



**STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES**

Number 19

July 1997

**Muskegon River Watershed Assessment
Appendix**

Richard P. O'Neal

**MICHIGAN DEPARTMENT OF NATURAL RESOURCES
FISHERIES DIVISION**

**Fisheries Special Report 19
July, 1997**

**MUSKEGON RIVER WATERSHED ASSESSMENT
APPENDIX**

Richard P. O'Neal

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*Printed under authority of Michigan Department of Natural Resources
Total number of copies printed 150 — Total cost \$856.51 — Cost per copy \$5.71*

Appendix 1
Distribution Maps of Fish Species

This appendix contains maps of known past and present fish distributions within the Muskegon River watershed. The distributions of fish species were compiled from records located at The University of Michigan, Museums Fisheries Library, Michigan Department of Natural Resources, Institute for Fisheries Research, and Michigan Department of Natural Resources offices in Grand Rapids and Cadillac. Scientific names and phylogenic order follow Robins et al. 1991. For species that are listed under Michigan's Endangered Species Act (Part 365, Endangered Species Protection, of the Natural Resource and Environmental Protection Act, Act 451 of the Public Acts of 1994), their status follows their scientific name. Categories are declining, rare, threatened, endangered, extinct and locally extinct.

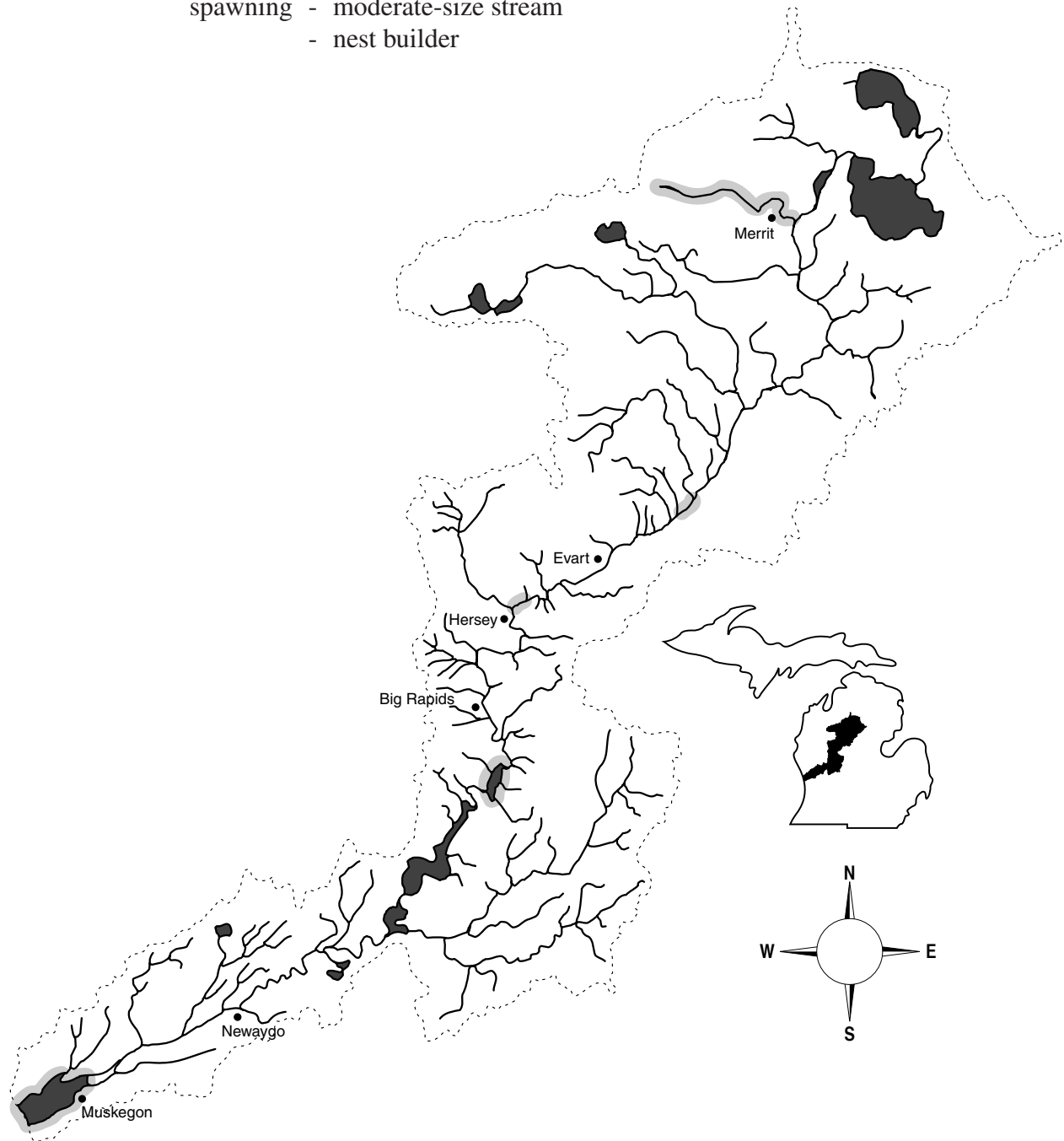
The habitat descriptions were compiled from The Fishes of Ohio (Trautman 1982), Freshwater Fishes of Canada (Scott and Crossman 1973), Fishes of Wisconsin (Becker 1983), Fishes of Missouri (Pflieger 1975), and Fishes of the Great Lakes Region (Hubbs and Lagler 1947).

Chestnut lamprey (*Ichthyomyzon castaneus*)

Habitat:

- feeding - stable substrate of sand and silt with light growth of *chara* or quiet backwaters of muck and silt with dense rooted vegetation
- moderate current
- clear moderate-size water

- spawning - moderate-size stream
- nest builder

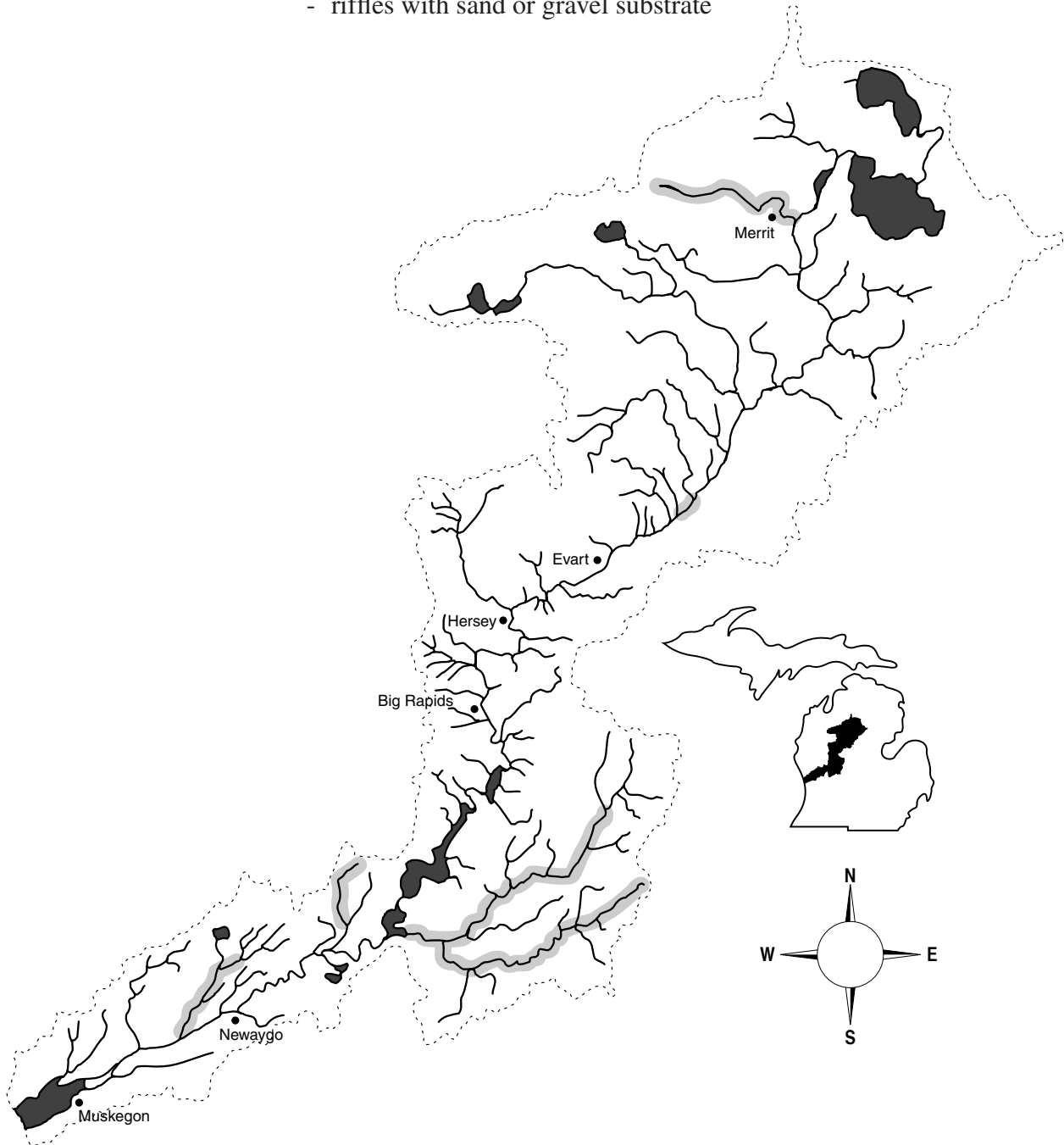


Northern brook lamprey (*Ichthyomyzon fossor*)

Habitat:

- feeding - young: low gradient, substrate with bars and beds of mixed sand and organic debris
- moderately warm water

- spawning - clear, high gradient streams (<15 feet wide)
- riffles with sand or gravel substrate



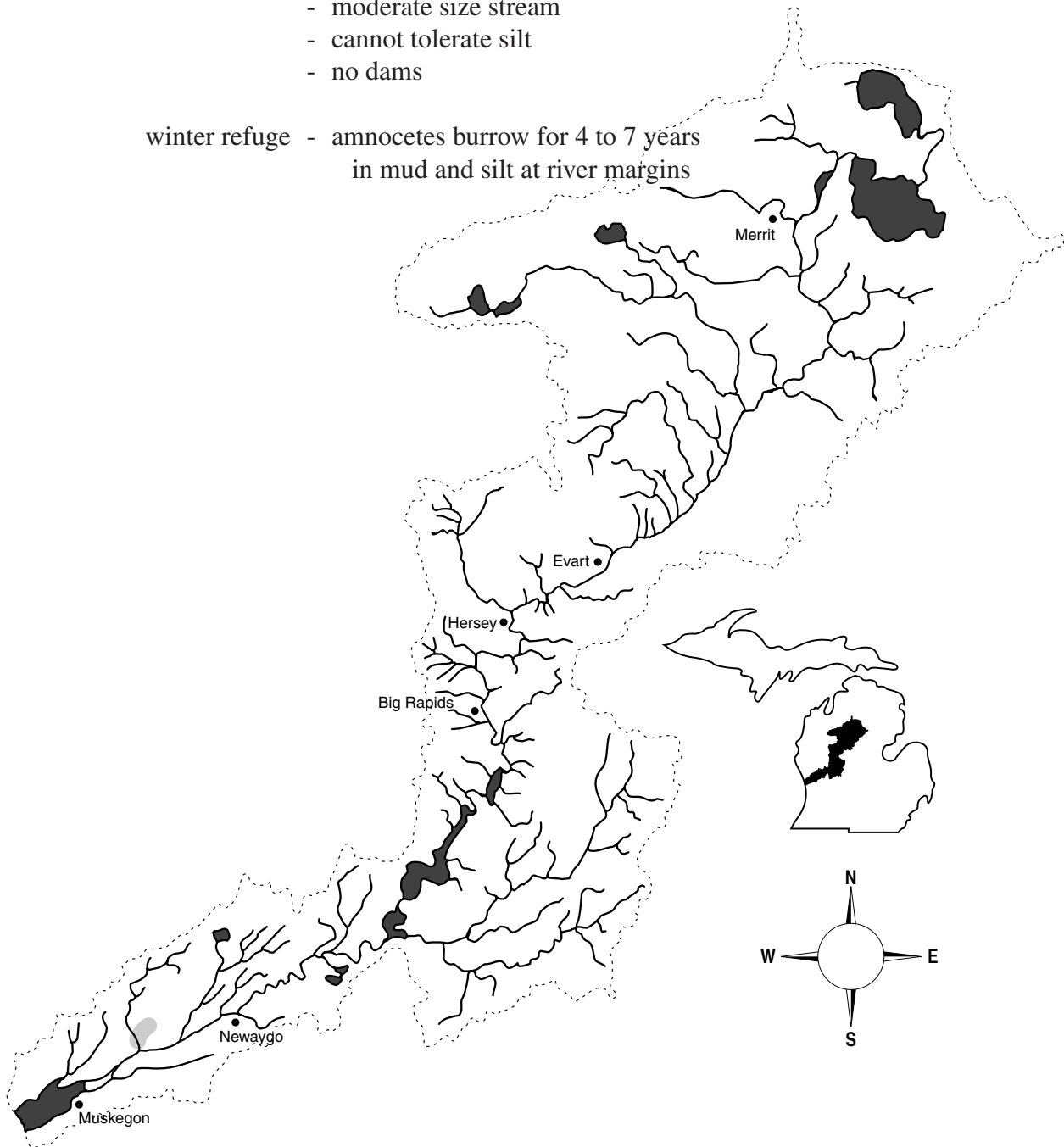
Silver lamprey (*Ichthyomyzon unicuspis*) - rare

Habitat:

- feeding - young: sand, muck, or organic debris substrate
- adults: clear river water with prey species

- spawning - gravel and sand substrate
- moderate gradient
- moderate size stream
- cannot tolerate silt
- no dams

- winter refuge - ammocetes burrow for 4 to 7 years in mud and silt at river margins



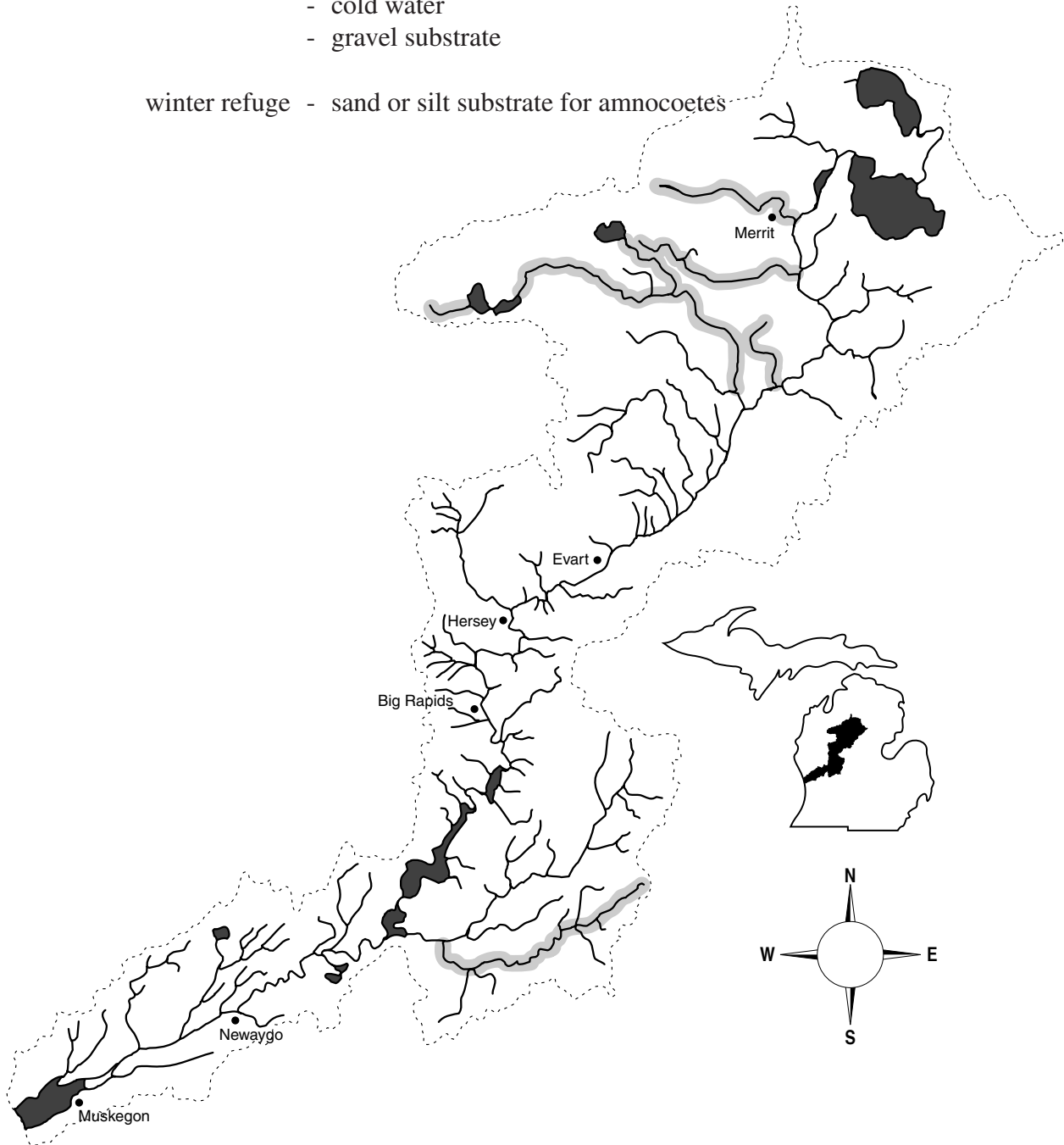
American brook lamprey (*Lampetra appendix*)

Habitat:

- feeding - young: low gradient, substrate with bars and beds of mixed sand and organic debris
- clear cool stream water, sensitive to turbidity

- spawning - clear, high gradient streams (>15 feet wide)
- cold water
- gravel substrate

- winter refuge - sand or silt substrate for ammocoetes

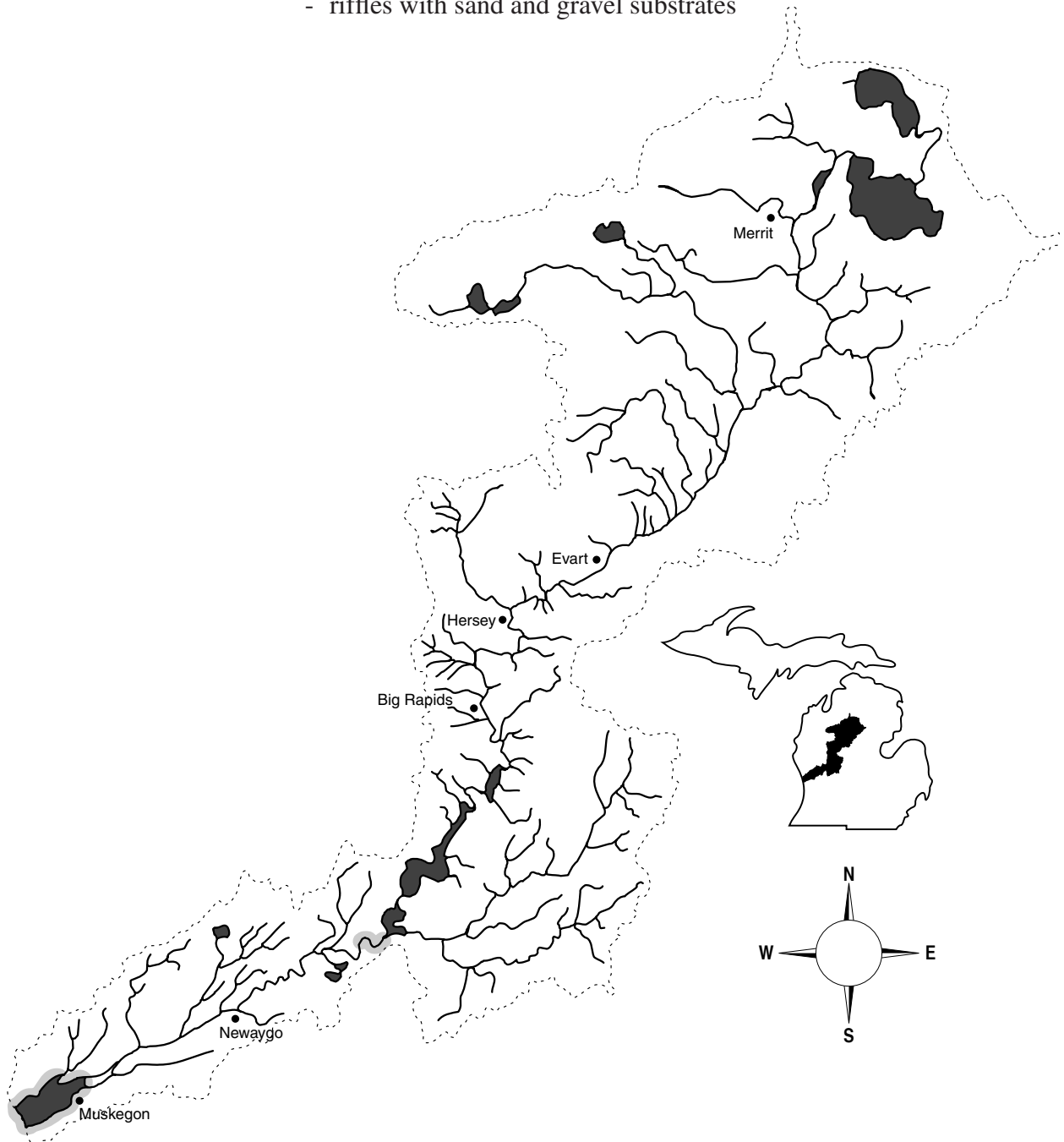


Sea lamprey (*Petromyzon marinus*)

Habitat:

- feeding - young: substrate with beds of sand mixed with organic debris
- cannot tolerate silt
- adults: clear cool water of Lake Michigan

- spawning - no dams
- riffles with sand and gravel substrates

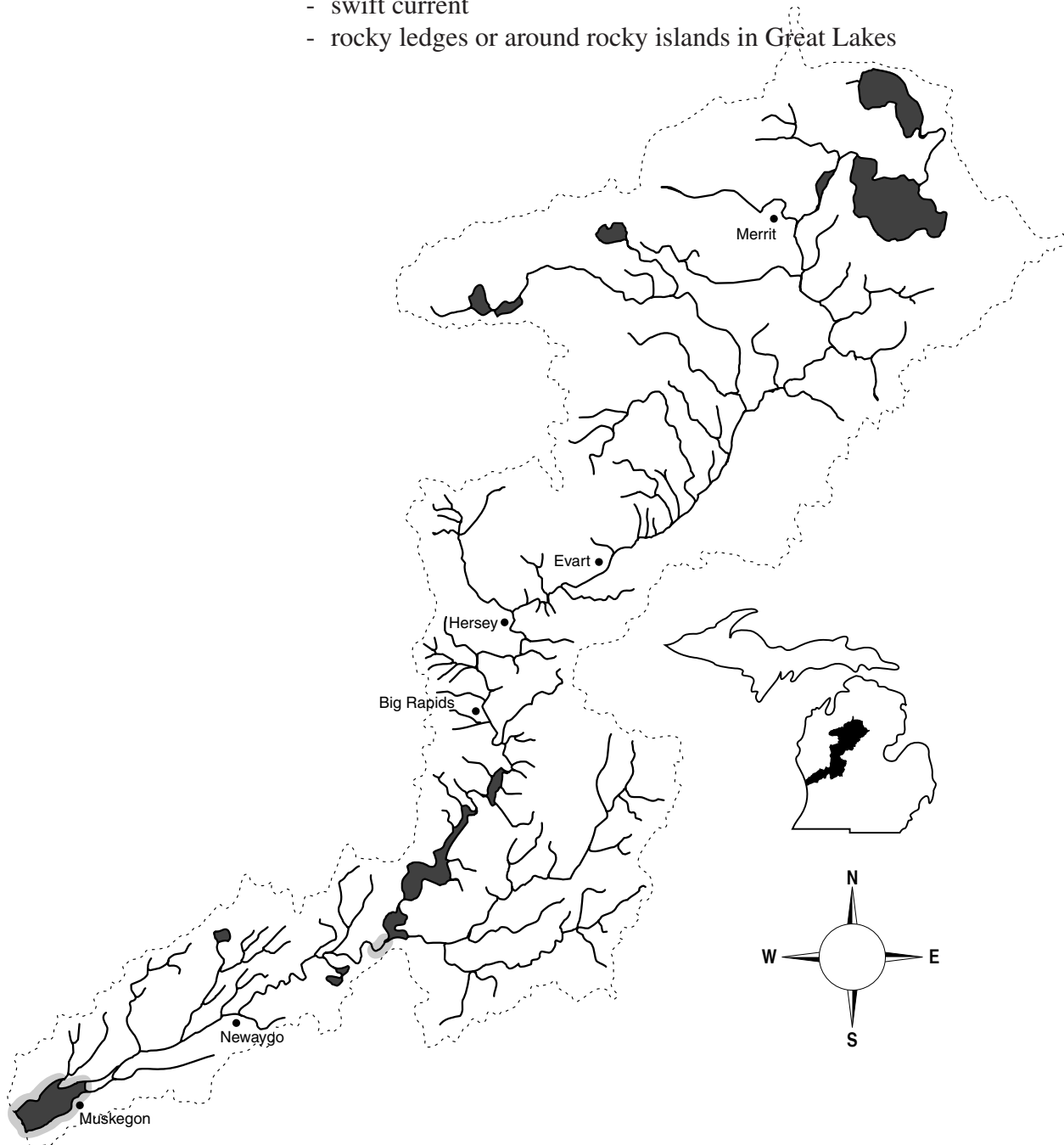


Lake sturgeon (*Acipenser fulvescens*)

Habitat:

- feeding - shoal areas of large rivers, lakes, and impoundments
- gravel, sand, rock substrates

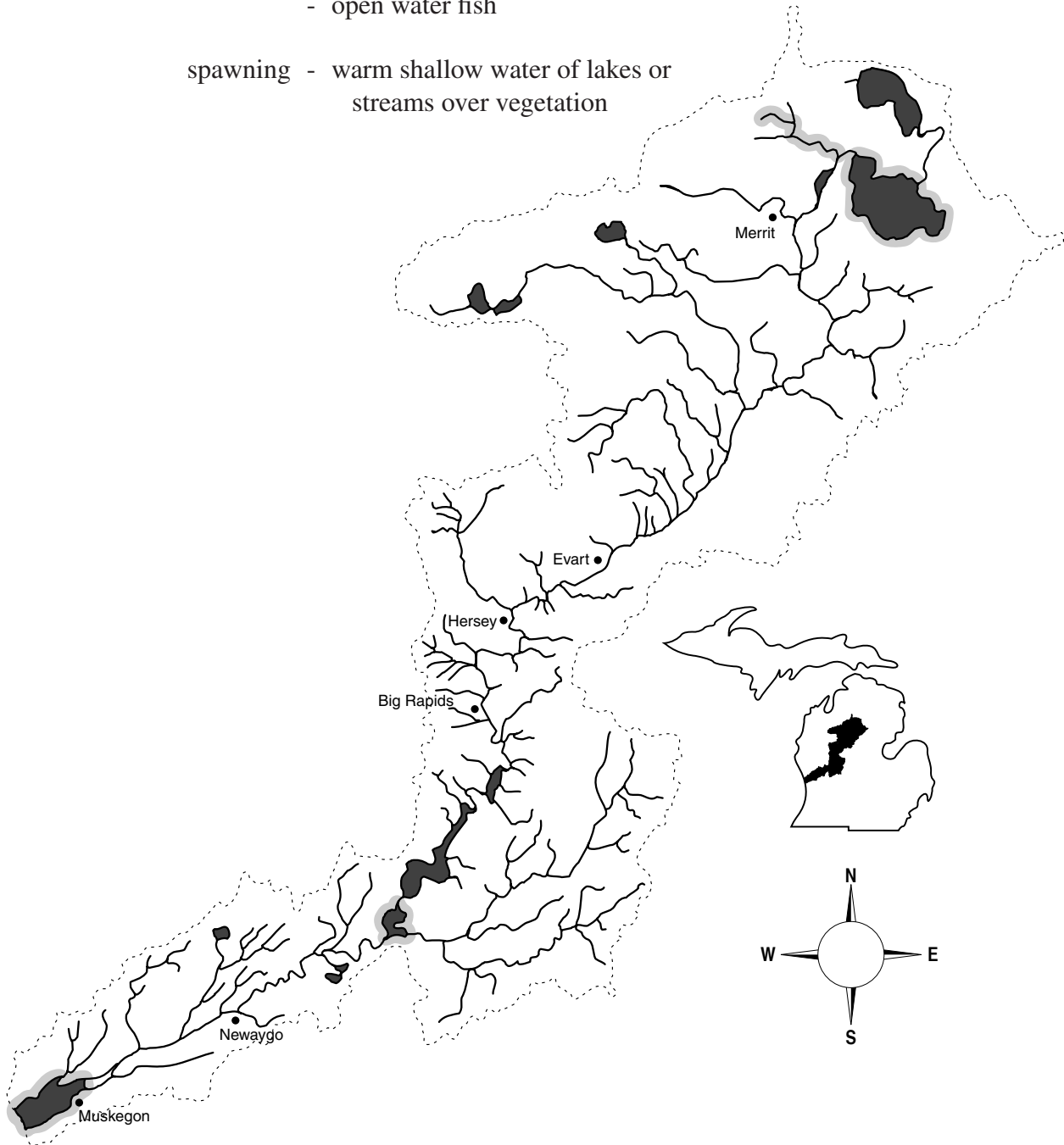
- spawning - in or before rapids, at the base of dams in rivers
- in 2-15 feet of water
- swift current
- rocky ledges or around rocky islands in Great Lakes



Longnose gar (*Lepisosteus osseus*)

Habitat:

- feeding - adults: in deeper water
 - young: in shallows
 - clear water, low-gradient streams, lakes, and impoundments
 - will feed in moderate current
 - aquatic vegetation preferred, but not necessary
 - open water fish
- spawning - warm shallow water of lakes or streams over vegetation



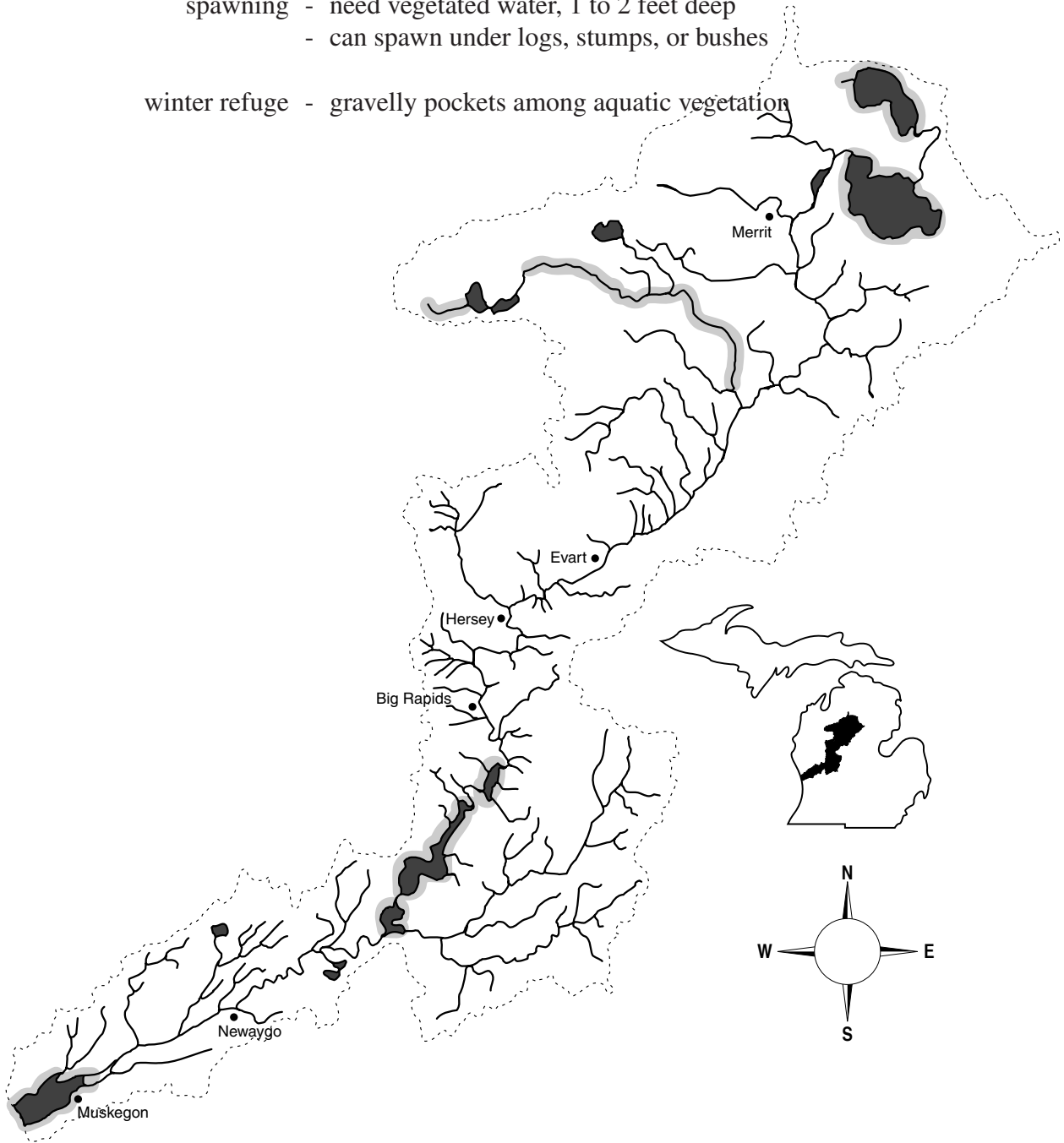
Bowfin (*Amia calva*)

Habitat:

- feeding
 - clear water
 - abundant rooted aquatic vegetation
 - low gradient streams, lakes, and impoundments
 - tolerate only small amount of silt

- spawning
 - need vegetated water, 1 to 2 feet deep
 - can spawn under logs, stumps, or bushes

- winter refuge
 - gravelly pockets among aquatic vegetation



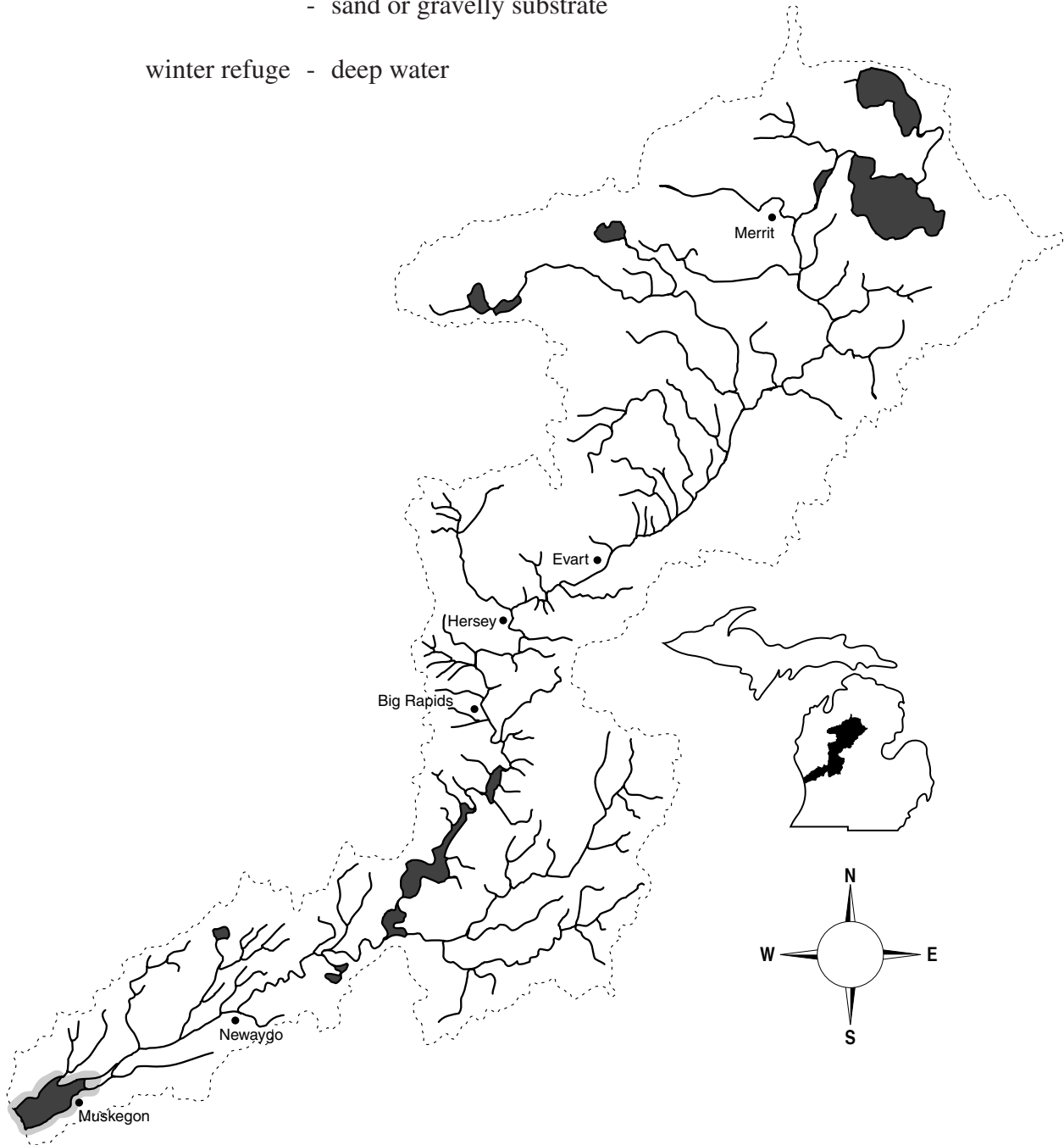
Alewife (*Alosa pseudoharengus*)

Habitat:

- feeding - adults: deep water of Lake Michigan
- young: shallow water of Lake Michigan
- prefers warmer waters

- spawning - streams or shallow beaches of lake
- sand or gravelly substrate

- winter refuge - deep water



Gizzard shad (*Dorosoma cepedianum*)

Habitat:

- feeding - large streams with low gradient, impoundments, and Lake Michigan
- tolerant of clear and turbid water

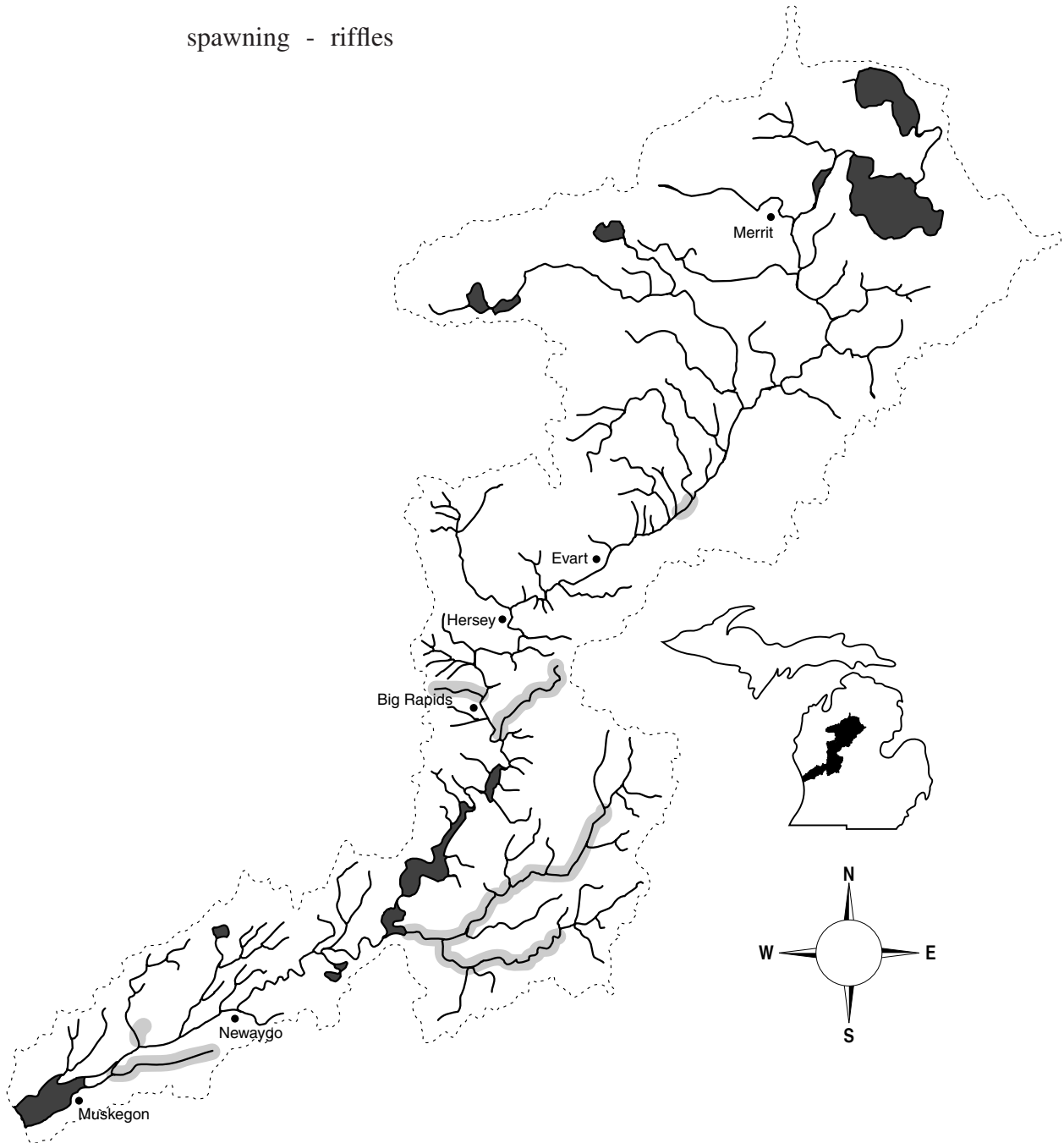
- spawning - shallow areas of ponds, lakes, and large rivers
- low gradient



Central stoneroller (*Campostoma anomalum*)

Habitat:

- feeding - moderate to high gradients
 - rocky riffles
 - somewhat tolerant of turbidity
 - riffles and adjacent pools of warm, clear, shallow streams
 - gravel or cobble substrate
- spawning - riffles



Goldfish (*Carassius auratus*)

Habitat:

- feeding - vegetation
- low gradient, shallow, warm water streams, rivers, lakes, and impoundments
- tolerates some turbidity and siltation

- spawning - warm, weedy shallows

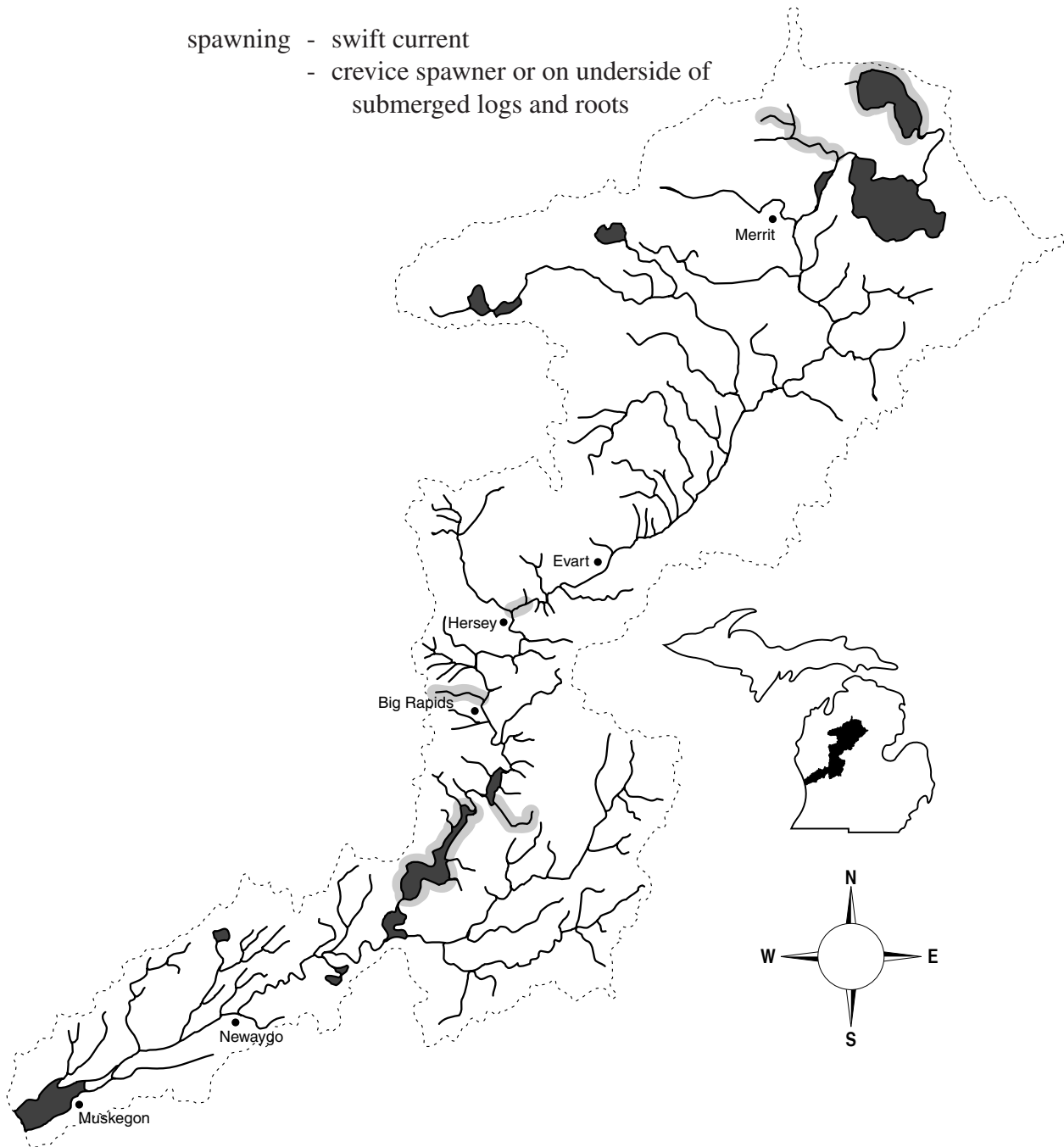


Spotfin shiner (*Cyprinella spiloptera*)

Habitat:

- feeding
 - clear water tolerant of turbidity and siltation
 - some current
 - shallow depths
 - medium sized streams, lakes, and impoundments
 - clear sand or gravel substrate

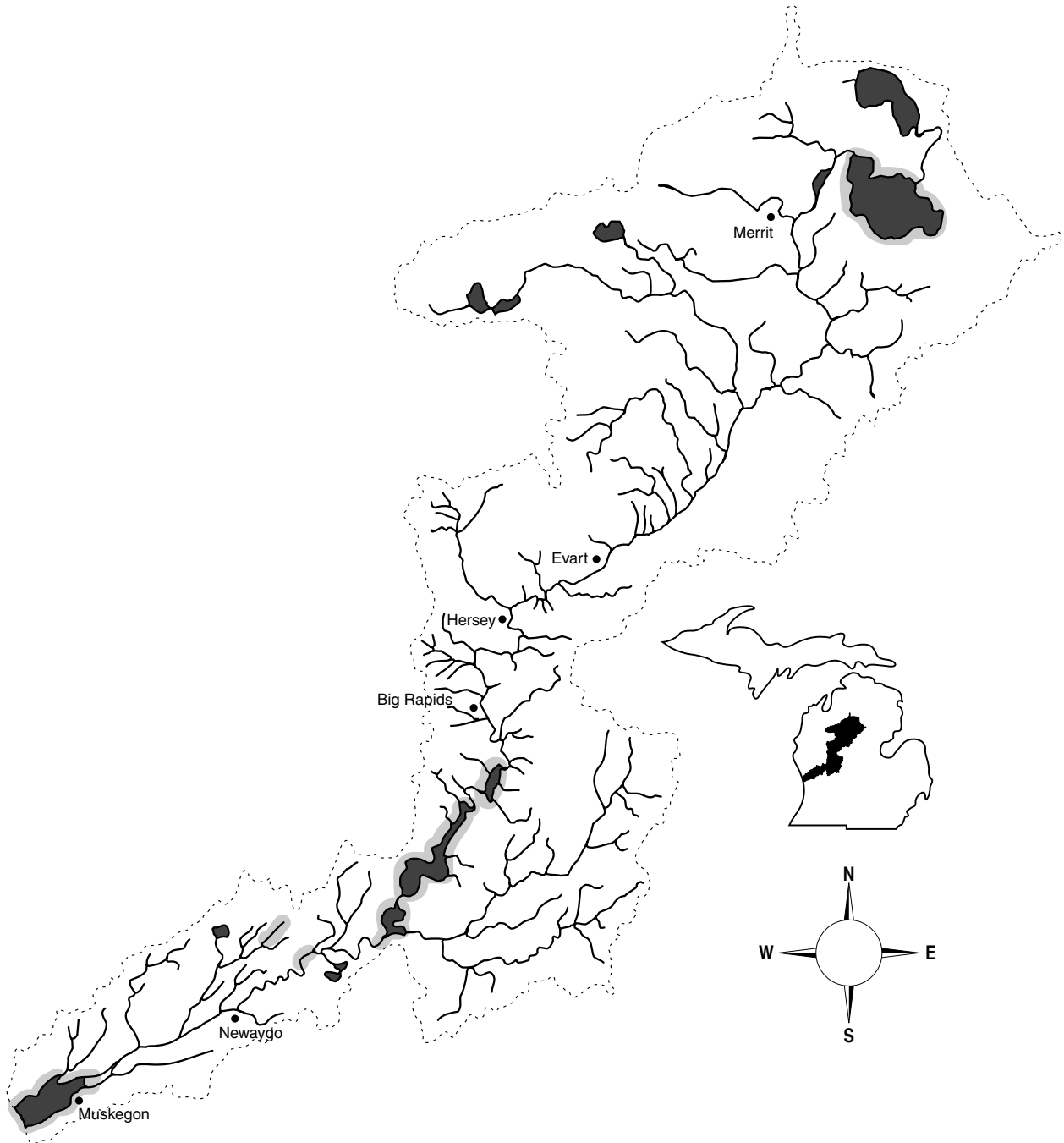
- spawning
 - swift current
 - crevice spawner or on underside of submerged logs and roots



Common carp (*Cyprinus carpio*)

Habitat:

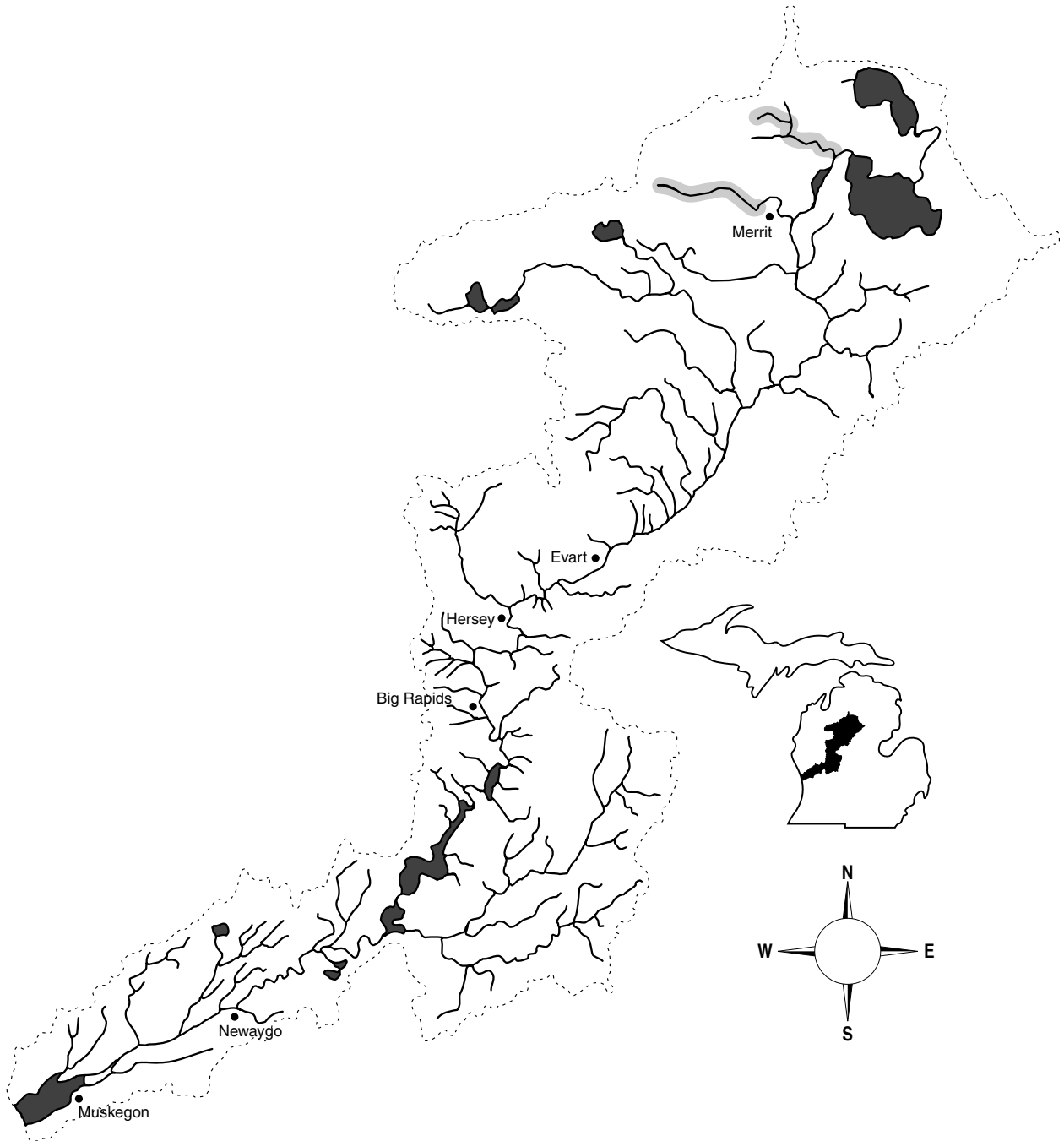
- feeding - low gradient fertile streams, rivers, lakes, and impoundments
 - abundance of aquatic vegetation or organic matter
 - tolerant of all substrates and clear to turbid water
- spawning - weedy or grassy shallows



Brassy minnow (*Hybognathus hankinsoni*)

Habitat:

- feeding - cool acidic streams
- slow to moderate current
- sand or gravel substrate

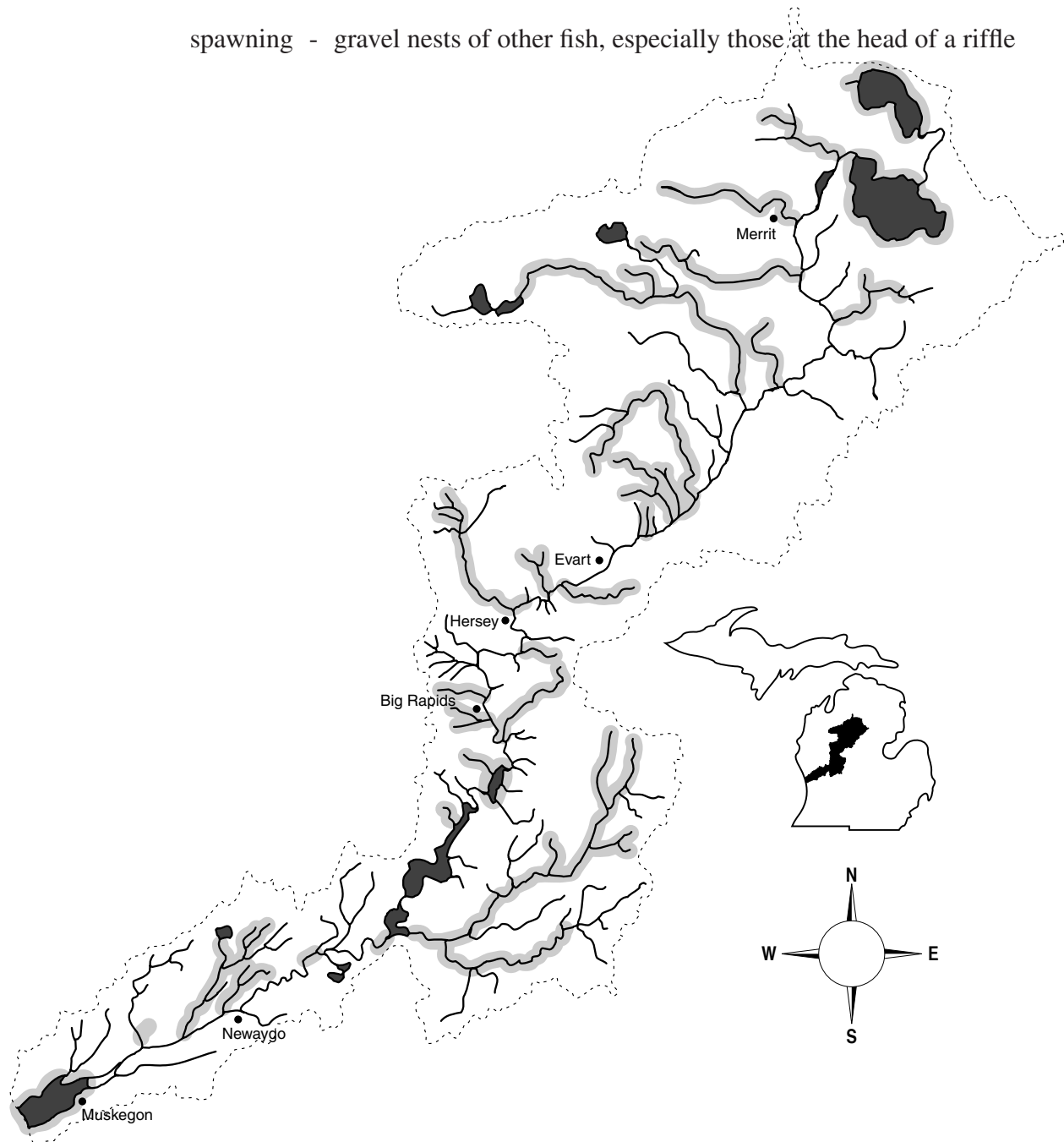


Common shiner (*Luxilus cornutus*)

Habitat:

- feeding - small, clear, high-gradient streams and rivers, or shores of clear water lakes and impoundments
 - gravel substrate
 - can tolerate some submerged aquatic vegetation
 - not very tolerant of turbidity or silted waters

- spawning - gravel nests of other fish, especially those at the head of a riffle

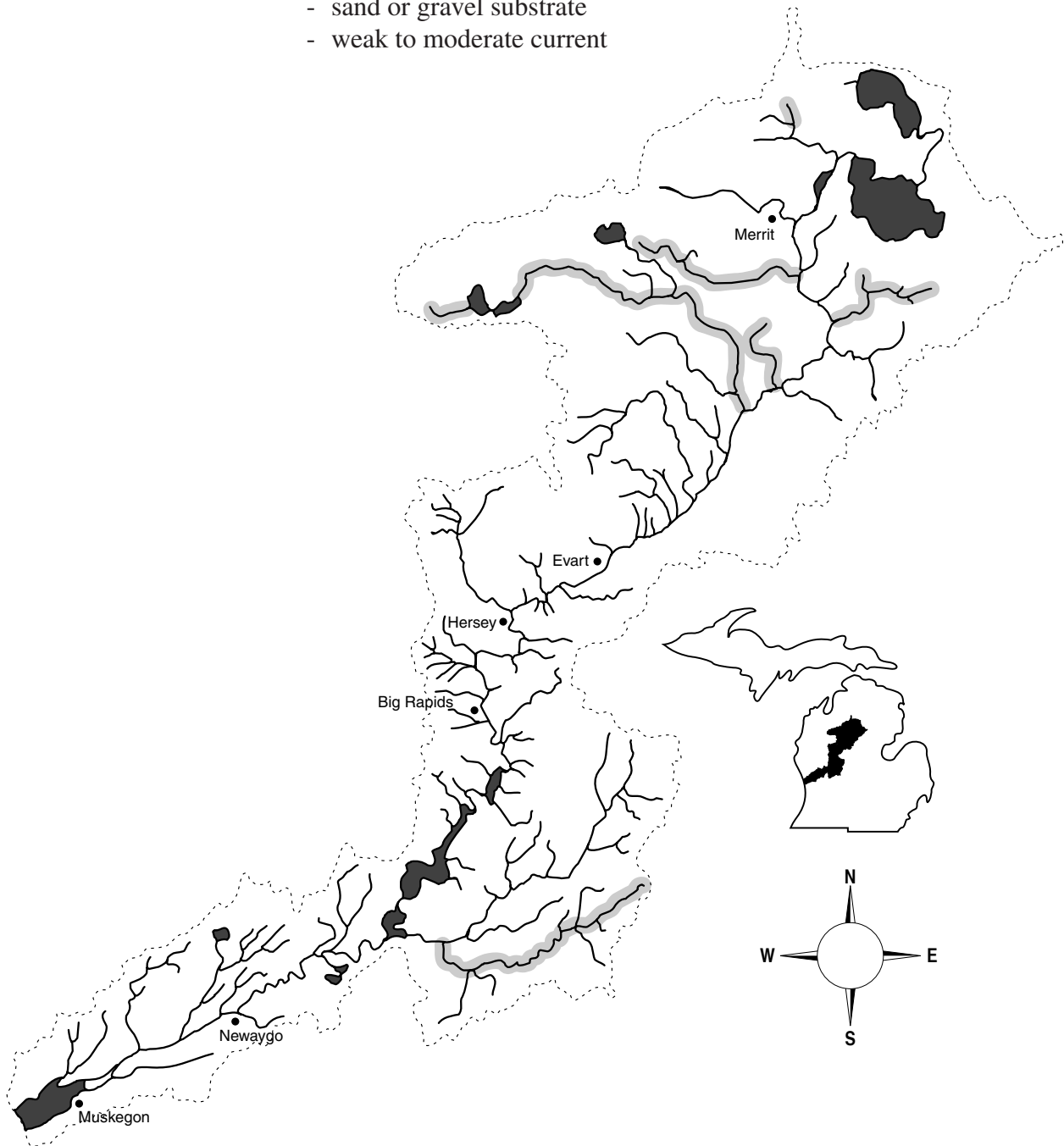


Pearl dace (*Margariscus margarita*)

Habitat:

- feeding - cool, neutral to acidic streams and lakes
- clear to slightly turbid water

- spawning - males are territorial
- clear water, 18-24 inches deep
- sand or gravel substrate
- weak to moderate current

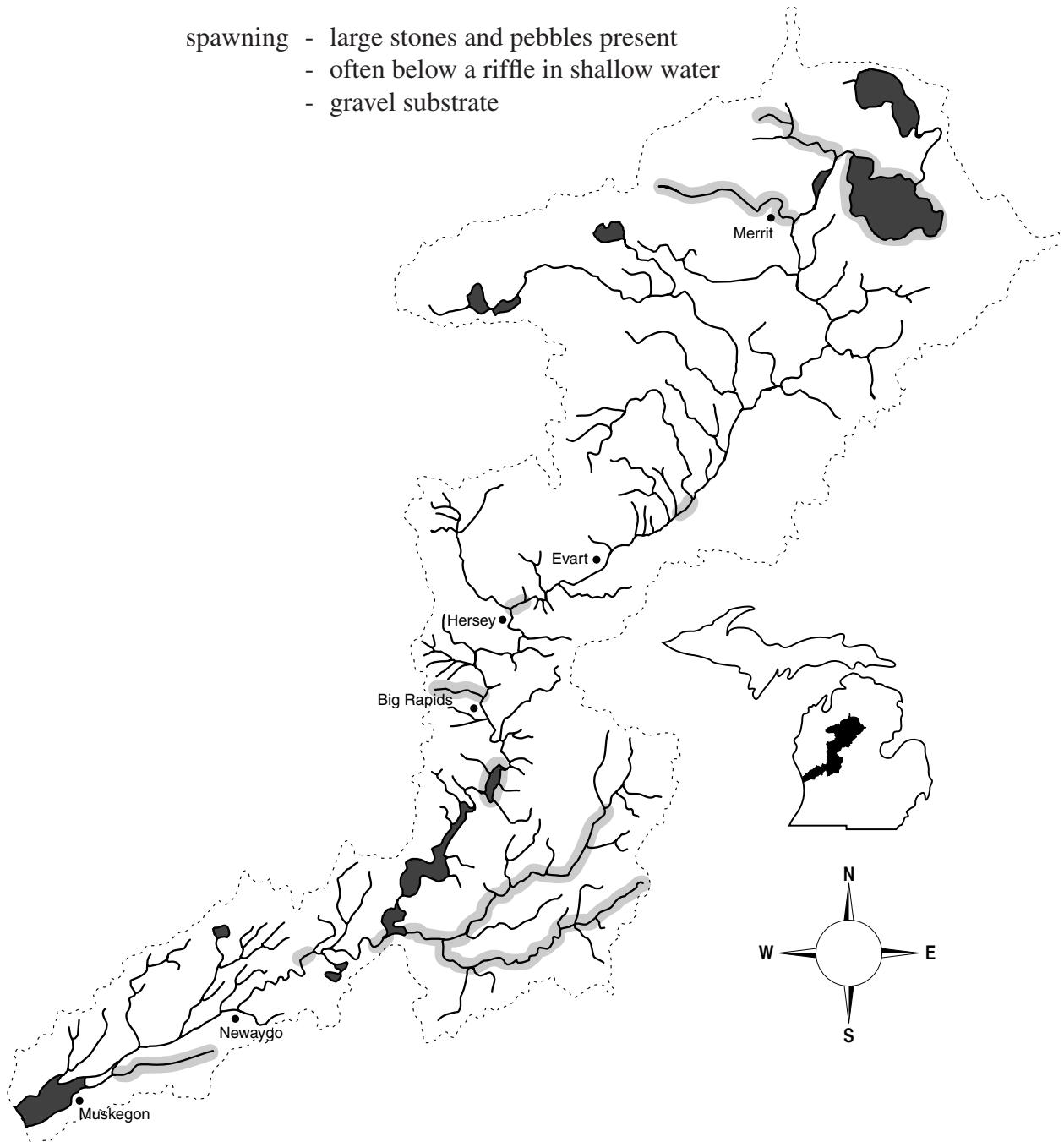


Hornyhead chub (*Nocomis biguttatus*)

Habitat:

- feeding
 - adults: near riffles
 - young: near vegetation
 - clear water, does not tolerate turbidity
 - gravel substrate
 - low gradient streams that are tributaries to large streams

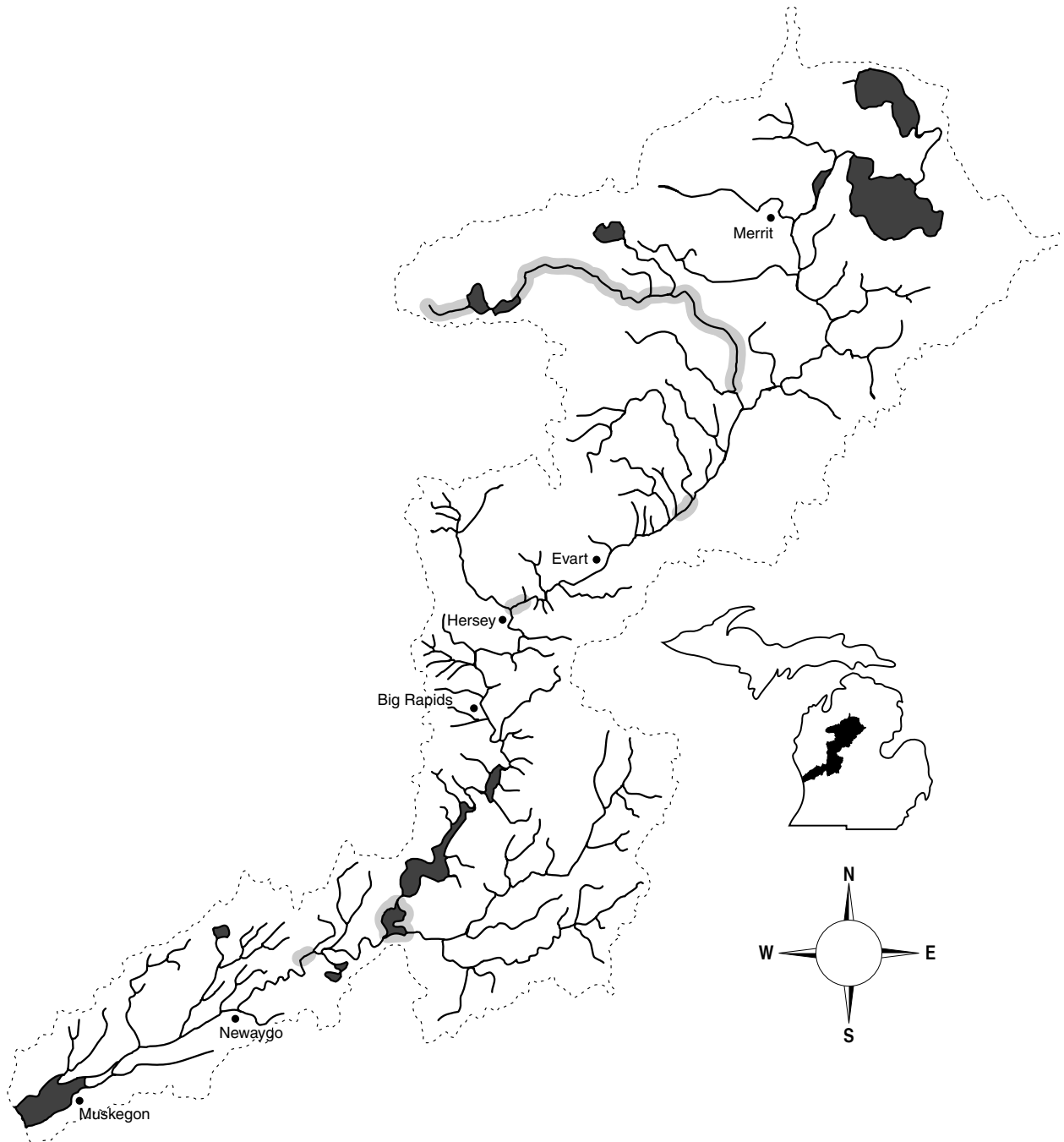
- spawning
 - large stones and pebbles present
 - often below a riffle in shallow water
 - gravel substrate



River chub (*Nocomis micropogon*)

Habitat:

- feeding - moderate to large streams
- moderate to high gradient
- gravel, boulder, or bedrock substrate
- little to no aquatic vegetation
- cannot tolerate turbidity or siltation

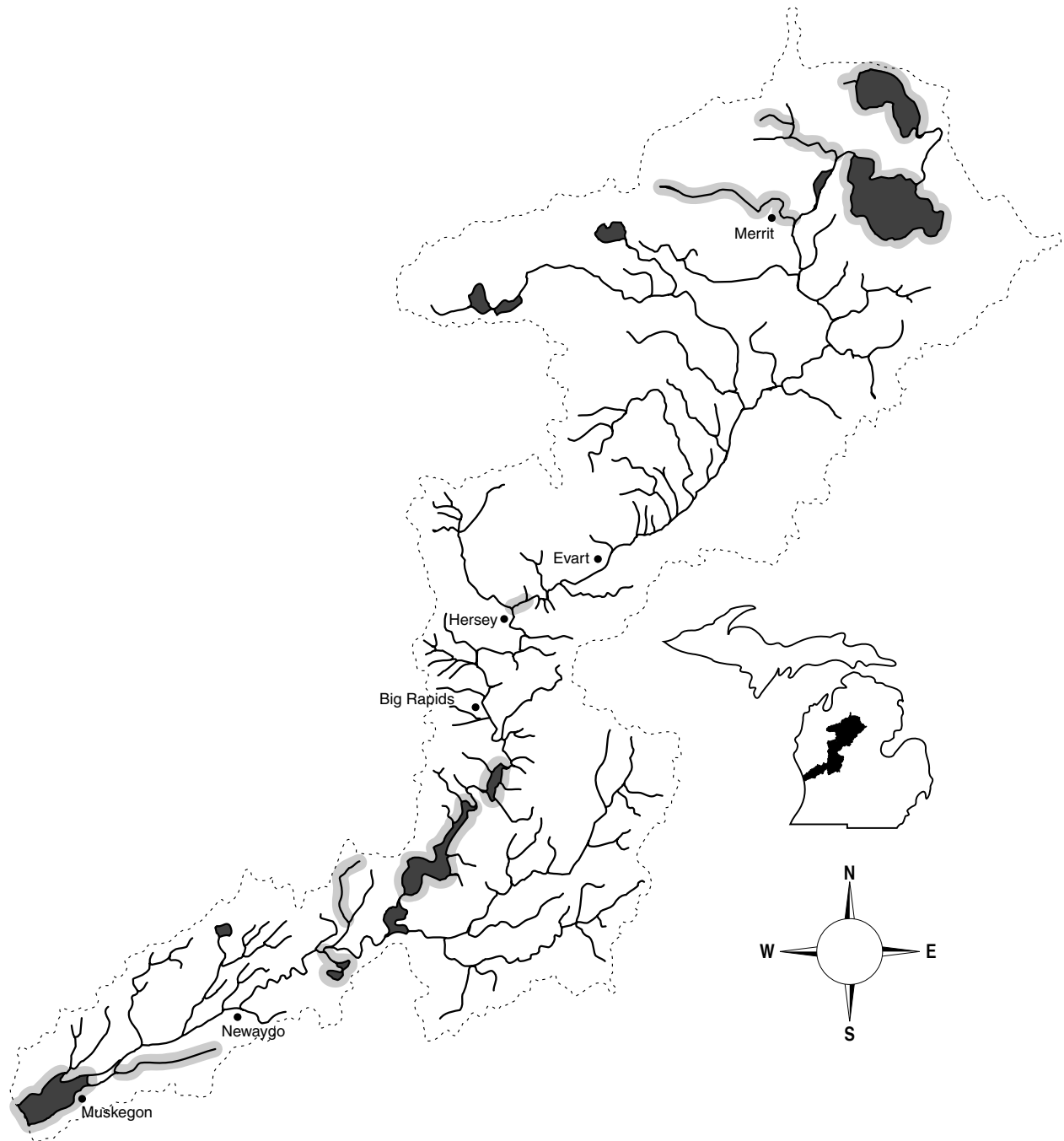


Golden shiner (*Notemigonus crysoleucas*)

Habitat:

- feeding - lakes and impoundments and quiet pools of low gradient streams
- clear shallow water
- heavy vegetation

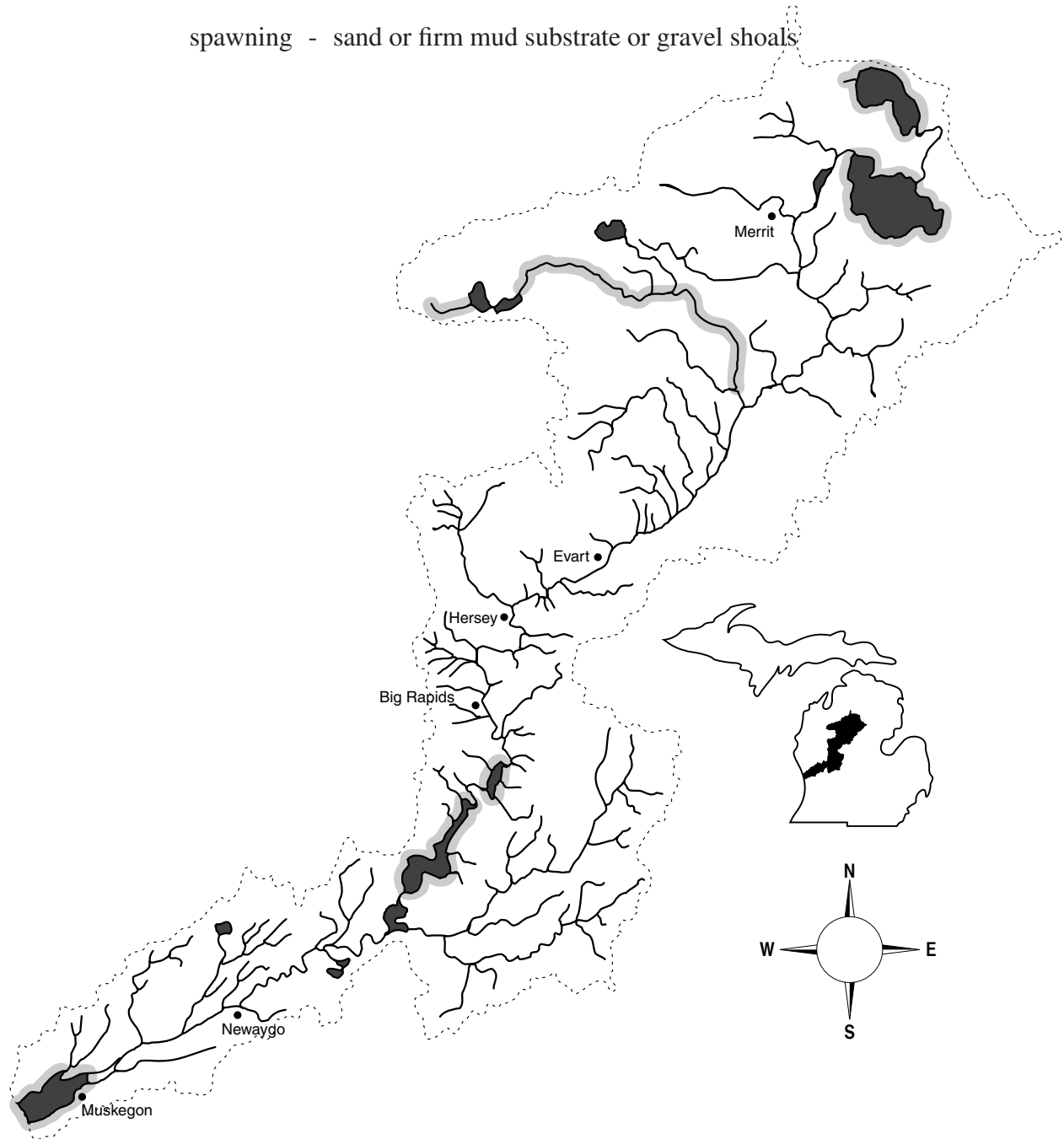
- spawning - vegetation



Emerald shiner (*Notropis atherinoides*)

Habitat:

- feeding - open-large stream channels
 - low to moderate gradient
 - range of turbidites and bottom types
 - midwater or surface preferred, substrate of little importance
 - avoids rooted vegetation
- spawning - sand or firm mud substrate or gravel shoals



Bigmouth shiner (*Notropis dorsalis*)

Habitat:

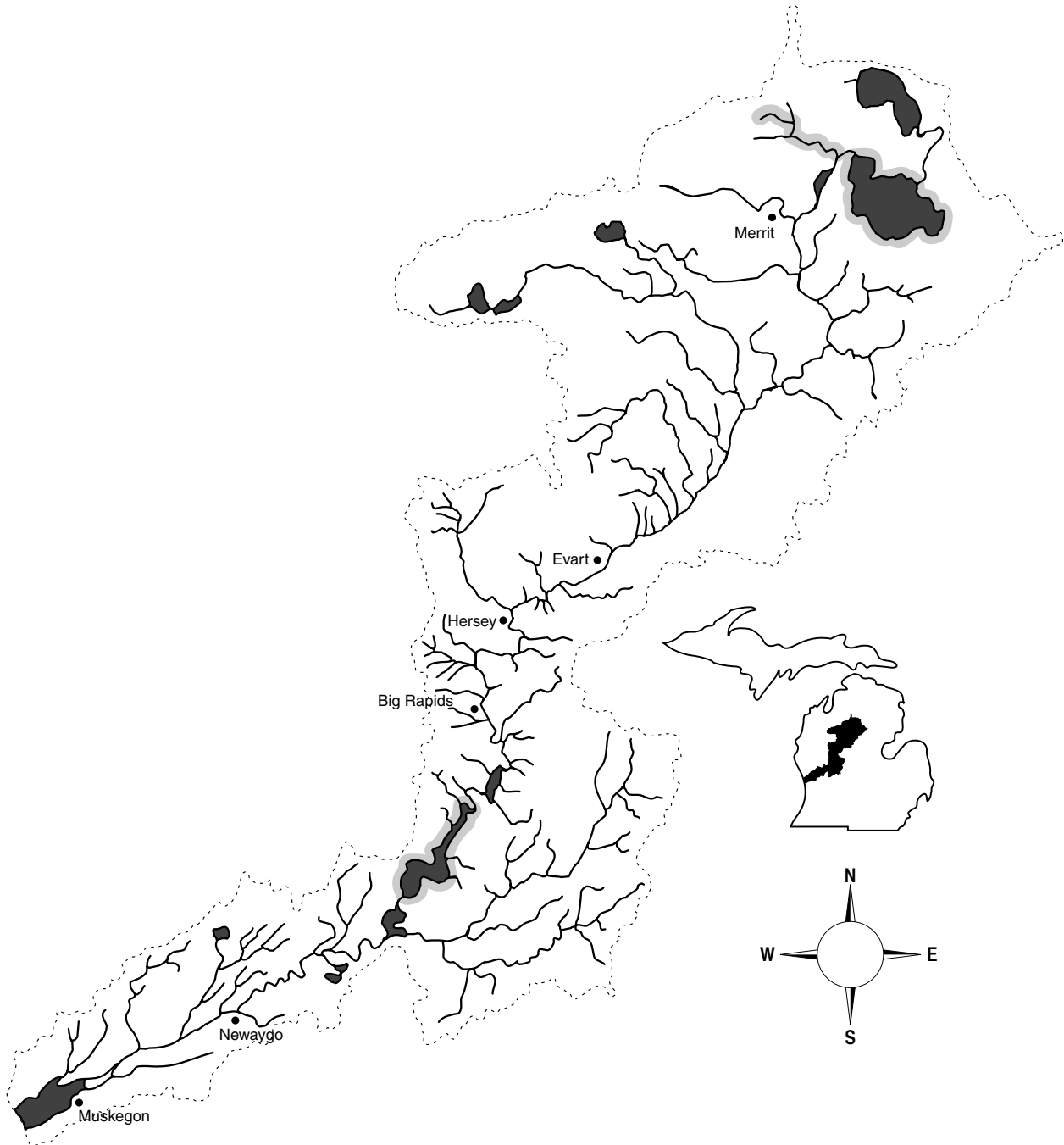
- feeding - small clear streams
- good flows
- sand or gravel substrate
- open water, free from vegetation



Blackchin shiner (*Notropis heterodon*)

Habitat:

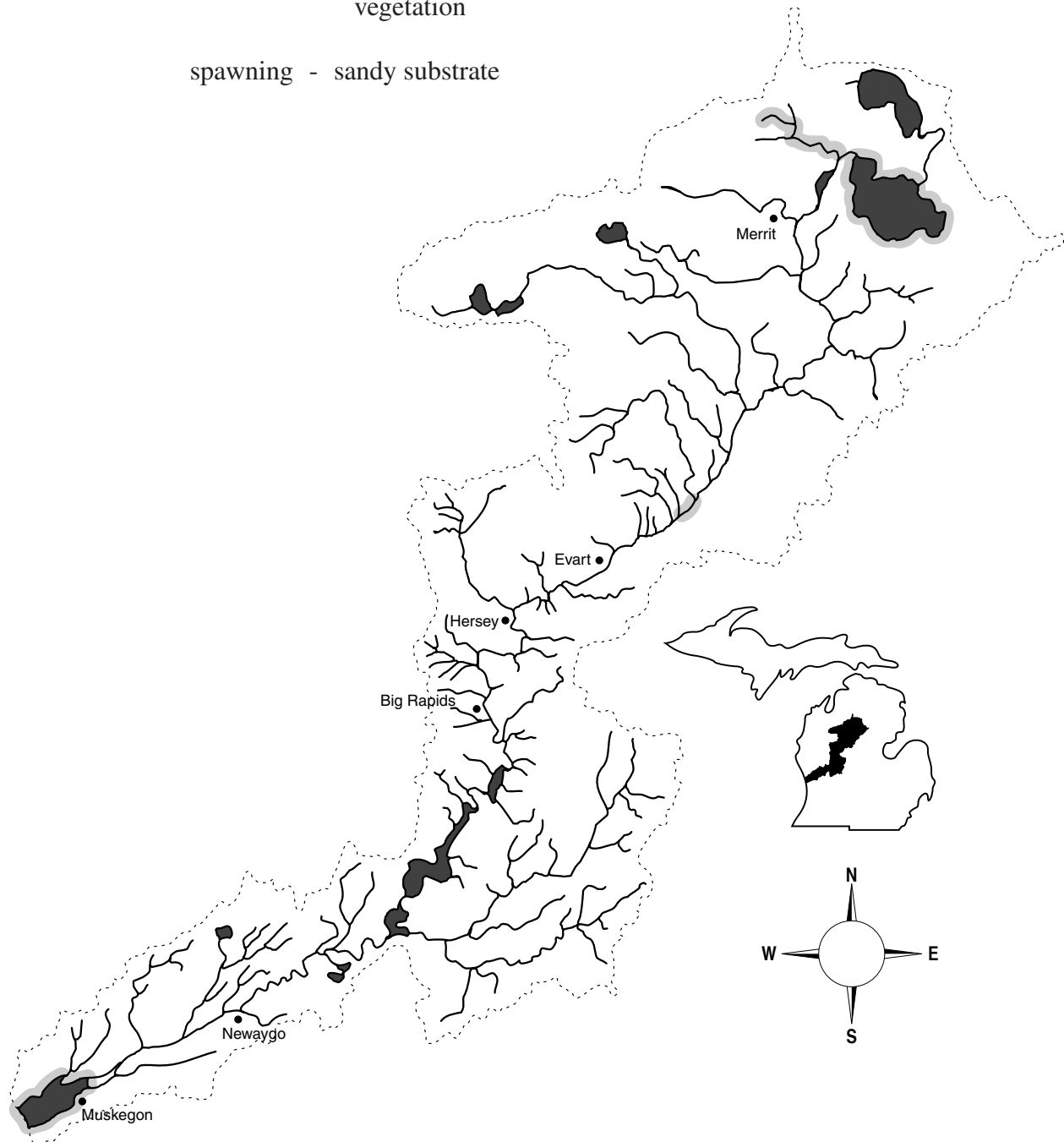
- feeding - lakes, impoundments, and quiet pools in streams and rivers
- clear water
- clean sand, gravel, or organic debris substrate
- dense beds of submerged aquatic vegetation
- cannot tolerate turbidity, silt, or loss of aquatic vegetation



Blacknose shiner (*Notropis heterolepis*)

Habitat:

- feeding - clear lakes, impoundments, and pools of small, clear, low gradient streams
 - aquatic vegetation
 - clean sand, gravel, marl, muck, peat, or organic debris substrate
 - cannot tolerate much turbidity, much siltation, or loss of aquatic vegetation
- spawning - sandy substrate

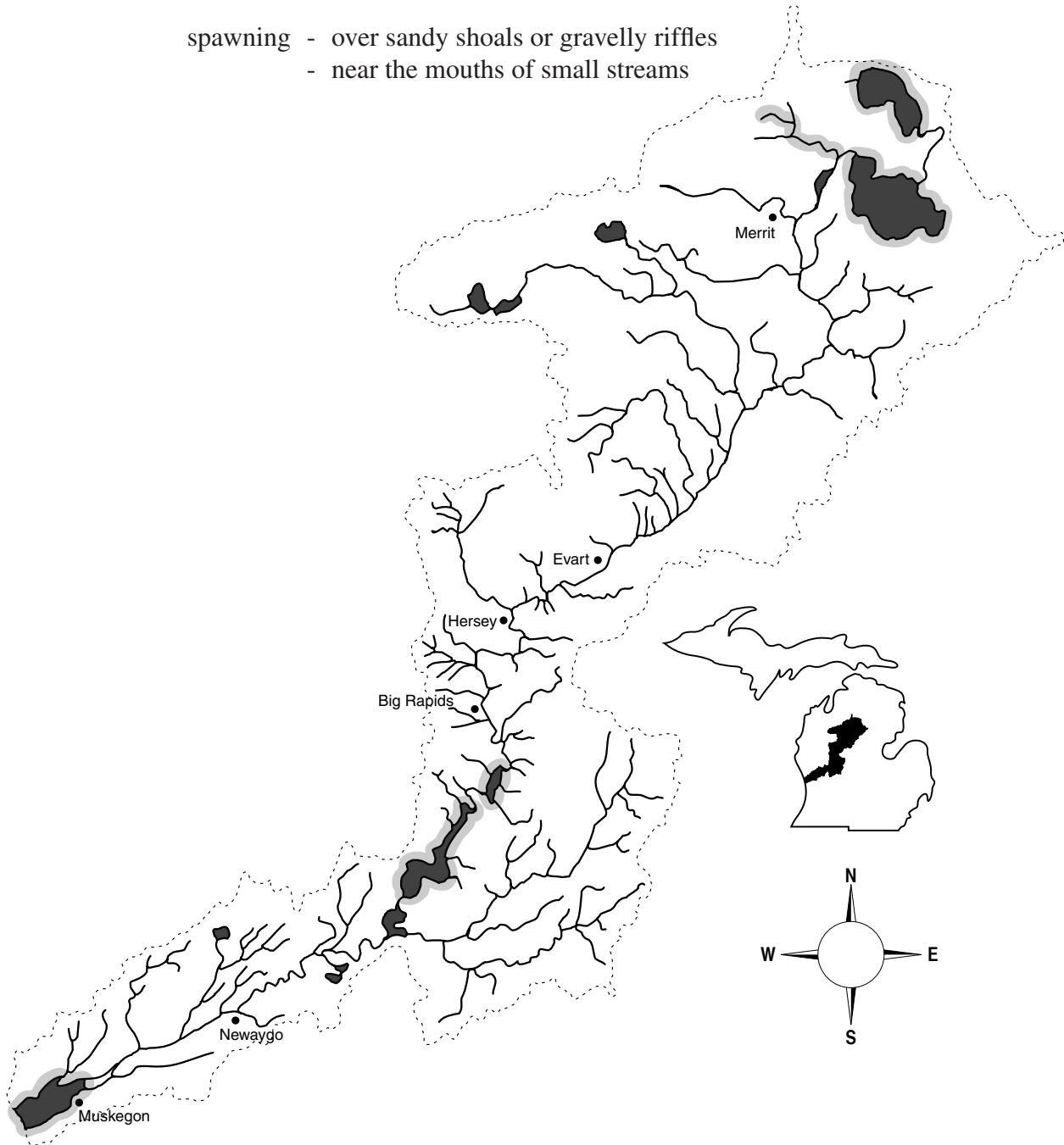


Spottail shiner (*Notropis hudsonius*)

Habitat:

- feeding
 - large rivers, lakes, and impoundments
 - firm sand and gravel substrate
 - low current
 - sparse to moderate vegetation
 - avoids turbidity

- spawning
 - over sandy shoals or gravelly riffles
 - near the mouths of small streams

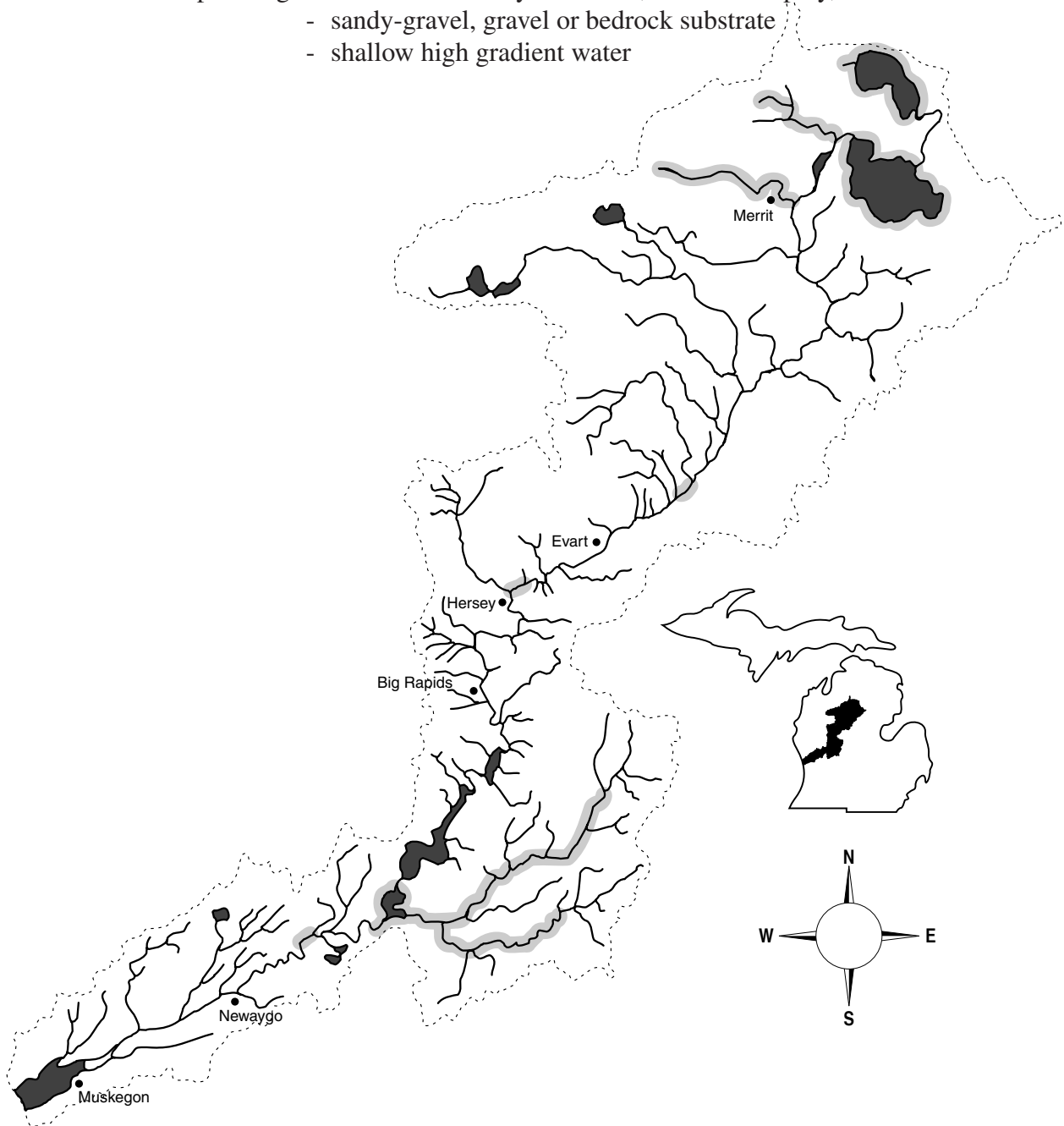


Rosyface shiner (*Notropis rubellus*)

Habitat:

- feeding
 - moderate sized streams
 - moderate to high gradient
 - gravel or sand substrate; intolerant of silt substrate
 - clear water; intolerant of turbidity

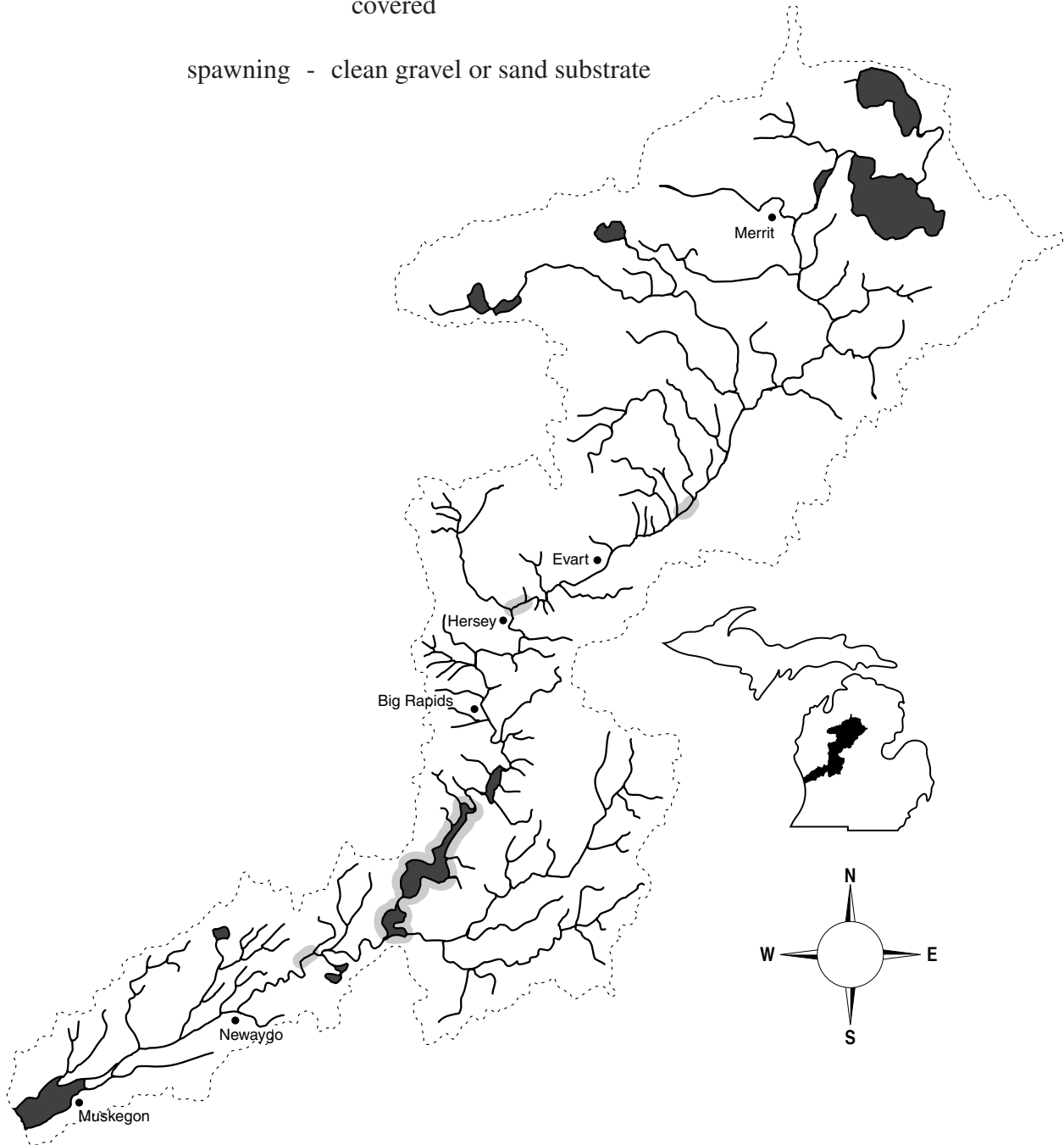
- spawning
 - on nests of horneyhead chub, chesnut lamprey, and redhorses
 - sandy-gravel, gravel or bedrock substrate
 - shallow high gradient water



Sand shiner (*Notropis stramineus*)

Habitat:

- feeding - sand and gravel substrate
 - shallow pools in medium size streams, lakes, and impoundments
 - clear water and low gradient
 - rooted aquatic vegetation preferred
 - tolerant of some inorganic pollutants provided substrate is not covered
- spawning - clean gravel or sand substrate

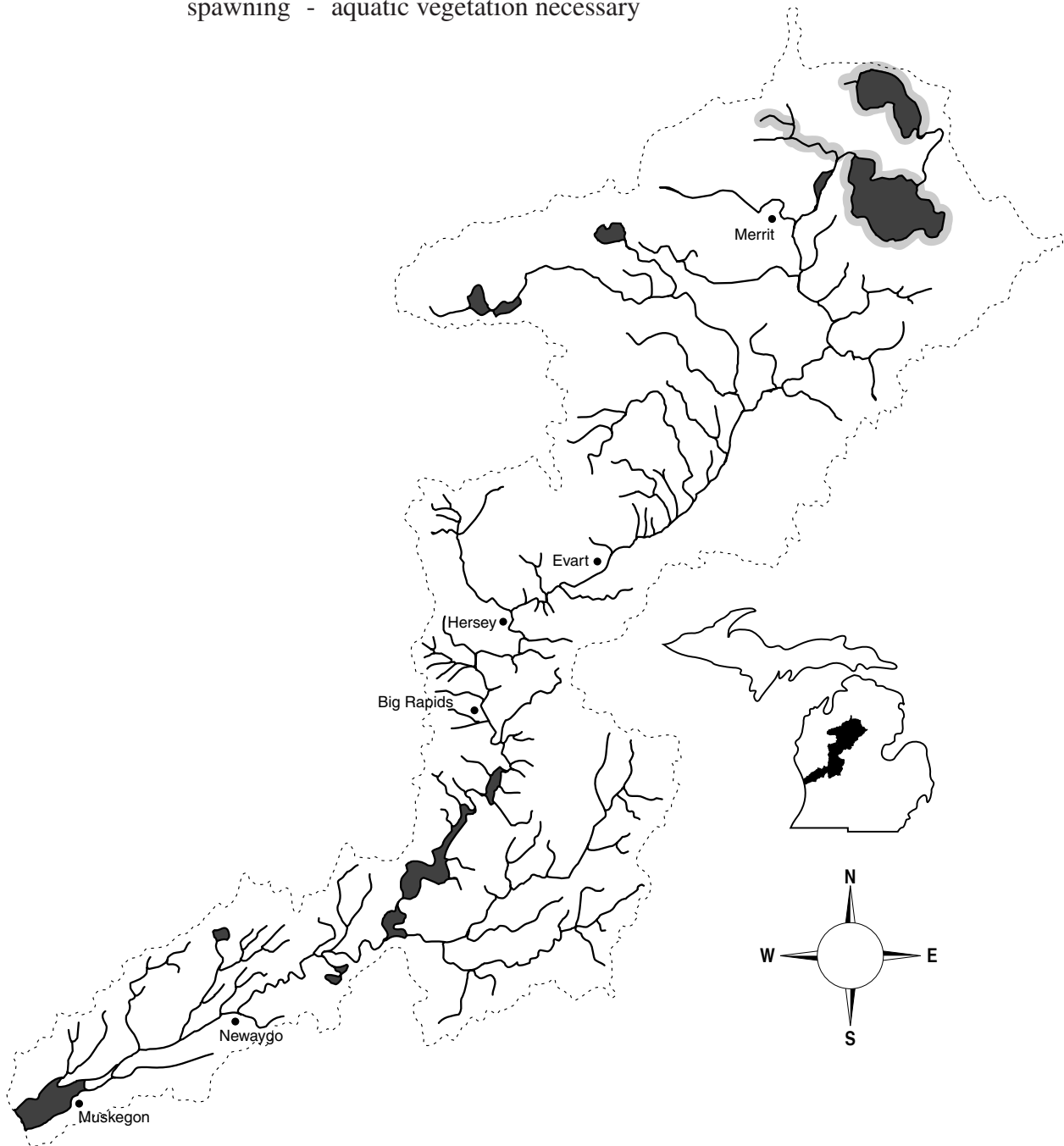


Mimic shiner (*Notropis volucellus*)

Habitat:

- feeding - pools and backwater of streams, moderately weedy lakes and impoundments
- quiet or still water
- clear shallow water

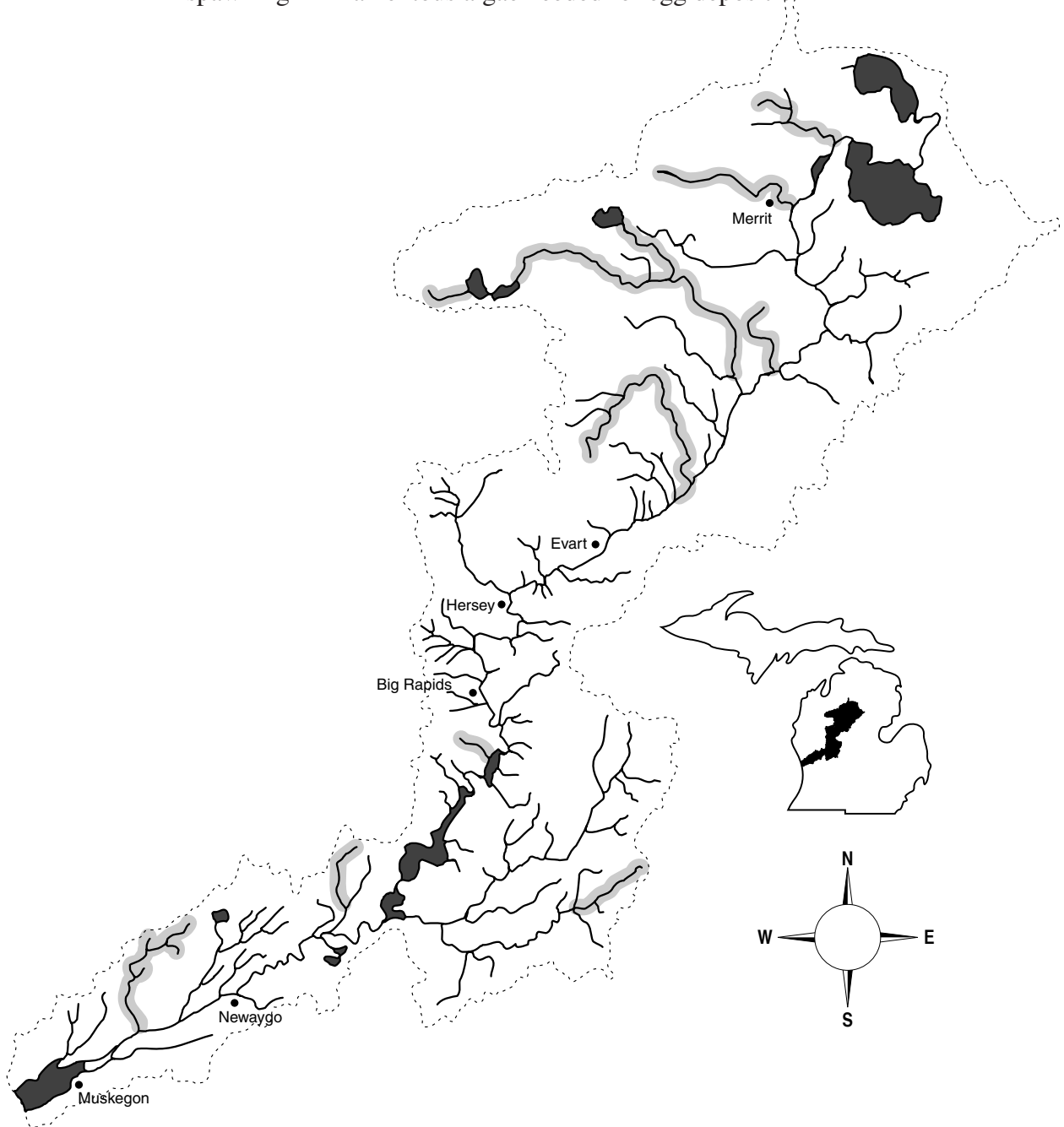
- spawning - aquatic vegetation necessary



Northern redbelly dace (*Phoxinus eos*)

Habitat:

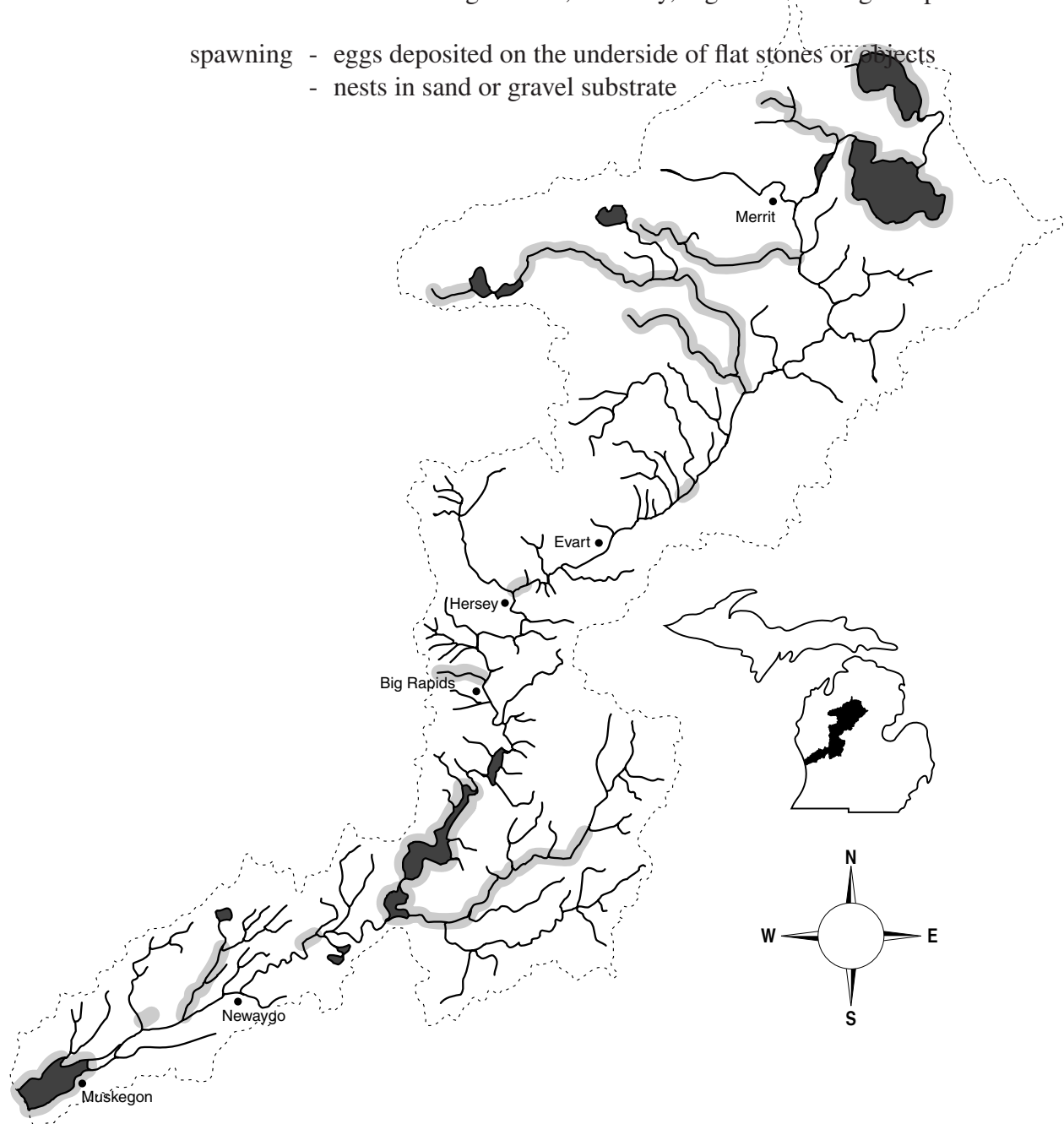
- feeding - slow current
 - in boggy lakes and streams
 - detritus or silt substrate
 - clear to slightly turbid water
- spawning - filamentous algae needed for egg deposition



Bluntnose minnow (*Pimephales notatus*)

Habitat:

- feeding - quiet pools and backwaters of medium to large streams, lakes, and impoundments
 - clear warm water
 - some aquatic vegetation
 - firm substrates
 - tolerates all gradients, turbidity, organic and inorganic pollutants
-
- spawning - eggs deposited on the underside of flat stones or objects
 - nests in sand or gravel substrate



Fathead minnow (*Pimephales promelas*)

Habitat:

- feeding - pools of small streams, lakes, and impoundments
- tolerant of turbidity, high temperatures, and low oxygen

- spawning - on underside of objects in water 2 to 3 feet deep
- prefer sand, marl, or gravel substrate



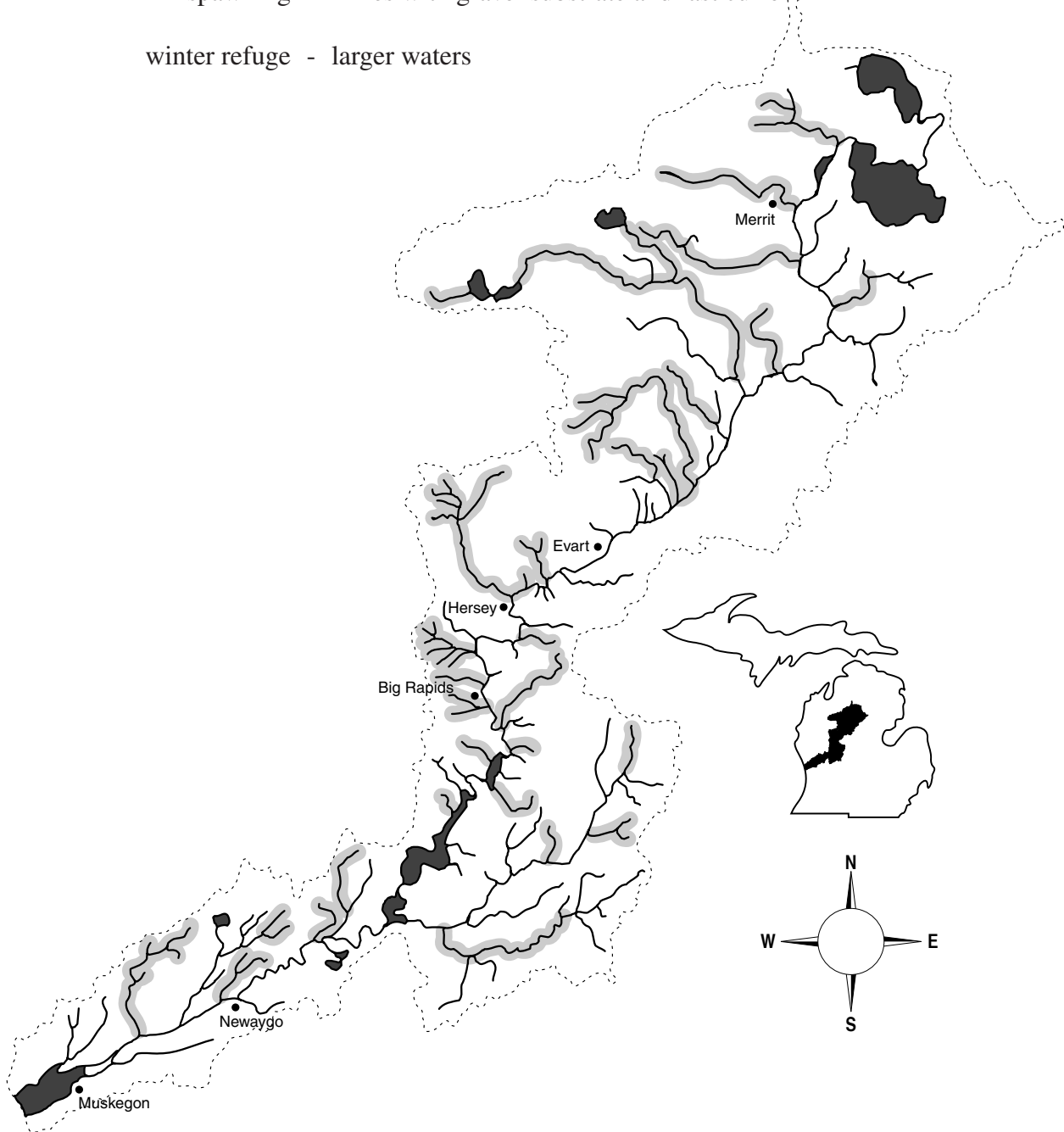
Blacknose dace (*Rhinichthys atratulus*)

Habitat:

- feeding - moderate to high gradient streams
- sand and gravel substrate
- clear cool water in pools with deep holes and undercut banks
- does not tolerate turbidity and silt well

- spawning - riffles with gravel substrate and fast current

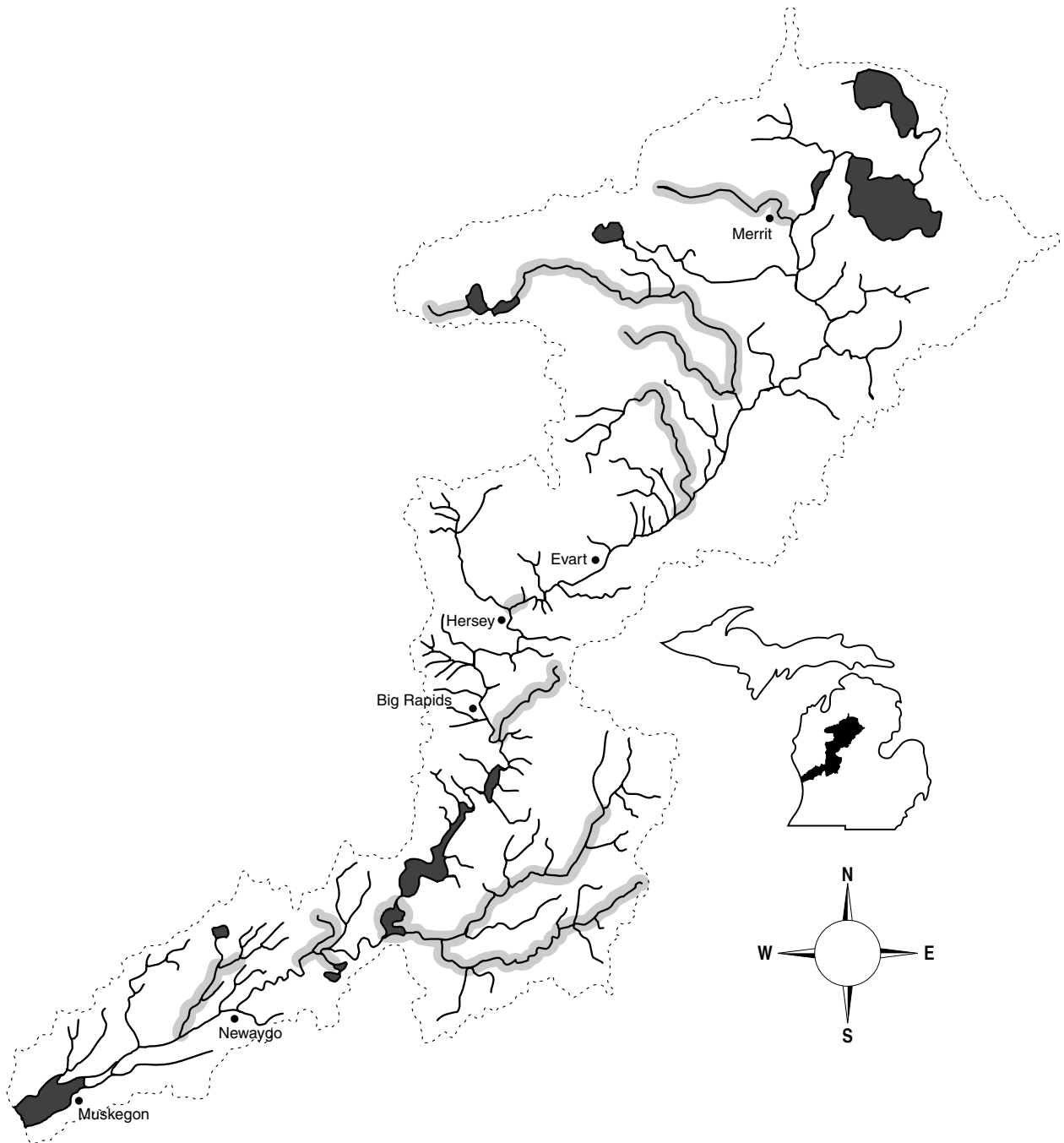
- winter refuge - larger waters



Longnose dace (*Rhinichthys cataractae*)

Habitat:

- lakes and streams
- high gradient
- gravel or boulder substrate



Creek chub (*Semotilus atromaculatus*)

Habitat:

- feeding - streams, rivers, or shore waters of lakes and impoundments
 - can tolerate intermittent flows
 - tolerates moderate turbidity

- spawning - gravel nests
 - low current

- winter refuge - deeper pools and runs

