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Appendix B

Abundance and presence/absence data
for fish in the Black River watershed.

This appendix contains known past and present fish distributions (except for four species of lamprey and two species of trout shown in the main report) in the Black River system. Distributions of fishes were compiled from records located at the University of Michigan Museum of Zoology, Michigan Department of Natural Resources Institute for Fisheries Research, and from the Michigan Department of Natural Resources Lake Erie Management Unit. Specific locations and density estimates were generated and plotted by the author. Exotic species are noted following their species name.

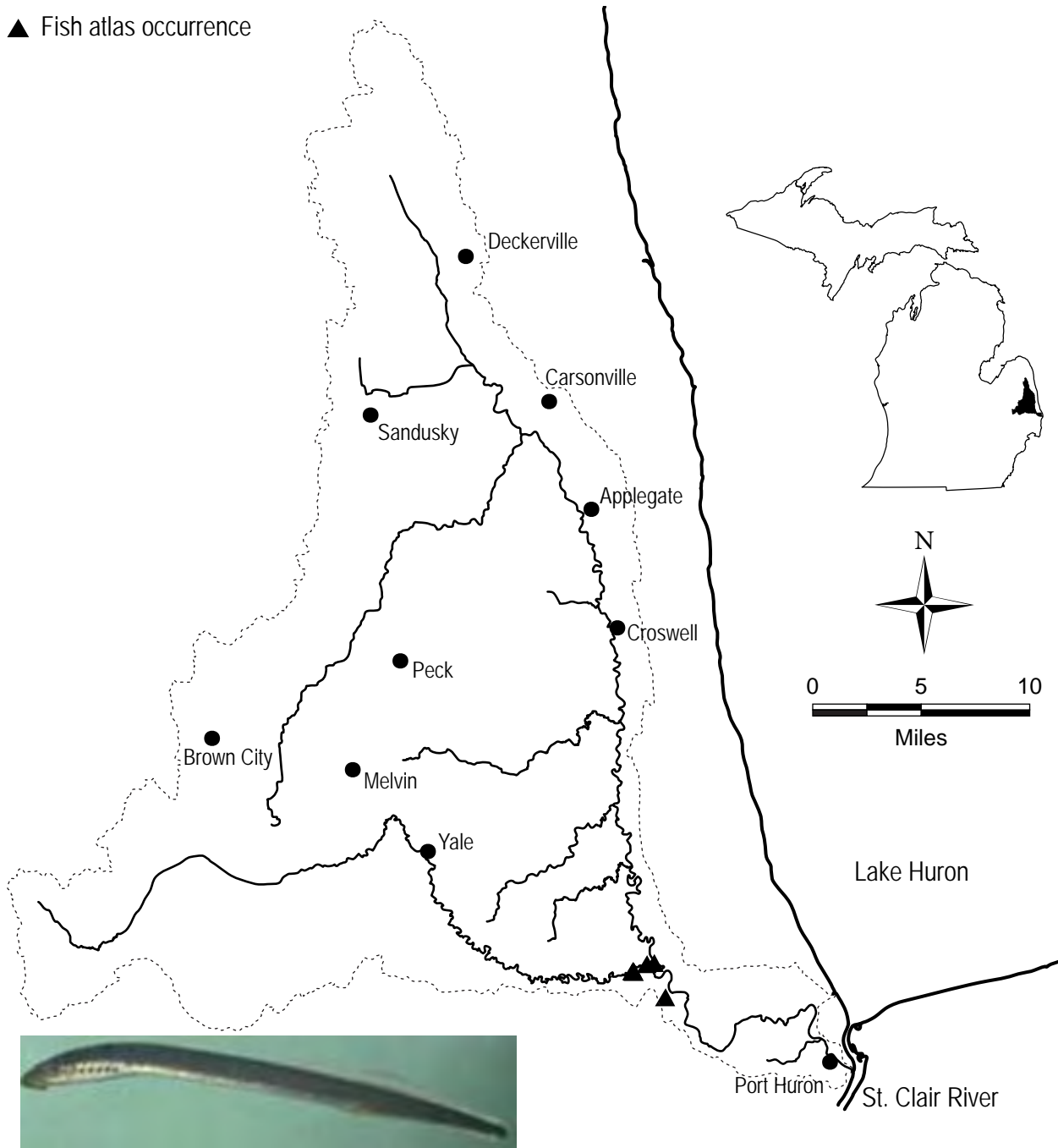
Habitat descriptions were compiled from the Fishes of Ohio (Trautman 1981), Freshwater Fishes of Canada (Scott and Crossman 1973), Fishes of Wisconsin (Becker 1983), Fishes of Missouri (Pflieger 1975), Fishes of the Great Lakes Region (Hubbs and Lagler 1947), and Kraft et al. 2006.

Images of fish species were provided by the New York State Department of Environmental Conservation (Kraft et al. 2006).

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▲ Fish atlas occurrence

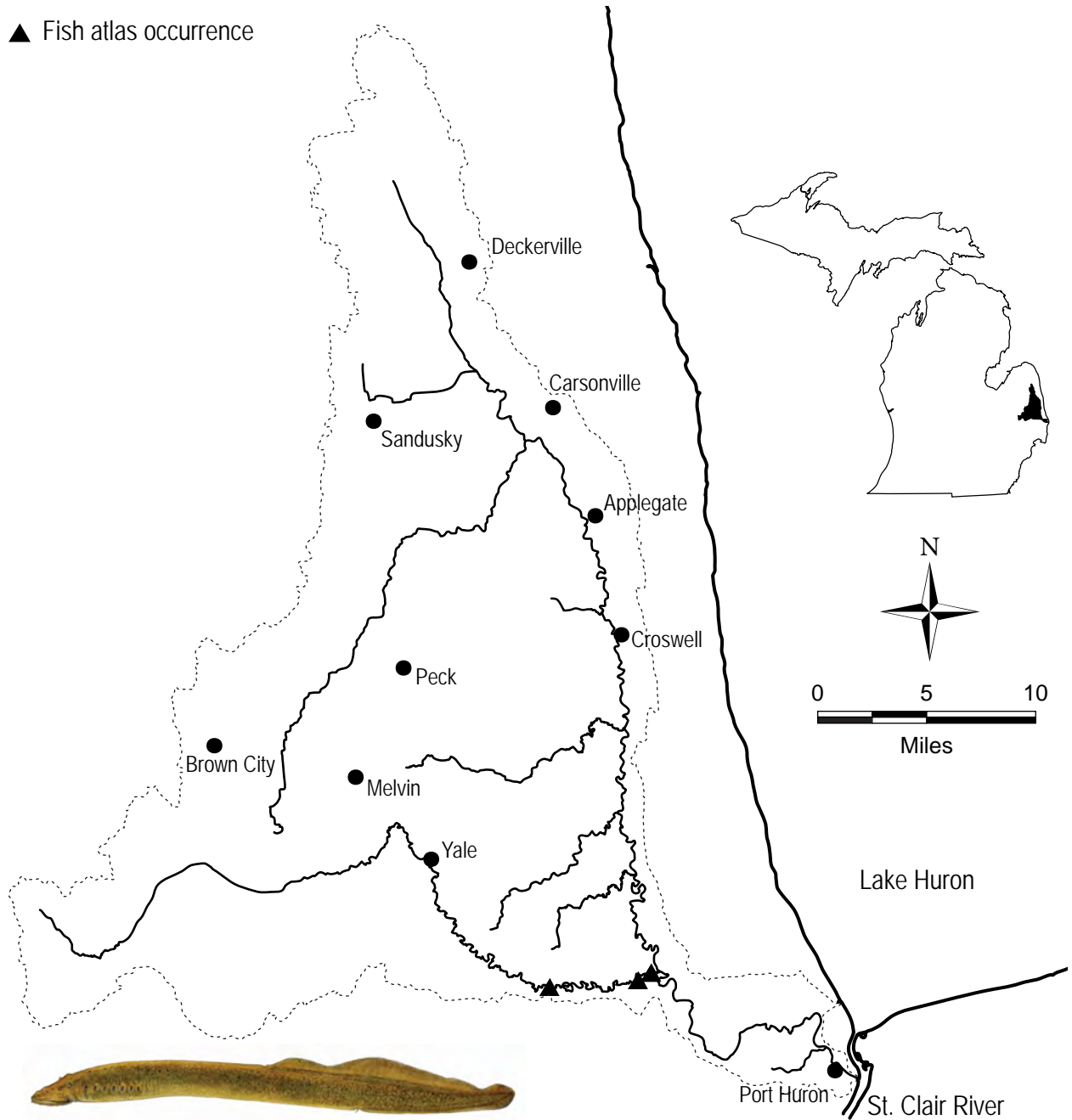


Northern brook lamprey (*Ichthyomyzon fossor*)

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

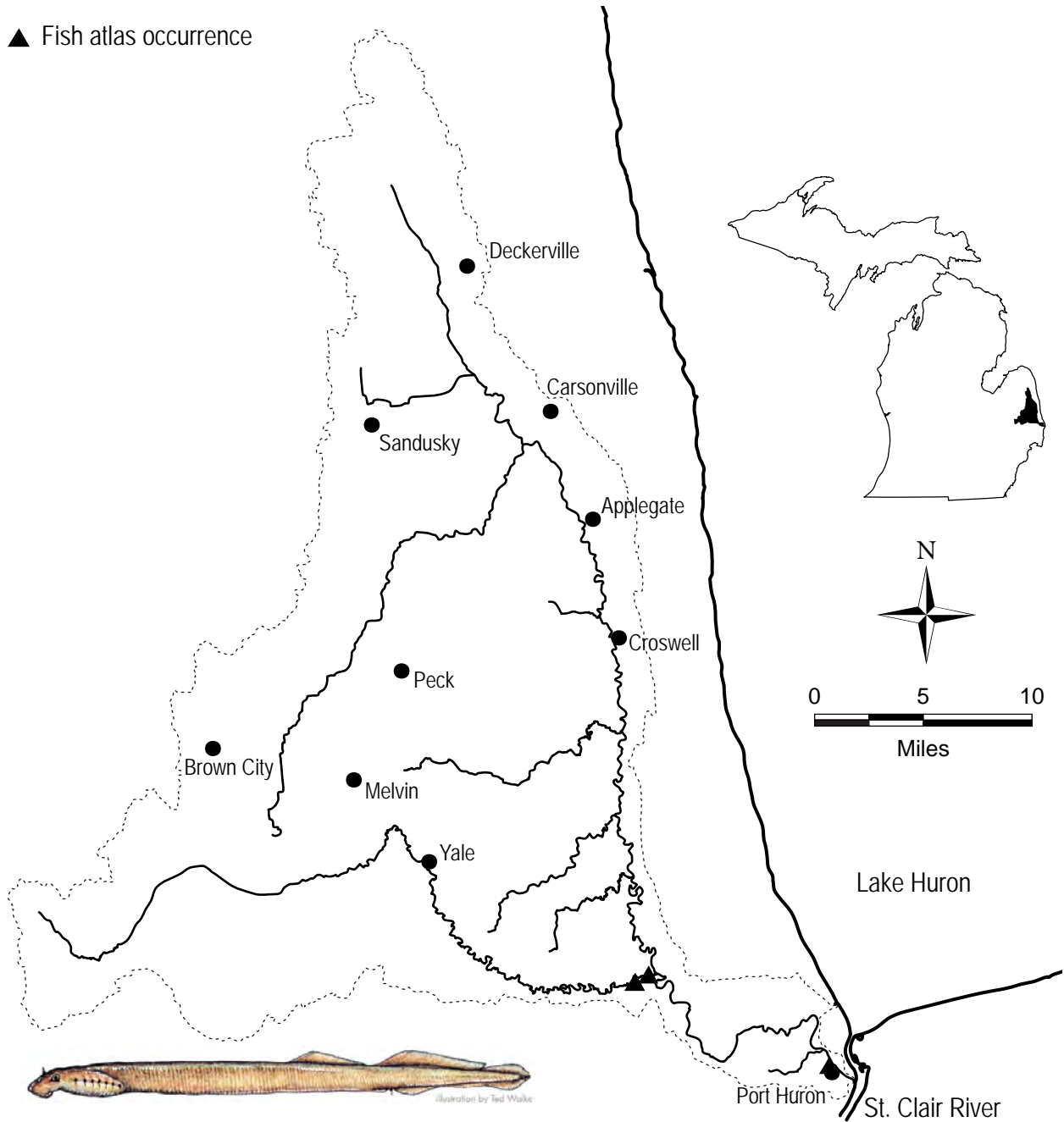
▲ Fish atlas occurrence



Silver lamprey (*Ichthyomyzon unicuspis*)

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

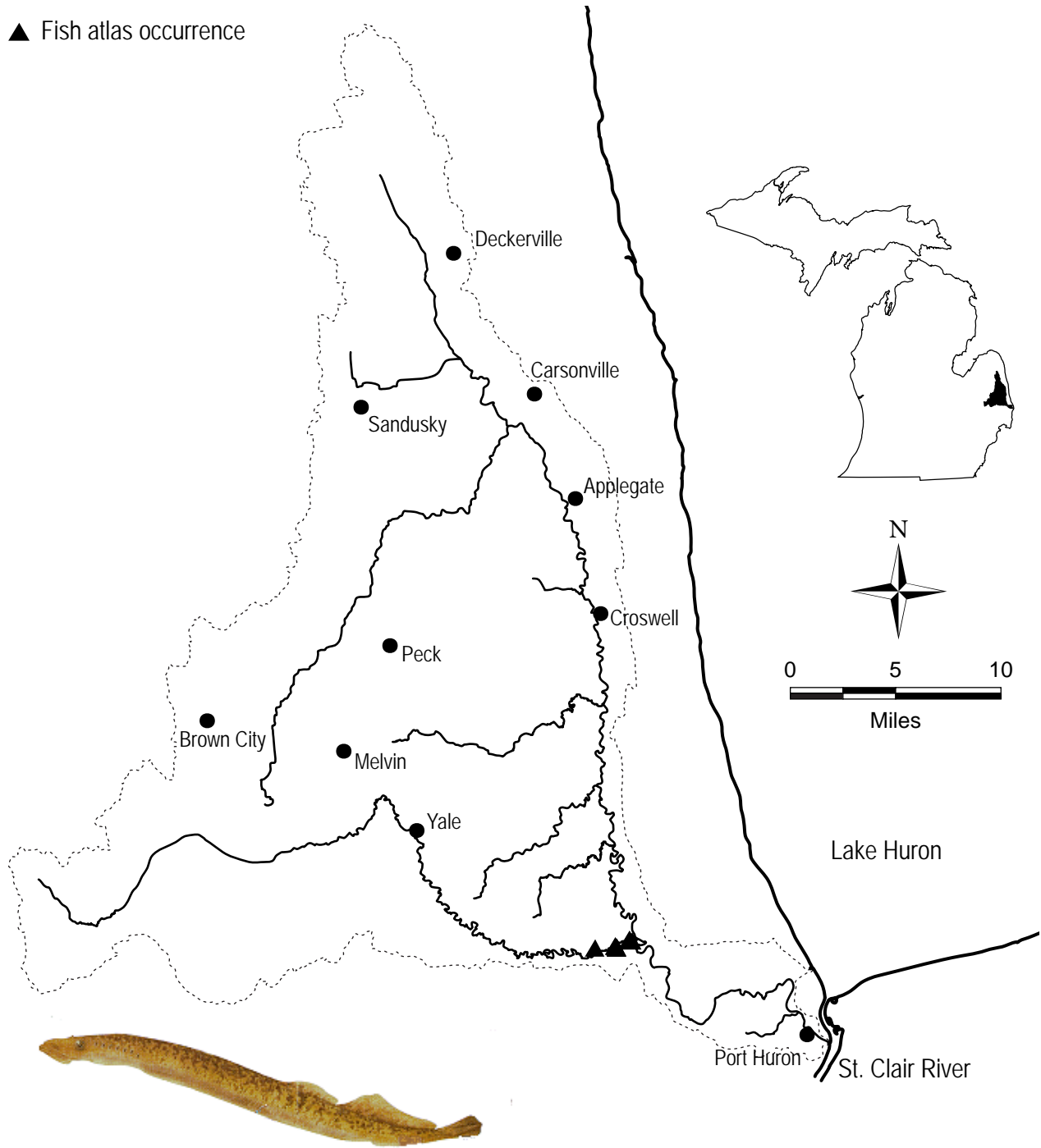


American brook lamprey (*Lampetra appendix*)

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 ammocetes

▲ Fish atlas occurrence

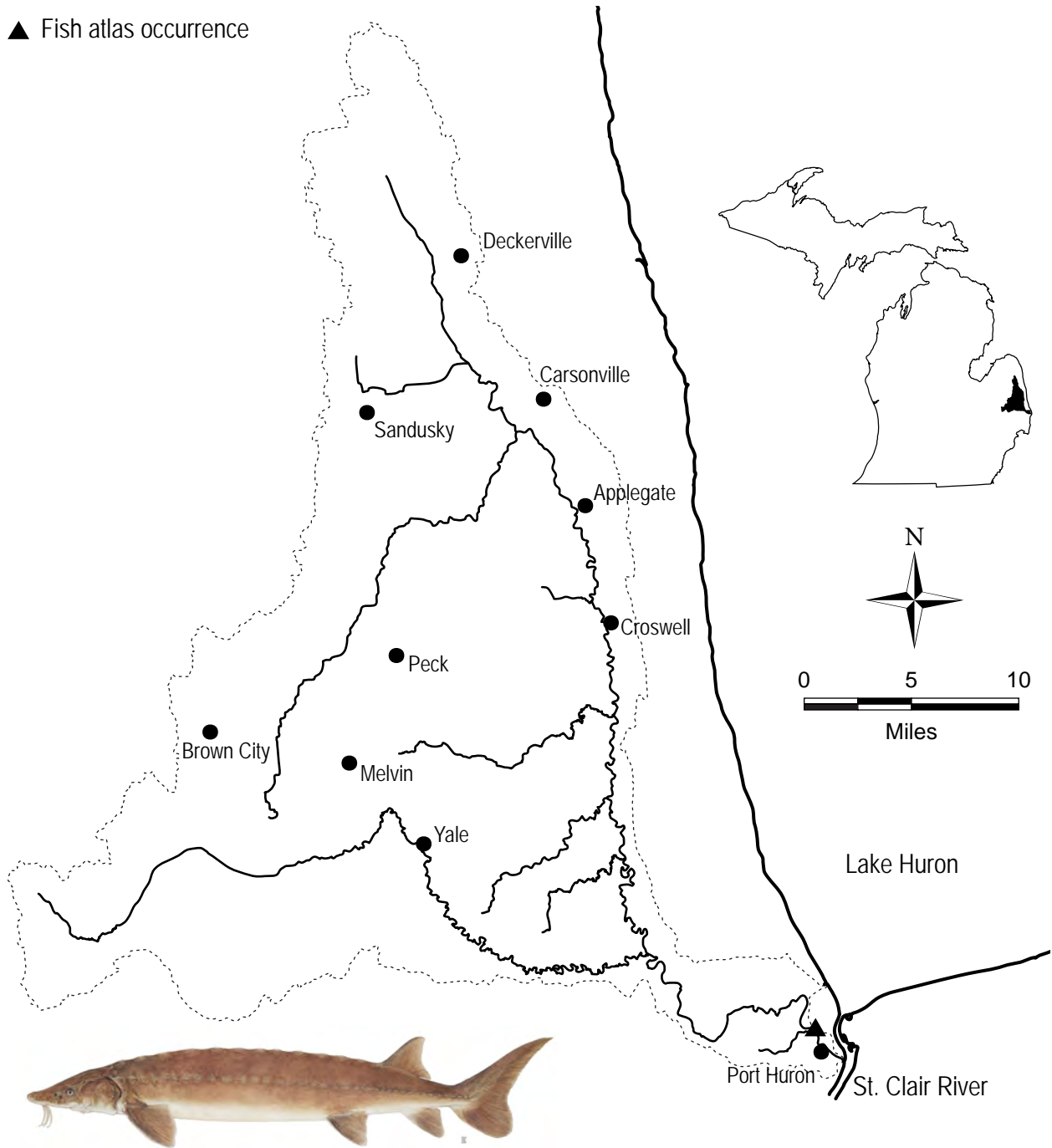


Sea lamprey (*Petromyzon marinus*)

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

▲ Fish atlas occurrence

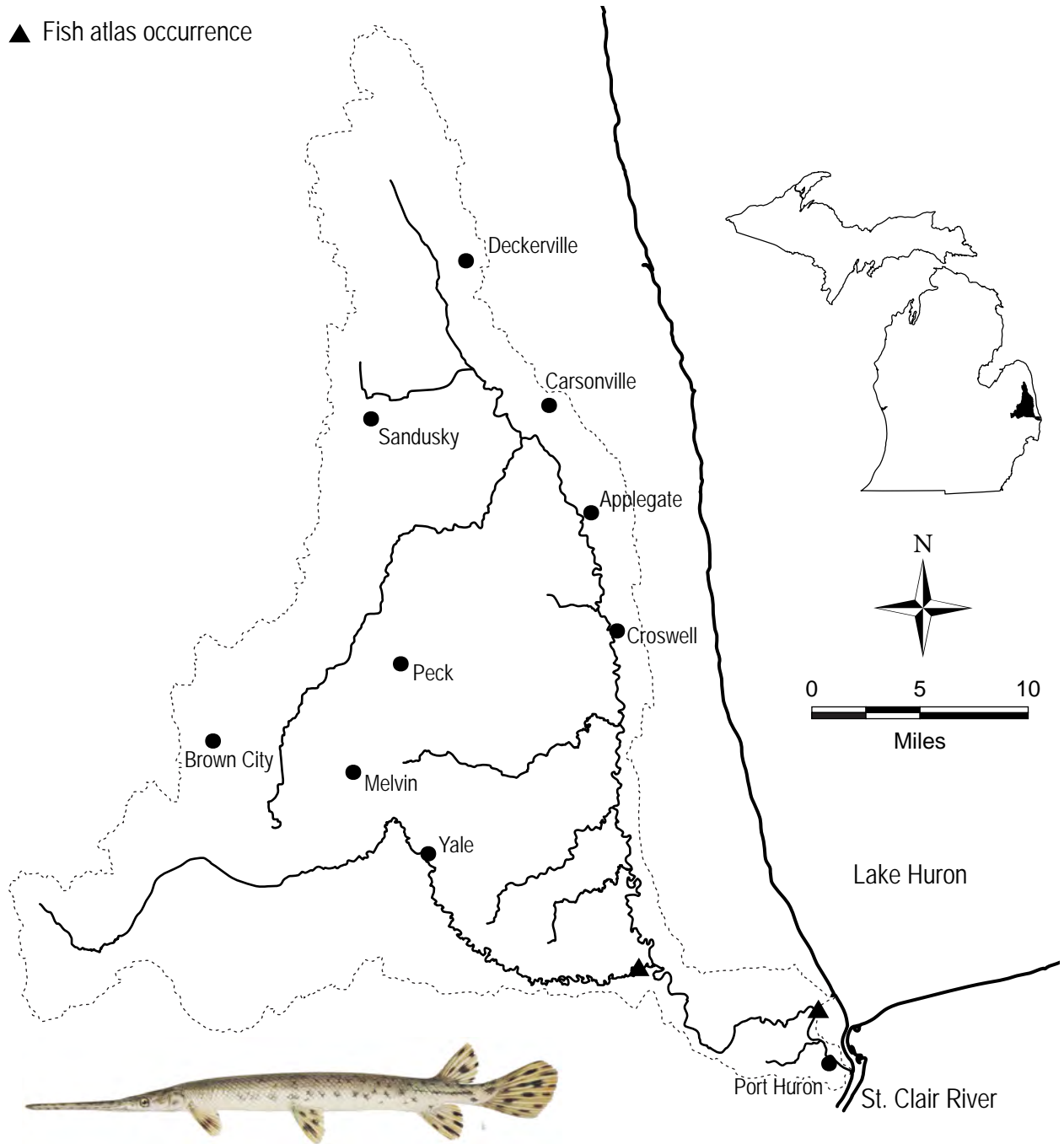


Lake sturgeon (*Acipenser fulvescens*) - threatened

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

▲ Fish atlas occurrence



Longnose gar (*Lepisosteus osseus*)

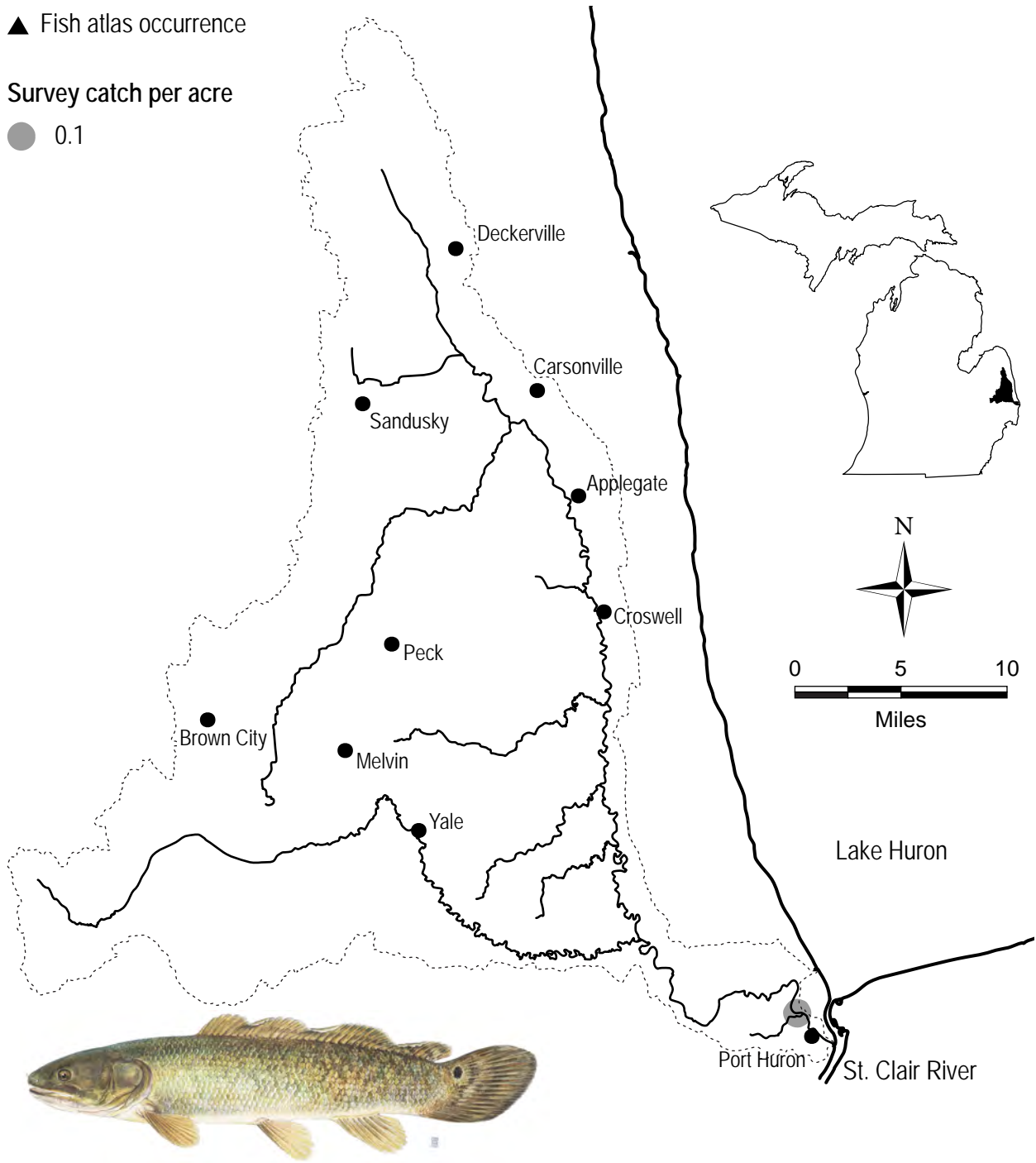
Habitat:

- 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

▲ Fish atlas occurrence

Survey catch per acre

● 0.1



Bowfin (*Amia calva*)

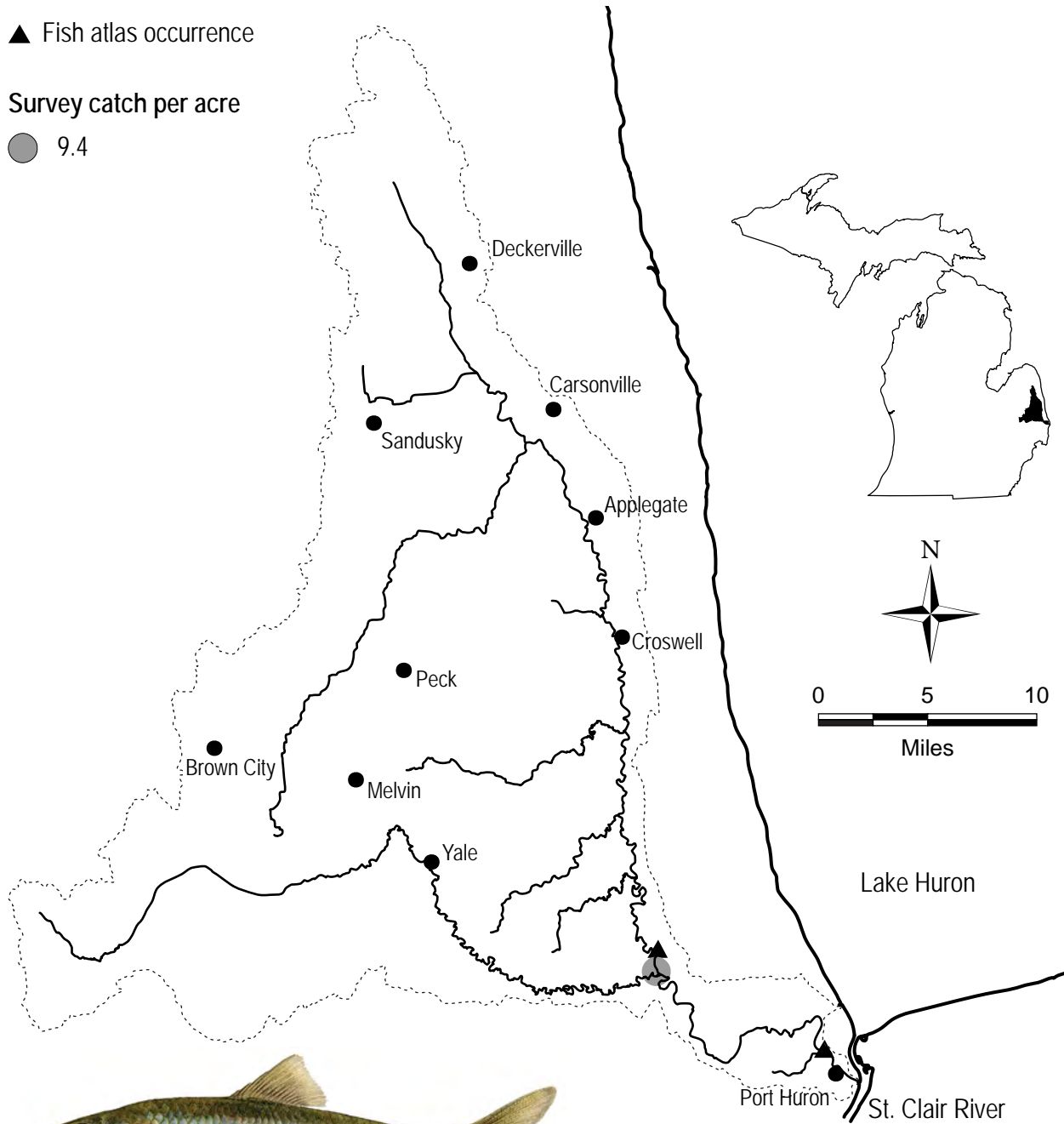
Habitat:

- 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

▲ Fish atlas occurrence

Survey catch per acre

● 9.4



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

▲ Fish atlas occurrence

Survey catch per acre

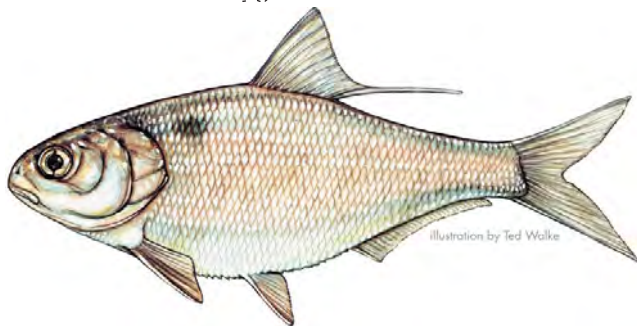
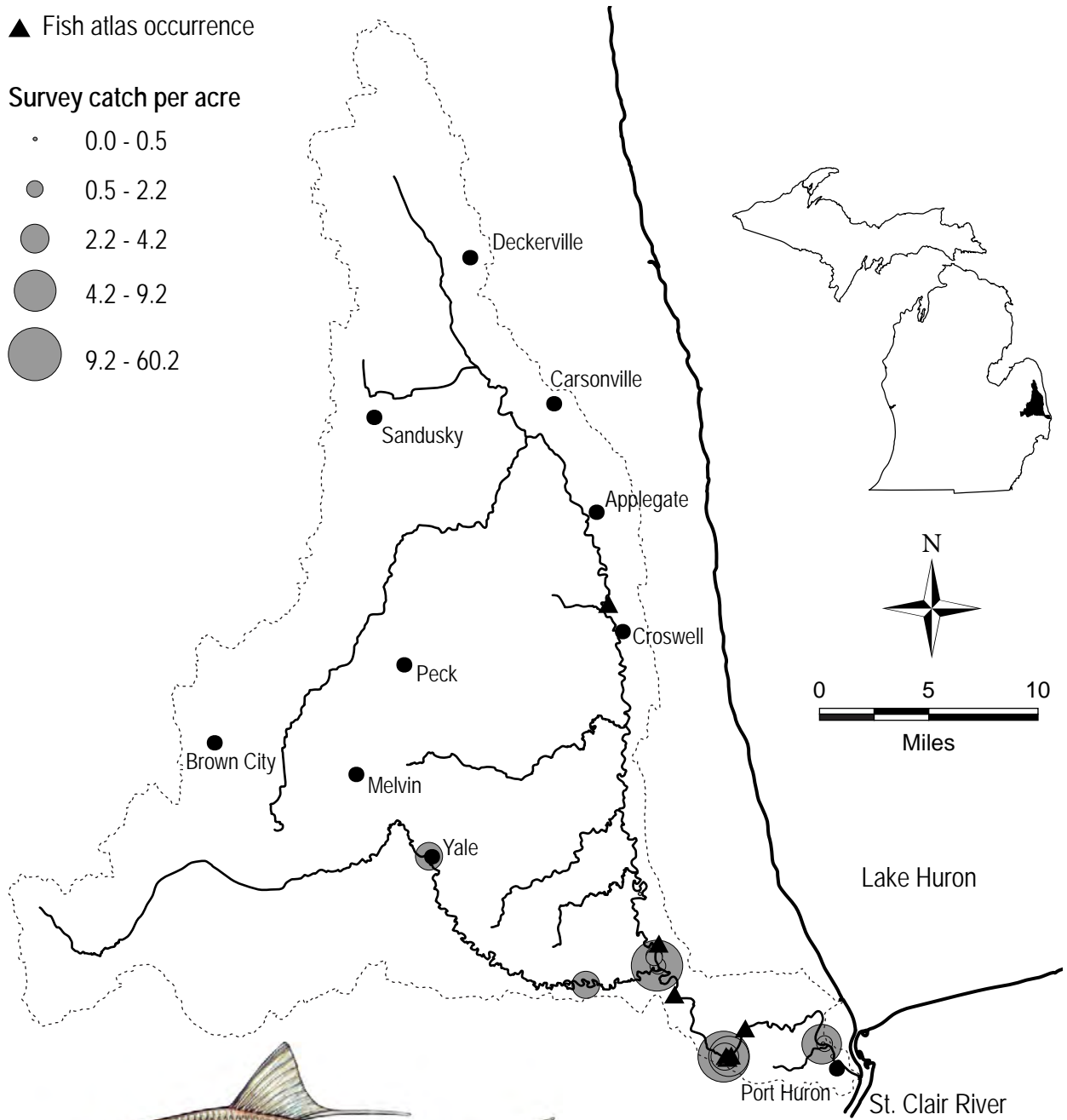


illustration by Ted Walker

Gizzard shad (*Dorosoma cepedianum*)

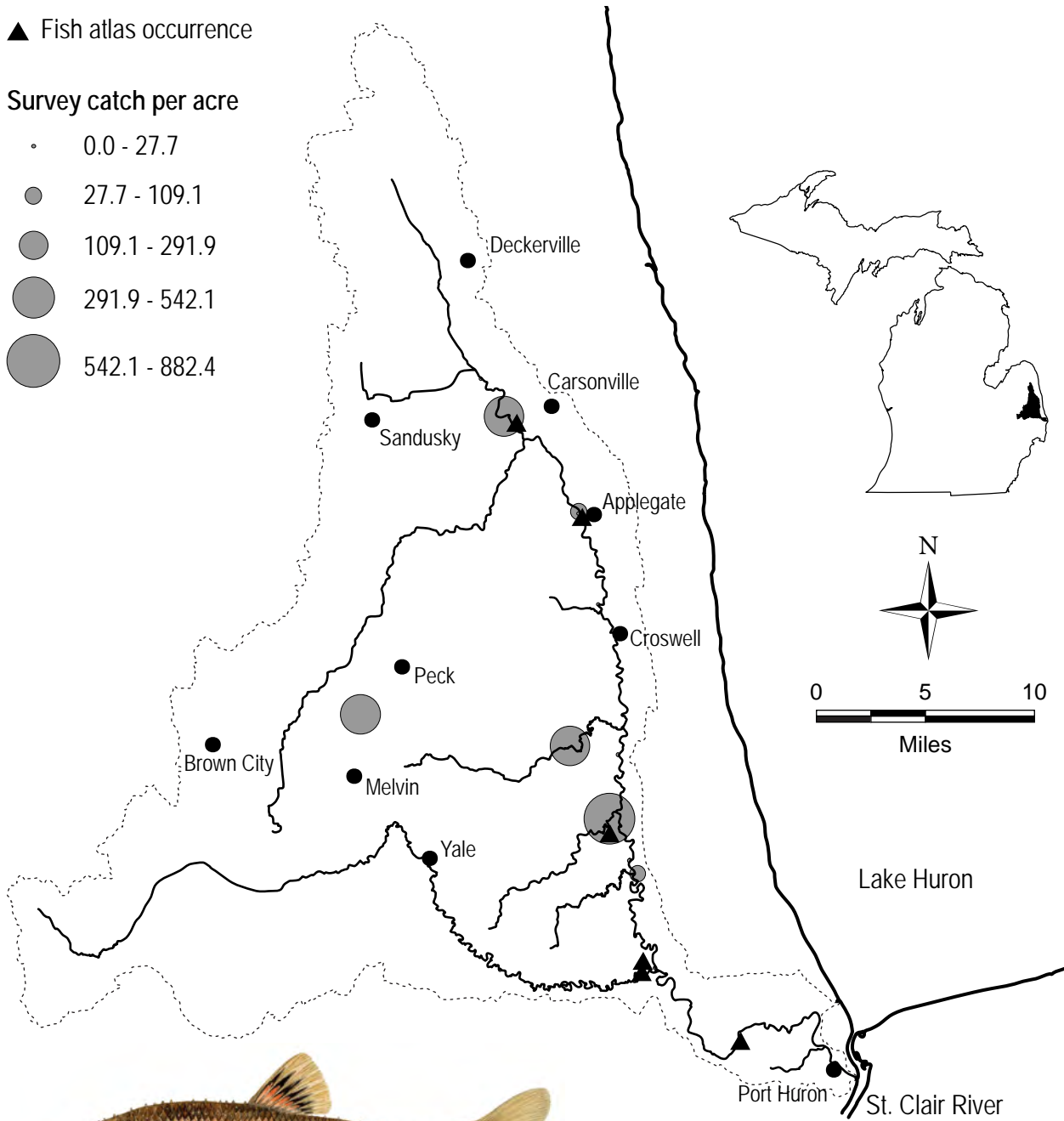
Habitat:

- feeding - large streams with low gradient, impoundments
- tolerant of clear and turbid water
- spawning - shallow areas of ponds, lakes, and large rivers
- low gradient

▲ Fish atlas occurrence

Survey catch per acre

- 0.0 - 27.7
- 27.7 - 109.1
- 109.1 - 291.9
- 291.9 - 542.1
- 542.1 - 882.4



Central stoneroller (*Campostoma anomalum pullam*)

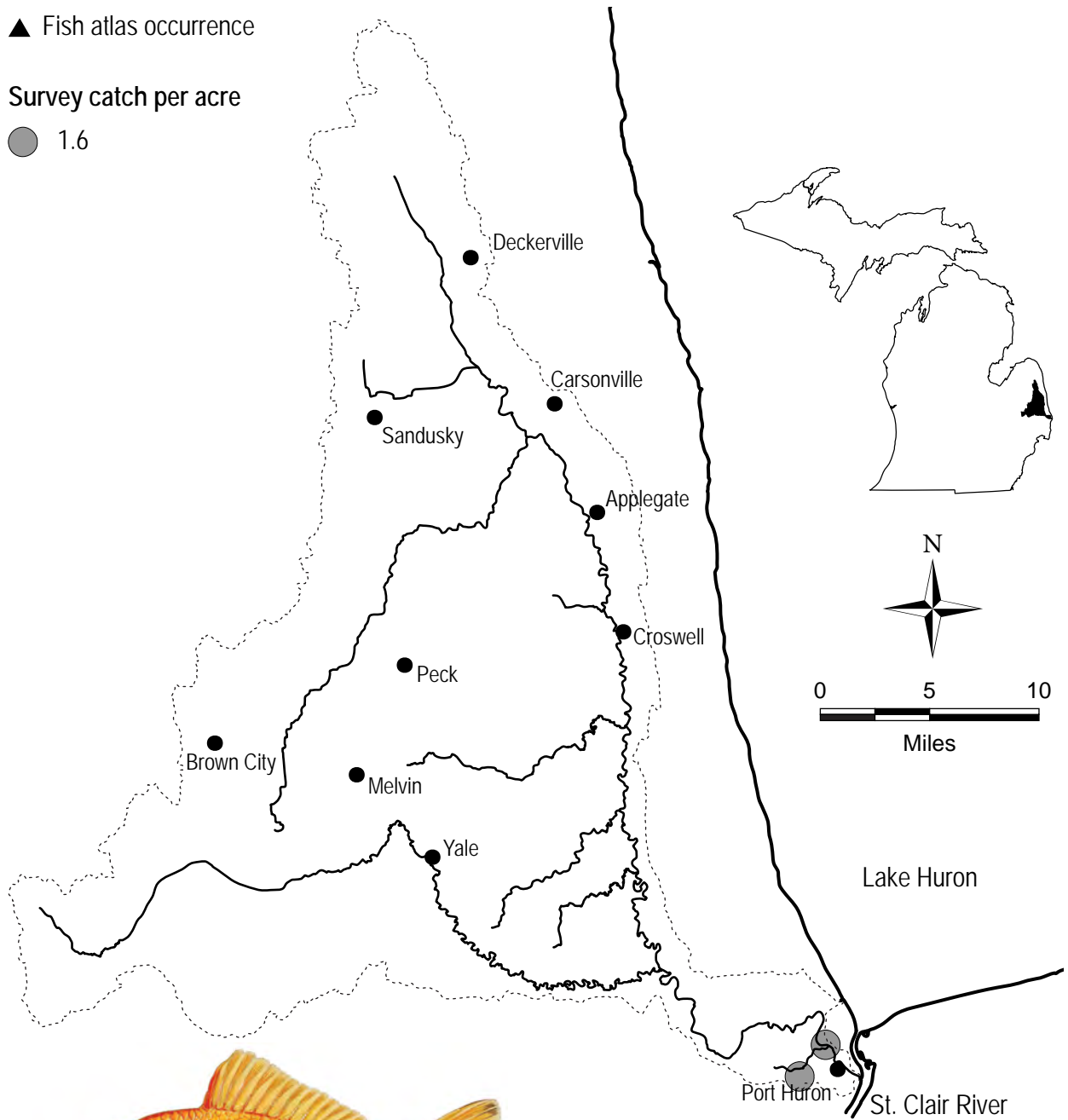
Habitat:

- 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

▲ Fish atlas occurrence

Survey catch per acre

● 1.6



Goldfish (*Carassius auratus*)

Habitat:

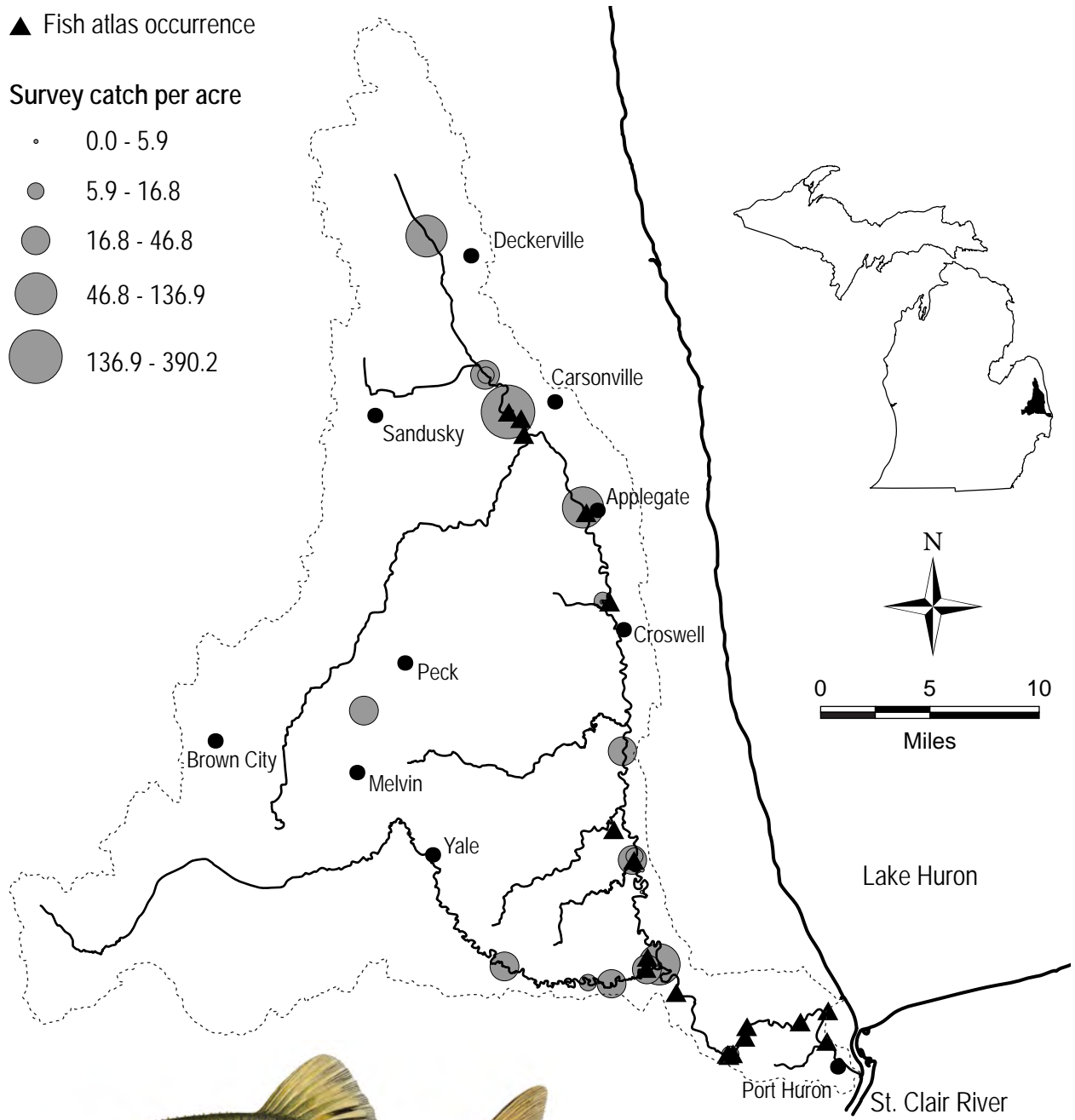
- feeding - vegetation
- low gradient, shallow, warm water streams, rivers, lakes, and impoundments
- tolerates some turbidity and siltation
- spawning - warm, weedy shallows

Black River Assessment

▲ Fish atlas occurrence

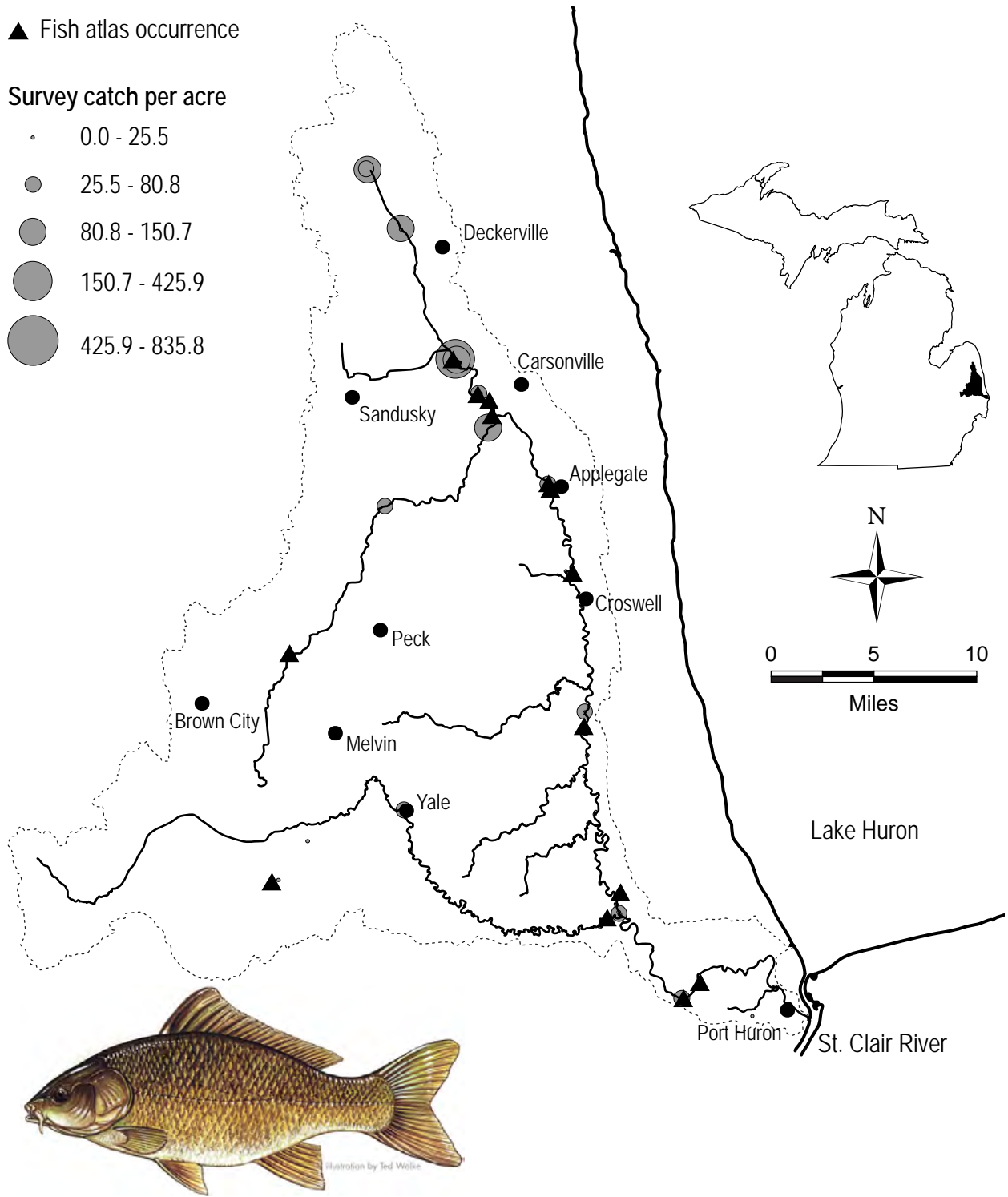
Survey catch per acre

- 0.0 - 5.9
- 5.9 - 16.8
- 16.8 - 46.8
- 46.8 - 136.9
- 136.9 - 390.2



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*)

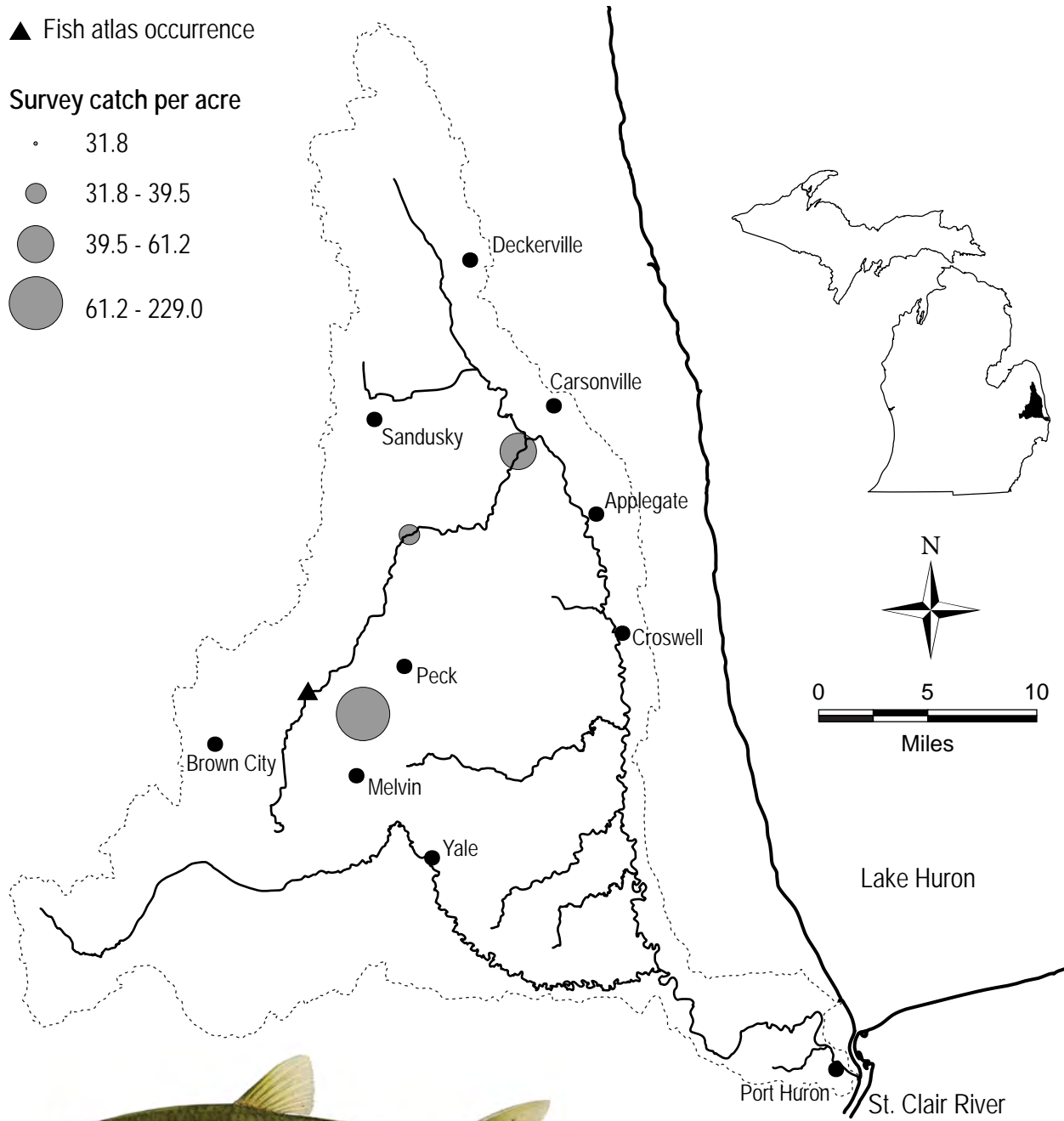
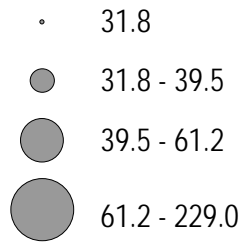
Habitat:

- 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

Black River Assessment

▲ Fish atlas occurrence

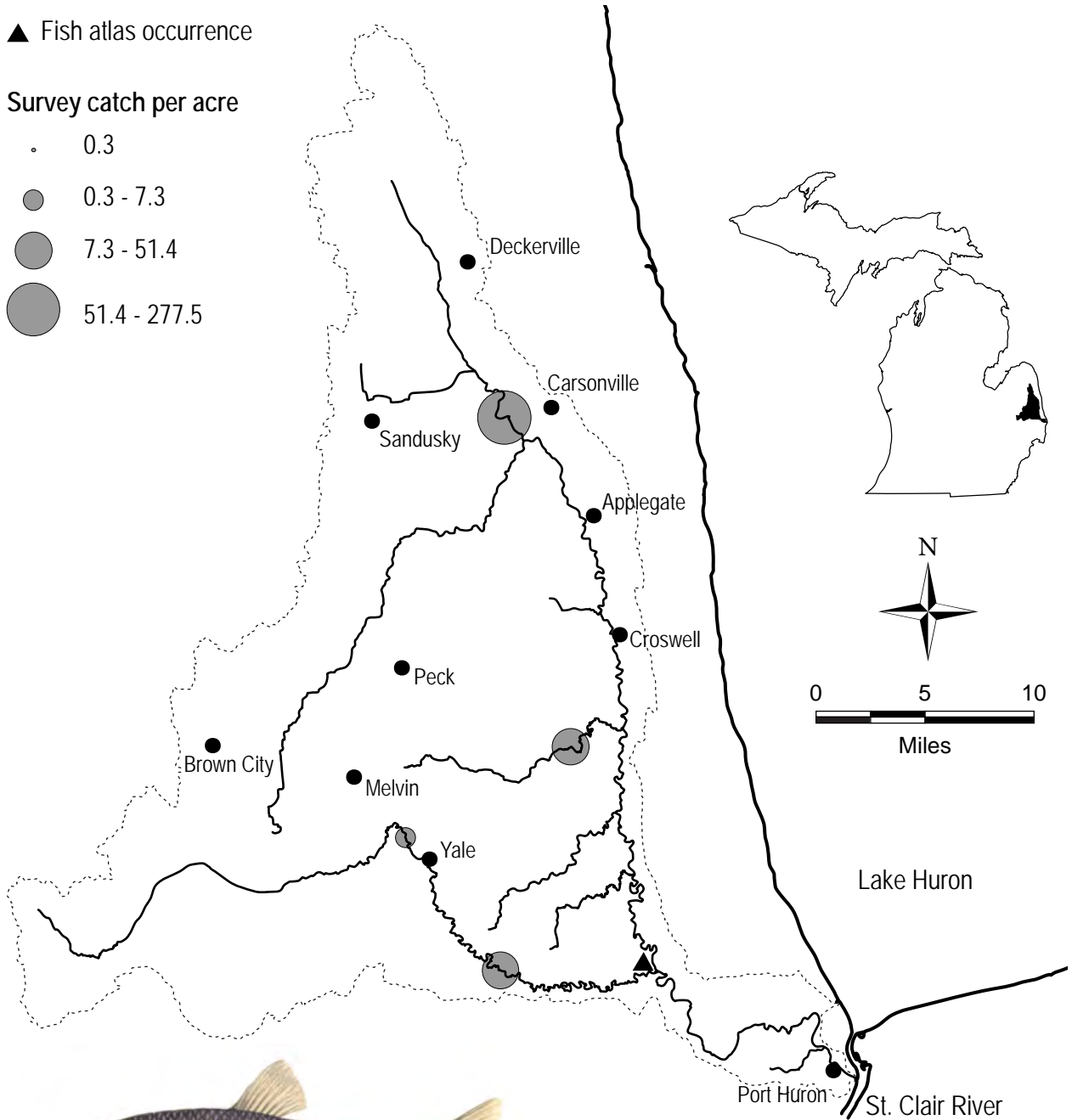
Survey catch per acre



Brassy minnow (*Hybognathus hankinsoni*)

Habitat:

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



Striped shiner (*Luxilus chrysocephalus*)

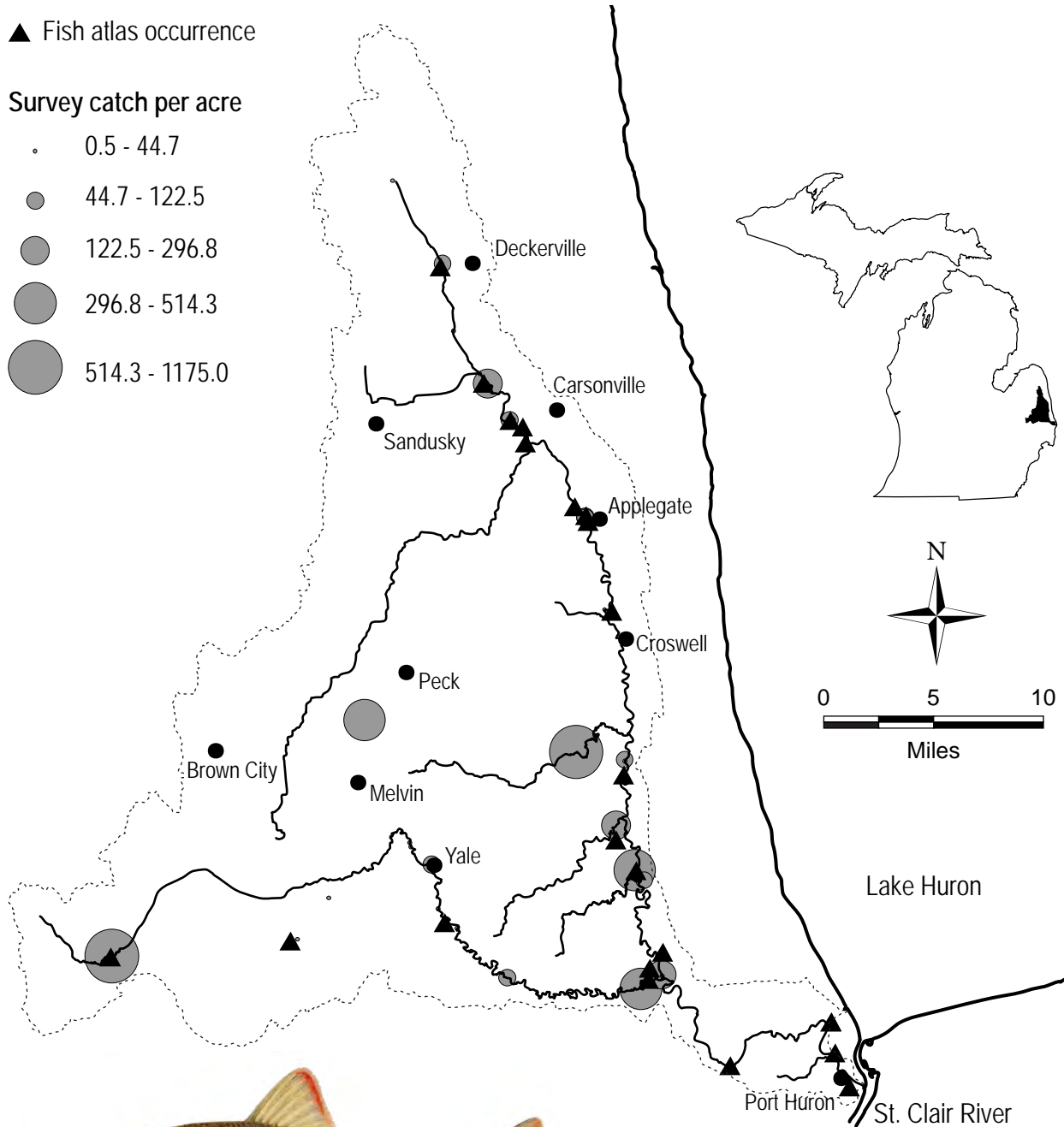
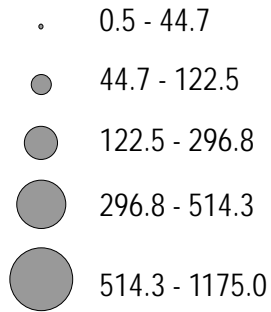
Habitat:

- feeding - clear to slightly turbid streams and rivers
- gravel substrate
- low gradient
- spawning - gravel, boulder, bedrock, or sand substrate
- clear water in small streams with moderate to high gradient
- winter refuge - in large deep pools of low gradient rivers

Black River Assessment

▲ Fish atlas occurrence

Survey catch per acre



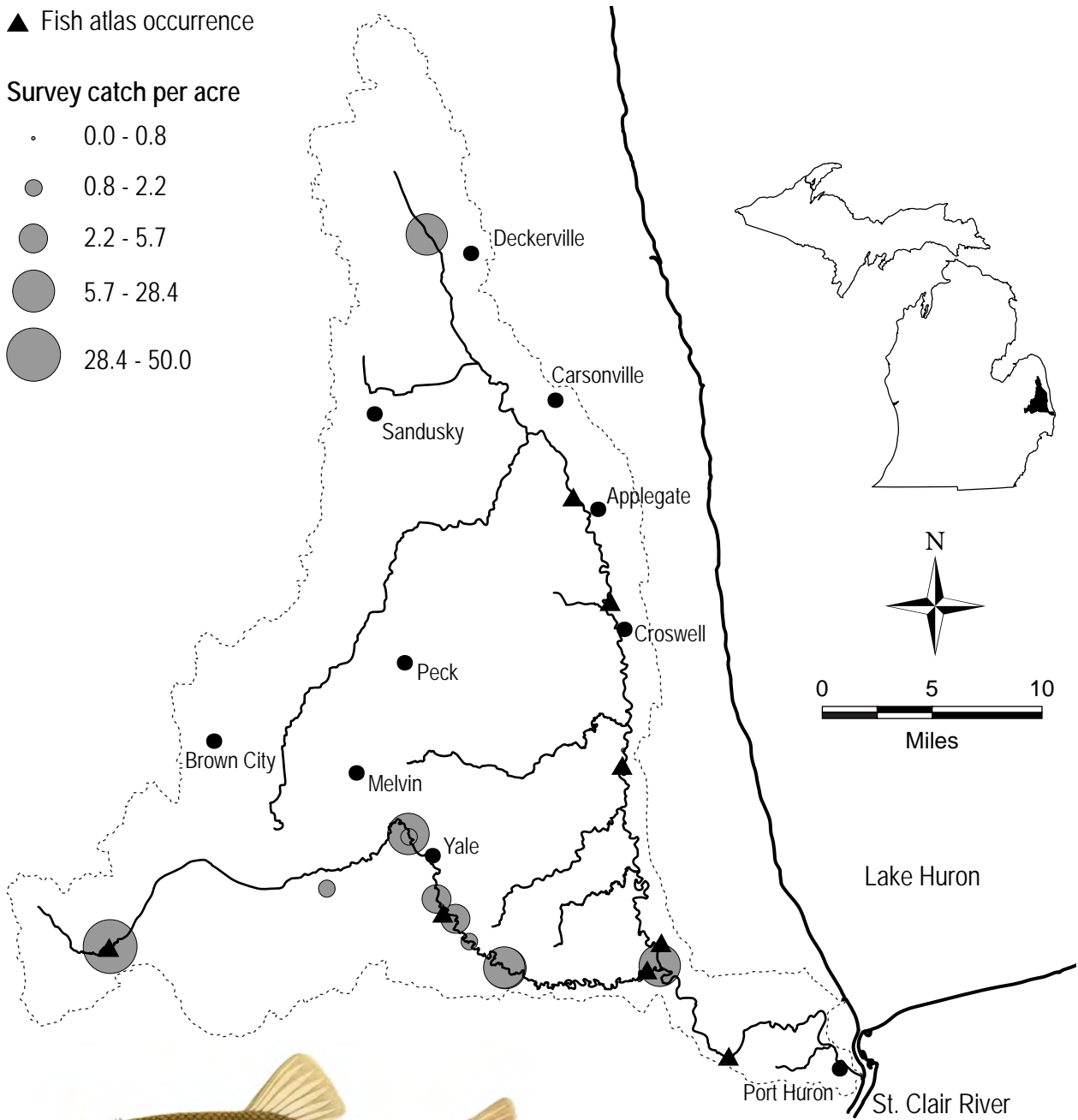
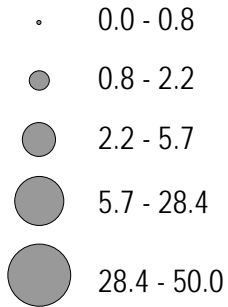
Common shiner (*Luxilus cornutus*)

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

▲ Fish atlas occurrence

Survey catch per acre

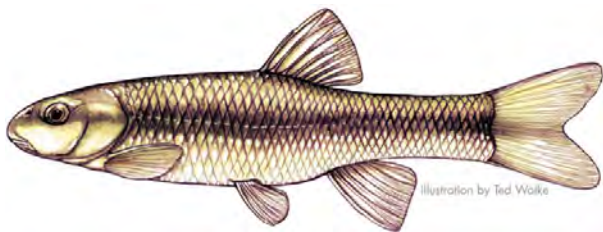
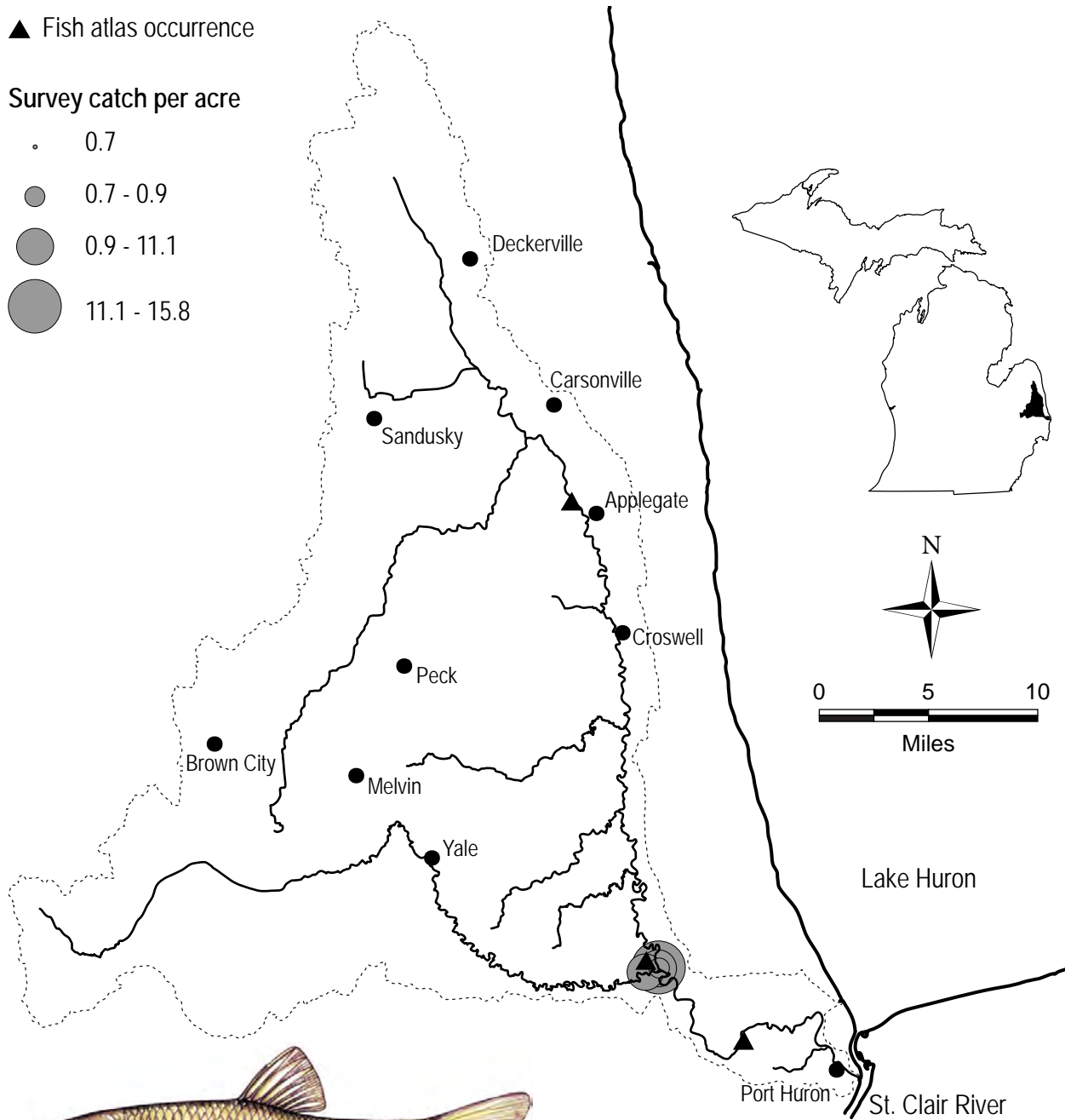
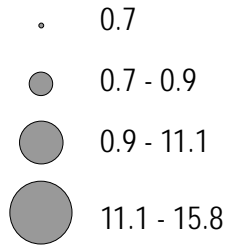


Hornyhead chub (*Nocomis biguttatus*)

- 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

▲ Fish atlas occurrence

Survey catch per acre



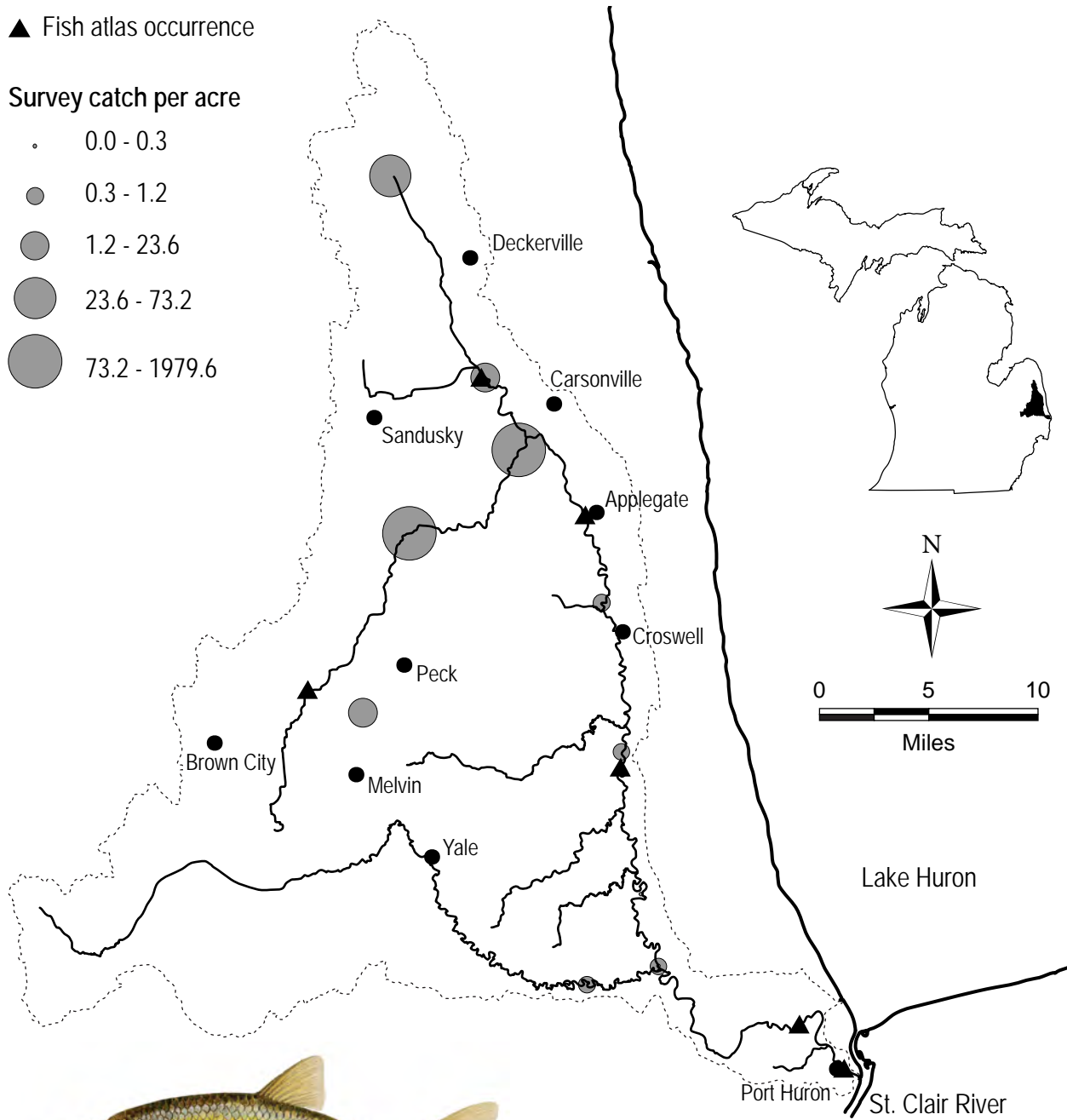
River chub (*Nocomis micropogon*)

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

▲ Fish atlas occurrence

Survey catch per acre



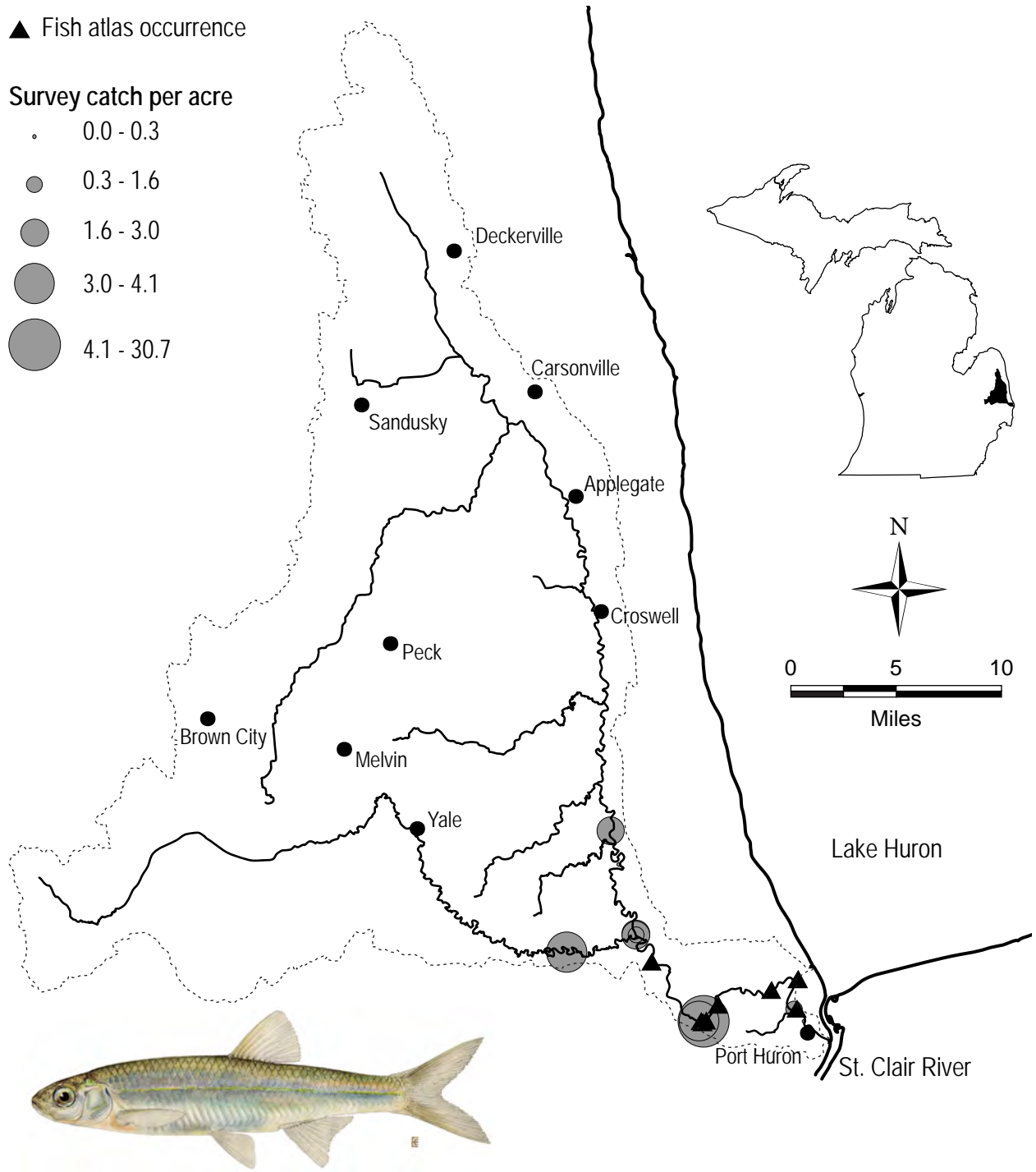
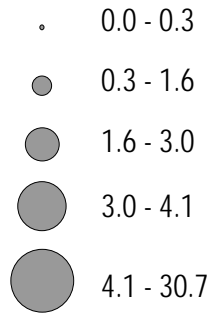
Golden shiner (*Notemigonus crysoleucas*)

Habitat:

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

▲ Fish atlas occurrence

Survey catch per acre

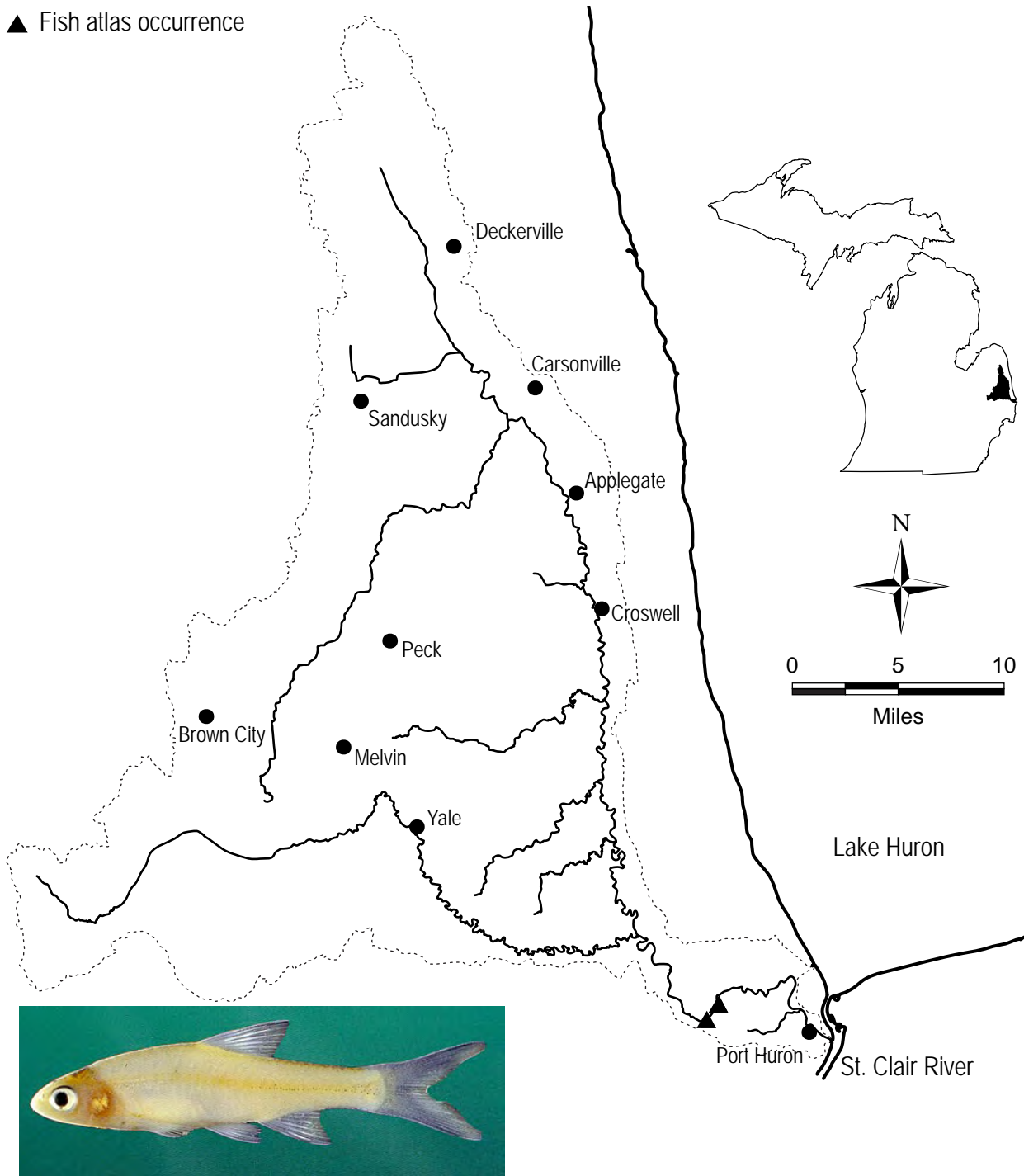


Emerald shiner (*Notropis atherinoides*)

Habitat:

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

▲ Fish atlas occurrence



Ghost shiner (*Notropis buchanaui*)

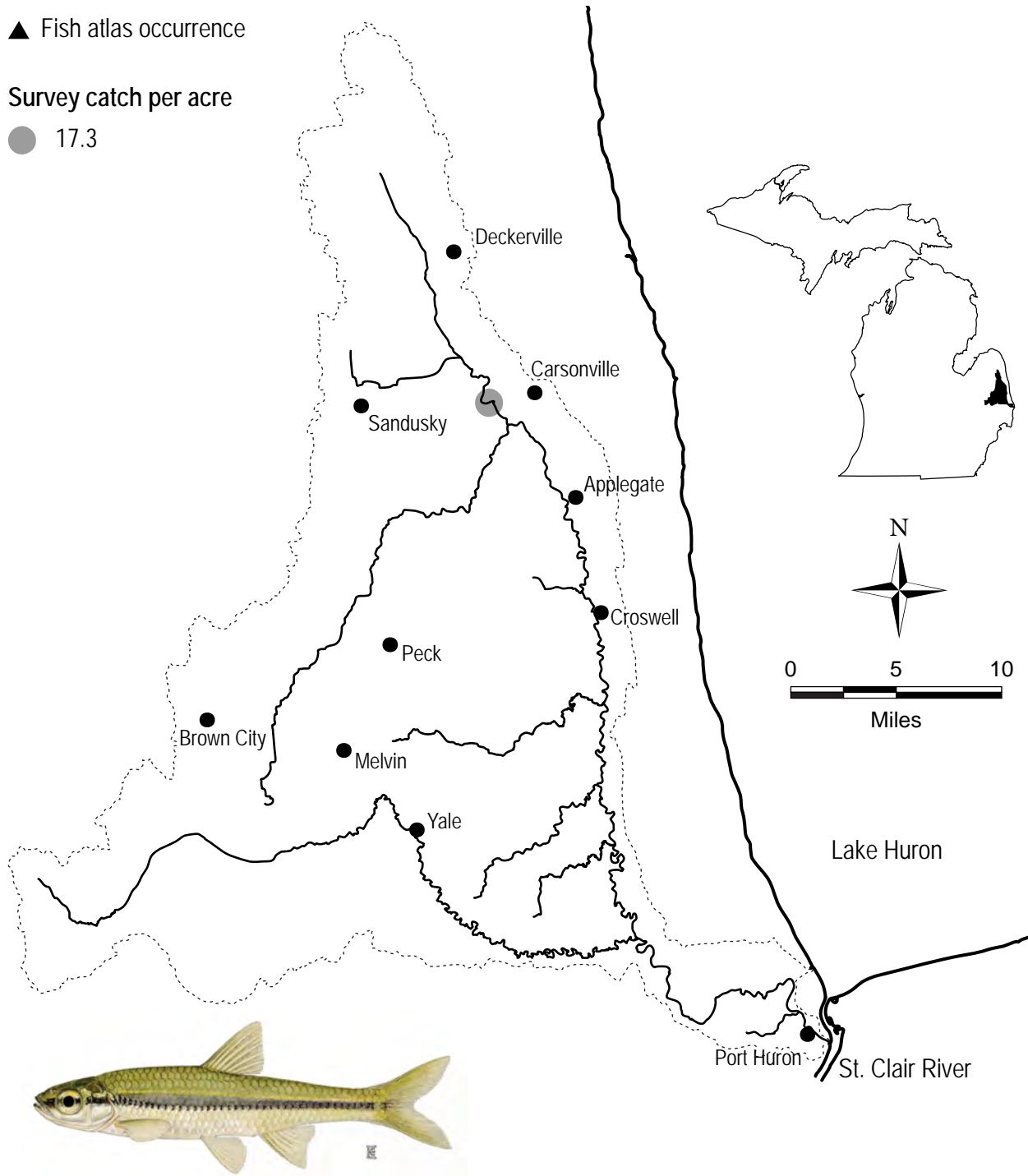
Habitat:

- quiet waters of rivers and lakes
- clean sand, gravel bottom
- requires some aquatic vegetation

▲ Fish atlas occurrence

Survey catch per acre

● 17.3



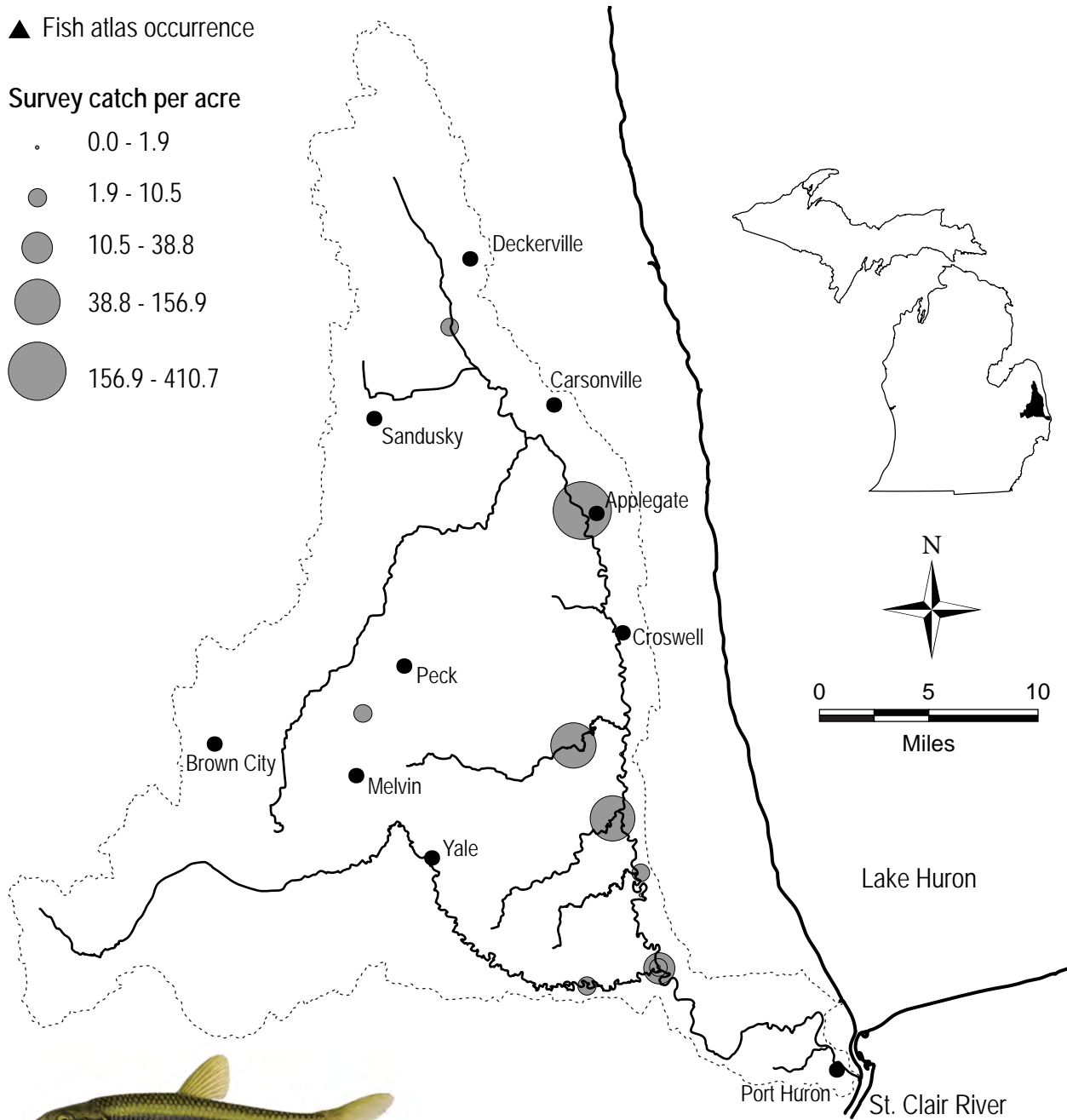
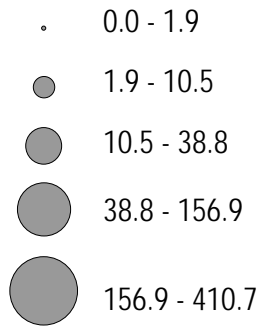
Blackchin shiner (*Notropis heterodon*)

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

▲ Fish atlas occurrence

Survey catch per acre



Blacknose shiner (*Notropis heterolepis*)

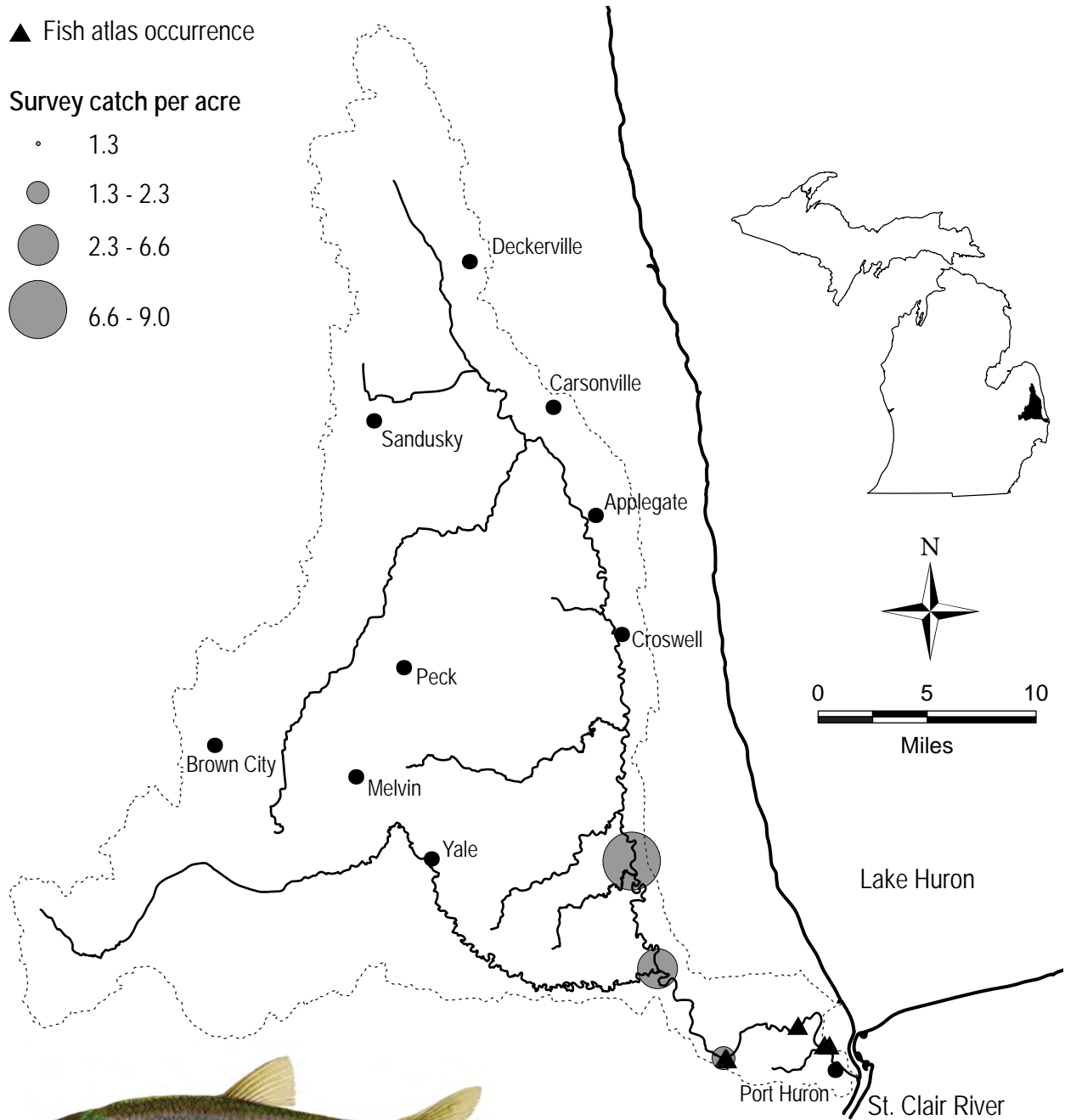
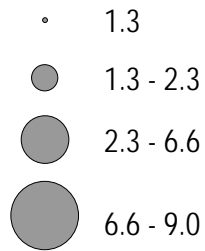
Habitat:

- 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

Black River Assessment

▲ Fish atlas occurrence

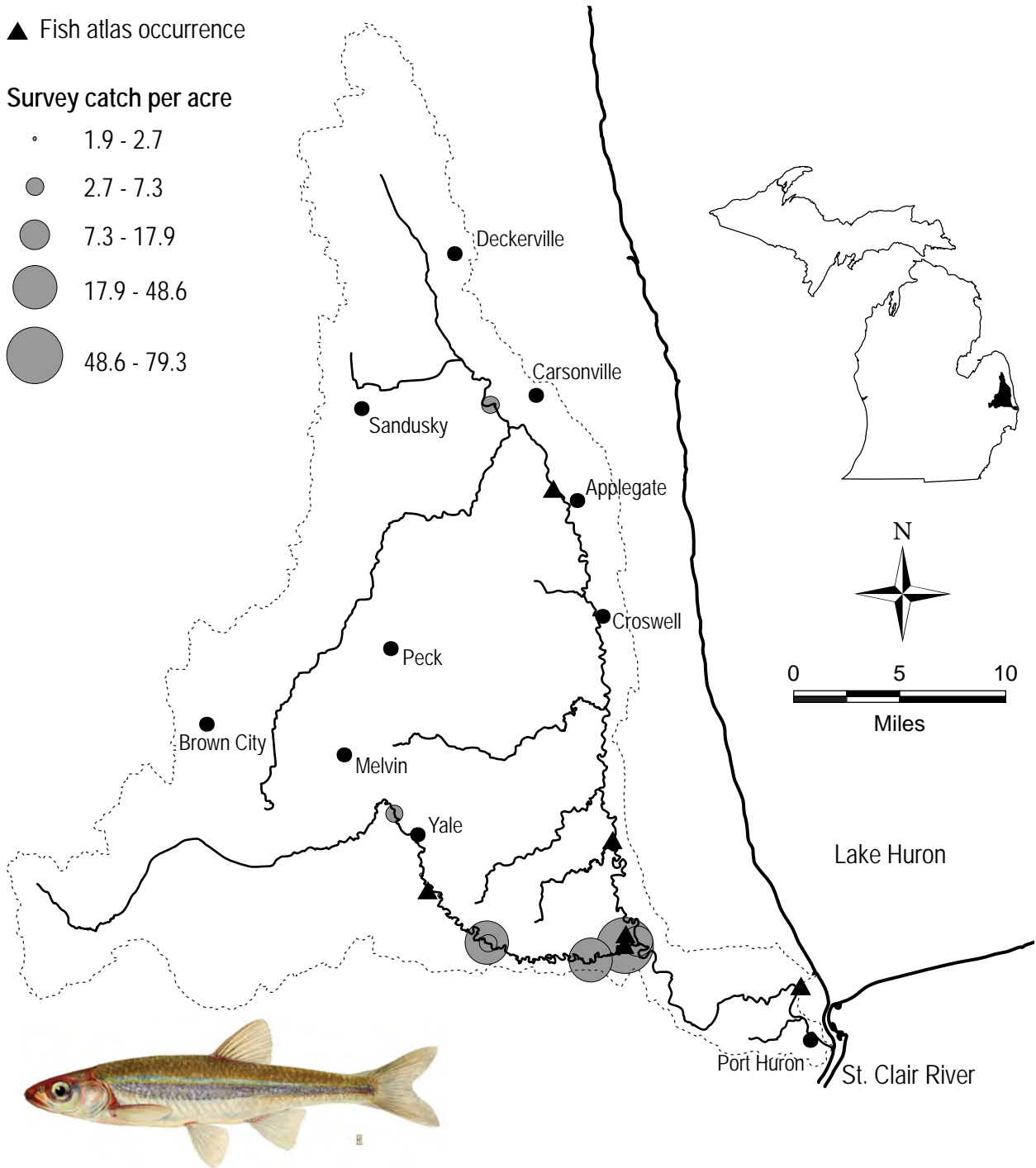
Survey catch per acre



Spottail sniner (*Notropis nuasonius*)

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*)

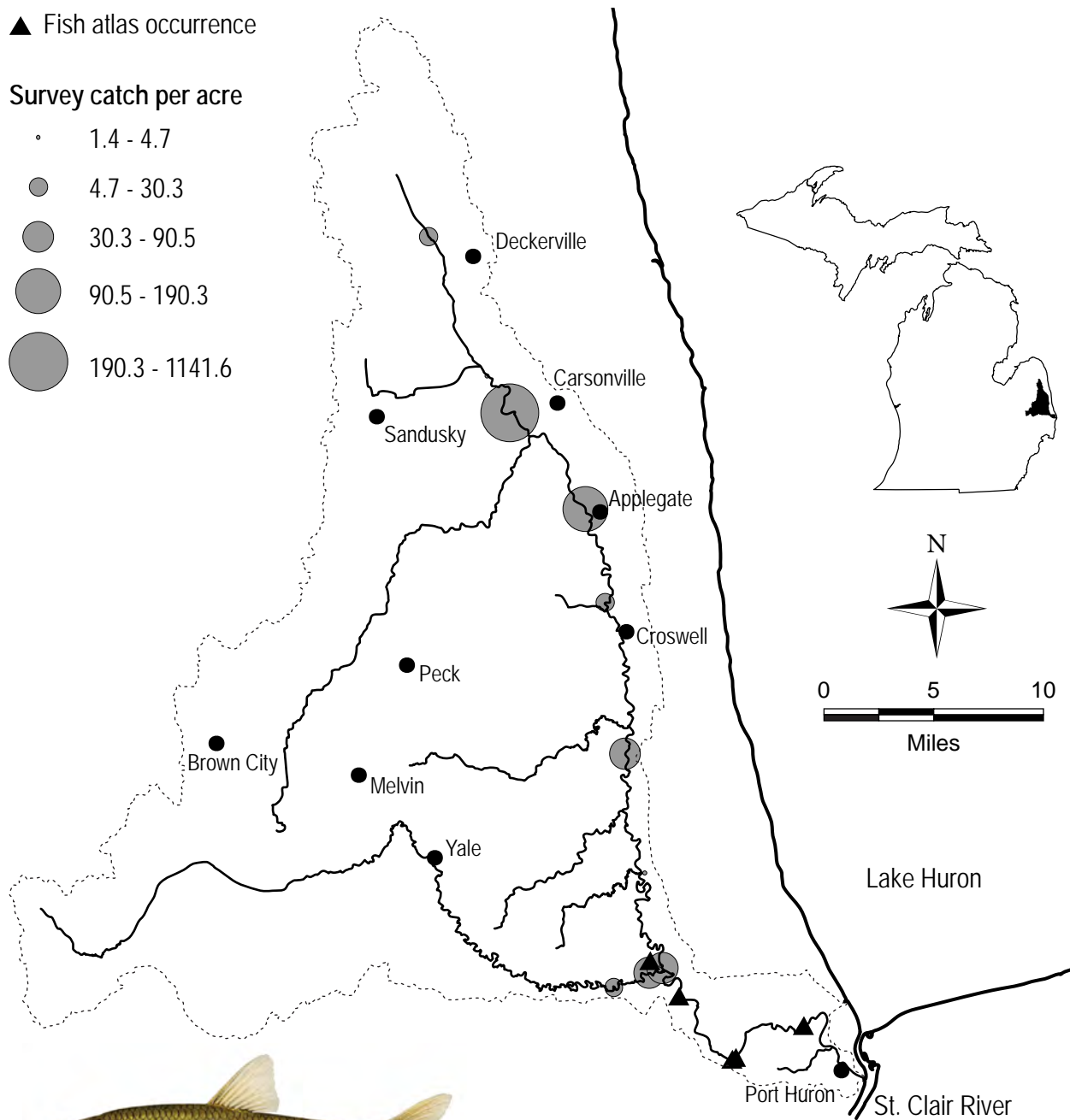
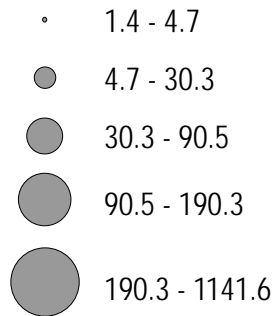
Habitat:

- 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 honeyhead chub, chesnut lamprey, and redhorses
- sandy-gravel, gravel or bedrock substrate
- shallow high gradient water

Black River Assessment

▲ Fish atlas occurrence

Survey catch per acre



Sand shiner (*Notropis stramineus*)

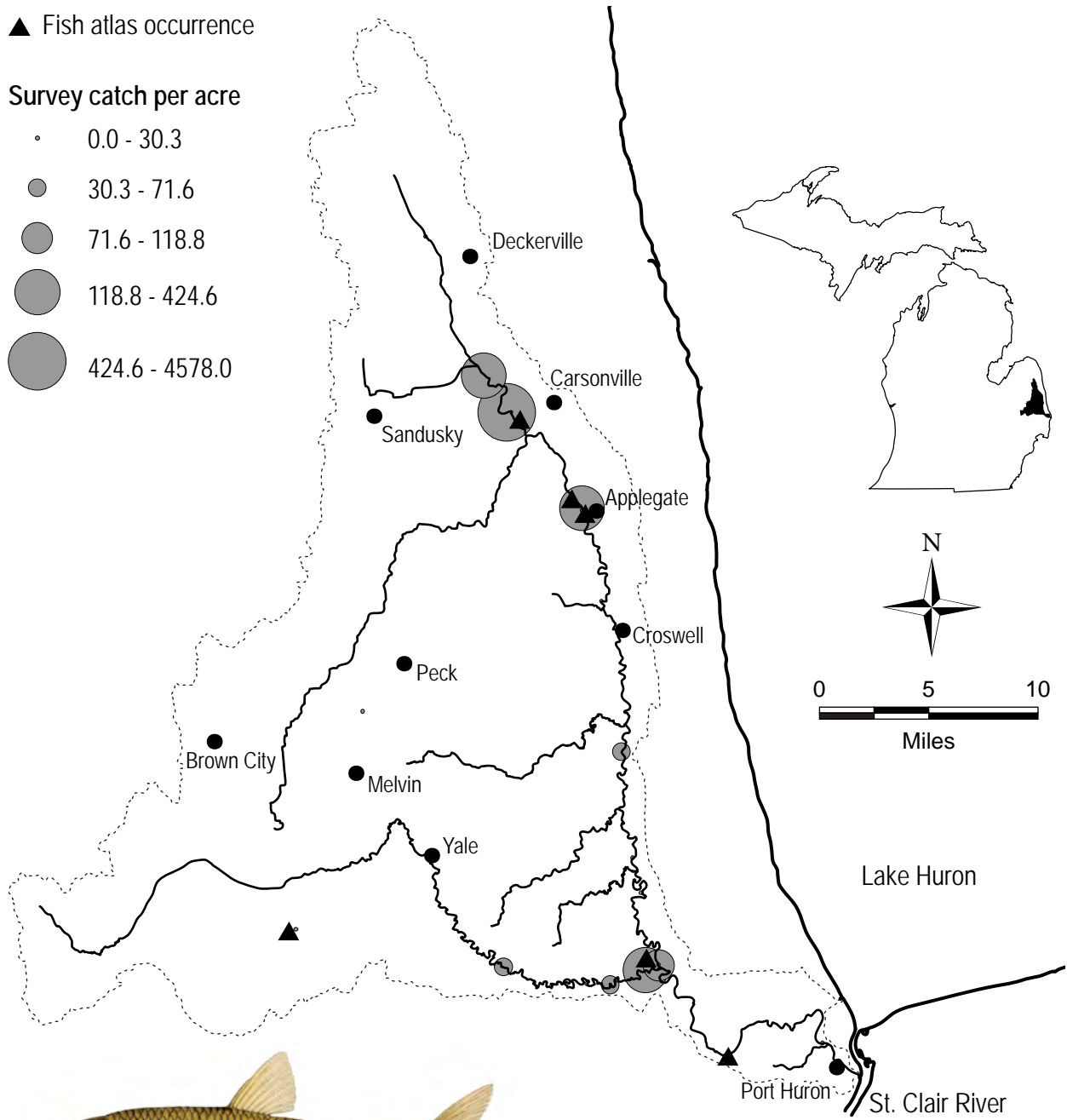
Habitat:

- 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

▲ Fish atlas occurrence

Survey catch per acre

- 0.0 - 30.3
- 30.3 - 71.6
- 71.6 - 118.8
- 118.8 - 424.6
- 424.6 - 4578.0



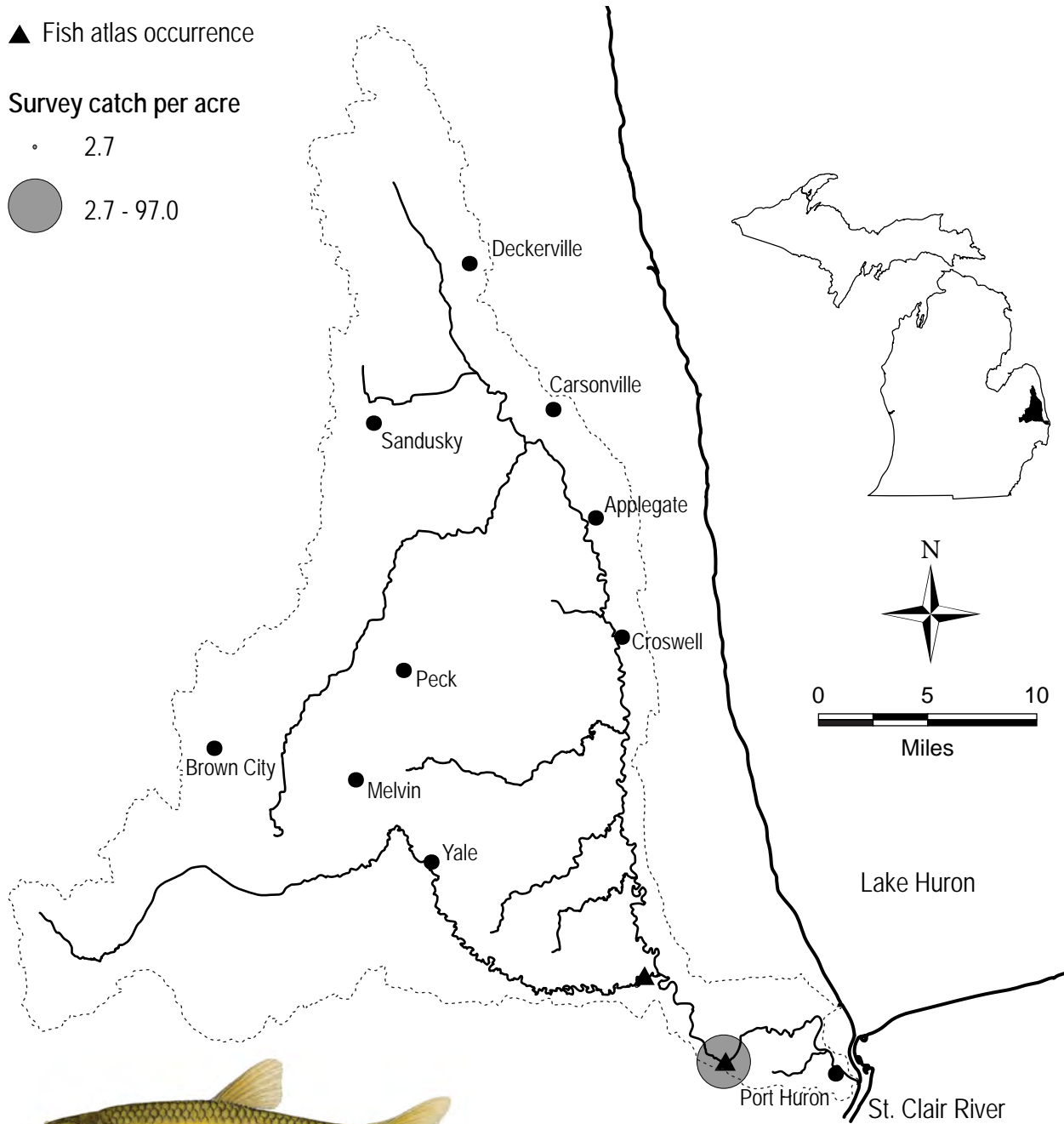
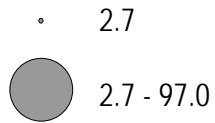
Mimic shiner (*Notropis volucellus*)

Habitat:

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

▲ Fish atlas occurrence

Survey catch per acre



Pugnose minnow (*Opsopoeodus emiliae*) – endangered

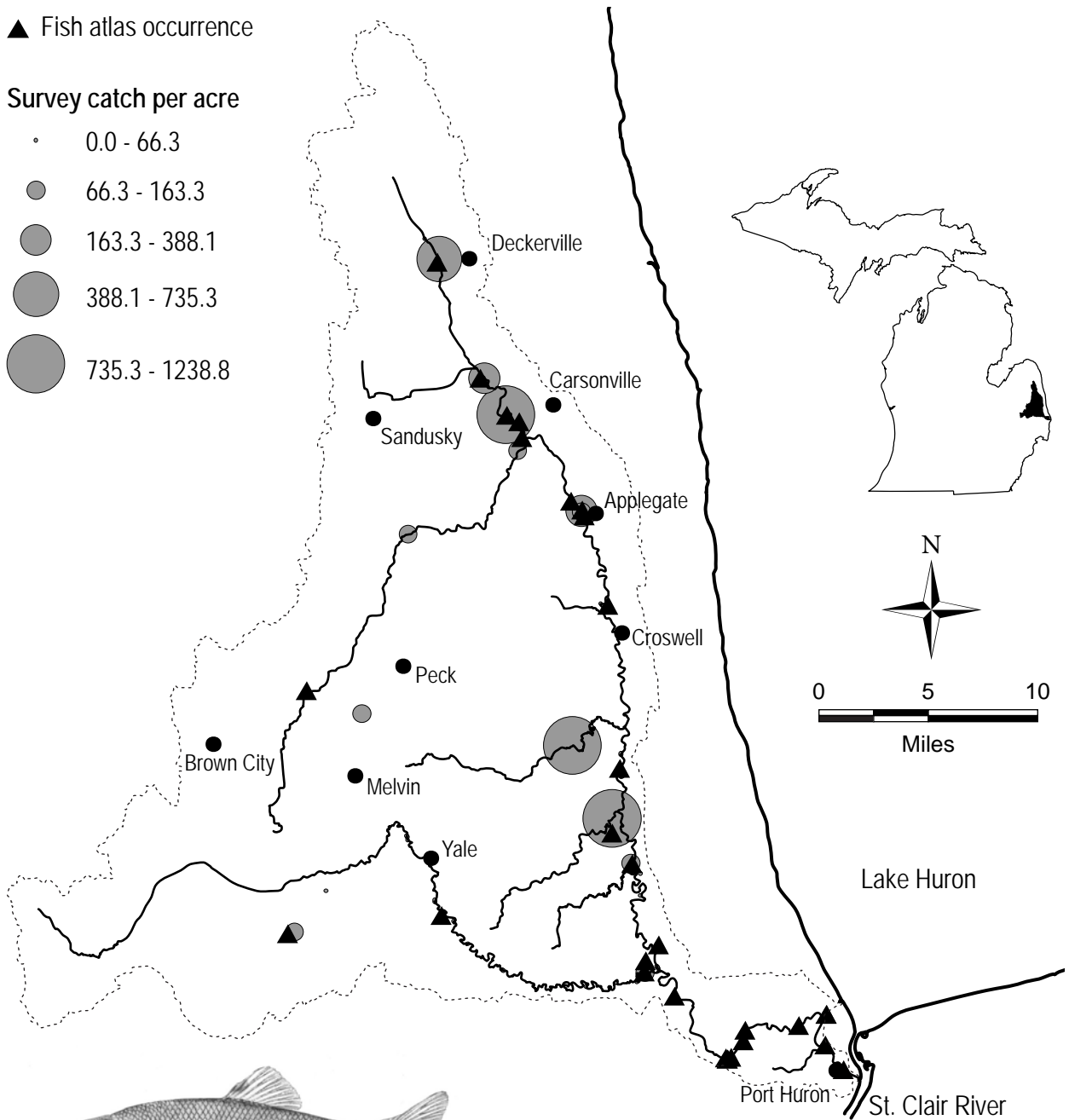
Habitat:

- feeding - clear vegetated rivers
- low current
- sand or mud substrates
- intolerant of turbidity

▲ Fish atlas occurrence

Survey catch per acre

- 0.0 - 66.3
- 66.3 - 163.3
- 163.3 - 388.1
- 388.1 - 735.3
- 735.3 - 1238.8



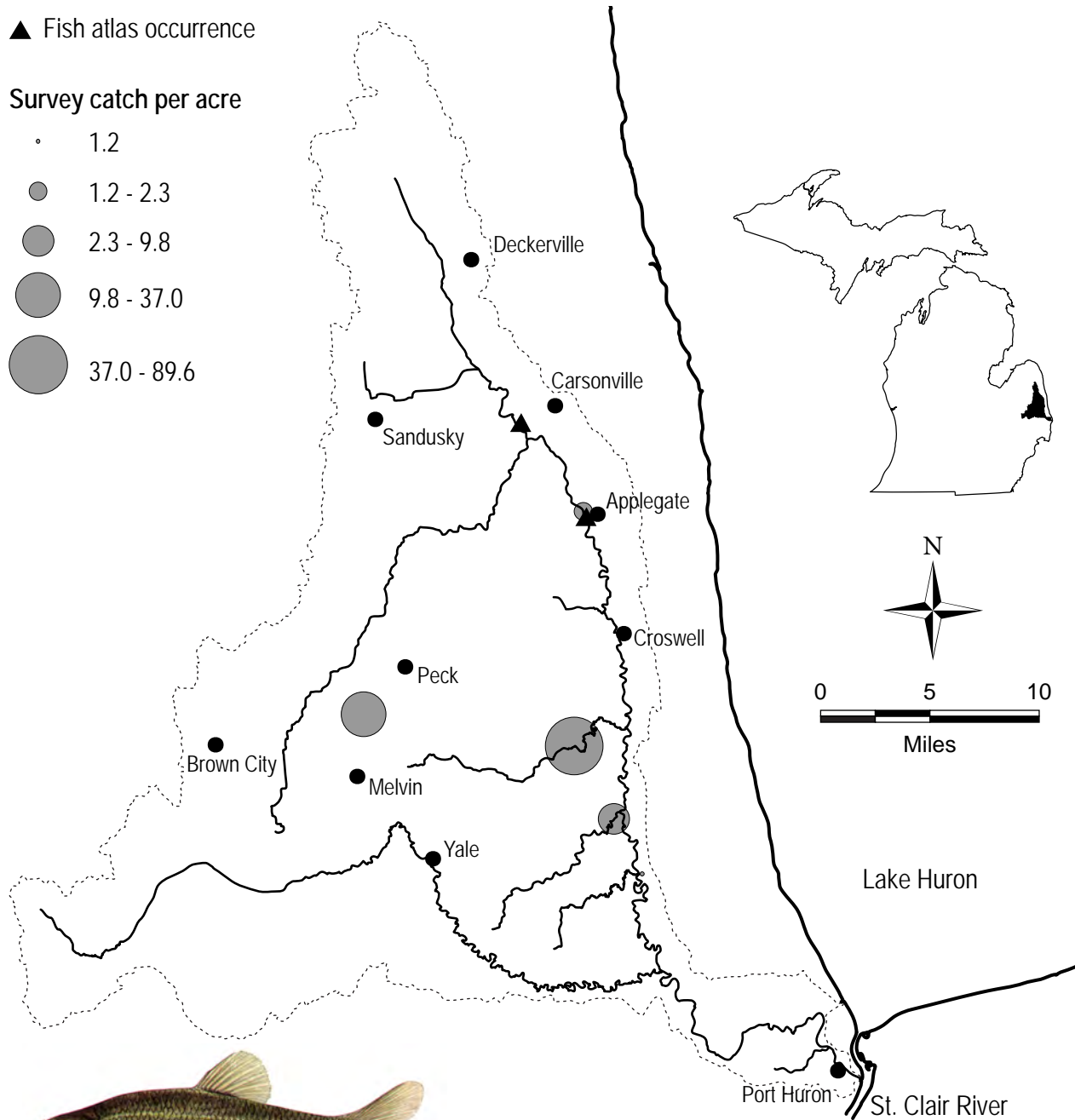
Bluntnose minnow (*Pimephales notatus*)

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

▲ Fish atlas occurrence

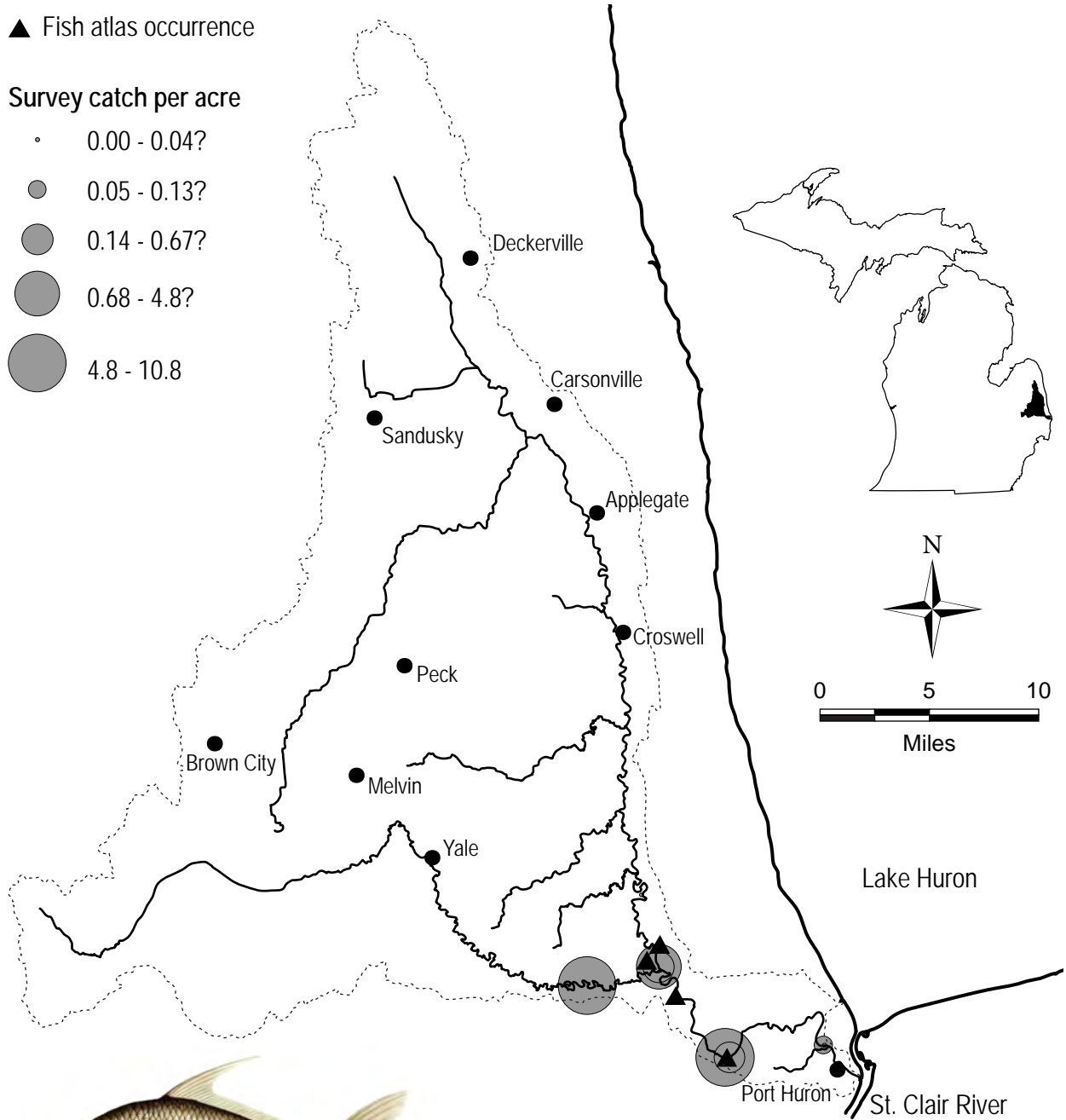
Survey catch per acre



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



Quillback (*Carpion cyprinus*)

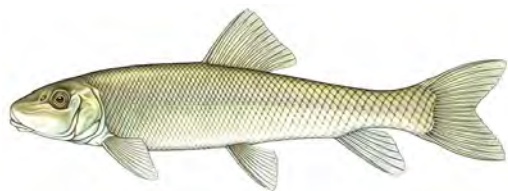
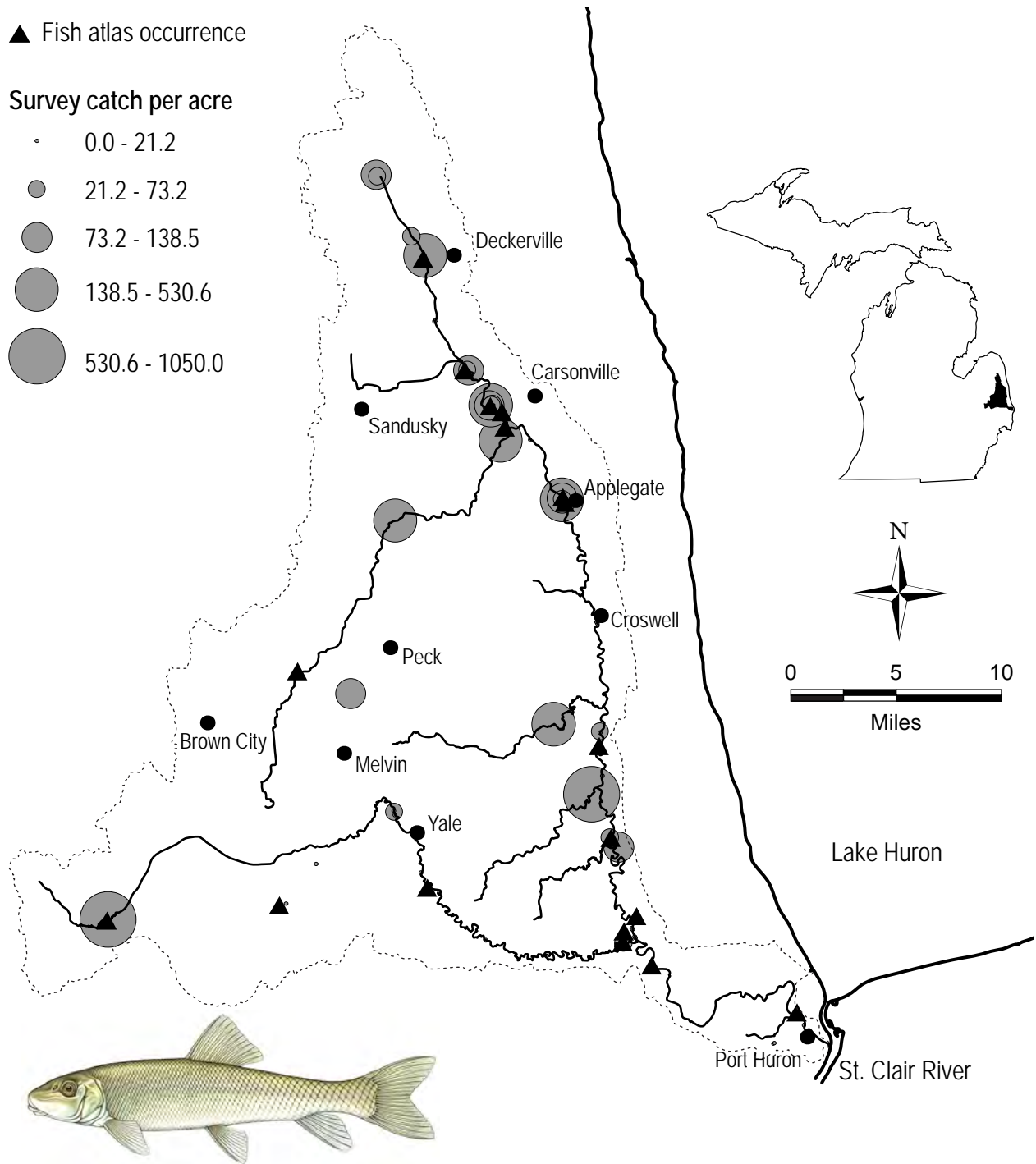
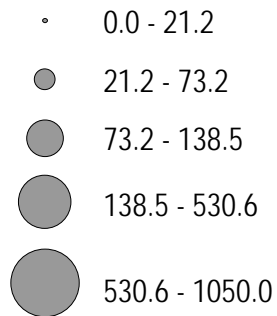
Habitat:

- feeding - clear to turbid water
- Lake Michigan
- sand, sandy gravel, sandy silt, or clay-silt substrate
- medium- to low-gradient rivers and streams; also lakes and sloughs
- spawning - streams or overflow areas of bends of rivers or bays of lakes
- scatter eggs over sand or mud substrate

Black River Assessment

▲ Fish atlas occurrence

Survey catch per acre



White sucker (*Catostomus commersonii*)

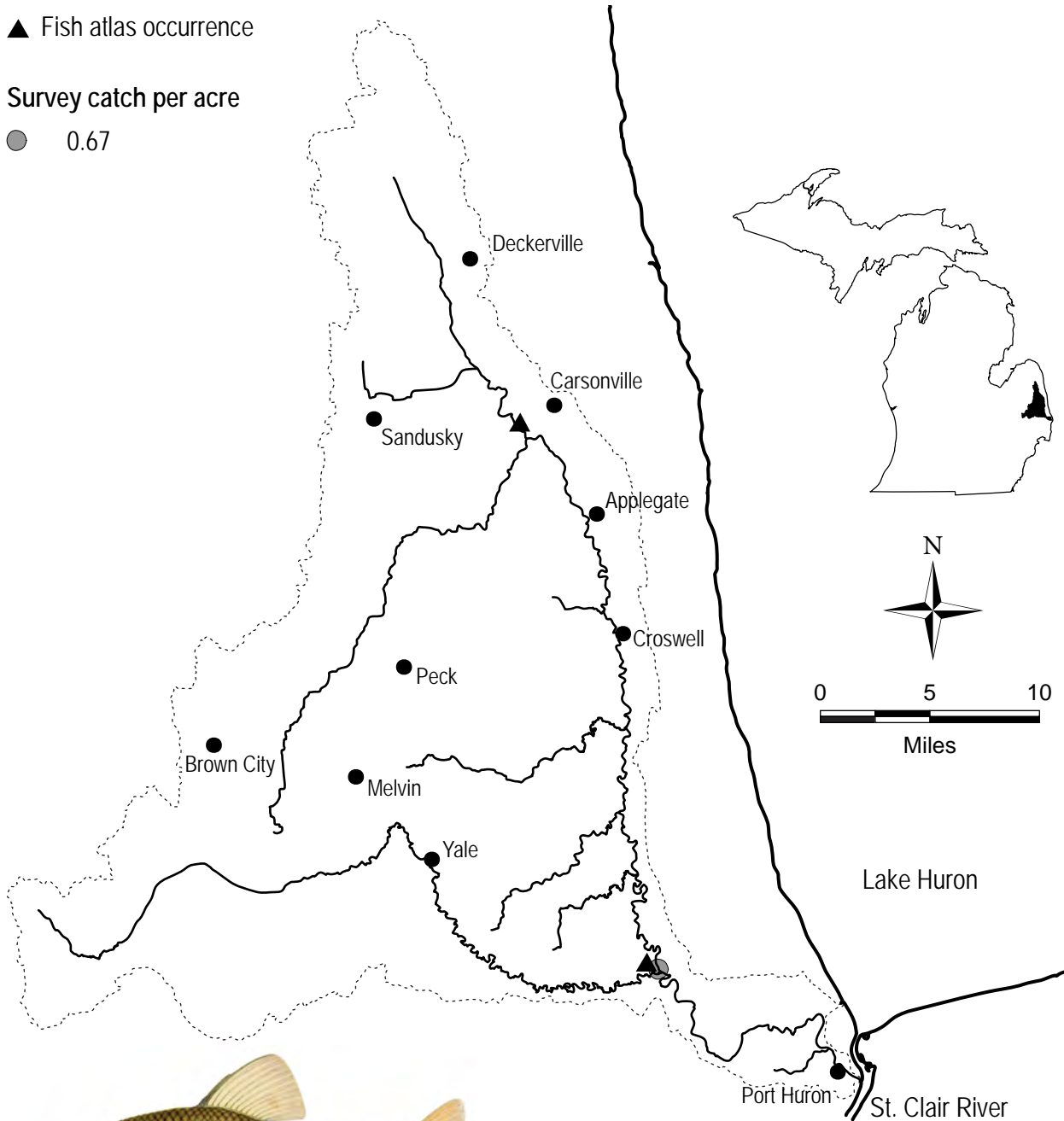
Habitat:

- feeding - streams, rivers, lakes, and impoundments
- can inhabit highly turbid and polluted waters
- spawning - quiet gravelly shallow areas of streams

▲ Fish atlas occurrence

● Survey catch per acre

● 0.67



Lake chubsucker (*Erimyzon sucetta*)

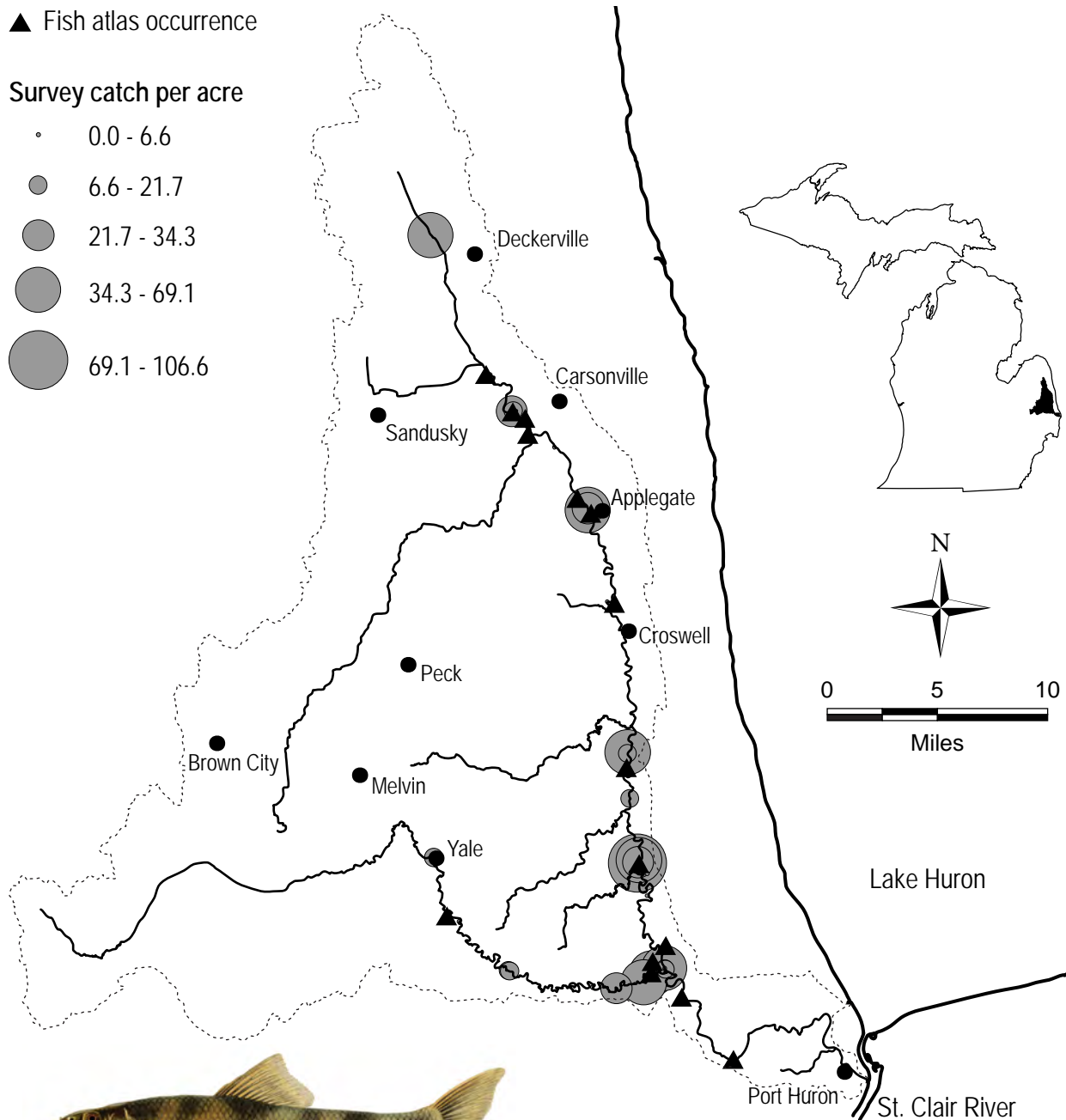
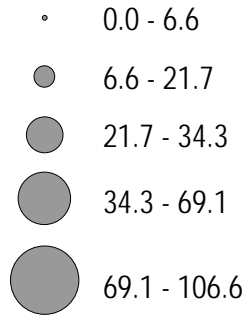
Habitat:

- feeding - larger clear streams, rivers, lakes, and impoundments
- cannot tolerate turbid water
- low gradient
- prefers dense vegetation over substrate of sand or silt mixed with organic debris
- spawning - small clear streams with moderate to high gradient
- sand or gravel substrate; no clayey silt

Black River Assessment

▲ Fish atlas occurrence

Survey catch per acre



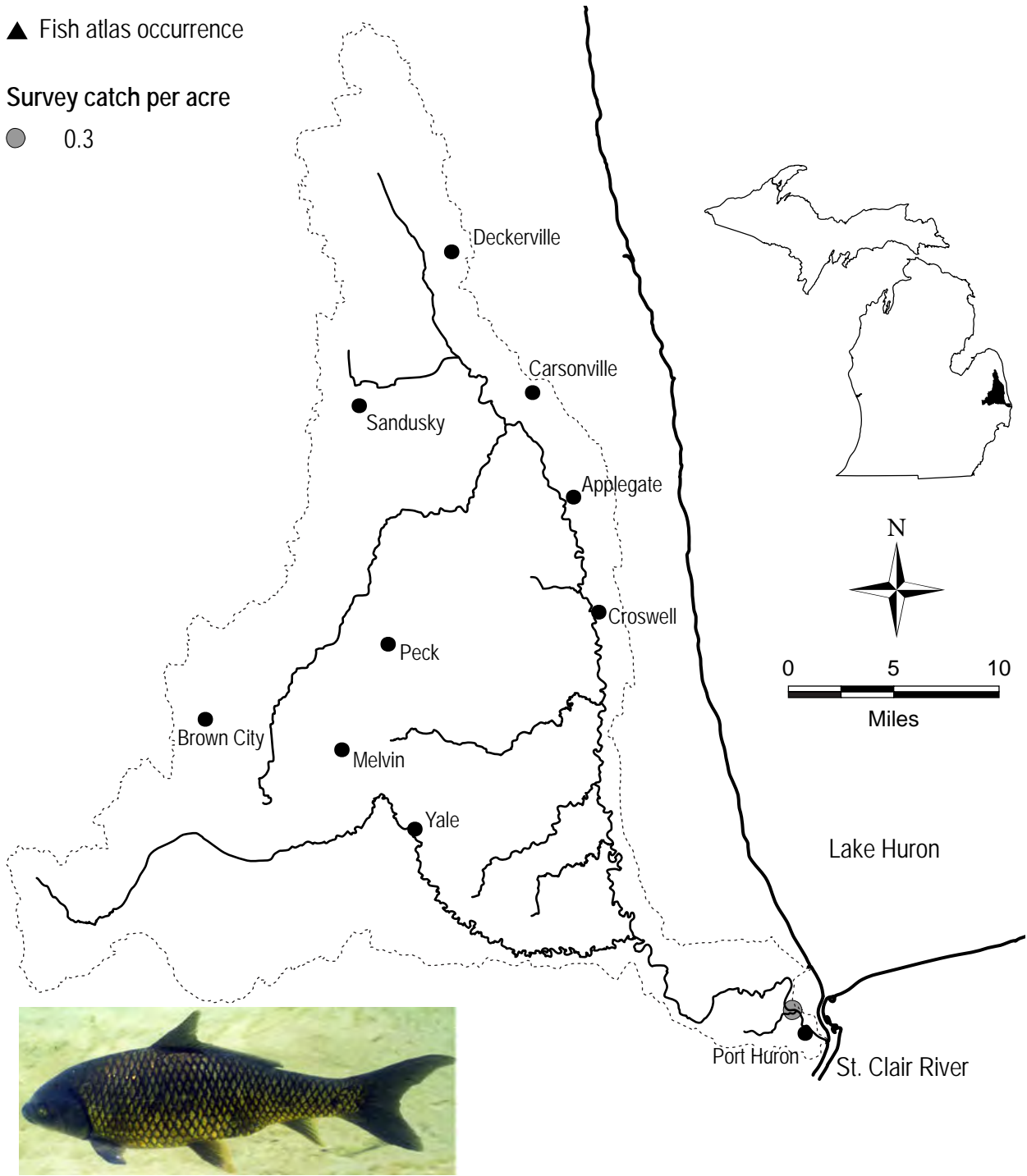
Northern hog sucker (*Hypentelium nigricans*)

- Habitat:
- feeding - gravel or rubble substrate
 - riffles and adjacent pools of warm shallow streams
 - clear water
 - doesn't like turbidity or siltation
 - avoids profuse amounts of aquatic vegetation
 - spawning - riffles
 - shallow gravel substrate
 - high gradient
 - winter refuge - deeper quieter pools

▲ Fish atlas occurrence

Survey catch per acre

● 0.3



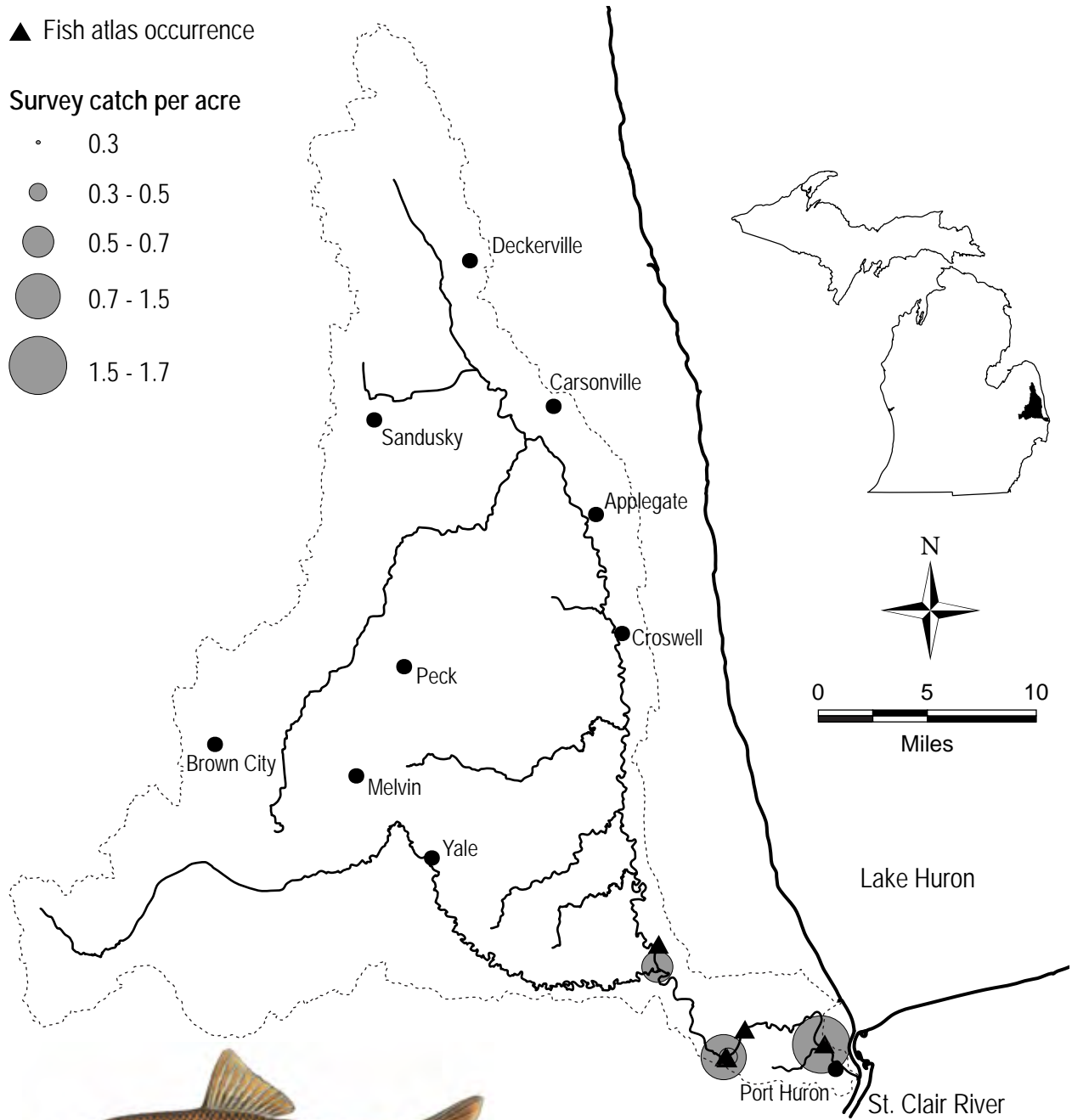
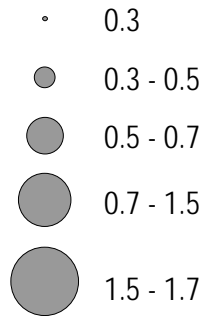
Black buffalo (*Ictiobus niger*)

Habitat:

- feeding - large rivers
- deep fast riffles
- occasionally shallow overflow ponds and sloughs
- varying turbidity over various substrates
- spawning - shallows
- sometimes flooded areas

▲ Fish atlas occurrence

Survey catch per acre



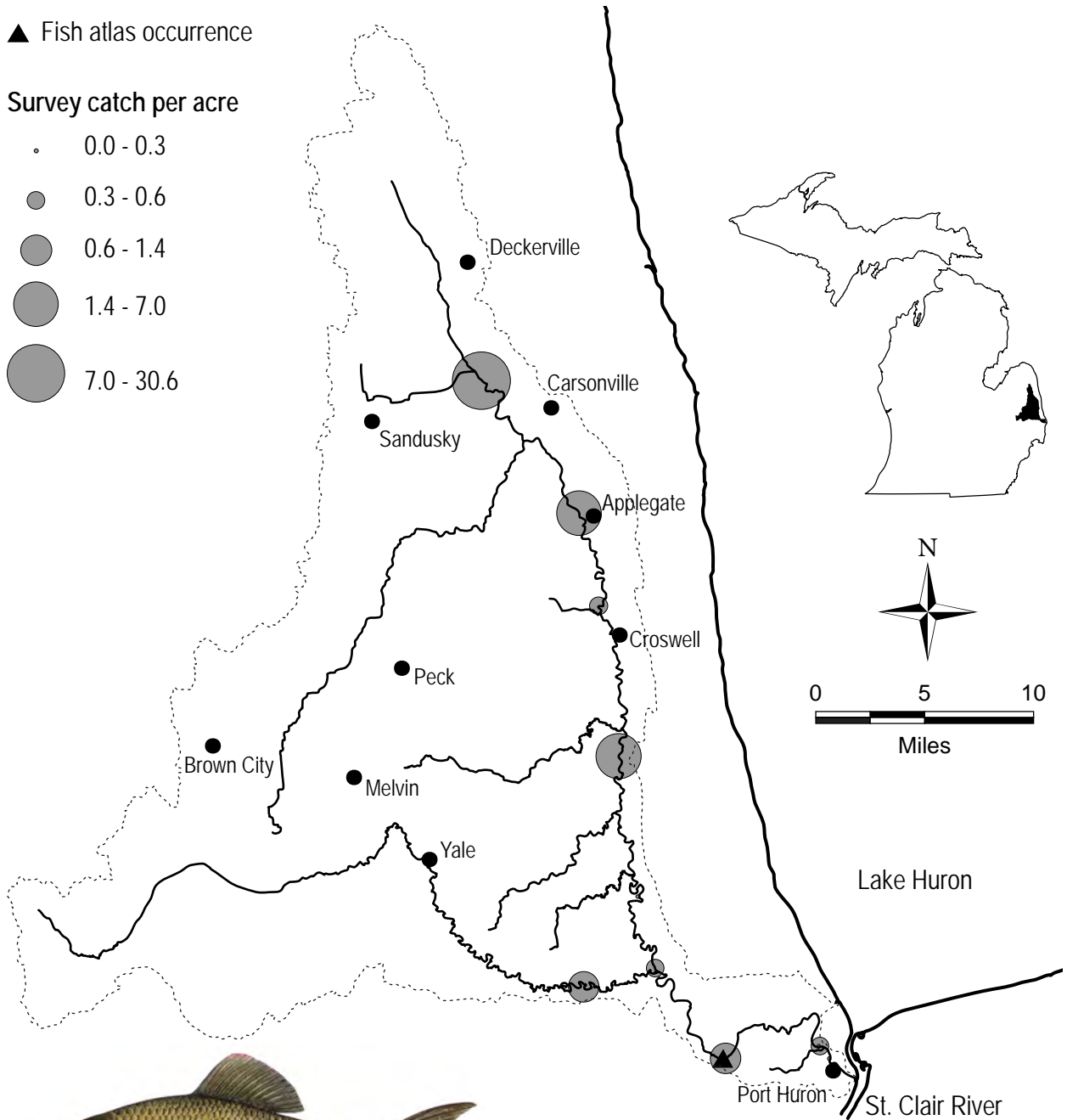
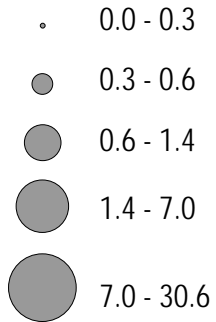
Spotted sucker (*Minytrema melanops*)

Habitat:

- feeding - clear warm rivers (pools, backwaters) with little current
- abundant vegetation
- soft substrate with organic debris
- intolerant of turbidity
- spawning - riffles

▲ Fish atlas occurrence

Survey catch per acre



Silver redhorse (*Moxostoma anisurum*)

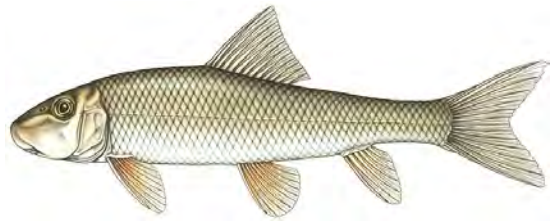
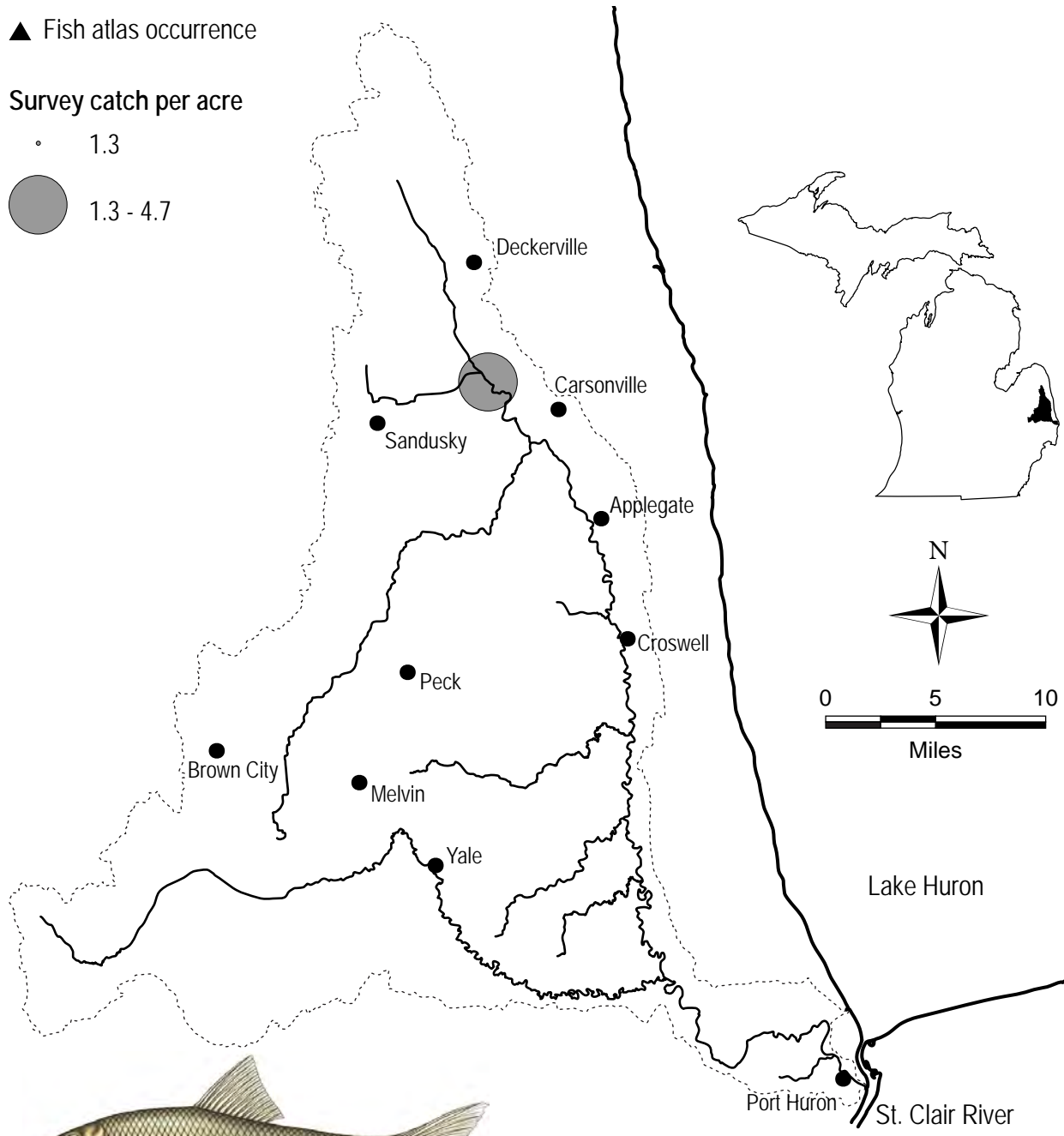
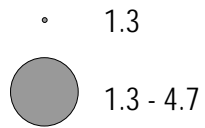
Habitat:

- feeding - streams, rivers, lakes, and impoundments
- low current
- pollution and turbidity intolerant
- spawning - swift current in rivers, do not spawn in tributaries
- males territorial
- gravel to rubble substrate

Black River Assessment

▲ Fish atlas occurrence

Survey catch per acre



Black redhorse (*Moxostoma duquesnei*)

Habitat:

- feeding - gravel substrate
- clear water, intolerant of siltation, turbidity, and low gradients
- medium size streams
- cooler swifter streams and short rocky pools with current
- spawning - gravelly riffles
- winter refuge - deeper holes