donaciformis*						
X	*Obovaria olivaria*	2		2	11.8		
X[R]	*Actinonaias carinata*						
	A. ellipsiformis						

		A	J	T	%	R	[illegible]
X	*Ligumia recta*						
	L. subrostrata						
X^R	*Carunculina parva*						
	Lampsilis teres						
	L. higginsi						
X^R	*L. radiata siliquoidea*						
X^R	*L. ovata ventricosa*						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X^R	*A. imbecillis*						
X^R	*A. grandis*						
	Strophitus undulatus						
20		16	1	17	100.0	0	0

Notes:

[1] This is the only record of this species alive in the St. Paul District in recent memory.

The "X^R" records are from National Biocentric [illegible], in [illegible] at [illegible]

EXHIBIT 133

37. Crats Island Bank Repair

Site data: Exhibit(s) 35

Map(s): Exhibit(s) 201, 224

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

	A	J	T	%	P	H
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis						
A. grandis						
Strophitus undulatus						
0	0	0	0		0	0

Notes:

EXHIBIT 134

38. Teepeeota Point

Site data: Exhibit(s) 36

Map(s): Exhibit(s) 201, 225

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	3.8		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	3.8		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	9		9	34.6		
	Plethobasus cyphyus						
X	*Pleurobema cordatum*	1		1	3.8		
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	2		2	7.7		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata					X	
X	*T. donaciformis*		10	10	38.5		
X	*Obovaria olivaria*	1		1	3.8		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*		1	1	3.8		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa					X	
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
8		15	11	26	100.0	2	0

Notes:

EXHIBIT 135

39. Grand Encampment

Site data: Exhibit(s) 37

Map(s): Exhibit(s) 201, 225

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	3.8		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	2		2	7.7		
	F. ebena						
	Megalonaias gigantea						
	Amblema plicata						
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*		21	21	80.8		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*		2	2	7.7		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis					X	
	A. grandis						
	Strophitus undulatus						
4		3	23	26	100.0	1	0

Notes:

EXHIBIT 136

40. Beef Slough

Site data: Exhibit(s) 38

Map(s): Exhibit(s) 201, 225

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	4		4	22.2		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	3		3	16.7		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	7		7	38.9		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	2		2	11.1		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	1		1	5.6		
X	*Obovaria olivaria*	1		1	5.6		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
6		18	0	18	100.0	0	0

Notes:

EXHIBIT 137

Pool 5

Site data: Exhibit(s) 39-43

Map(s): Exhibit(s) 201

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	9		9	1.3	X	X^D
	Tritogonia verrucosa						X^D
	Cyclonaias tuberculata						
X	*Fusconaia flava*	3		3	0.4	X	X^D
	F. ebena						X^D
	Megalonaias gigantea						
X	*Amblema plicata*	21	2	23	3.2	X	
	Plethobasus cyphyus						X^D
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						X^D
X	*Obliquaria reflexa*	3		3	0.4	X	X^D
	Proptera alata					X	
X	*P. laevissima*	2	3	5	0.7	X^F	
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1	9	10	1.4	X	
	L. leptodon						
	Ellipsaria lineolata					X^F	X^D
X	*Truncilla truncata*	2		2	0.3		
X	*T. donaciformis*	4	572	576	81.0	X	
X	*Obovaria olivaria*	1		1	0.1	X^A	
	Actinonaias carinata						X^D
	A. ellipsiformis						

		A	J	T	%	R	H
X	*Ligumia recta*		1	1	0.1	X^F	X^D
	L. subrostrata						
X	*Carunculina parva*	5	68	73	10.3		
	Lampsilis teres						
	L. higginsi						
X	*L. radiata siliquoidea*	1		1	0.1	X	X^D
X	*L. ovata ventricosa*	1		1	0.1		X^D
	Plagiola triquetra						
X	*Arcidens confragosus*	1		1	0.1		X^D
	Lasmigona complanata						X^D
	L. costata						X^D
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	0.1		
X	*A. grandis*		1	1	0.1	X	
	Strophitus undulatus					X^F	
16		55	656	711	100.0	14	15

Notes:

EXHIBIT 138

41. Locks and Dam 4 Lower Approach

Site data: Exhibit(s) 39

Map(s): Exhibit(s) 201, 226

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	6.3		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	1		1	6.3		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	1		1	6.3		
	Proptera alata						
X	*P. laevissima*		2	2	12.5		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*		4	4	25.0		
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*		6	6	37.5		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*		1	1	6.3		
	Strophitus undulatus						
7		3	13	16	100.0	0	0

Notes:

EXHIBIT 139

42. Mule Bend, 43. Head of Island 42 Bank Repair

Site data: Exhibit(s) 40

Map(s): Exhibit(s) 201, 226

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	16.7		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
	Amblema plicata						
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*		3	3	50.0		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	2		2	33.3		
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
3		3	3	6	100.0	0	0

Notes:

EXHIBIT 140

44. West Newton

Site data: Exhibit(s) 41

Map(s): Exhibit(s) 201, 227

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	2		2	0.5	X	
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava					X	
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	1	1	2	0.5	X	
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	1		1	0.2	X	
	Proptera alata					X	
X	*P. laevissima*	1	1	2	0.5		
	P. capax						
	P. purpurata						
	Leptodea fragilis					X	
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	3	352	355	83.1	X	
X	*Obovaria olivaria*	1		1	0.2	X	
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
X	*Ligumia recta*		1	1	0.2		
	L. subrostrata						
X	*Carunculina parva*		63	63	14.8		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea					X	
	L. ovata ventricosa					X	
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
8		9	418	427	100.0	10	0

Notes:

EXHIBIT 141

45. Weaver Bottoms Complex

Site data: Exhibit(s) 42

Map(s): Exhibit(s) 201, 228

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	0.4		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	1	1	2	0.9		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*		2	2	0.9		
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*		214	214	95.1		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*		5	5	2.2		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
X	*L. ovata ventricosa*	1		1	0.4		
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
6		3	222	225	100.0	0	0

Notes:

EXHIBIT 142

46. Locks and Dam 5 Culvert Construction

Site data: Exhibit(s) 43

Map(s): Exhibit(s) 201, 202, 229

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	5		5	13.5		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	2		2	5.4		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	18		18	48.6		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	1		1	2.7		
	Proptera alata						
X	*P. laevissima*	1		1	2.7		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1		1	2.7		
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	1		1	2.7		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	I	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*	5		5	13.5		
	Lampsilis teres						
	L. higginsi						
X	*L. radiata siliquoidea*	1		1	2.7		
	L. ovata ventricosa						
	Plagiola triquetra						
X	*Arcidens confragosus*	1		1	2.7		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	2.7		
	A. grandis					X	
	Strophitus undulatus						
11		37	0	37	100.0	1	0

Notes:

EXHIBIT 143

Pool 5A

Site data: Exhibit(s) 43-49

Map(s): Exhibit(s) 202

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra					X^W	
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	13		13	20.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	9		9	13.8		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	18		18	27.7		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	4		4	6.2		
	Proptera alata					X^W	
X	*P. laevissima*	1		1	1.5		
	P. capax						
	P. purpurata						
X^W	*Leptodea fragilis*						
	L. leptodon						
X^W	*Ellipsaria lineolata*						
X	*Truncilla truncata*	1		1	1.5		
X	*T. donaciformis*	10	4	14	21.5		
X	*Obovaria olivaria*	1		1	1.5		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						X^A
X	*Carunculina parva*		2	2	3.1		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
X^W	*L. ovata ventricosa*						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						X^A
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	2		2	3.1		
X^W	*Strophitus undulatus*						
14		59	6	65	100.0	2	2

Notes:

EXHIBIT 144

47. Locks and Dam 5 Lower Approach

Site data: Exhibit(s) 44

Map(s): Exhibit(s) 202, 229

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	20.0		
	F. ebena						
	Megalonaias gigantea						
	Amblema plicata						
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	1		1	20.0		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1		1	20.0		
X	*T. donaciformis*	2		2	40.0		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

	A	J	T	S	R	H
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis						
A. grandis						
Strophitus undulatus						
1	[illegible]	[illegible]	[illegible]	100.0	[illegible]	[illegible]

Notes:

EXHIBIT 145

48. Island 58, 49. Island 58 Bank Repair, 50. Fountain City

Site data: Exhibit(s) 45

Map(s): Exhibit(s) 202, 230

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	7		7	18.4		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	5		5	13.2		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	10		10	26.3		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	3		3	7.9		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	7	4	11	28.9		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	S	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	2		2	5.5		
	Strophitus undulatus						
6		34	4	58	1	[illegible]	[illegible]

Notes:

EXHIBIT 146

51. Fountain City Service Base

Site data: Exhibit(s) 46

Map(s): Exhibit(s) 202, 230

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
0		0	0	0		0	0

Notes:

EXHIBIT 147

52. Fountain City Small Boat Harbor

Site data: Exhibit(s) 47

Map(s): Exhibit(s) 202, 230

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	11.1		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	3		3	33.3		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	4		4	44.4		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
X	*Obovaria olivaria*	1		1	11.1		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
4		9	0	9	100.0	0	0

Notes:

EXHIBIT 148

53. Betsy Slough, 54. Betsy Slough Bank Repair, 55. Wilds Bend

Site data: Exhibit(s) 48

Map(s): Exhibit(s) 202, 230

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	5		5	55.6		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	3		3	33.3		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	1		1	11.1		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
3		9	0	9	100.0	0	0

Notes:

EXHIBIT 149

56. Locks and Dam 5a Upper Approach

Site data: Exhibit(s) 49

Map(s): Exhibit(s) 202, 231

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	1		1	25.0		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
X	*P. laevissima*	1		1	25.0		
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	[illegible]	T	[illegible]	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*		2	2	50.0		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
3		2	2	4	100.0	0	0

Notes:

EXHIBIT 150

Pool 6

Site data: Exhibit(s) 50-53

Map(s): Exhibit(s) 202

		A	J	T	%	R	H
	Cumberlandia monodonta						
X	*Quadrula metanevra*	7		7	0.2		X^{D}
X^{CC}	*Q. quadrula*						
	Q. nodulata						
X	*Q. pustulosa*	147		147	5.0	X^{F}	X^{D}
	Tritogonia verrucosa					X^{W}	X^{D}
	Cyclonaias tuberculata						
X	*Fusconaia flava*	193		193	6.6	X^{F}	X^{D}
X	*F. ebena*	1		1	<0.1	X^{F}	X^{D}
	Megalonaias gigantea						X^{D}
X	*Amblema plicata*	769		769	26.3	X^{F}	X^{D}
	Plethobasus cyphyus						
X^{CC}	*Pleurobema cordatum*					X^{W}	
	Elliptio crassidens						X^{D}
X^{W}	*E. dilatata*					X^{F}	X^{D}
X	*Obliquaria reflexa*	221		221	7.5	X^{F}	
X	*Proptera alata*	5		5	0.2		X^{D}
X	*P. laevissima*	32		32	1.1		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	7		7	0.2		
	L. leptodon						
	Ellipsaria lineolata					X^{W}	
X	*Truncilla truncata*	4		4	0.1		X^{D}
X	*T. donaciformis*	1395		1395	47.6		
X	*Obovaria olivaria*	10		10	0.3	X^{F}	X^{D}
	Actinonaias carinata						X^{D}
	A. ellipsiformis						

		A	J	T	%	R	H
X	*Ligumia recta*	6	1	7	0.2	X^F	X^D
	L. subrostrata						X^U
X	*Carunculina parva*	37		37	1.3		
	Lampsilis teres					X^F	
	L. higginsi						
	L. radiata siliquoidea						X^D
X	*L. ovata ventricosa*	62		62	2.1	X^F	X^D
	Plagiola triquetra						
	Arcidens confragosus						
X	*Lasmigona complanata*	1		1	<0.1		X^D
	L. costata						X^D
	L. compressa						
	Alasmidonta marginata						X^D
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	4	1	5	0.2		
X	*A. grandis*	25		25	0.9	X^F	X^D
	Strophitus undulatus						
21		2926	2	2928	100.0	14	21

Notes:

EXHIBIT 151

57. Locks and Dam 5A Lower Approach

Site data: Exhibit(s) 50

Map(s): Exhibit(s) 202, 231

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	100.0		
	F. ebena						
	Megalonaias gigantea						
	Amblema plicata						
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

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		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
1		1	0	1	100.0	0	0

Notes:

EXHIBIT 152

58. Winona Commercial Harbor and Small Boat Harbors

Site data: Exhibit(s) 51

Map(s): Exhibit(s) 202, 232

		A	J	T	%	R	H
	Cumberlandia monodonta						
X	*Quadrula metanevra*	1		1	12.5		
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	12.5		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	3		3	37.5		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	3		3	37.5		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

	A	J	T	%	R	H
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis						
A. grandis						
Strophitus undulatus						
4	8	0	8	100.0	0	0

Notes:

EXHIBIT 153

59. Winona Lower Railroad Bridge

Site data: Exhibit(s) 52

Map(s): Exhibit(s) 202, 232

		A	J	T	%	R	H
	Cumberlandia monodonta						
X	*Quadrula metanevra*	1		1	0.1		
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	96		96	6.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	109		109	6.8		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	266		266	16.6		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	119		119	7.4		
X	*Proptera alata*	1		1	0.1		
X	*P. laevissima*	11		11	0.7		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1		1	0.1		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	2		2	0.1		
X	*T. donaciformis*	920		920	57.4		
X	*Obovaria olivaria*	9		9	0.6		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
X	*Ligumia recta*	1	1	2	0.1		
	L. subrostrata						
X	*Carunculina parva*	19		19	1.2		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
X	*L. ovata ventricosa*	26		26	1.6		
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	3		3	0.2		
X	*A. grandis*	17		17	1.1		
	Strophitus undulatus						
16		1601	1	1602	100.0	0	0

Notes:

EXHIBIT 154

60. Gravel Point

Site data: Exhibit(s) 53

Map(s): Exhibit(s) 202, 232

		A	J	T	%	R	H
	Cumberlandia monodonta						
X	*Quadrula metanevra*	5		5	0.4		
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	51		51	3.9		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	82		82	6.2		
X	*F. ebena*	1		1	0.1		
	Megalonaias gigantea						
X	*Amblema plicata*	500		500	38.0		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	99		99	7.5		
X	*Proptera alata*	4		4	0.3		
X	*P. laevissima*	21		21	1.6		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	6		6	0.5		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	2		2	0.2		
X	*T. donaciformis*	475		475	36.1		
X	*Obovaria olivaria*	1		1	0.1		
	Actinonaias carinata						
	A. ellipsiformis						

		A	I	T	S	R	H
X	*Ligumia recta*	5		5	0.4		
	L. subrostrata						
X	*Carunculina parva*	18		18	1.4		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
X	*L. ovata ventricosa*	36		36	2.7		
	Plagiola triquetra						
	Arcidens confragosus						
X	*Lasmigona complanata*	1		1	0.1		
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1	1	2	0.2		
X	*A. grandis*	8		8	0.6		
	Strophitus undulatus						
18		1316	1	1317	100.0	0	0

Notes:

EXHIBIT 155

Pool 7

Site data: Exhibit(s) 54-57

Map(s): Exhibit(s) 203

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra					X^H	X^D
	Q. quadrula					X^H	
	Q. nodulata					X^H	
X	*Q. pustulosa*	44		44	25.1	X^H	X^D
	Tritogonia verrucosa					X^H	X^D
	Cyclonaias tuberculata						
X	*Fusconaia flava*	8		8	4.6	X^H	
	F. ebena						X^D
	Megalonaias gigantea					X^W	
X	*Amblema plicata*	42		42	24.0	X^H	X^D
	Plethobasus cyphyus						X^D
	Pleurobema cordatum					X^W	
	Elliptio crassidens						X^H
X^W	*E. dilatata*					X^H	
X	*Obliquaria reflexa*	6		6	3.4	X^H	X^D
X	*Proptera alata*	1		1	0.6	X^H	X^D
X	*P. laevissima*	3		3	1.7	X^H	
	P. capax						
	P. purpurata						
X^S	*Leptodea fragilis*					X^H	
	L. leptodon						
X^W	*Ellipsaria lineolata*					X^F	
X	*Truncilla truncata*	2		2	1.1	X^H	
X	*T. donaciformis*	12	29	41	23.4	X^H	
X	*Obovaria olivaria*	22		22	12.6	X^H	X^D
	Actinonaias carinata					X^W	X^D
	A. ellipsiformis						

		A	J	T	%	R	H
X	*Ligumia recta*	1		1	0.6	X^H	X^D
	L. subrostrata						
X	*Carunculina parva*	2		2	1.1	X^H	
	Lampsilis teres						
	L. higginsi					X^F	X^D
X^M	*L. radiata siliquoidea*					X^H	X^D
X^S	*L. ovata ventricosa*					X^H	X^D
	Plagiola triquetra						
	Arcidens confragosus						
X	*Lasmigona complanata*	1		1	0.6		
	L. costata						
	L. compressa						
	Alasmidonta marginata						X^W
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata					X^H	
	A. imbecillis					X^H	
X	*A. grandis*	2		2	1.1		
	Strophitus undulatus					X^W	
18		146	29	175	100.0	27	16

Notes:

EXHIBIT 156

61. Locks and Dam 6 Lower Approach

Site data: Exhibit(s) 54

Map(s): Exhibit(s) 203, 233

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	2.8		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	2.8		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	4		4	11.1		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
X	*P. laevissima*	1		1	2.8		
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*		23	23	63.9		
X	*Obovaria olivaria*	4		4	11.1		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*	2		2	5.6		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
7		13	23	36	100.0	0	0

Notes:

EXHIBIT 157

62. Richmond Island

Site data: Exhibit(s) 55

Map(s): Exhibit(s) 203, 233

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	21		21	35.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	2		2	3.3		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	4		4	6.7		
X	*Proptera alata*	1		1	1.7		
X	*P. laevissima*	1		1	1.7		
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1		1	1.7		
X	*T. donaciformis*	7	5	12	20.0		
X	*Obovaria olivaria*	17		17	28.3		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	1		1	1.7		
	Strophitus undulatus						
9		55	5	60	100.0	0	0

Notes:

EXHIBIT 158

63. Queens Bluff

Site data: Exhibit(s) 56

Map(s): Exhibit(s) 203, 233

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	12		12	24.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	4		4	8.0		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	25		25	50.0		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	2		2	4.0		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	3	1	4	8.0		
X	*Obovaria olivaria*	1		1	2.0		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
X	*Lasmigona complanata*	1		1	2.0		
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	1		1	2.0		
	Strophitus undulatus						
8		49	1	50	100.0	0	0

Notes:

EXHIBIT 159

64. Locks and Dam 7 Upper Approach

Site data: Exhibit(s) 57

Map(s): Exhibit(s) 203, 234

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	10		10	34.5		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	3		3	10.3		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	11		11	37.9		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
X	*P. laevissima*	1		1	3.4		
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1		1	3.4		
X	*T. donaciformis*	2		2	6.9		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
X	*Ligumia recta*	1		1	3.4		
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
7		29	0	29	100.0	0	0

Notes:

EXHIBIT 160

Pool 8

Site data: Exhibit(s) 58-66

Map(s): Exhibit(s) 204

		A	J	T	%	R	H
	Cumberlandia monodonta						
X	*Quadrula metanevra*	1		1	0.1		
X	*Q. quadrula*	49		49	6.5	X^H	
X	*Q. nodulata*	5		5	0.7	X^H	
X	*Q. pustulosa*	82		82	10.8	X^H	
	Tritogonia verrucosa					X^W	
	Cyclonaias tuberculata						
X	*Fusconaia flava*	64	1	65	8.6	X^H	
	F. ebena						X^H
	Megalonaias gigantea						
X	*Amblema plicata*	190		190	25.1	X^H	
	Plethobasus cyphyus						X^H
	Pleurobema cordatum					X^W	X^H
	Elliptio crassidens						X^H
	E. dilatata					X^W	X^H
X	*Obliquaria reflexa*	30		30	4.0	X^H	
X	*Proptera alata*	15		15	2.0	X^H	
X	*P. laevissima*	1		1	0.1	X^H	
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	5	22	27	3.6	X^H	
	L. leptodon						
X^W	*Ellipsaria lineolata*						
X	*Truncilla truncata*	9		9	1.2	X^H	
X	*T. donaciformis*	30	21	51	6.7	X^H	
X	*Obovaria olivaria*	22		22	2.9	X^H	
	Actinonaias carinata					X^W	
	A. ellipsiformis						

		A	J	T	%	R	H
X^W	*Ligumia recta*					X^H	
	L. subrostrata						
X	*Carunculina parva*	8	154	162	21.4	X^H	
X	*Lampsilis teres*	5		5	0.7		
X^H	*L. higginsi*						
X	*L. radiata siliquoidea*	4		4	0.5	X^H	
X	*L. ovata ventricosa*	13	3	16	2.1	X^H	
	Plagiola triquetra						
X	*Arcidens confragosus*	1		1	0.1		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	0.1		
X	*A. grandis*	21		21	2.8		
	Strophitus undulatus						
23		556	201	757	100.0	20	5

Notes:

EXHIBIT 161

65. La Crosse Railroad Bridge

Site data: Exhibit(s) 58

Map(s): Exhibit(s) 204, 235

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	1		1	3.8		
	Q. nodulata						
X	*Q. pustulosa*	4		4	15.4		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	3.8		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	16		16	61.5		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	1		1	3.8		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	1	2	3	11.5		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
6		24	2	26	100.0	0	0

Notes:

EXHIBIT 162

66. Hingen Island Bank Repair

Site data: Exhibit(s) 59

Map(s): Exhibit(s) 204, 236

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	14.3		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	1		1	14.3		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	1		1	14.3		
X	*Obovaria olivaria*	4		4	57.1		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
4		7	0	7	100.0	0	0

Notes:

EXHIBIT 163

67. Sand Slough, 68. Sand Slough Bank Repair

Site data: Exhibit(s) 60

Map(s): Exhibit(s) 204, 236

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	1		1	3.6		
	Q. nodulata						
X	*Q. pustulosa*	4		4	14.3		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	6		6	21.4		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	10		10	35.7		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	1		1	3.6		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
X	*Obovaria olivaria*	5		5	17.9		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
X	*L. ovata ventricosa*	1		1	3.6		
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
7		28	0	28	100.0	0	0

Notes:

EXHIBIT 164

69. Root River

Site data: Exhibit(s) 61

Map(s): Exhibit(s) 204, 237

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
	Amblema plicata						
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	1		1	33.3		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	1		1	33.3		
X	*Obovaria olivaria*	1		1	33.3		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
5		3	0	3	100.0	0	0

Notes:

EXHIBIT 165

70. Picayune Island

Site data: Exhibit(s) 62

Map(s): Exhibit(s) 204, 237

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	16.7		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	1		1	16.7		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	2		2	33.3		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
X	*Obovaria olivaria*	2		2	33.3		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
4		6	0	6	100.0	0	0

Notes:

EXHIBIT 166

71. Above Brownsville

Site data: Exhibit(s) 63

Map(s): Exhibit(s) 204, 237

		A	J	T	%	R	H
	Cumberlandia monodonta						
X	*Quadrula metanevra*	1		1	0.8		
X	*Q. quadrula*	4		4	3.1		
X	*Q. nodulata*	1		1	0.8		
X	*Q. pustulosa*	11		11	8.5		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	5		5	3.9		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	21		21	16.3		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	7		7	5.4		
X	*Proptera alata*	1		1	0.8		
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	3	11	14	10.9		
X	*Obovaria olivaria*	3		3	2.3		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*		55	55	42.6		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
X	*L. ovata ventricosa*	2	2	4	3.1		
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	2		2	1.6		
	Strophitus undulatus						
15		61	68	129	100.0	0	0

Notes:

EXHIBIT 167

72. Brownsville

Site data: Exhibit(s) 64

Map(s): Exhibit(s) 204, 238

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	3		3	1.9		
	Q. nodulata						
X	*Q. pustulosa*	4		4	2.5		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	2	1	3	1.9		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	5		5	3.2		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	3		3	1.9		
X	*Proptera alata*	1		1	0.6		
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*		22	22	14.0		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	3		3	1.9		
X	*T. donaciformis*	1	8	9	5.7		
X	*Obovaria olivaria*	1		1	0.6		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*		99	99	63.1		
	Lampsilis teres						
X[H]	*L. higginsi*						
	L. radiata siliquoidea						
X	*L. ovata ventricosa*	1	1	2	1.3		
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	2		2	1.3		
	Strophitus undulatus						
14		26	131	157	100.0	0	0

Notes:

EXHIBIT 168

73. Crosby Slough

Site data: Exhibit(s) 65

Map(s): Exhibit(s) 204, 239

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	9		9	8.2		
	Q. nodulata						
X	*Q. pustulosa*	25		25	22.7		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	18		18	16.4		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	38		38	34.5		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	7		7	6.4		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	3		3	2.7		
X	*T. donaciformis*	7		7	6.1		
X	*Obovaria olivaria*	2		2	1.8		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
X	*Arcidens confragosus*	1		1	0.9		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
9		110	0	110	100.0	0	0

Notes:

EXHIBIT 169

74. Warners Landing

Site data: Exhibit(s) 66

Map(s): Exhibit(s) 204, 239

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	31		31	10.7		
X	*Q. nodulata*	4		4	1.4		
X	*Q. pustulosa*	32		32	11.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	31		31	10.7		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	97		97	33.5		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	10		10	3.4		
X	*Proptera alata*	13		13	4.5		
X	*P. laevissima*	1		1	0.3		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	5		5	1.7		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	3		3	1.0		
X	*T. donaciformis*	16		16	5.5		
X	*Obovaria olivaria*	4		4	1.4		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*	8		8	2.7		
X	*Lampsilis teres*	5		5	1.7		
	L. higginsi						
X	*L. radiata siliquoidea*	4		4	1.4		
X	*L. ovata ventricosa*	9		9	3.1		
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	0.3		
X	*A. grandis*	17		17	5.8		
	Strophitus undulatus						
18		291	0	291	100.0	0	0

Notes:

EXHIBIT 170

Pool 9

Site data: Exhibit(s) 67-78

Map(s): Exhibit(s) 205

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	29		29	5.0	X^F	
X	*Q. nodulata*	10		10	1.7	X^P	
X	*Q. pustulosa*	54		54	9.2	X^F	
	Tritogonia verrucosa					X^F	
	Cyclonaias tuberculata						
X	*Fusconaia flava*	41		41	7.0	X^F	
	F. ebena					X^F	
X	*Megalonaias gigantea*	5		5	0.9	X^F	
X	*Amblema plicata*	292	2	294	50.3	X^F	
	Plethobasus cyphyus						
X	*Pleurobema cordatum*	3		3	0.5		
	Elliptio crassidens						
X	*E. dilatata*	3		3	0.5	X^F	
X	*Obliquaria reflexa*	15		15	2.6	X^F	
X	*Proptera alata*	8		8	1.4	X^F	
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	3		3	0.5	X^P	
	L. leptodon						
	Ellipsaria lineolata					X^F	
X	*Truncilla truncata*	16		16	2.7	X^F	
X	*T. donaciformis*	28	21	49	8.4		
X	*Obovaria olivaria*	26		26	4.4	X^F	
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta					X^F	
	L. subrostrata						
X	*Carunculina parva*		5	5	0.9		
X	*Lampsilis teres*	1		1	0.2	X^F	
	L. higginsi						
	L. radiata siliquoidea					X^F	
X	*L. ovata ventricosa*	1		1	0.2	X^F	
	Plagiola triquetra						
X	*Arcidens confragosus*	3		3	0.5		
X	*Lasmigona complanata*	2		2	0.3		
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata					X^H	
	A. imbecillis						
X	*A. grandis*	17		17	2.9	X^F	
	Strophitus undulatus						
20		557	28	585	100.0	21	0

Notes:

EXHIBIT 171

75. Island 126, 76. Head of Island 126 Bank Repair

Site data: Exhibit(s) 67

Map(s): Exhibit(s) 205, 240

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	1		1	14.3		
	Q. nodulata						
X	*Q. pustulosa*	1		1	14.3		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	3		3	42.9		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1		1	14.3		
	T. donaciformis						
X	*Obovaria olivaria*	1		1	14.3		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
5		7	0	7	100.0	0	0

Notes:

EXHIBIT 172

77. Twin Island, 78. Head of Twin Island Bank Repair

Site data: Exhibit(s) 68

Map(s): Exhibit(s) 205, 240

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	2		2	14.3		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
	Amblema plicata						
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*		10	10	71.4		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*		2	2	14.3		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
3		2	12	14	100.0	0	0

Notes:

EXHIBIT 173

79. Below Twin Island

Site data: Exhibit(s) 69

Map(s): Exhibit(s) 205, 240

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
X	*Q. pustulosa*	1		1	20.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	2		2	40.0		
	F. ebena						
	Megalonaias gigantea						
	Amblema plicata						
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	1		1	20.0		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*		1	1	20.0		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
4		4	1	5	100.0	0	0

Notes:

EXHIBIT 174

80. Battle Island

Site data: Exhibit(s) 70

Map(s): Exhibit(s) 205, 241

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	1		1	2.6		
	Q. nodulata						
X	*Q. pustulosa*	7		7	18.4		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	10		10	26.3		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
X	*E. dilatata*	1		1	2.6		
X	*Obliquaria reflexa*	4		4	10.5		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1		1	2.6		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	2		2	5.3		
X	*T. donaciformis*	4		4	10.5		
X	*Obovaria olivaria*	7		7	18.4		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
X	*L. ovata ventricosa*	1		1	2.6		
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
10		38	0	38	100.0	0	0

Notes:

EXHIBIT 175

81. DeSoto

Site data: Exhibit(s) 71

Map(s): Exhibit(s) 205, 242

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	2		2	1.6		
	Q. nodulata						
X	*Q. pustulosa*	12		12	9.7		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	10		10	8.1		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	88		88	71.0		
	Plethobasus cyphyus						
X	*Pleurobema cordatum*	3		3	2.4		
	Elliptio crassidens						
X	*E. dilatata*	2		2	1.6		
X	*Obliquaria reflexa*	2		2	1.6		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	2		2	1.6		
X	*T. donaciformis*	1		1	0.8		
X	*Obovaria olivaria*	1		1	0.8		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
X	*Arcidens confragosus*	1		1	0.8		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
11		124	0	124	100.0	0	0

Notes:

EXHIBIT 176

82. Above Indian Camp Light,
83. Mouth of Hummingbird Slough Bank Repair

Site data: Exhibit(s) 72

Map(s): Exhibit(s) 205, 243

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	2		2	1.8		
X	*Q. nodulata*	2		2	1.8		
X	*Q. pustulosa*	8		8	7.1		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	9		9	8.0		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	64	2	66	58.4		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	2		2	1.8		
X	*Proptera alata*	2		2	1.8		
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	4	8	12	10.6		
X	*Obovaria olivaria*	8		8	7.1		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
X	*Lasmigona complanata*	2		2	1.8		
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
10		103	10	113	100.0	0	0

Notes:

EXHIBIT 177

84. Indian Camp Light

Site data: Exhibit(s) 73

Map(s): Exhibit(s) 205, 243

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
X	*Q. nodulata*	1		1	3.4		
X	*Q. pustulosa*	1		1	3.4		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	5		5	17.2		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	11		11	37.9		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	2		2	6.9		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1		1	3.4		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	2		2	6.9		
X	*T. donaciformis*	3	1	4	13.8		
X	*Obovaria olivaria*	1		1	3.4		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*		1	1	3.4		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
10		27	2	29	100.0	0	0

Notes:

EXHIBIT 178

85. Lansing Upper Light

Site data: Exhibit(s) 74

Map(s): Exhibit(s) 205, 243

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	2		2	2.0	X^P	
X	*Q. nodulata*	1		1	1.0	X^P	
X	*Q. pustulosa*	5		5	5.0	X^P	
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	7		7	6.9	X^P	
	F. ebena						
X	*Megalonaias gigantea*	3		3	3.0	X^P	
X	*Amblema plicata*	48		48	47.5	X^P	
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa					X^P	
X	*Proptera alata*	5		5	5.0	X^P	
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	1		1	1.0	X^P	
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	3		3	3.0		
X	*T. donaciformis*		1	1	1.0		
X	*Obovaria olivaria*	8		8	7.9	X^P	
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta					X^P	
	L. subrostrata						
X	*Carunculina parva*		2	2	2.0		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea					X^P	
	L. ovata ventricosa					X^P	
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	15		15	14.9	X^P	
	Strophitus undulatus						
13		98	3	101	100.0	14	0

Notes:

EXHIBIT 179

86. Lansing Small Boat Harbor

Site data: Exhibit(s) 75

Map(s): Exhibit(s) 205, 243

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
	Amblema plicata						
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	1		1	100.0		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
1		1	0	1	100.0	0	0

Notes:

87. Atchafalaya

Site data: Exhibit(s) 76

Map(s): Exhibit(s) 205, 244

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	8		8	10.3		
X	*Q. nodulata*	2		2	2.6		
X	*Q. pustulosa*	8		8	10.3		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	6		6	7.7		
	F. ebena						
X	*Megalonaias gigantea*	1		1	1.3		
X	*Amblema plicata*	39		39	50.0		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	2		2	2.6		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	3		3	3.8		
X	*T. donaciformis*	6		6	7.7		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
X	*Lampsilis teres*	1		1	1.3		
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
X	*Arcidens confragosus*	1		1	1.3		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	1		1	1.3		
	Strophitus undulatus						
12		78	0	78	100.0	0	0

Notes:

EXHIBIT 181

88. Crooked Slough

Site data: Exhibit(s) 77

Map(s): Exhibit(s) 205, 245

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	9		9	14.3		
X	*Q. nodulata*	3		3	4.8		
X	*Q. pustulosa*	9		9	14.3		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	2		2	3.2		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	24		24	38.1		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	2		2	3.2		
X	*Proptera alata*	1		1	1.6		
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	3		3	4.8		
X	*T. donaciformis*	9		9	14.3		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	1		1	1.6		
	Strophitus undulatus						
10		63	0	63	100.0	0	0

Notes:

EXHIBIT 182

89. Locks and Dam 9 Upper Approach

Site data: Exhibit(s) 78

Map(s): Exhibit(s) 205,246

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	4		4	33.3		
X	*Q. nodulata*	1		1	8.3		
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
X	*Megalonaias gigantea*	1		1	8.3		
X	*Amblema plicata*	5		5	41.7		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
	T. donaciformis						
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
X	*Arcidens confragosus*	1		1	8.3		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
5		12	0	12	100.0	0	0

Notes:

EXHIBIT 183

Pool 10

Site data: Exhibit(s) 79-89

Map(s): Exhibit(s) 206

		A	J	T	%	R	H
	Cumberlandia monodonta						X[BB]
X	*Quadrula metanevra*	8		8	0.3	X[H]	X[E]
X	*Q. quadrula*	68		68	2.6	X[H]	X[E]
X	*Q. nodulata*	60		60	2.3	X[H]	X[E]
X	*Q. pustulosa*	159		159	6.2	X[H]	X[E]
	Tritogonia verrucosa					X[H]	X[E]
	Cyclonaias tuberculata						X[E]
X	*Fusconaia flava*	84		84	3.3	X[H]	X[E]
	F. ebena					X[H]	X[E]
X	*Megalonaias gigantea*	61		61	2.4	X[H]	X[E]
X	*Amblema plicata*	1711	4	1715	66.6	X[H]	X[E]
	Plethobasus cyphyus						X[E]
	Pleurobema cordatum					X[H]	X[V]
	Elliptio crassidens						X[H]
X	*E. dilatata*	63		63	2.4	X[H]	X[E]
X	*Obliquaria reflexa*	49		49	1.9	X[H]	X[E]
X	*Proptera alata*	22		22	0.9	X[H]	X[E]
X	*P. laevissima*	2	1	3	0.1	X[H]	X[V]
	P. capax						X[E]
	P. purpurata						
X	*Leptodea fragilis*	13	1	14	0.5	X[H]	X[E]
	L. leptodon						X[V]
	Ellipsaria lineolata					X[H]	X[E]
X	*Truncilla truncata*	20		20	0.8	X[H]	X[E]
X	*T. donaciformis*	27	22	49	1.9	X[H]	X[E]
X	*Obovaria olivaria*	62		62	2.4	X[H]	X[E]
	Actinonaias carinata					X[H]	X[E]
	A. ellipsiformis						

		A	J	T	%	R	H
X	*Ligumia recta*	7		7	0.3	X^H	X^E
	L. subrostrata						
X	*Carunculina parva*	4	79	83	3.2	X^H	X^V
X	*Lampsilis teres*	1		1	<0.1	X^H	X^E
X^1	*L. higginsi*					X^H	X^E
X	*L. radiata siliquoidea*	8		8	0.3	X^H	X^E
X	*L. ovata ventricosa*	8		8	0.3	X^H	X^E
	Plagiola triquetra						
X	*Arcidens confragosus*	15		15	0.6	X^H	X^E
	Lasmigona complanata					X^H	X^V
	L. costata					X^H	X^V
	L. compressa						
	Alasmidonta marginata						X^V
	A. viridis						
	Simpsoniconcha ambigua						X^E
	Anodontoides ferussacianus						
X^W	*Anodonta suborbiculata*						
X	*A. imbecillis*	4		4	0.2	X^H	X^E
X	*A. grandis*	11		11	0.4	X^H	X^E
X	*Strophitus undulatus*	3		3	0.1	X^H	X^E
26		2470	107	2577	100.0	32	42[2]

Notes:

[1] See note 1, Exhibit 98.

[2] This total includes the records of *Quadrula fragosa*, *Pleurobema rubrum* (i.e., "*P. cordatum*" and *P. sintoxia* from this site by Havlik and Stansbery (1978).

EXHIBIT 184

90. Locks and Dam 9 Lower Approach

Site data: Exhibit(s) 79

Map(s): Exhibit(s) 206,246

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	1		1	1.0		
X	*Q. nodulata*	2		2	2.0		
X	*Q. pustulosa*	17		17	17.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	4		4	4.0		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	56		56	56.0		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	14		14	14.0		
X	*Proptera alata*	1		1	1.0		
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	2		2	2.0		
X	*T. donaciformis*	1		1	1.0		
X	*Obovaria olivaria*	1		1	1.0		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	1.0		
	A. grandis						
	Strophitus undulatus						
11		100	0	100	100.0	0	0

Notes:

EXHIBIT 185

91. Hay Point Bank Repair

Site data: Exhibit(s) 80

Map(s): Exhibit(s) 206, 246

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	5		5	0.8		
X	*Q. nodulata*	2		2	0.3		
X	*Q. pustulosa*	47		47	7.7		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	19		19	3.1		
	F. ebena						
X	*Megalonaias gigantea*	6		6	1.0		
X	*Amblema plicata*	428		428	70.2		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
X	*E. dilatata*	37		37	6.1		
X	*Obliquaria reflexa*	8		8	1.3		
X	*Proptera alata*	8		8	1.3		
X	*P. laevissima*		1	1	0.2		
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	6		6	1.0		
X	*T. donaciformis*	4	3	7	1.1		
X	*Obovaria olivaria*	7		7	1.1		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
X	*Ligumia recta*	3		3	0.5		
	L. subrostrata						
X	*Carunculina parva*		14	14	2.3		
	Lampsilis teres						
	L. higginsi						
X	*L. radiata siliquoidea*	1		1	0.2		
X	*L. ovata ventricosa*	2		2	0.3		
	Flagiola triquetra						
X	*Arcidens confragosus*	2		2	0.3		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
X	*A. grandis*	6		6	1.0		
X	*Strophitus undulatus*	1		1	0.2		
20		592	18	610	100.0	0	0

Notes:

EXHIBIT 186

92. Jackson Island

Site data: Exhibit(s) 81

Map(s): Exhibit(s) 206,247

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	2		2	1.7		
X	*Q. nodulata*	2		2	1.7		
X	*Q. pustulosa*	7		7	6.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	6		6	5.2		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	90		90	77.6		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
X	*Proptera alata*	1		1	0.9		
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1		1	0.9		
X	*T. donaciformis*	2		2	1.7		
X	*Obovaria olivaria*	2		2	1.7		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
X	*L. ovata ventricosa*	1		1	0.9		
	Plagiola triquetra						
X	*Arcidens confragosus*	1		1	0.9		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	0.9		
	A. grandis						
	Strophitus undulatus						
12		116	0	116	100.0	0	0

Notes:

EXHIBIT 187

93. Mississippi Gardens[1]

Site data: Exhibit(s) 82

Map(s): Exhibit(s) 206, 247

	A	J	T	%	R	H
Cumberlandia monodonta						
Quadrula metanevra						
Q. quadrula						
Q. nodulata						
Q. pustulosa						
Tritogonia verrucosa						
Cyclonaias tuberculata						
Fusconaia flava						
F. ebena						
Megalonaias gigantea						
Amblema plicata						
Plethobasus cyphyus						
Pleurobema cordatum						
Elliptio crassidens						
E. dilatata						
Obliquaria reflexa						
Proptera alata						
P. laevissima						
P. capax						
P. purpurata						
Leptodea fragilis						
L. leptodon						
Ellipsaria lineolata						
Truncilla truncata						
T. donaciformis						
Obovaria olivaria						
Actinonaias carinata						
A. ellipsiformis						

	A	J	T	%	R	H
Ligumia recta						
L. subrostrata						
Carunculina parva						
Lampsilis teres						
L. higginsi						
L. radiata siliquoidea						
L. ovata ventricosa						
Plagiola triquetra						
Arcidens confragosus						
Lasmigona complanata						
L. costata						
L. compressa						
Alasmidonta marginata						
A. viridis						
Simpsoniconcha ambigua						
Anodontoides ferussacianus						
Anodonta suborbiculata						
A. imbecillis						
A. grandis						
Strophitus undulatus						

Notes:

[1] See discussion of this Site in Results: Sites.

EXHIBIT 188

94. Prairie du Chien East Channel

Site data: Exhibit(s) 83

Map(s): Exhibit(s) 206, 248

		A	J	T	%	R	H
	Cumberlandia monodonta						X^V
X	*Quadrula metanevra*	8		8	0.7	X^V	X^V
X	*Q. quadrula*	29		29	2.6	X^V	X^V
X	*Q. nodulata*	2		2	0.2	X^V	X^V
X	*Q. pustulosa*	41		41	3.6	X^V	X^V
	Tritogonia verrucosa					X^V	X^V
	Cyclonaias tuberculata						X^V
X	*Fusconaia flava*	34		34	3.0	X^V	X^V
	F. ebena					X^V	X^V
X	*Megalonaias gigantea*	53		53	4.7	X^V	X^V
X	*Amblema plicata*	861		861	76.6	X^V	X^V
	Plethobasus cyphyus						X^V
	Pleurobema cordatum					X^V	X^V
	Elliptio crassidens						X^V
X	*E. dilatata*	24		24	2.1	X^V	X^V
X	*Obliquaria reflexa*	4		4	0.4	X^V	X^V
X	*Proptera alata*	9		9	0.8	X^V	X^V
	P. laevissima					X^V	X^V
	P. capax						X^V
	P. purpurata						
	Leptodea fragilis					X^V	X^V
	L. leptodon						X^V
	Ellipsaria lineolata					X^V	X^V
X	*Truncilla truncata*	6		6	0.5	X^V	X^V
X	*T. donaciformis*	2		2	0.2	X^V	X^V
X	*Obovaria olivaria*	33		33	2.9	X^V	X^V
	Actinonaias carinata						X^V
	A. ellipsiformis						

		A	J	T	%	R	H
X	*Ligumia recta*	4		4	0.4	X^V	X^V
	L. subrostrata						
	Carunculina parva					X^V	X^V
X^H	*Lampsilis teres*					X^V	X^V
X^1	*L. higginsi*					X^V	X^V
	L. radiata siliquoidea						X^V
X	*L. ovata ventricosa*	4		4	0.4	X^V	X^V
	Plagiola triquetra						X^H
X	*Arcidens confragosus*	3		3	0.3	X^V	X^V
	Lasmigona complanata					X^V	X^V
	L. costata						X^V
	L. compressa						
	Alasmidonta marginata						X^V
	A. viridis						X^V
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	0.1	X^V	X^V
X	*A. grandis*	5		5	0.4	X^V	X^V
X	*Strophitus undulatus*	1		1	0.1	X^V	X^V
21		1124[3]	0	1124[3]	100.0	29	42[2]

Notes:

[1] See note 1, Exhibit 98.

[2] A "bone" fragment of *Quadrula fragosa* recently was found at Prairie du Chien in material dredged by the Corps in 1976 (M.E. Havlik, Malacological Consultants, La Crosse, Wisconsin, personal communication). This discovery is included in the H column total.

[3] To the taxon totals should be added two *Elliptio dilatata* and one *Protera alata* collected by the Academy in 1977, but not recorded by Fuller (1978b).

EXHIBIT 189

95. Prairie du Chien Commercial and Small Boat Harbors

Site data: Exhibit(s) 84

Map(s): Exhibit(s) 206, 248

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
	Q. nodulata						
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*		4*	4	4.9		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*		1	1	1.2		
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*		12	12	14.6		
	Obovaria olivaria						
	Actinonaias carinata						
	A. ellipsiformis						

* Small size and incompletely developed beak sculpture of these juveniles has prevented their unequivocal identification; some or all may be *Fusconaia flava*.

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*		65	65	79.3		
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecellis						
	A. grandis						
	Strophitus undulatus						
4		0	82	82	100.0	0	0

Notes:

EXHIBIT 190

96. McGregor

Site data: Exhibit(s) 85

Map(s): Exhibit(s) 206, 248

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	3		3	1.5		
	Q. nodulata						
X	*Q. pustulosa*	9		9	4.5		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	3		3	1.5		
	F. ebena						
X	*Megalonaias gigantea*	1		1	0.5		
X	*Amblema plicata*	163		163	81.1		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
X	*E. dilatata*	2		2	1.0		
X	*Obliquaria reflexa*	6		6	3.0		
X	*Proptera alata*	1		1	0.5		
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*		7	7	3.5		
X	*Obovaria olivaria*	2		2	1.0		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
X	*Arcidens confragosus*	4		4	2.0		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecellis						
	A. grandis						
	Strophitus undulatus						
11		194	7	201	100.0	0	0

Notes:

EXHIBIT 191

97. Wyalusing Bend Light

Site data: Exhibit(s) 86

Map(s): Exhibit(s) 206, 249

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
	Q. quadrula						
X	*Q. nodulata*	1		1	4.8		
X	*Q. pustulosa*	4		4	19.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	2		2	9.5		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	9		9	42.9		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
	Obliquaria reflexa						
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
	Truncilla truncata						
X	*T. donaciformis*	1		1	4.8		
X	*Obovaria olivaria*	2		2	9.5		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
X	*L. radiata siliquoidea*	1		1	4.8		
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecellis						
	A. grandis						
X	*Strophitus undulatus*	1		1	4.8		
8		21	0	21	100.0	0	0

Notes:

EXHIBIT 192

98. Wyalusing

Site data: Exhibit(s) 87

Map(s): Exhibit(s) 206, 249

		A	J	T	3	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	4		4	6.6		
X	*Q. nodulata*	2		2	3.3		
X	*Q. pustu[illegible]*	7		7	11.5		
	Tritogonia [illegible]rucosa						
	Cyclonaias tuberculata						
	Fusconaia flava						
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	31		31	50.8		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	6		6	9.8		
X	*Proptera alata*	1		1	1.6		
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	1		1	1.6		
X	*T. donaciformis*	1		1	1.6		
X	*Obovaria olivaria*	4		4	6.6		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
X	*Arcidens confragosus*	3		3	4.9		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
X	*A. imbecillis*	1		1	1.6		
	A. grandis						
	Strophitus undulatus						
11		61	0	61	100.0	0	0

Notes:

EXHIBIT 193

99. McMillan Island

Site data: Exhibit(s) 88

Map(s): Exhibit(s) 206, 250

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	19		19	8.4		
X	*Q. nodulata*	41		41	18.2		
X	*Q. pustulosa*	27		27	12.0		
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	13		13	5.8		
	F. ebena						
X	*Megalonaias gigantea*	1		1	0.4		
X	*Amblema plicata*	58		58	25.8		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	10		10	4.4		
X	*Proptera alata*	1		1	0.4		
X	*P. laevissima*	2		2	0.9		
	P. capax						
	P. purpurata						
X	*Leptodea fragilis*	13		13	5.8		
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	2		2	0.9		
X	*T. donaciformis*	14		14	6.2		
X	*Obovaria olivaria*	10		10	4.4		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
X	*Carunculina parva*	4		4	1.8		
X	*Lampsilis teres*	1		1	0.4		
X[1]	*L. higginsi*						
X	*L. radiata siliquoidea*	6		6	2.7		
X	*L. ovata ventricosa*	1		1	0.4		
	Plagiola triquetra						
X	*Arcidens confragosus*	2		2	0.9		
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
19		225	0	225	100.0	0	0

Notes:

[1] The St. Paul District's Corps mussel survey crew found a living Higgins' Eye near McMillan Island in August 1980.

EXHIBIT 194

100. Locks and Dam 10 Upper Approach

Site data: Exhibit(s) 89

Map(s): Exhibit(s) 206, 251

		A	J	T	%	R	H
	Cumberlandia monodonta						
	Quadrula metanevra						
X	*Q. quadrula*	5		5	13.5		
X	*Q. nodulata*	8		8	21.6		
	Q. pustulosa						
	Tritogonia verrucosa						
	Cyclonaias tuberculata						
X	*Fusconaia flava*	3		3	8.1		
	F. ebena						
	Megalonaias gigantea						
X	*Amblema plicata*	15		15	40.5		
	Plethobasus cyphyus						
	Pleurobema cordatum						
	Elliptio crassidens						
	E. dilatata						
X	*Obliquaria reflexa*	1		1	2.7		
	Proptera alata						
	P. laevissima						
	P. capax						
	P. purpurata						
	Leptodea fragilis						
	L. leptodon						
	Ellipsaria lineolata						
X	*Truncilla truncata*	2		2	5.4		
X	*T. donaciformis*	2		2	5.4		
X	*Obovaria olivaria*	1		1	2.7		
	Actinonaias carinata						
	A. ellipsiformis						

		A	J	T	%	R	H
	Ligumia recta						
	L. subrostrata						
	Carunculina parva						
	Lampsilis teres						
	L. higginsi						
	L. radiata siliquoidea						
	L. ovata ventricosa						
	Plagiola triquetra						
	Arcidens confragosus						
	Lasmigona complanata						
	L. costata						
	L. compressa						
	Alasmidonta marginata						
	A. viridis						
	Simpsoniconcha ambigua						
	Anodontoides ferussacianus						
	Anodonta suborbiculata						
	A. imbecillis						
	A. grandis						
	Strophitus undulatus						
8		37	0	37	100.0	0	0

Notes:

Appendix D

Maps

Exhibits 195-251

This Appendix contains maps of the river reaches, navigation pools, and individual sites surveyed by the Academy in 1977 through 1979. Exhibits 195 through 206 essentially are redrawn from maps in the St. Paul District's Environmental Impact Statement about O & M activities (USACE, 1974b). Exhibits 207 through 251 essentially are photostats of the Corps UMR drainage navigation charts (USACE, 1975).

Exhibit 195

Study Area

The map is drawn to a scale too small for portrayal of all prominent landmarks in the study area (e.g., rivers, locks and dams, municipalities). The three-digit number in each rectangle refers to one of the next 11 exhibits, in which that part of the study area lying within the rectangle is drawn to a much larger scale.

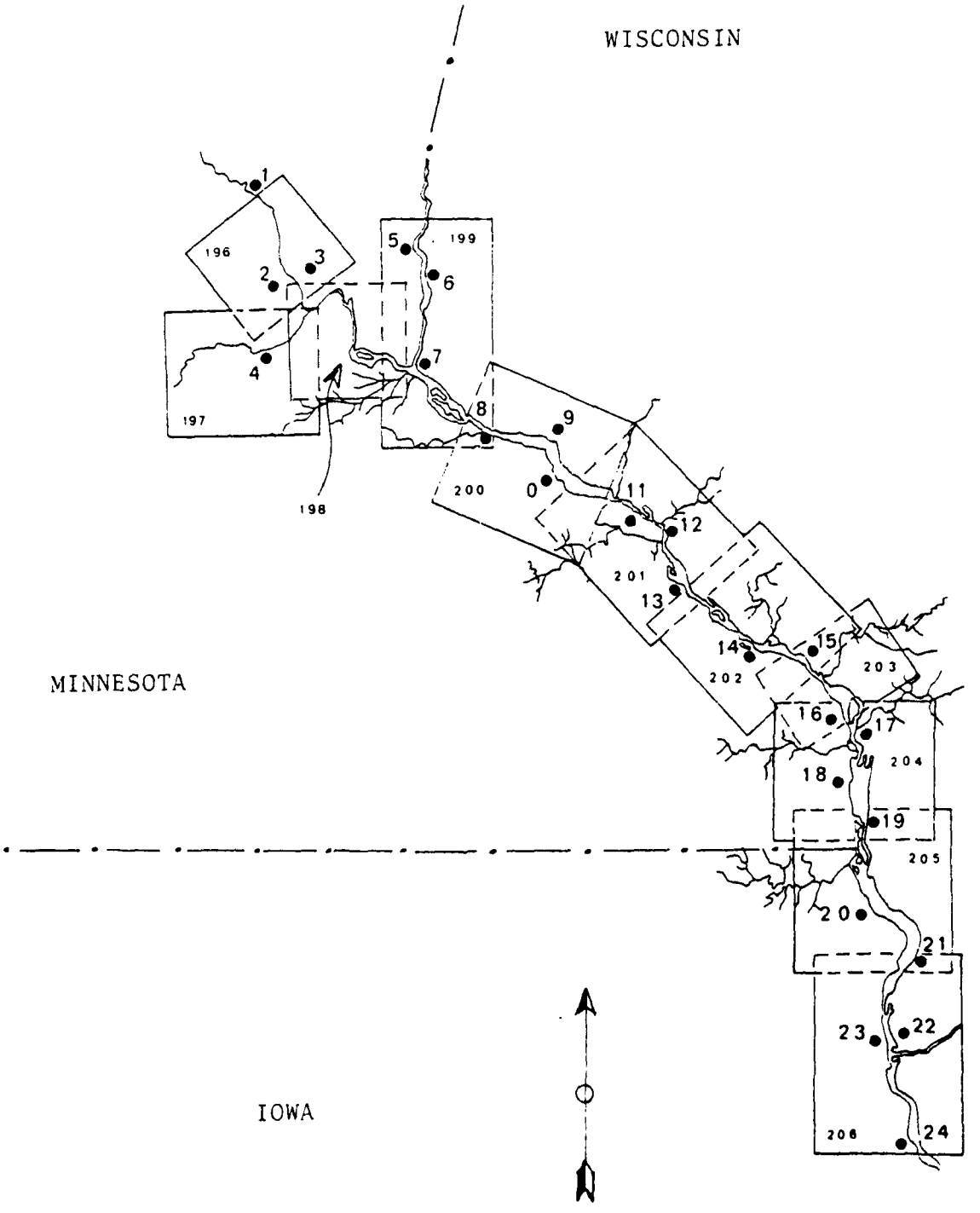
The one- and two-digit numbers refer to the following list of landmarks, most of which were chosen for this map because they are municipalities of special significance in this study (a locks and dam installation is located there and/or much field work was conducted in the vicinity).

1. Anoka
2. Minneapolis (Upper and Lower St. Anthony Falls Locks and Dams)
3. St. Paul (Locks and Dam 1)
4. Savage
5. Stillwater
6. Hudson
7. Prescott (Locks and Dam 2 upstream)
8. Red Wing (Locks and Dam 3 upstream)
9. Maiden Rock
10. Lake City
11. Wabasha
12. Alma (Locks and Dam 4)
13. Minneiska (Locks and Dam 5)
14. Winona (Locks and Dam 5A)
15. Trempealeau (Locks and Dam 6)
16. Dresbach (Locks and Dam 7)
17. La Crosse

18. Brownsville
19. Genoa (Locks and Dam 8)
20. Lansing
21. Lynxville (Locks and Dam 9 downstream)
22. Prairie du Chien
23. McGregor
24. Guttenberg (Locks and Dam 10)

Exhibit 195

Study Area



Exhibits 196-206

Upper Mississippi River Pools and Minnesota, St. Croix, and Black Rivers

The next 11 maps portray the contents of the rectangles in Exhibit 195 on a larger scale.

The larger, one-, two-, or three-digit numbers refer to the Sites listed below. The smaller, underscored, three-digit numbers refer to river miles evenly divisible by five, which are portrayed by dots within squares. Other river miles are indicated by dots. The 9-Foot Navigation Channel follows the lines connecting the dots.

(The only exception to these remarks involves RM 795 between Locks and Dam 3 and Red Wing, Minnesota (Exhibit 200). Mile 795 lies in a side channel, probably because the main channel once was there, but later was relocated in order to shorten navigation distance. As a result, between RM 790 and 800 there no longer are precisely 10 miles, and locations in the modern channel that lie in that reach cannot be specified in terms of river mileage unless a few tenths of a mile are assumed not to exist. Fortunately, the Academy studied no sites in this reach.)

Upper and Lower St. Anthony Falls and Locks and Dam are represented by the respective acronyms USAF, LSAF, and L/D. The directional arrows bear north.

The following list correlates the name and number of each Site with the number(s) of the exhibit(s) presenting map(s) of that Site.

	Study Area	195
	Minnesota River	197, 207
1.	Cargill	197, 207
2.	Petersons Bar	197, 207
3.	Route I-35W Bridge	197, 207
	St. Croix River	199
4.	Stillwater	199, 208
5.	Hudson	199, 209
6.	Catfish Bar	199, 210

7. Kinnickinnic	199, 211
Black River	203, 204
Upper Mississippi River	195
Upper St. Anthony Falls Pool	196
8. SOO Line Railroad Bridge	196, 212
9. Broadway Avenue and Plymouth Avenue Bridges	196, 212
Lower St. Anthony Falls Pool	196
Pool 1	196
10. Lake Street Bridge	196, 213
11. St. Paul Daymark 849.1	196, 213
12. Locks and Dam 1 Upper Approach Construction	196, 198, 213
Pool 2	198
13. Smith Avenue ("High") Bridge	198, 214
14. Robinsons Rocks	198, 215
15. Nininger	198, 216
Pool 3	199
16. Vermillion River	199, 216
17. Hastings Small Boat Harbor	199, 216
18. Prescott	199, 217
19. Pine Coulee	199, 217
20. Truedale Slough	199, 217
21. Four Mile Island	199, 217
22. Big River	199, 218
23. Morgan Coulee	199, 219
24. Coulters Island	199, 219
25. Below Diamond Bluff	199, 219

Pool 4	200, 201
26. Above Trenton	200, 220
27. Trenton	200, 220
28. Cannon River	200, 220
29. Red Wing Commercial and Small Boat Harbors	200, 220
30. Red Wing Highway Bridge	200, 221
31. Bay City Small Boat Harbor	200, 222
32. Bay City Commercial and Recreational Sites	200, 222
33. Wacouta Point	200, 222
34. Lake City Small Boat Harbor	200, 223
35. Reads Landing	201, 224
36. Wabasha Small Boat Harbor	201, 224
37. Crats Island Bank Repair	201, 224
38. Teepeeota Point	201, 225
39. Grand Encampment	201, 225
40. Beef Slough	201, 225
Pool 5	201
41. Locks and Dam 4 Lower Approach	201, 226
42. Mule Bend	201, 226
43. Head of Island 42 Bank Repair	201, 226
44. West Newton	201, 227
45. Weaver Bottoms Complex	201, 228
46. Locks and Dam 5 Culvert Construction	201, 202, 229
Pool 5A	202
47. Locks and Dam 5 Lower Approach	202, 229
48, 49, 50. Island 58, Island 58 Bank Repair, and Fountain City	202, 230

51. Fountain City Service Base	202, 230
52. Fountain City Small Boat Harbor	202, 230
53, 54, 55. Betsy Slough, Betsy Slough Bank Repair, and Wilds Bend	202, 230
56. Locks and Dam 5A Upper Approach	202, 231
Pool 6	202
57. Locks and Dam 5A Lower Approach	202, 231
58. Winona Commercial Harbor and Small Boat Harbors	202, 232
59. Winona Lower Railroad Bridge	202, 232
60. Gravel Point	202, 232
Pool 7	203
61. Locks and Dam 6 Lower Approach	203, 233
62. Richmond Island	203, 233
63. Queens Bluff	203, 233
64. Locks and Dam 7 Upper Approach	203, 234
Pool 8	204
65. La Crosse Railroad Bridge	204, 235
66. Hingen Island Bank Repair	204, 236
67, 68. Sand Slough and Sand Slough Bank Repair	204, 236
69. Root River	204, 237
70. Picayune Island	204, 237
71. Above Brownsville	204, 237
72. Brownsville	204, 238
73. Crosby Slough	204, 239
74. Warners Landing	204, 239
Pool 9	205

75, 76.	Island 126 and Head of Island 126 Bank Repair	205, 240
77, 78.	Twin Island and Head of Twin Island Bank Repair	205, 240
79.	Below Twin Island	205, 240
80.	Battle Island	205, 241
81.	DeSoto	205, 242
82, 83.	Above Indian Camp Light and Mouth of Hummingbird Slough Bank Repair	205, 243
84.	Indian Camp Light	205, 243
85.	Lansing Upper Light	205, 243
86.	Lansing Small Boat Harbor	205, 243
87.	Atchafalaya	205, 244
88.	Crooked Slough Cut	205, 245
89.	Locks and Dam 9 Upper Approach	205, 246
	Pool 10	206
90.	Locks and Dam 9 Lower Approach	206, 246
91.	Hay Point Bank Repair	206, 246
92.	Jackson Island	206, 247
93.	Mississippi Gardens	206, 247
94.	Prairie du Chien East Channel	206, 248
95.	Prairie du Chien Commercial and Small Boat Harbors	206, 248
96.	McGregor	206, 248
97.	Wyalusing Bend Light	206, 249
98.	Wyalusing	206, 249
99.	McMillan Island	206, 250
100.	Locks and Dam 10 Upper Approach	206, 251

AD-A097 003 ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA PA DIV OF--ETC F/G 6/6
FRESHWATER MUSSELS (MOLLUSCA: BIVALVIA: UNIONIDAE) OF THE UPPER--ETC(U)
SEP 80 S L FULLER
UNCLASSIFIED 79-24F-VOL-2 NL

4 OF 5
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097003

Exhibit 196

Upper Mississippi River Sites 8-12

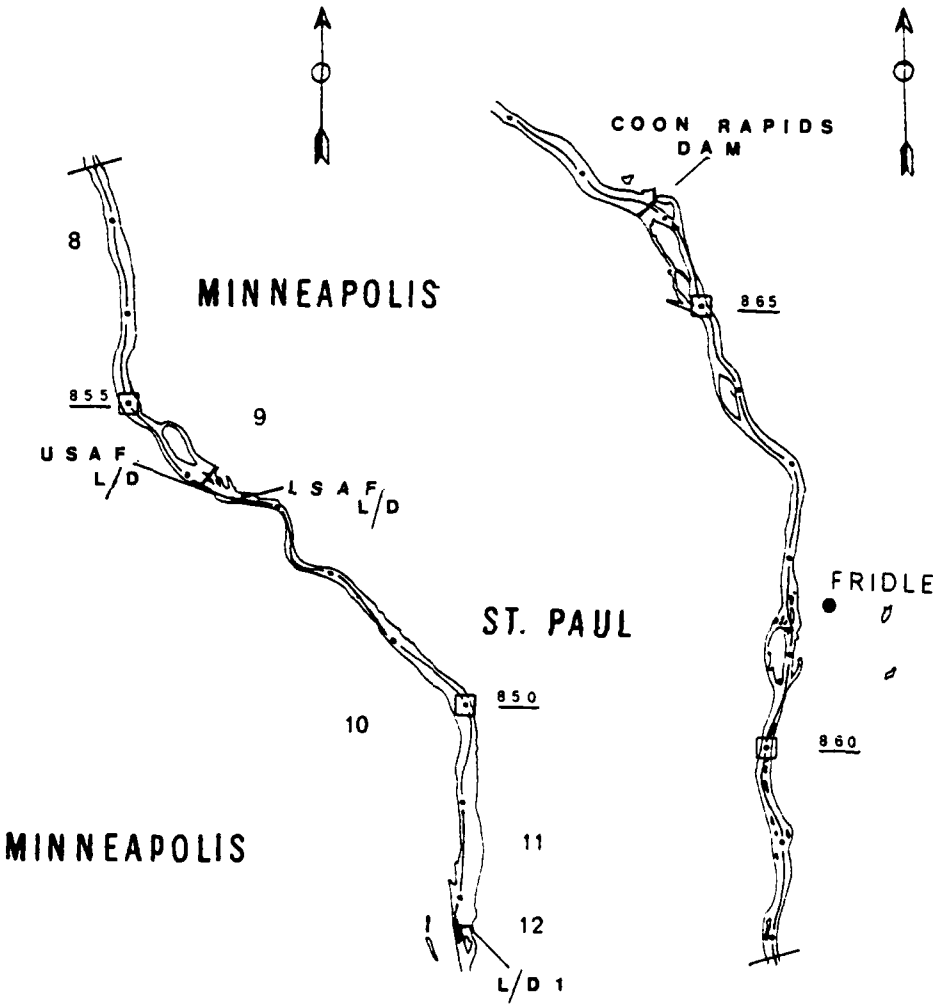


Exhibit 197

Minnesota River Sites 1-3

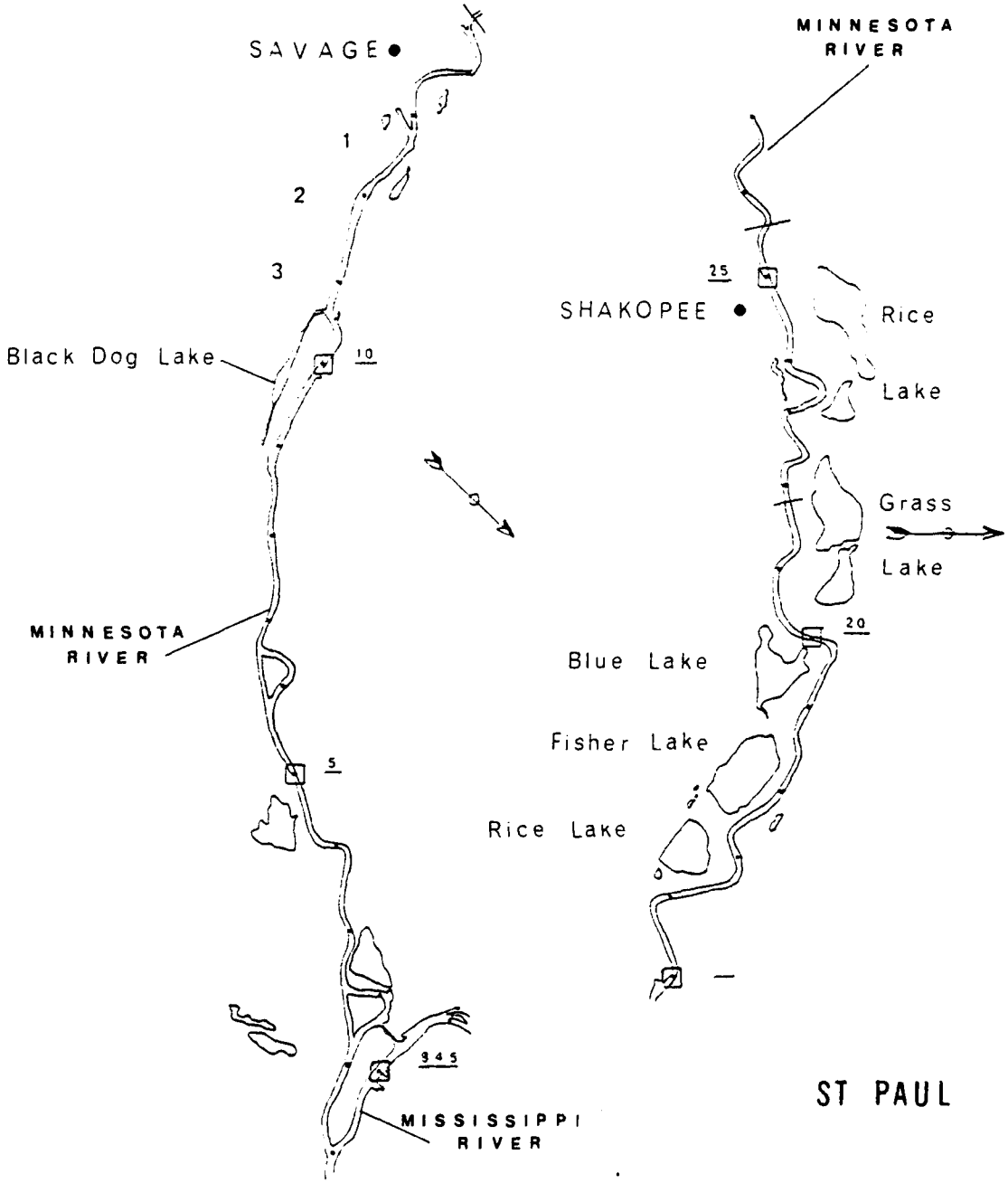


Exhibit 198

Upper Mississippi River Sites 12-15

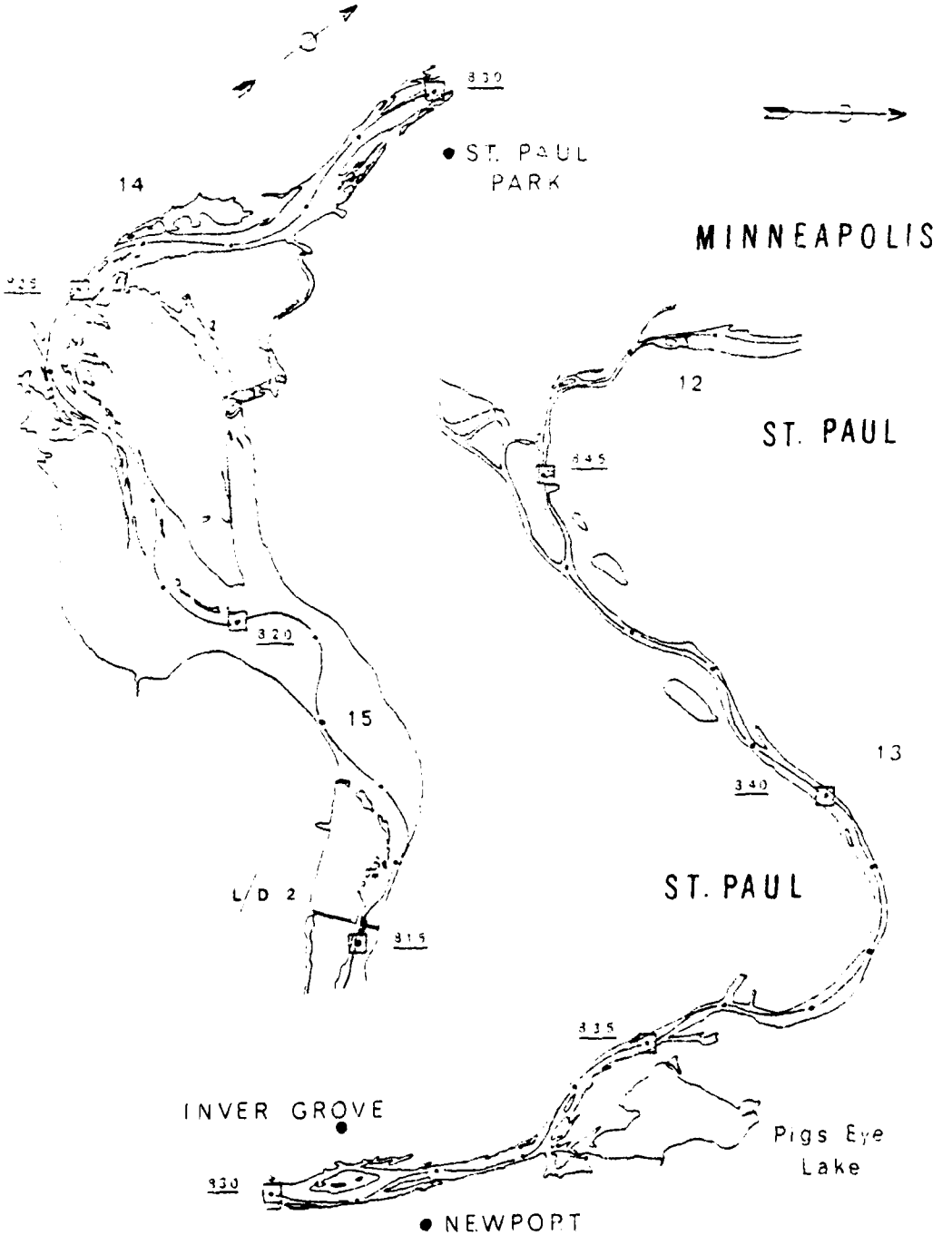


Exhibit 199

St. Croix River Sites 4-7

Upper Mississippi River Sites 16-25

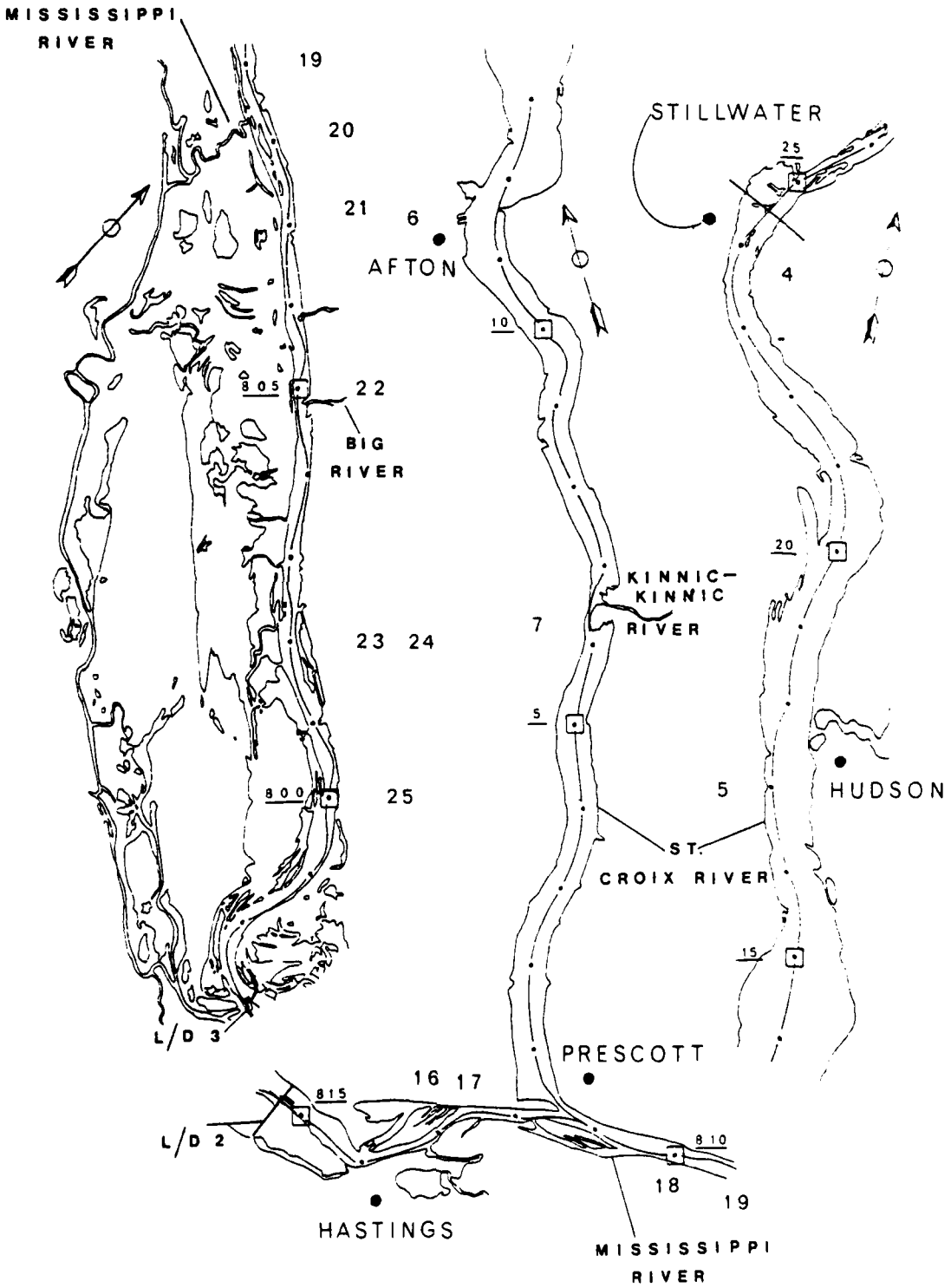


Exhibit 200

Upper Mississippi River Sites 26-34

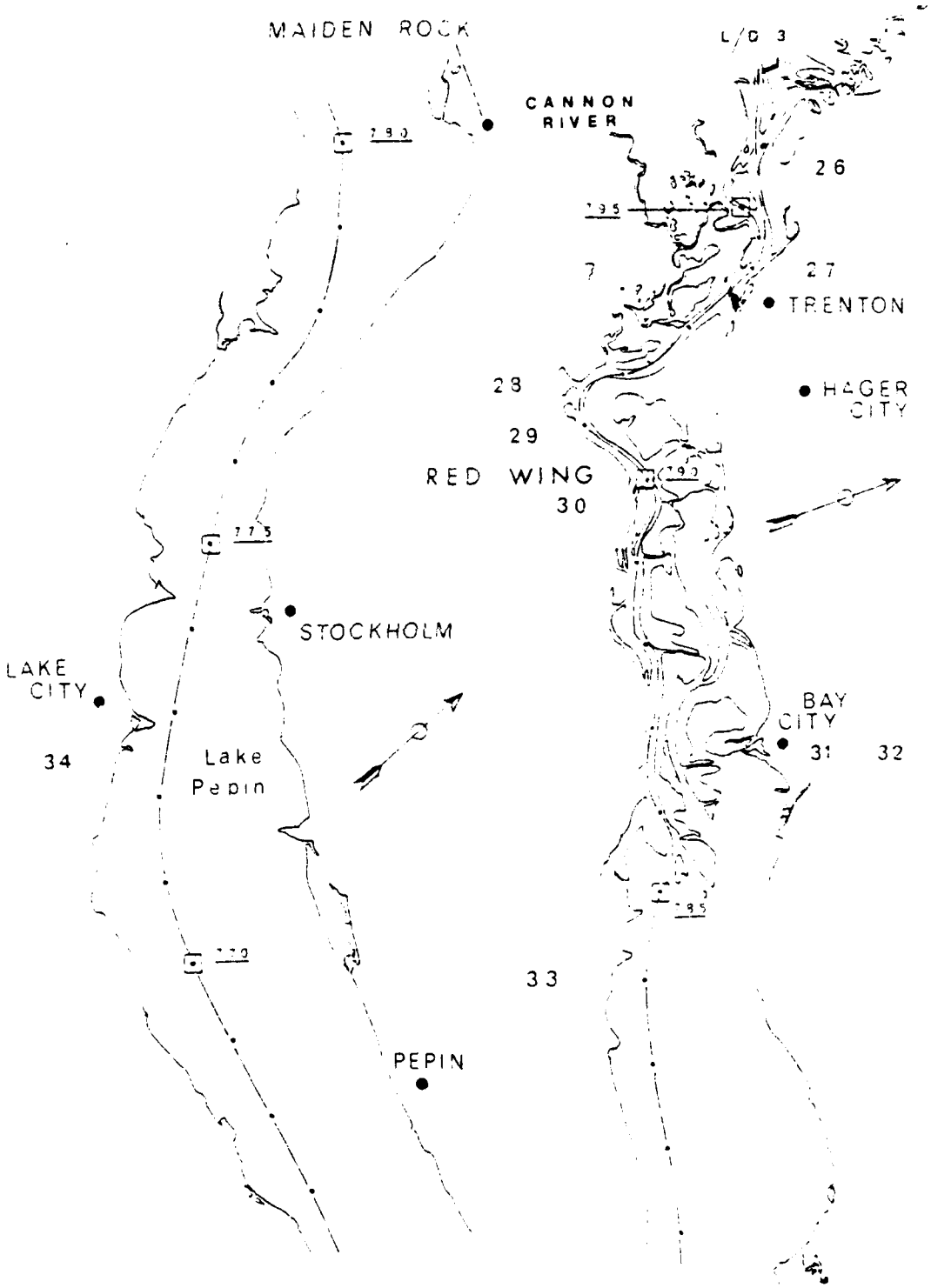


Exhibit 201

Upper Mississippi River Sites 35-46

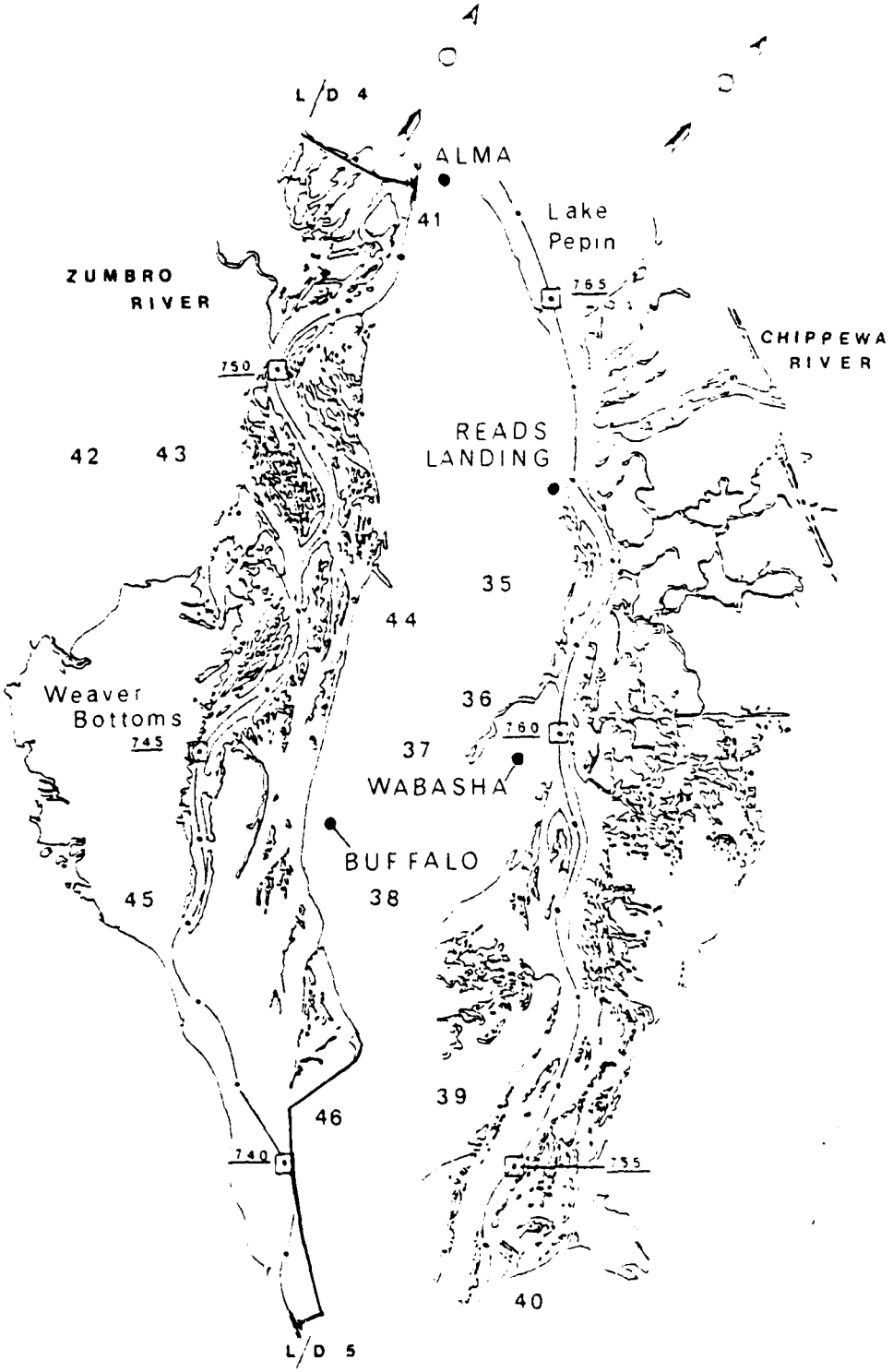


Figure 2

Upper Mississippi River Sites [illegible]

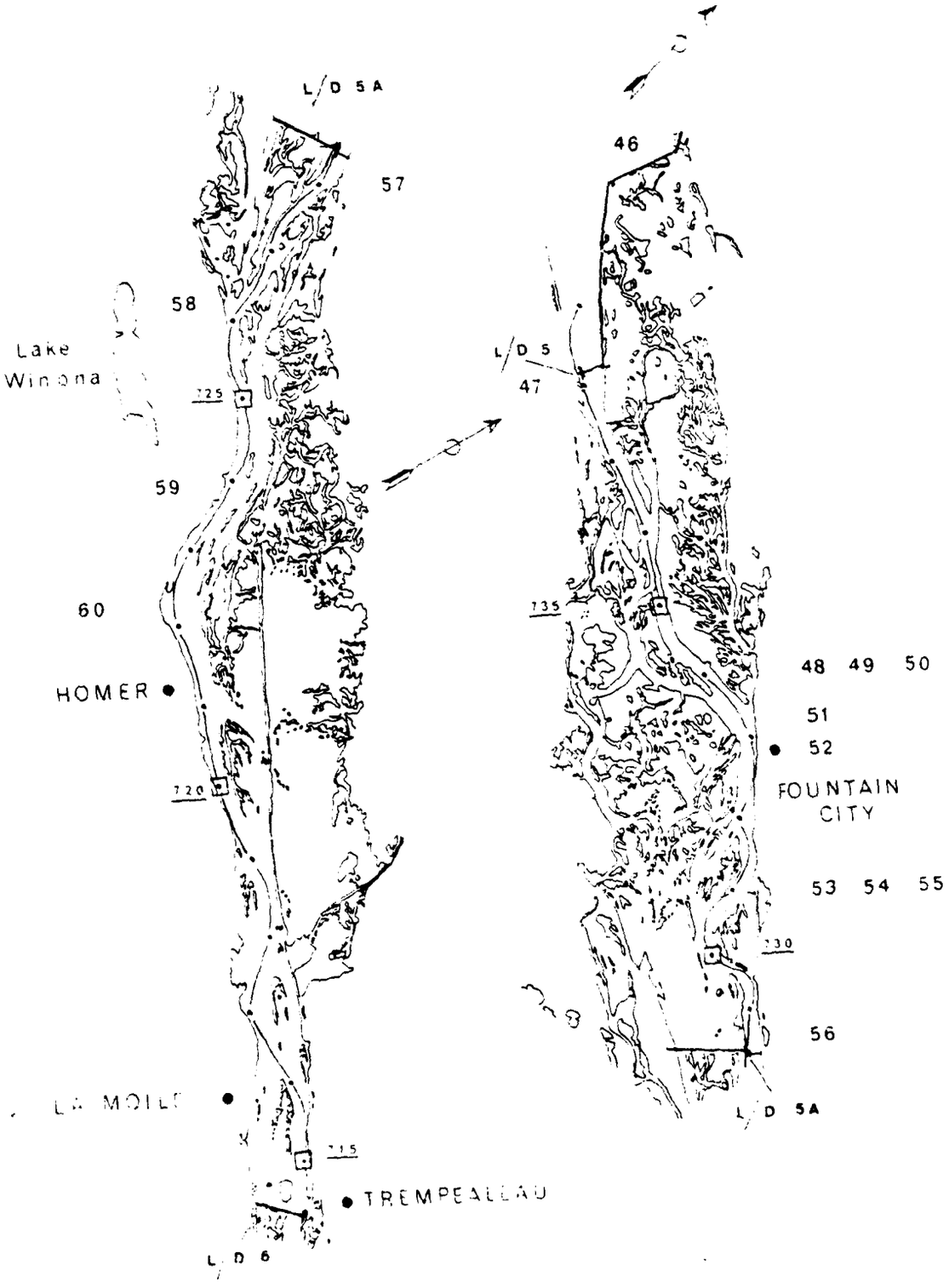


Exhibit 203

Upper Mississippi River Sites 61-64

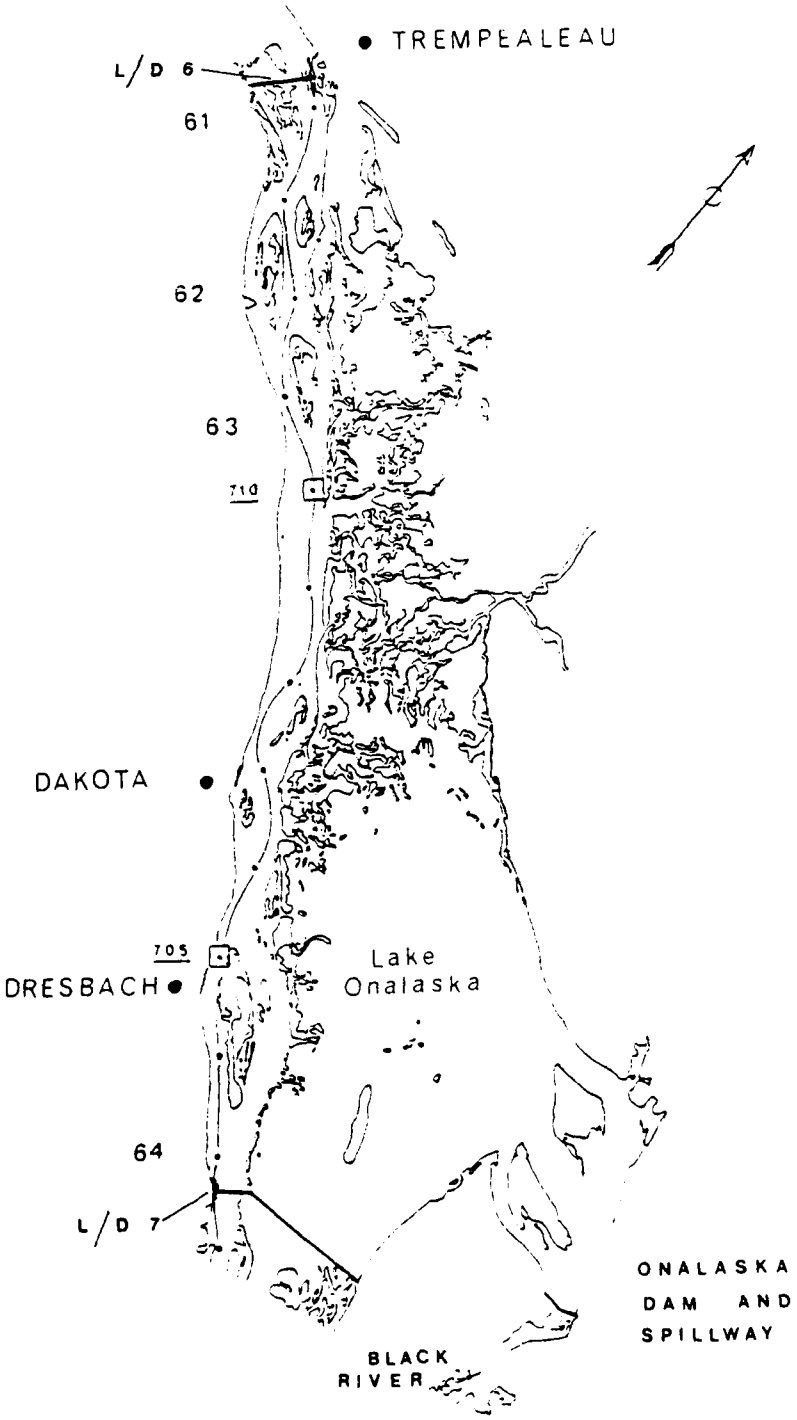


EXHIBIT [illegible]

Upper Mississippi River Miles 65-74

Exhibit 205

Upper Mississippi River Sites 77-89

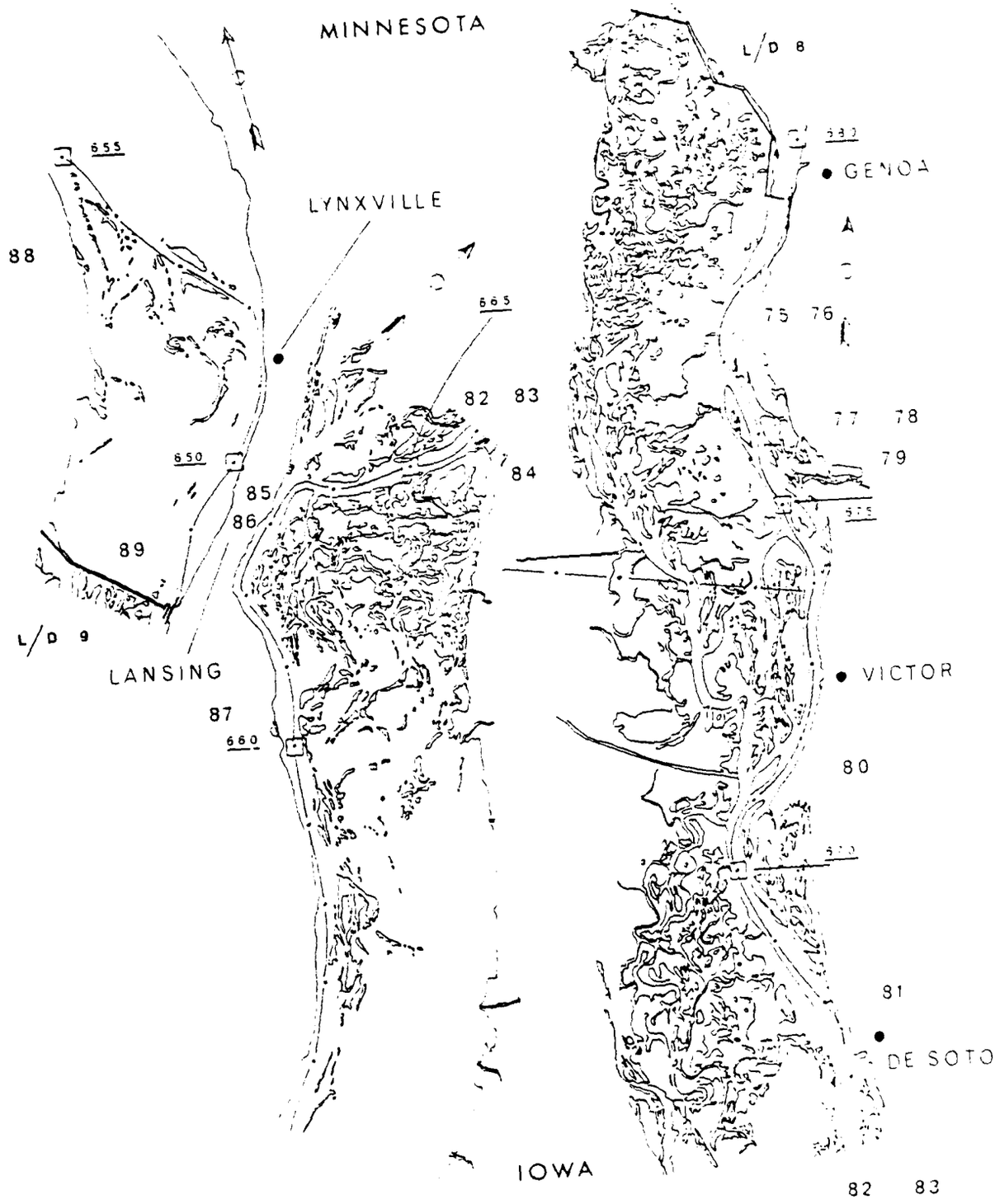
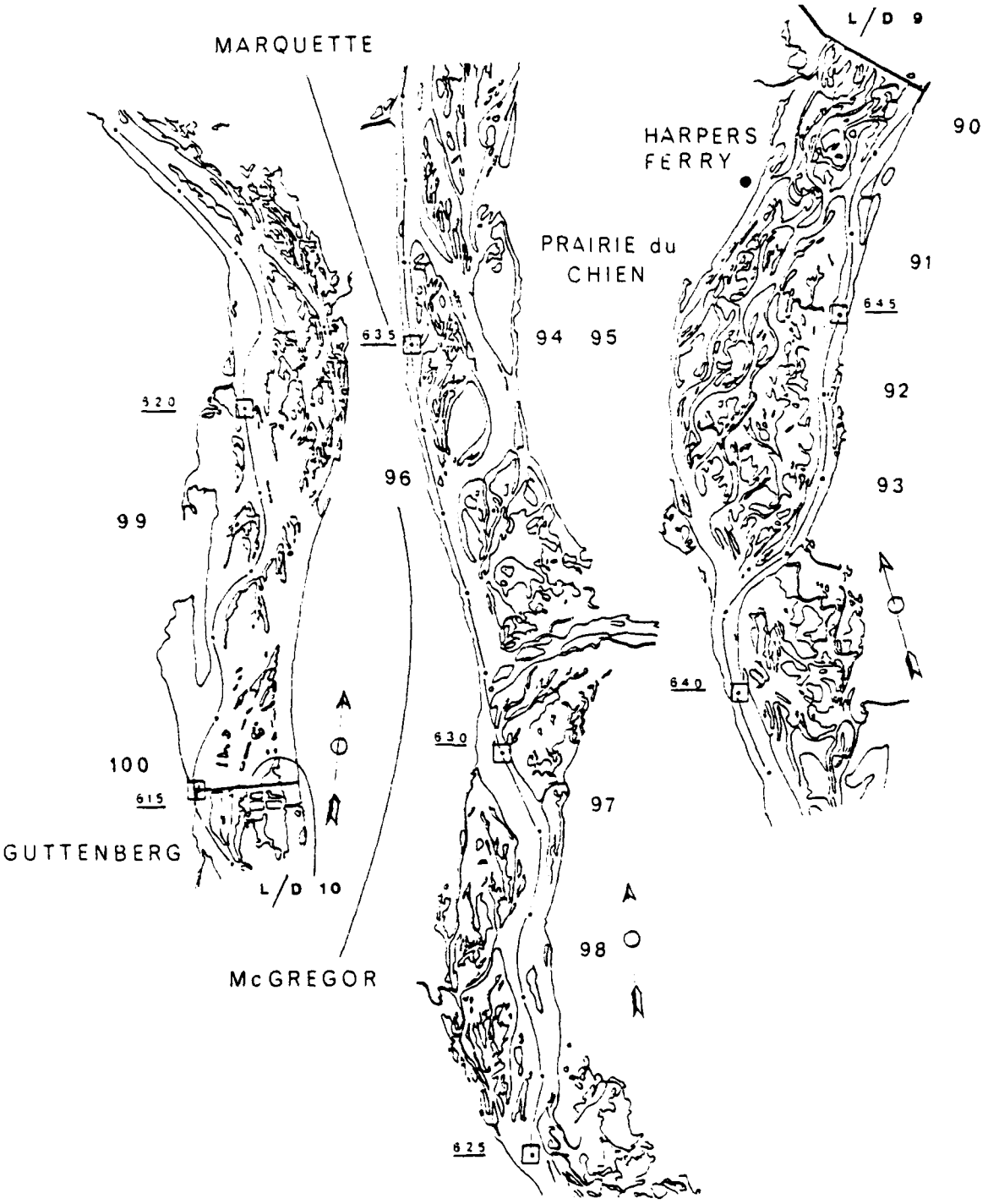


Exhibit 206

Upper Mississippi River Sites 90-100



Exhibits 207-251

Sites

In the following 45 Exhibits the 100 Sites surveyed during this project are depicted on the same scale as is used on the Corps navigation charts (USACE, 1975).

The upper and lower limits of a Site are represented by dark bars across the navigation channel and its borders (in some cases the entire breadth of the river is included). Each Site is given the same number used for it in Exhibits 196 through 206.

Approximate areas of mussel beds brailed by the Academy during the study period are indicated. For the purposes of this report, mussel "beds" are those few populations that, in the Principal Investigator's opinion, were substantially more species- and individual-rich than all other study area populations. This subjective criterion is used in the absence of preferable alternatives (see Brice and Lewis, 1979; Krumholz et al., 1970; Cvancara, 1972). Because of temporal constraints, diving in order to verify the limits and densities of beds was not conducted. Consequently, neither size- nor age-class structure is known for any of them. However, the comparative representations of the species in each can be approximately inferred from data in Appendix C. Beds occurred at only four formal study Sites in the St. Paul District: Hudson Railroad Bridge (St. Croix River), Hay Point Bank Repair, Prairie du Chien East Channel, and McGregor (all three in Pool 10); the relevant Appendix C data are in Exhibits 94, 185, 188, and 190, respectively. One other bed in the District is known to the Principal Investigator: the Whiskey Rock bed below Lansing, Iowa, in Pool 9, slightly outside the nearest Site (see Exhibit 243). According to commercial clammers, there are others, but only in Pools 9 and 10 (personal communications).

The portrayals of mussel beds necessarily are approximate (and in some instances vague) because diving in order to define their peripheries was not conducted and/or because reports have not been specific on this point.

Mussel beds are indicated by asterisk(s) or dotted lines. Arrows are used to draw the reader's attention to them. Beds are shown on pages 287, 302, 310, 321, 324, and 326. Note that much of the Prairie du Chien East Channel floor is one vast mussel bed (page 326).

Exhibit 207

1. Cargill
2. Petersons Bar
3. Route I-35W Bridge

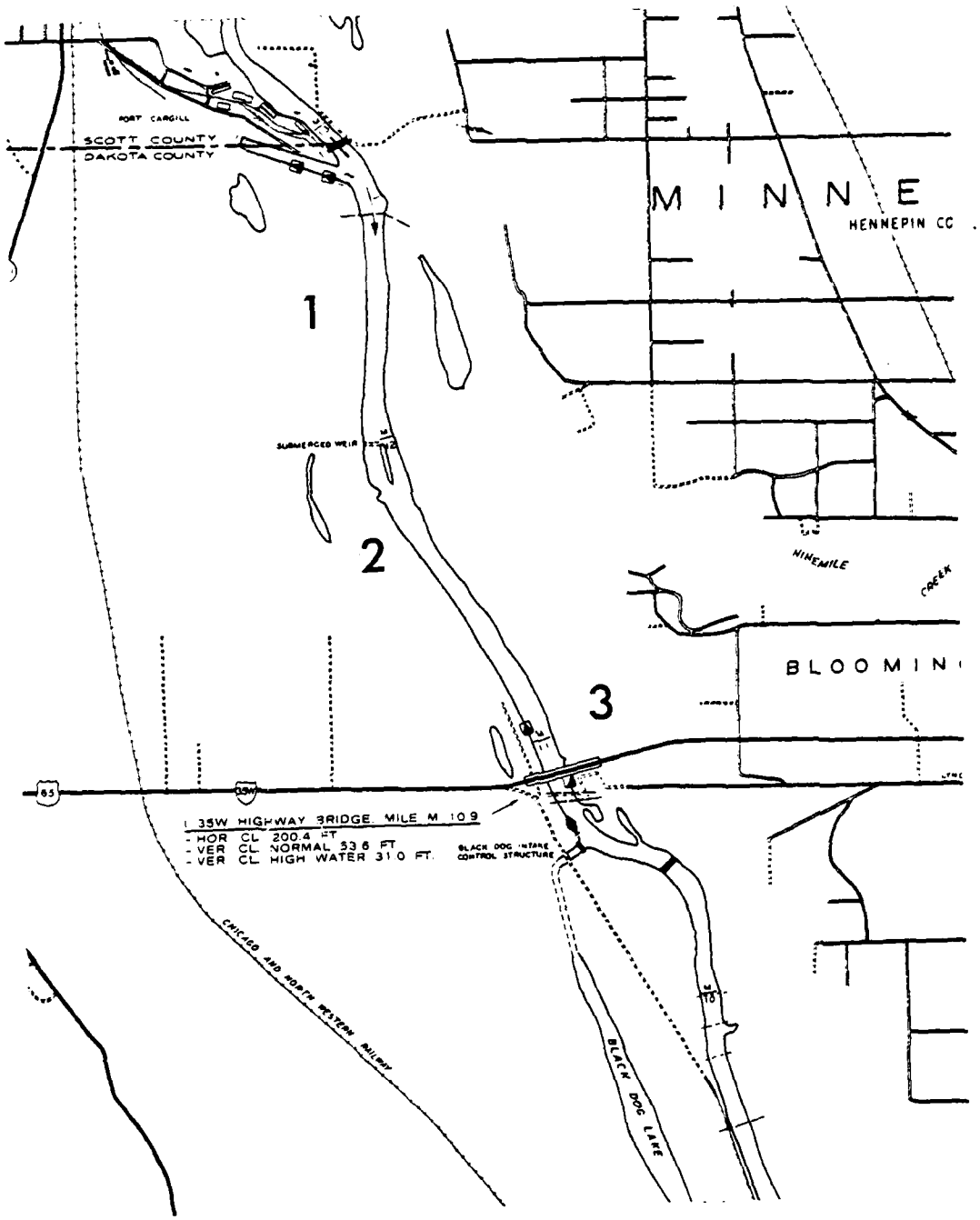


Exhibit 208

4. Stillwater

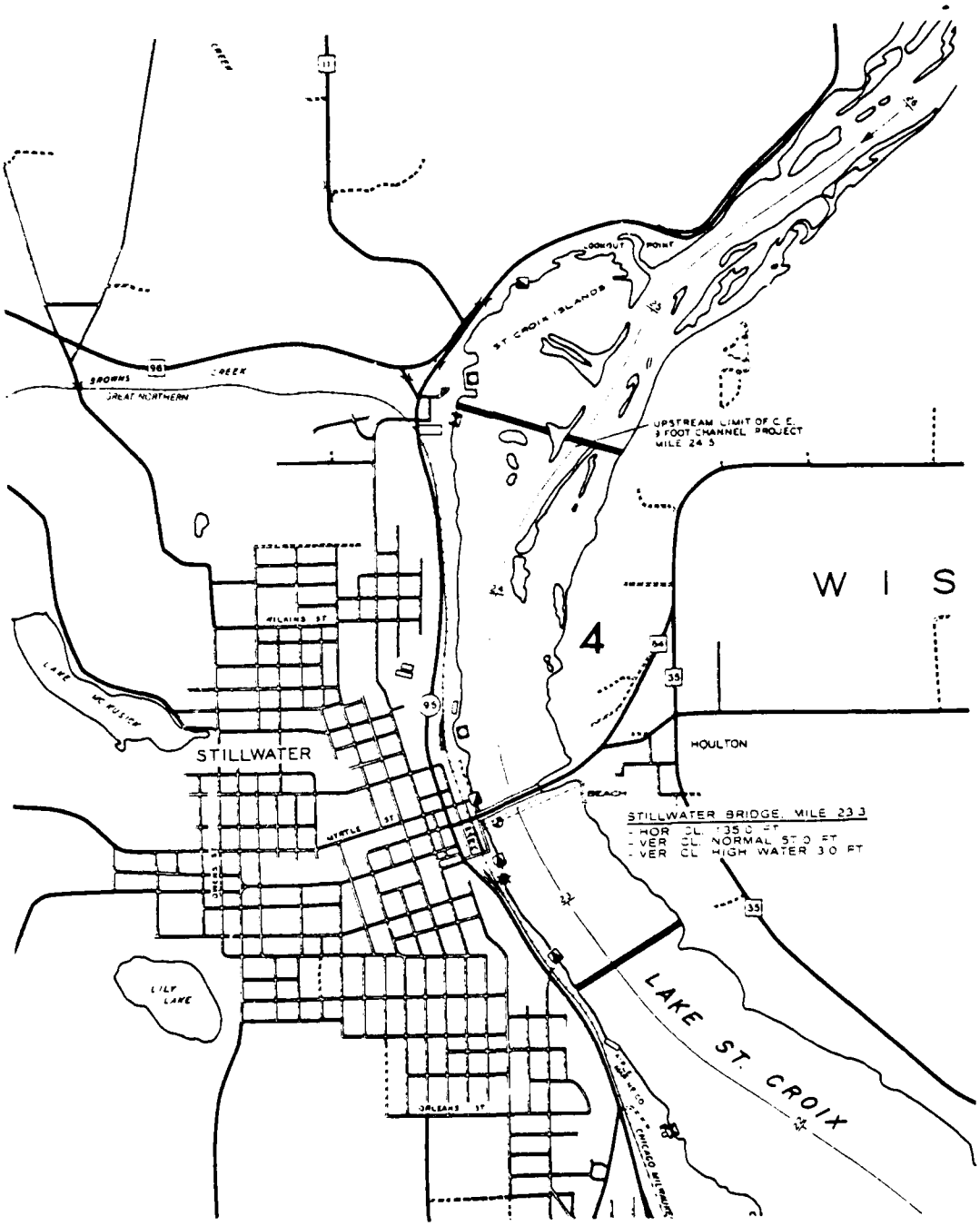


Exhibit 209

5. Hudson

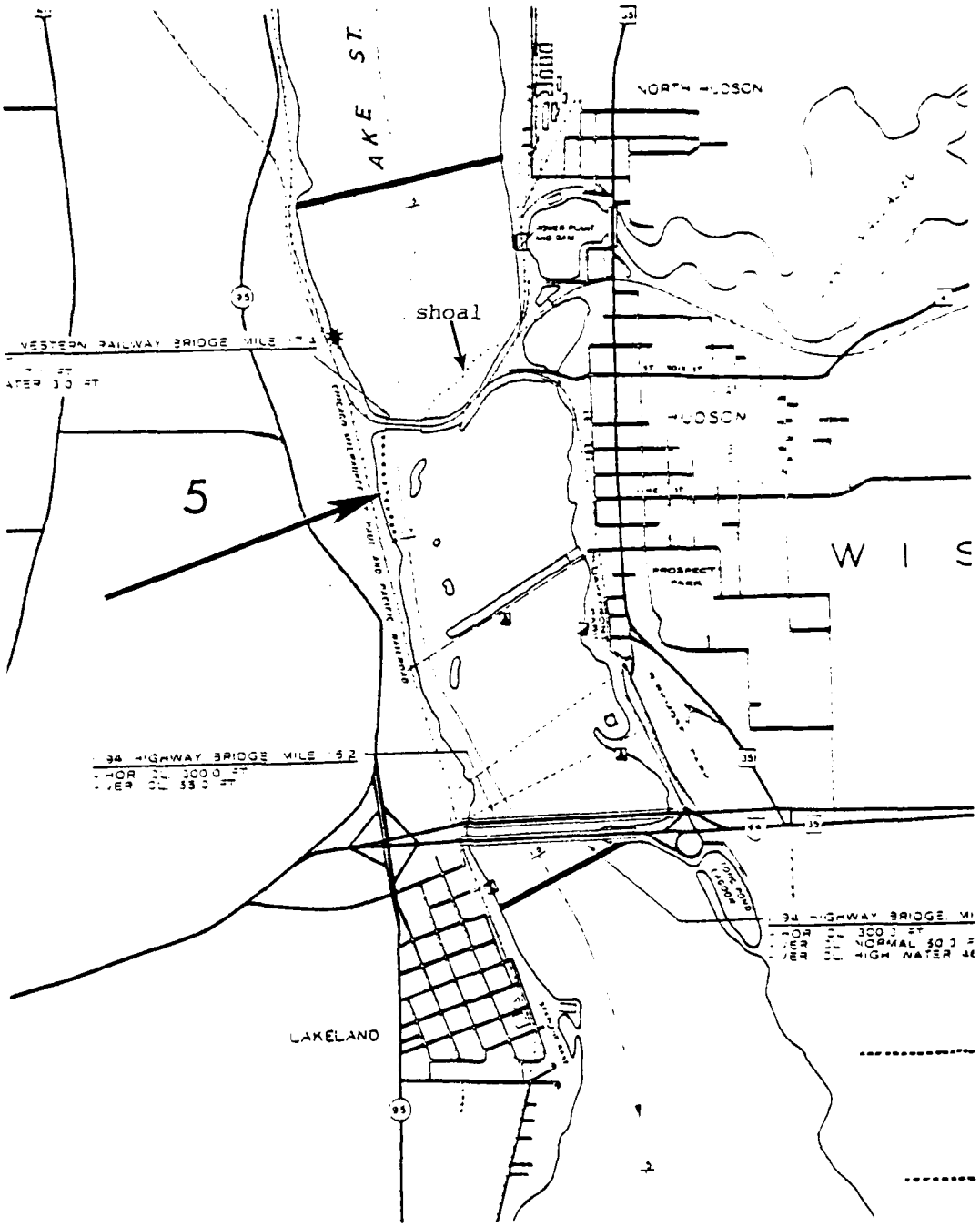


Exhibit 210

6. Catfish Bar

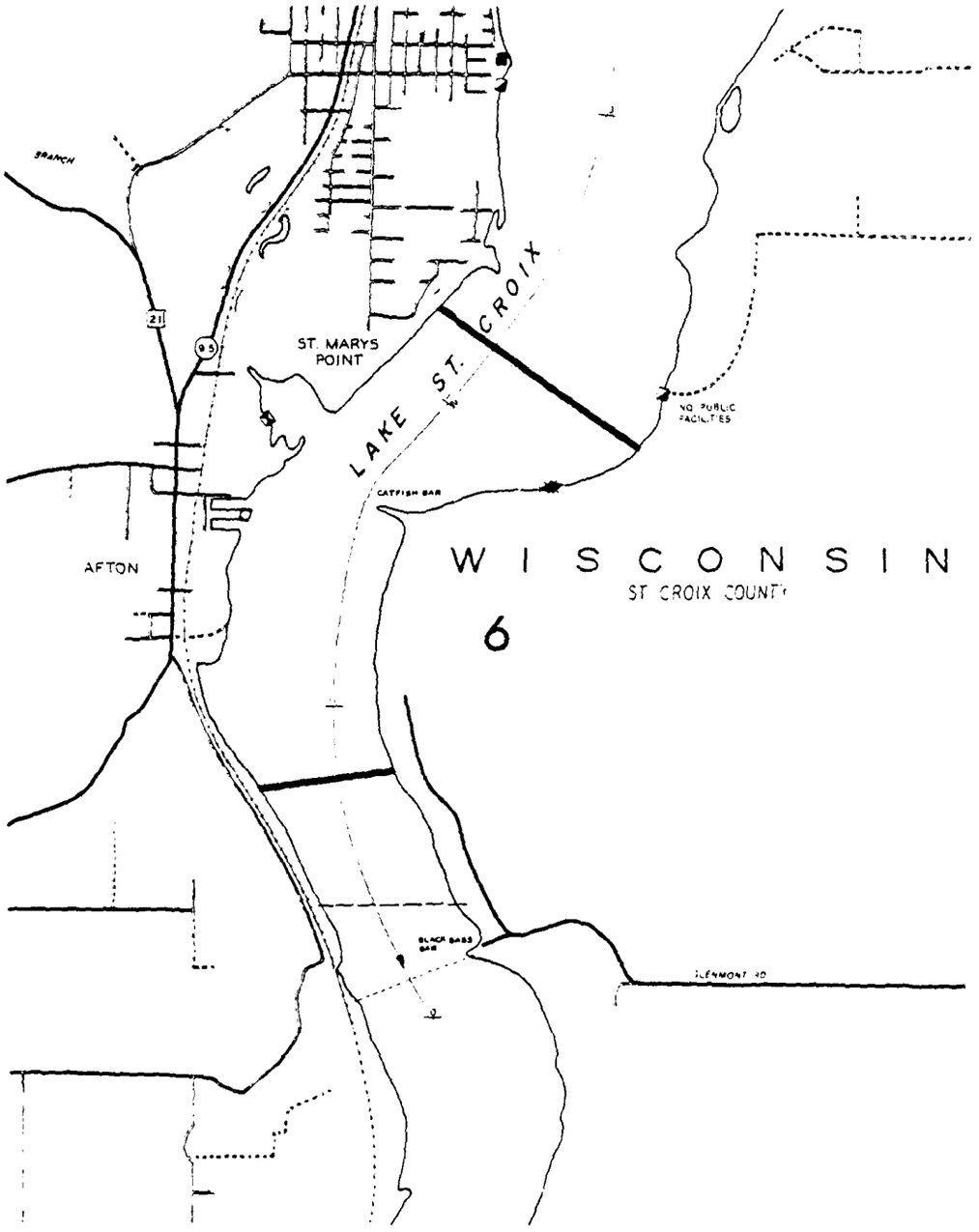


Exhibit 211

7. Kinnickinnic

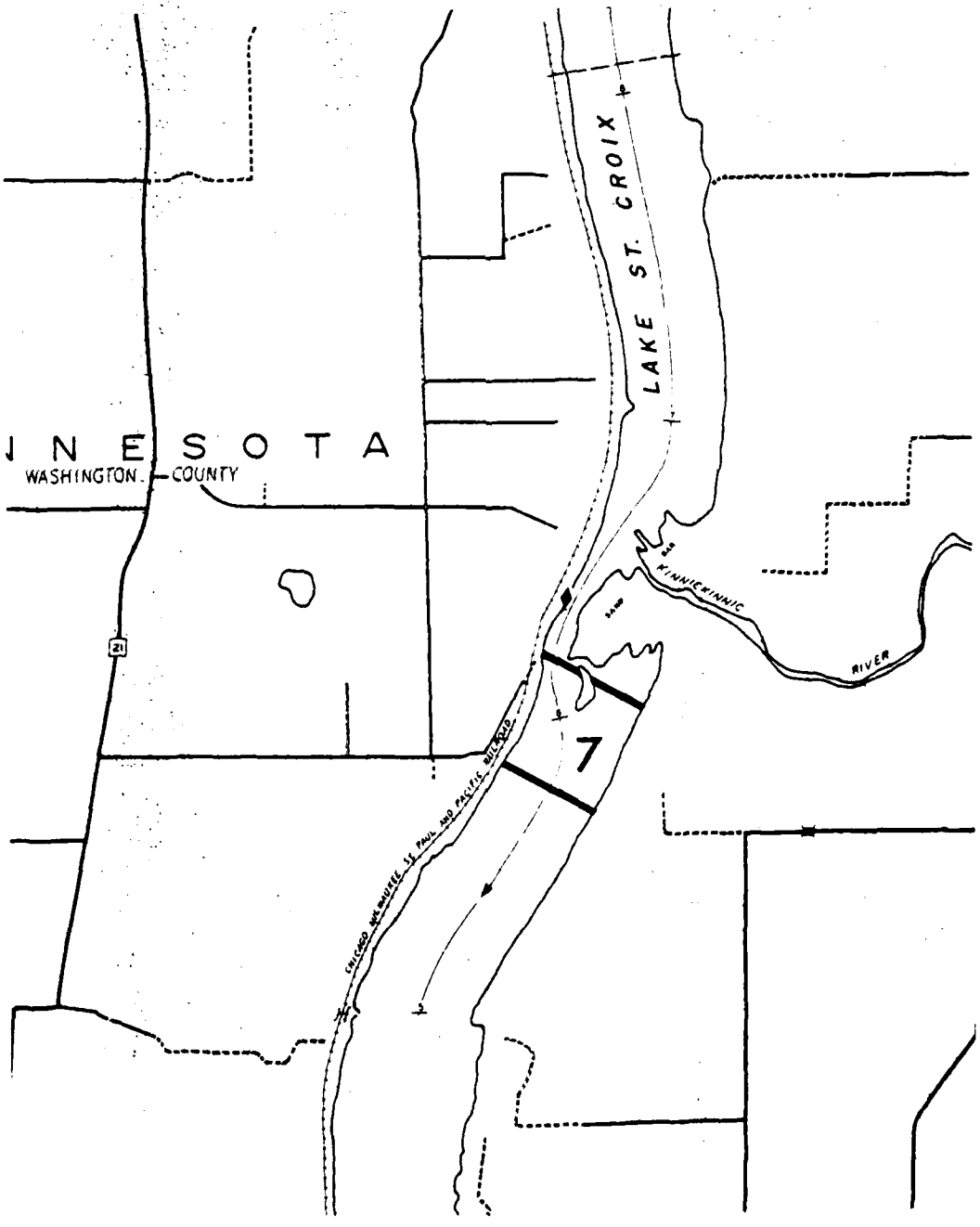
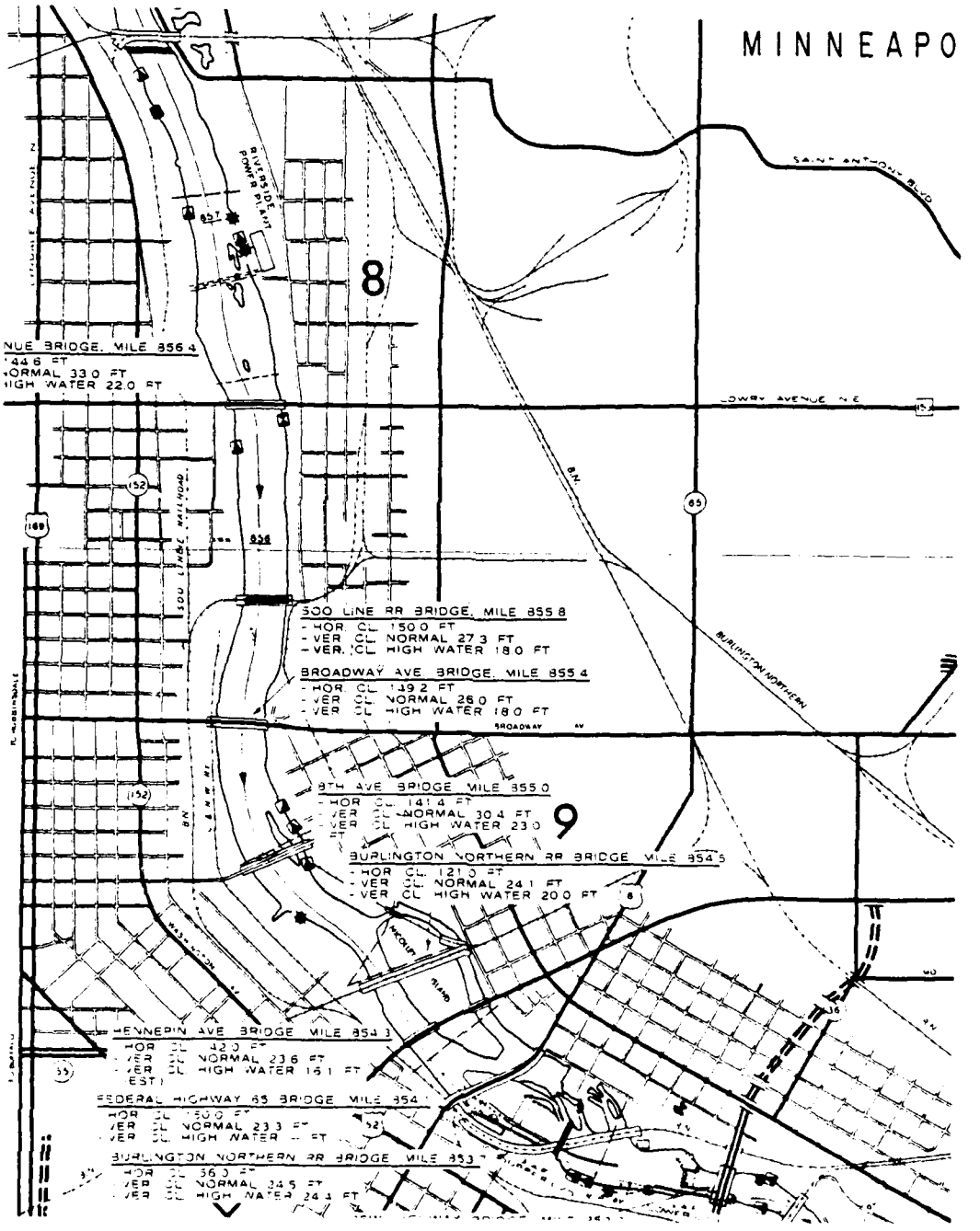


Exhibit 212

8. SOO Line Railroad Bridge
9. Broadway and Plymouth Avenues Bridges



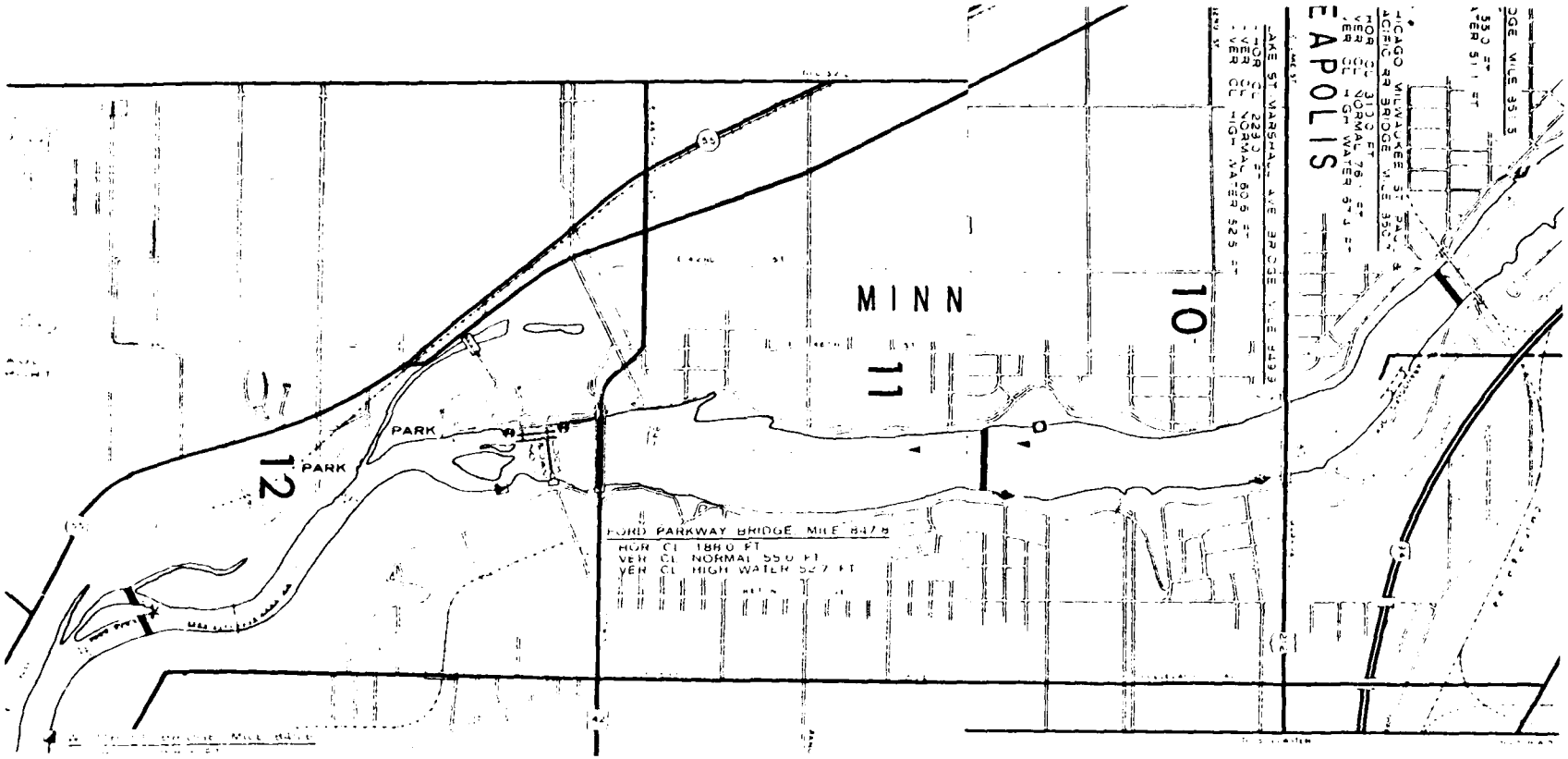


Exhibit 213

10. Lake Street Bridge
11. St. Paul Daymark 849.1
12. Locks and Dam 1 Upper Approach Construction (in part)

Exhibit 214

13. Smith Avenue ("High") Bridge

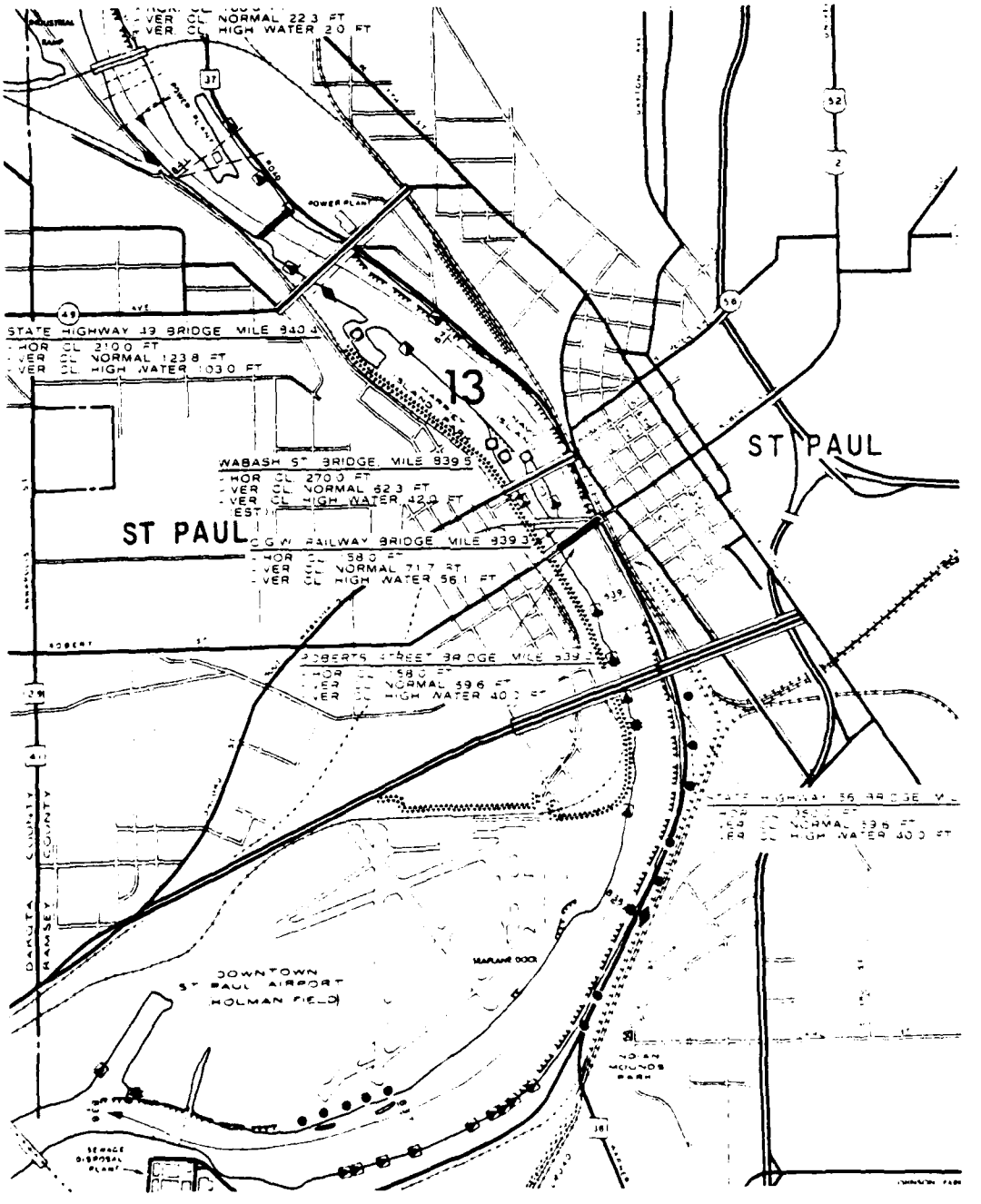
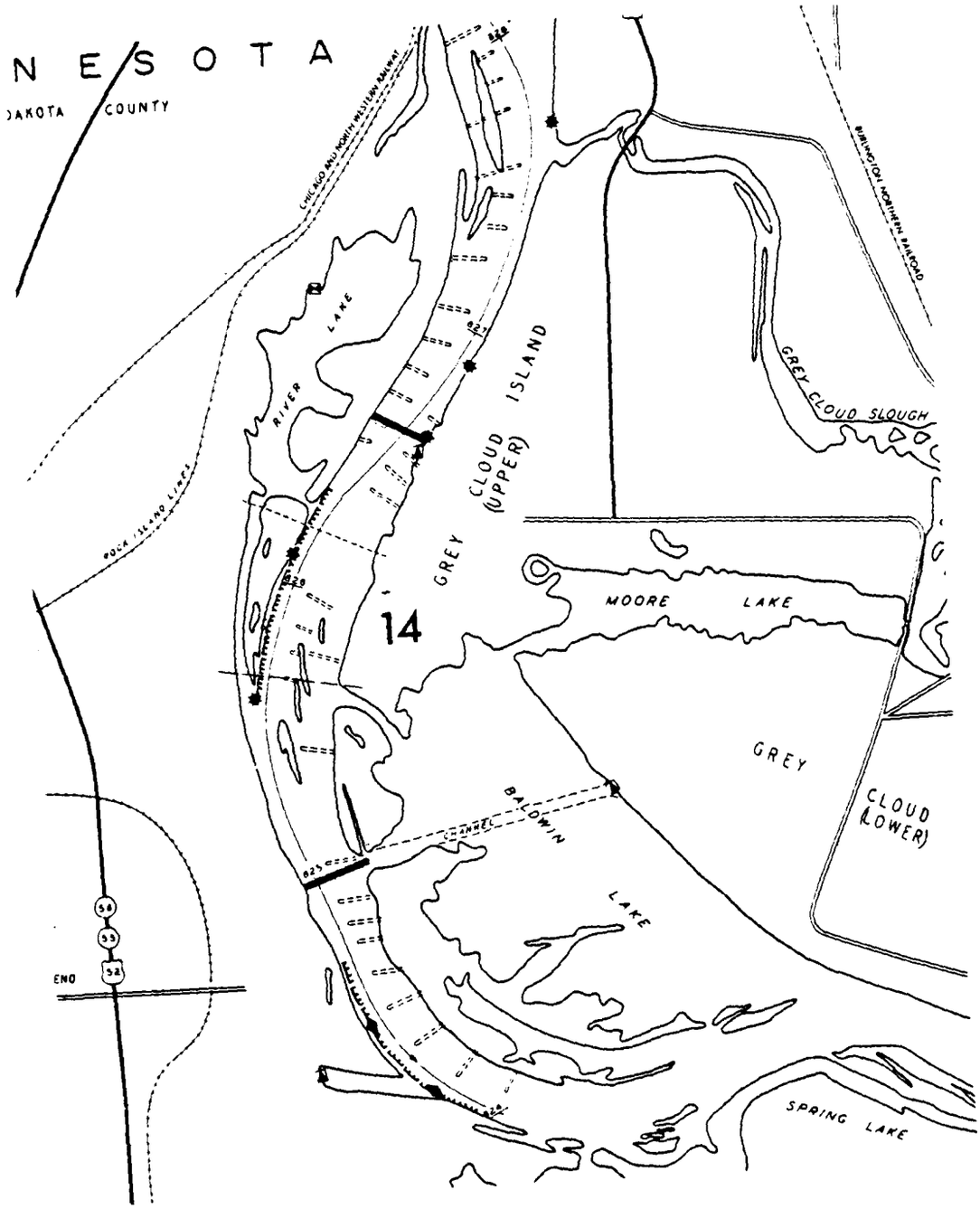


Exhibit 215

14. Robinsons Rocks



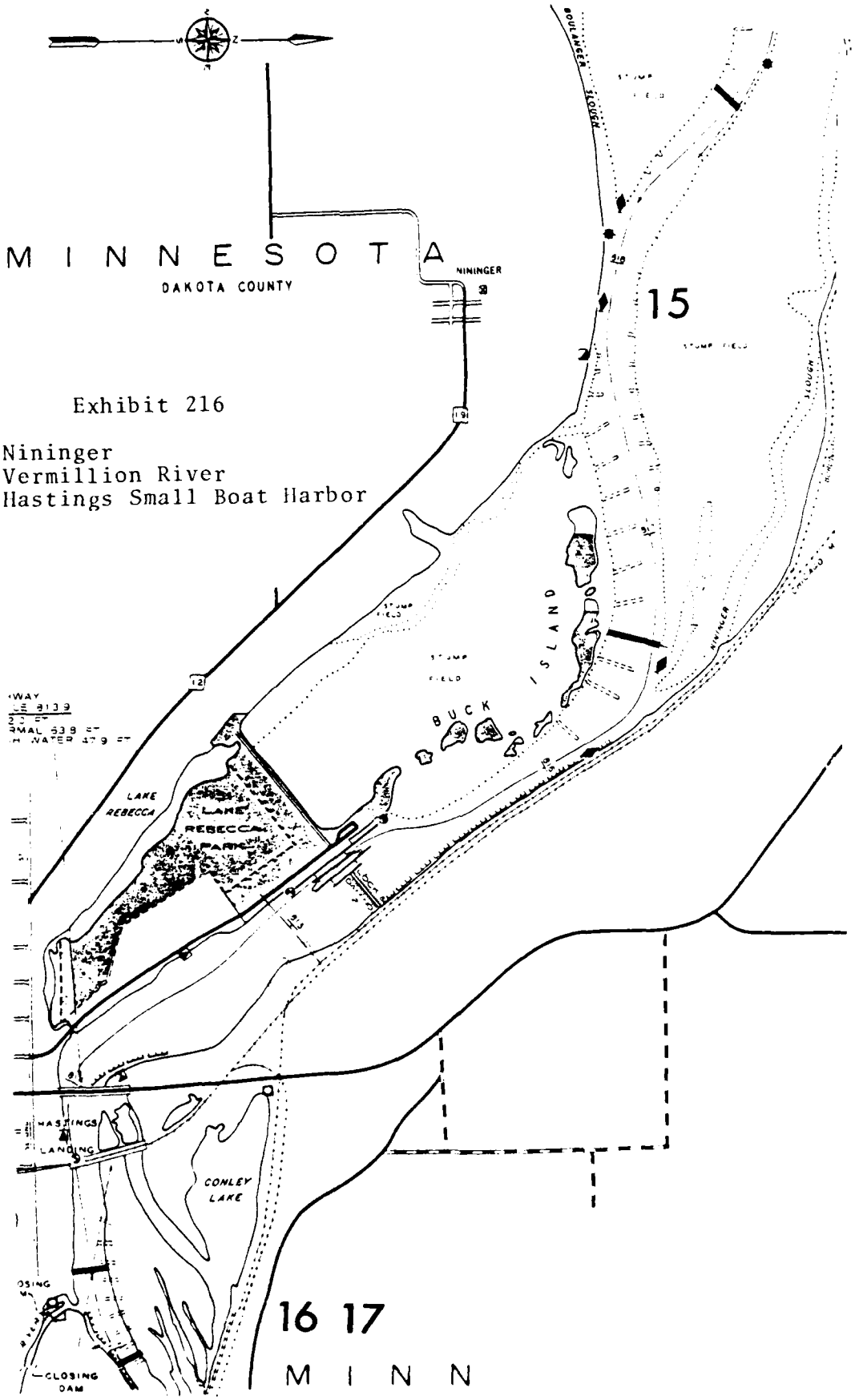


Exhibit 216

15. Nininger
16. Vermillion River
17. Hastings Small Boat Harbor

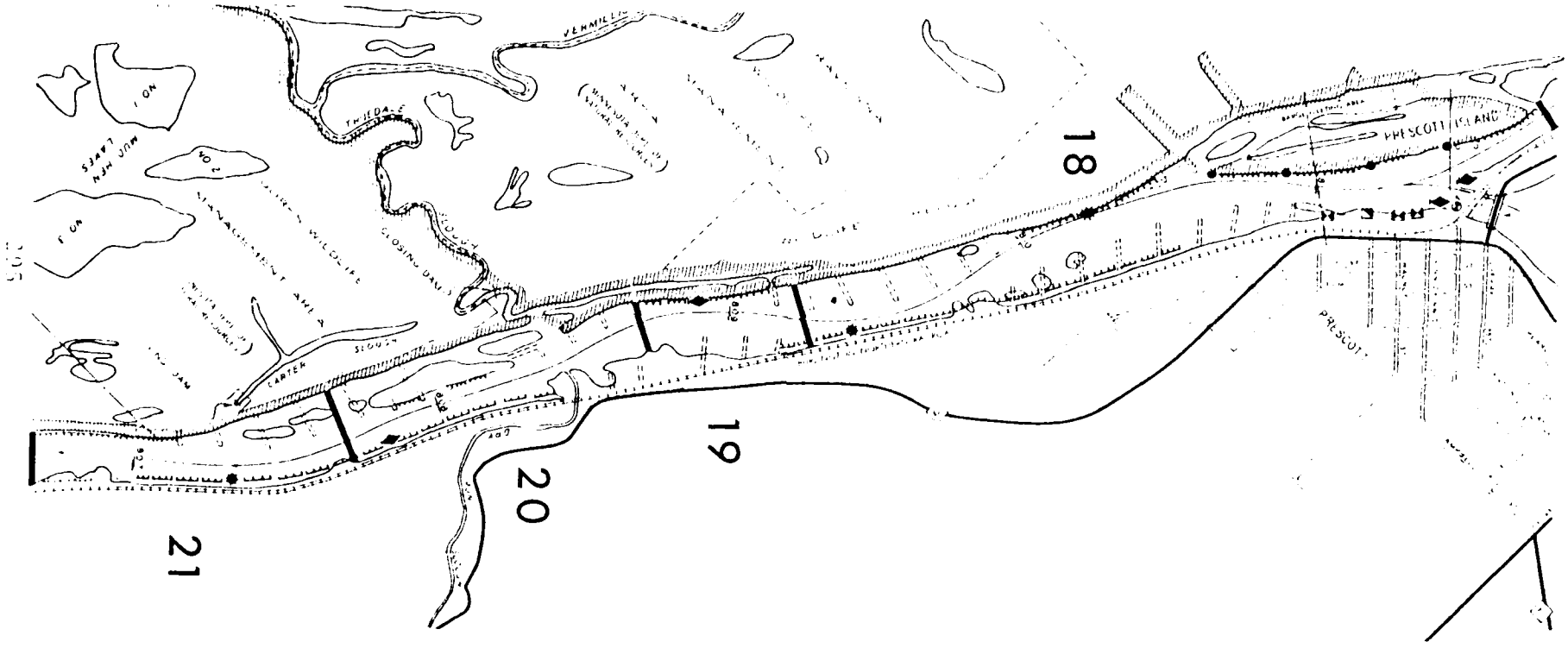
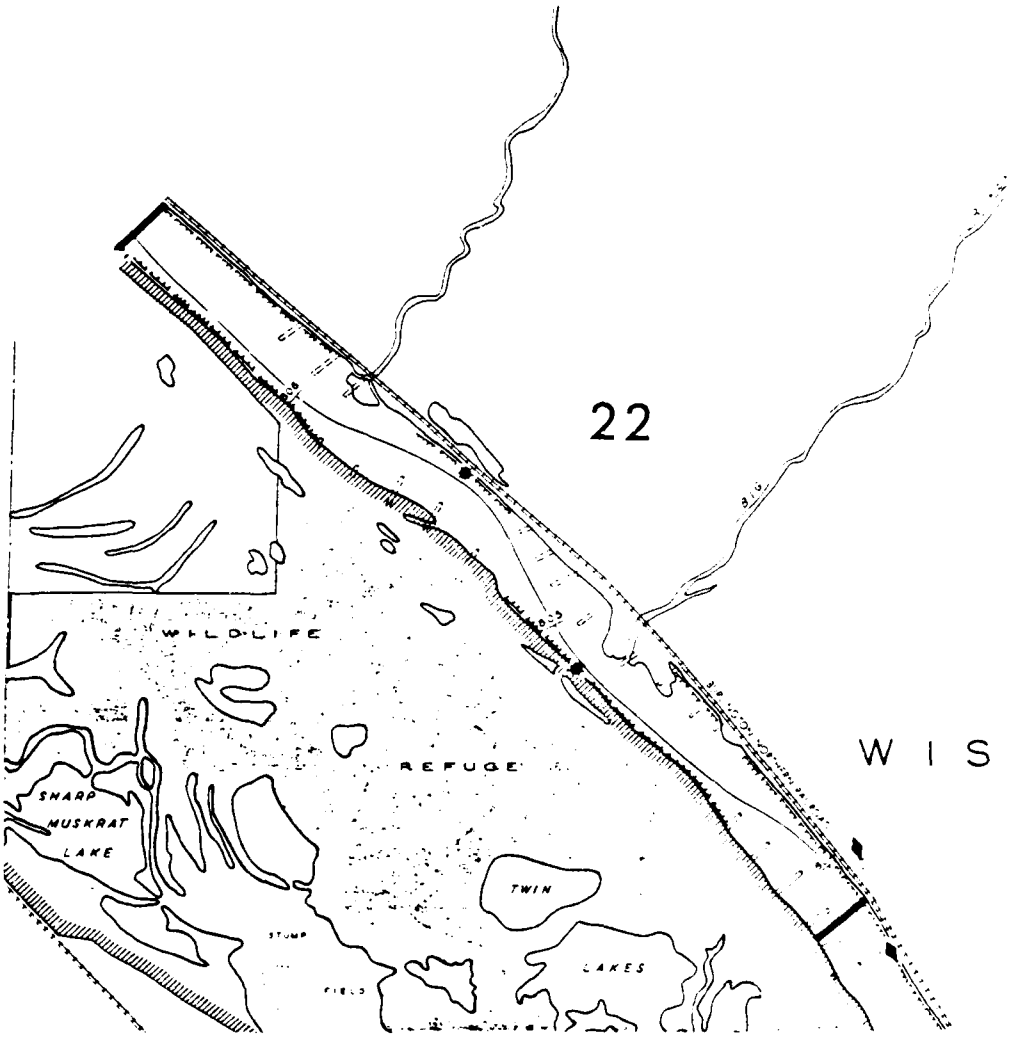


Exhibit 217

18. Prescott
19. Pine Coulee
20. Truedale Slough
21. Four Mile Island

Exhibit 218

22. Big River



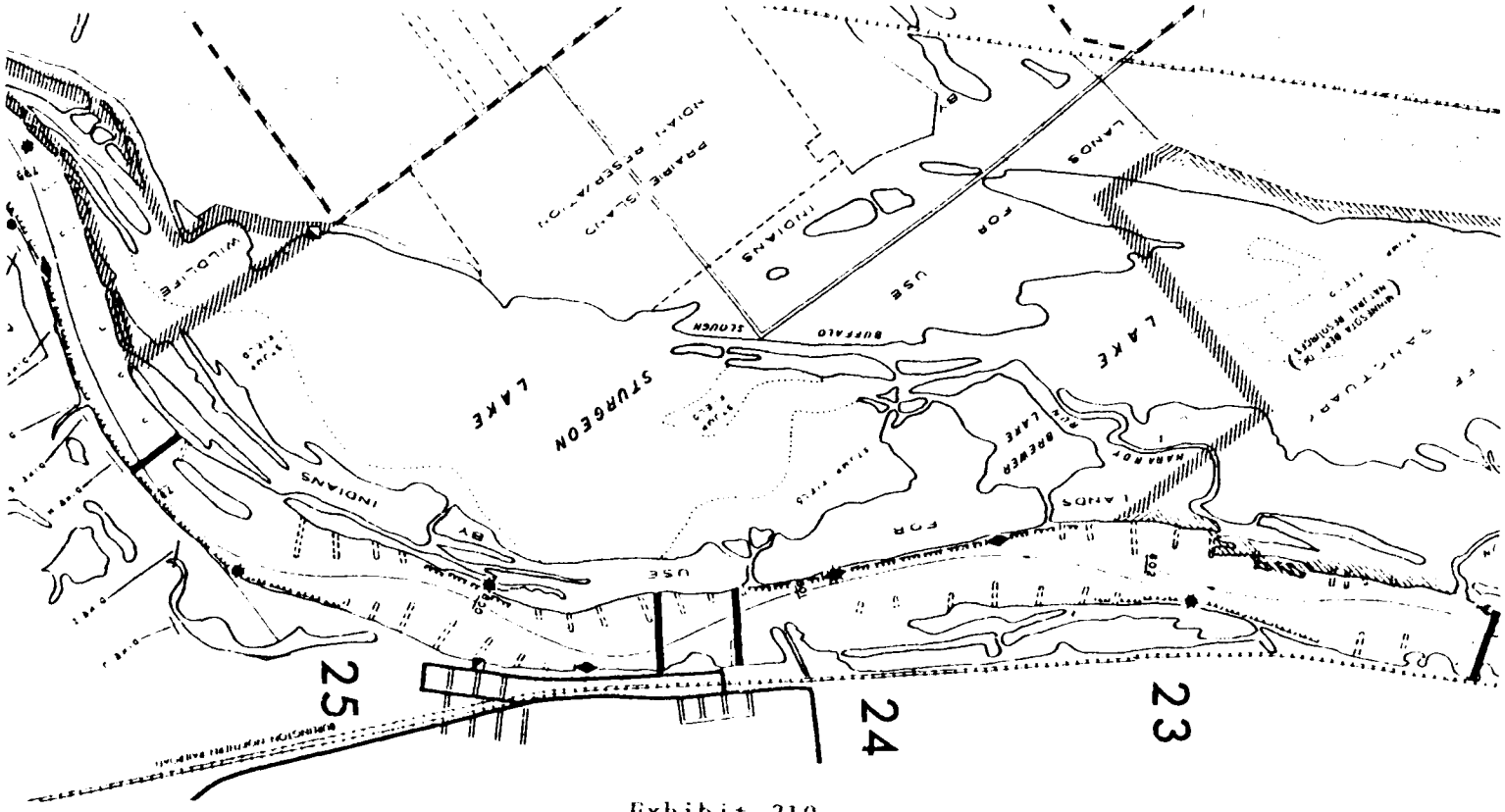


Exhibit 219

23. Morgan Coulee
24. Coulters Island
25. Diamond Bluff

Exhibit 220

26. Above Trenton
27. Trenton
28. Cannon River
29. Red Wing Commercial and Small Boat Harbors

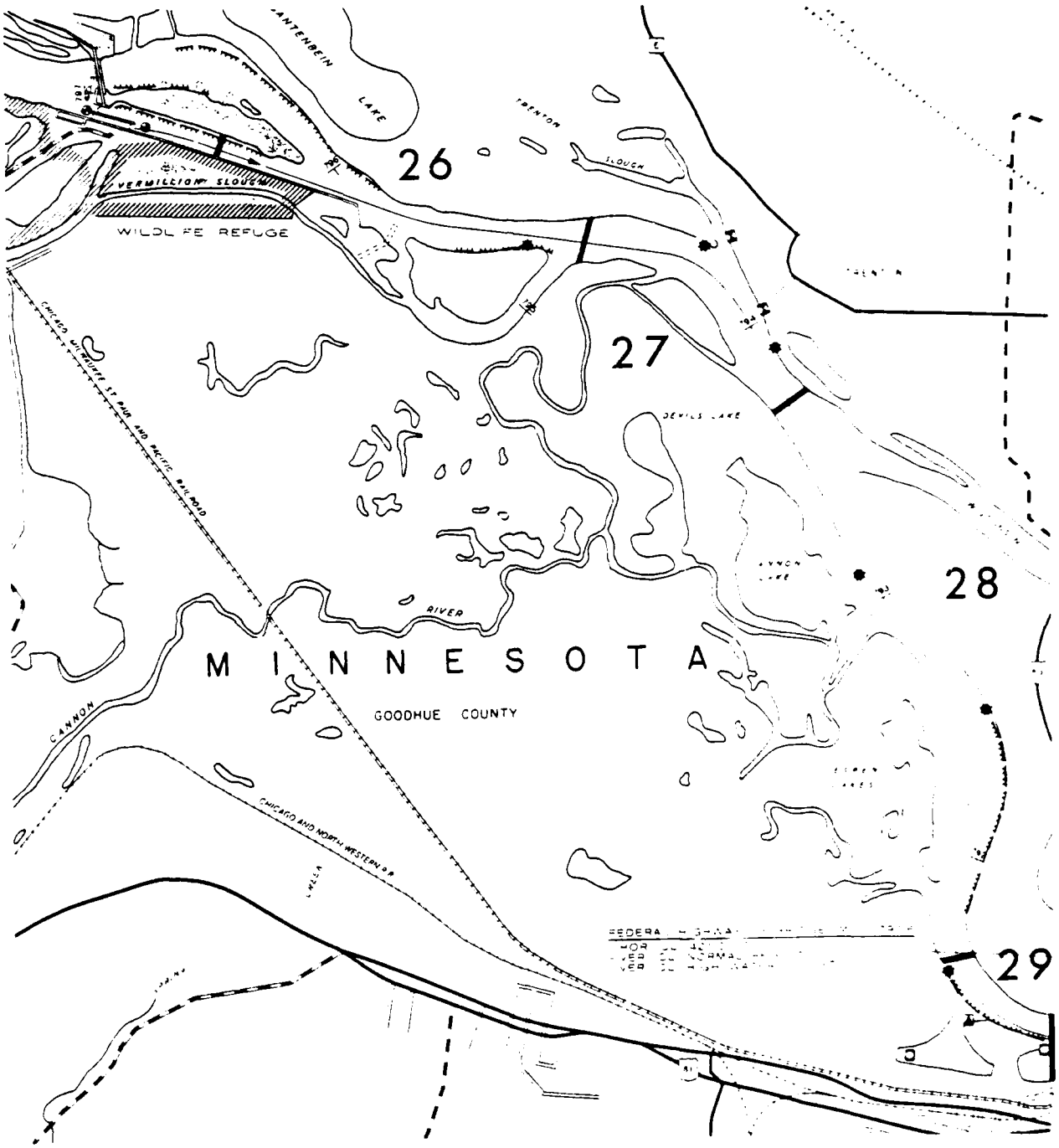


Exhibit 221

30. Red Wing Highway Bridge

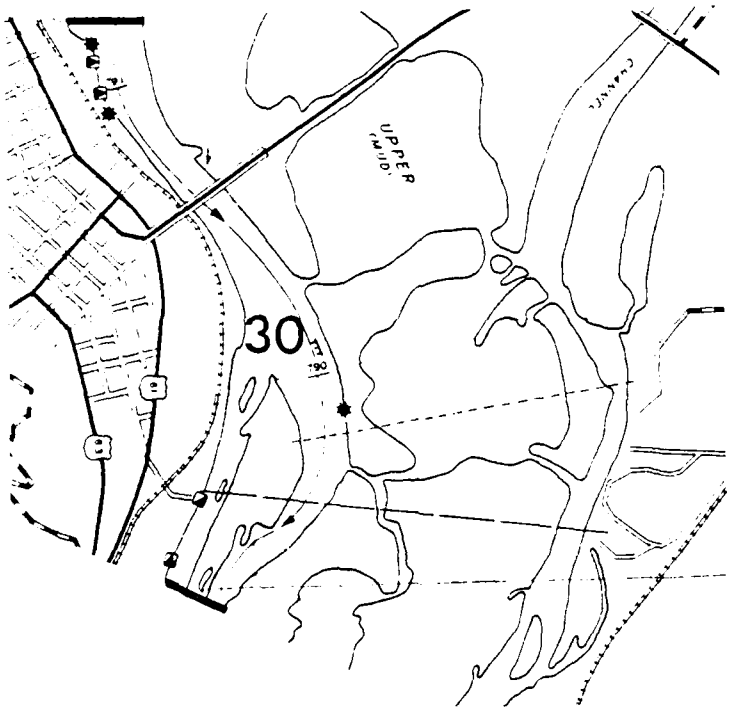


Exhibit 222

31. Bay City Small Boat Harbor
32. Bay City Commercial and Recreational Sites
33. Wacouta Point

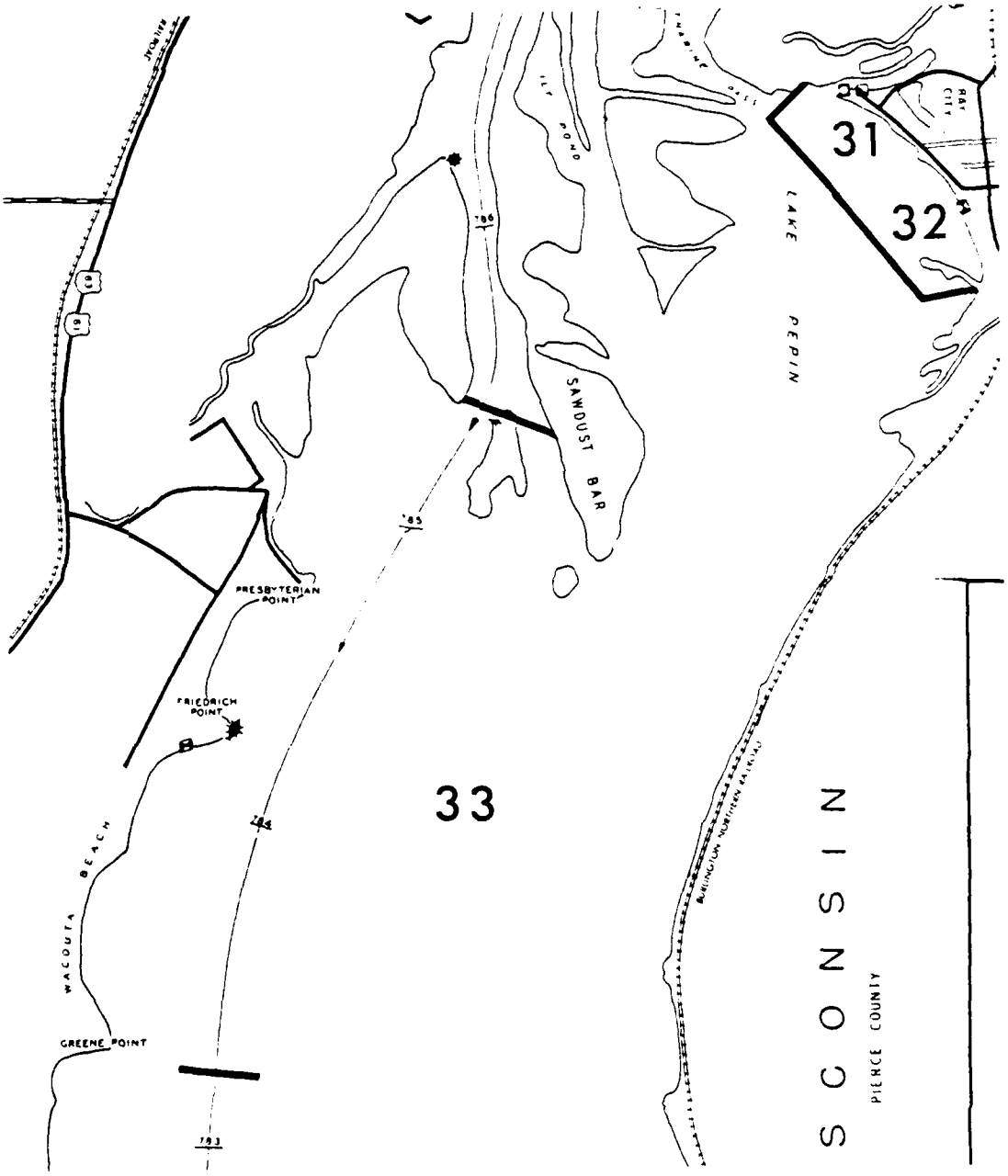
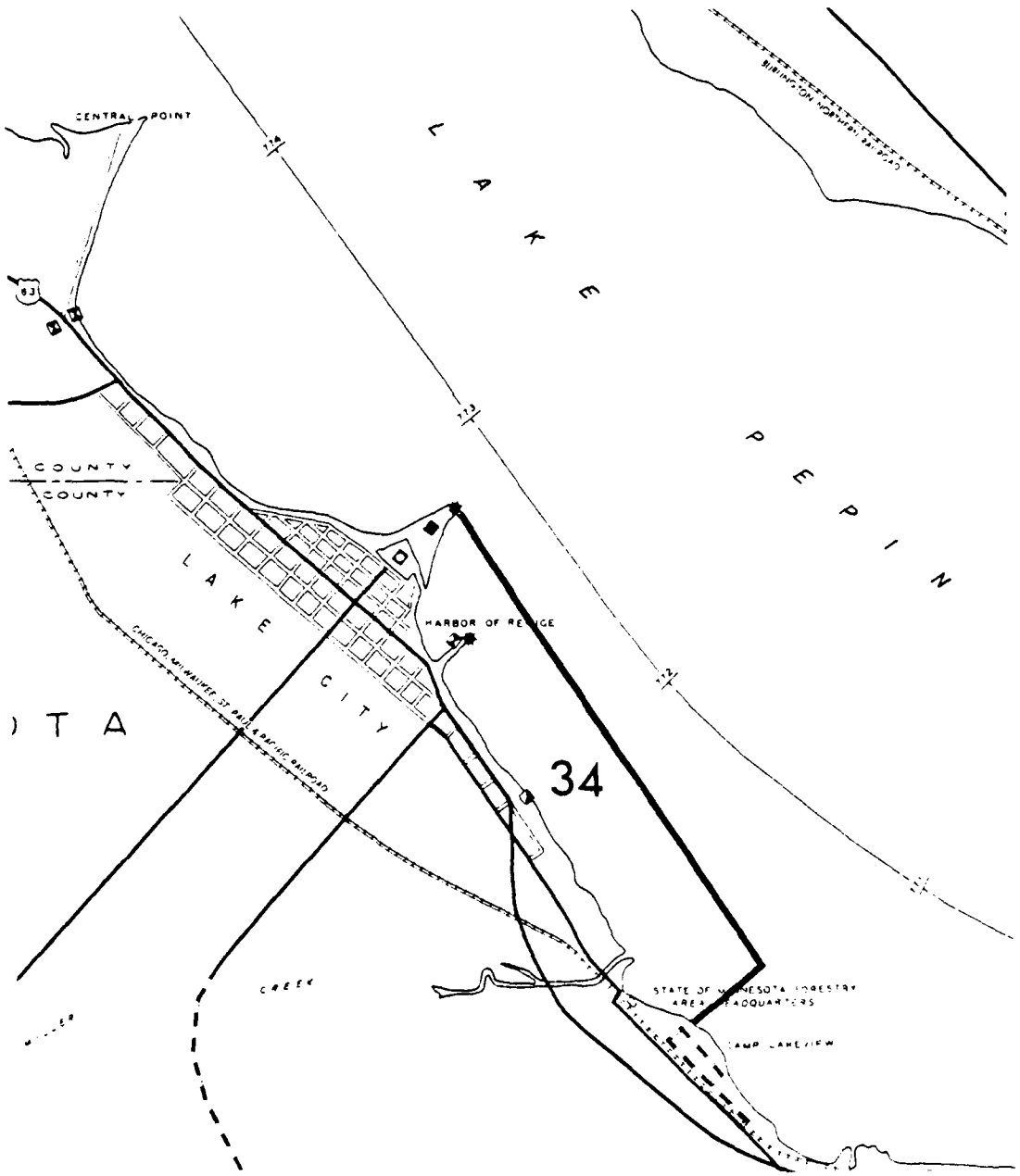


Exhibit 223

34. Lake City Small Boat Harbor



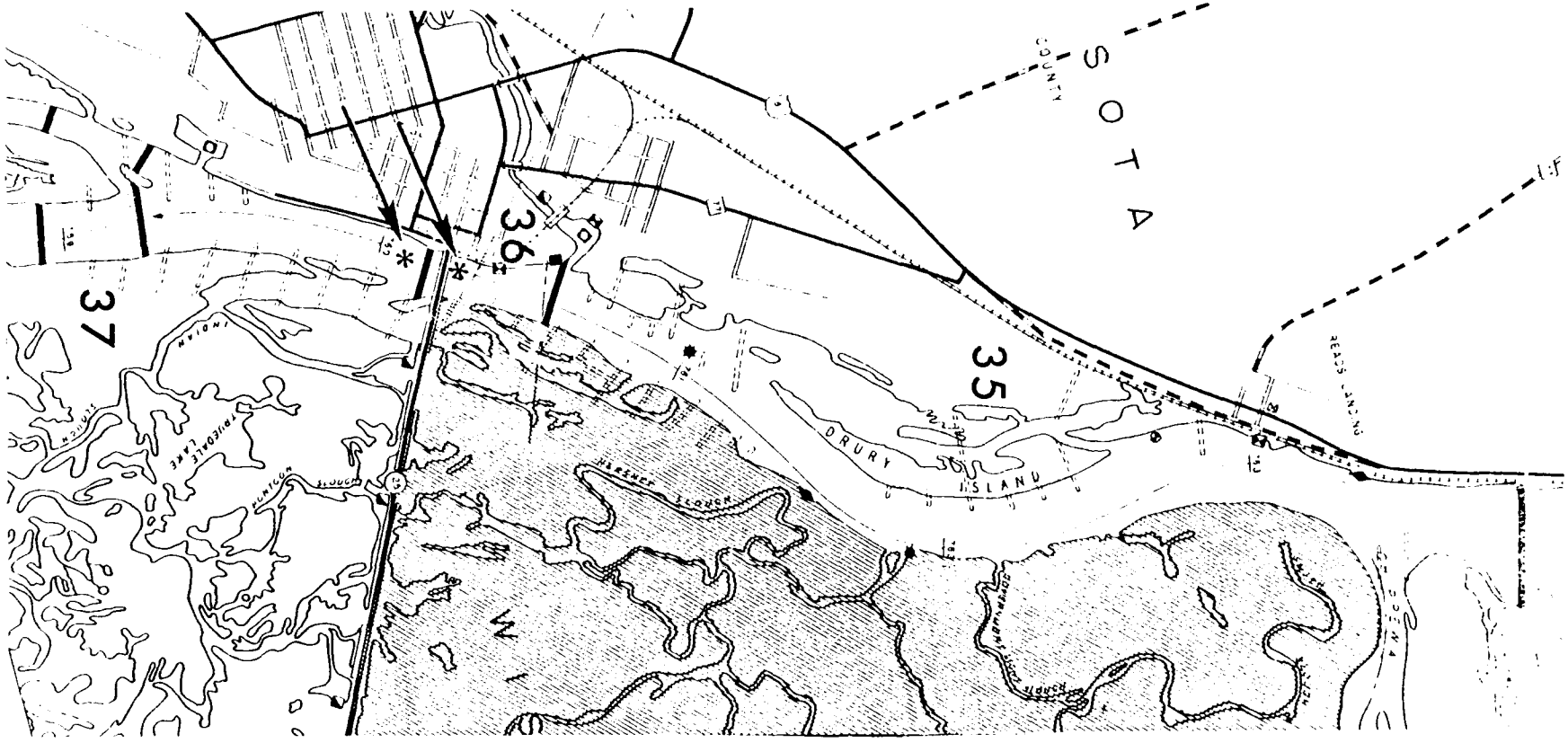


Exhibit 224

35. Reeds Landing
36. Wabasha Small Boat Harbor
37. Crats Island Bank Repair

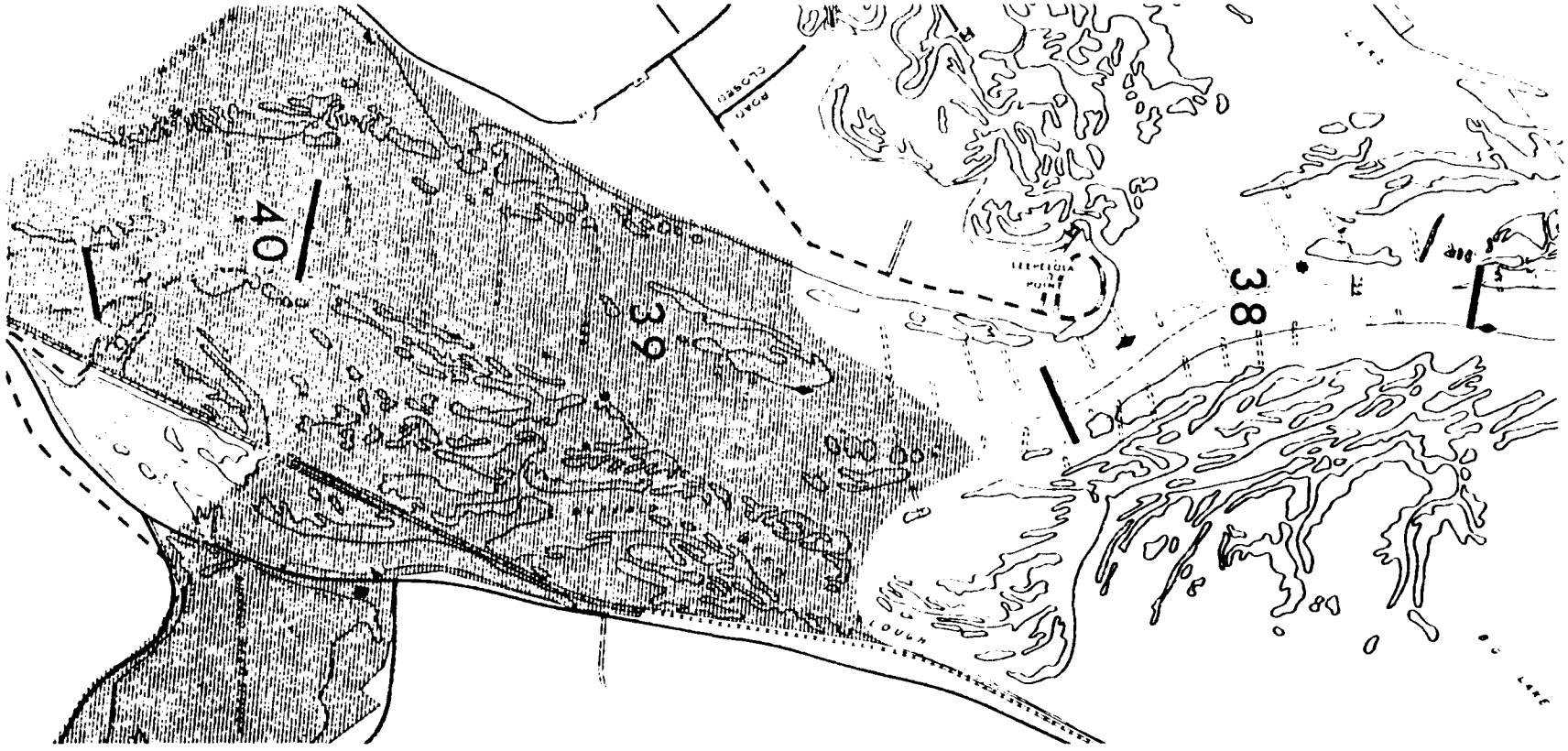


Exhibit 225

38. Teepeecota Point
39. Grand Encampment
40. Beef Slough

Exhibit 226

41. Locks and Dam 4 Lower Approach
42. Mule Bend
43. Head of Island 42 Bank Repair

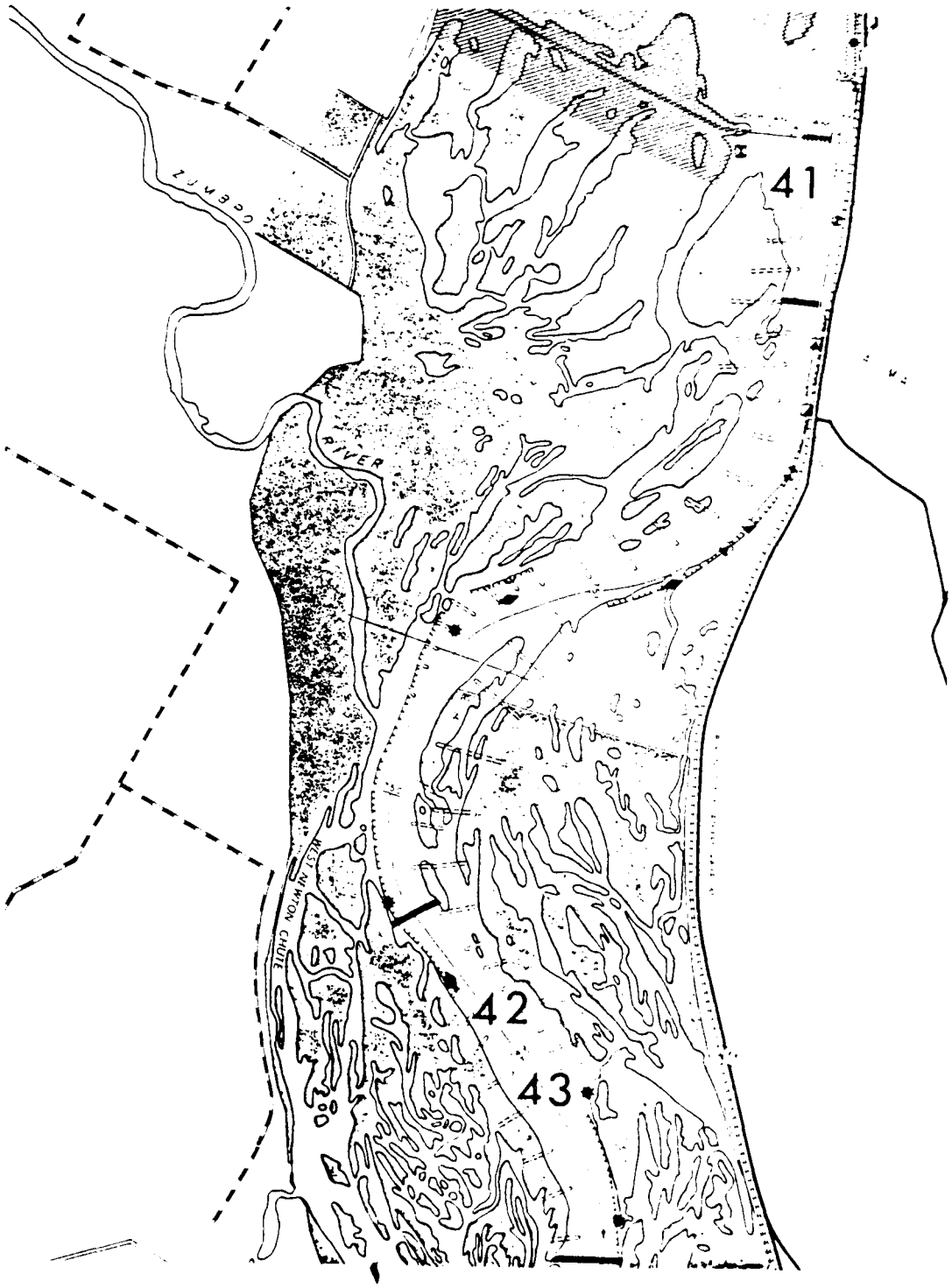
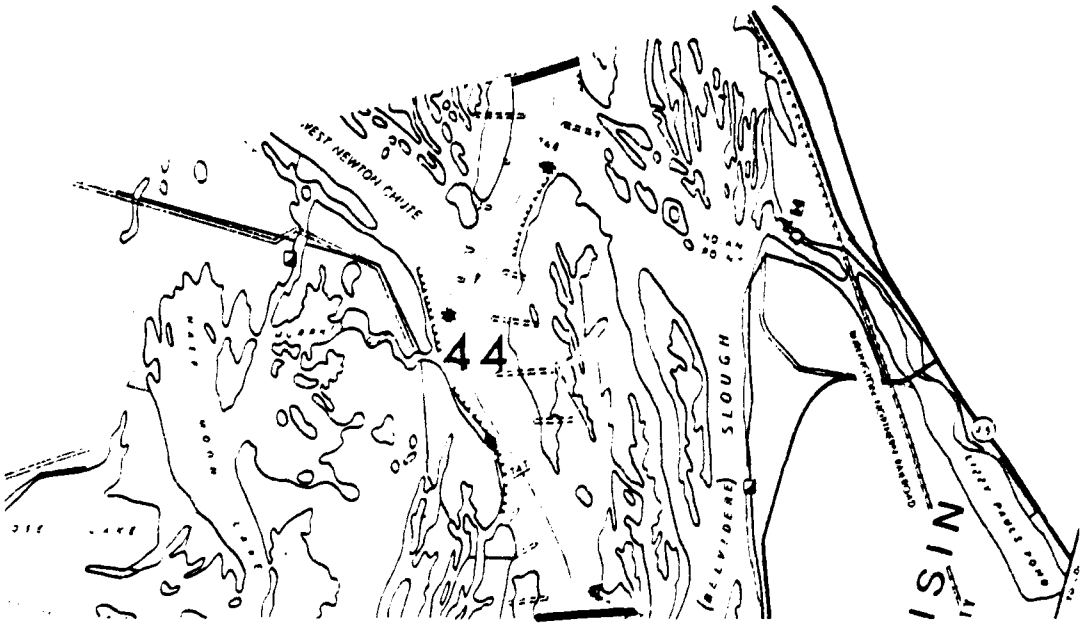


Exhibit 227

44. West Newton



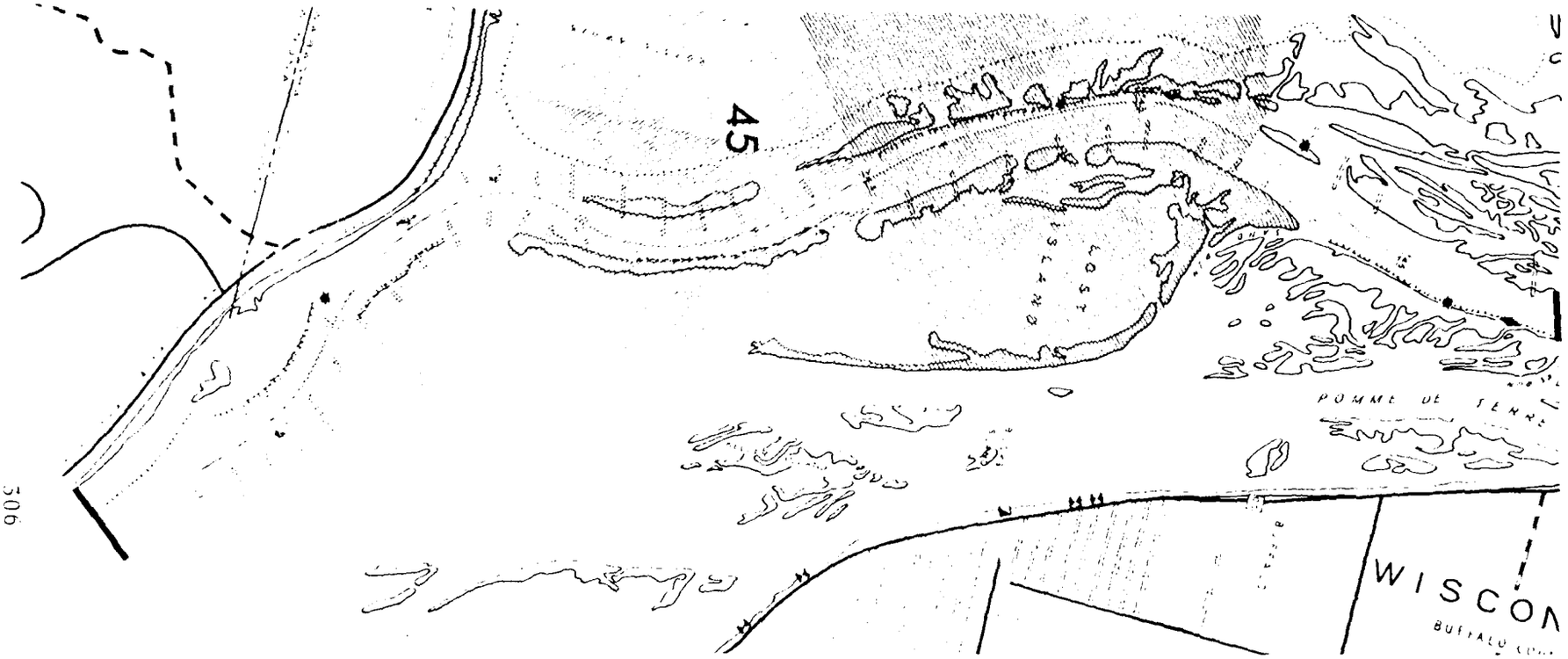
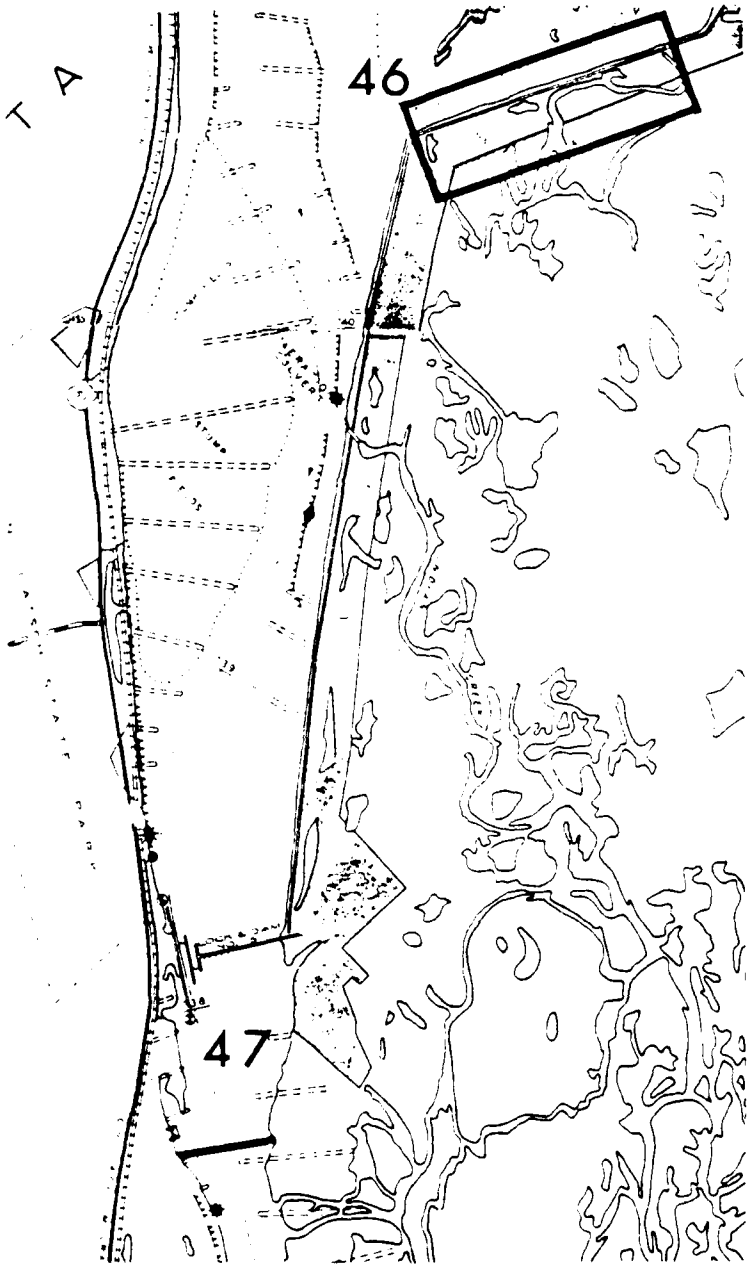


Exhibit 228

45. Weaver Bottoms Complex

Exhibit 229

46. Locks and Dam 5 Culvert Construction
47. Locks and Dam 5 Lower Approach



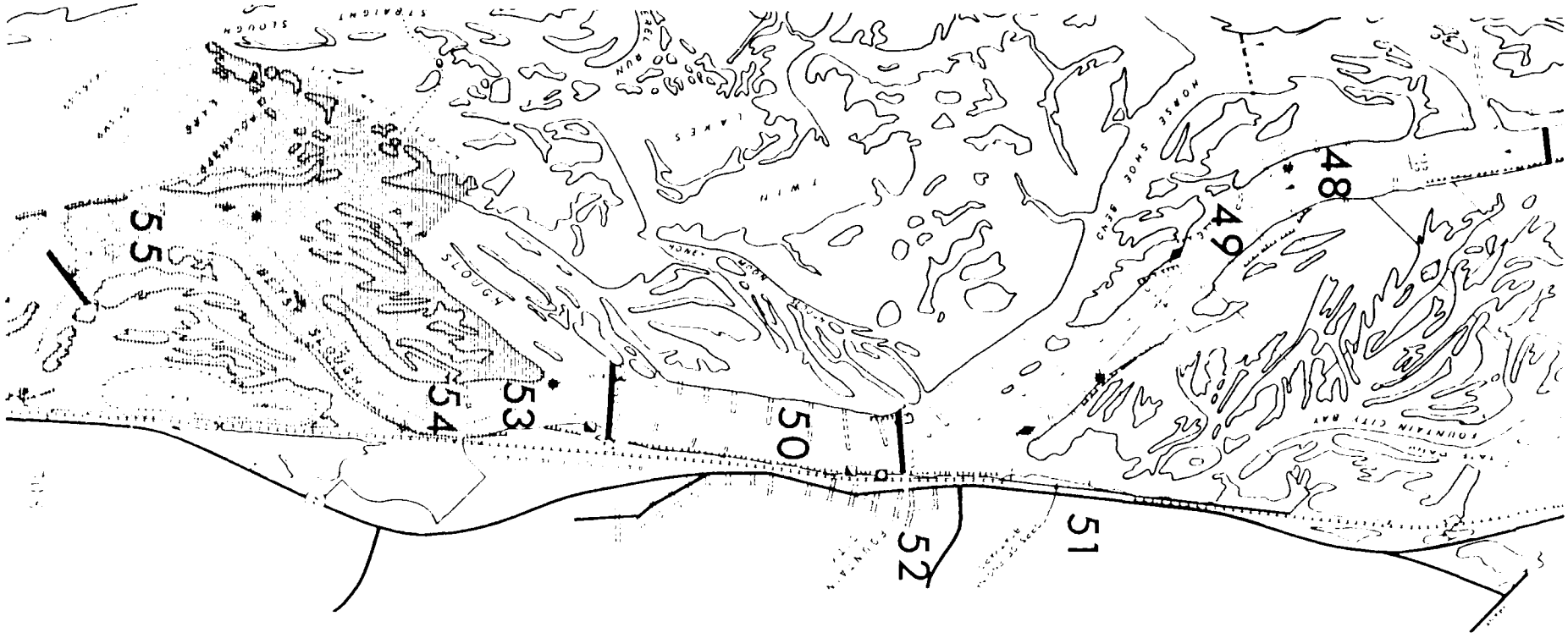


Exhibit 230

48. Island 58
49. Island 58 Bank Repair
50. Fountain City
51. Fountain City Service Base
52. Fountain City Small Boat Harbor
53. Betsy Slough
54. Betsy Slough Bank Repair
55. Wilds Bend

Exhibit 231

56. Locks and Dam 5A Upper Approach
57. Locks and Dam 5A Lower Approach

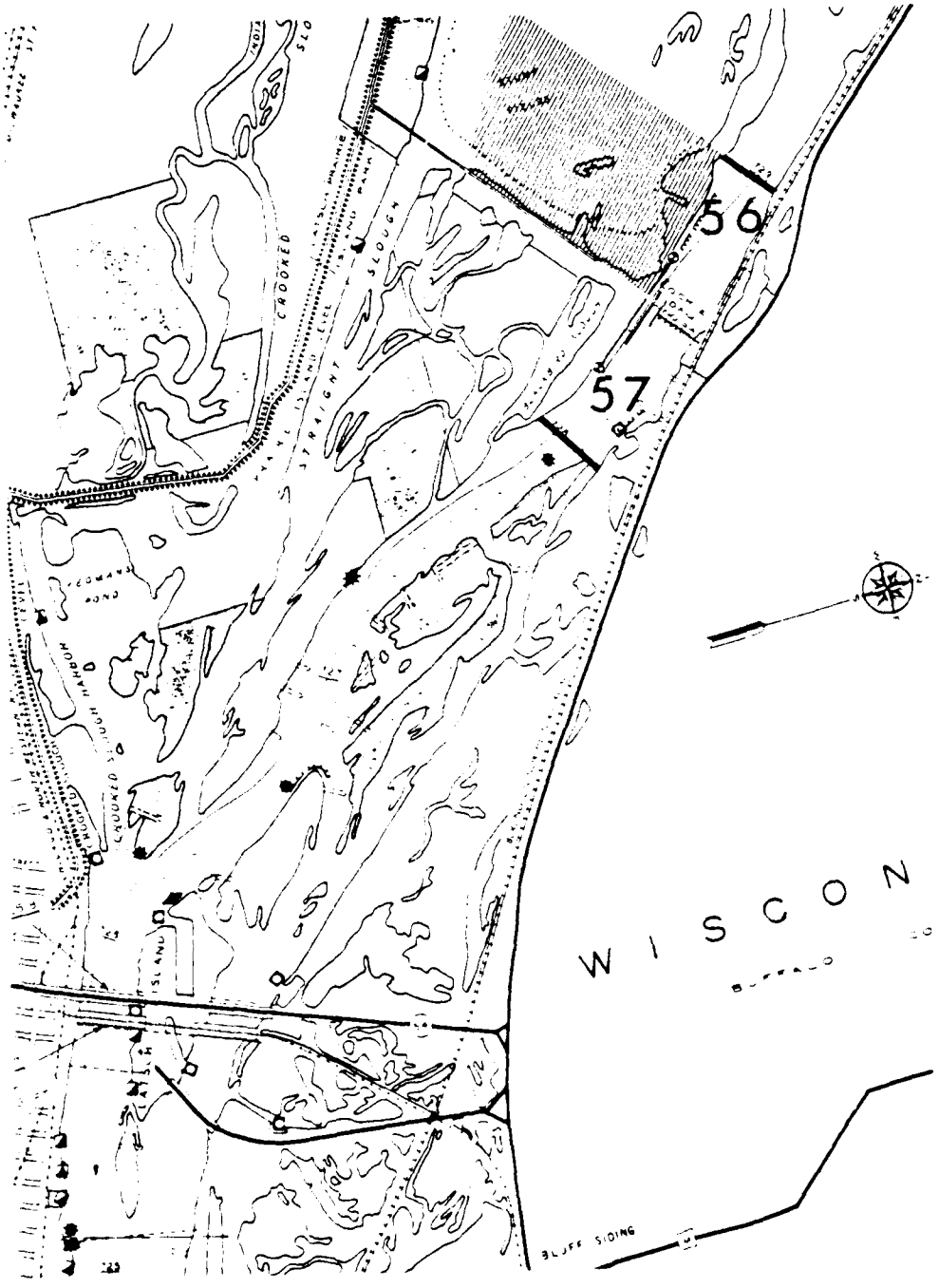


Exhibit 232

58. Winona Commercial Harbor and Small Boat Harbors
59. Winona Lower Railroad Bridge
60. Gravel Point

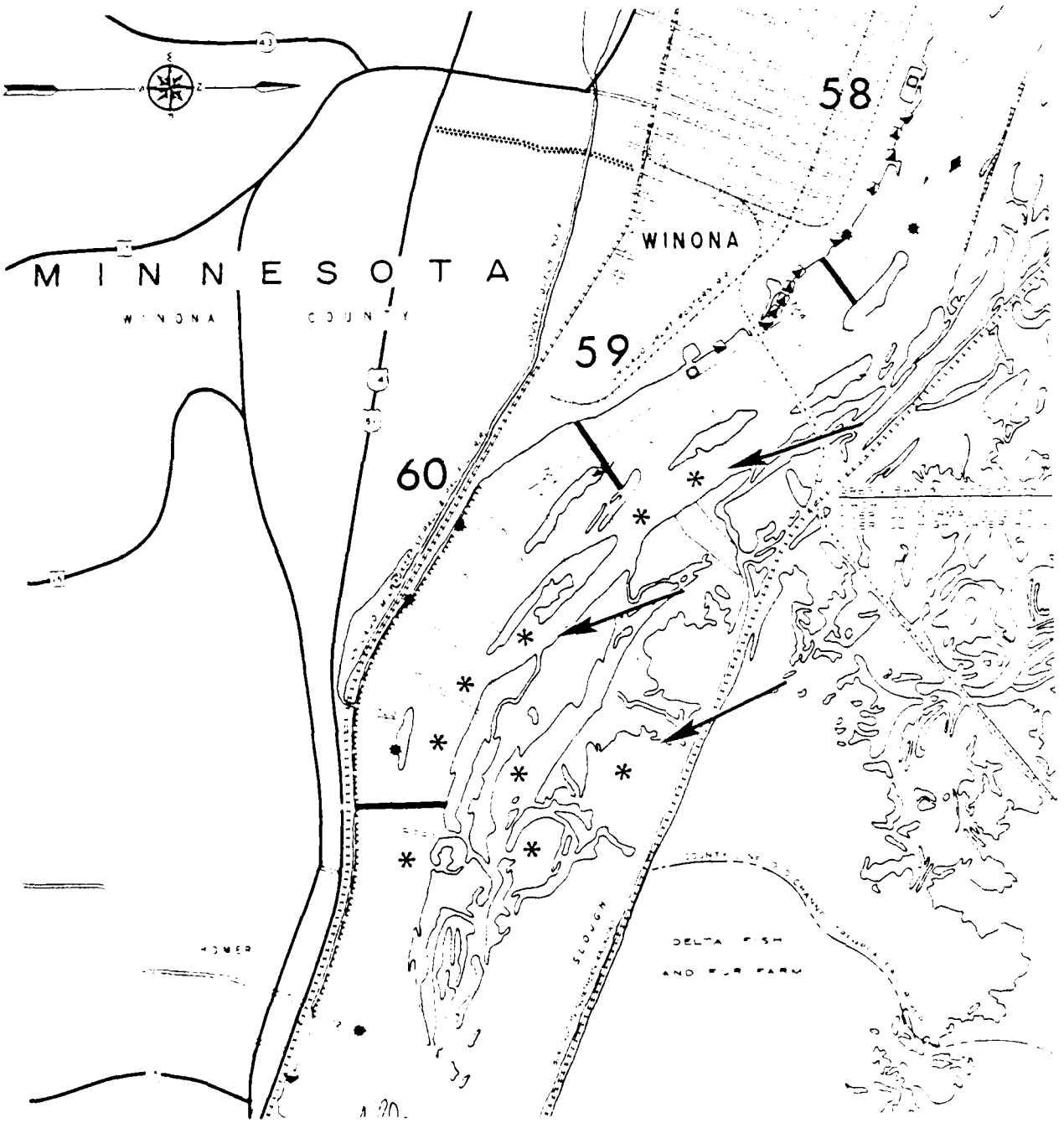


Exhibit 233

61. Locks and Dam 6 Lower Approach
62. Richmond Island
63. Queens Bluff

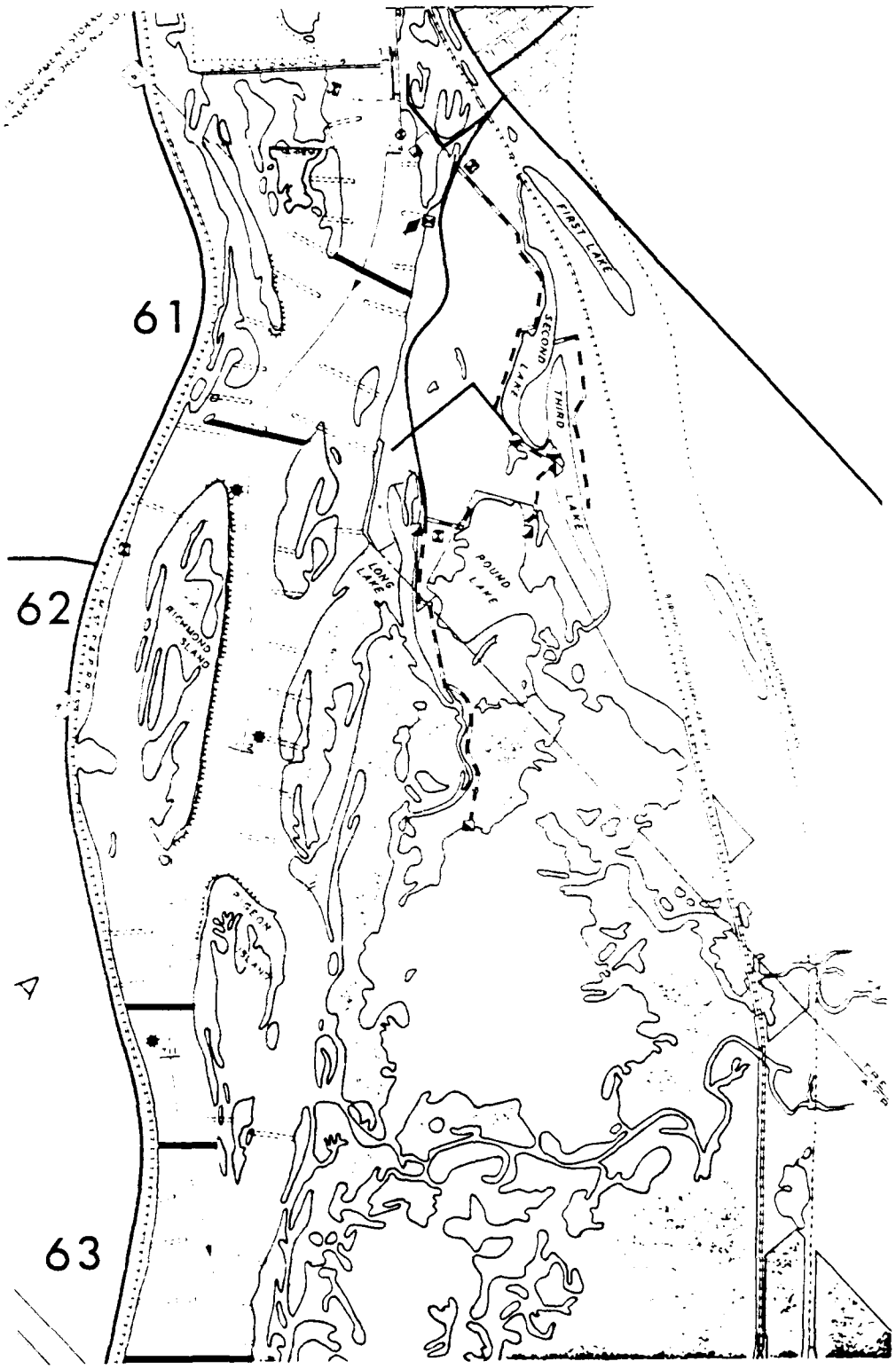


Exhibit 234

64. Locks and Dam 7 Upper Approach

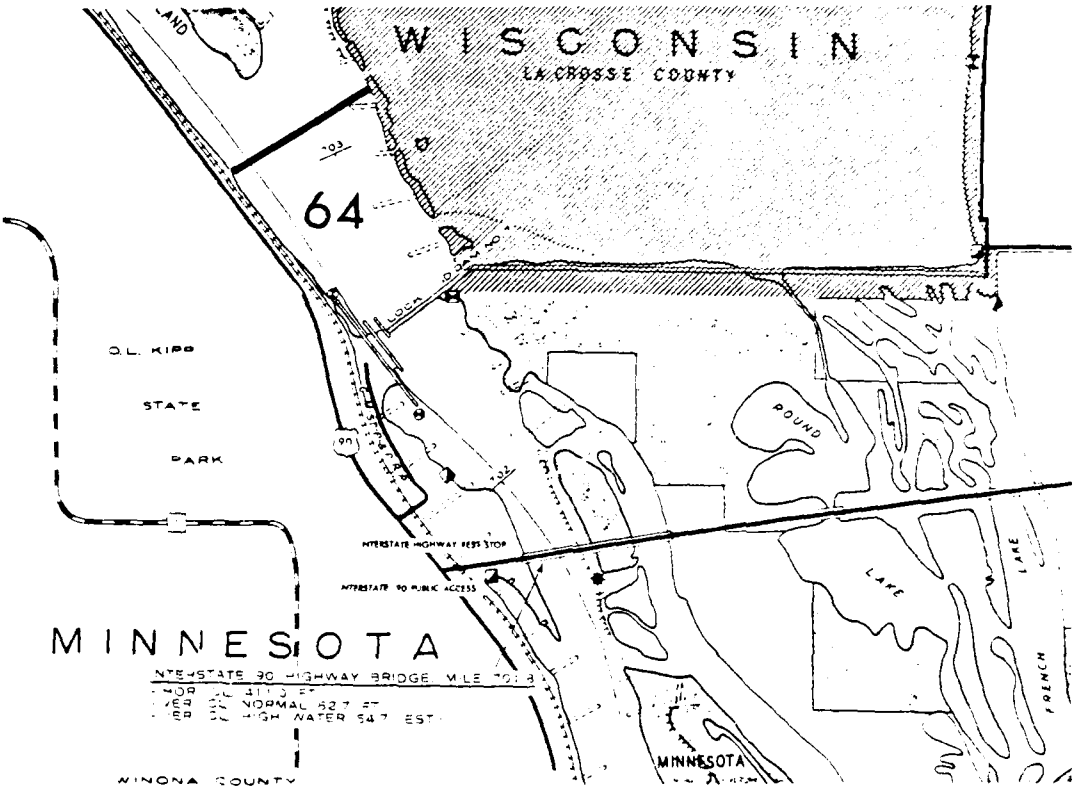


Exhibit 235

65. La Crosse Railroad Bridge

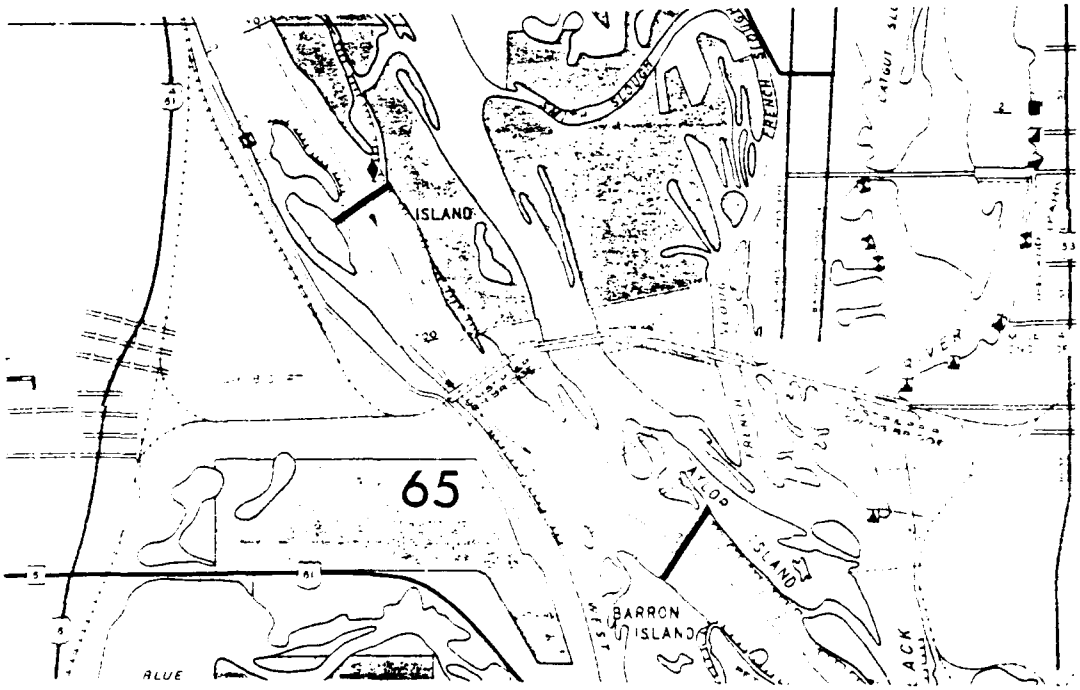


Exhibit 236

66. Hingen Island Bank Repair
67. Sand Slough
68. Sand Slough Bank Repair

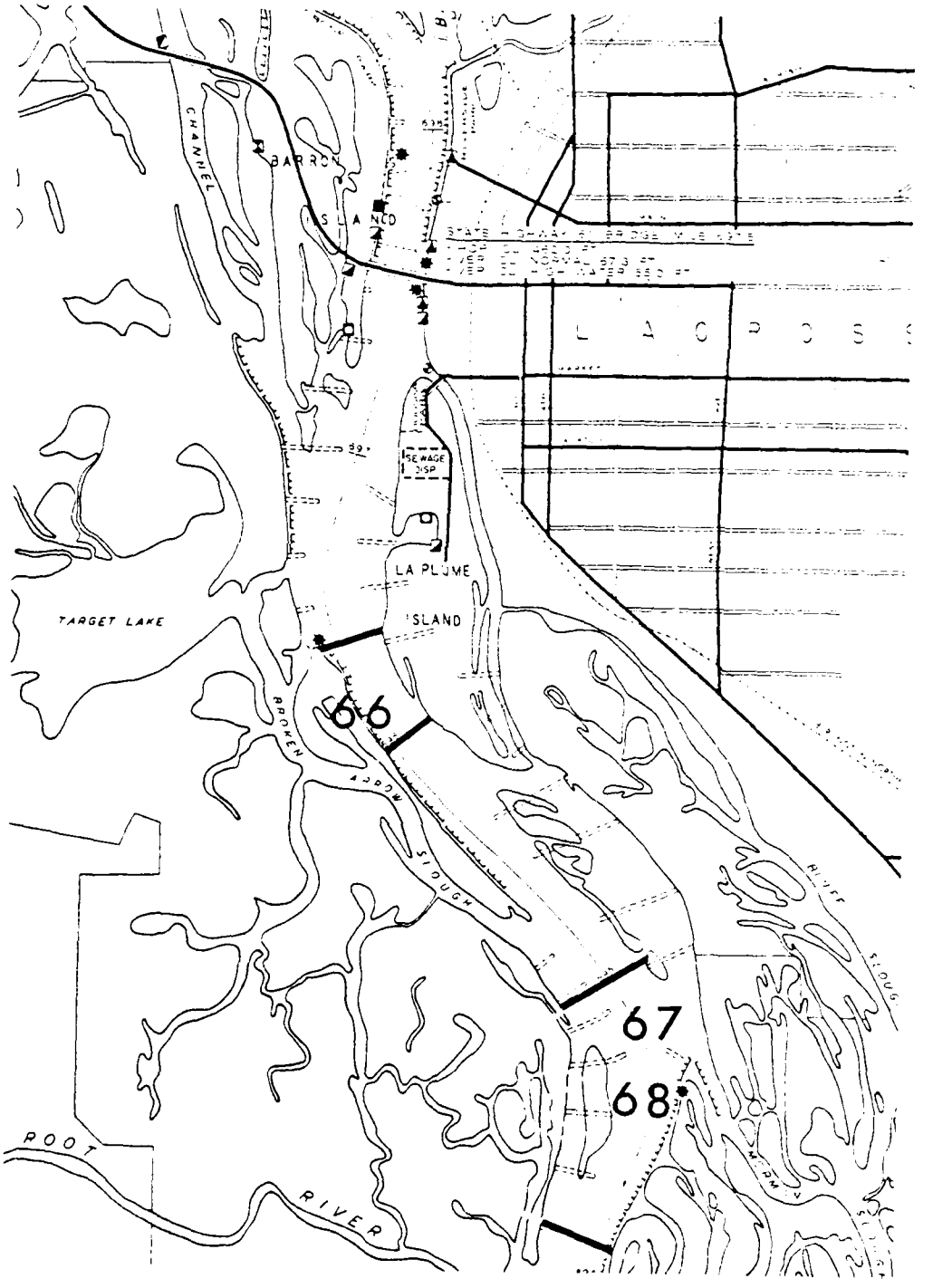


Exhibit 237

69. Root River
70. Picayune Island
71. Above Brownsville

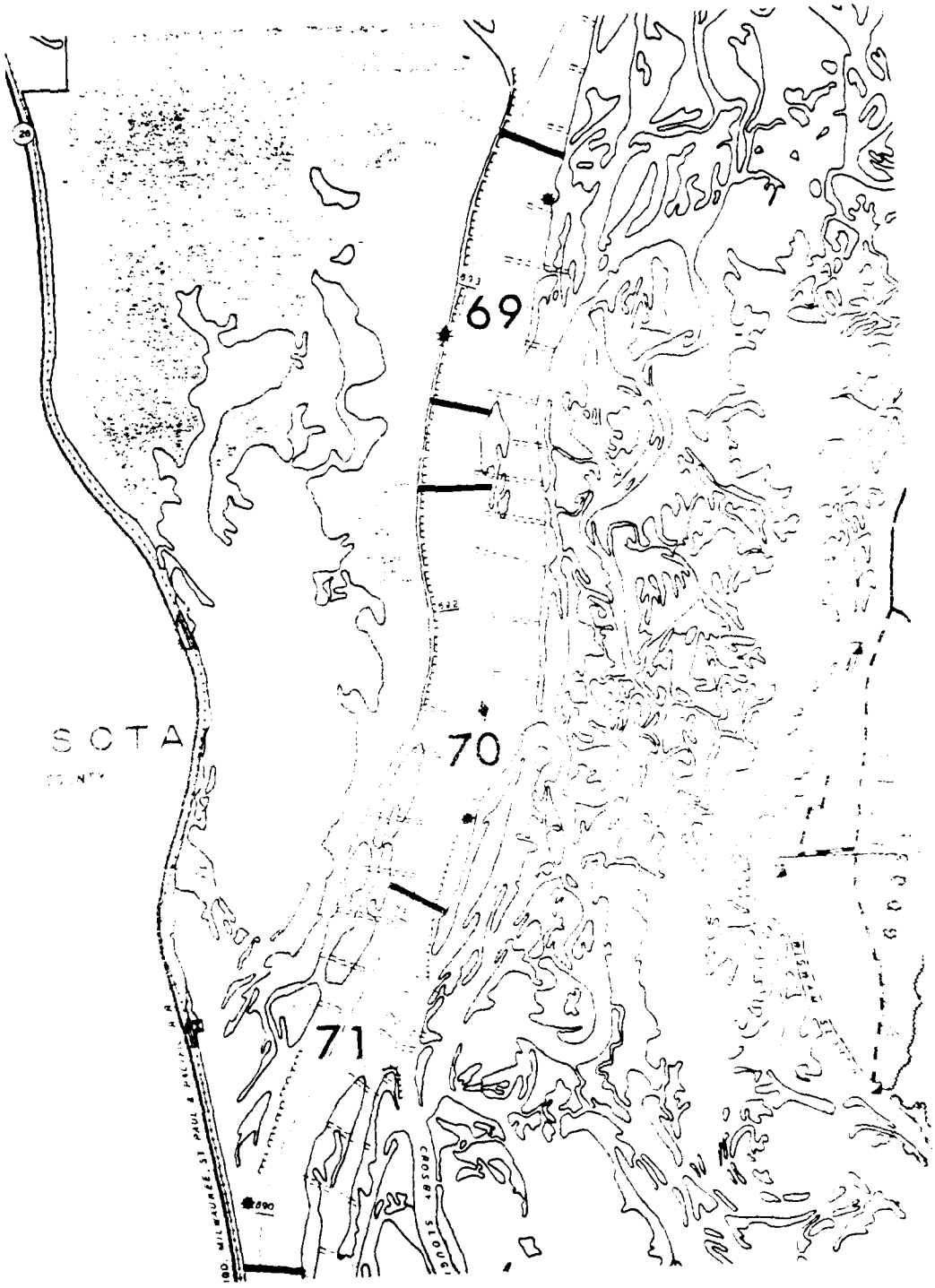


Exhibit 238

72. Brownsville

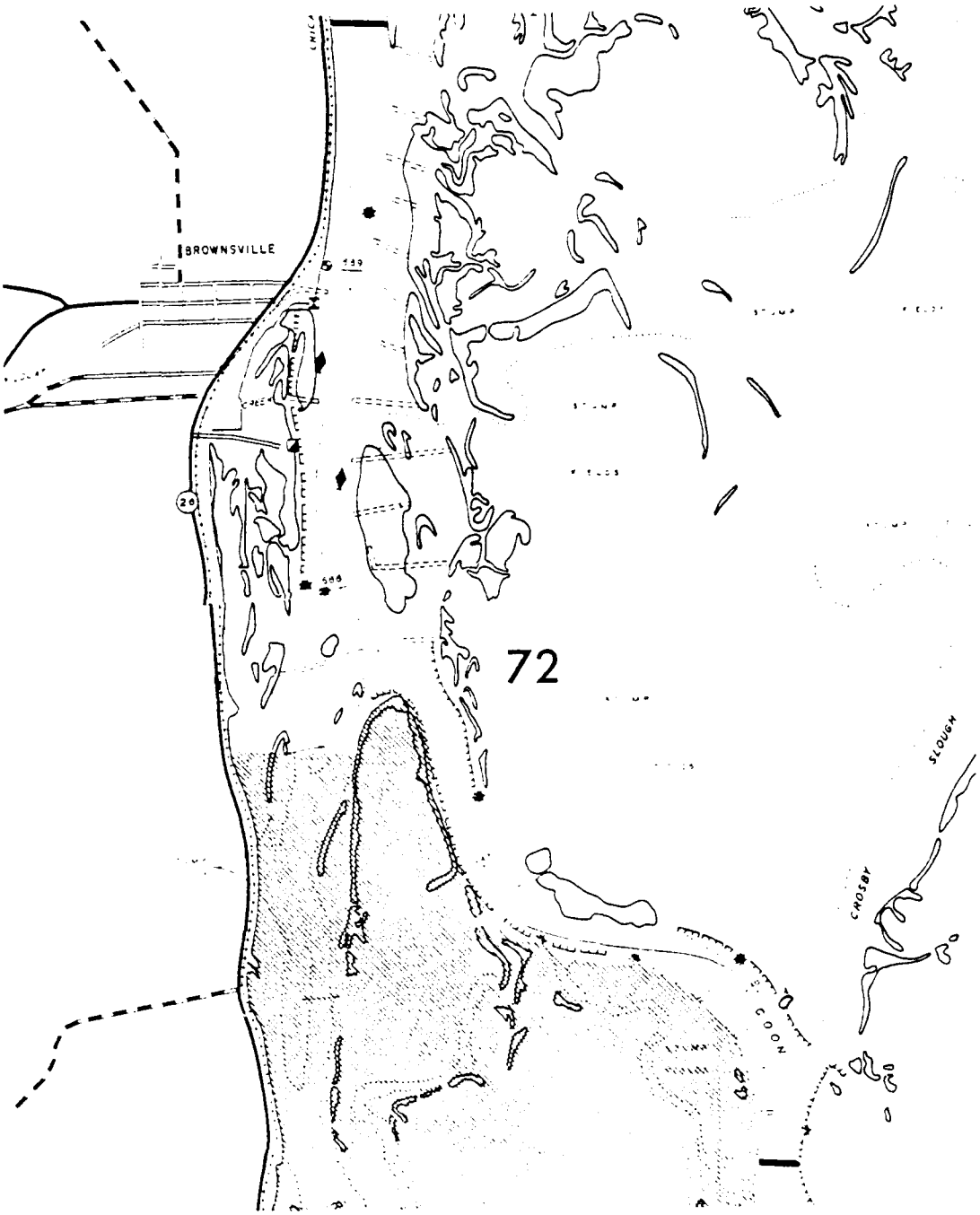


Exhibit 239

73. Crosby Slough
74. Warners Landing

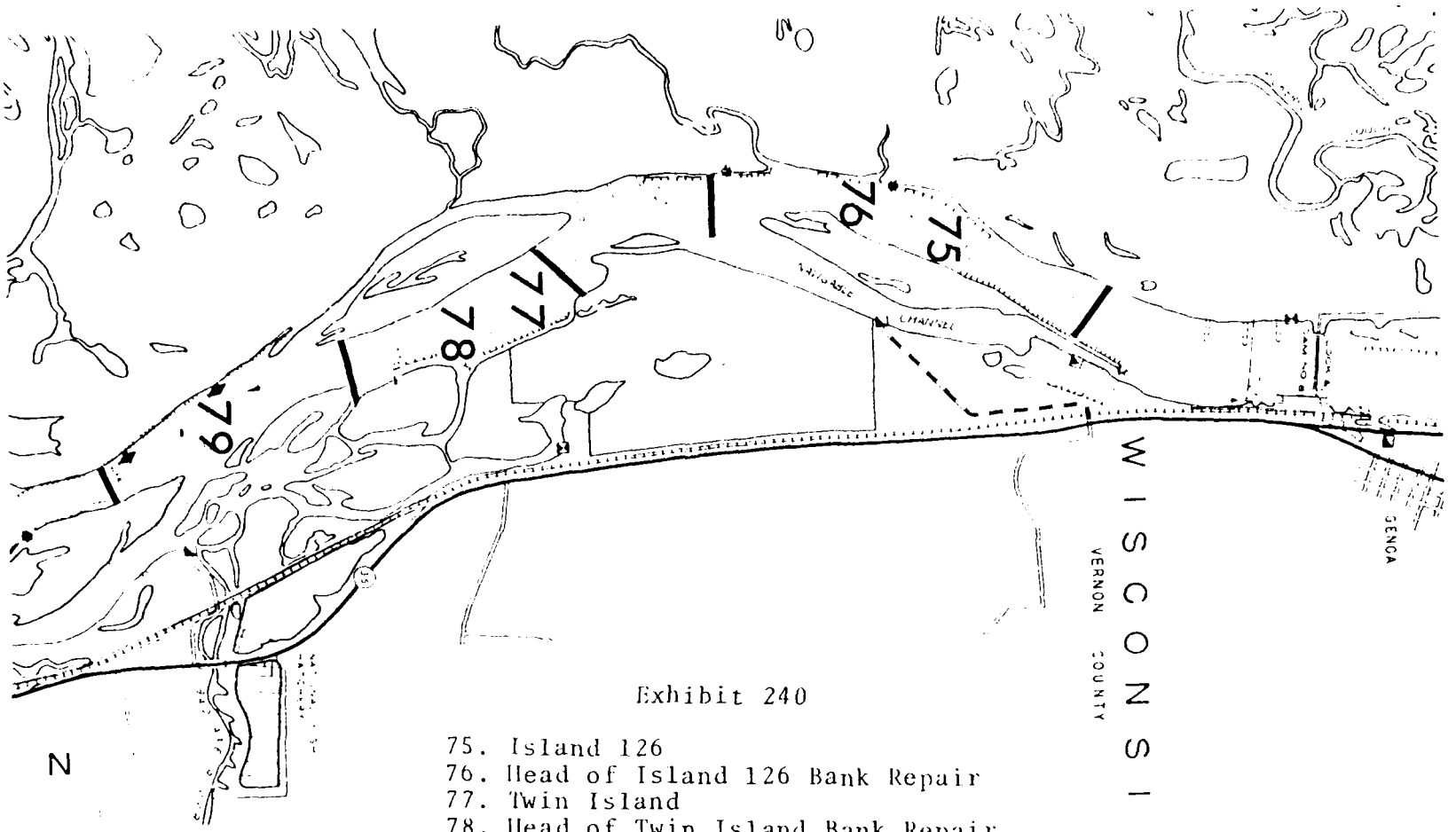


Exhibit 240

75. Island 126
76. Head of Island 126 Bank Repair
77. Twin Island
78. Head of Twin Island Bank Repair
79. Below Twin Island

Exhibit 241

80. Battle Island

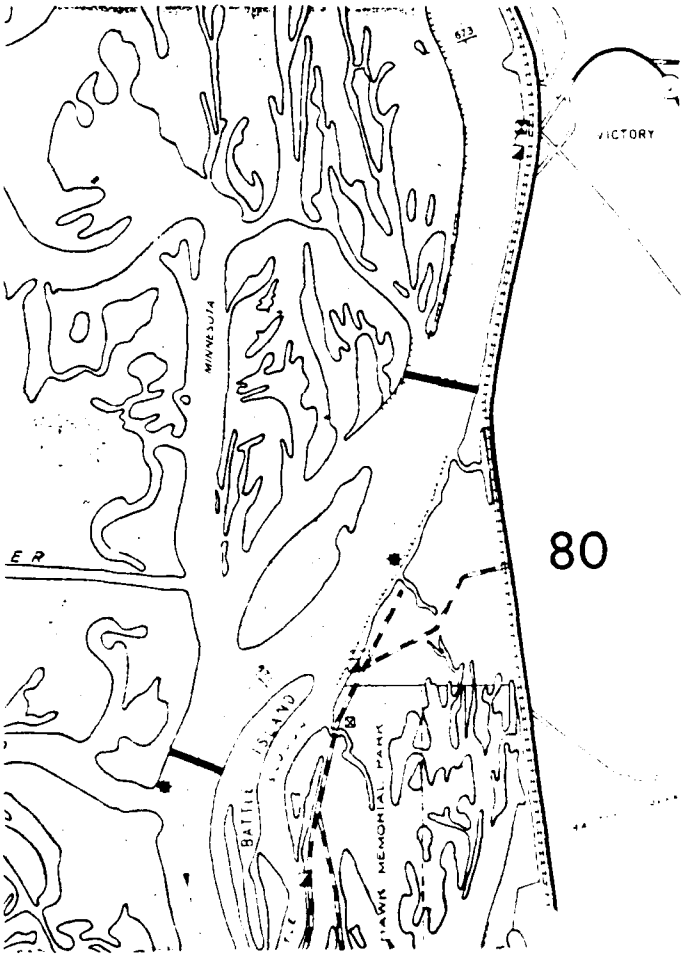
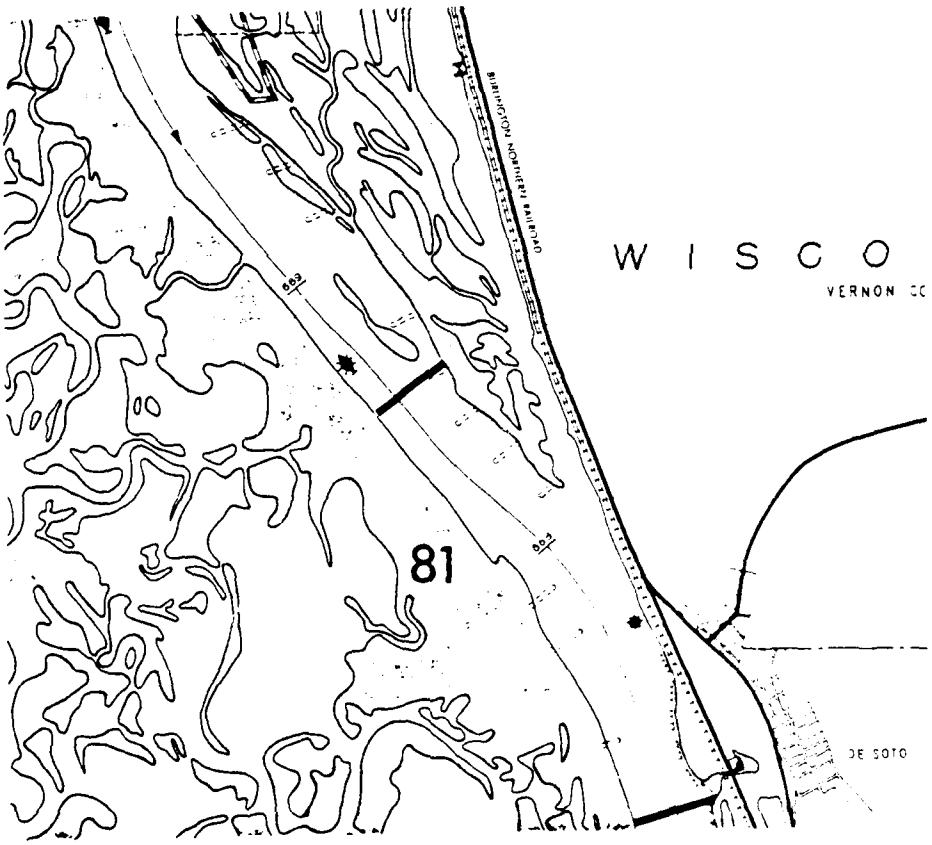


Exhibit 242

18. DeSoto



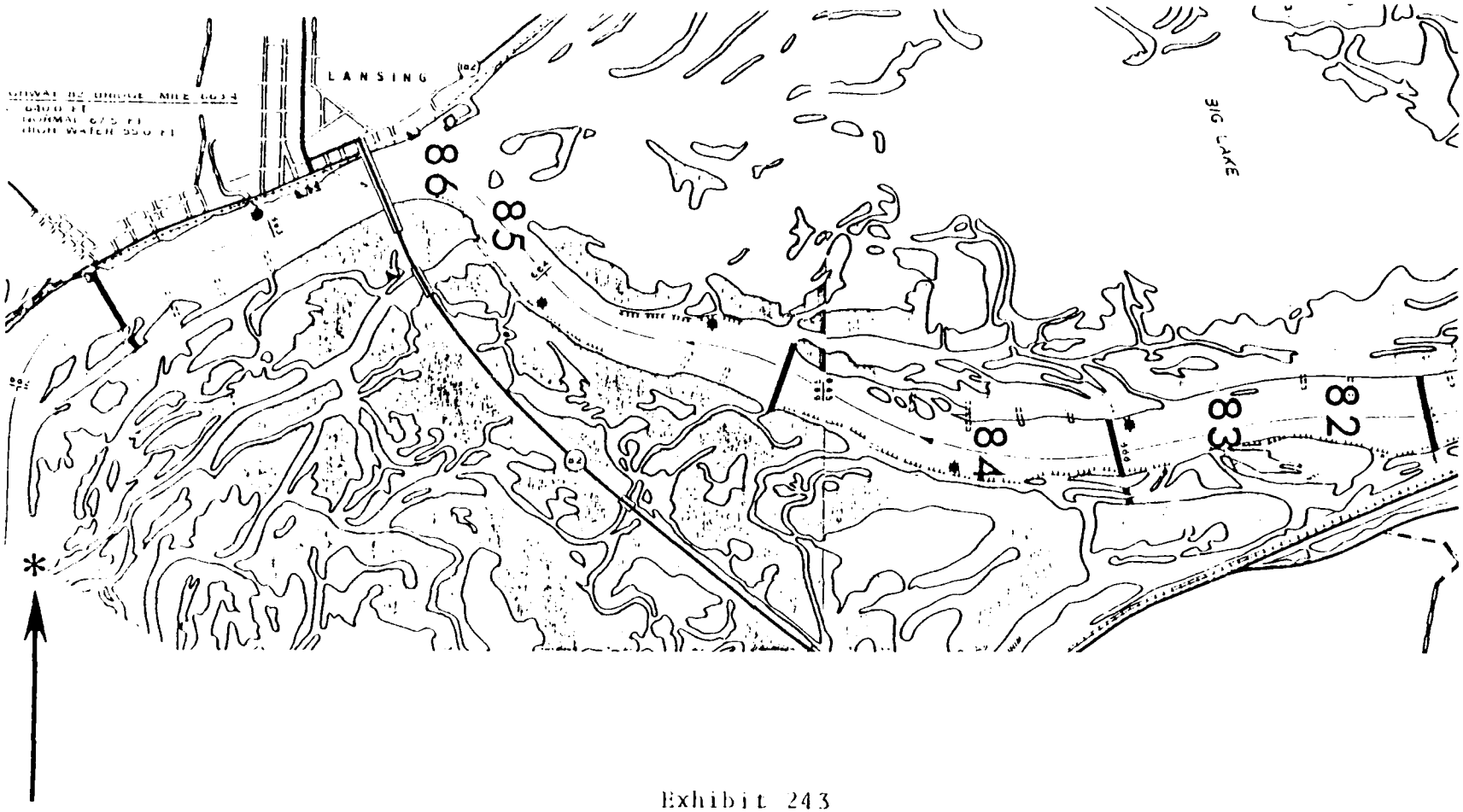


Exhibit 243

82. Above Indian Camp Light
83. Mouth of Hummingbird Slough Bank Repair
84. Indian Camp Light
85. Lansing Upper Light
86. Lansing Small Boat Harbor

Exhibit 244

87. Atchafalaya

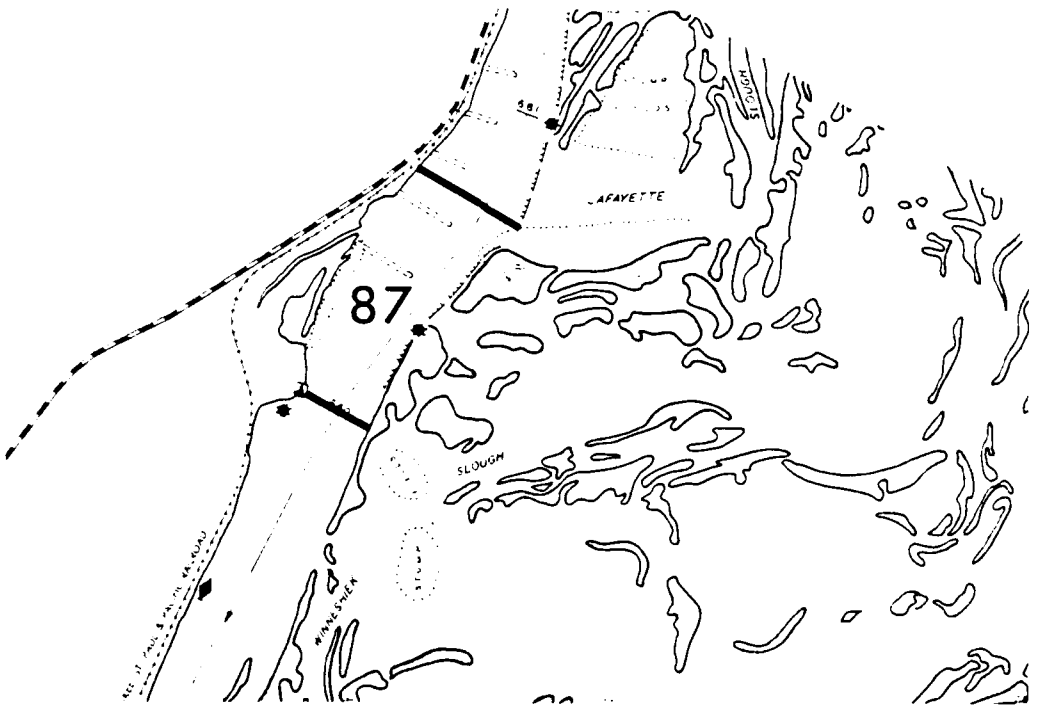
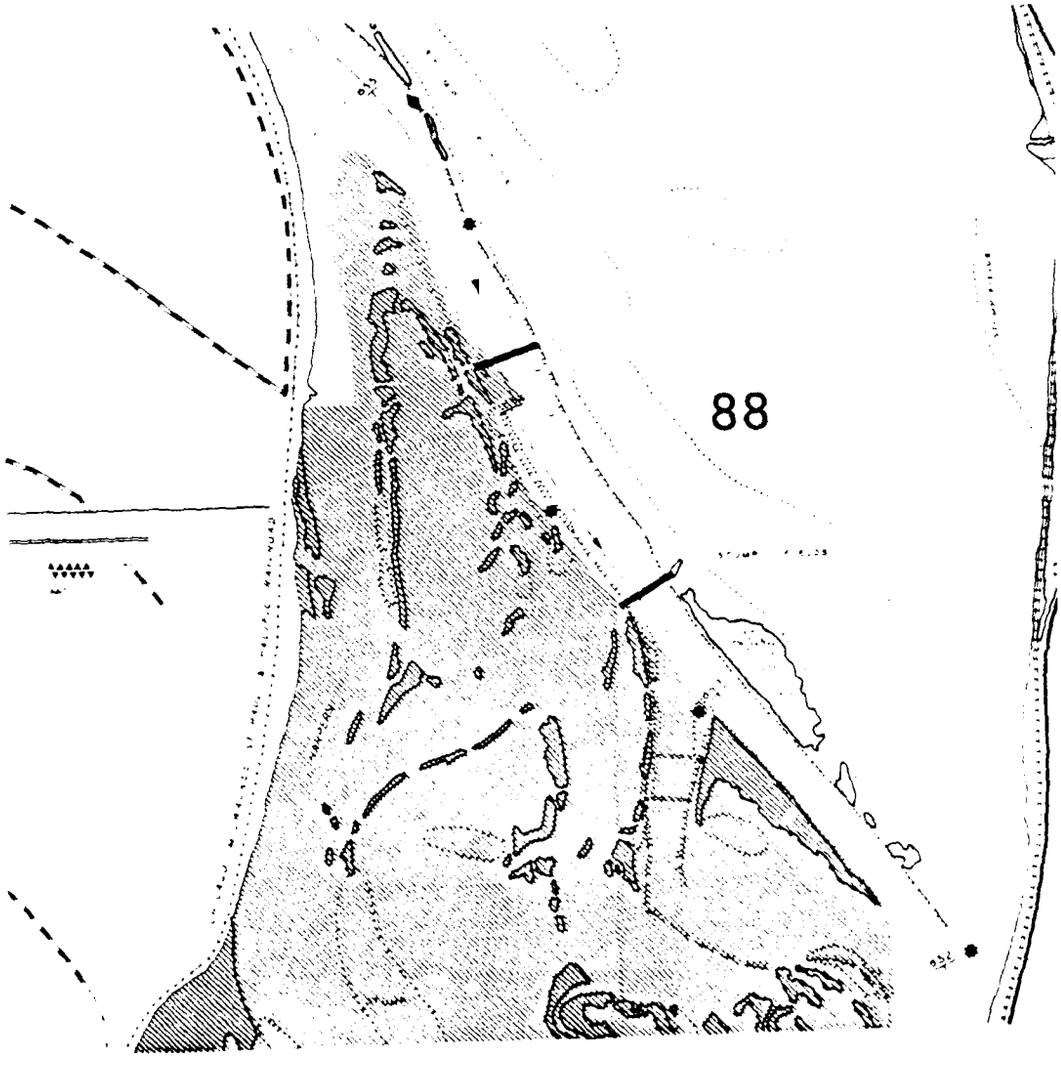


Exhibit 245

88. Crooked Slough



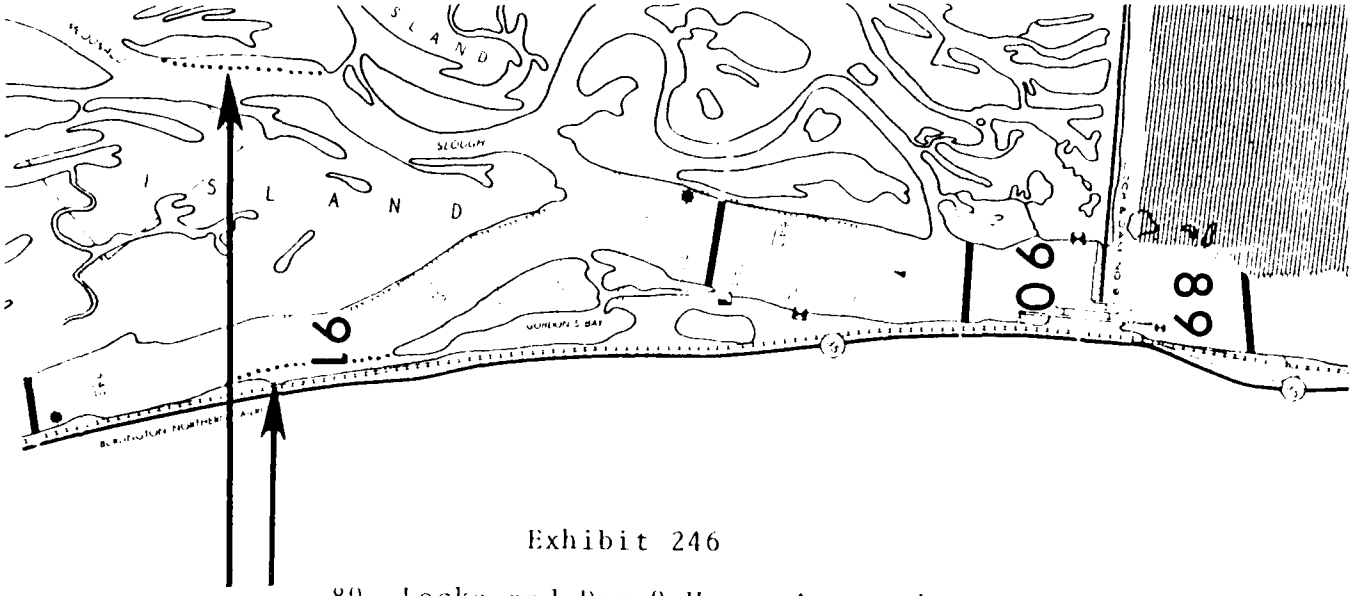


Exhibit 246

89. Locks and Dam 9 Upper Approach
90. Locks and Dam 9 Lower Approach
91. Hay Point Bank Repair

Exhibit 247

92. Jackson Island
93. Mississippi Gardens

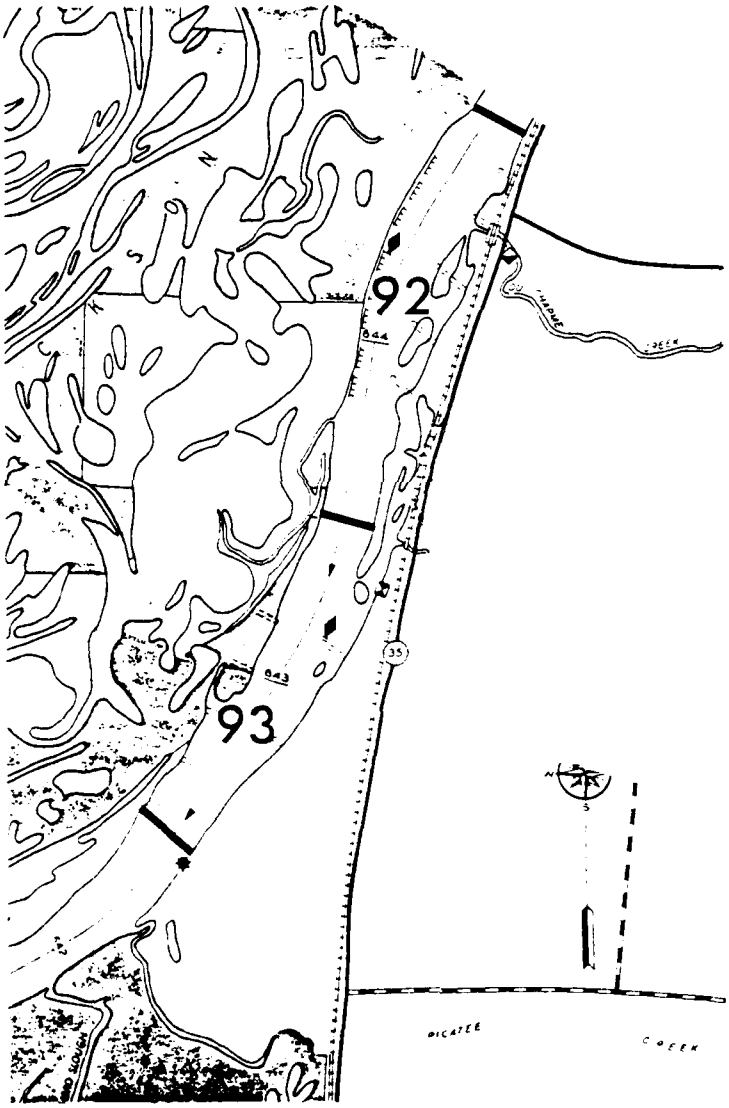


Exhibit 248

94. Prairie du Chien East Channel
95. Prairie du Chien Commercial and Small Boat Harbors
96. McGregor

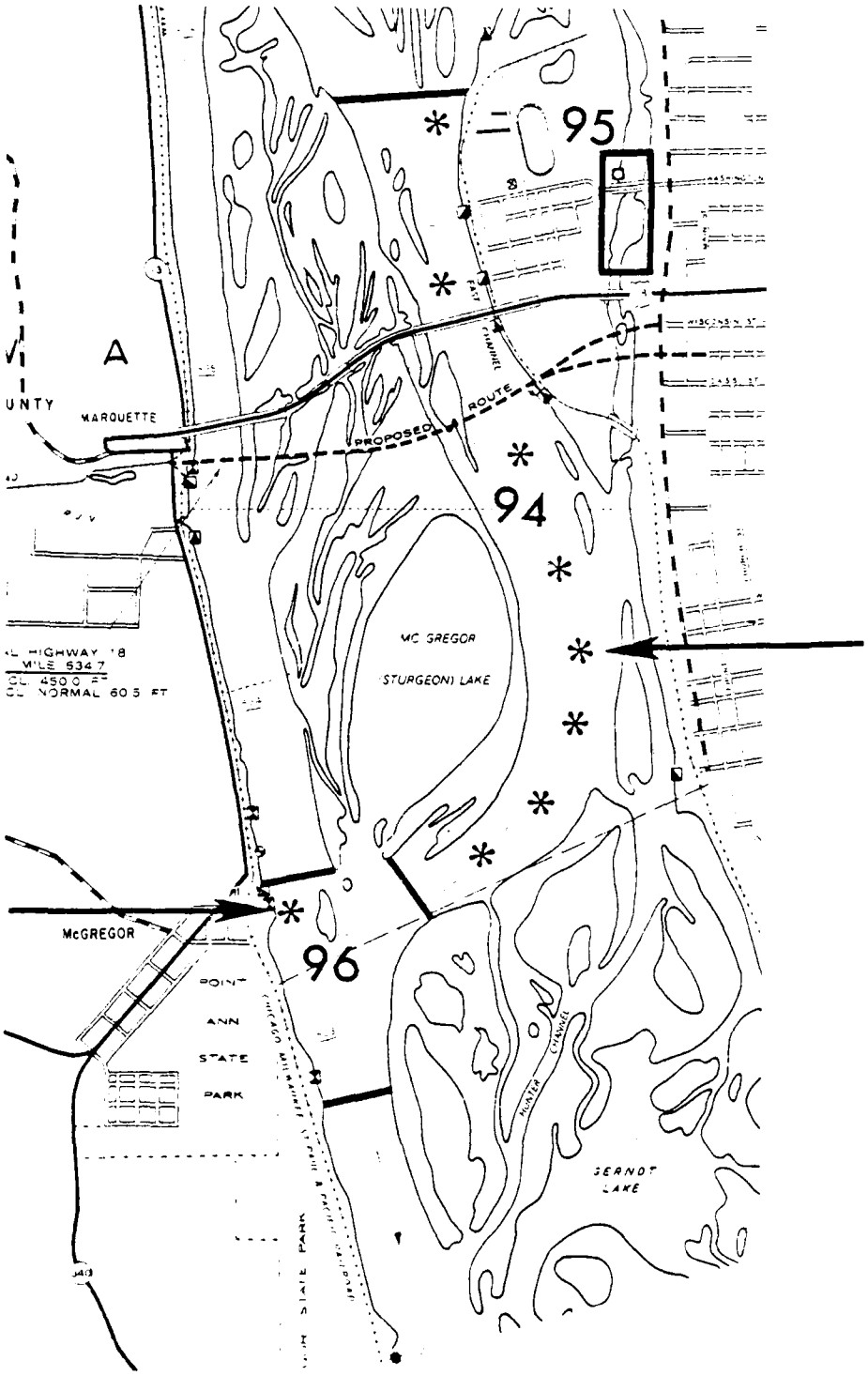


Exhibit 249

97. Wyalusing Bend Light
98. Wyalusing

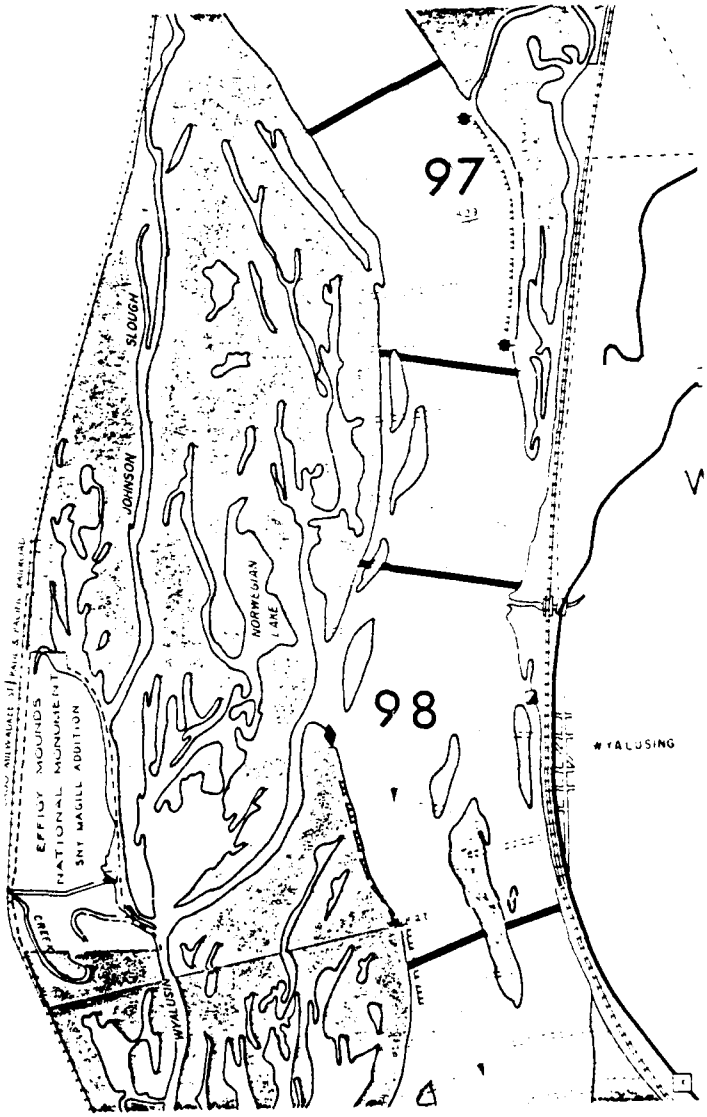


Exhibit 250

99. McMillan Island

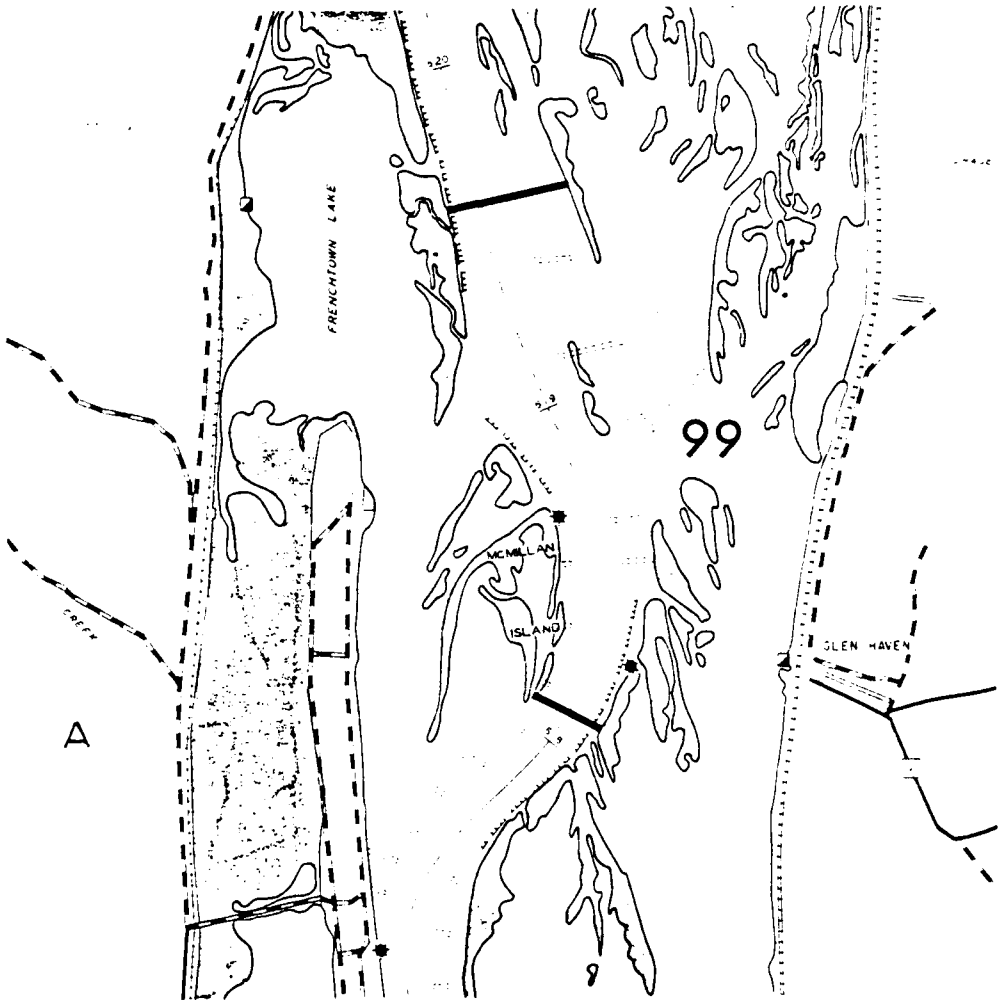
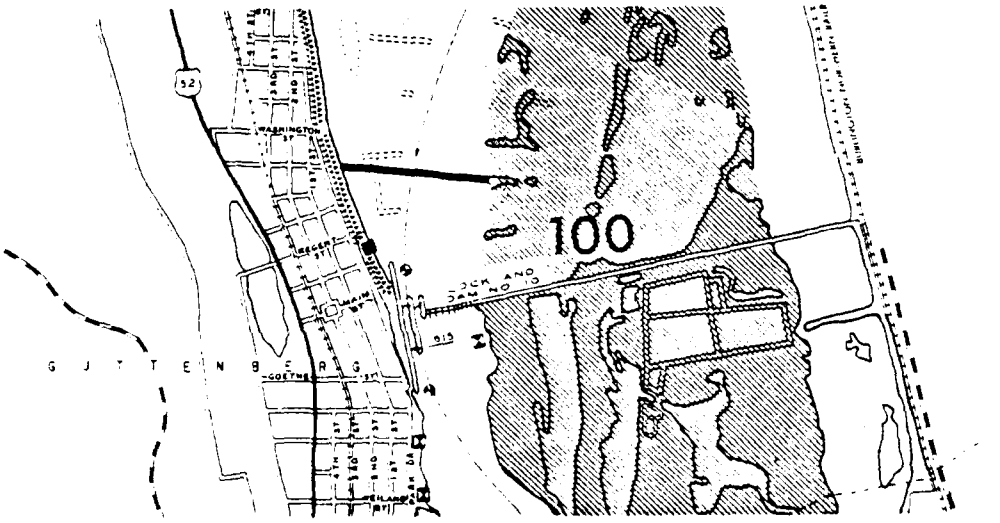


Exhibit 251

100. Locks and Dam 10 Upper Approach



Appendix E

Illustrated Key to Taxonomic Identification
of Upper Mississippi River Recent Species-Group
Mussel Taxa
(Exhibits 252-299)

Purpose of the Key

The following key to Recent Upper Mississippi River mussels is designed to facilitate identification of legally protected and other rare mussel taxa without killing the specimen. These rare taxa appear in early couplets to permit an investigator more rapidly to establish whether he or she has encountered such a species.

Identifying mussels is difficult because they have few characters and character-states in comparison to many other macroscopic organisms, such as arthropods (insects, crustaceans, etc.). It is even more difficult to identify *living* mussels, because dentition and many soft-tissue features normally are hidden by the valves. As perhaps originally advanced by Fuller (1971), however, freshwater mussels usually can be identified alive if the investigator is thoroughly familiar with the fauna under study, including aspects of the species' soft tissues. If a living mussel is left undisturbed in a vessel of habitat water, its valves eventually will open, and the mantle apertures, post-basal mantle margin, and marsupium can be observed. The following key depends chiefly upon these features and the outer surface of the adult shell. However, some specimens are hard to identify under any circumstances: examples include deformed animals and the males of certain taxa. Consequently, the key is extensively illustrated. Most identifications can be made simply by examining the figures. Especially because UMR mussels are a small fauna of macroscopic animals, the investigator can (and should) soon be able to recognize all 50 species-group taxa on sight.

No key can serve all conceivable goals equally well. By concentrating on identification of living organisms, this key, for example, is less useful in identifying empty shells. Once again, however, the illustrations alone probably will permit accurate (though perhaps not rapid) identification. Also, much strictly conchological information occurs in the key. Thus the key will be of some service to the beachcomber and the ethno-malacologist, as well as the neontologist.

This key is essentially artificial, i.e., it is a pragmatic tool of identification and thus stresses morphological similarities rather than natural relationships among taxa. Taxa do not "key out" in phylogenetic order. The illustrations, however, are in the phylogenetic order of Appendix A, Exhibit 1a.

Mussel Biology Required For Use of the Key

A mussel can be "relaxed" in two senses: either it has been stupefied prior to fixation of its soft tissues, or it is relaxing

(in the usual sense) underwater in nature or in a laboratory setting better suited to observation. In any event, the observer whose goal is taxonomic identification must concentrate on three regions of the mussel's soft tissues (as opposed to the shell, which, also, is considered below). These three are the gills, the postbasal mantle margin, and the mantle apertures. These soft-tissue regions and their features, plus characteristics of the shell, are illustrated in the accompanying semi-diagrammatic drawings. Taxon-specific identification features are shown in the exhibits that follow the taxonomic key.

Like most bivalve mollusks, a freshwater mussel has two gills, one hanging in the mantle cavity on each side of the body. The gills have important functions in mussel nutrition, respiration, and reproduction; gill structure involved in reproduction is important in taxonomy. Each gill is divided into two apposing, unequal leaves, the inner and outer demibranchs. The marsupium is that portion of the gills that incubates the mussel larvae (glochidia). The morphology of the marsupium can be very important in taxonomy.

The Unionidae of the UMR exhibit several types of marsupia. In the tetragenous condition the marsupium occupies the entirety of both gills (i.e., all four demibranchs). The homogenous type of marsupium occupies the entirety of the outer demibranchs only. The heterogenous marsupium is more or less restricted to the postbasal portions of the outer demibranchs. In the mesogenous condition the marsupium consists of sacs extending below the middle of the ventral margin in the outer demibranchs. The diagenous marsupium is, in effect, a variant of the homogenous type in which the oval (egg) and larval (glochidial) masses lie perpendicular to the apposing walls of the outer demibranchs. There are other types of unionid marsupia, but they are not found in the UMR fauna.

Otherwise similar mussels from the UMR often can be separated by using marsupial types as discriminants. This tool is powerful when it can be used. However, it is often impossible readily to discern marsupial type unless the mussel is gravid (i.e., "charged" with eggs (i.e., ovigerous) or glochidia (i.e., larvigerous)), and gravidity ordinarily is a seasonal phenomenon that varies according to the taxa in question. In any event, the distribution of marsupial types among UMR naiad taxa follows as an aid in identification.

Marsupium Type	Taxa
tetragenous	Margaritiferinae
tetragenous	Ambleminae: Amblemini (except *Cyclonaias*), plus *Fusconaia*

Marsupium Type	Taxa
homogenous	Ambleminae: Elliptionini (except *Fusconaia*), plus *Cyclonaias*
mesogenous	Ambleminae: Lampsilini: *Obliquaria*
heterogenous	Ambleminae: Lampsilini (except *Obliquaria*)
homogenous	Anodontinae (except *Strophitus*)
diagenous	Anodontinae: *Strophitus*

This table shows unequivocal relationships between and among mussel taxa and marsupial character-states. The relationships are clearcut and thus very useful in theory, but they are hard to use in practice because the investigator's specimen(s) may or may not be gravid and because gravidity can be hard to detect, especially by the naked eye and in the case of the homogenous marsupium.

Features of the postbasal mantle margin (PbMM) are consistently more useful in taxonomy than are those of the marsupium. The key issues are whether or not the PbMM is broad and/or papillose. Both states are considered advanced; in more primitive mussels papillation and/or great breadth of the PbMM does not occur. Broad and/or papillose PbMMs are confined to the Ambleminae: Lampsilini: Heterogenae. Seemingly anomalous instances of broad PbMM occur in other groups where large arborescent papillae require breadth of mantle margin as substrate for musculature that controls movement of such papillae; examples include the genera *Cumberlandia*, *Orthonymus*, and *Plethobasus*, plus, perhaps, the heterogenous species *Proptera purpurata* (which is essentially extralimital to the UMR). In two UMR genera, *Caruncula* and *Lampsilis*, there are specialized PbMM features: caruncles (single, colorful, enormous papillae on each side of the body) and flaps (single, large, colorful, fish-shaped structures on each side of the body).

Specialized features of the PbMM (e.g., breadth, papillation, caruncles, and flaps) usually vary according to sex and season. Breadth and papillation are common to both sexes, but ordinarily are better developed in the female, especially when she is gravid. Caruncles and flaps are peculiar to the female and may be better developed during gravidity. There can be mystifying exceptions to these "rules". For instance, the degree of flap development can be similar in both sexes of a

given species of *Lampsilis*, and the flaps of otherwise distinct species in this genus can greatly resemble each other. Such phenomena can, of course, be results of undetected hermaphroditism and/or sybling species. A somewhat more defined example is the occurrence of the caruncle in *Caruncalina*, for which this structure is diagnostic. Hermaphroditism is widespread in this genus (van der Schalie, 1970), and the Principal Investigator observed several gravid *C. parva* from the mussel beds opposite Winona, Minnesota, that lacked caruncles. Histological analysis of gonadal tissue may or may not reveal a dominant sex in such individuals. In any event, it is clear that sexual features can be unstable and thus sometimes an uncertain basis for taxonomic determinations.

Features of the mantle apertures function as taxonomic discriminants that, in the Principal Investigator's experience, do not vary seasonally or according to the sex of the individual mussel. At the posterior end of a mussel the apposing mantle margins are somewhat constricted in order to form two openings through which the external, aquatic environment can interact with the internal environment within the mantle cavity of the animal. This mantle constriction creates the incurrent and excurrent mantle apertures. Inward through the lower, incurrent aperture flows water bearing food and oxygen. Outward through the upper, excurrent aperture flows a stream bearing the mussel's wastes (and usually, in season, the glochidia released by females).

The incurrent mantle aperture is never blocked by cohesion of the apposing mantle margins (or by other morphological means), but the excurrent aperture usually is abbreviated to some extent. The excurrent aperture usually is subdivided into anal (lower) and supra-anal (upper) portions by a suture between the apposing mantle margins. This subdivision is regarded as an advanced trait because it increases the force with which matter (including wastes and glochidia) is expelled from the parent. Expulsion of wastes is an obvious necessity; more efficient propulsion of glochidia increases the chance that mussel larvae may infect a host fish. If it is not subdivided, the excurrent aperture is termed entire.

After completing metamorphosis from the glochidial stage as a parasite on the host fish, the juvenile mussel excysts and settles to the waterway bed. It is very small (perhaps a centimeter in length) and usually sculpted. As the mussel grows, the juvenile shell becomes part of the beaks (umbos or umbones) of the adult shell, and its sculpture is called the beak sculpture. Because the adult shell thus includes the juvenile shell, a distinction is made in the key between the juvenile shell and adult shell growth. The distinction is important in cases where the beak sculpture is neoteinic, i.e., it continues onto the adult shell growth. This and other features of the beak sculpture (including its absence, if that is the case) are important taxonomic discriminants. Because the beak sculpture occupies the

oldest part of the shell, however, it is most subject to erosion and/or corrosion and thus cannot be detected on many specimens. For this reason beak sculpture as a discriminant is avoided in the key wherever possible.

In its simplest form beak sculpture consists of a few short, low, concentric ridges, straight or curved, whose ends angle rather sharply toward the dorsal shell margin. At these angles the ridge often is swollen. Later, younger ridges (i.e., those farther from the dorsal shell margin) may consist only of these swellings. Where the beak sculpture is neoteinic, these swellings continue onto adult shell growth as two diverging rows of tubercles, whose size varies directly with increasing distance from the dorsal shell margin. In some mussel groups (notably Anodontinae), the beak sculpture ridges curve upward at their midpoints. The result is a series of curved W's; the swellings or tubercles are at the apices of the V's that form the W's. This type of beak sculpture is called double-looped. In most beak sculpture the ridges are essentially parallel to the dorsal shell margin, but in some groups (notably *Caruncula*) they clearly are at an angle to the dorsal margin. This is oblique beak sculpture.

The sculpture on adult shell growth may be a continuation of simplified beak sculpture, as already noted, and/or it may include peculiar elements. These are of three types: tubercles, ribs, and plications.

Tubercles may be pointed, rounded, or shelf-like (lamellar). Large, rounded tubercles are called knobs.

Ribs are radial (i.e., extending from the beak to the shell margin), low ridges. Ribs usually are interrupted, i.e., they may not extend continuously from beak to margin.

Plications or plicae (adjective: plicate) are large, long, rather high ridges that run more or less subparallel to the dorsal and ventral shell margins. Plicate UMR genera are *Amblema* and *Megalonaias*.

Adult shell growth can be divided into several taxonomically meaningful regions. Dorsal, ventral, anterior, and posterior margins of the shell conventionally are recognized even though the point where one margin ends and the next begins can be very unclear. The region where the posterior and ventral margins join is called postbasal. The postbasal margin of the shell and/or soft tissues (especially the mantle margin) is taxonomically very important.

The mantle apertures are at the posterior end of a mussel. The animal's foot is at the anterior end. The anterior end is

buried in the riverbed when the mussel is alive; the posterior end protrudes into the water column. In the illustrations of mussels following the key (i.e., Exhibits 252-299) and in the text-figures (unless otherwise indicated) the posterior end is to the right in drawings of shells by Fuges and Whiting; to the left, in drawings by Call, Pilsbry, and Tottenham (the artists are discussed below).

The topography of the shell usually exhibits useful identification features. On the inner shell surface these are limited to the hinge plate and dentition. The hinge plate is the more or less broad and strong part of the shell along its dorsal margin. The pseudocardinal teeth are on the hinge plate beneath and/or slightly before the beaks. The lateral teeth lie along the plate behind the beaks and subparallel to the dorsal margin. The interdentum is the part of the hinge plate between the pseudocardinal and lateral teeth. Variation in the dentition provides stable taxonomic discriminants. The edentulous hinge plate lacks both pseudocardinal and lateral teeth. Alternatively, only the laterals may be absent. Except in occasional diseased individuals the pseudocardinals are never absent unless the laterals, also, are lacking. In other words, the dentition can exhibit one of three states: absent, only pseudocardinals present, and fully dentate. These variations are not used in the key, because its primary objective is identification of living mussels, and in order to examine the dentition of a living specimen one inevitably kills it.

The outer surface of the shell exhibits several regions. The anterior and posterior margins of the beak extend toward the ventral margin of the shell in two ridges. The anterior ridge is weak and does not extend nearly so far as the shell margin, but the posterior ridge is conspicuous and reaches the postbasal margin. The anterior slope (a poorly defined area) lies between the anterior shell margin and the anterior ridge; in contrast, the posterior slope is well defined and lies between the posterior shell margin and the posterior ridge. It often is sculpted with tubercles and/or ribs.

Both the anterior and posterior ridges may be conspicuous if the beak sculpture continues far onto adult shell growth. In this case, one of the radial rows of tubercles in the neoteinic sculpture lies along the anterior ridge, the other, along the posterior ridge. Only in such a case (as in the genera *Quadrula* and *Arcidens*) can the existence of the anterior ridge be fully appreciated.

The area bounded by the beak, the anterior and posterior ridges, and the ventral shell margin is the disc. It ordinarily is a poorly defined, undecorated region, but, if the anterior ridge is conspicuous, the disc is easily recognized. In some species the disc is depressed and forms a broad, shallow furrow,

the sulcus. The sulcus usually involves a concave depression in the lateral outline of the ventral shell margin. *Quadrula quadrula* is the best example of these phenomena.

The Artists

This appendix is illustrated by text-figures and by Exhibits 252 through 299. The Principal Investigator drew and initialed the text-figures, which are essentially diagrammatic (and bear the logo "slhf"). The drawings in the exhibits are life-like and very accurate. They were created by several artists, living or deceased: Call, Fuges, Pilsbry, Tottenham, and Whiting.

R. Ellsworth Call was perhaps the foremost student of midwestern freshwater mollusks during the latter Nineteenth Century. Much of his work is of a calibre that was somewhat ahead of his time; he deserves to be considered a malacologist, not a conchologist. Several of Call's monographs are included in the bibliography of Fuller (1978b) and/or the present report because of their bearing on UMR naiades. In addition, Call was a master scientific illustrator. His drawings that are used below are from Call (1895). They are reproduced without change (except such alteration as occurs in the photostatic process) and with the permission of the Academy of Science of St. Louis. Call signed each of his drawings with one of several characteristic logos (, Call, R.E.C.). These have reproduced badly in the exhibits; consequently, Call's work is identified by "rc".

For 15 years, Mary Fuges has been a staff artist with the Academy of Natural Sciences of Philadelphia and has been a biological illustrator at several other institutions in this country and abroad. She created most of the mussel illustrations for the key, plus all of the drawings on the UMR naiad illustration poster that the Academy produced for the Corps and the Fish and Wildlife Service (Fuller et al., 1980). All her work in this report is signed "MF ".

Henry A. ("Harry") Pilsbry may have been the finest malacologist that this country has produced. Certainly, the volume of his published work is rivaled only by W. H. Dall's (Boss et al., 1968) and probably never will be equaled or surpassed (Clench and Turner, 1962). Much of this productivity was accomplished during Pilsbry's many decades as head of the Department of Mollusks at the Academy of Natural Sciences of Philadelphia. In his youth Pilsbry was a colleague (and perhaps a protégé) of R. E. Call. He contributed some drawings to Call's (1895) "Unionidae of Arkansas"; a few are included in the exhibits that follow the taxonomic key (below). Pilsbry's logo on these drawings is "Pilsbry, del." in minute handscript that reproduces poorly in the photostatic process. Therefore, his drawings used here are identified by "hp". As in the case of Call's drawings,

Pilsbry's work is reproduced without purposeful alteration and with the permission of the Academy of Science of St. Louis.

John L. Tottenham prepared most of the drawings in Burch's (1973, 1975) pioneering manuals of Recent Nearctic mussel identification. Tottenham did not sign this work, so the symbol "jt" is used to identify those of his drawings that are reproduced in this report. Permission for this use was given by J. B. Burch.

Diane Whiting is a freelance scientific illustrator who resides in Stacy, Minnesota, and contributed drawings of mussel shells to Fuller (1978b) and the present report. Her work is signed with the logo "DW".

Further Aid in Identification

There are several excellent sources of further description and illustration that complement this key and its drawings and thus serve to improve one's understanding of the taxonomy, as well as the biology, of UMR naiades. These include Baker (1898, 1928), Burch (1973, 1975), Call (1895), Coker (1919), Eddy and Hodson (1950), Fuller et al. (1980), Havlik (1978), Mathiak (1979), Murray and Leonard (1962), Parmalee (1967), Starrett (1971), and Valentine and Stansbery (1971). In most cases, the more recent of these references are the better illustrated, employ the more up-to-date taxonomy, and are the more available, both in libraries and for sale. To the best of the Principal Investigator's knowledge, the works by Burch (1975), Fuller et al., Mathiak, Murray and Leonard, Parmalee, and Starrett are in print and can be secured from their respective publishers. In addition, one should be able to find at least some of these sources in public and/or institutional libraries in the UMR valley (the list of such repositories of this report that appears early in this Volume is of some guidance in this respect).

These 14 references are perhaps the best to be had at present for identification of UMR naiades, above and beyond the following key, but they do exhibit various strengths and weaknesses.

Baker's (1898, 1928) monographs are profusely illustrated, and his descriptions of species-group taxa that he honored are lengthy and detailed, but his nomenclature understandably is out-of-date, especially because Baker had a strong tendency toward the creation of needless subspecific names.

Burch's (1973, 1975) monographs are uniquely comprehensive and are illustrated with uncommonly exquisite drawings (most of which usefully depict typical shells). The value of Burch's work is lessened for the non-specialist because his identifica-

tion keys are natural, i.e., at least in their early couplets they depend upon phylogenetic discriminants. This approach is entirely proper, especially for the needs of the investigator who already is well versed in naiadology, but the uninitiate will not be well served by couplet-choices that concern, for example, characteristics of the charged marsupium, which are hard to observe and are evident only seasonally.

Call's (1895) paper is among the very few works devoted principally to UMR naiades. His illustrations are perhaps the best that ever have been done of mussel shells, but many of the relevant species were not drawn. Moreover, Call's descriptions, though elaborate, are exclusively conchological, and his monograph is very hard to locate today.

Coker (1919) published some of the best, photographic figures of UMR mussels that are available. The plate (XIV) that includes the Endangered *Lampsilis higginsi* was omitted from some copies, however, and the figure of *Cumberlandia monodonta* (Plate XXIV) is mislabeled *Margaritana margaritifera*. Coker's paper is additionally remarkable because it offers one of the few published illustrations of *Quadrula fragosa* (Plate VII, figure c).

Eddy and Hodson (1950) provided a good mussel key. Their book has been a staple in college biology courses for years and is widely available.

Fuller et al. (1980) is a two-part wall poster describing and illustrating all species-group UMR mussel taxa that the Principal Investigator recognized as members of this fauna in early May of this year. D. H. Stansbery (OSU, personal communication) has since confirmed two further species, *Quadrula fragosa* and *Pleurobema sintoxia*, whose identifying features are discussed below. The poster is available from USFWS, Region III, and USACE, St. Paul District, the sponsoring agencies.

Havlik (1978) and Mathiak (1979) offer excellent color photographs.

Murray and Leonard (1962) is an almost model handbook and field guide to much of the UMR mussel fauna. Their illustration of the Endangered *Proptera capax* shows an atypical specimen, which may not be a Fat Pocketbook at all.

Parmalee's (1967) handbook is the superior because it treats a higher proportion of the UMR fauna.

Starrett's (1971) has fine color photographs and includes perhaps the best extant discussion of *Lampsilis higginsi* and its close relatives (but see Buchanan, 1979a).

The paper by Valentine and Stansbery (1971) deals with a fauna that is somewhat extralimital to the UMR, but its taxonomic key, among the best available, is still very useful for identifications elsewhere in the Mississippi basin. Their work also explains the correct classification of *Proptera laevissima*, which some writers continue to misplace in *Leptodea*.

In addition to these primary sources of aid in UMR naiad identification there are numerous secondary references that have a more limited bearing on this fauna: Athearn and Clarke (1962), Baker (1922), Call (1900), Clarke (1973), Clarke and Berg (1959), Clench (1959), Cvancara (1970), Drew (1890), Goodrich (1932), Heard (1968), La Rocque (1966-1970), Marshall (1890), Ortmann (1919), Pennak (1953), Robertson and Blakeslee (1948), Scammon (1906), Stein (1962), van der Schalie (1948), and Walker (1918). This rather large number (19) of references is mentioned in order to improve one's chances of finding at least some of them and because several of them offer peculiarities that are worth emphasizing here.

Call (1900), La Rocque, and Ortmann treated a large fraction of the UMR naiad fauna. These works, plus Athearn and Clarke, Clarke, Clarke and Berg, and Cvancara, are unusually well illustrated. Marshall's paper is included in this selection because of his unparalleled drawings of beak sculpture.

About one-third of UMR species-group mussel taxa have been sole subjects of individual studies, some of which are of value in identification. These taxa and the corresponding studies are alphabetized below.

Actinonaias ellipsiformis--van der Schalie and van der Schalie (1963).

Amblema plicata--Fikes and Tubb (1971), Imlay (1972), Stansbery (1970), Stein (1968).

Anodonta grandis--Downing (1902), Penn (1939).

A. imbecillis--Allen (1924), Fuller and Hartenstine (1980), Heard (1975), Tucker (1927, 1928).

A. suborbiculata--Schuster (1978).

Anodontoides ferussacianus--Edgar (1965), Harman (1970).

Carunculina parva--Call (1896), Mermilliod (1973).

Cumberlandia monodonta--Stansbery (1966).

Lampsilis higginsi--Grier (1921).

L. ovata ventricosa--Cvancara (1963), Grier (1926b), Kraemer (1970), Welsh (1961).

L. radiata siliquoidea--Blystad (1923), Counts (1977), Harvey (1969), Tedla and Fernando (1969).

Ligumia subrostrata--Bereza et al. (1976), Dietz (1974).

Plagiola triquetra--Johnson (1978).

Pleurobema cordatum complex--Badman and Chin (1973), Chin (1972), Yokley (1972).

Proptera laevissima--Coker and Surber (1911).

Quadrula quadrula--Neel (1941).

Strophitus undulatus--Ellis and Keim (1918).

Tritogonia tuberculata--Jones (1926). [Some of the soft-tissue description is inaccurate.]

Taxa Not in the Key

Fifty species-group freshwater mussel taxa presently are known to have been recorded from the UMR: 47 of these are treated in the following taxonomic key. The other three species are *Lasmigona compressa, Quadrula fragosa,* and *Pleurobema sintoxia*.

The key was completed during a period when the Principal Investigator was determined to excise *Lasmigona compressa* (Exhibit 291) from this report on the grounds that its single, possibly equivocal UMR record does not warrant the species' inclusion. This standpoint has since been reversed: the Creek Heelsplitter remains in the report and was treated by Fuller (1980b) and Fuller et al. (1980). This species "keys out" with *Anodonta imbecillis* (couplet-choice 38b) as long as the key is in its present form. *L. compressa* strongly resembles its congener *L. costata*, but lacks the latter's sculptured posterior slope (see, e.g., Fuller et al., 1980).

The presence of *Quadrula fragosa* in the UMR was claimed by Havlik and Stansbery (1978) and was verified by them earlier this year in the Principal Investigator's presence. Coker (1919:

Plate VII, figure c) published an excellent photograph of this species' shell. The False Mapleleaf seems to key out as Mapleleaf, *Q. quadrula* (couplet-choice 9a), but its soft tissues are undescribed, so its passage through couplets 1 through 8 cannot be evaluated. *Q. quadrula* differs from *Q. fragosa* most noticeably in that the latter's posterior slope is alate and much the more tuberculate.

Pleurobema sintoxia, Round Pigtoe, differs from Pink Pigtoe, *P. rubrum* (couplet-choice 6b), by being much more nearly subcircular in lateral outline of the shell.

Text-Figures

The following captions and legends introduce 11 labeled text-figures that illustrate morphological features discussed above and used as discriminants in the key (below). The figures are semi-diagrammatic.

Figure 1. Left valve, lateral view.

Figure 2. Right valve, lateral view, complete dentition.

Figure 3. Right valve, lateral view, incomplete dentition.

Figure 4. Lateral view of an animal whose left valve has been removed and whose left mantle sheet has been removed along the heavy line.

Figure 5. Lateral view from the left of a *Lampsilis* exhibiting features of the posterior and post-basal mantle margins.

Figure 6. Tetragenous marsupium, lateral view from the left. Note that in both demibranchs the interlamellar septa are closely and about equally spaced.

Figure 7. Homogenous marsupium, lateral view from the left. Note that in the outer demibranch (od) the interlamellar septa are spaced about twice as closely as in the inner demibranch.

Figure 8. Mesogenous marsupium, lateral view from the left.

Figure 9. Heterogenous marsupium, lateral view from the left.

Figure 10. Structures of the posterior mantle margins in posterior view.

Figure 11. SAME.

A -- anterior margin

aa -- anal aperture

aam -- anterior adductor muscle

ap -- arborescent papilla(e)

ar -- anterior ridge

as -- anterior slope

asaa -- auxiliary supra-anal aperture(s)

b -- beak

bc -- beak cavity

D -- dorsal margin

eea -- entire excurrent aperture

es -- eye spot

gr -- growth ring

het -- heterogenous marsupium

hom -- homogenous marsupium

hp -- hinge plate

i -- interdentum

ia -- incurrent aperture

id -- inner demibranch

l -- ligament

L -- left margin

lt -- lateral tooth (teeth)

mf -- mantle flap

mm -- mesogenous marsupium

od -- outer demibranch

op -- oral palpus

P -- posterior margin

pam -- posterior adductor muscle

pbm -- postbasal margin

pbmm -- postbasal mantle margin

pr -- posterior ridge

ps -- posterior slope

pt -- pseudocardinal tooth (teeth)

R -- right margin

s -- shell

saa -- supra-anal aperture

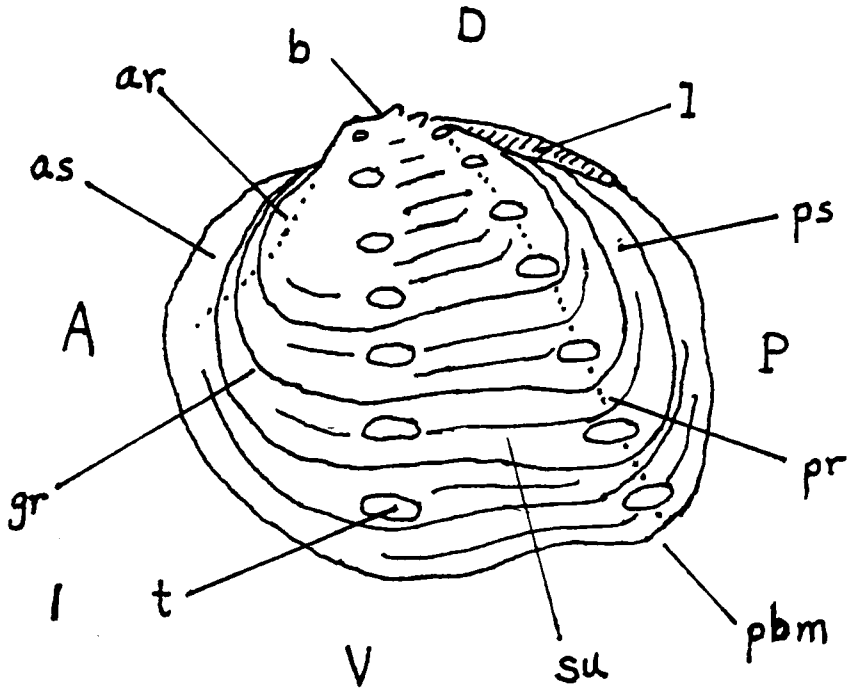
sea -- subdivided excurrent aperture

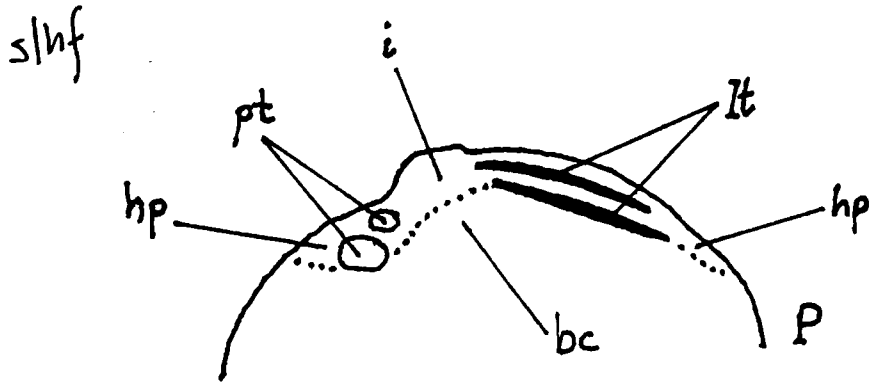
sp -- simple papilla(e)

su -- sulcus

t -- tubercle

V -- ventral margin





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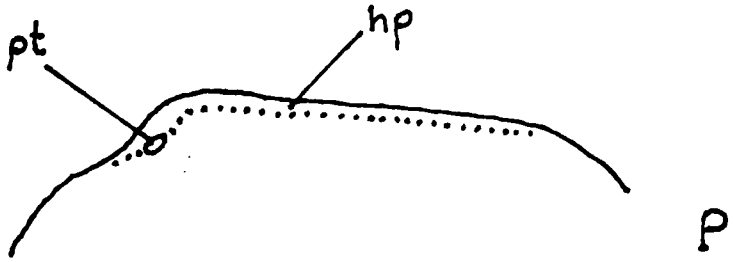

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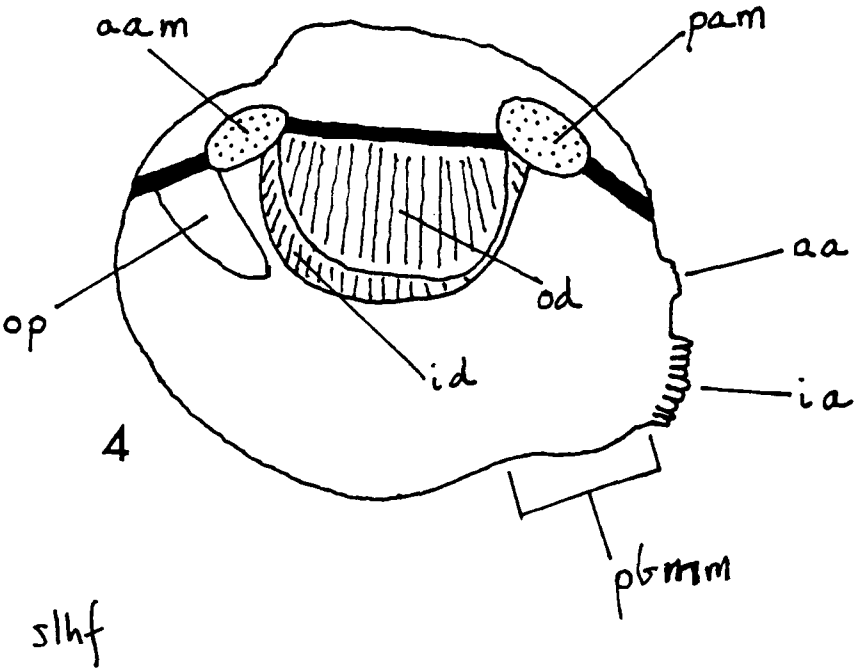
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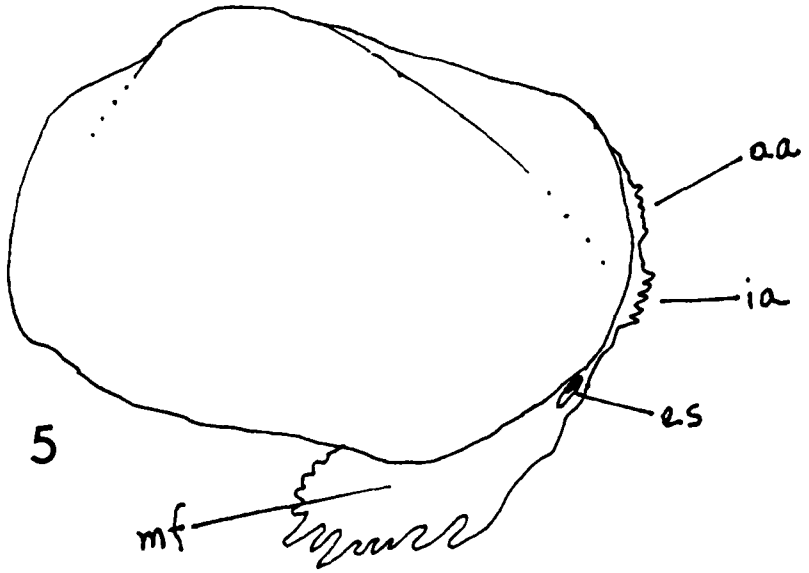
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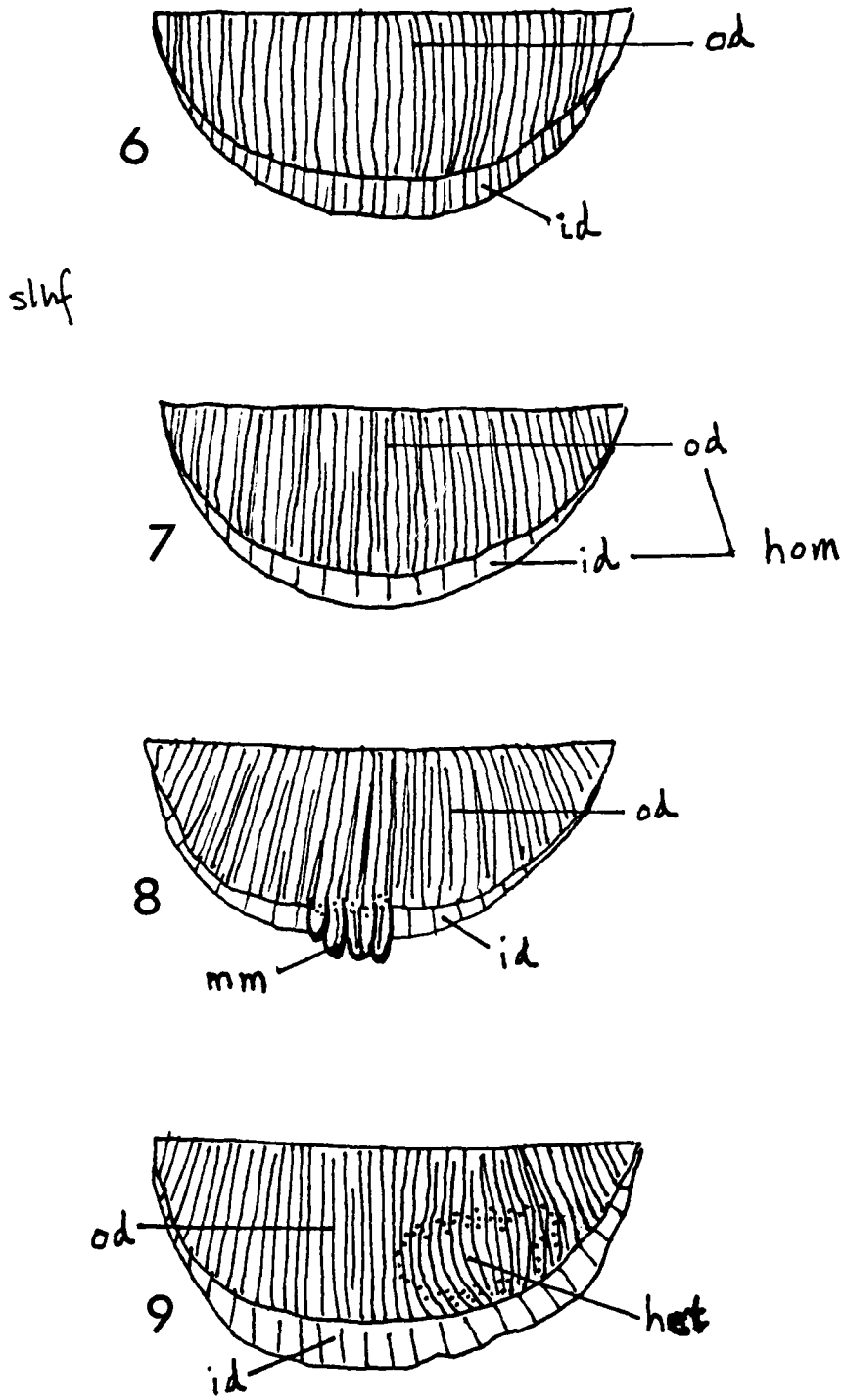
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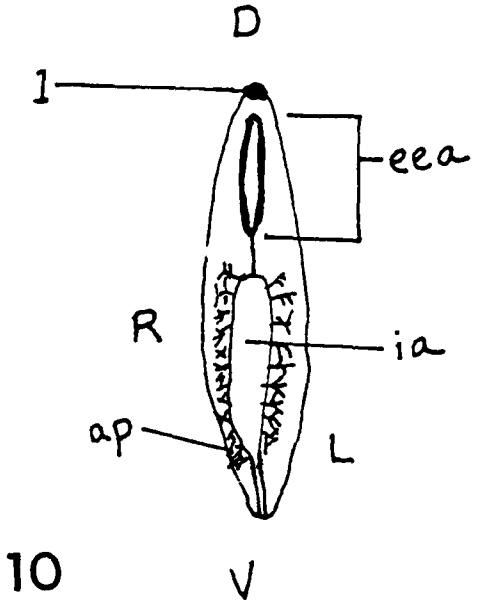

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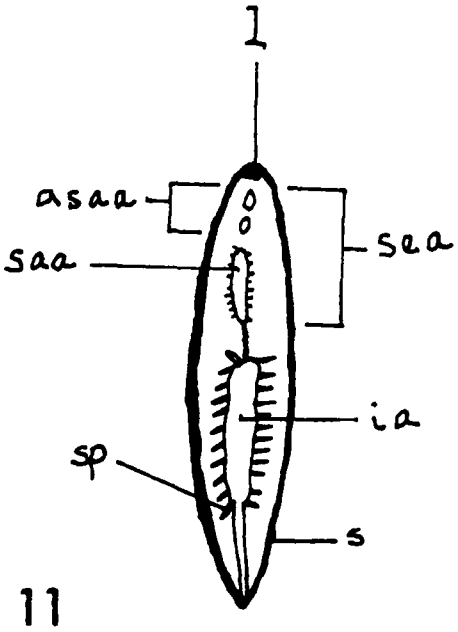


11

Key to Recent Upper Mississippi River Species-Group Mussel Taxa

1a. Incurrent papillae arborescent 2

b. Incurrent papillae simple 12

2a. (1a) Excurrent aperture entire 3

b. Excurrent aperture subdivided 4

3a. (2a) Shell subterete; adult shell growth without sculpture (Exhibit 252) ..... *Cumberlandia monodonta*

b. Shell subrectangular or subcircular; sculpture widespread, tubercular; beak sculpture neoteinic (Exhibit 258) ..... *Cyclonaias tuberculata*

4a. (2b) Adult shell growth without sculpture 5

b. Adult shell growth sculpted 7

5a. (4a) Posterior ridge sharp (Exhibit 259) .. *Fusconaia flava*

b. Posterior ridge rounded 6

6a. (5b) Postbasal shell margin rounded (Exhibit 260) .... *Fusconaia ebena*

b. Postbasal shell margin pointed (Exhibit 264) .... *Pleurobema rubrum*

7a. (4b) Sculpture confined to a radial row of knobs on the disc (Exhibit 263) ..... *Plethobasus cyphyus*

b. Disc without knobs; sculpture can occur anywhere on adult shell growth 8

8a. (7b) Shell elongate (Exhibit 257) .... *Tritogonia verrucosa*

b. Shell subrectangular or subcircular 9

9a. (8b) Disc sulcate (Exhibit 254) ..... *Quadrula quadrula*

b. Disc not sulcate 10

10a. (9b) Posterior ridge with knobs (Exhibit 253) .... *Quadrula metanevra*

b. Shell without knobs 11

11a. (10b) Shell sculpture chiefly confined to two radial rows of more or less lamellar tubercles, one on each of the anterior and posterior ridges; shell angular; no radial pigmentation (Exhibit 255) .... *Quadrula nodulata*

b. Shell sculpture tubercular (rarely lamellar), not in rays, ranging from absent through covering entire shell; shell rounded; beaks pigmented in green rays (Exhibit 256) ..... *Q. pustulosa*

12a. (1b) Postbasal mantle margin papillose 13

b. Postbasal mantle margin without papillae 31

13a. (12a) Adult shell growth sculpted 14

b. Adult shell growth without sculpture 15

14a. (13a) Radial row of knobs on disc (Exhibit 267) .... *Obliquaria reflexa*

b. Ribs on both sides of the lower posterior ridge (Exhibit 287) ..... *Plagiola triquetra*

15a. (13b) Postbasal mantle margin with special structure (caruncle or flap) 16

b. Postbasal mantle margin papillose and perhaps very broad, but without special structures 20

16a. (15a) Caruncles present (Exhibit 282) .... *Carunculina parva*

b. Flaps present 17

17a. (16b) Beak sculpture several swollen concentric ridges (Exhibit 286) ..... *Lampsilis ovata ventricosa*

b. Beak sculpture numerous low, oblique, interwoven ridges 18

18a. (17b) Beak sculpture ridges long; shell subterete (Exhibit 283) ..... *Lampsilis teres*

b. Beak sculpture ridges short; shell suboval or somewhat elongate 19

19a. (18b) Entire mantle flap actively mobile; flap clearly pisciform (Exhibit 284) ..... *Lampsilis higginsi*

b. Actively mobile part of flap a "ribbon" of tissue at anterior end; flap somewhat pisciform (Exhibit 285) ..... *L. radiata siliquoidea*

20a. (15b) Postbasal mantle margin comparatively broad 21

b. Postbasal mantle margin comparatively narrow 22

21a. (20a) Shell subterete (Exhibit 280) ..... *Ligumia recta*

b. Shell elongate (Exhibit 281) ..... *L. subrostrata*

22a. (20b) Periostracum with chevrons 23

b. Periostracum without chevrons 25

23a. (22a) Posterior ridge rounded (Exhibit 276) .... *Truncilla donaciformis*

b. Posterior ridge sharp 24

24a. (23b) Sexual dimorphism expressed chiefly in shell outline (Exhibit 275) ..... *Truncilla truncata*

b. Sexual dimorphism expressed chiefly in shell breadth (Exhibit 274) ..... *Ellipsaria lineolata*

25a. (22b) Shell alate 26

b. Shell without alae 27

26a. (25a) Pseudosiphons ordinary (Exhibit 268) .. *Proptera alata*

b. Pseudosiphons long (Exhibit 269) ..... *P. laevissima*

27a. (25b) Shell oviform (Exhibit 277) ..... *Obovaria olivaria*

b. Shell otherwise 28

28a. (27b) Beaks very high and inflated (Exhibit 270) .....
..... *Proptera capax*

b. Beaks neither very high nor very inflated 29

29a. (28b) Shell inflated (Exhibit 271) ..... *Proptera purpurata*

b. Shell compressed 30

30a. (29b) Shell elongate (Exhibit 279) .....
..... *Actinonaias ellipsiformis*

b. Shell not elongate (Exhibit 278) ..... *A. carinata*

31a. (12b) Postbasal mantle margin comparatively broad 32

b. Postbasal mantle margin comparatively narrow 33

32a. (31a) Shell strongly alate, weakly compressed (Exhibit 272) ..... *Leptodea fragilis*

b. Shell weakly alate, very compressed (Exhibit 273) ..... *L. leptodon*

33a. (31b) Disc sculpted 34

b. Disc without sculpture 37

34a. (33a) Shell alate (Exhibit 289) ..... *Lasmigona complanata*

b. Shell without alae 35

35a. (34b) Beak sculpture neoteinic 36

b. Beak sculpture not neoteinic (Exhibit 262) .....
..... *Amblema plicata*

36a. (35a) Beak sculpture two divergent rays of tubercles (Exhibit 288) ..... *Arcidens confragosus*

b. Beak sculpture an amorphous mass of tubercles (Exhibit 261) ..... *Megalonaias gigantea*

37a. (33b) Beaks low; dorsal shell margin straight 38

b. Beaks elevated; dorsal shell margin not straight .. 39

38a. (37a) Shell subcircular (Exhibit 296) .... *Anodonta suborbiculata*

b. Shell elongate (Exhibit 297) ..... *A. imbecillis*

39a. (37b) Posterior slope sculpted 40

b. Posterior slope without sculpture 43

40a. (39a) Posterior slope strongly sculpted (Exhibit 290) ... . *Lasmigona costata*

b. Posterior slope weakly sculpted 41

41a. (40b) Posterior ridge rounded (Exhibit 299) .... *Strophitus undulatus*

b. Posterior ridge sharp 42

42a. (41b) Shell compressed, subquadrate (Exhibit 265) .... *Elliptio crassidens*

b. Shell inflated, elongate (Exhibit 242) .... *Alasmidonta marginata*

43a. (39b) Shell subterete (Exhibit 266) ..... *Elliptio dilatata*

b. Shell otherwise 44

44a. (43b) Shell subquadrate (Exhibit 293) .. *Alasmidonta viridis*

b. Shell elongate 45

45a. (44b) Beak sculpture not double-looped (Exhibit 295) .... *Anodontoides ferussacianus*

b. Beak sculpture double-looped 46

46a. (45b) Beak sculpture weak (Exhibit 294) .... *Simpsoniconcha ambigua*

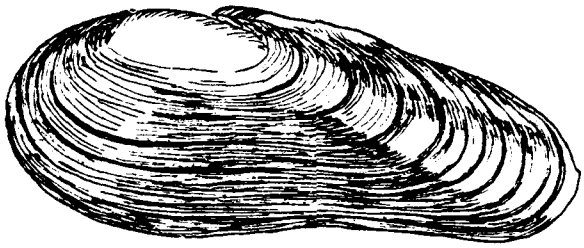
b. Beak sculpture strong (Exhibit 298) .. *Anodonta grandis*

Exhibit 252

Cumberlandia monodonta (Say), Spectacle Case

Figure 1. Lateral view of outer surface of left valve (About 1.0x.) Note elongation.

Figure 2. Lateral view of inner surface of right valve. (About 1.0x.) Note the weak dentition.



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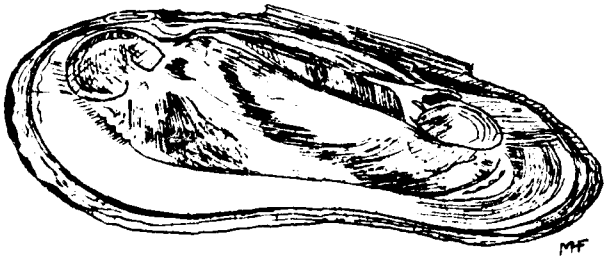

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Exhibit 253

Quadrula metanevra (Rafinesque), Monkeyface

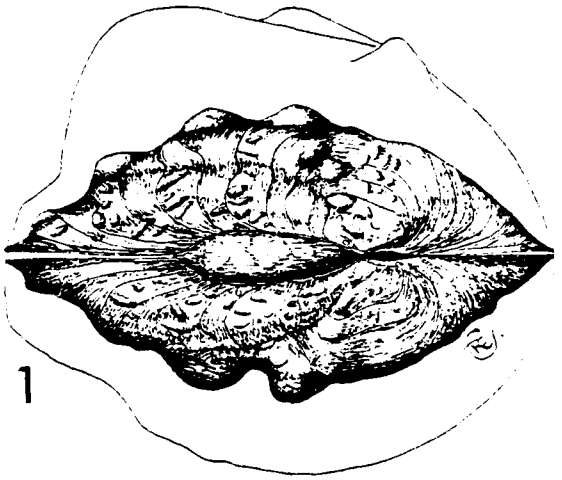
Figure 1. Dorsal view and lateral outline. (About 1.0x.)

Figure 2. Lateral views of (a) outer surface of right valve and (b) hinge of left valve. (About 1.0x.)

Figure 3. Lateral view of outer surface of left valve of young adult. (About 2.0x.)

Figure 4. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note emphasis on sculpture.

Figure 5. Same as Figure 4. Note emphasis on pigmentation.



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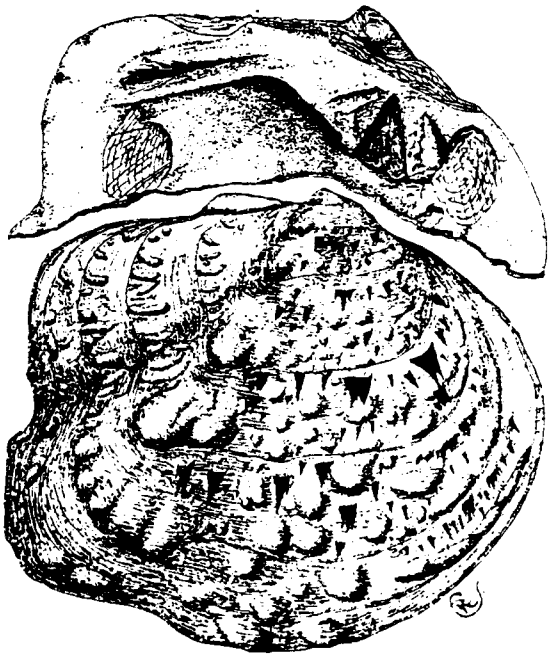

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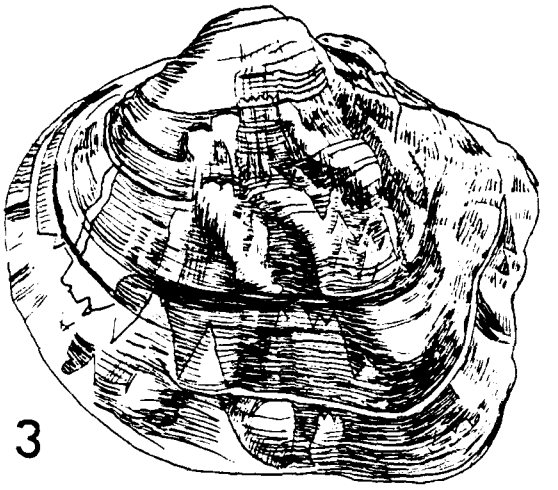

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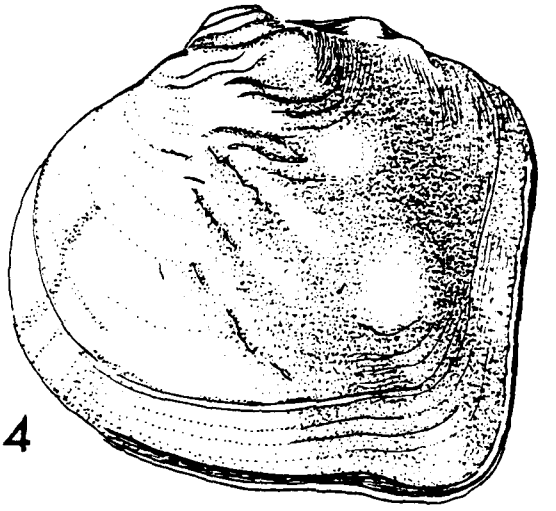

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Exhibit 254

Quadrula quadrula Rafinesque, Mapleleaf

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note the two divergent radial rows of tubercles (arrows), the sulcus between them, the excavation of the shell margin at the base of the sulcus, and that the beak sculpture extends onto the disc.

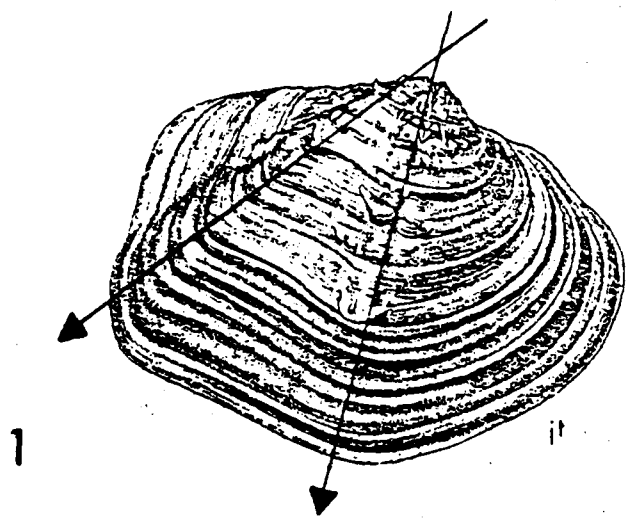


Exhibit 255

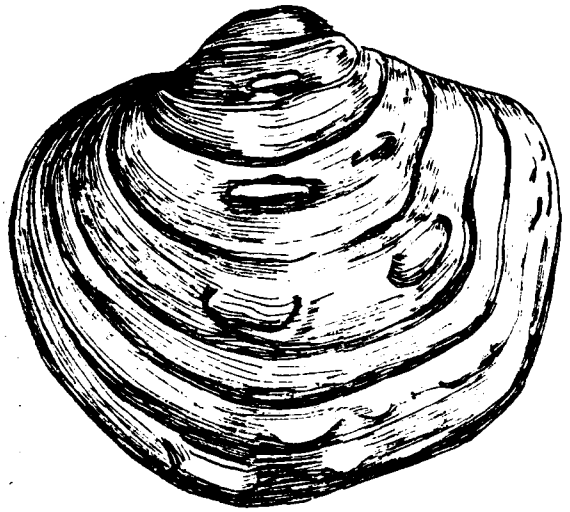
Quadrula nodulata (Rafinesque), Wartyback

Figure 1. Lateral view of outer surface of left valve. (About 1.5x.) Note the two divergent radial rows of tubercles and the triangular outline of the postbasal margin.

Figure 2. Lateral view of inner surface of right valve. (About 1.5x.)

Figure 3. Dorsal view of juvenile. (About 4.0x.) Note beak sculpture, two divergent radial rows of tubercles extending onto disc.

Figure 4. Posterior view of SAME.



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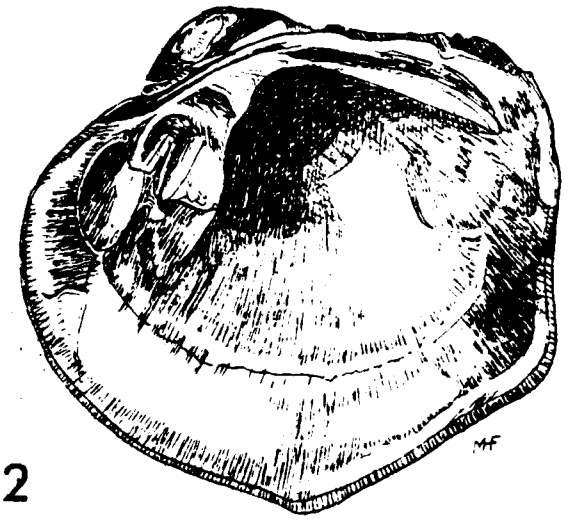

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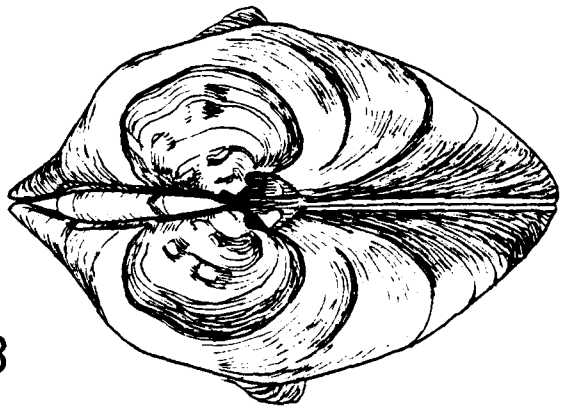

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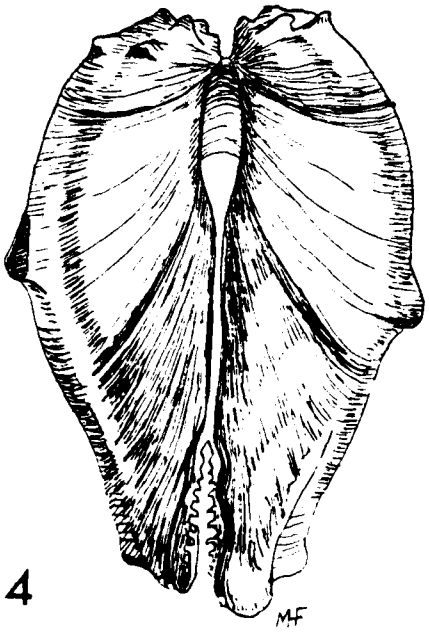

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Exhibit 256

Quadrula pustulosa (Lea), Pimpleback

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note the beak sculpture, a few concentric ridges, and (see Figure 2a) the pigmented (green) umbonal rays.

Figure 2. (a) Lateral view of outer surface of right valve of young adult. (About 1.0x.) Note umbonal rays (see Figure 1) and lack of sculpture (see Figure 6), which occasionally occurs in *Q. pustulosa*.
(b) Dorsal view of SAME.

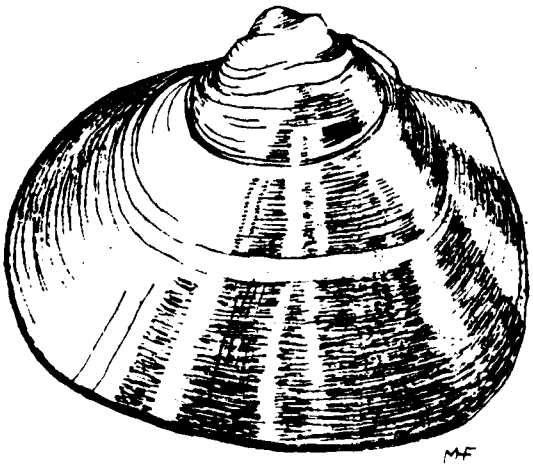
Figures 3, 4, 7, and 8. (a) Lateral view of outer surface of right valve. (b) Dorsal view. (About 1.0x.) Note the sculpture patterns exhibited by this highly variable species (see Figures 5, 6, 11, and 12).

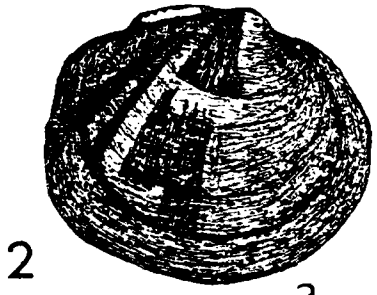
Figure 5. (a) Lateral view of outer surface of right valve.
(b) Dorsal view and lateral outline from the right. (About 1.0x.)

Figure 6. (a) Lateral view of outer surface of right valve.
(b) Dorsal view emphasizing growth lines. (About 1.0x.) Note the umbo, naturally low even though eroded (contrast with Figure 5).

Figures 9 and 10. Growth series of lateral outlines of right valve. (About 1.0x.)

Figures 11 and 12. Dorsal view and lateral outline from the right. (About 1.0x.) Note the differences in inflation.





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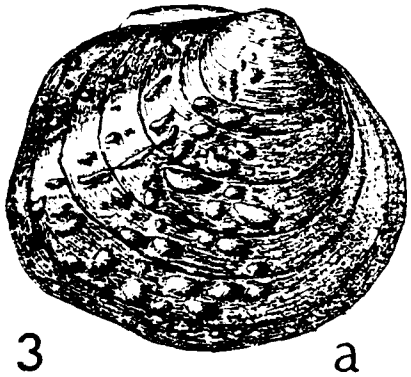

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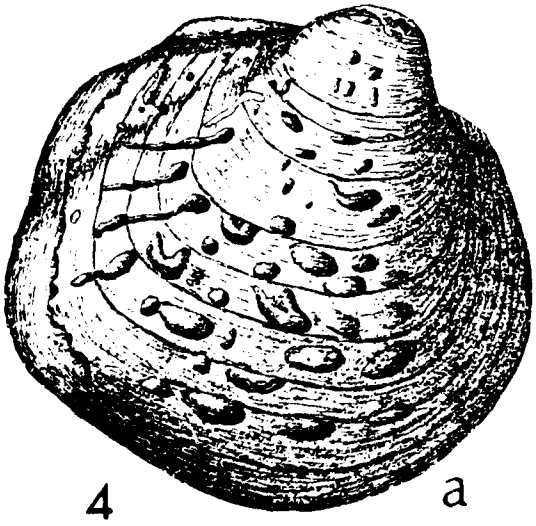

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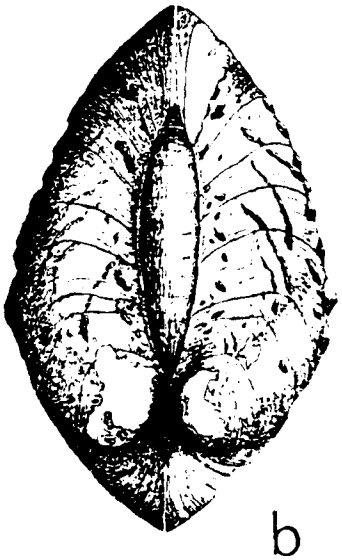

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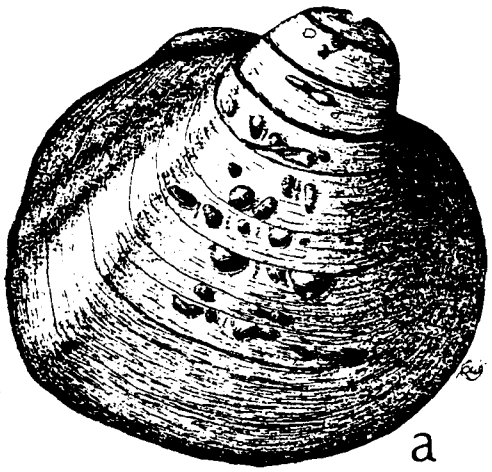

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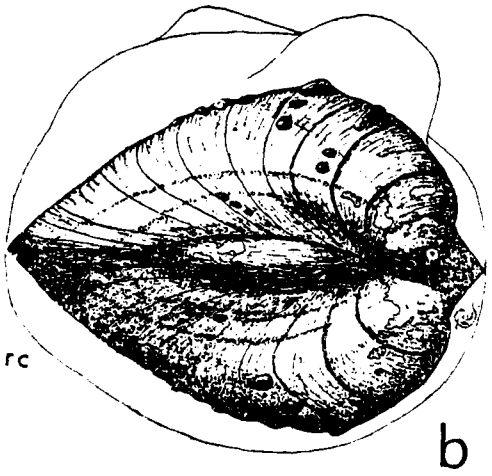

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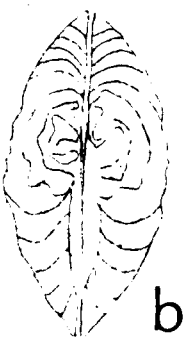

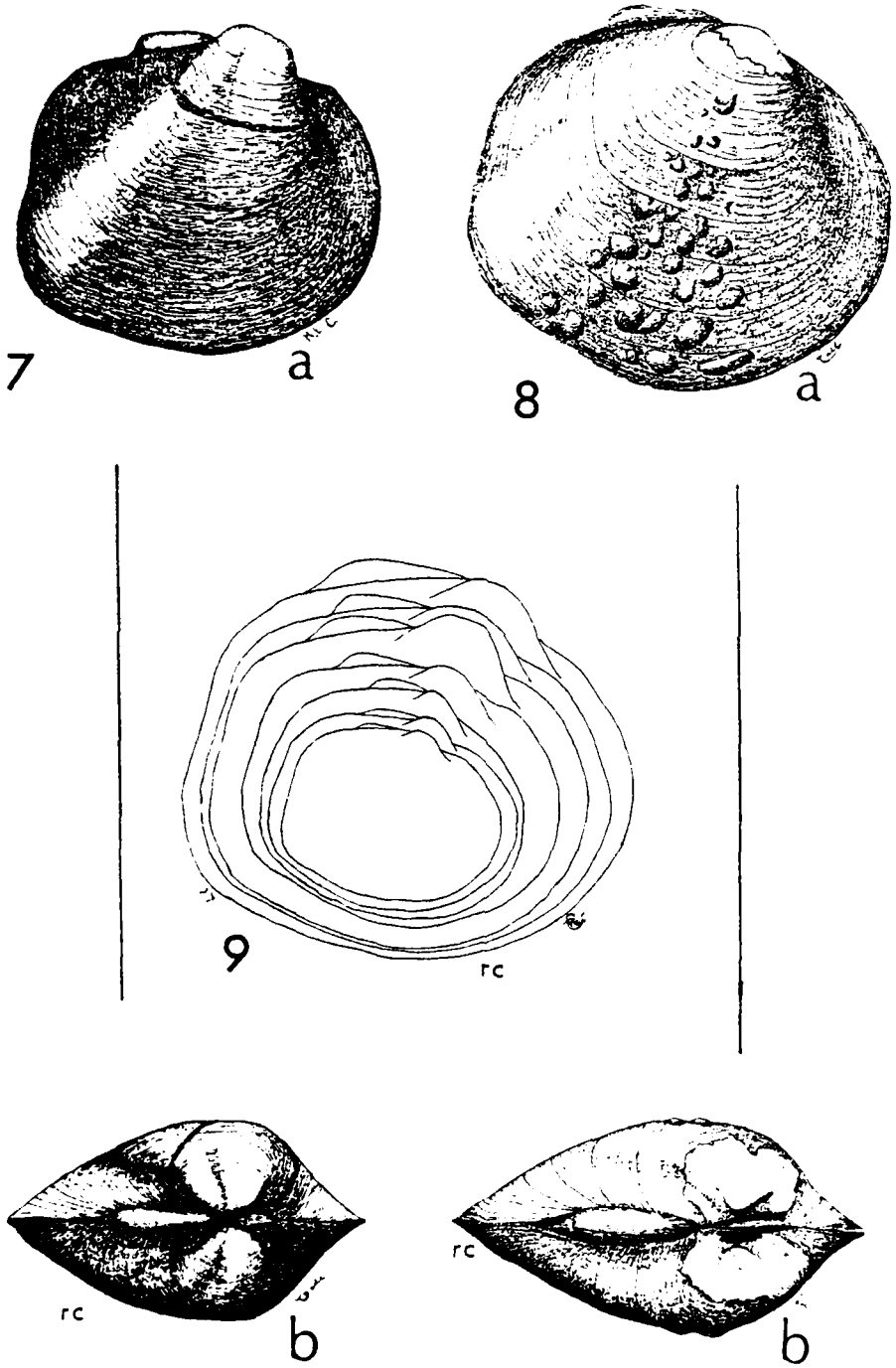
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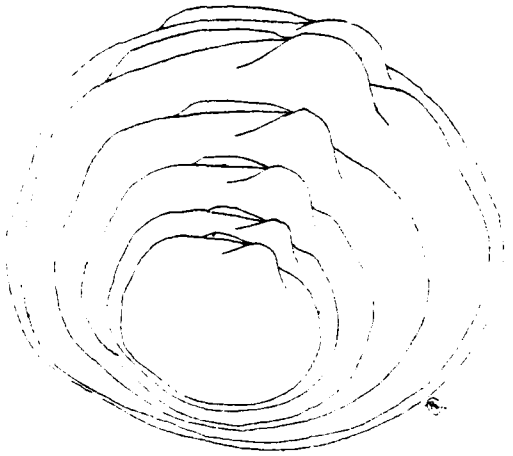

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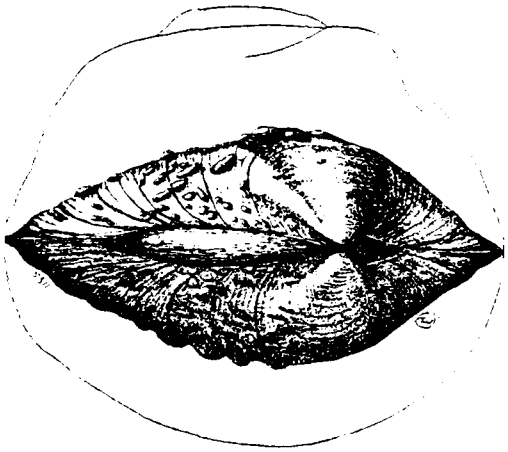

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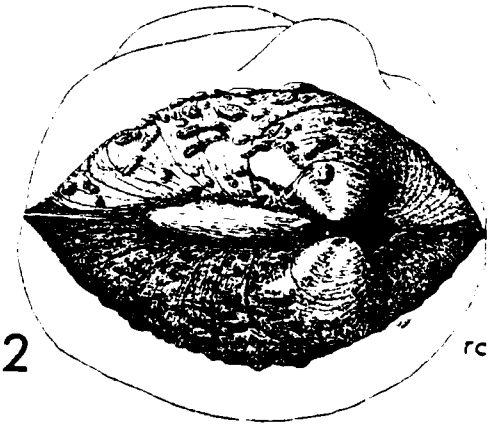

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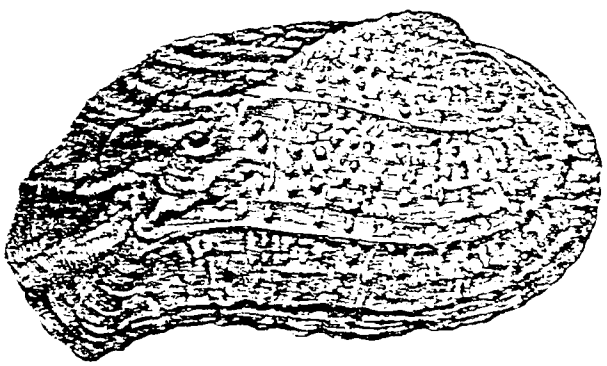
Exhibit 257

Tritogonia verrucosa (Rafinesque), Buckhorn

Figure 1. Lateral view of outer surface of right valve of female. (About 1.0x.) Note the arcuate, hook-like expansion of the postbasal area (the male lacks this feature and is obliquely truncate postbasally.

Figure 2. Lateral view of hinge of left valve (About 1.0x.)



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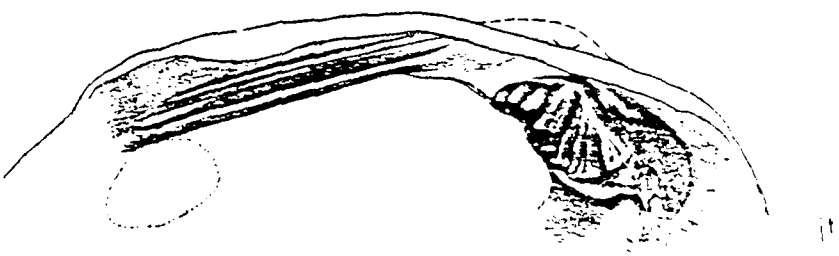

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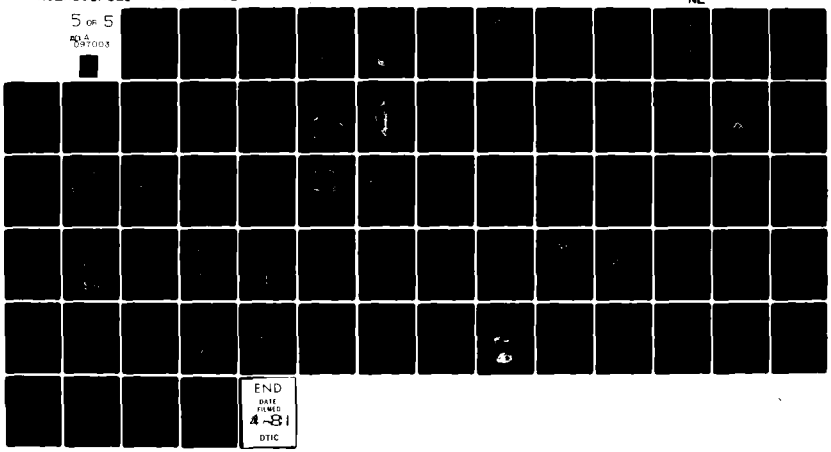
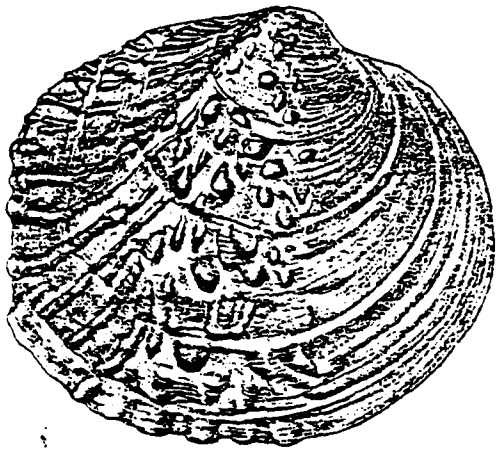


Exhibit 258

Cyclonaias tuberculata (Rafinesque), Purple Pimpleback

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.)

Figure 2. Lateral view of inner surface of left valve. (About 1.0x.) Note broad interdentum (arrow) and massive hinge plate and dentition.



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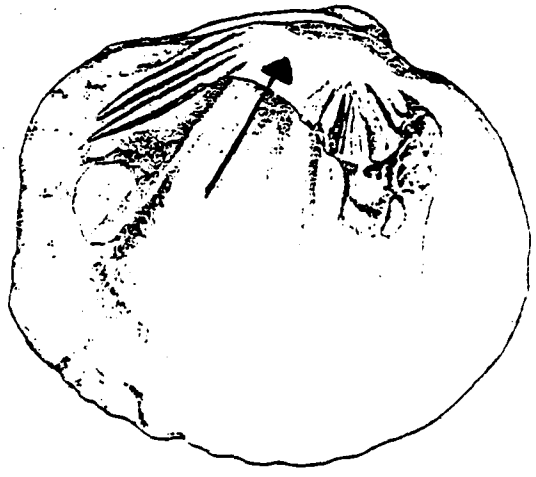

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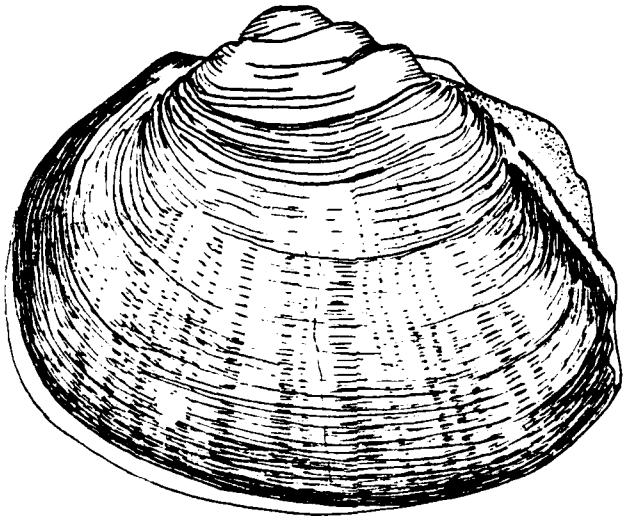
Exhibit 259

Fusconaia flava (Rafinesque), Pigtoe

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note beak sculpture, a few concentric ridges, and the lack of umbonal pigment (compare Exhibit 256, Figure 1).

Figures 2 and 3. Lateral view of outer surface of left valve (About 1.0x.) Note the sharper postbasal point of the younger shell (Figure 2).



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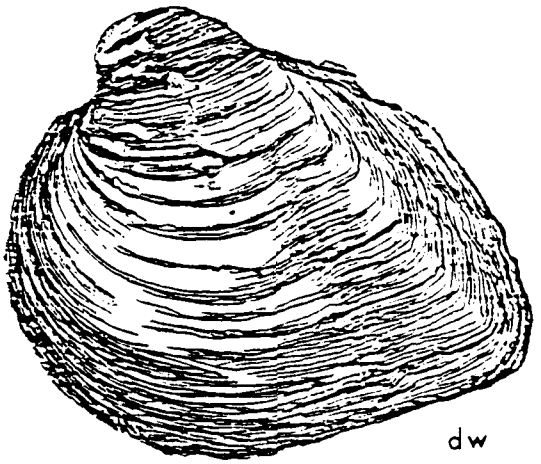

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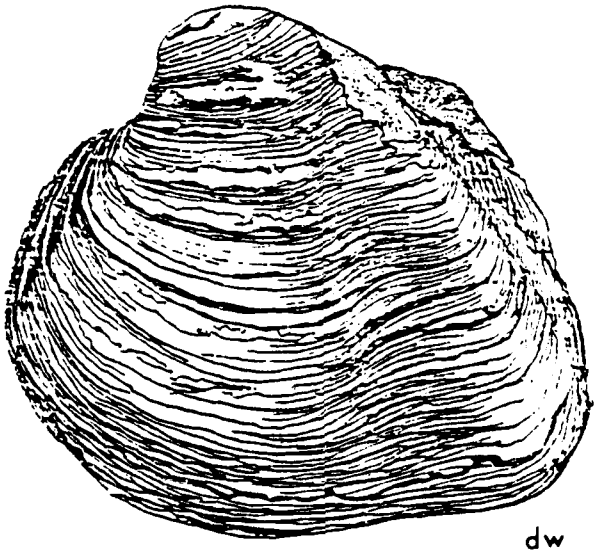

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Exhibit 260

Fusconaia ebena (Lea), Ebony Shell

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note the rounded ventral and post-basal margins and that the beak curves anteriad.

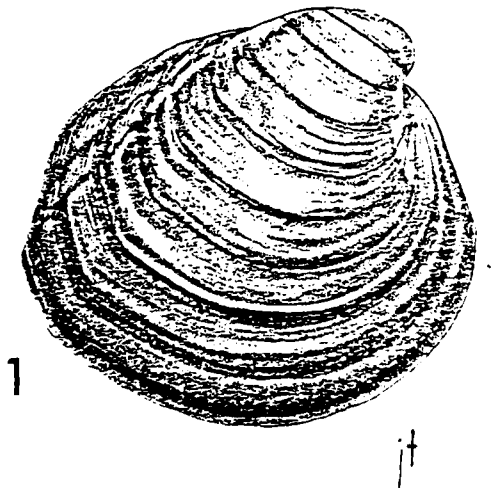

Exhibit 261

Megalonaias gigantea (Barnes), Washboard

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note that the upper disc is sculpted (contrast Exhibit 262, Figure 3) and that the sculpture is an extension of that on the beak.

Figure 2. Lateral view of hinge of left valve. (About 1.0x.)

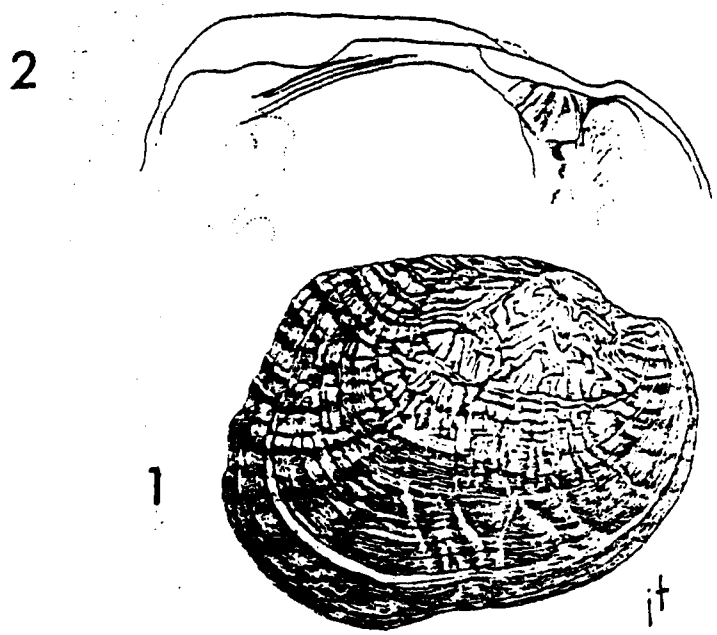

Exhibit 262

Amblema plicata (Say), Threeridge

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note beak sculpture, several rather sharp concentric ridges (contrast Exhibits 256 and 259, Figure 1), and the pigmented (green) rays on the posterior ridge and slope, which usually are lost in the adult (see Figure 2).

Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) Note that sculpture on upper disc is not umbonal in character (contrast Exhibit 261, Figure 1).

Figure 3. Lateral view of hinge of left valve. (About 1.0x.)

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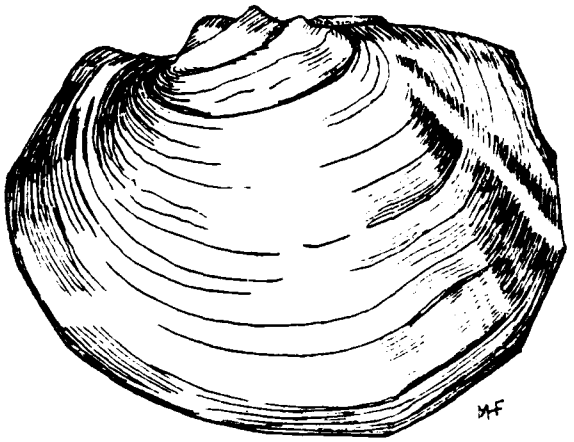

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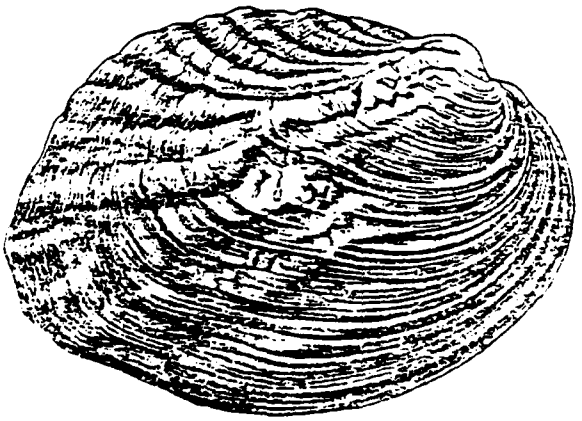


Exhibit 263

Plethobasus cyphyus (Rafinesque), Bullhead

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note triangular outline of post-basal margin (arrows) and see annotation of couplet-choice 7a (above).

Figure 2. Lateral view of hinge of left valve. (About 1.0x.) Note heavy dentition.

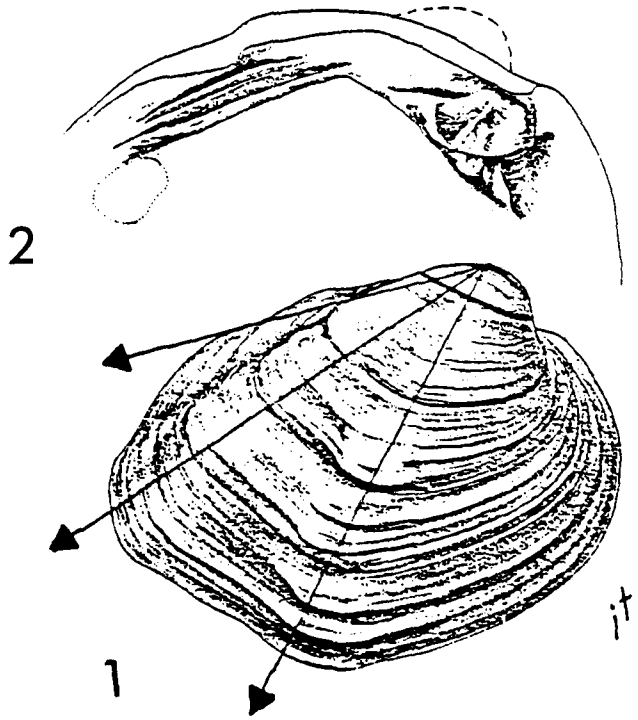
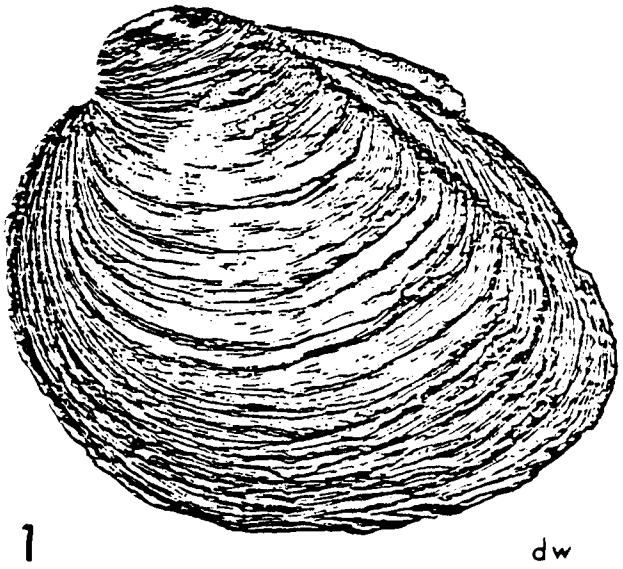


Exhibit 264

Pleurobema rubrum (Rafinesque), Pink Pigtoe

Figure 1. Lateral view of outer surface of left valve. (About 1.0x.) Note the pointed postbasal margin and the rounded posterior ridge (contrast Exhibits 259 and 260, Figures 2 and 3 and Figure 1, respectively). This figure illustrates the *P. rubrum* morph that is usually encountered in the UMR today.

Figure 2. (a) Lateral view of outer surface of right valve. Note pointed postbasal margin and somewhat arcuate outline. (About 1.0x.) (b) Lateral view of inner surface of left valve. (About 1.0x.) Note heavy dentition. (c) Partial dorsal view emphasizing growth lines. Note laterally compressed posterior (left) outline. This figure illustrates another of the several morphs of *P. rubrum*; this one is rarely found in the UMR any longer.



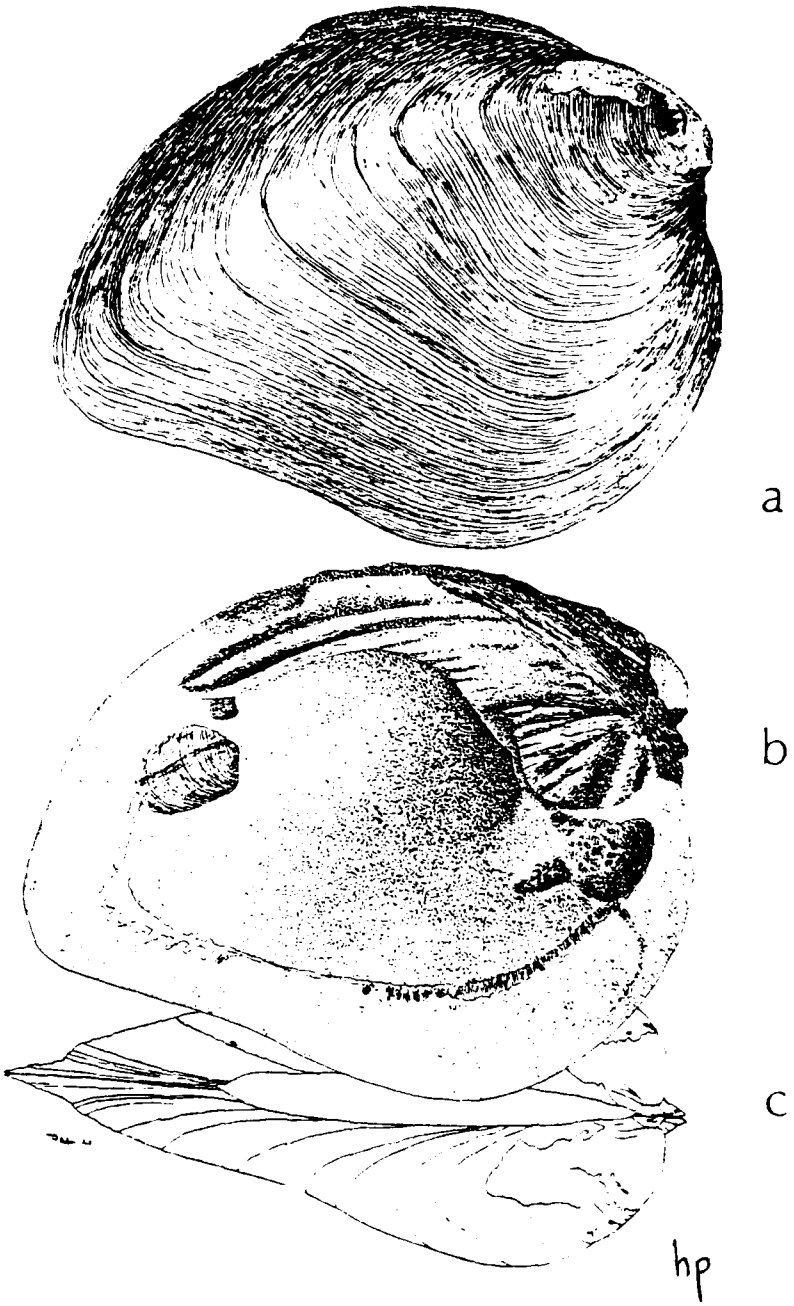

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Exhibit 265

Elliptio crassidens (Lamarck), Elephant Ear

Figure 1. (a) Lateral view of outer surface of right valve. (About 1.0x.) (b) Lateral view of inner surface of left valve. Note that, although this is a large and heavy shell, the dentition is weak in comparison to those shown in most previous Exhibits. (c) Partial dorsal view emphasizing growth lines.

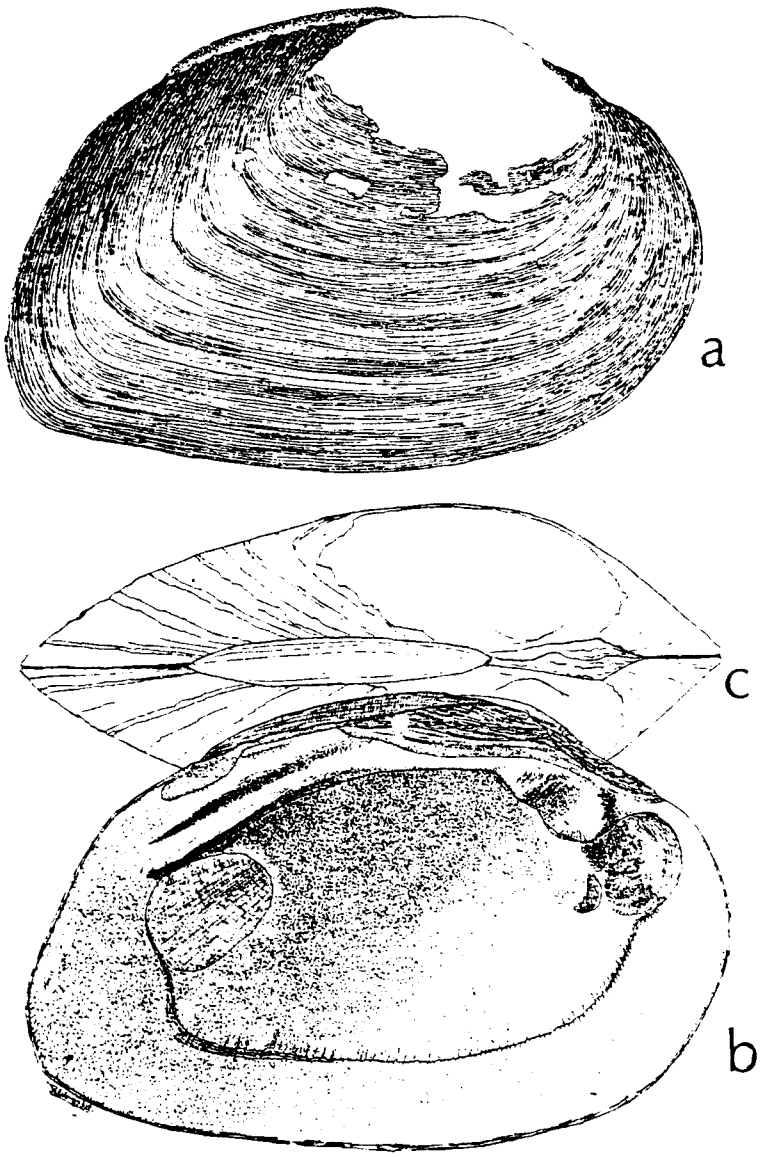

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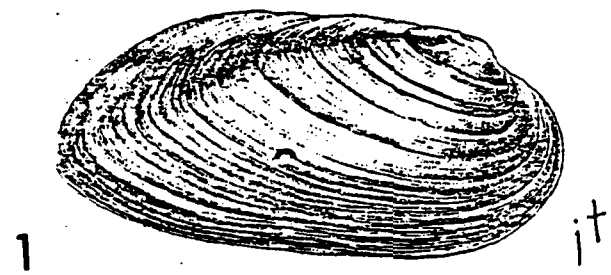
Exhibit 266

Elliptio dilatata (Rafinesque), Spike

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Most *E. dilatata* from the UMR today are more nearly dagger-shaped.

Figure 2. Ventral view of posterior end of whole animal preserved in lifelike aspect. (About 4.0x.) Note the narrow, apapillose apposing postbasal mantle margins (oblique arrows) and the distal (ventral) margins of the inner demibranchs of the gills (vertical arrows), which exhibit partioning into water tubes. Contrast this figure to, e.g., Exhibit 280, Figures 4 and 5.



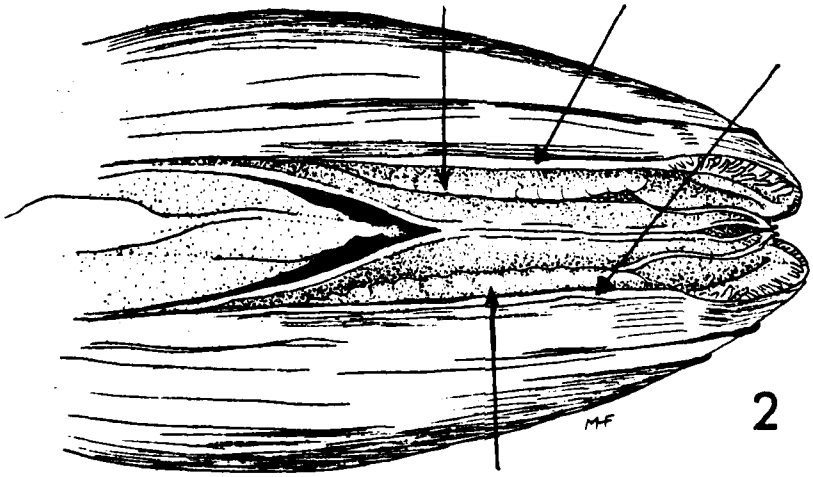
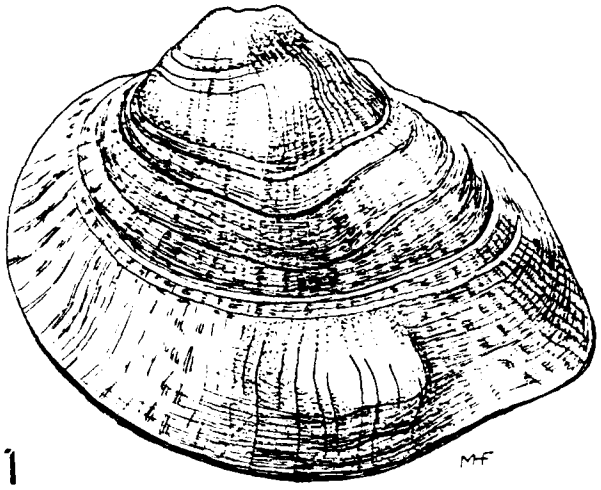


Exhibit 267

Obliquaria reflexa (Rafinesque), Threehorn

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 6.0x.)

Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) Note radial row of knobs on disc, which perpetuate the beak sculpture (see Figure 1).



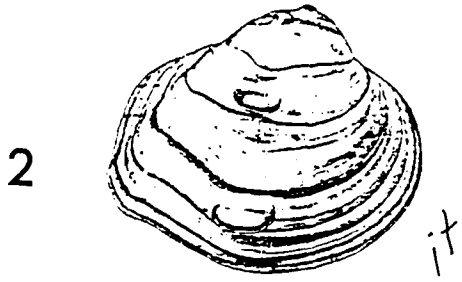


Exhibit 268

Proptera alata (Say), Pink Heelsplitter

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note the unsculpted posterior slope and the lack of periostracal "scratches" on the disc (contrast Exhibit 289). Note, also, the weak (in this specimen, absent) anterior ala ("wing") (arrow) (contrast Exhibit 269 and Exhibit 272, Figures 2 and 3).

Figure 2. Lateral view of inner surface of left valve. (About 1.0x.) Note the weak pseudocardinal teeth. The broken row of open subrectangles (arrow) above the lateral teeth indicates where the ligament broke when the valves were parted.

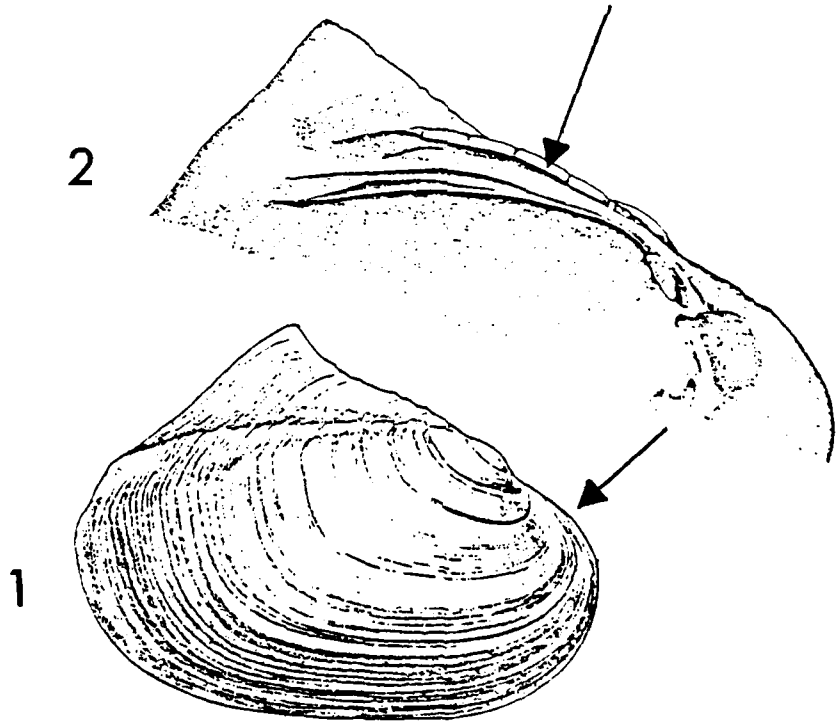


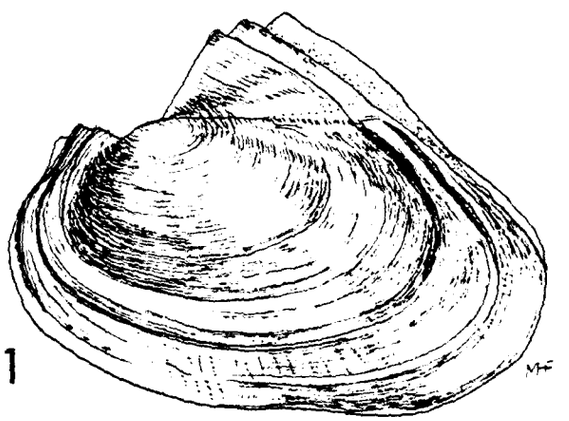
Exhibit 269

Proptera laevissima (Lea), Pink Papershell

Figure 1. *Lateral view of outer surface of left valve.* (About 1.0x.) Note the strong bi-alation (contrast Exhibits 268, 272, and 289, Figure 1a) and that the dorsal margins of the alae ("wings") are almost perpendicular to one another. (Contrast Exhibit 272, Figures 2 and 3).

Figure 2. SAME, but right valve.

Figure 3. Left lateral view of animal with foot (i) and pseudosiphons (ii) extended. Note the length of the latter structures.



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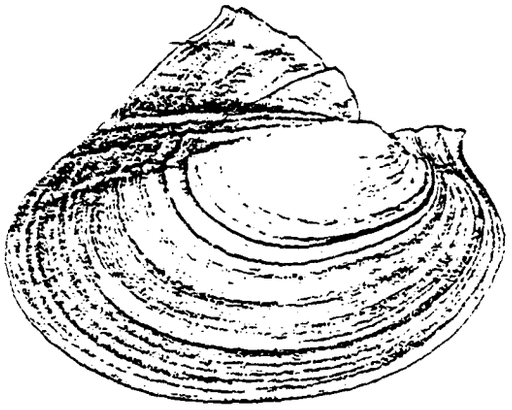

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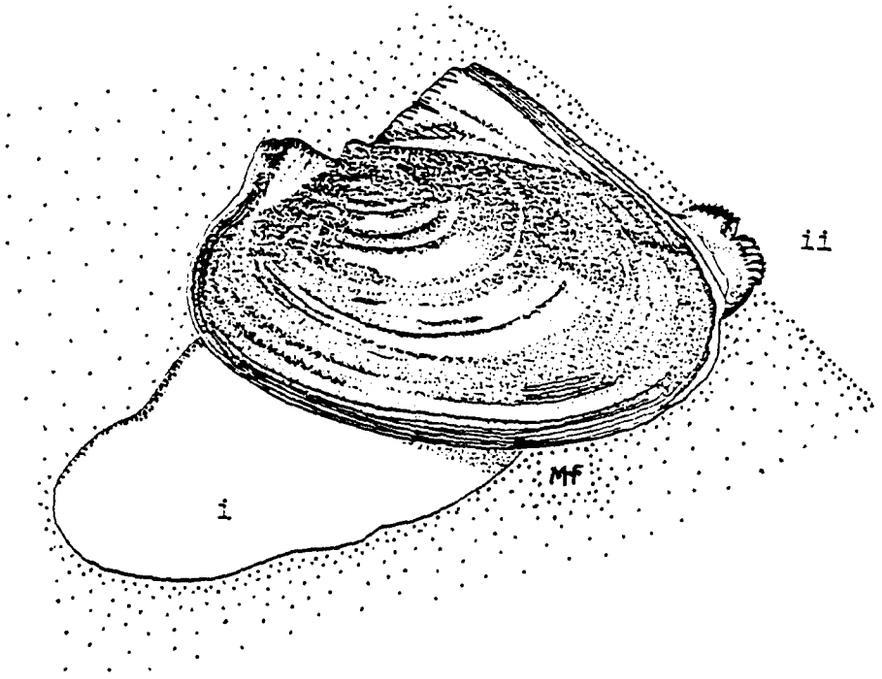
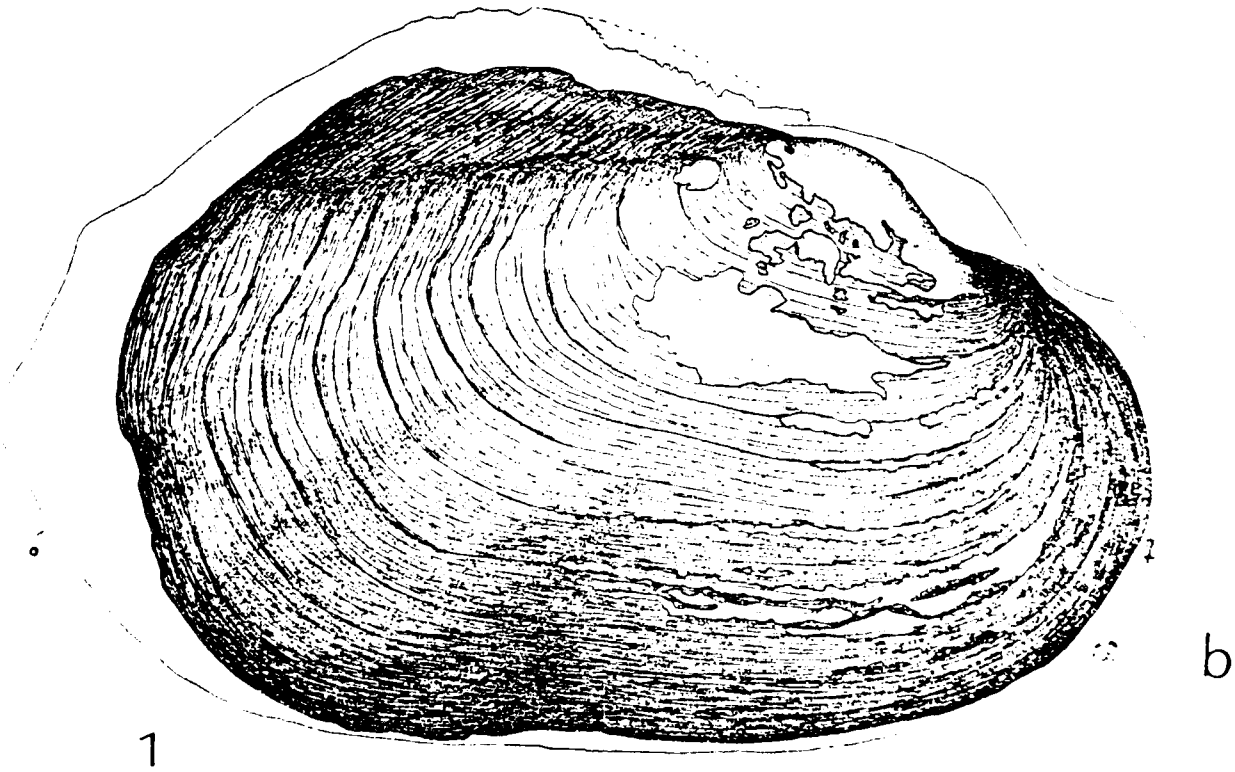


Exhibit 270

Proptera purpurata (Lamarck), Purple Pocketbook

Figure 1. (a) Dorsal view. (About 1.0x.) Note inflation. (b) Lateral view of outer surface of right valve of female and lateral outline of male right valve. (About 1.0x.) Note the lack of alae (contrast Exhibits 268, 269, and 289, Figure 1a) and the difference between the male (♂) and female (♀) outlines.



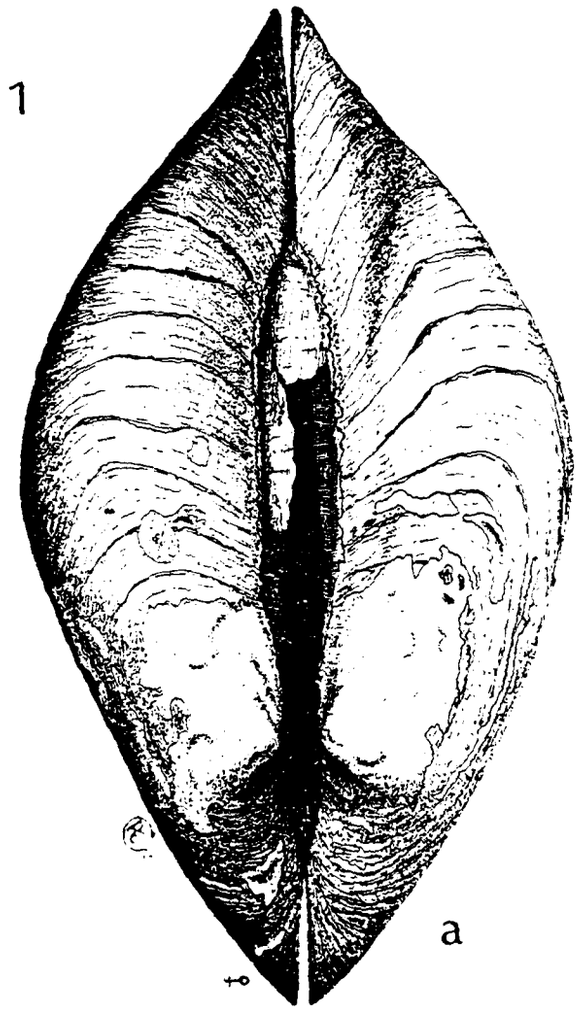

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Exhibit 271

Proptera capax (Green), Fat Pocketbook

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note the elevated and swollen umbo (arrow).

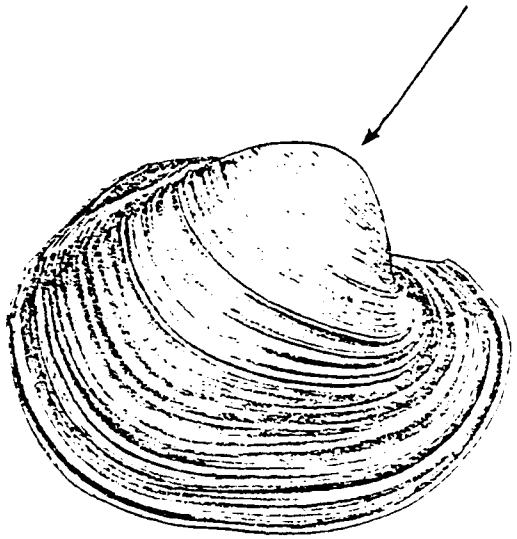

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Exhibit 272

Leptodea fragilis (Rafinesque), Fragile Papershell

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 3.0x.) Note lack of beak sculpture.

Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) Note the strong posterior (left) ala and weak anterior (right) one (contrast Exhibits 268, 269, 273, and 289, Figure 1a).

Figure 3. Lateral view of inner surface of left valve. (About 1.0x.) Note weak pseudocardinal dentition (arrow), and contrast Exhibit 268, Figure 2.

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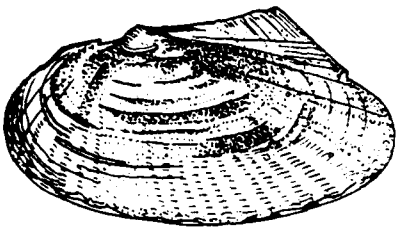

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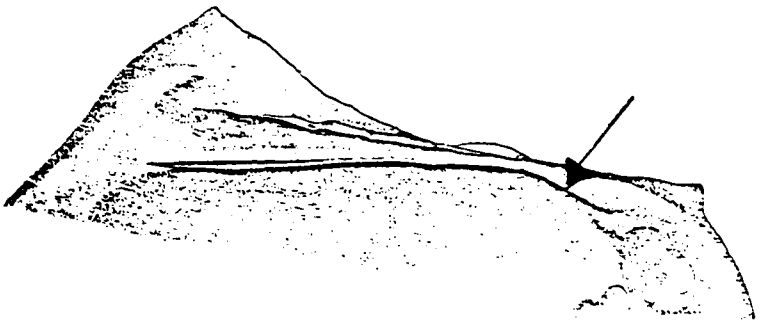

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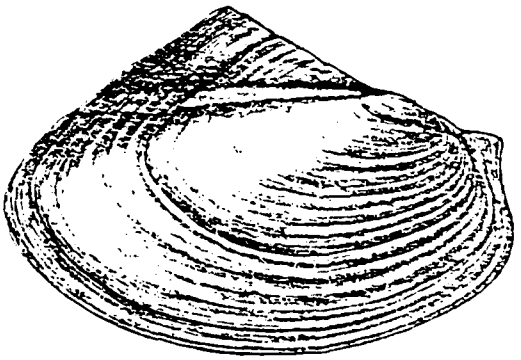

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Exhibit 273

Leptodea leptodon (Rafinesque), Narrow Papershell

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note the lack of bi-alation and the weak posterior ala (arrow) (contrast Exhibit 272).

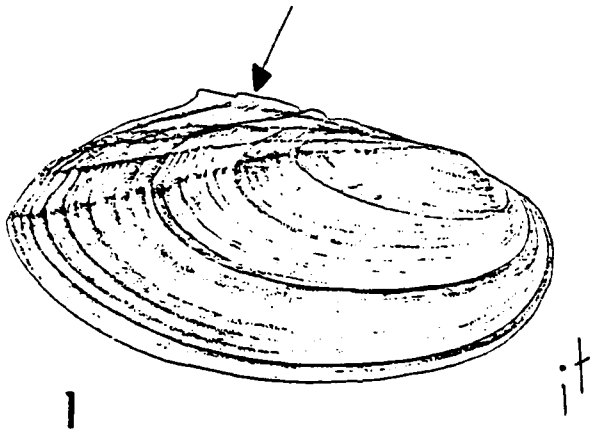

Exhibit 274

Ellipsaria lineolata (Rafinesque), Butterfly

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note the radial rows of pigmented chevrons.

Figure 2. Lateral view of hinge of left valve. (About 1.0x.)

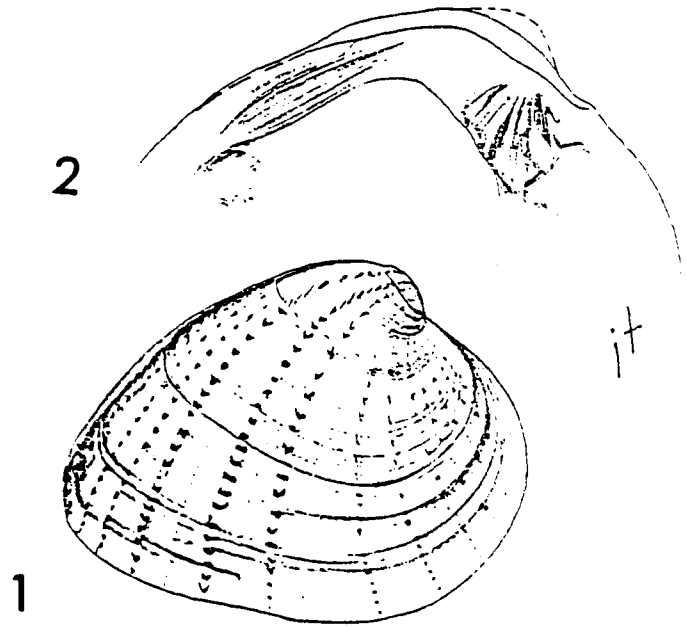

Exhibit 275

Truncilla truncata (Rafinesque), Deertoe

Figure 1. Lateral view of outer surface of left valve of male. (About 1.0x.) The postbasal margin of the female is more rostrate. This figure is of a specimen lacking the radial rows of pigmented chevrons that commonly occur in this species.

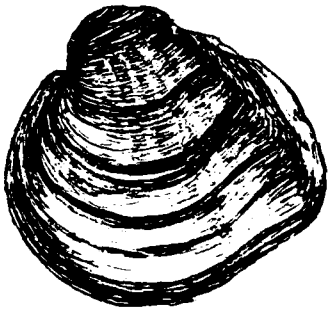

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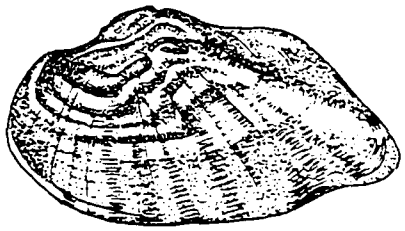
Exhibit 276

Truncilla donaciformis (Lea), Fawnfoot

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note the beak sculpture, numerous non-concentric wavy ridges.

Figure 2. Lateral view of outer surface of right valve of male (About 1.5x.) Note the radial rows of pigmented chevrons. The female is much higher posteriorly.



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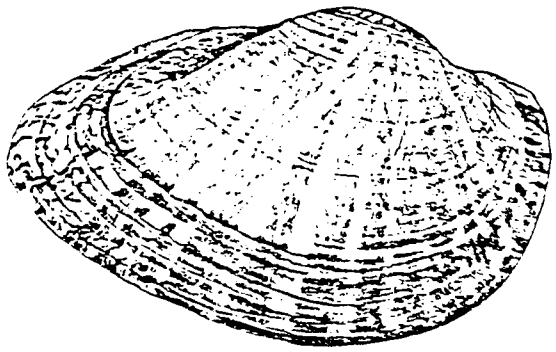

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Exhibit 277

Obovaria olivaria (Rafinesque), Hickorynut

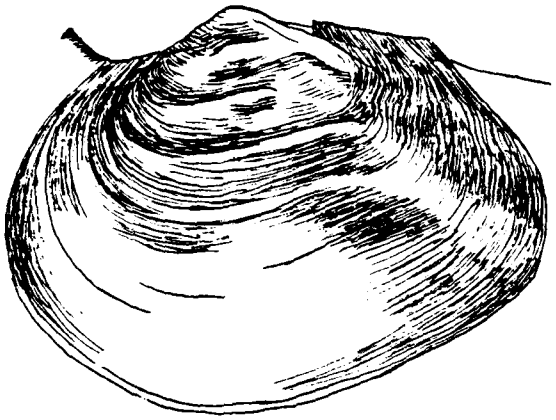
Figure 1. Lateral view of outer surface of immediately post-glochidial growth of left valve. (About 10.0x.) Note the beak sculpture, several weak non-concentric ridges (contrast Exhibit 284, Figure 1).

Figure 2. Lateral view of outer surface of left valve of young adult. (About 2.0x.) Note radial raised lines on periostracum.

Figure 3. Lateral view of outer surface of left valve. (About 1.0x.) Note elongate-oval outline and prominent, somewhat pointed umbo (contrast Exhibit 284, Figures 4 and 7).

Figure 4. Lateral view of inner surface of right valve. (About 1.0x.) Contrast Exhibit 284, Figures 5 and 8.

Figure 5. SAME, but hinge only. (About 2.0x.) Note lamella (lower arrow) below lateral tooth (upper arrow), and compare with Exhibit 284, Figure 6.



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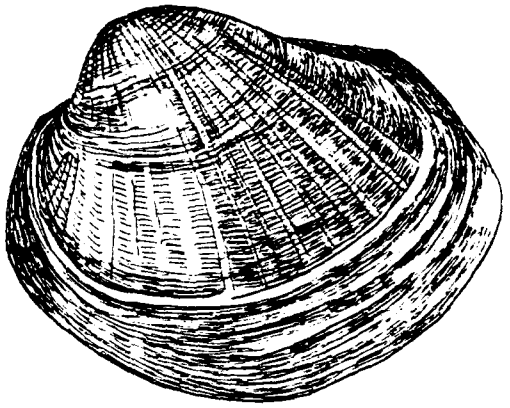

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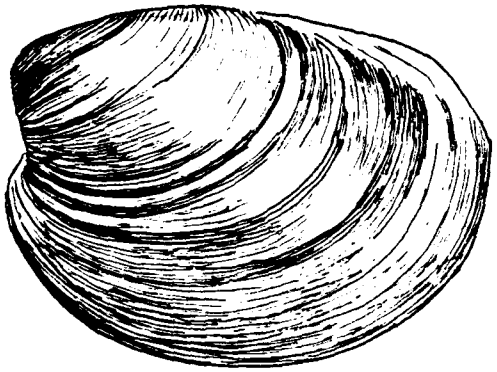

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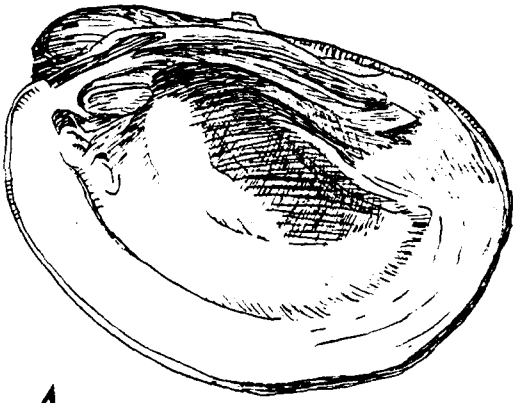

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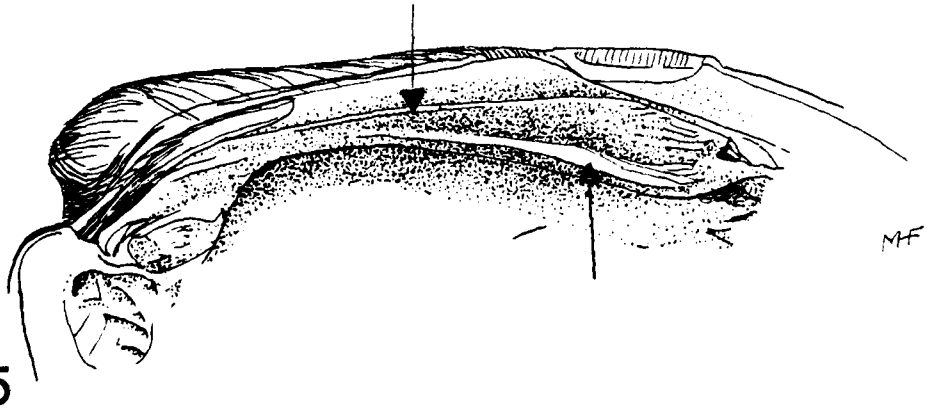

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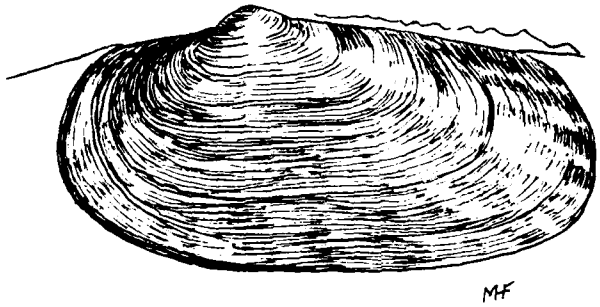
Exhibit 278

Actinonaias carinata (Barnes), Mucket

Figure 1. Lateral view of outer surface of immediately post-glochidial growth of left valve. (About 10.0x.) Note the lack of beak sculpture, and contrast Exhibits 277 and 284, Figure 1.

Figure 2. Lateral view of outer surface of right valve of female. (About 1.0x.) The male is somewhat less high posteriorly; conchological sexual dimorphism occurs in *Actinonaias*, but is weakly expressed.

Figure 3. Lateral view of hinge of left valve. (About 1.0x.)



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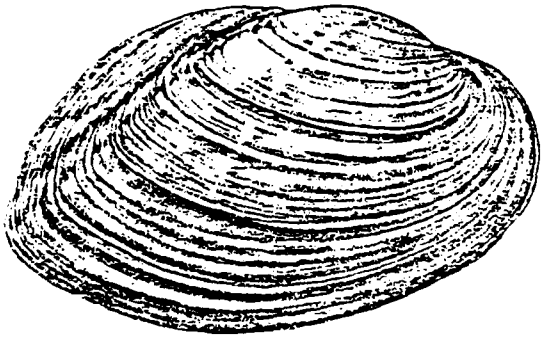

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Exhibit 279

Actinonaias ellipsiformis (Conrad), Ellipse

Figure 1. Lateral view of outer surface of right valve. (About 1.5x.) Contrast Exhibit 278, Figure 2.

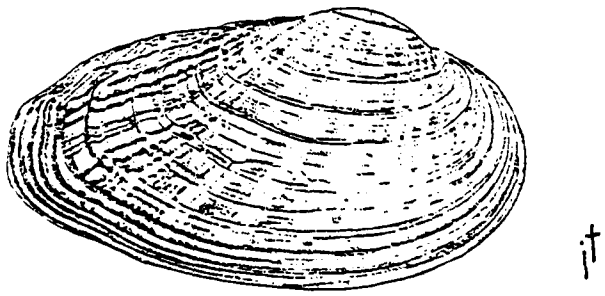

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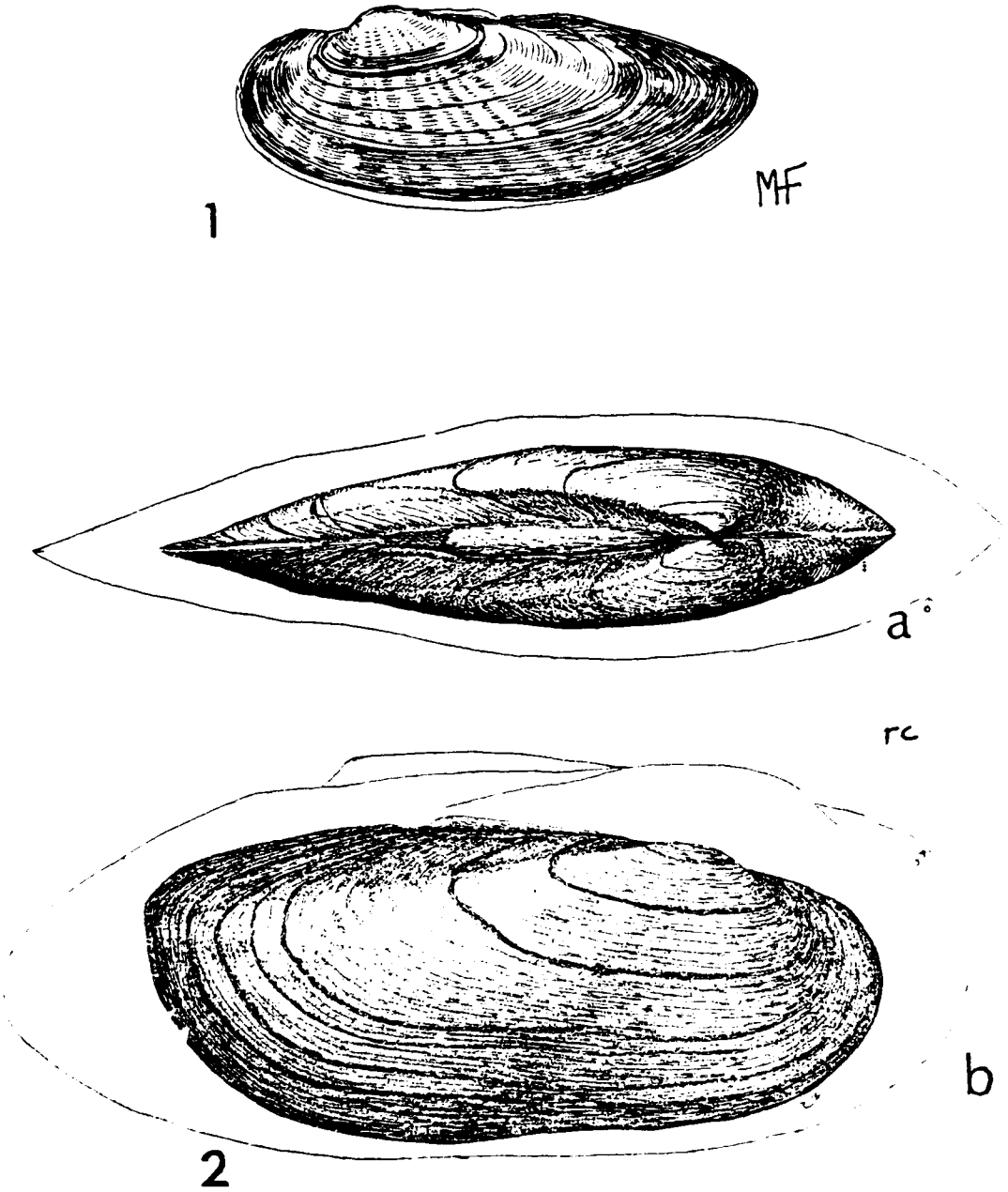
Exhibit 280

Ligumia recta (Lamarck), Black Sandshell

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note lack of beak sculpture (contrast Exhibit 283, Figure 1).

Figure 2. (a) Dorsal view of female and dorsal outline of male. (About 1.0x.) Note the lateral compression of both sexes. (b) Lateral view of outer surface of right valve of female and right lateral outline of male. (About 1.0x.) Note the nearly dagger-like shape of the male. Compare the lateral view of the female to Exhibit 281.

Figure 3. (a) Ventral view of posterior end of male preserved in almost lifelike aspect. (About 2.5x.) Note the small papillae on the apposing postbasal mantle margins. (b) Ventral view of posterior end of female preserved in almost lifelike aspect (About 2.5x.) Note the large papillae on the apposing postbasal mantle margins and the latters' breadth.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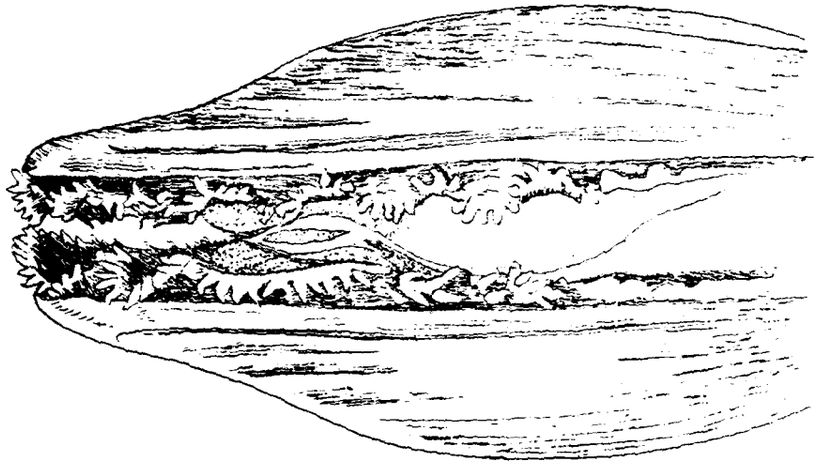

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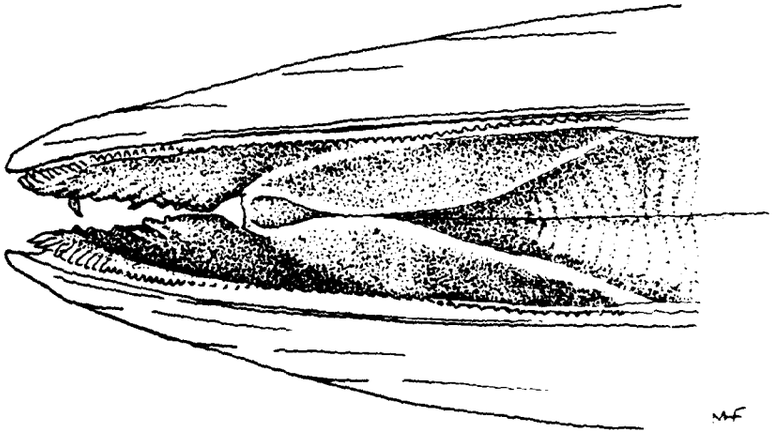

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Exhibit 281

Ligumia subrostrata (Say), Western Pondmussel

Figure 1. Lateral view of outer surface of right valve of female. (About 1.0x.) Compare non-outline portion of Figure 2b, Exhibit 280. Male left lateral outline resembles that of Figure 1, Exhibit 280.

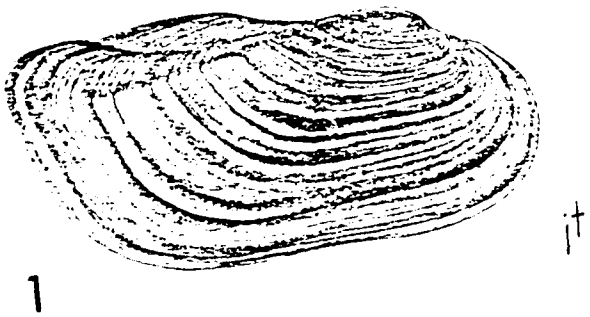


Exhibit 282

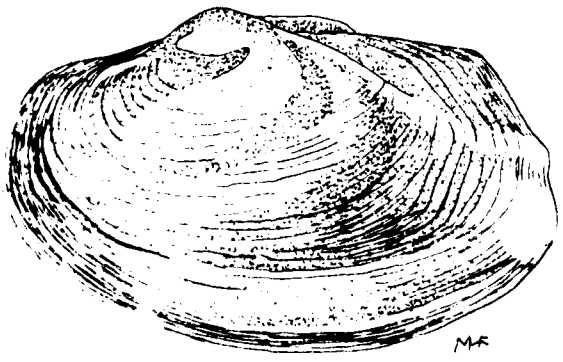
Carunculina parva (Barnes), Lilliput

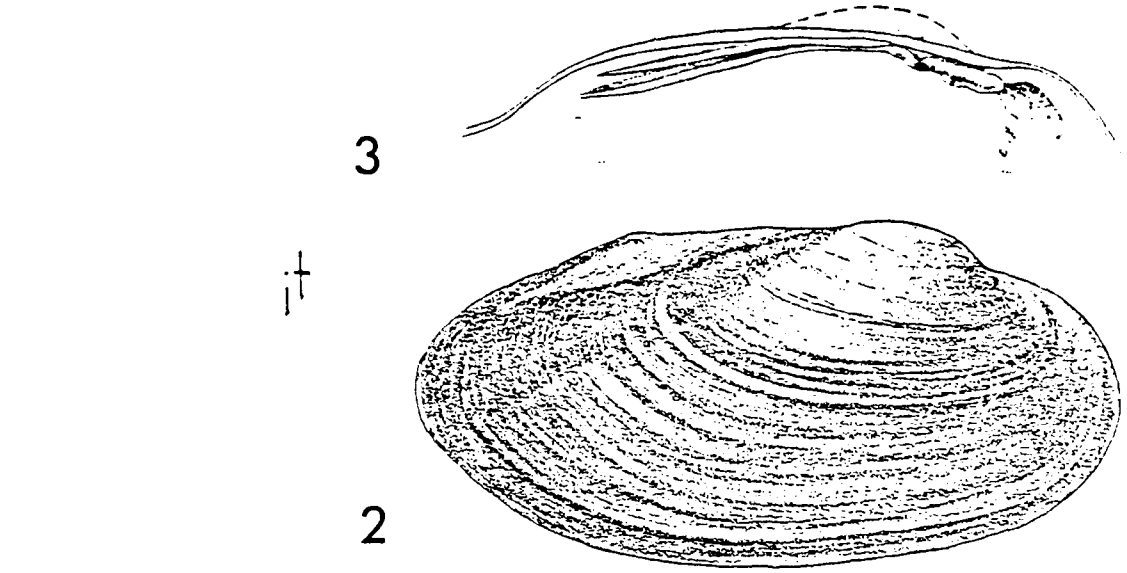
Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note beak sculpture, several prominent ridges about 45° oblique to the growth lines.

Figure 2. Lateral view of outer surface of right valve of male. (About 3.0x.) The female shell is extended postbasad.

Figure 3. Lateral view of hinge in left valve. (About 3.0x.)

Figure 4. Ventral view of posterior end of (a) male and (b) female animals preserved in lifelike aspect. Note the apposing, female caruncles (arrows); the greater breadth of the female's postbasal mantle margins; and that papillation of those margins extends farther anteriad in the male.





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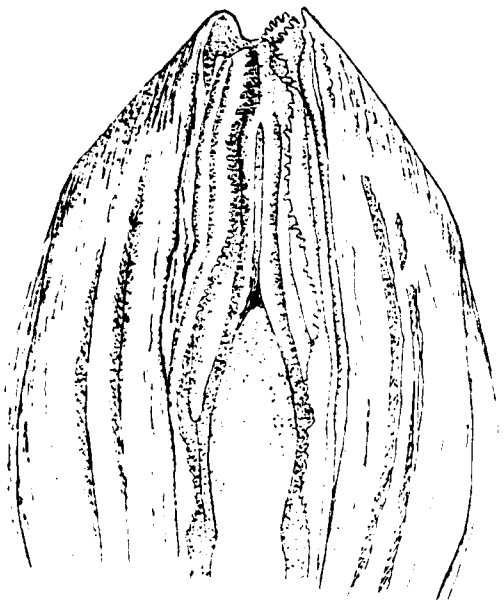

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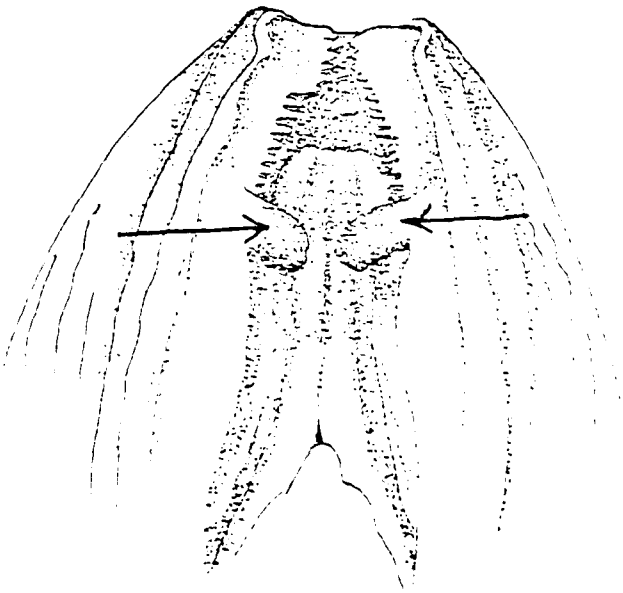

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Exhibit 283

Lampsilis teres (Rafinesque), Yellow Sandshell

Figure 1. Lateral view of outer surface of immediately post-glochidial growth of left valve. (About 10.0x.) Note beak sculpture, several nearly straight, sharp ridges oriented postbasal to the growth lines. Contrast this character-state to those in Figure 1 of Exhibits 282, 284, and 286, as examples.

Figures 2. Lateral view of outer surface of right valve of male. (About 1.0x.) Contrast Figure 3a.

Figure 3. Lateral view of outer surface of right valve of (a) female and (b) animal of undetermined sex. Note that sexual dimorphism in *L. teres* can be weakly expressed and that some individuals cannot be sexed on the basis of conchological features alone.

Figure 4. Posterior end of female preserved in nearly lifelike aspect. (a,b) Ventral views. (c) Ventrolateral view. Note the variability of the mantle flaps.

Figure 5. Left valve and mantle margin of female with emphasis upon outline. (a) Ventrolateral view. (b) Ventral view. Note the unusually great breadth of the postbasal mantle margin in this individual, and contrast its lack of pigmentation to the character-state in Figures 4b and c

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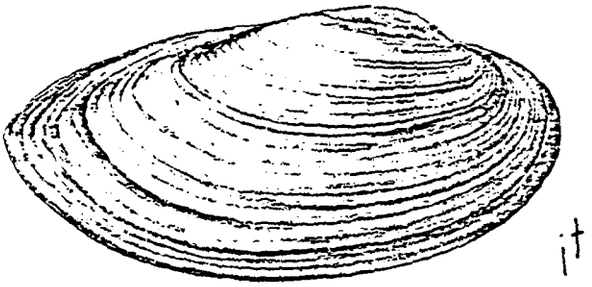
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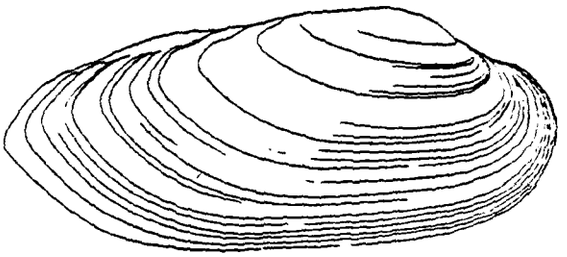
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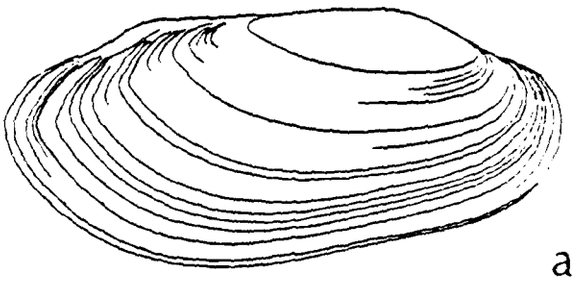
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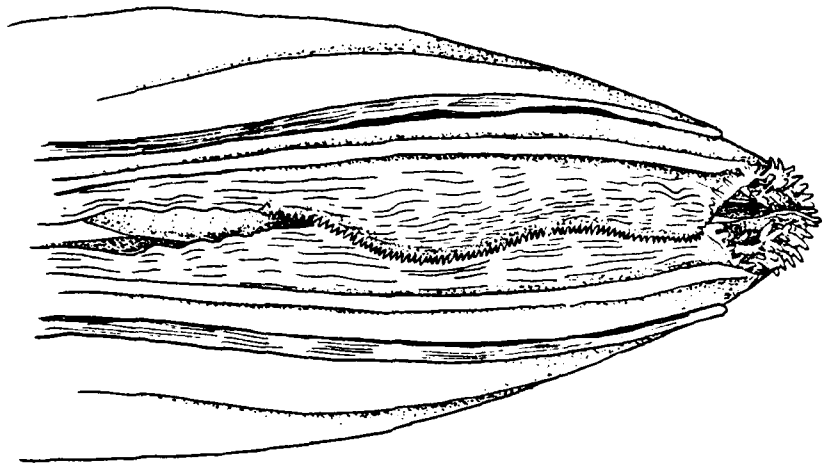

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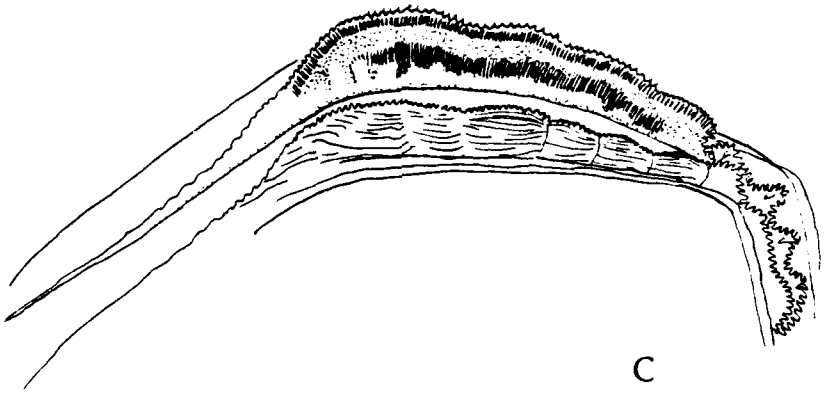

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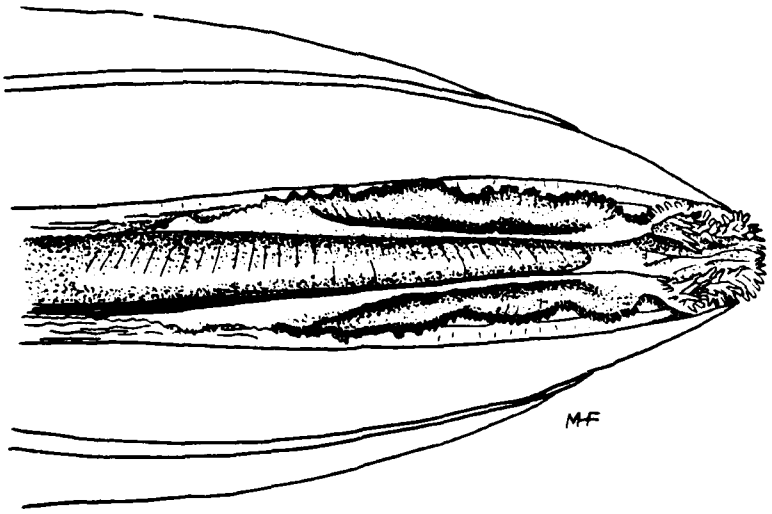

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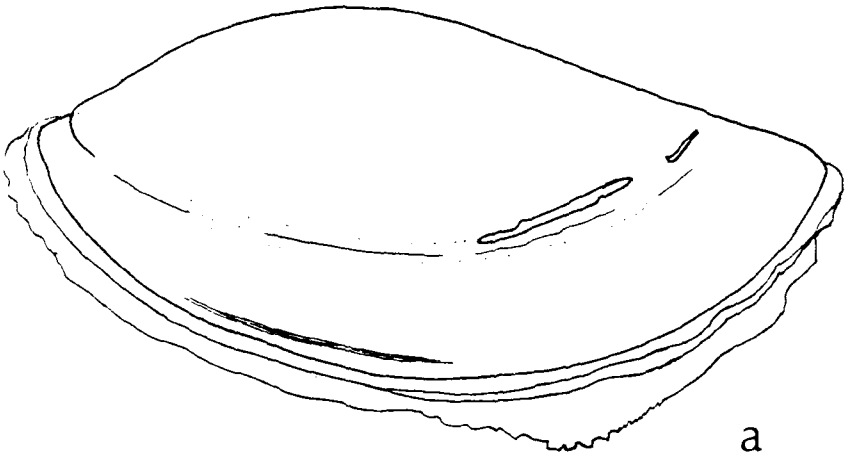

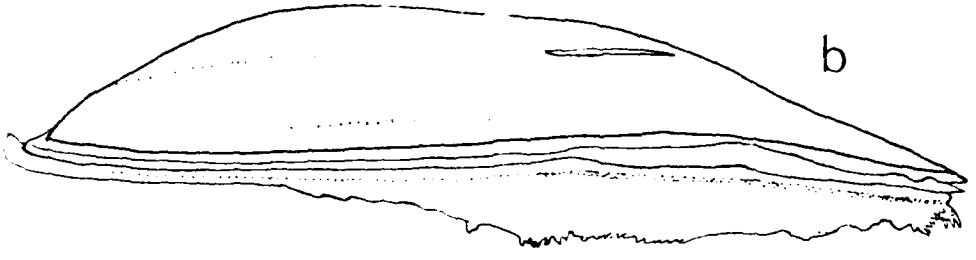

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Exhibit 284

Lampsilis higginsi (Lea), Higgins' Eye

Figure 1. Lateral view of outer surface of immediately post-glochidial growth of the left valve. (About 15.0x.) Note the beak sculpture, several interwoven ridges (compare Figure 1 in Exhibits 277, 278, 285, and 286).

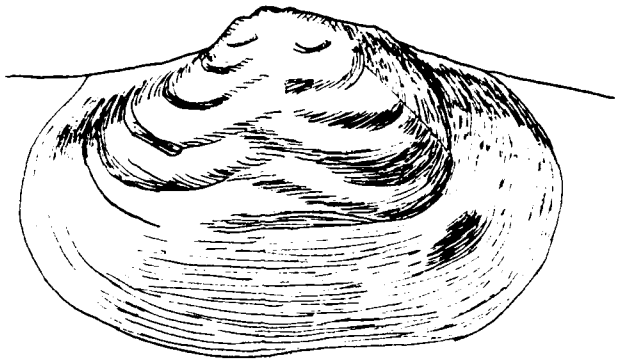
Figure 2. Lateral view of outer surface of left valve of young adult of undetermined sex. (About 1.0x.) Note the more or less radial distribution of pigment (green), which usually is lost in the mature adult.

Figure 3. SAME, but probably a female: note that the posterior height is greater than that of the shell of almost equal length in Figure 2.

Figure 4 and 7. Lateral view of outer surface of left valve of male. (About 1.0x.) Contrast to Exhibit 277, Figure 3.

Figure 5 and 8. Lateral view of inner surface of right valve of male. (About 1.0x.) Contrast to Exhibit 277, Figure 4.

Figure 6. Lateral view of hinge of right valve. (About 2.0x.) Note lamella (lower arrow) below lateral tooth (upper arrow), and compare with Exhibit 277, Figure 5.



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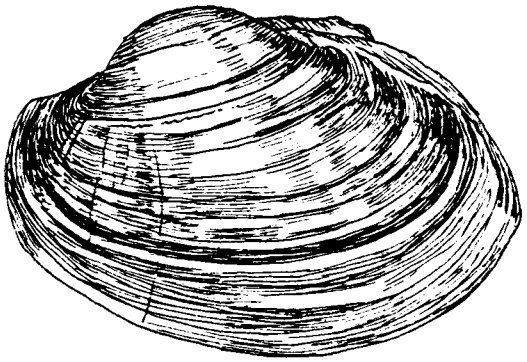

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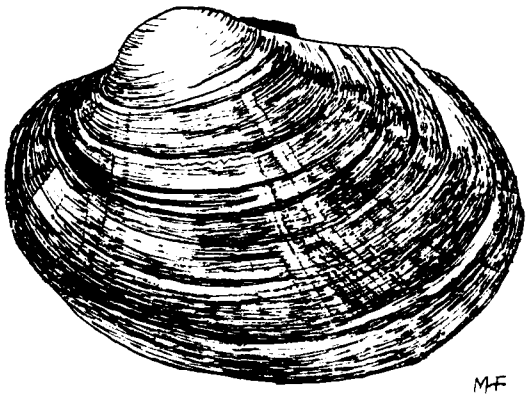

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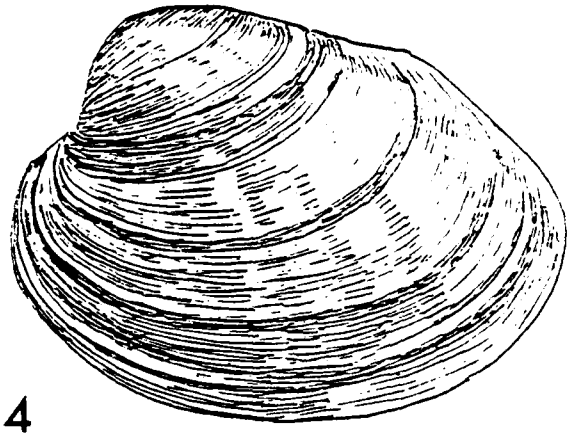

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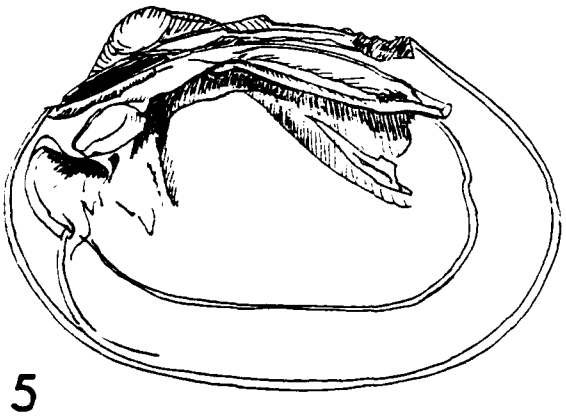

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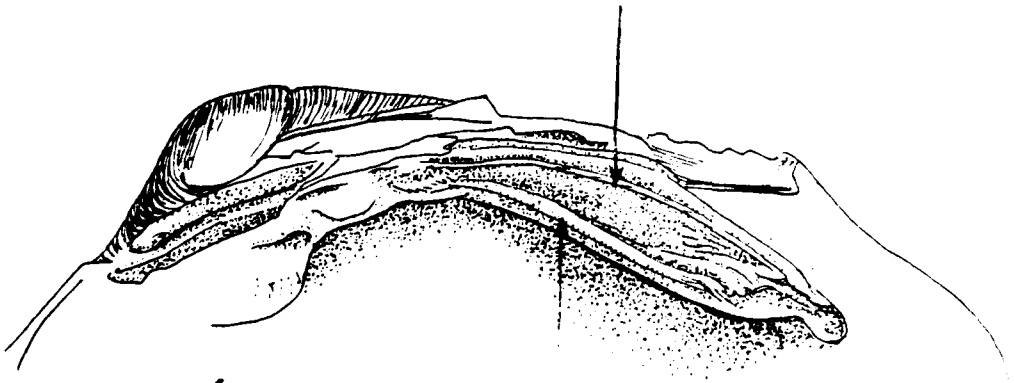

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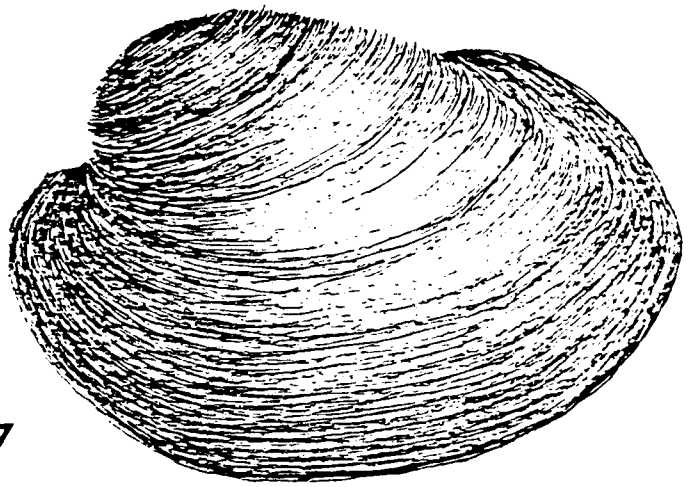

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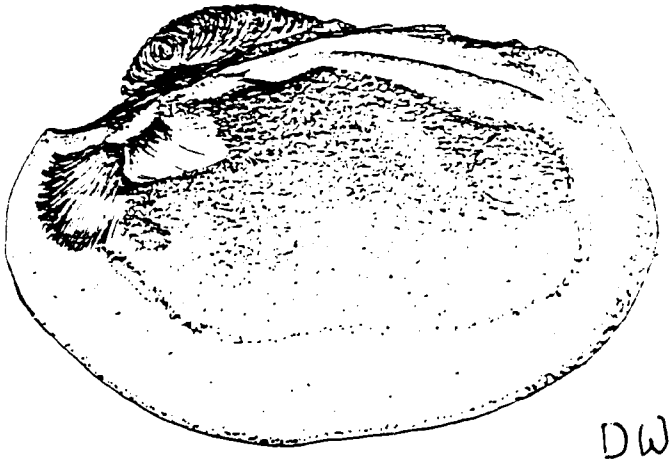

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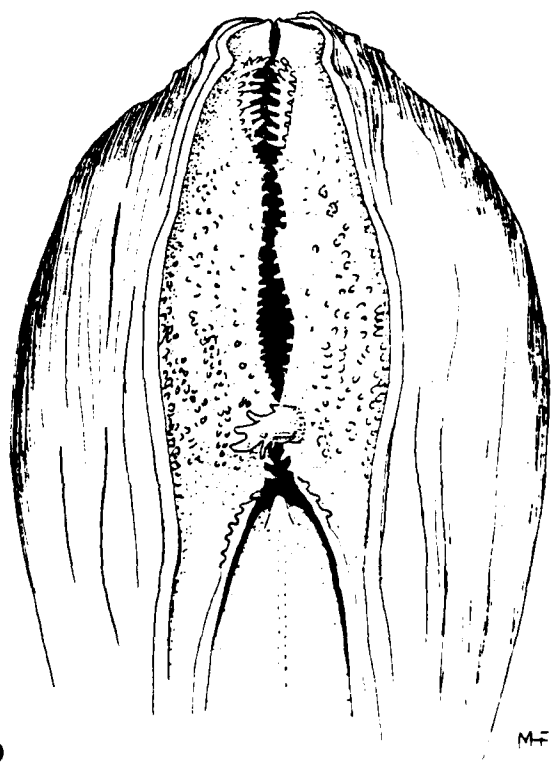
Exhibit 285

Lampsilis radiata siliquoidea (Barnes), Fat Mucket

Figure 1. Ventral view of posterior end of female. (About 2.0x.) Note papillae on outer surface (as well as margin) of mantle flap, plus ribbon-like part of flap (arrow).

Figure 2. (a) Lateral view of outer surface of right valve of female. (About 1.0x.) (b) Dorsal view of female (upper) and male (lower). (About 1.0x.) (c) Lateral view of inner surface of left valve of female (behind) and male (before).



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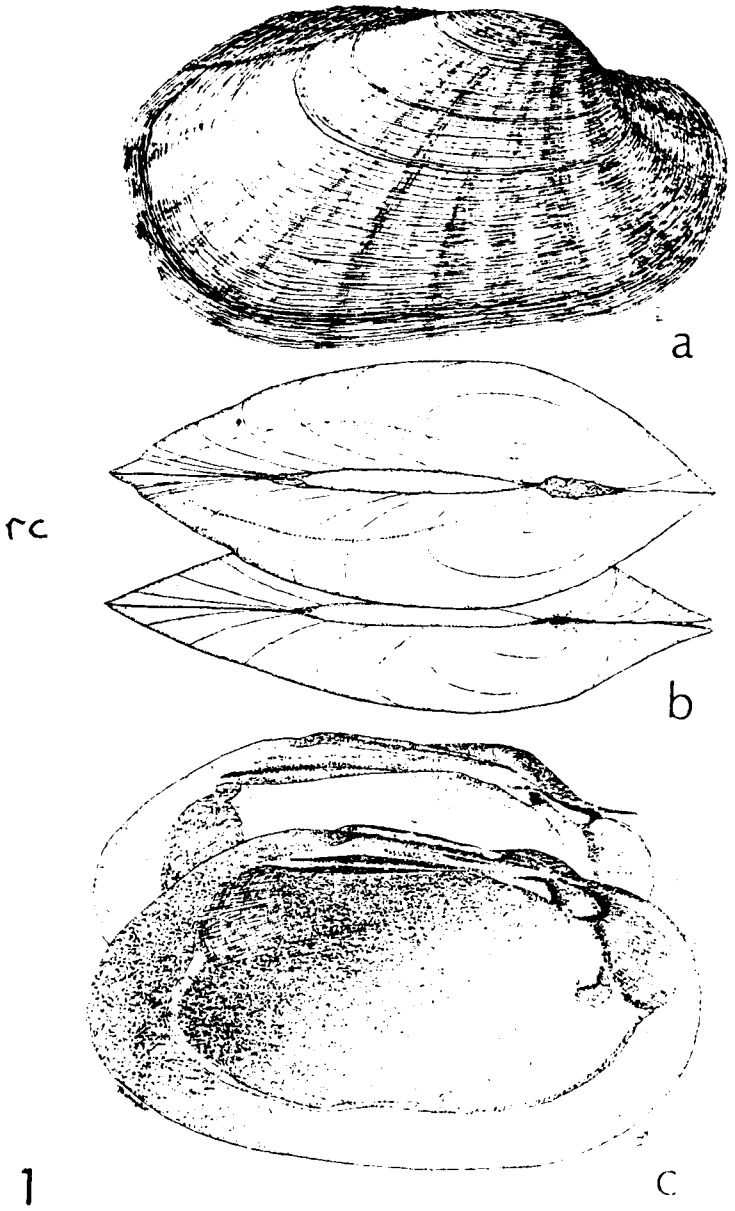
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Exhibit 286

Lampsilis ovata ventricosa (Barnes), Pocketbook

Figure 1. Juvenile. (a) Dorsal view. (About 4.0x.) (b) Lateral view of outer surface of left valve. (About 4.0x.) Note beak sculpture, several rounded concentric ridges, and contrast Figure 1 in Exhibits 283 and 284.

Figure 2. Lateral view of outer surface of right valve of female. (About 1.0x.) The male is much more pointed postbasally.

1

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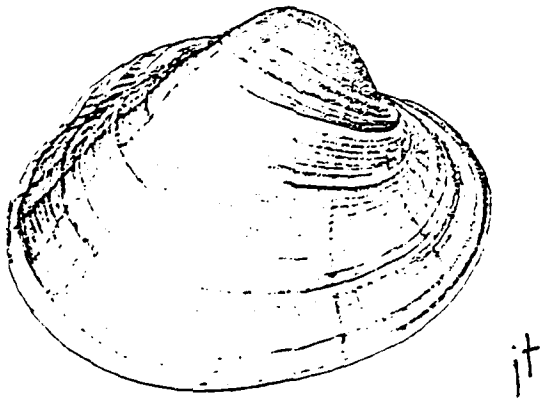

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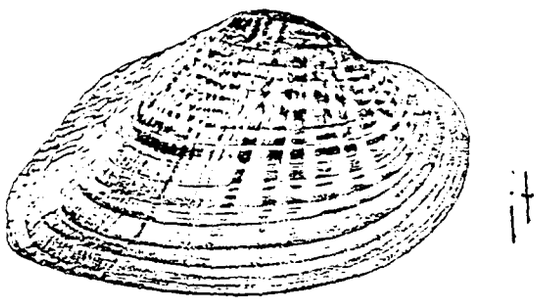
Exhibit 287

Plagiola triquetra (Rafinesque), Snuffbox

Figure 1. Lateral view of outer surface of right valve of male. (About 1.0x.) Note the strong radial ribs before and behind the posterior ridge.

Figure 2. SAME, but left valve of female.



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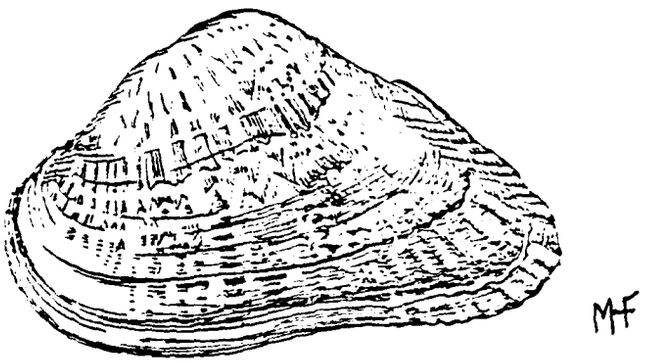

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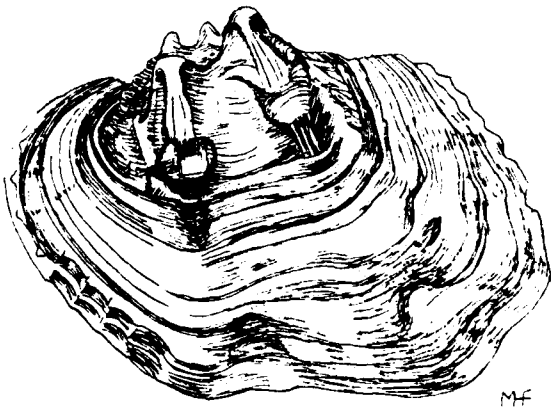
Exhibit 288

Arcidens confragosus (Say), Rockshell

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note beak sculpture, two divergent radial rows of tubercles.

Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) Note spread of beak sculpture onto disc.

Figure 3. Lateral view of hinge of left valve. (About 1.0x.) Note weak, but complete dentition.



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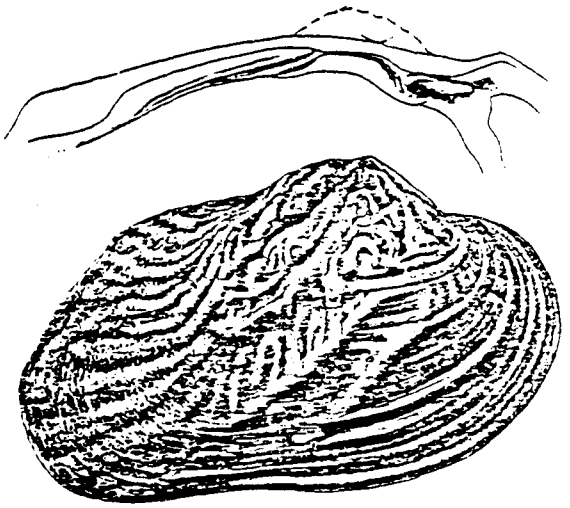

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Exhibit 289

Lasmigona complanata (Barnes), White Heelsplitter

Figure 1. (a) Lateral view of outer surface of left valve. (b) Dorsal view. (Both about 1.0x.) Note beak sculpture, double-looped and extending onto disc, and sculpted corrugations on posterior slope.

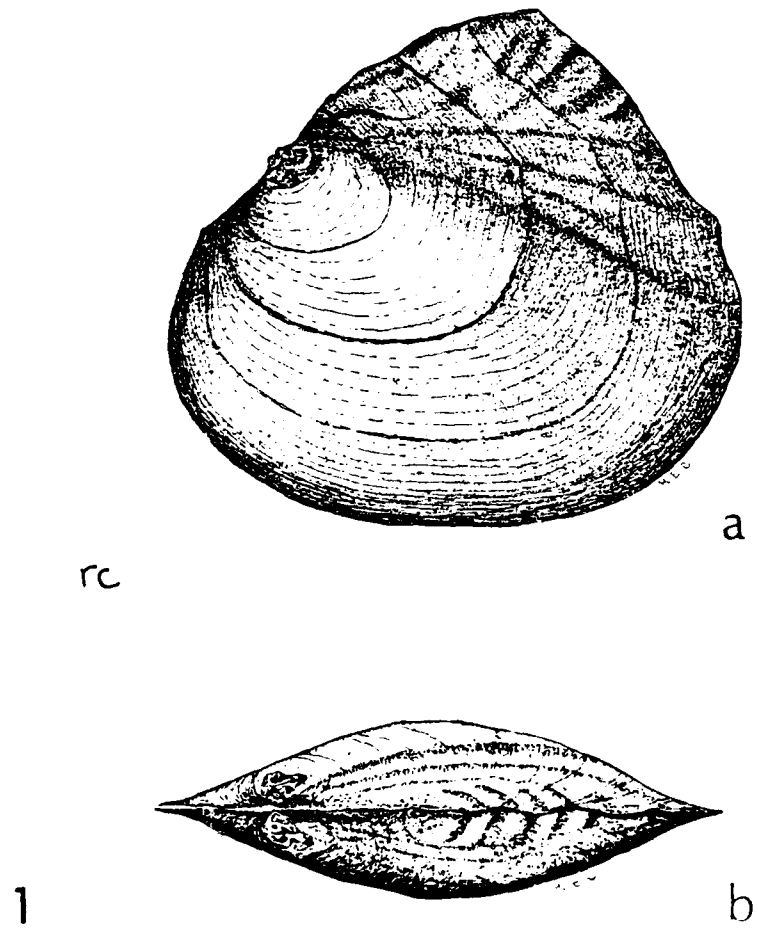

Exhibit 290

Lasmigona costata (Rafinesque), Fluted Shell

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note sculpture before and behind posterior ridge.

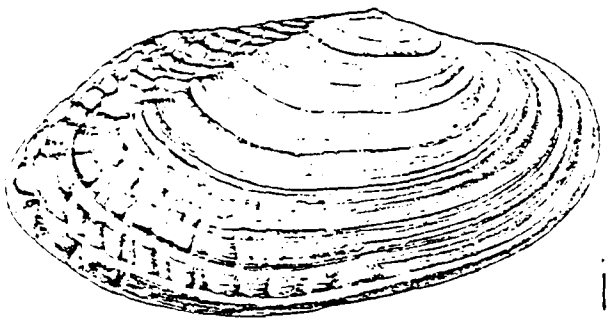

Exhibit 291

Lasmigona compressa (Lea), Creek Heelsplitter

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.)

Figure 2. Lateral view of hinge of left valve. (About 1.0x.) Note complete, moderately well developed dentition.

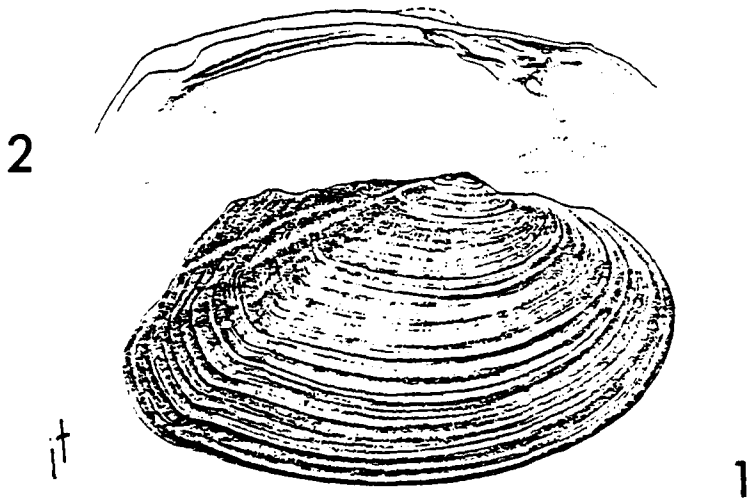

Exhibit 292

Alasmidonta marginata (Say), Elktoe

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note sculpture on posterior slope.

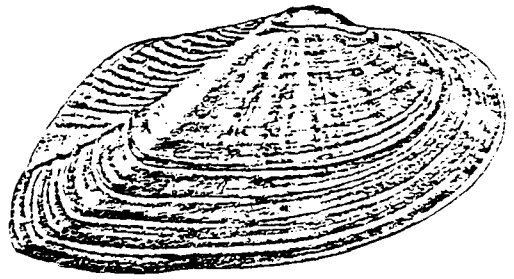

Exhibit 293

Alasmidonta viridis (Rafinesque), Slippershell

Figure 1. Lateral view of outer surface of right valve. (About 1.5x.) Note conspicuous, undulating beak sculpture.

Figure 2. Lateral view of hinge of left valve. (About 2.0x.) Note moderately well developed pseudocardinal teeth and weak lateral dentition.

Exhibit 294

Simpsoniconcha ambigua (Say), Salamander Mussel

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.)

Figure 2. Lateral view of hinge of left valve. (About 1.0x.)

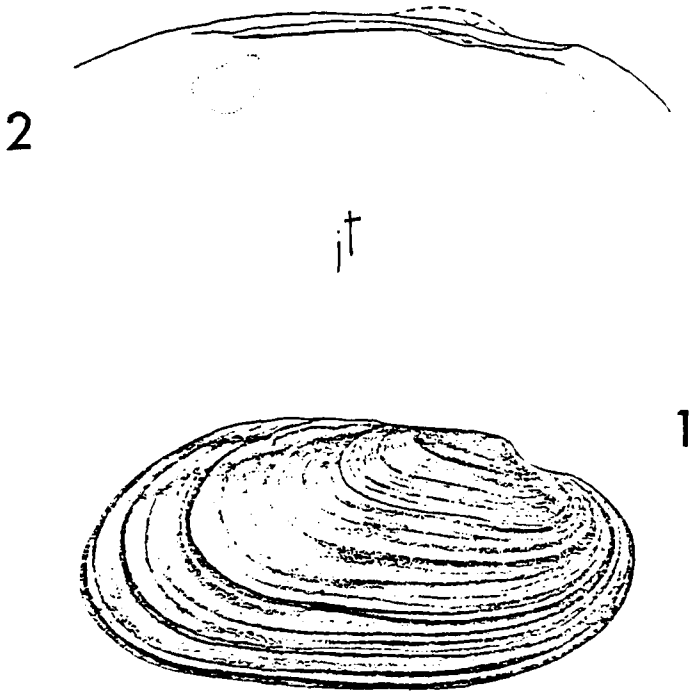

Exhibit 295

Anodontoides ferussacianus (Lea), Cylinder

Figure 1. Lateral view of outer surface of right valve. (About 1.0x.)

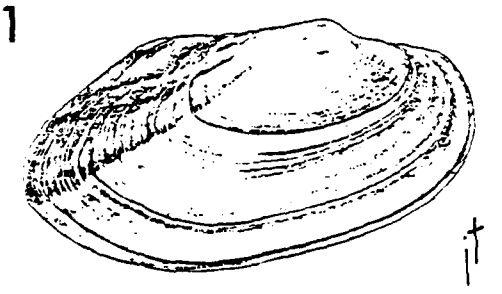

Exhibit 296

Anodonta suborbiculata (Say), Flat Floater

Figure 1. Lateral view of outer surface of immediately post-glochidial growth of left valve. (About 10.0x.) Note that the beak sculpture is confined to a weak (anterior) and a strong (posterior) row of tubercles.

Figure 2. Lateral view of outer surface of left valve. (About 1.0x.)

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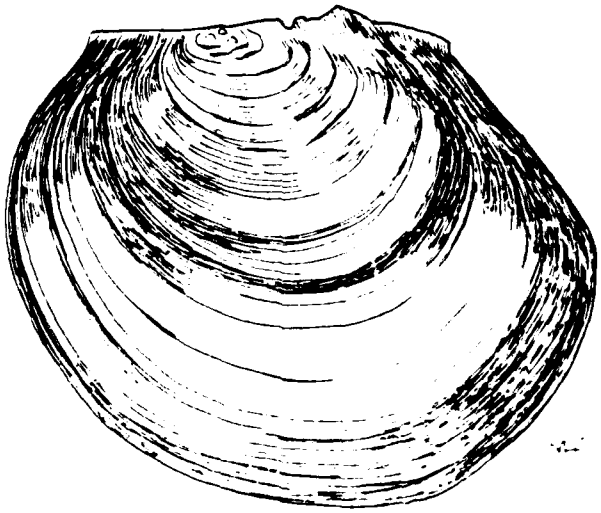

Exhibit 297

Anodonta imbecillis (Say), Paper Floater

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 5.0x.) Note beak sculpture, a few extremely weak ridges subparallel to the growth lines.

Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) Note nearly straight dorsal margin and low, laterally compressed umbo (arrow).

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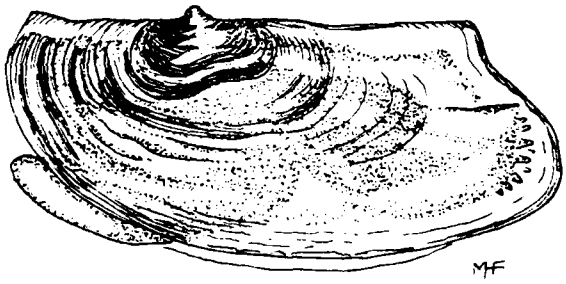

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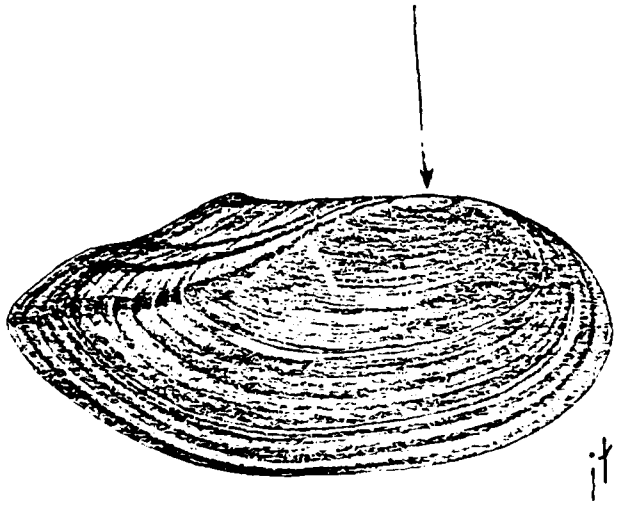

Exhibit 298

Anodonta grandis (Say), Giant Floater

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 5.0x.) Note double-looped beak sculpture.

Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) (a) Typical form. (b) Form sometimes called *A. g. corpulenta* (Cooper).

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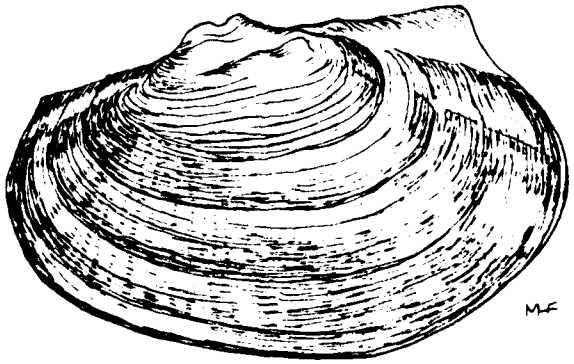

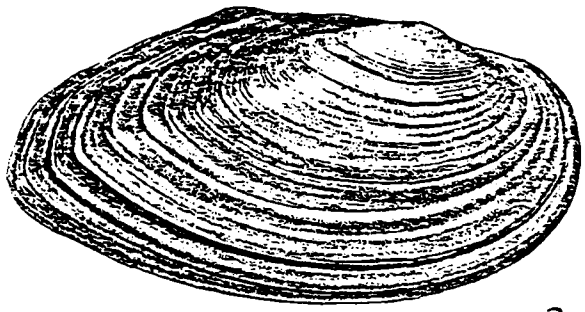

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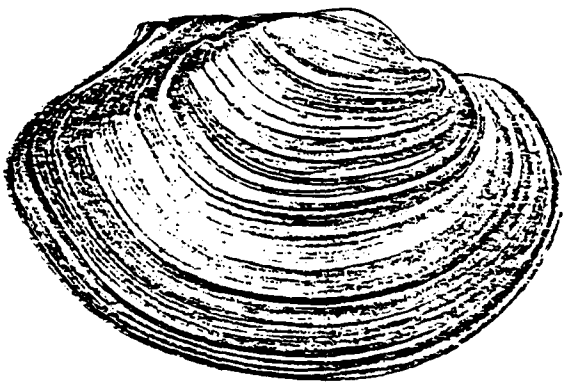

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Exhibit 299

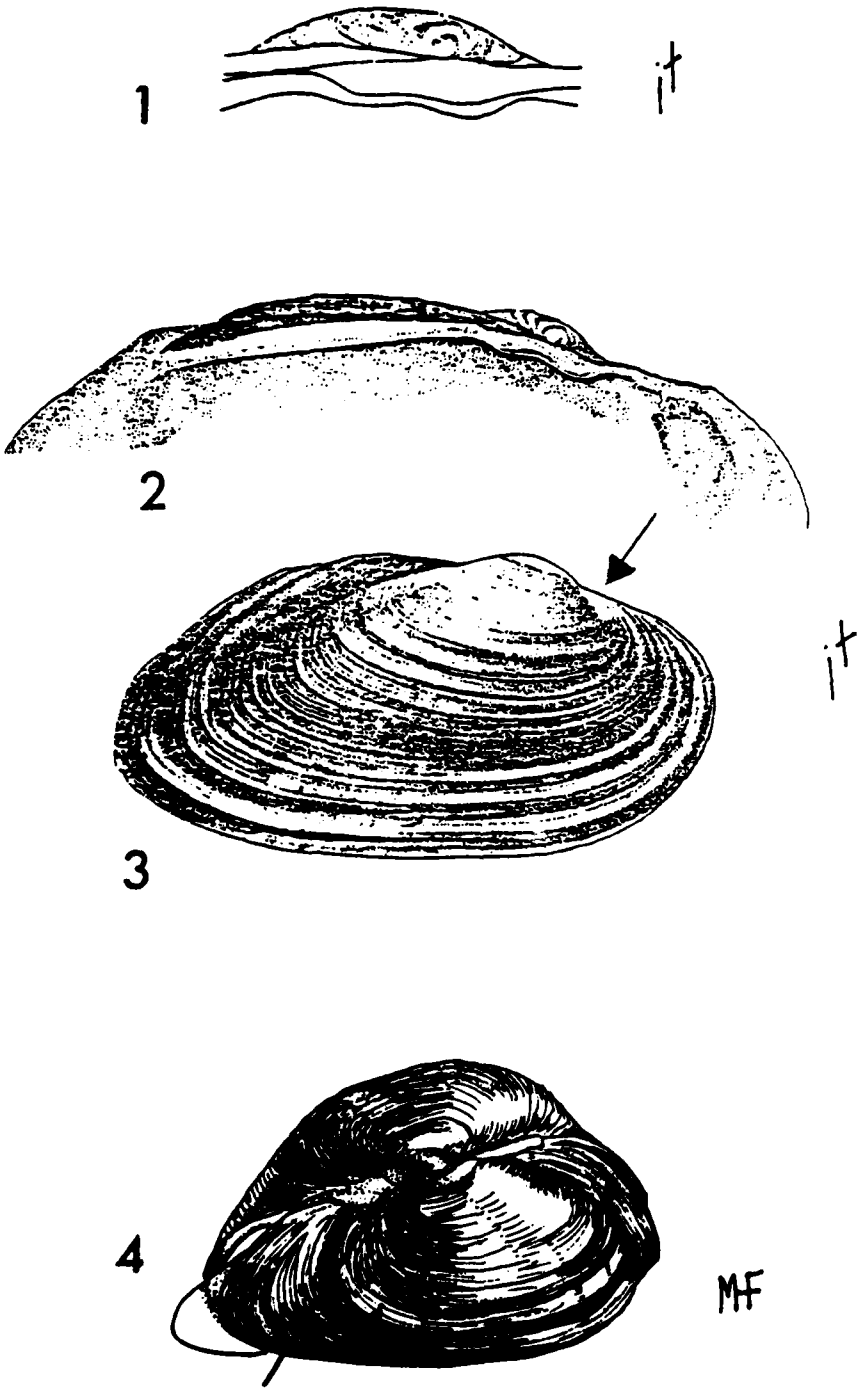
Strophitus undulatus (Say), Strange Floater

Figure 1. Dorsal view of left valve. (About 2.0x.) Note beak sculpture, several strong concentric ridges (see Figures 2 and 4).

Figure 2. Lateral view of hinge of left valve. (About 1.5x.) Note weak dentition.

Figure 3. Lateral view of outer surface of right valve. (About 1.0x.) The dorsal margin usually is much lower before (arrow) than behind the umbo, but this feature is poorly represented in this specimen, though it is somewhat apparent in Figure 4 (arrow).

Figure 4. Anterodorsal view. (About 1.0x.)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ADDITIONS AND CORRECTIONS

Page and, as useful, paragraph and line references are given. Enumeration of "paragraph" on a given page starts with the first complete *or* fractional paragraph on that page.

Volume II

Page 3; pages 54-263:

The "master list" (Appendix A, Exhibit 1a) differs from the taxa portrayals in Appendix C (Exhibits 90-194) because of necessary changes that came to the Principal Investigator's attention after completion of the latter. (1) *Quadrula fragosa* was added to the list and does not appear in Exhibits 90-194. (2) "*Pleurobema cordatum*" was split into *P. rubrum* and *P. sintoxia*. The latter two species replace "*P. cordatum* on the list, but not in those Exhibits. (3) *Proptera capax* follows *P. purpurata* in Exhibit 1a; their order is reversed in Exhibits 90-194. In a very few instances these changes affect data portrayal in Appendix C. Such effects are discussed in footnotes to the corresponding Exhibits and/or in the Additions and Corrections section.

Pages 3-4:

Development of the Academy's "master list" of Recent UMR species-group naiad taxa required several stages. First, the relevant historical literature was compiled. Second, this literature was reviewed and evaluated in the light of modern taxonomic concepts. Third, several historical collections of mussel shells were examined. Fourth, the Principal Investigator made numerous easy decisions (and some very difficult ones) about which taxa were to be admitted to the list.

Most of the more important compilations of historical UMR mussel records date from the last century: Call (1885, 1895), Drew (1890), Garman (1888), Grant (1886, 1888), Holzinger (1888), Keyes (1888), Pratt (1876), Shimek (1888), Tryon (1865), and Witter (1883). Very few initial records of a mussel's UMR occurrence are not found among these papers. The rest of such records appear in certain Twentieth Century literature: Baker (1903, 1905), Chadwick (1906), Coker (1919), Dawley (1947), Fuller (1978b), Havlik and Stansbery (1978), Perry (1979), Shimek (1921), and Wilson and Danglade (1914). It is important to realize that all but a few of the historical records were established in the two earliest of these references, by Tryon

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(1865) and Pratt (1876). Moreover, most of the records common to these two authors occur in Tryon. In other words, the overwhelming majority of taxon-specific naiad records already were historical more than a century ago.

Supplementary (and sometimes corroborative) information about UMR naiades, including some novel taxon-specific records, is provided in the accounts of the major relevant surveys of the past 50 years. These are the Grier (1922, 1926a) surveys in 1920 and 1925 for the then U.S. Bureau of Fisheries; the Ellis (1931a, 1931b) survey of 1930 and 1931, also for the Bureau; the Corps-Academy survey of 1977 through 1979, recorded by Fuller (1978b) and in this report; and the WDNR survey in 1977 through 1980, whose cumulative report is in preparation.

In addition to drawing upon the holdings of major institutions (e.g., ANSP and OSU), the Principal Investigator visited the Pratt collection at the Putman Museum in Davenport, Iowa, and the Shimek collection in the Museum of Natural History at the University of Iowa, Iowa City. (The assistance of Carol Hunt and George D. Schrimper of the respective staffs is gratefully acknowledged.) These two examinations permitted evaluation of most of the equivocal records in both Pratt (1876) and Shimek (1888).

Finally, the numerous personal communications of David H. Stansbery (OSU) refined the Principal Investigator's sense of certain other taxa to such a point that the "master list" (Exhibit 1a) now stands at 50.

Page 3:

Any mention of Pleurobemini or Unionini in the report should read "Elliptionini".

As Fuller (1978b) stated:

> There is no evidence sufficient to support or refute addition of the enigmatic *Cokeria southalli* to a list of upper Mississippi basin naiades. Marshall (1916) based this taxon on a single, possibly deformed specimen that had been first described by Coker and Southall (1915)*. This shell resembles F.C. Baker's (1928) illustrations of some apparently teratological *Amblema plicata*. The soft-tissue morphology of *C. southalli* is unknown; its conchology suggests ascription to the Amblemini. The illustration by Coker and Southall was repeated by Marshall.

*Coker, R.E., and Southall, J.B. 1915. Mussel resources in tributaries of the Upper Missouri River. Report of the United States Commissioner of Fisheries for 1914, Appendix 4:1-17. Separately issued as Bureau of Fisheries Document No. 812.

Pages 5-6:

The decision to admit a "master list" of UMR mussel host fishes to Appendix A was made after the other appendical materials were completed. This accounts for the splitting of "Exhibit 1" of the Draft Preliminary Report into Exhibits 1a and 1b of the Final Report.

Page 6:

Below *Fundulus zebrinus*, insert:

Family Poeciliidae
Gambusia affinis (Baird and Girard), Mosquitofish

Below *Lepomis macrochirus* insert:

Lepomis marginatus (Holbrook), Dollar Sunfish

Page 7:

The grand total square footage that was brailed during this project's three seasons is 13,265,000. Seemingly astronomical, this figure actually amounts to slightly less than only one half (0.48) of a square mile. The admittedly adverse environmental impact of the survey (i.e., the death of over 10,000 living mussels), as opposed to its long-term benefit in advising Corps O & M activities, thus was limited to a fraction of 1% of the possible study area. It is encouraging that so much insight (into the UMR mussel fauna) cost so little damage. A critic might assert, on the other hand, that too little area was surveyed. He must realize that the purposeful restriction of the area to O & M sites of high potential damage to benthos was environmentally beneficial and unavoidably limited the scope of the riverbed actually surveyed.

These remarks might seem disclamatory and apologetic were it not for the fact that the goals, results, and interpretations of this survey have already begun to be misunderstood; there are five parties that have been instrumental to the project (ANSP, USACE, USFWS, UWLC, and WDNR), and none of them deserves to be wrongly criticized as a result of supporting that effort. One example of such misunderstanding appears in a recent article* suggesting that *Lampsilis higginsi* should not be on the Endangered species list. The suggestion is based in part on a misrepresentation of information imputed to the Principal Investigator, but drawn from an article that he did not write.

*Johnson, R.I. Zoogeography of North American Unionacea (Mollusca: Bivalvia) north of the maximum Pleistocene glaciation. Bulletin of the Museum of Comparative Zoology, 149:77-189 (1980).

Pages 8-51:

"RM" is an abbreviation of "river mile(s)".

The compass points used in the geographic data portrayals conform to the following legend.

E	-- east	SE	-- southeast
N	-- north	SSE	-- south-southeast
NE	-- northeast	SW	-- southwest
NW	-- northwest	W	-- west
S	-- south	WNW	-- west-northwest

The hyphen (-) equals "by"; e.g., SSE is "south-southeast" or "south by southeast".

Page 28, Exhibit 43:

The synopsis of brail runs is omitted because none was made.

Page 48, Exhibit 82:

The synopsis of brail runs is omitted because none was recorded (see discussion of the Mississippi Gardens Site in the text).

Page 49, Exhibit 84:

The synopsis of brail runs is omitted because, although it was attempted, brailing the river bed was impossible on account of heavy submerged vegetation. Brailing was not unproductive, however, because on the vegetation entangled in the chains and hooks there were numerous juvenile mussels.

Page 52:

The rapidly growing value of zooarchaeology (the science or study of animals as a factor in archaeology) and ethnomalacology in characterizing the prehistoric mussel fauna is exemplified by the following, recent paper: Parmalee, P.W., W.E. Klippel, and A.E. Bogan, 1980. Notes on the prehistoric and present status of the naiad fauna of the middle Cumberland River, Smith County, Tennessee. Nautilus, 94:93-105.

Pages 174-175:

The Dakota and Winters Landing Sites in Pool 6 were cursorily surveyed in 1977. Few mussels were found at the former Site; at the latter, none (Fuller, 1977).

Page 273:

For "FRIDLE" read "FRIDLEY".

Page 282:

For "VICTOR" read "VICTORY"; for "DE SOTO" read "DESOTO".

Page 283:

For "PRAIRIE du CHIEN" read "PRAIRIE DU CHIEN".

Page 284, paragraph 3, lines 14-15:

For "Hudson Railroad Bridge" read "Hudson".

Page 284, paragraph 3, lines 18-21:

Inadvertently omitted is mention of the remnant bed off Wabasha, Minnesota.

Page 289:

The formal limits of the Kinnickinnic Site are shown. Brailing was conducted as far upstream as the mouth of the Kinnickinnic River.

Page 316:

The Brownsville Site includes the major side channel opening to the right at about RM 687.7. Brailing continued down this channel as far as the stump field.

Page 320 (and elsewhere in this report):

The correct rendering is "DeSoto", not "De Soto", according to the United States Postal Service, regardless of representations to the contrary on Corps Navigation Charts and other documents.

Page 324:

The Hay Point Bank Repair Site includes McDonald Slough downstream to the latitude of the lower limit of the Site in the main channel.

Page 328:

The McMillan Island Site includes the side channel that opens at the head of McMillan Island itself. Brailing was conducted down this channel until the water became prohibitively shallow.

Page 330 (and elsewhere in this report):

Note that Recent (as oposed to "recent") means the period of geological time since Wisconsin (i.e., the last Pleistocene) glaciation (i.e., about the last 10,000 years).

Page 333, paragraph 1, line 7:

Tetragenous and homogenous marsupia are difficult to recognize as such because, even when fully charged, most swell very little and thus resemble uncharged demibranchs. When marsupia are empty, their only identifying features often are microscopic and impossible to examine without destroying the animal.

Page 334, paragraph 2, lines 10-12:

In many Lampsilini (Exhibit 1a) the glochidia are discharged through the marsupial walls, not dorsad through the water tubes and then the excurrent aperture.

Page 336, paragraph 4:

Radial tubercles "along" a ridge do not necessarily run along its apical surface.

Page 337-338:

If all figures on a page are by one artist, his or her logo appears there only once.

Page 337:

The following remarks should appear after the discussion of sculpture.

Not to be confused with sculpture in the strict sense are the growth rings (or lines or re s), which mark periods when no new shell material was deposited by the mantle margin. Such periods of dormancy are induced by low water temperature (as in winter), deprivation (as poor food supply), etc. The annual (i.e., winter) growth rests ordinarily are very prominent. The number of annual rings is a reliable approximation of the animal's age in years.

Shape often is almost as valuable a discriminant as sculpture. Unless otherwise indicated, descriptives of shell shape are used in the Key with reference to the shell as seen from the side (i.e., in lateral view). The descriptives include elongate, terete, circular, rectangular, oblique, alate, angular, and quadrate. Some of these expressions deserve definition here. An <u>elongate</u> shell is conspicuously longer than high. A <u>terete</u>

shell tapers and is subcircular in transverse section. An oblique shell is skewed, much as a scalene triangle. An alate shell has one ala or two alae ("wings") on the dorsal margin. Note that the prefix "sub" (similar to, approximately) often is applied to these descriptives. A quadrate shell is subsquare.

In dorsal view (i.e., as seen from above), a compressed shell is narrow (and often flattened) from side to side, and an inflated one is comparatively broad and rounded.

Page 337, paragraph 4, line 1:

For "Mary Fuges" read "Mary H. Fuges". Realizing this makes her logo (MF) more understandable.

Page 339, paragraph 9:

See Buchanan (1979a) for another good discussion of *Lampsilis higginsi*. It includes D.H. Stansbery's (OSU) rationale for considering Higgins' Eye endemic to the UMR.

Page 340 (and elsewhere in this report):

For "Pennak (1953)" read "Pennak (1953, 1978)".

Page 341:

Lasmigona costata appears in couplet-choice 40a.

Page 342, paragraph 1, lines 1-2:

Neel (1941) published another figure of putative *Quadrula fragosa*, but even he questioned its identity.

Page 342, paragraph 2:

Note that *Pleurobema sintoxia* keys out with *P. rubrum*.

Page 342, paragraph 3, Figure 6 caption:

Marsupial demibranchs (which occur only in females and some hermaphrodites) are compartmentalized into columnar passages (the water-tubes). Water flows along these passages through the gill, thus permitting effective gas exchange. The water tubes are separated by partitions (the septa; singular: septum), which provide "endoskeletal" support for the gill. The septa in a marsupium are about twice as thick and closely spaced as those in a non-marsupial demibranch or portion thereof. Thus is provided added support for the marsupium and its contents (ova and/or glochidia). In an homogenous mussel, for example,

the septa of the inner, non-marsupial, "male" demibranch of the female are set about twice as far apart as are those of the outer, marsupial, "female" demibranch.

Page 344:

Naiad soft-tissue anatomy is in essence a simple subject, which has not been succinctly expounded. There simply is no good, single, published guide. Burch's (1973, 1975) works are rather readily available and helpful.

Pages 349-354:

A couplet-choice number in parentheses following an initial couplet-choice number (e.g., "1b" in "12a (1b)") identifies the antecedent of the given couplet; in other words, having made the choice 1b in couplet 1, the user of the taxonomic key is directed to couplet 12, where he must make another choice (either 12a or 12b), etc.

"X" (as in "2.0x") means "times natural size" (as in "two times natural size").

Page 351, couplet-choice 24b:

The female *Ellipsaria lineolata* is laterally (i.e., from side to side) inflated (i.e., broadened, swollen) in comparison to the male, which is laterally compressed (i.e, flattened). The difference is conspicuous.

Page 374, Figure 2 caption:

For "umbonal in character" read "neoteinic".

Page 381, Figure 2 caption:

"Apapillose" means "without papillae".

Page 393, Figure 1 caption:

"Rostrate" means "beak-like".

Page 395, Figure 5; page 409, Figure 6:

Both *Obovaria olivaria* and *Lampsilis higginsi* can exhibit a lamella (i.e., shelf-like process, in this case) on the hinge plate below the lateral tooth of the right shell valve. This confounds the claim that the presence/absence of this

lamella is a reliable conchological discriminant between these two species.

Page 403, Figure 2 caption:

"Postbasad" means "toward the postbasal (margin)".

Page 403, Figure 4 caption:

"Anteriad" means "toward the anterior (margin)".

Page 430, Figure 4 caption:

"Anterodorsal", in this instance, refers to a view of the specimen from both in front of and above it. The view of this specimen that is depicted is not perfectly anterodorsal, because the animal is tilted laterad (i.e., to the side).

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