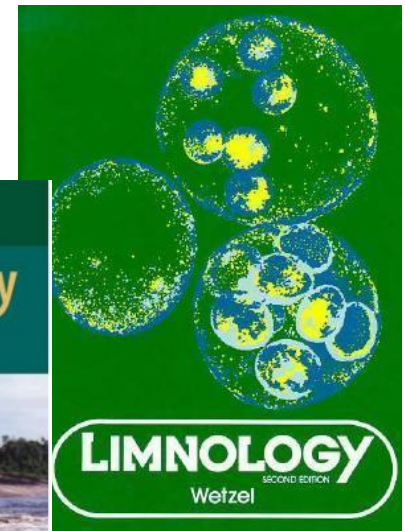
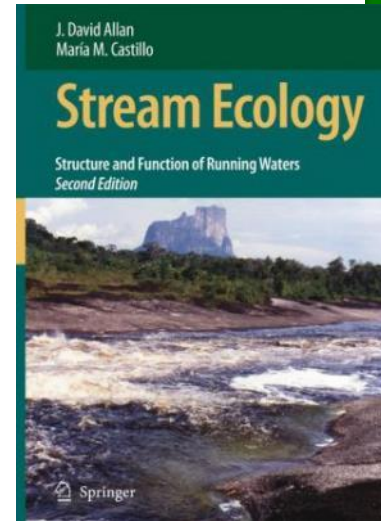


Fisheries Ecology 101: The Fishes in Your Lake

Q & A session!

Aquatic Ecology

- Fisheries Ecology
- Stream Ecology
- Limnology
- Freshwater Ecology
- Flowing (Lotic) and Non-flowing (Lentic) Aquatic Ecology. . . .
- Ahhh! Help!



Many anecdotes & experiences . . .

- Palette Lake Wisconsin (N. Highland Fishery Research Area)
- Working for the UW Center for Limnology
- My schooling
- Conducting myriad outreach activities for school children to senior groups
- Experiences gleaned from my students
- Friends leading lake associations, “multiple use”
- People have many, many questions!

“Put-Grow-Take” Fisheries



ANGLERS



**Hatchery
Truck**

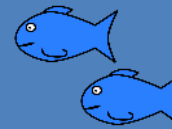
RESIDENCES



LAKE



gamefishes



**forage
species**

**Chemical Manipulations
Fish Feeding**

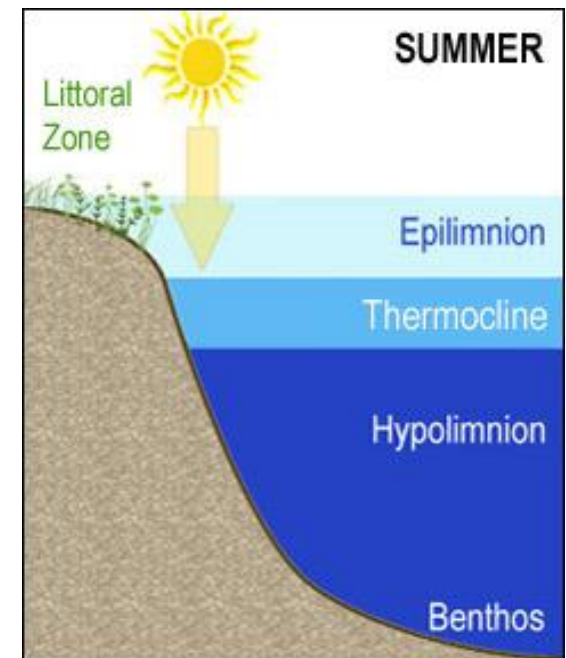
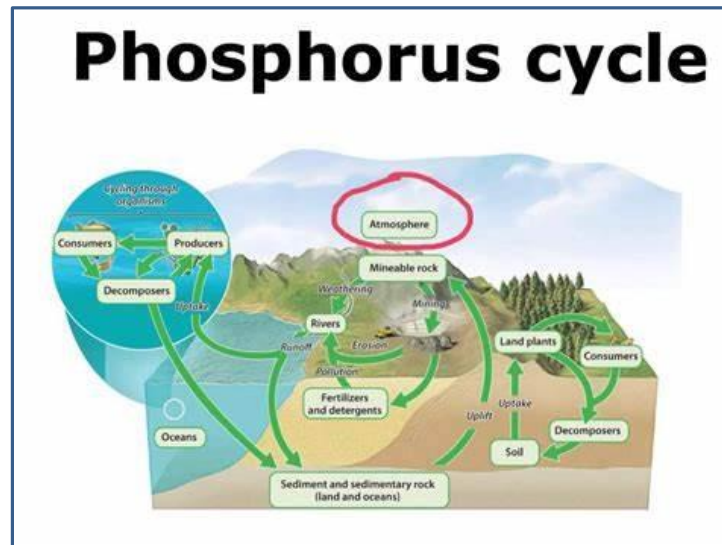
**Expense?
Sustainability?
Aesthetics?**

Your lake can naturally and sustainably foster diverse and robust fisheries!

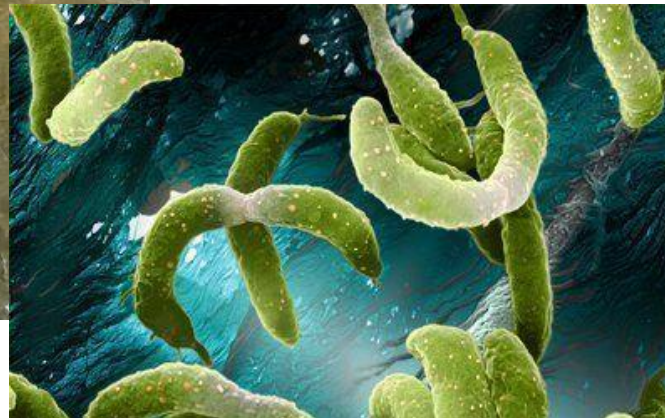
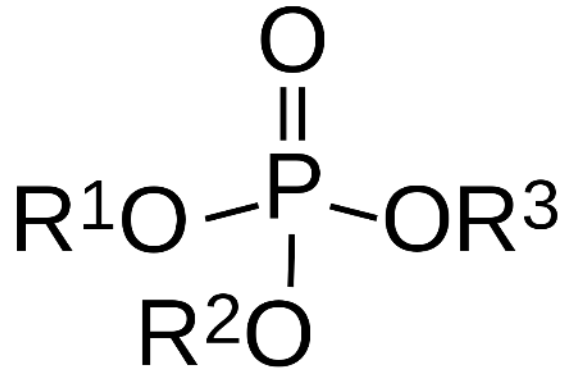
- Consider your lake's attributes
- Gather data regularly and in a standardized way
- Habitat quality and qualities
- Wholistic thinking
- Species matching the habitat, for EACH life stage
- Harvest regulations and targets
- Stocking only when needed
- Indicator species, IBI
- Don't think in absolutes, **strive** for outcomes
- What can you do with your slice of shoreline?
- How can you work with/for agency professionals?

Chemical and physical

- Nutrient cycles
- Water inputs and outflows
- Temperature regimes
- Sources of potential pollution



Nutrients, Production and Decomposition



Low-level consumers



Smaller predators

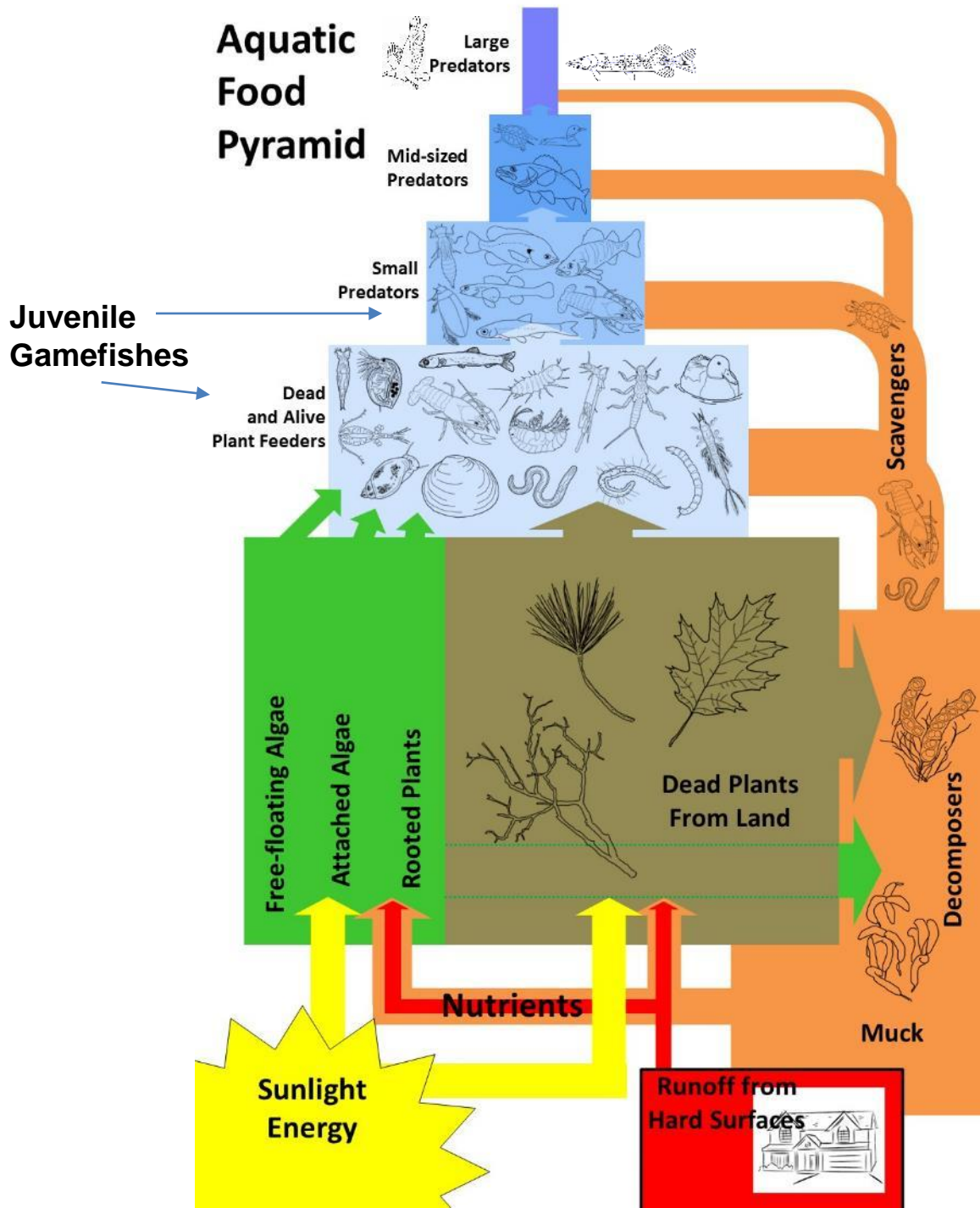


Mid-sized predators



Top predators



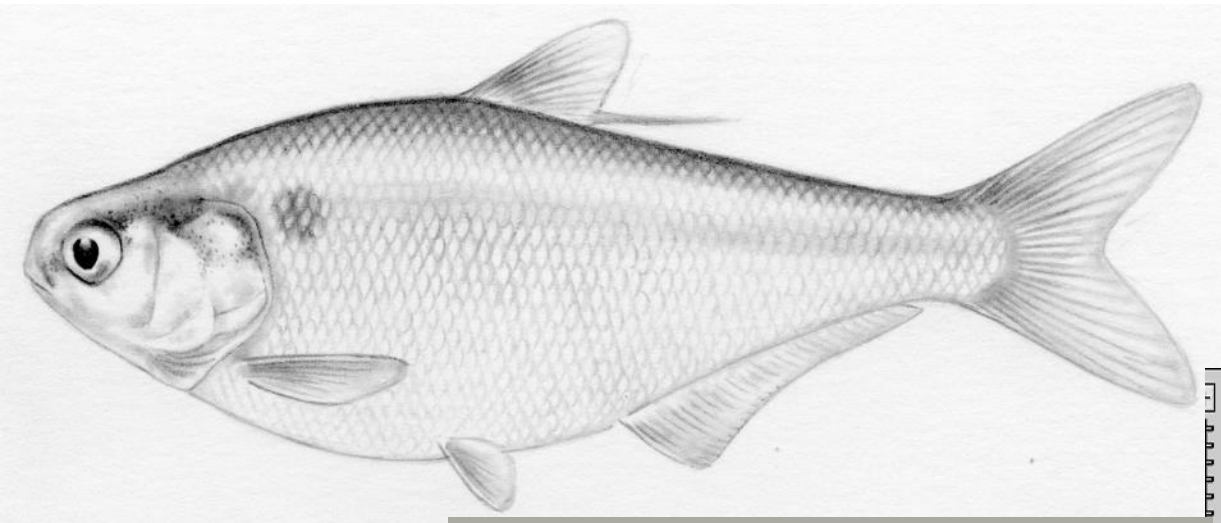


Fish that eat plants

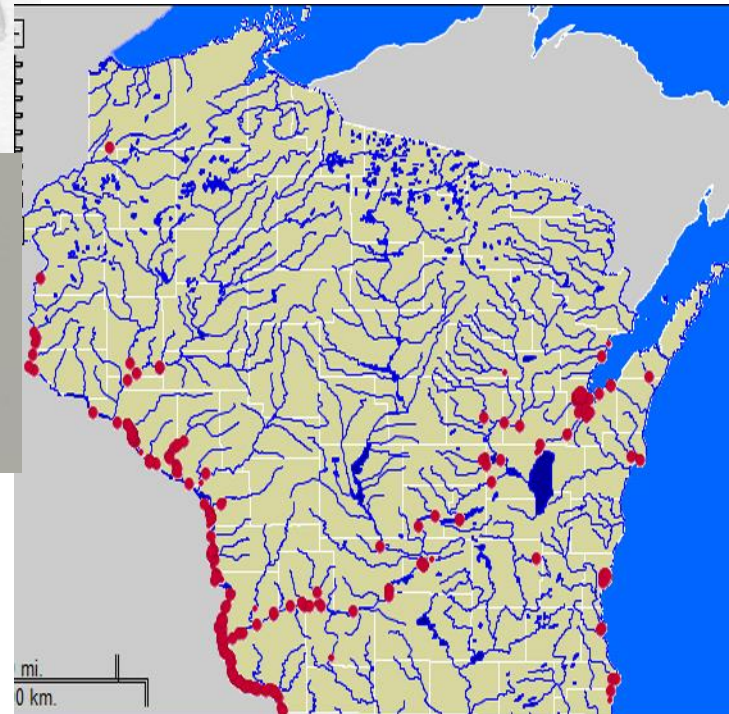
Family Clupeidae

Gizzard Shad

Dorosoma cepedianum



- No Lateral line
 - Single lateral spot
 - Keeled belly, isthmus to anus
 - Dorsal fin centered on back, WITH basal filament
 - Subterminal mouth, boxy snout
- illustrations © J.T. Sipiorski



Family Cyprinidae
Brassy Minnow
Hybognathus hankinsoni

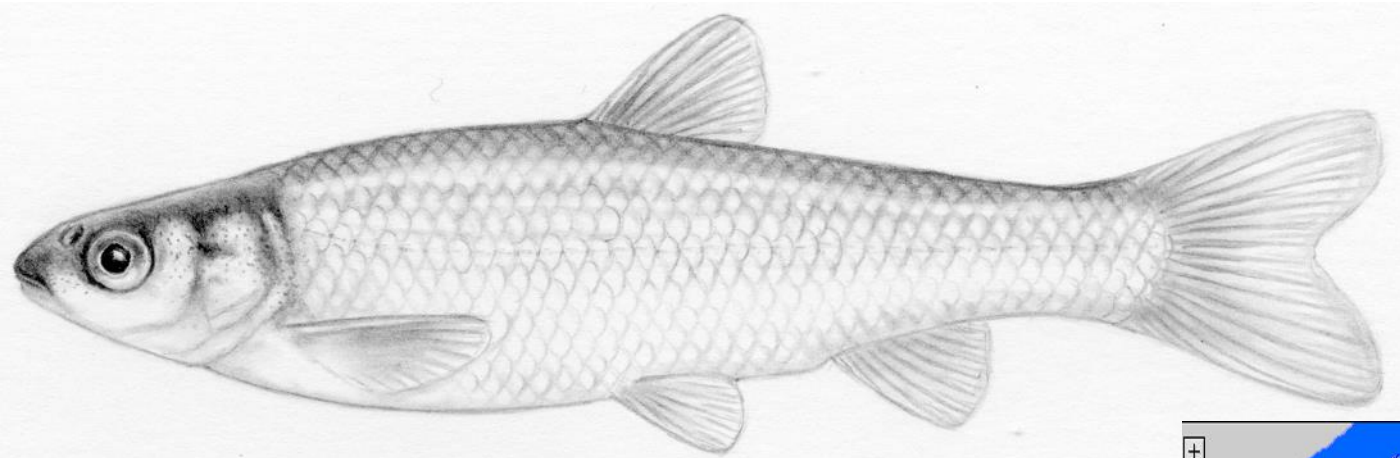
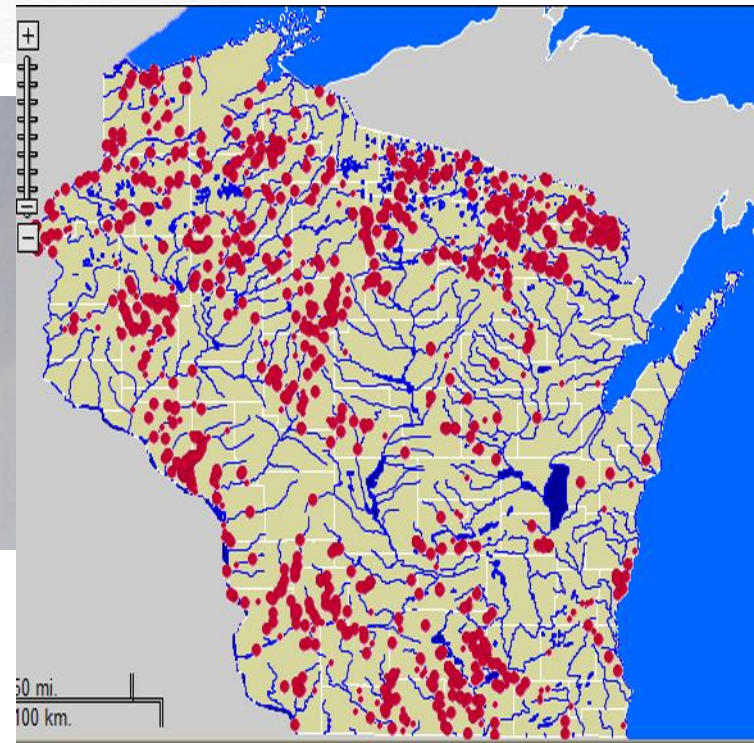
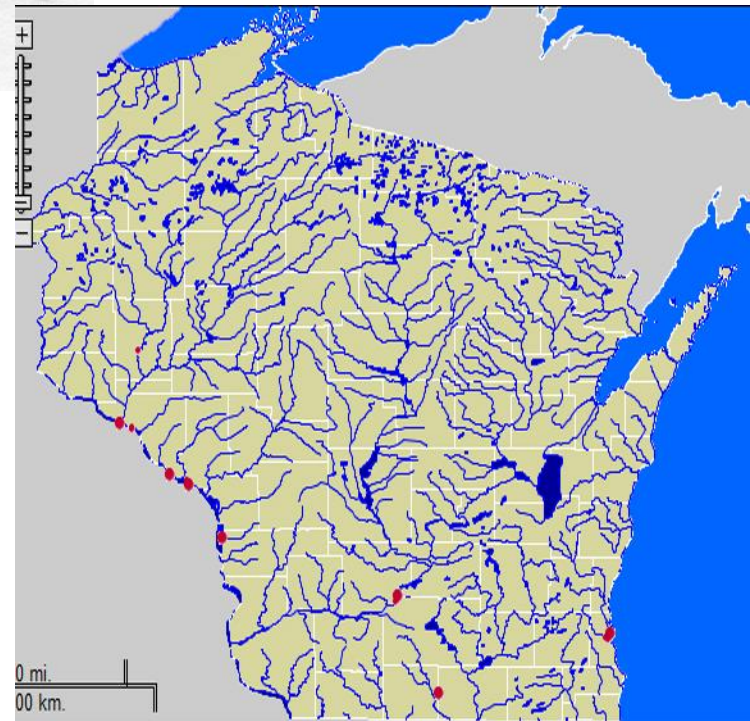
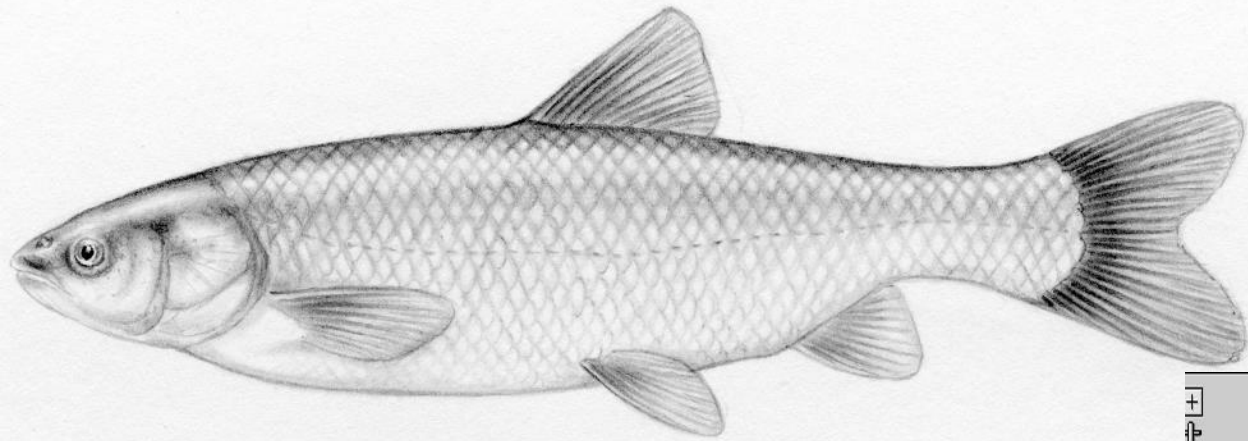


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Grass Carp

Ctenopharyngodon idella

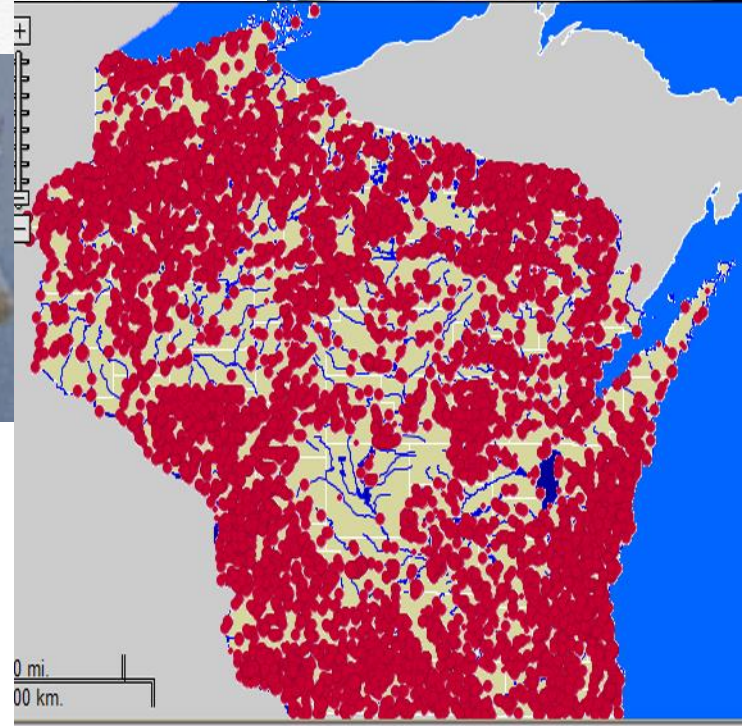
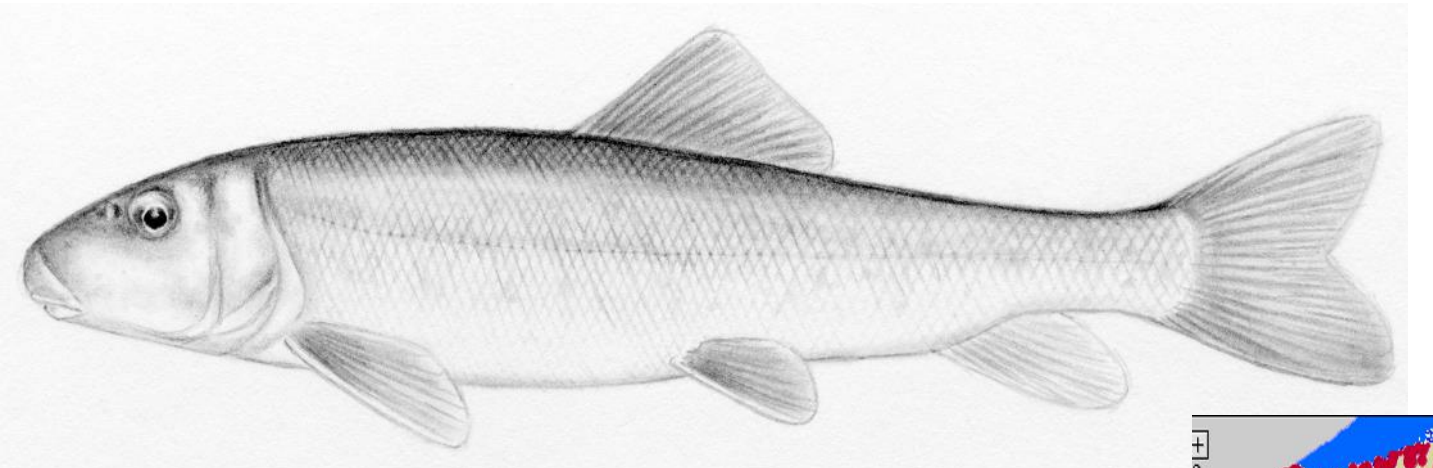


Omnivores and Detritivores

Family Catostomidae

White Sucker

Catostomus commersoni



- Fusiform body
- Short dorsal fin
- Short snout

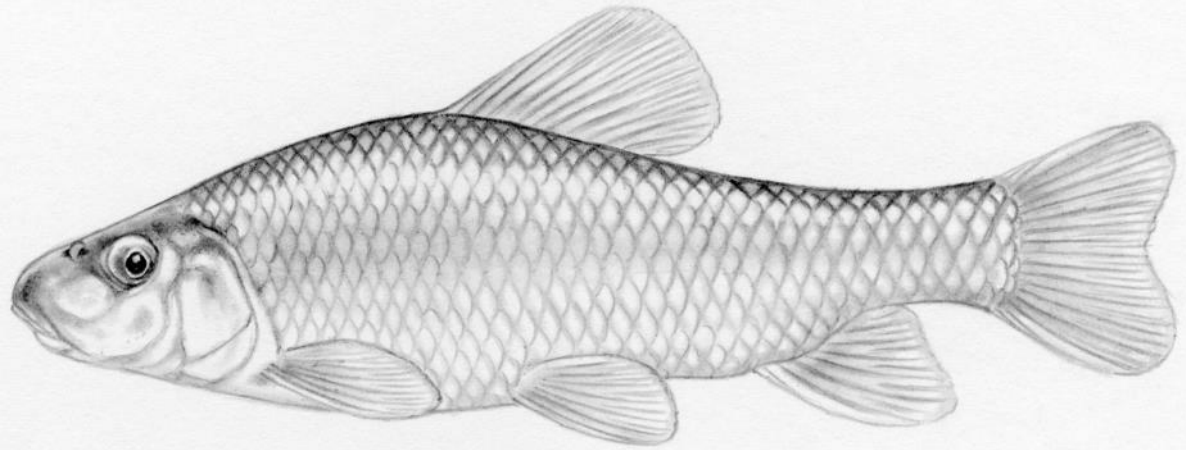
- Pappilose lips
- 53-74 lateral scales
- Mottling in young

illustrations © J.T. Sipiorski

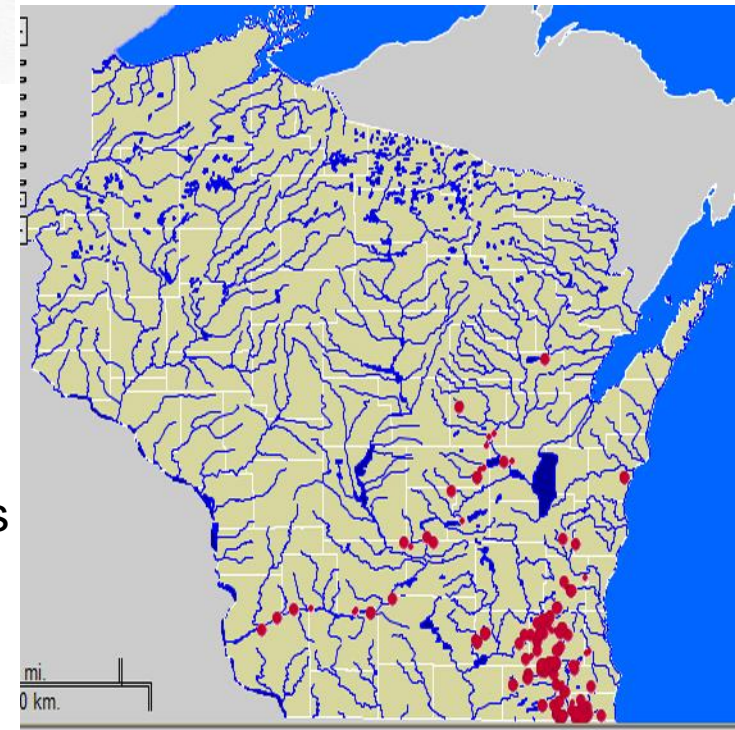
Family Catostomidae

Lake Chubsucker

Erimyzon sucetta



- Convex dorsal fin
- No lateral line
- Silvery appearance
- Usually 11-12 dorsal rays
- Young with strong lateral stripe

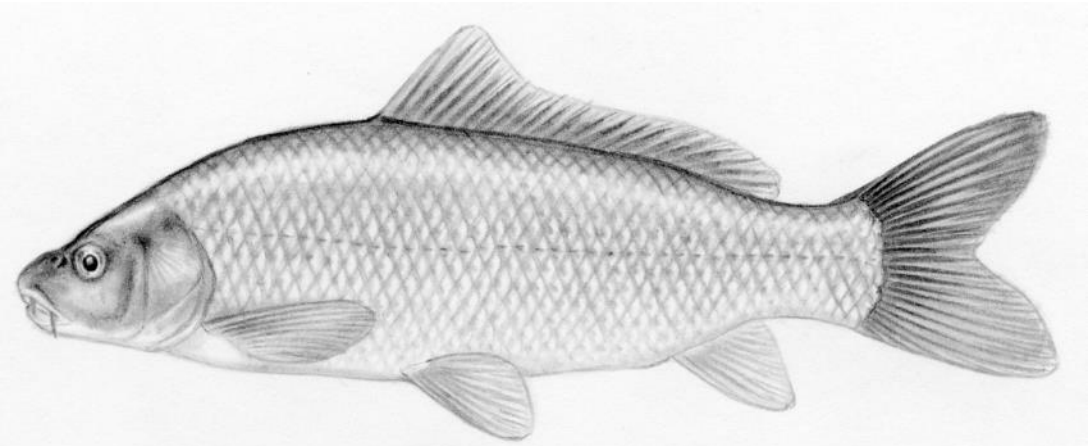


illustrations © J.T. Sipiorski

Family Cyprinidae

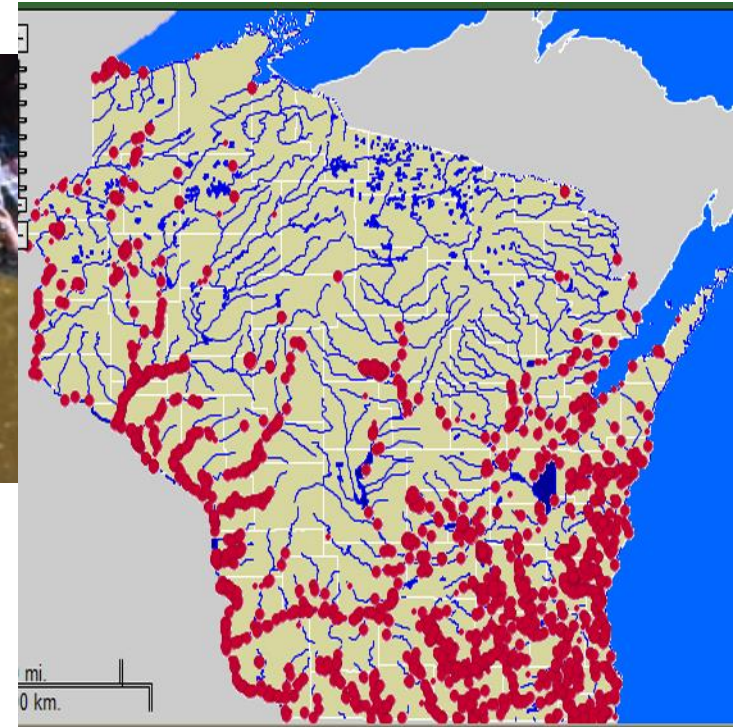
Common Carp

Cyprinus carpio



- Elongate dorsal fin with 1 spine
- 1 anal spine
- Barbels
- Subterminal mouth
- Yellow to tan cast

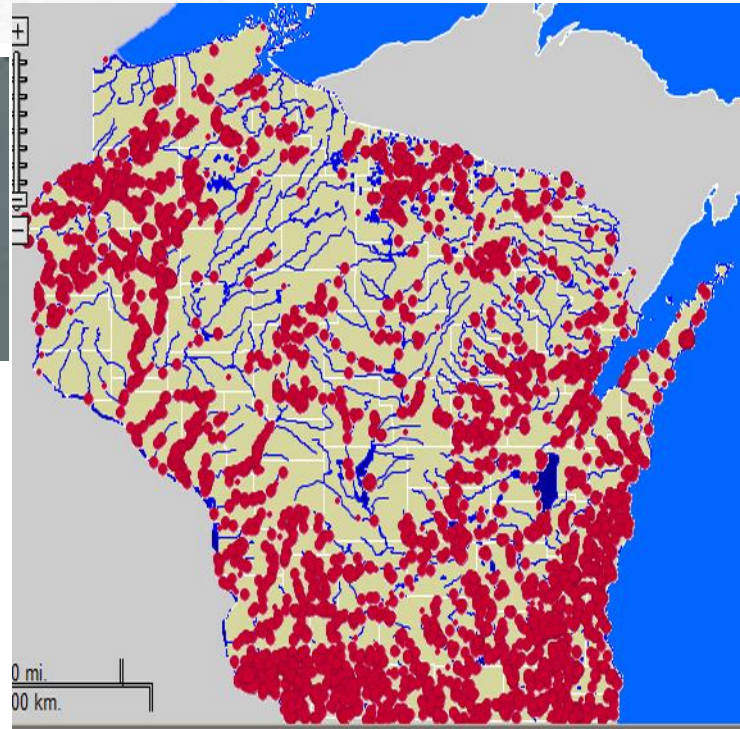
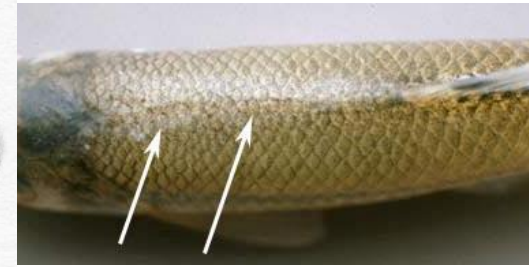
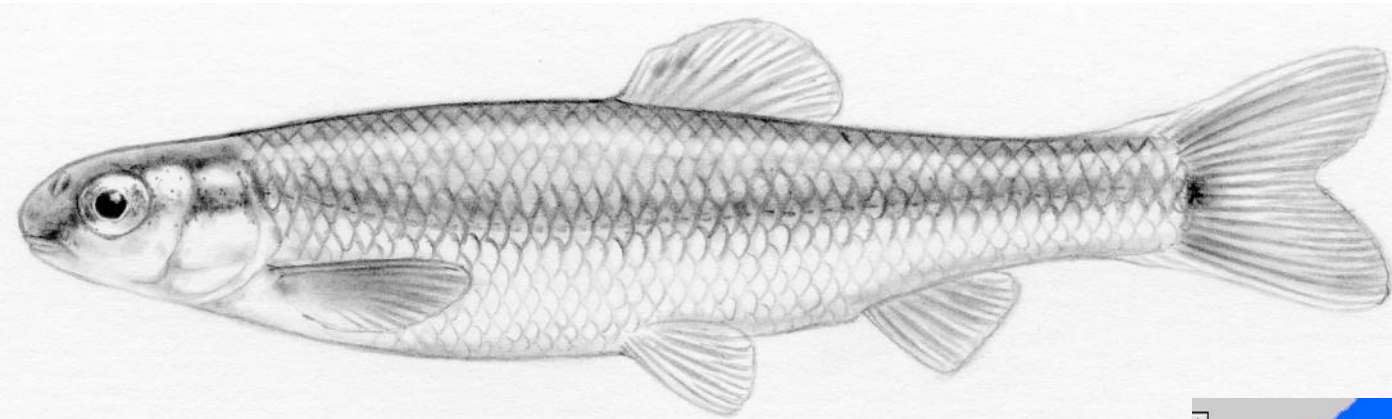
illustrations © J.T. Sipiorski



Family Cyprinidae

Bluntnose Minnow

Pimephales notatus



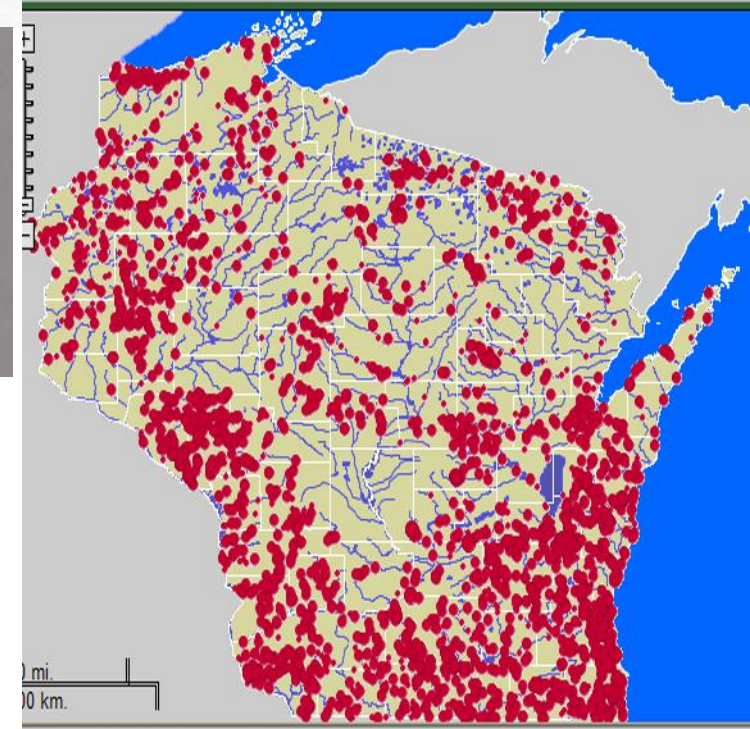
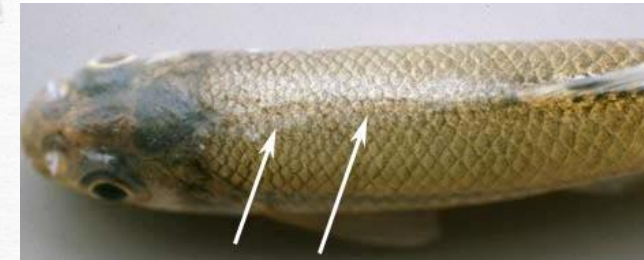
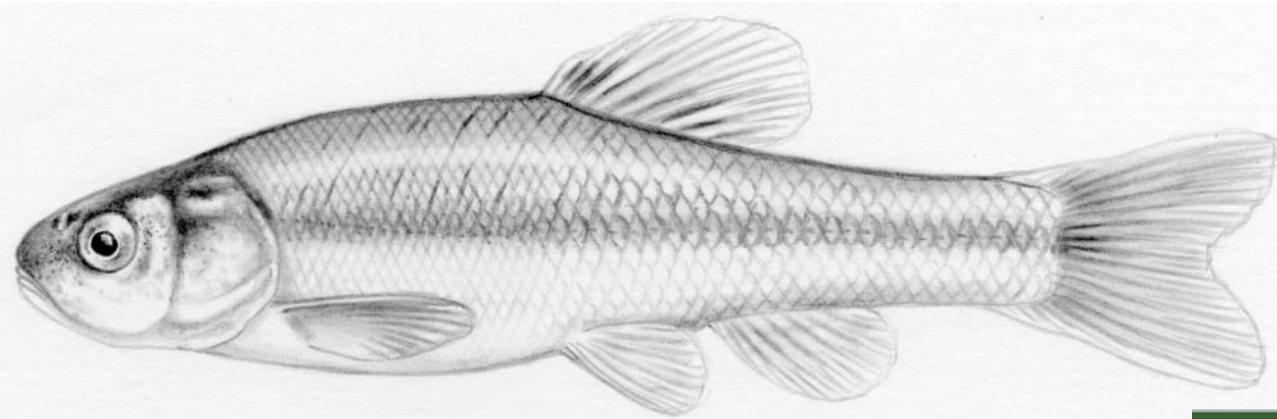
- Crowded nape scales
- First dorsal ray shorter than 2nd 3rd
- Subterminal mouth
- Dusky lateral stripe
- Prominent caudal spot

illustrations © J.T. Sipiorski

Family Cyprinidae

Fathead Minnow

Pimephales promelas



- Crowded nape scales
- First dorsal ray shorter than 2nd 3rd
- Terminal mouth
- Faint lateral stripe
- Faint caudal spot

illustrations © J.T. Sipiorski

Family Cyprinidae

Golden Shiner

Notemigonus crysoleucas

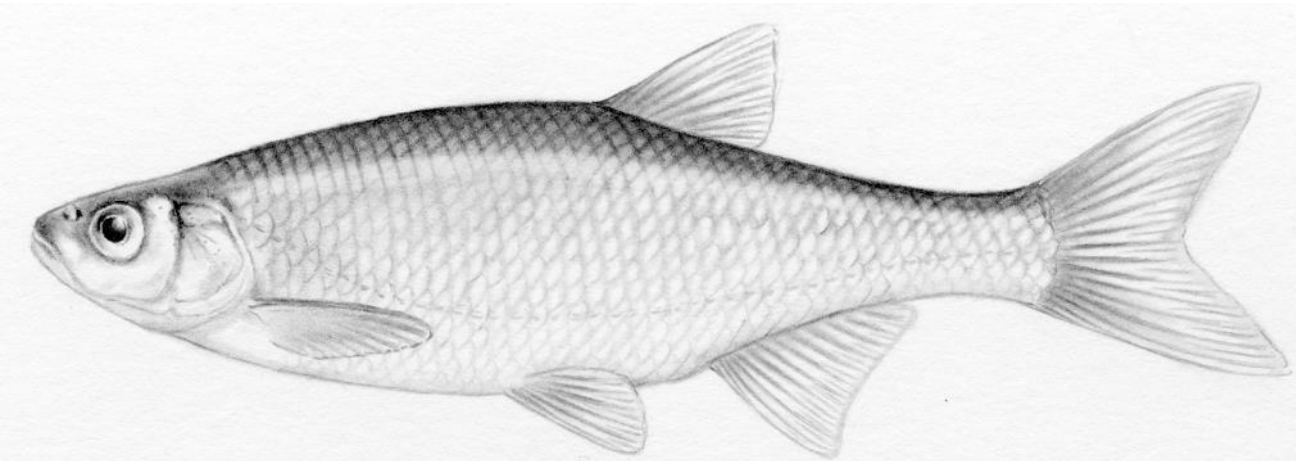
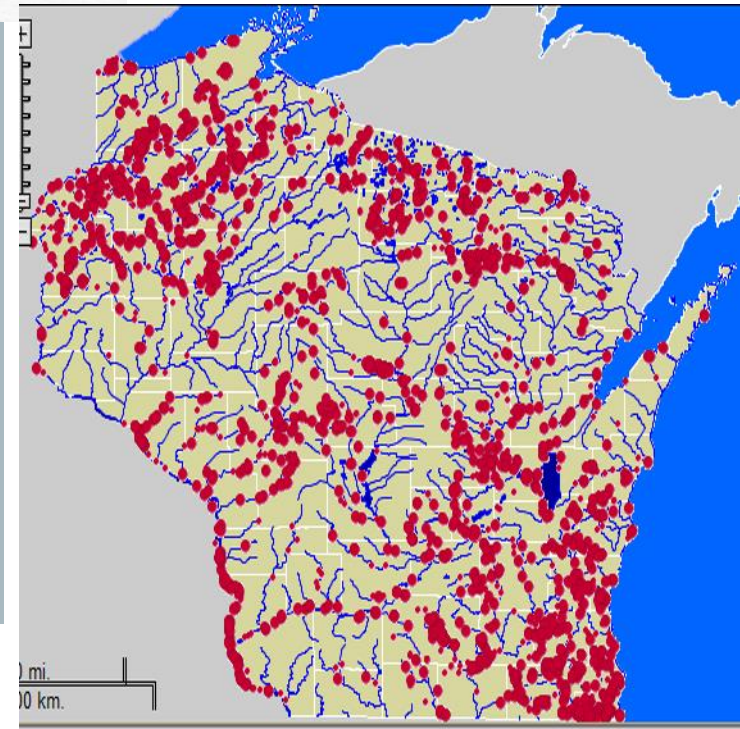


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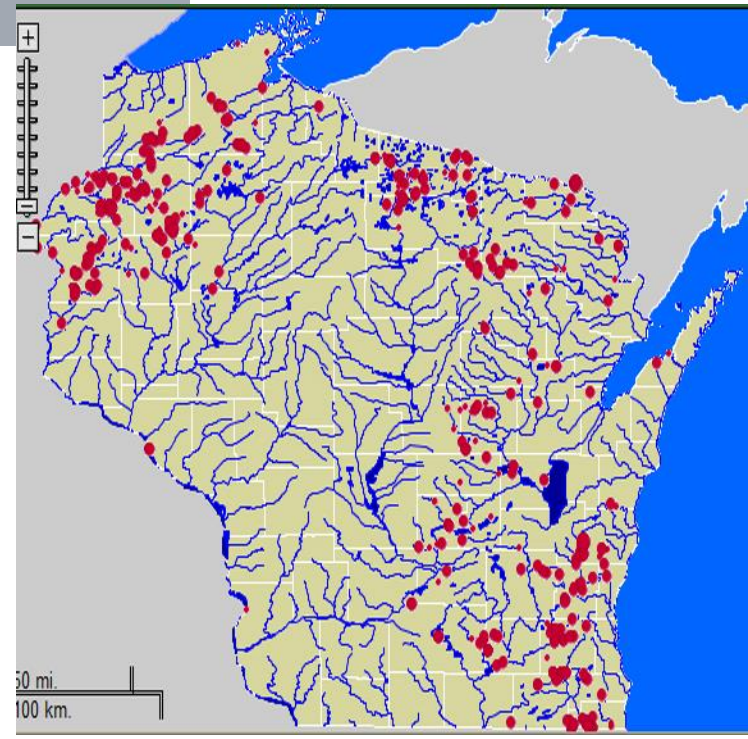
Family Cyprinidae

Blackchin Shiner

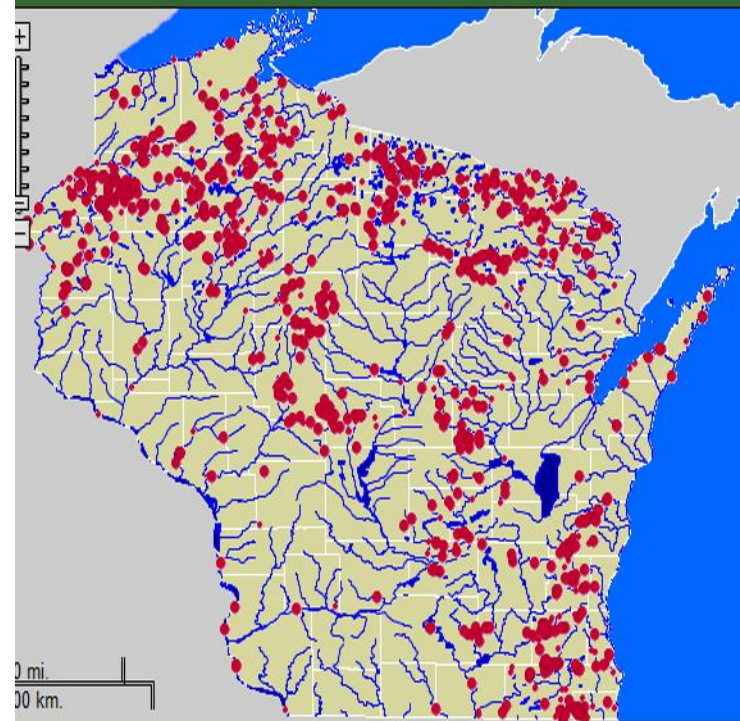
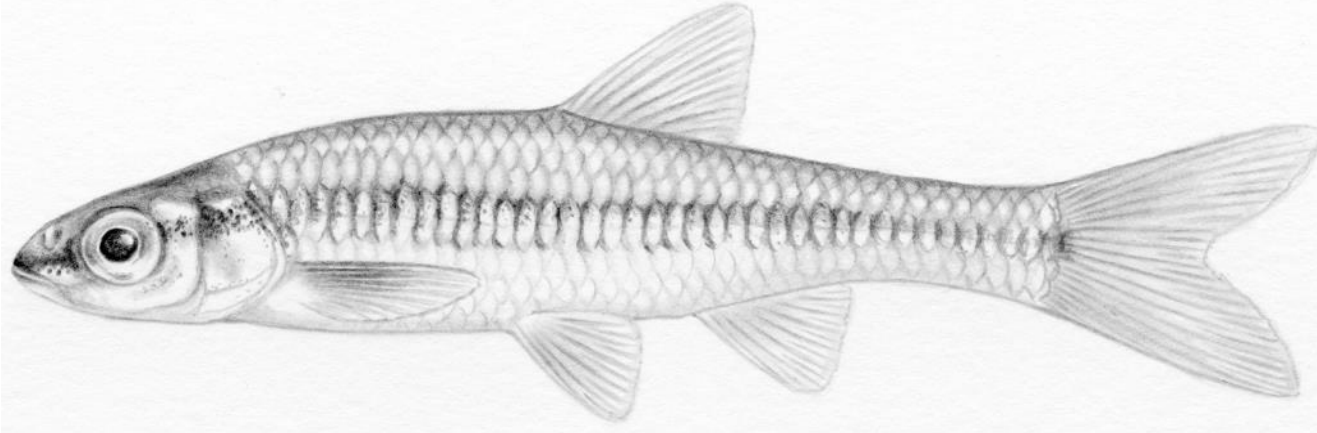
Notropis heterodon



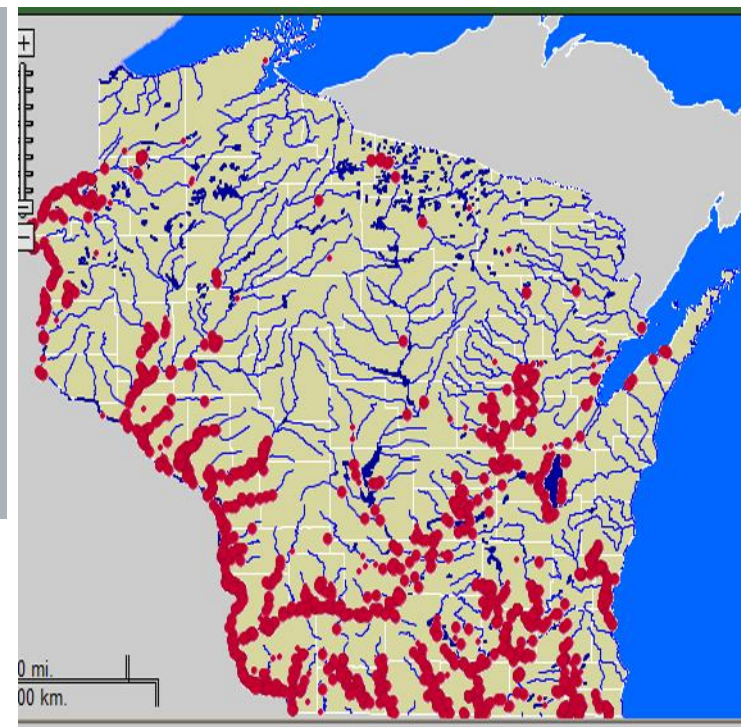
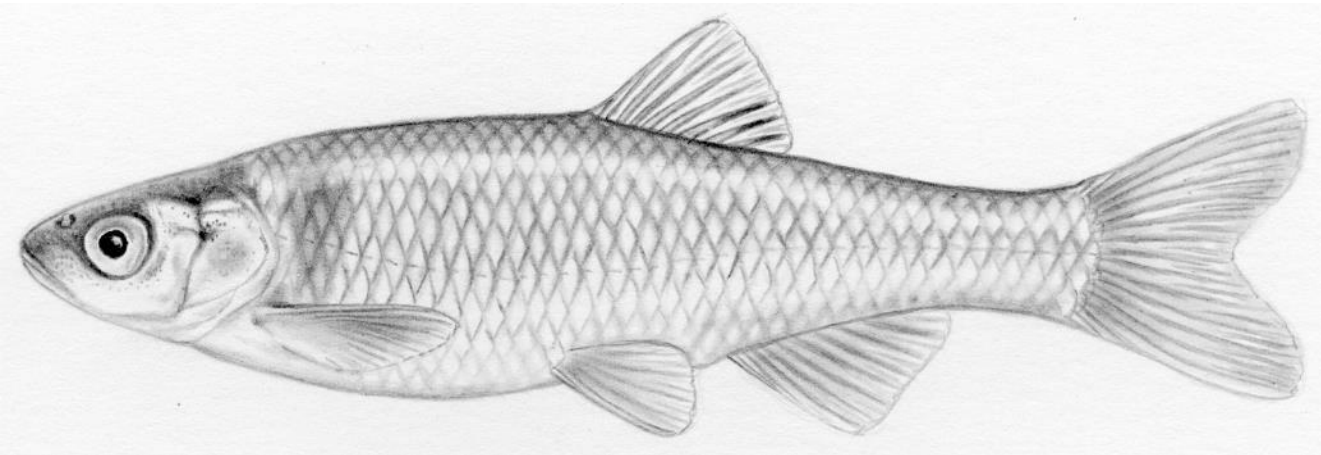
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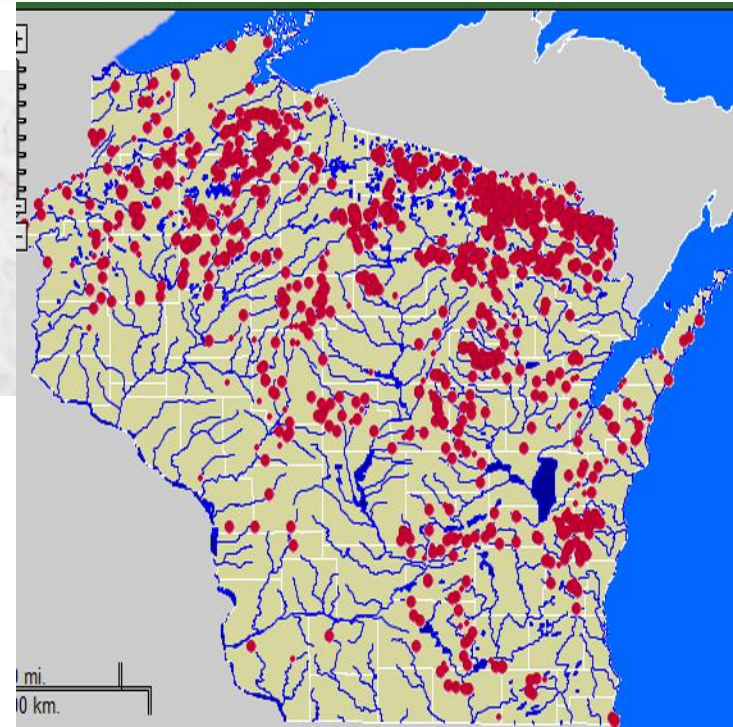
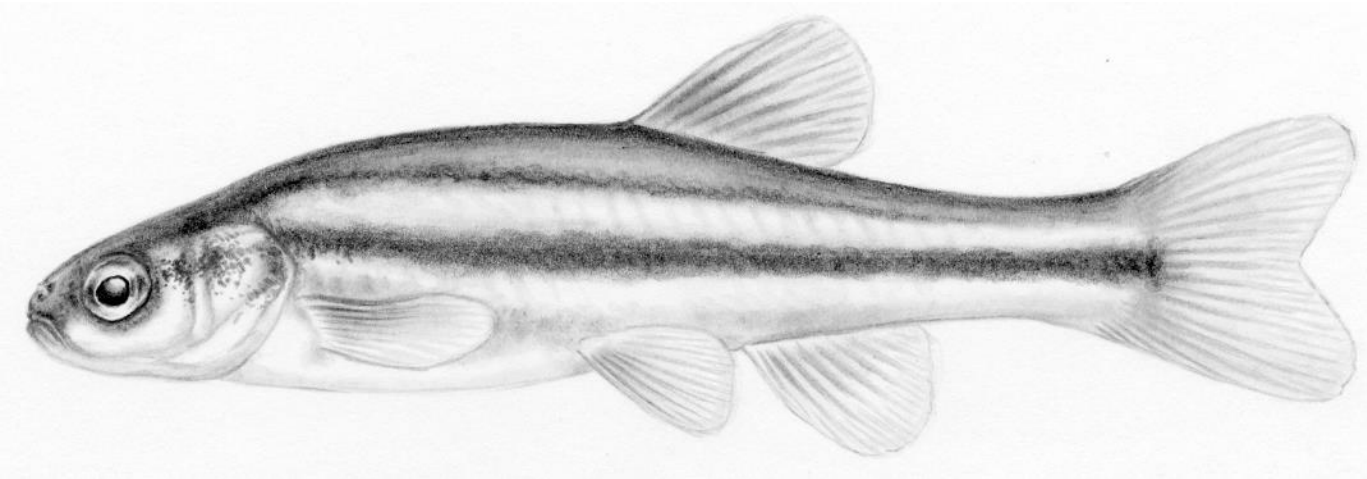
Family Cyprinidae
Blacknose Shiner
Notropis heterolepis



Family Cyprinidae
Spotfin Shiner
Cyprinella spiloptera



Family Cyprinidae
Northern Redbelly Dace
Phoxinus eos



Family Cyprinidae
Emerald Shiner
Notropis atherinoides

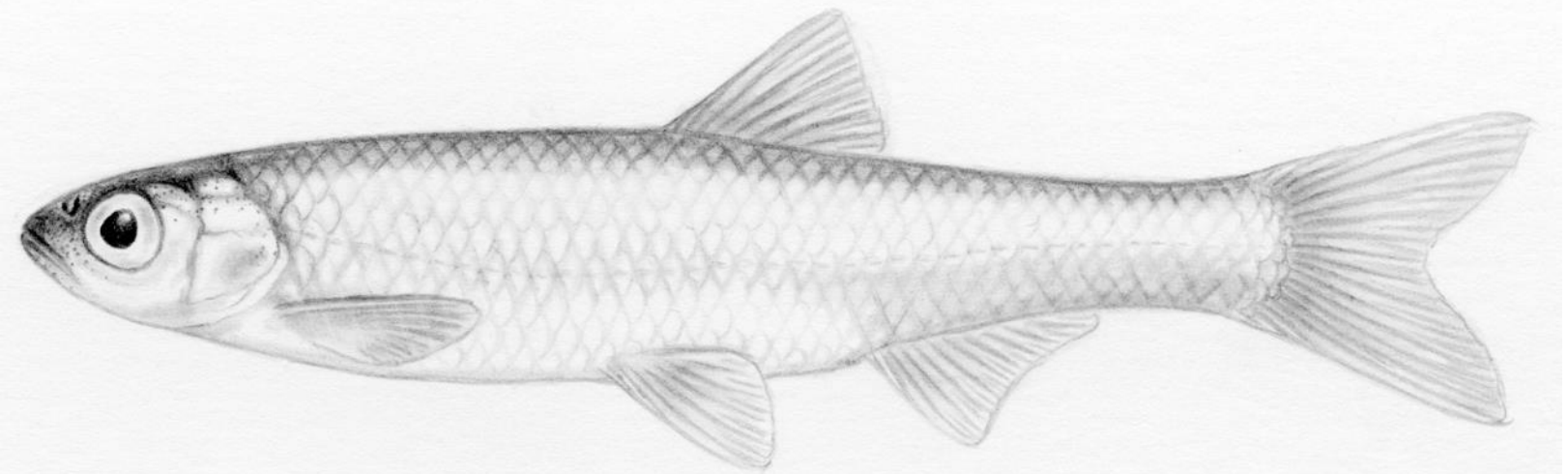
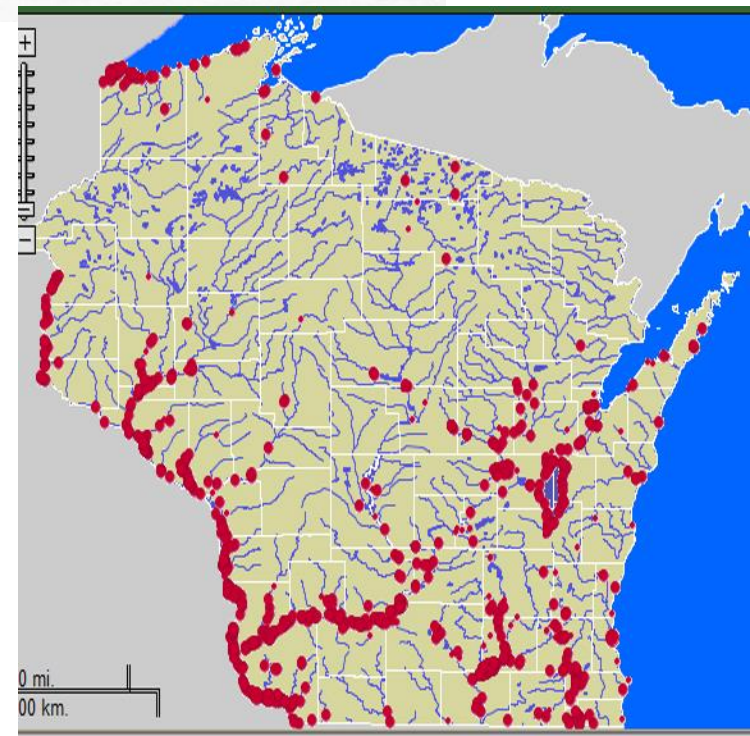


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Family Cyprinidae
Spottail Shiner
Notropis hudsonius

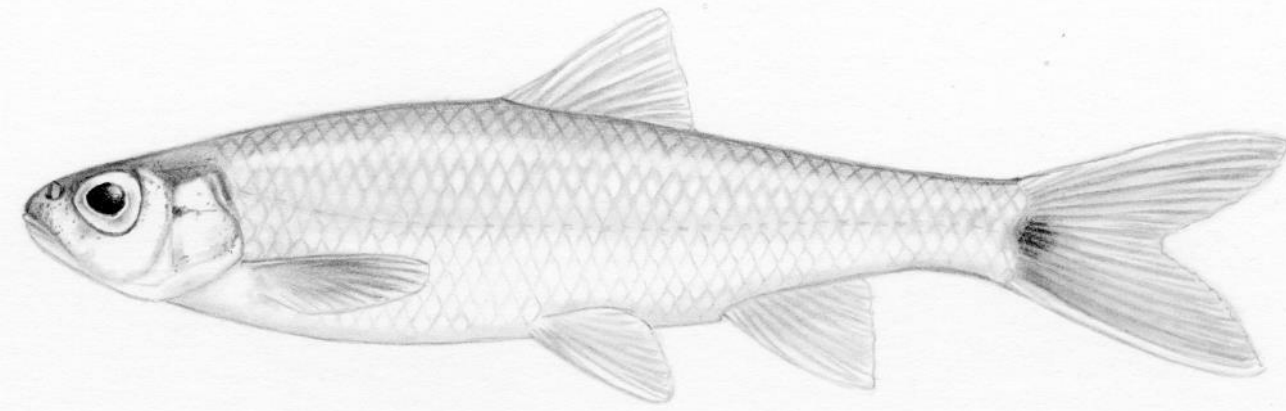
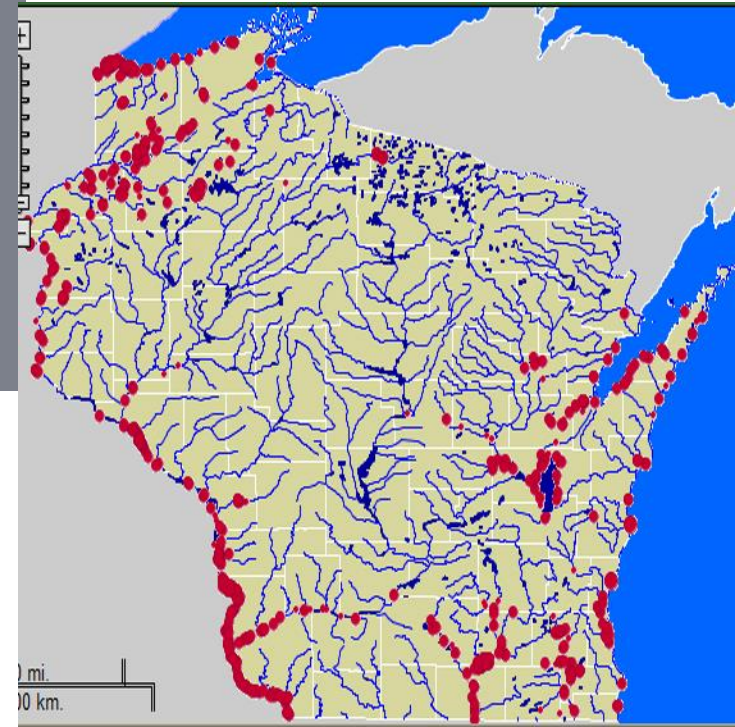
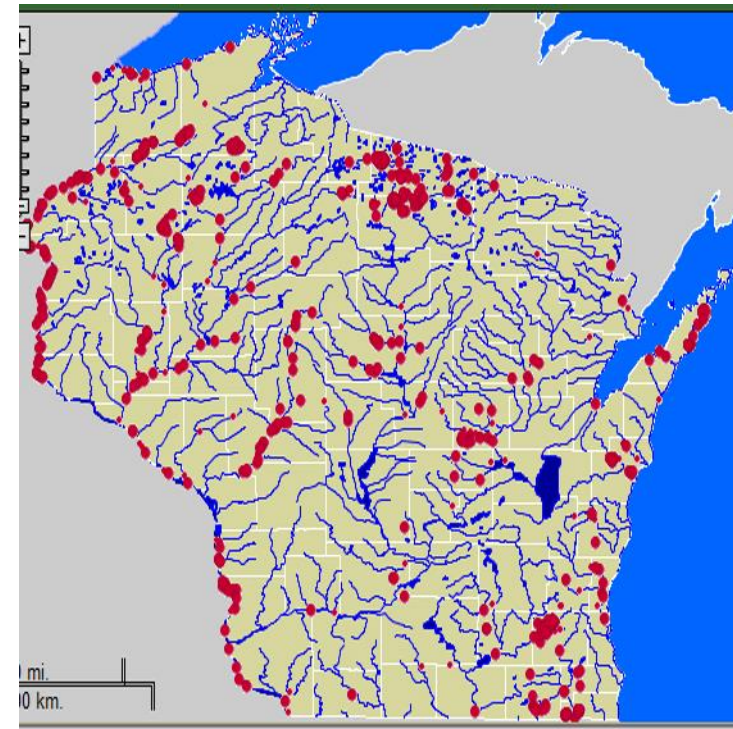
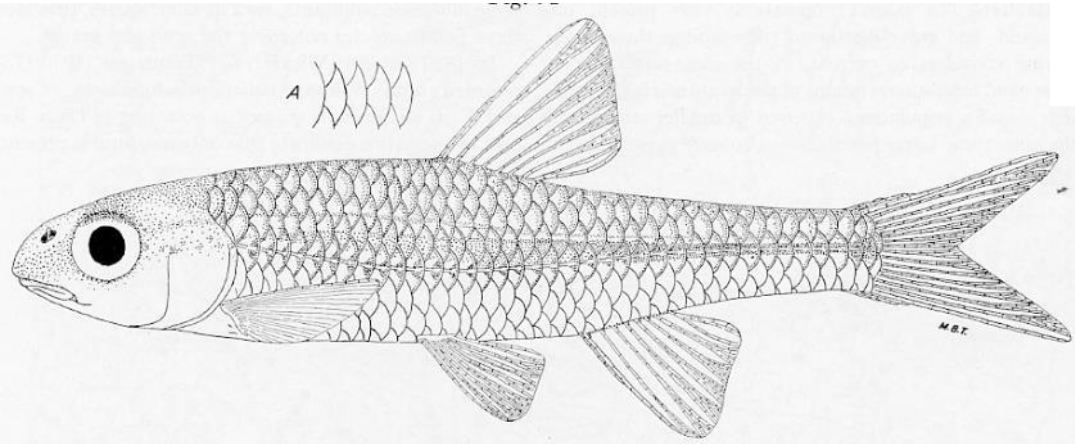


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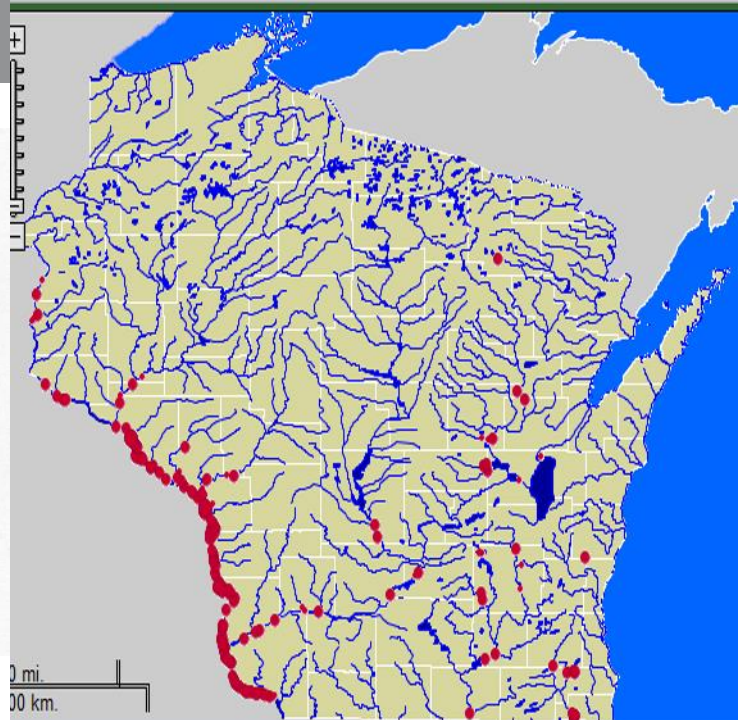
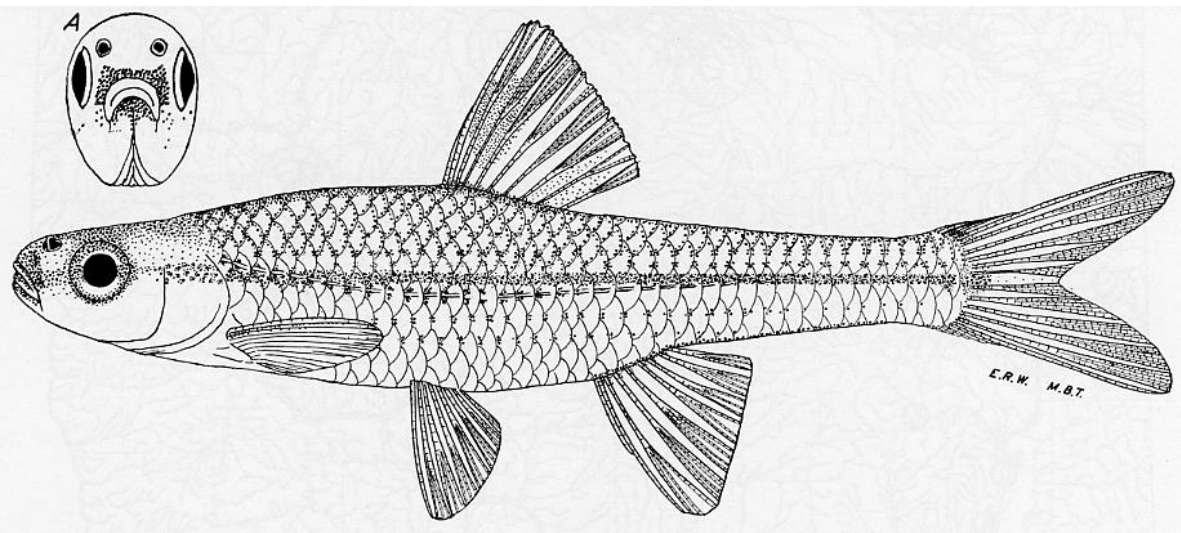
Family Cyprinidae
Mimic Shiner
Notropis volucellus



Family Cyprinidae
Pugnose Minnow
Opsopoeodus emiliae



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Family Acipenseridae

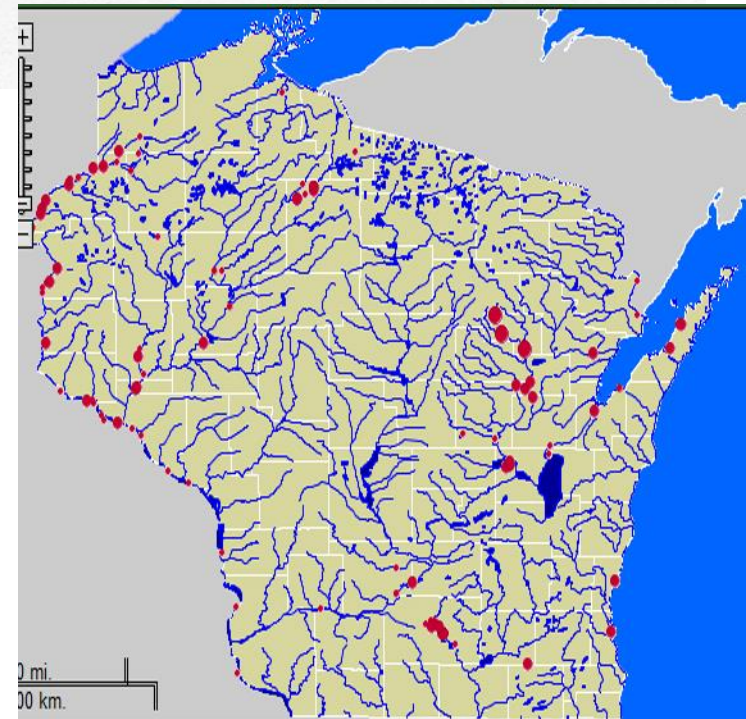
Lake Sturgeon

Acipenser fulvescens



- Conical snout
- Heterocercal caudal fin
- Bony scutes
- Barbels

illustrations © J.T. Sipiorski

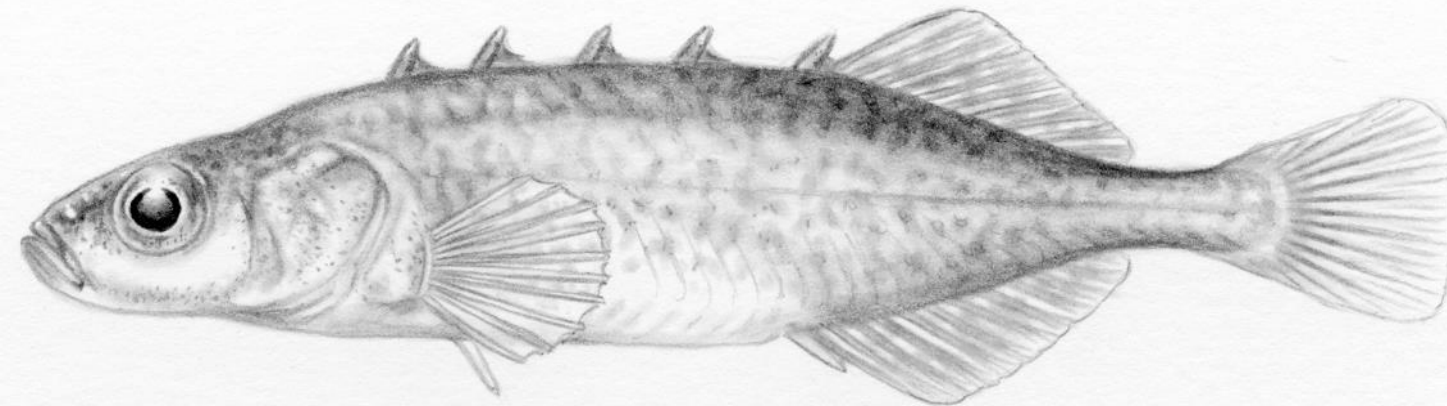


Zooplanktivores and Invertebrate Eaters

Family Gasterosteidae

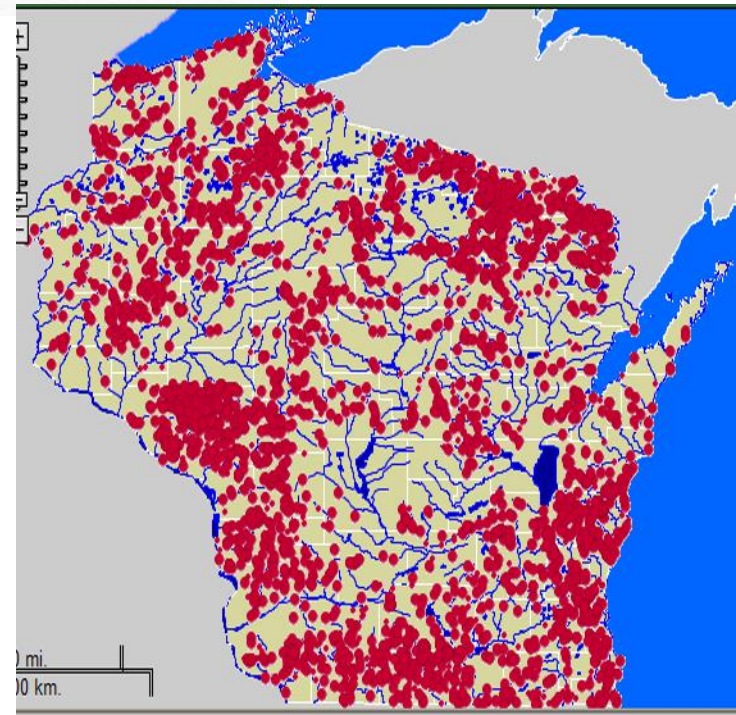
Brook Stickleback

Culaea inconstans



- 4-6 Dorsal spines prominent and separate
- Pelvic fin reduced to spine
- Narrow caudal peduncle
- Tube-like snout

illustrations © J.T. Sipiorski



Family Umbridae

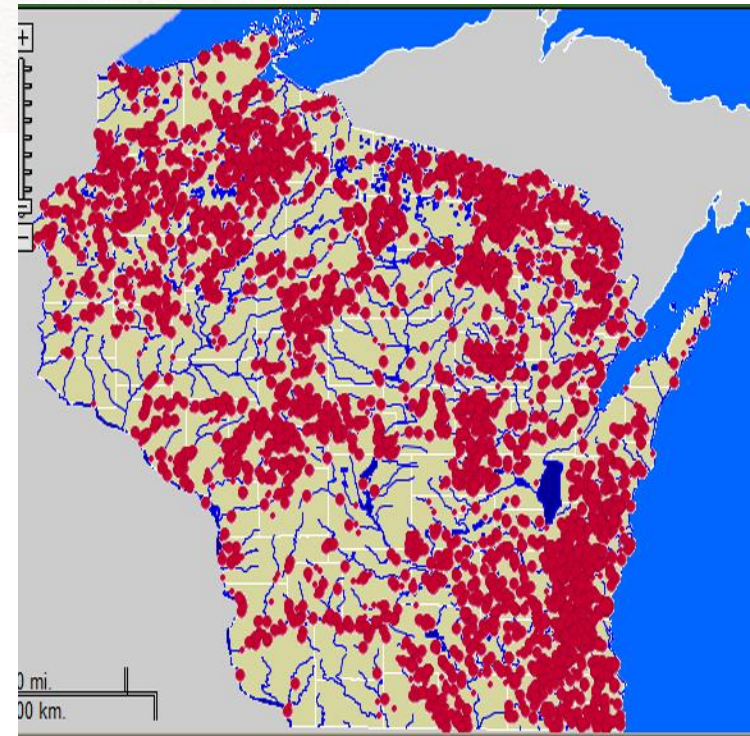
Central Mudminnow

Umbra limi



- Dorsal and anal fin farther back on body
- All fins rounded
- Dark vertical bars on light background
- Heavy, dark vertical bar at base of caudal fin
- Purplish iridescence

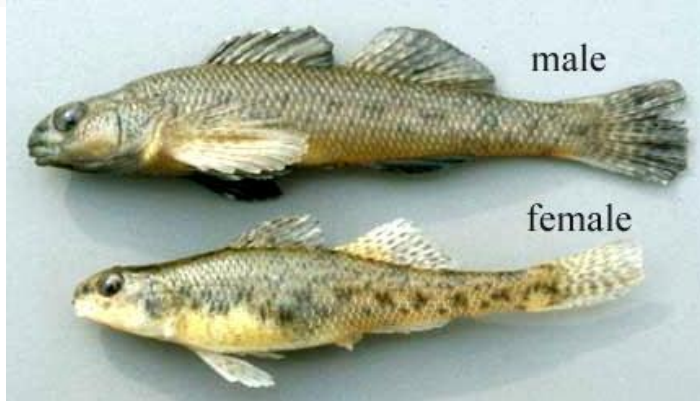
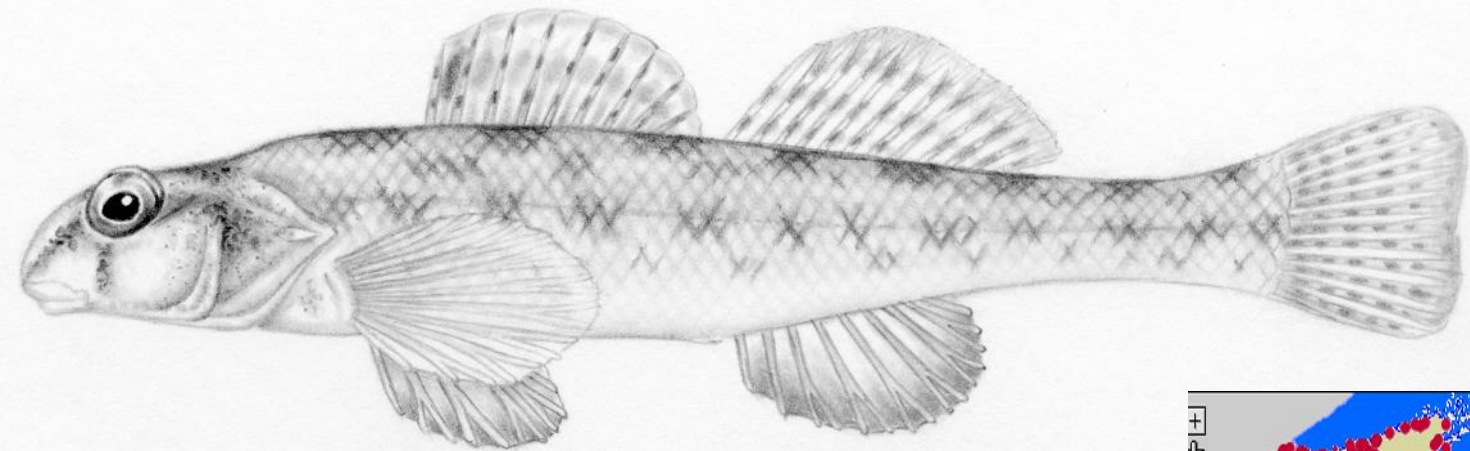
illustrations © J.T. Sipiorski



Family Percidae

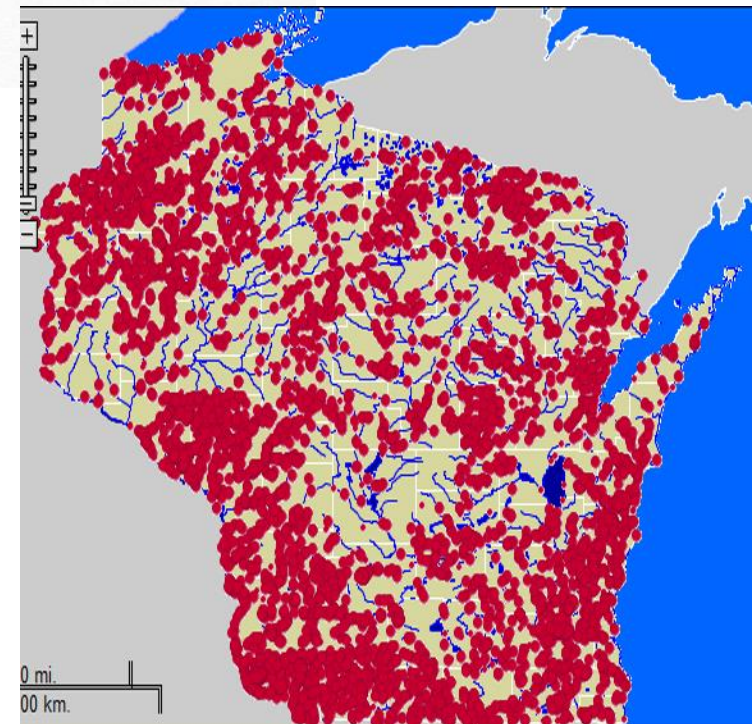
Johnny Darter

Etheostoma nigrum



- W's, X's, V's along the lateral line
- Single anal spine
- Lateral stripe discontinuous around snout

illustrations © J.T. Sipiorski



Family Percidae

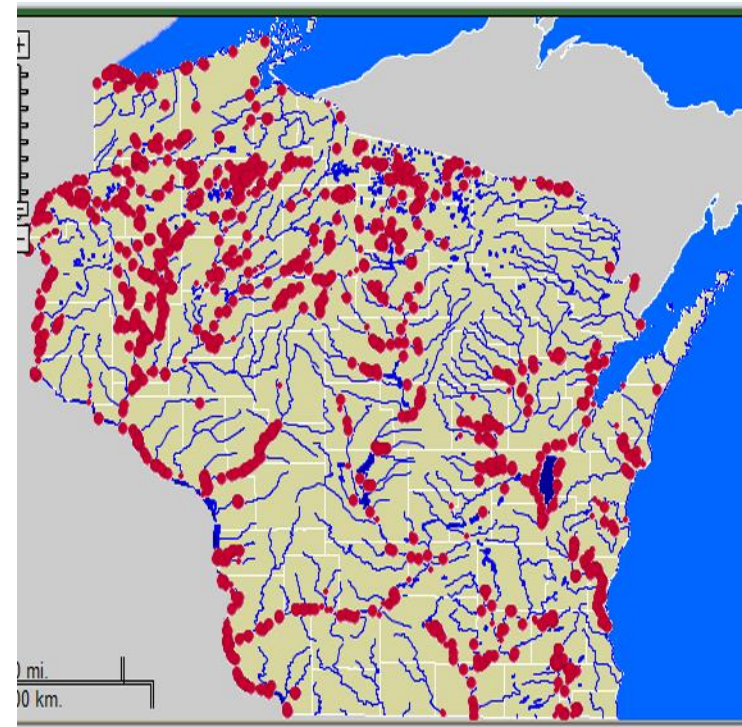
Logperch

Percina caprodes caprodes



- “Tiger stripes” along side • 2 Anal spines
- Bulbous tip to snout

illustrations © J.T. Sipiorski



Family Percidae
Iowa Darter
Etheostoma exile

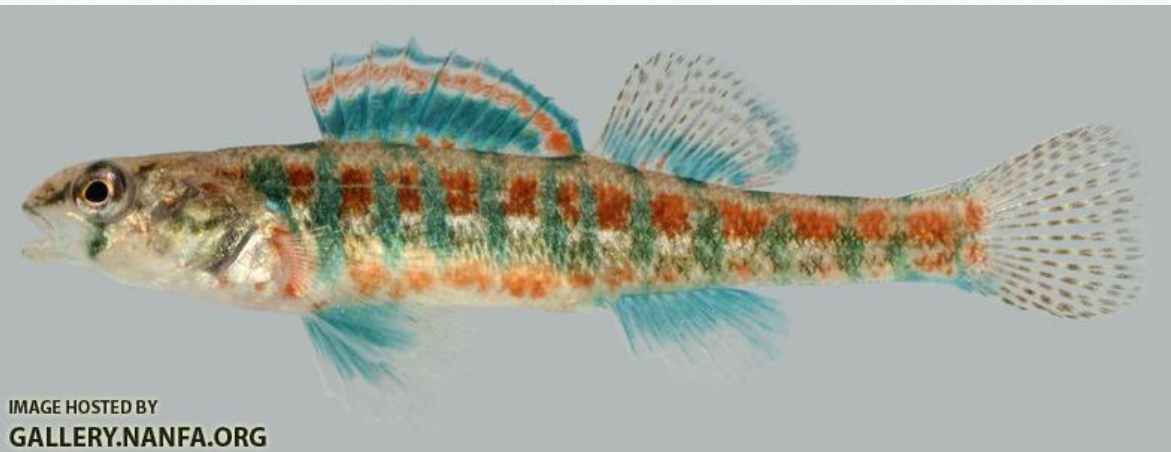
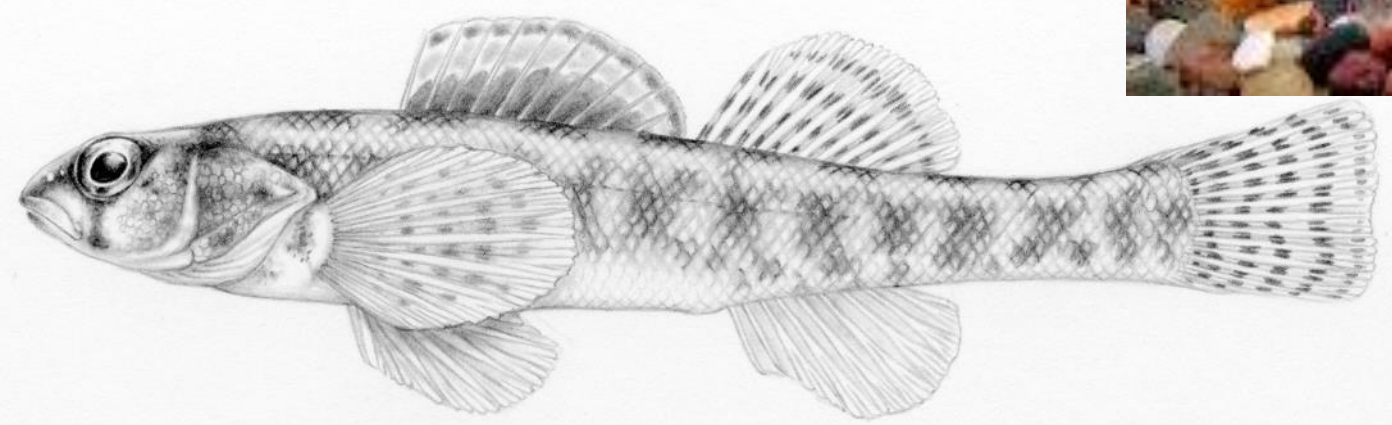
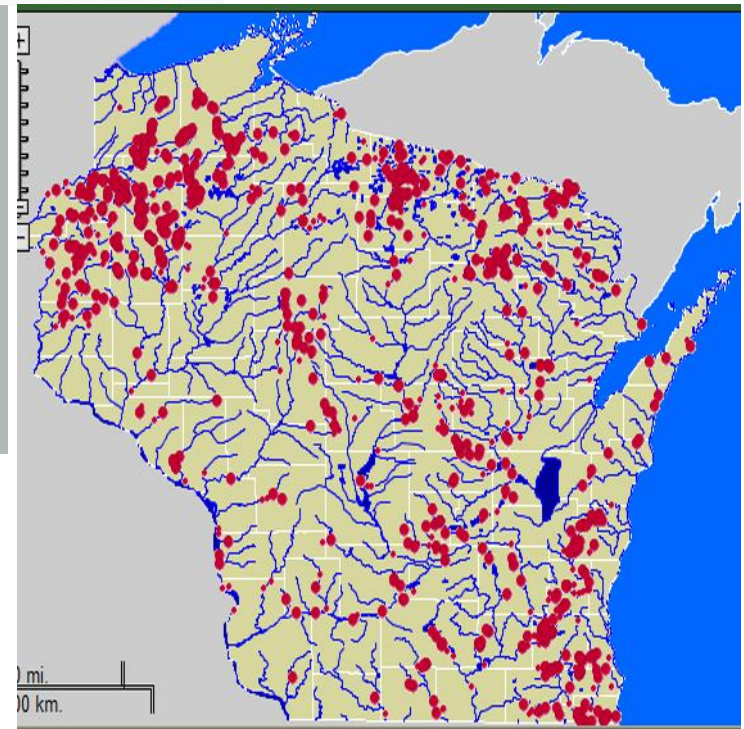
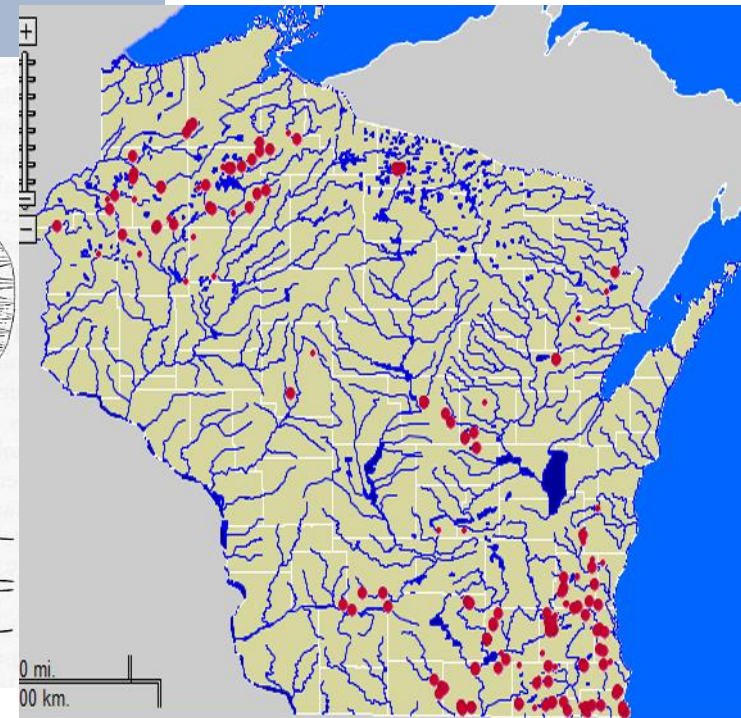
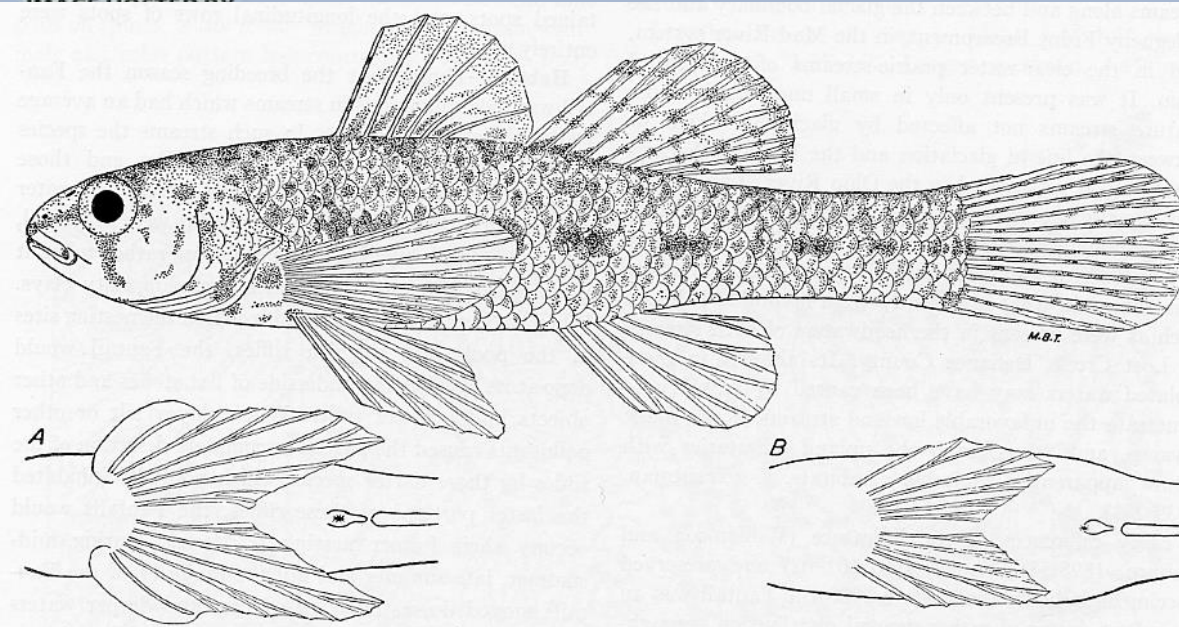


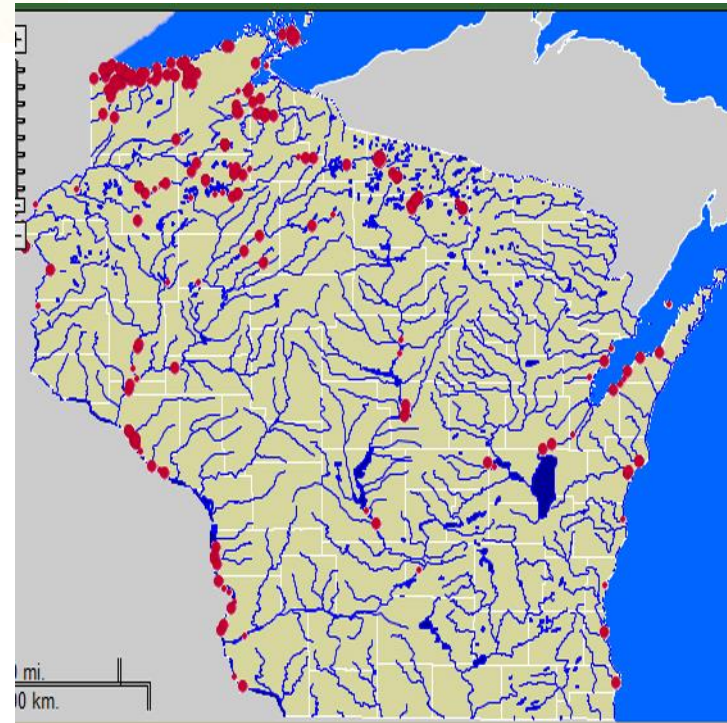
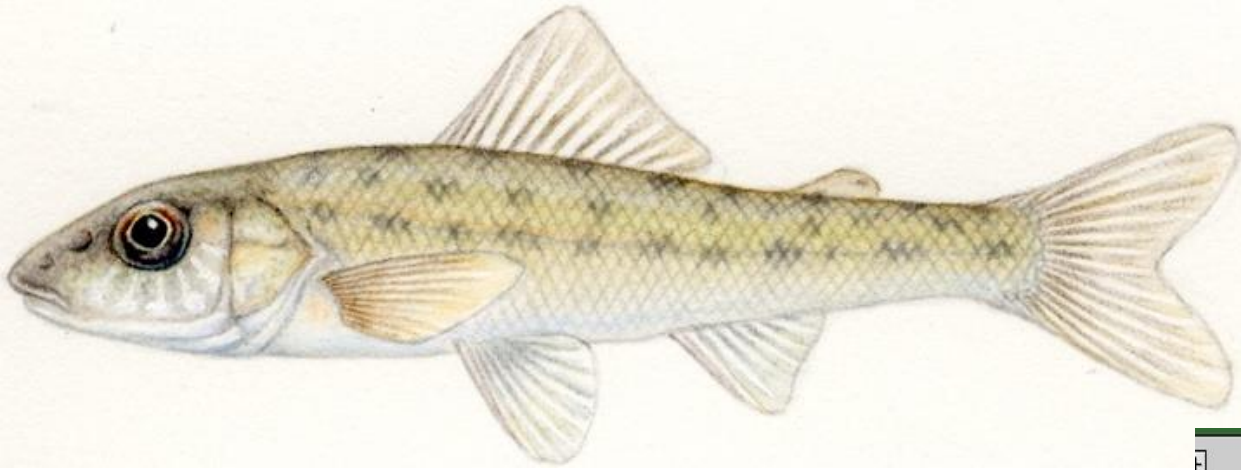
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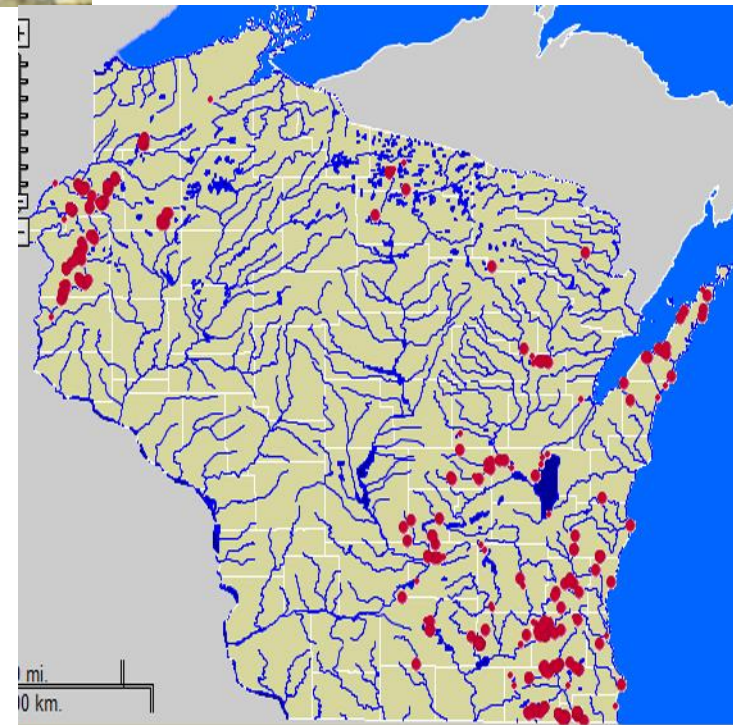
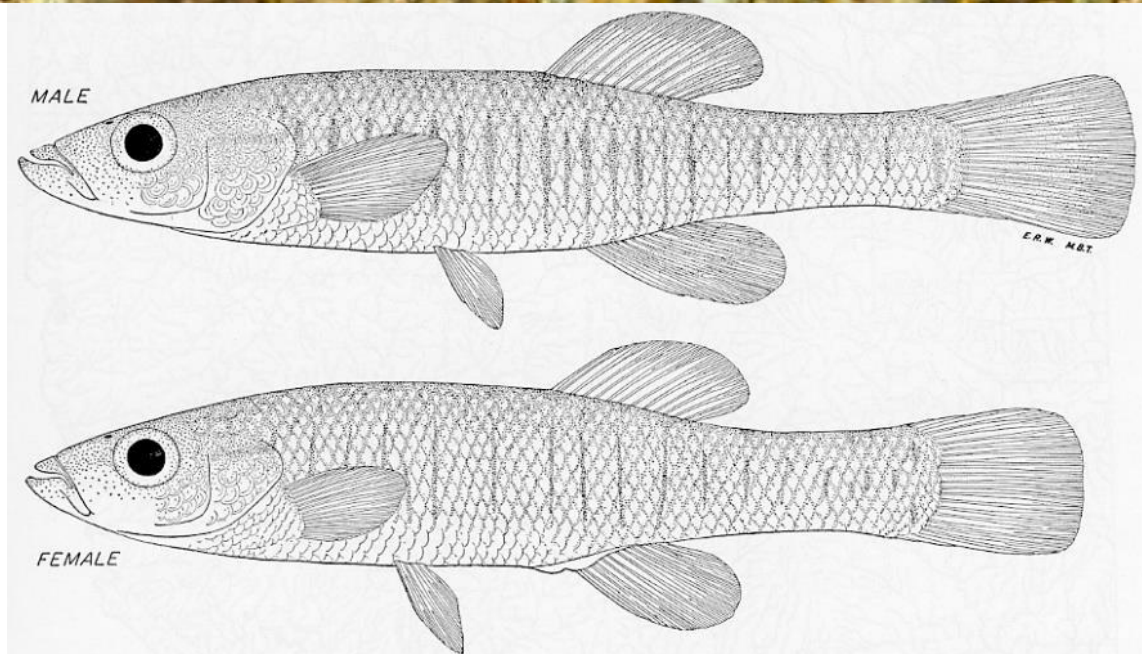
Family Percidae
Least Darter
Etheostoma microperca



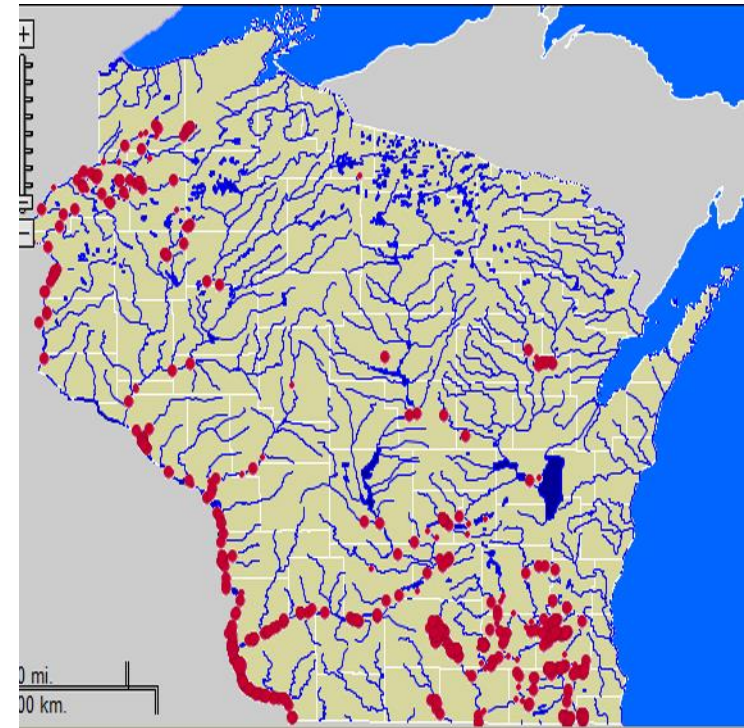
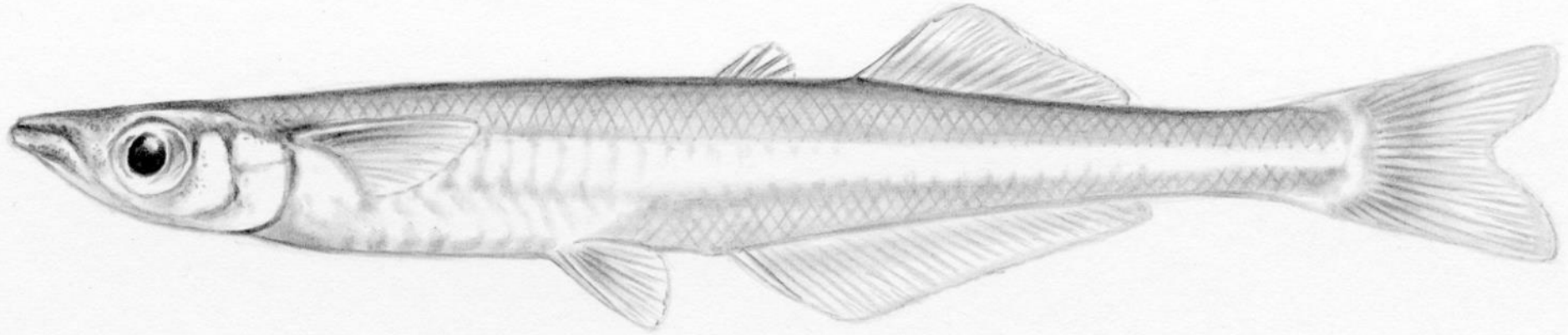
Family Percopsidae
Trout-perch
Percopsis omiscomaycus



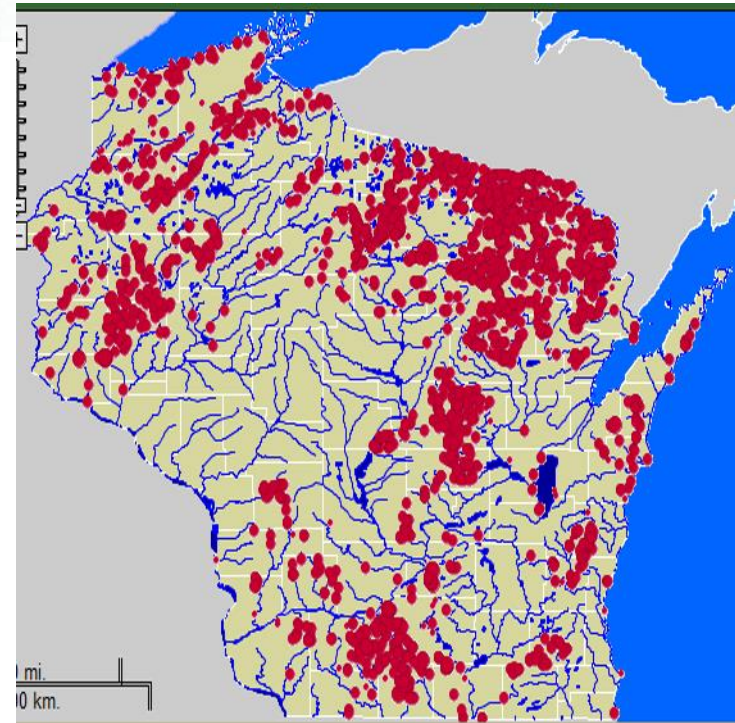
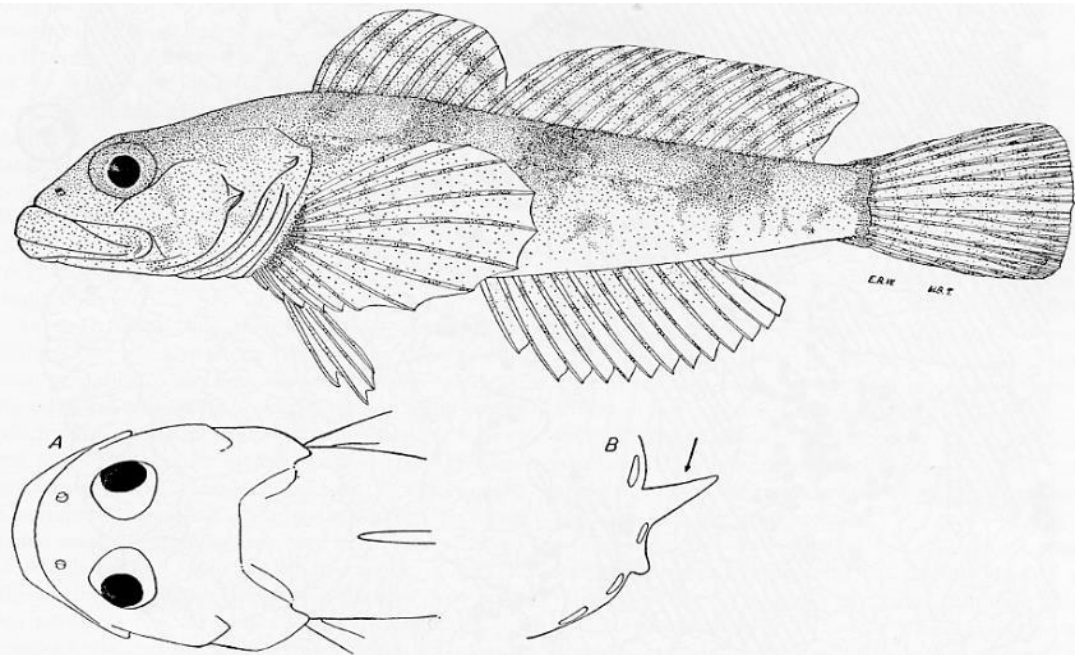
Family Fundulidae
Banded Killifish
Fundulus diaphanus



Family Atherinopsidae
Brook Silverside
Labidesthes sicculus



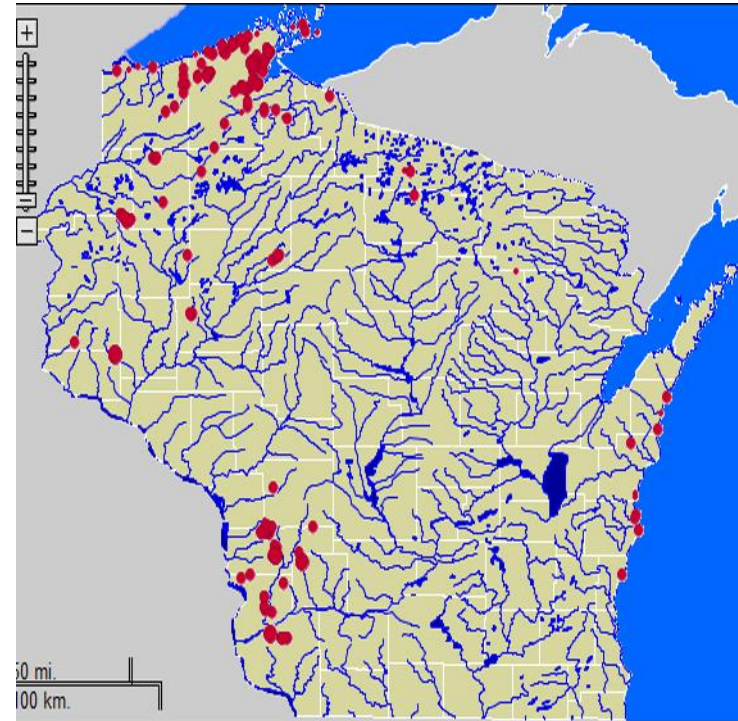
Family Cottidae
Mottled Sculpin
Cottus bairdii



Family Cottidae

Slimy Sculpin

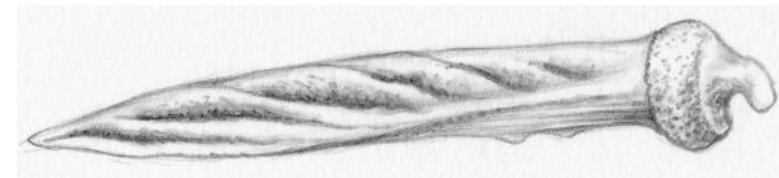
Cottus cognatus



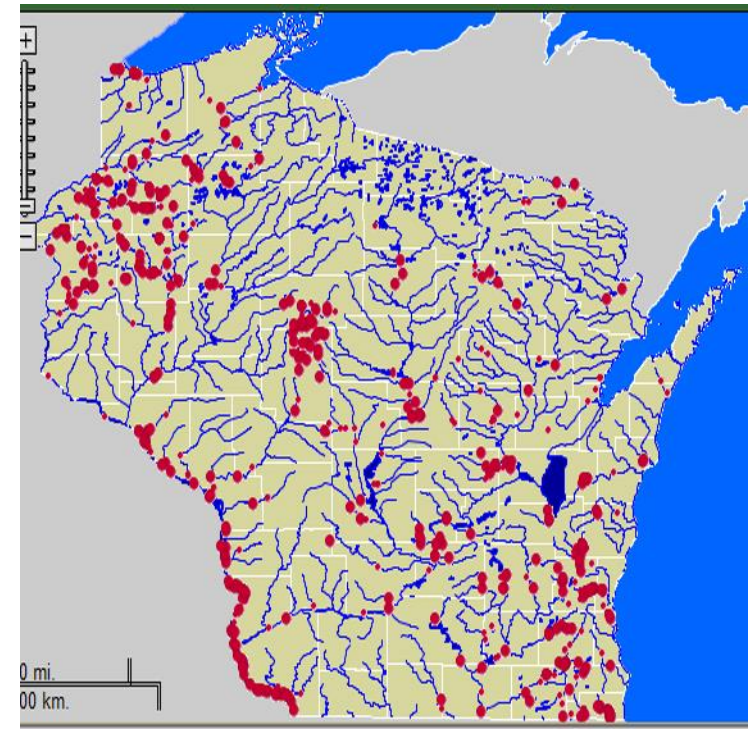
Family Ictarulidae

Tadpole Madtom

Noturus gyrinus



- Rounded/squared caudal fin
- Low, long adipose fin
- Median fins WITHOUT dark fringe
- Smooth pectoral spines
- Even upper and lower jaw
- Upper jaw tooth patch with backward pointing extensions
- Chubby

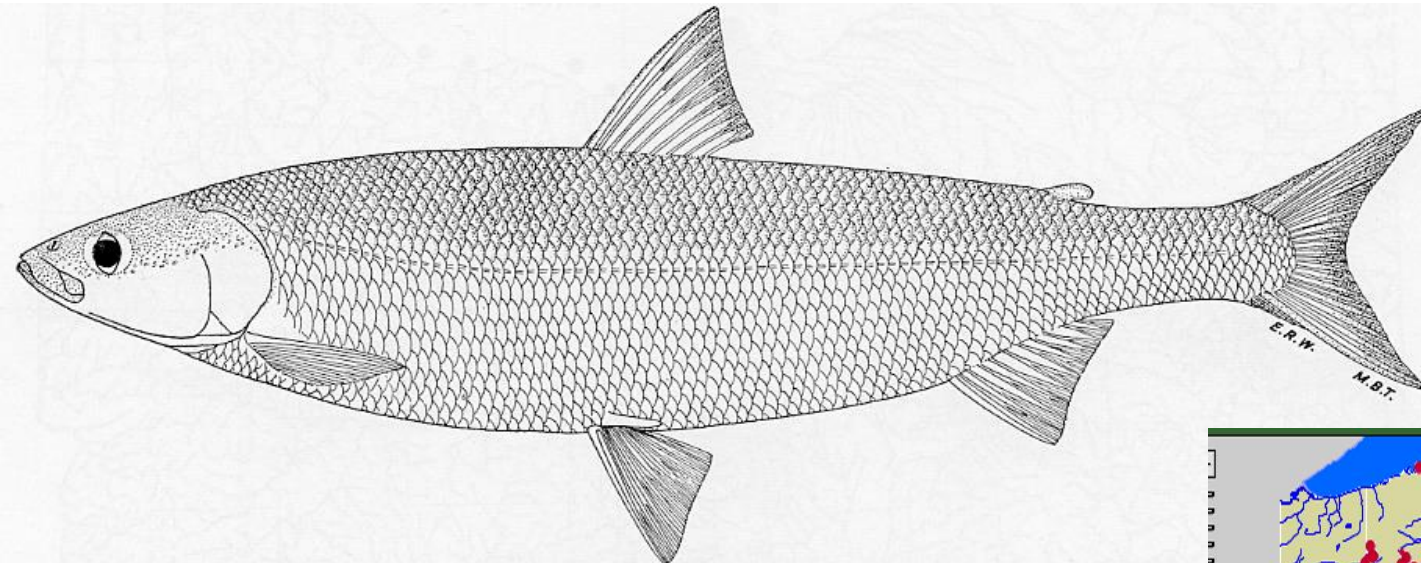


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Family Salmonidae

Cisco

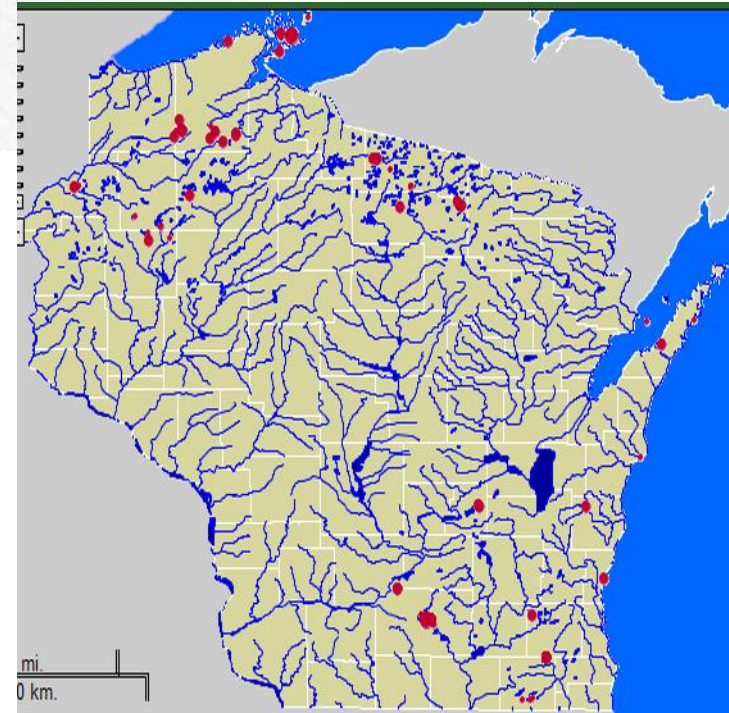
Coregonus artedii



- Silvery
- Adipose fin
- Axillary process

- Terminal mouth
- Elliptical cross section

illustrations © J.T. Sipiorski

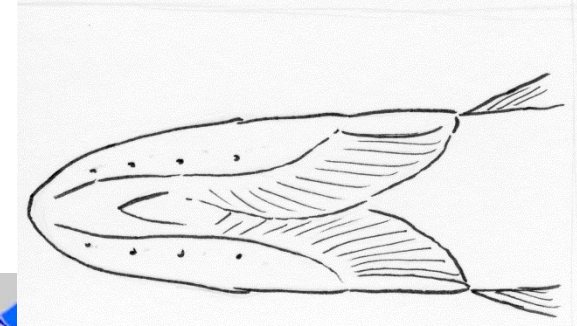
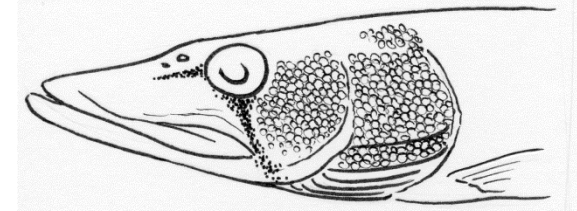
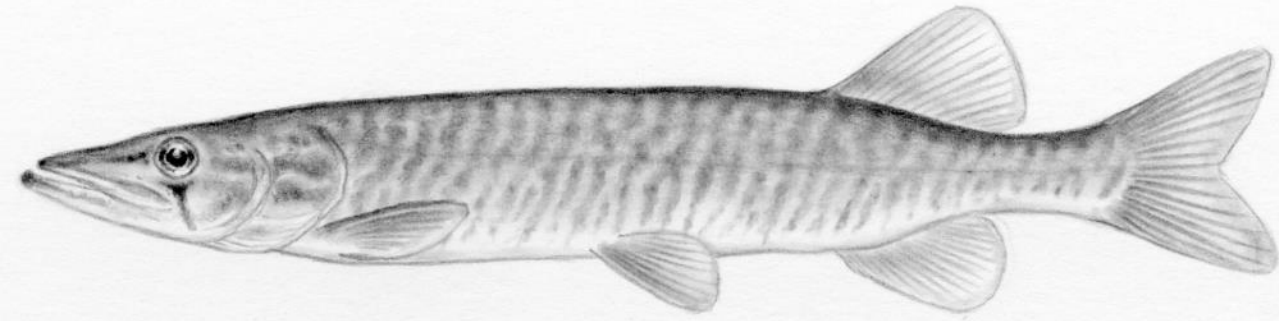


Smaller Predators (Fish and Invertebrates)

Family Esocidae

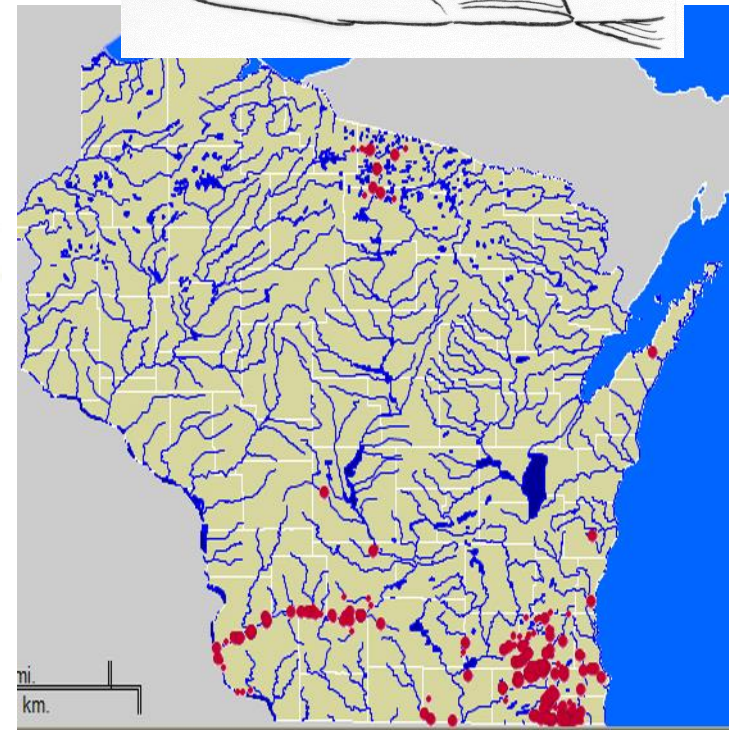
Grass Pickerel

Esox americanus vermiculatus



- Dorsal and anal fin far back on body
- Four jaw pores on each side
- Fully scaled cheek and operculum
- Dark vertical bars on light background
- Heavy tear mark
- MAX SIZE 15 INCHES

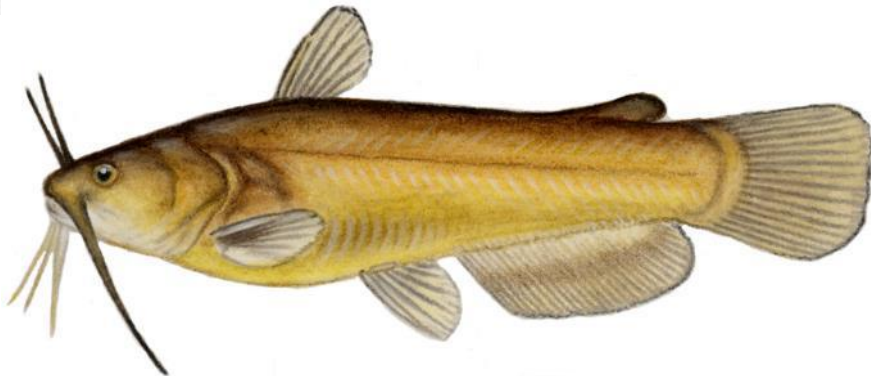
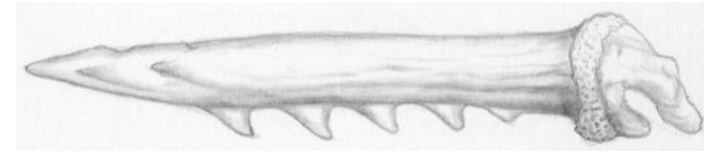
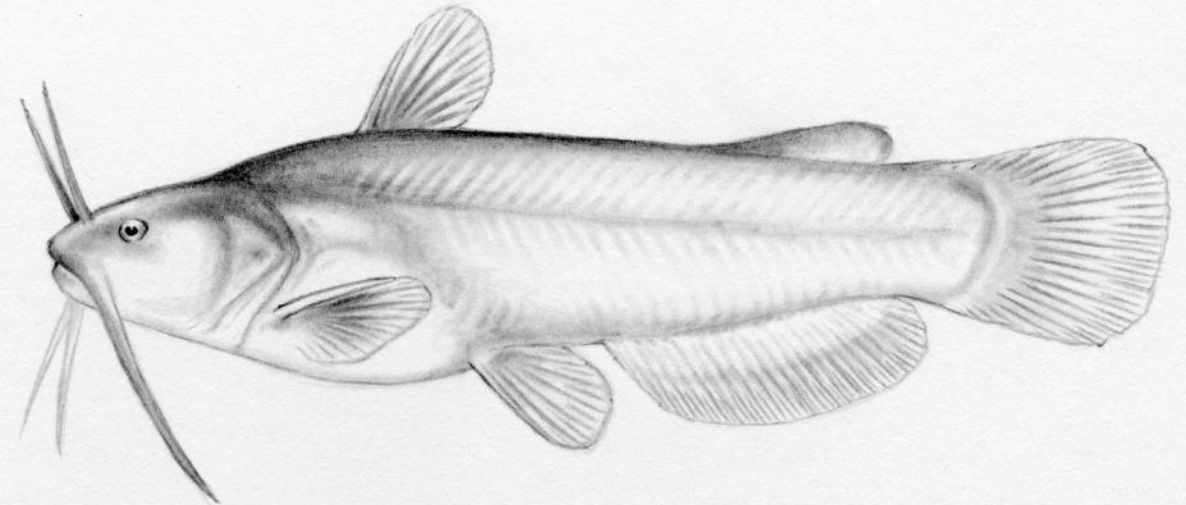
illustrations © J.T. Sipiorski



Family Ictaluridae

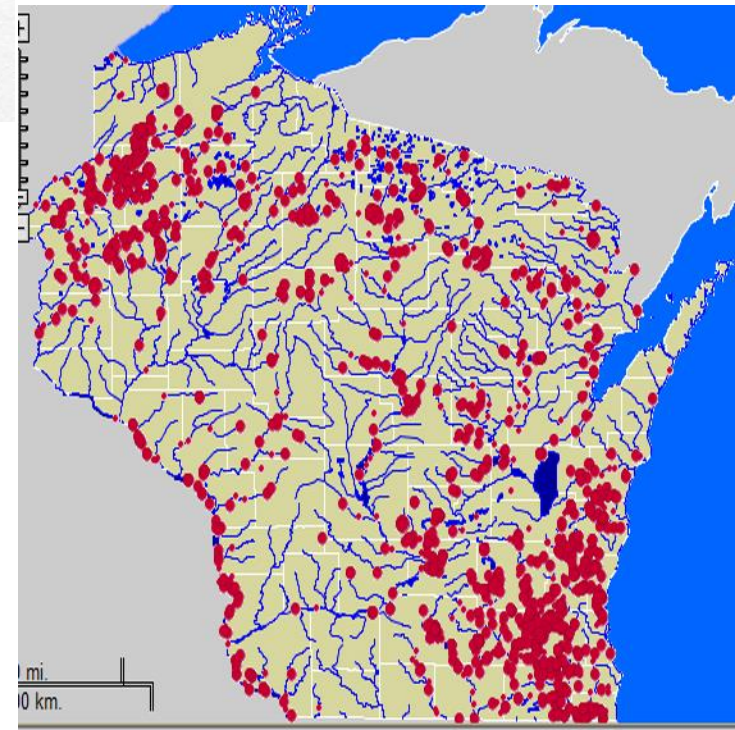
Yellow Bullhead

Ameiurus natalis



- Rounded caudal fin
- Light to dusky chin barbels
- Serrations on pectoral spines
- 24-27 anal fin rays
- 13-15 gill rakers

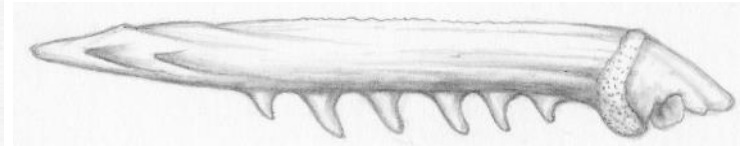
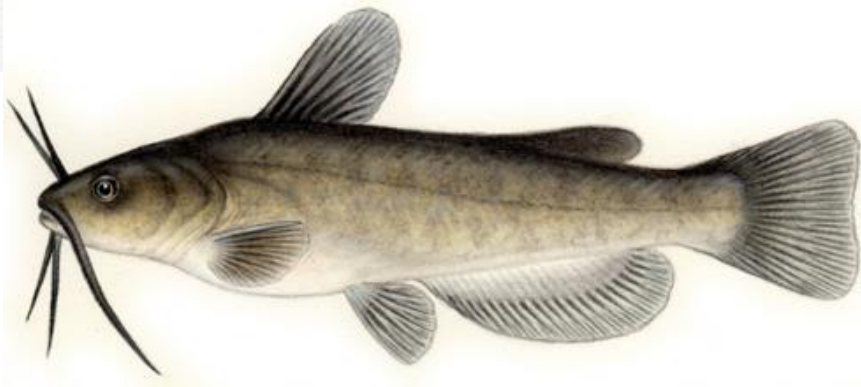
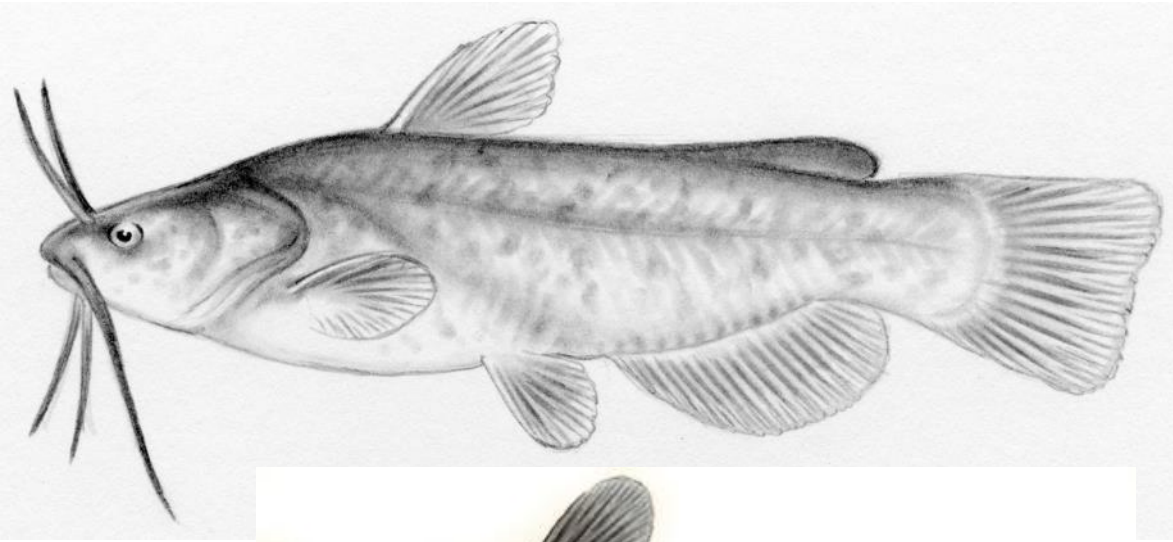
illustrations © J.T. Sipiorski



Family Ictaluridae

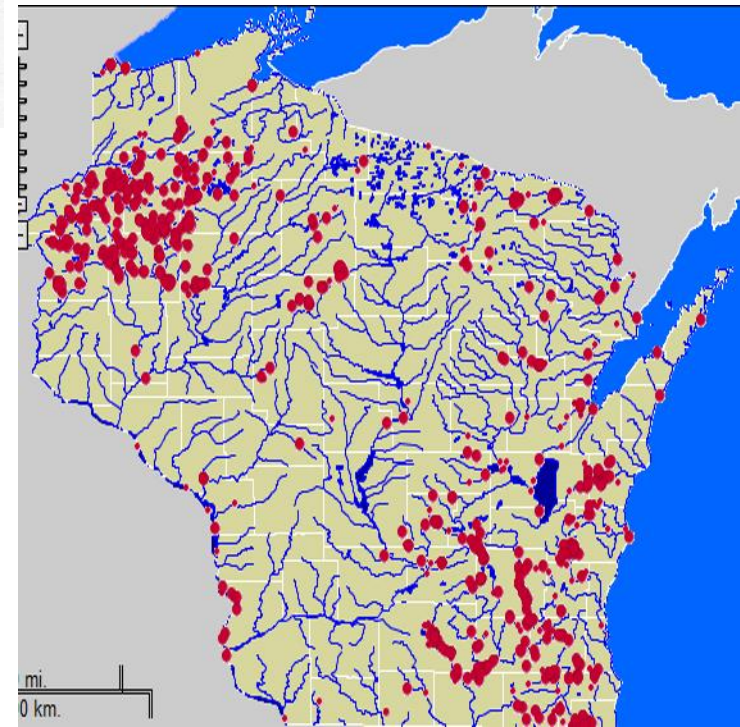
Brown Bullhead

Ameiurus nebulosus



- Emarginate caudal fin
- Dusky to black chin barbels
- Serrations on pectoral spines
- 19-23 anal fin rays
- 11-15 gill rakers

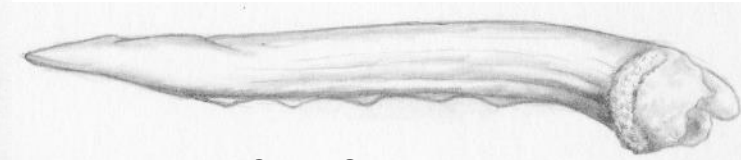
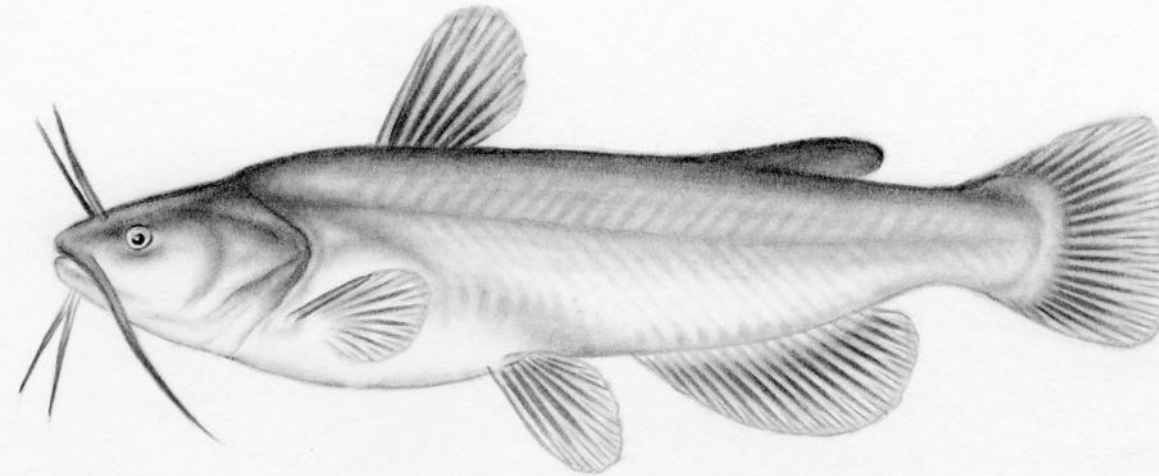
illustrations © J.T. Sipiorski



Family Ictaluridae

Black Bullhead

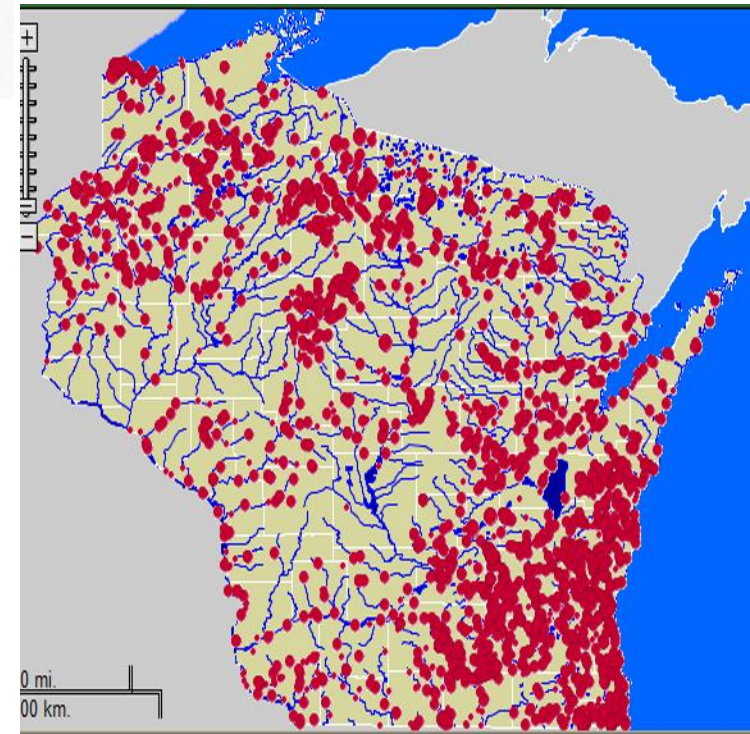
Ameiurus melas



illustrations © J.T. Sipiorski



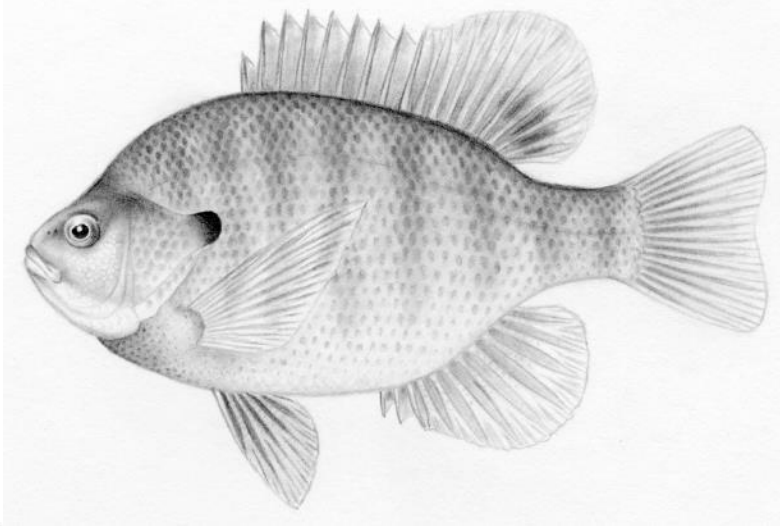
- Emarginate caudal fin
- Dusky to black chin barbels
- 19-23 anal fin rays
- 15-21 gill rakers
- Small to ABSENT serrations on pectoral spines



Family Centrarchidae

Bluegill

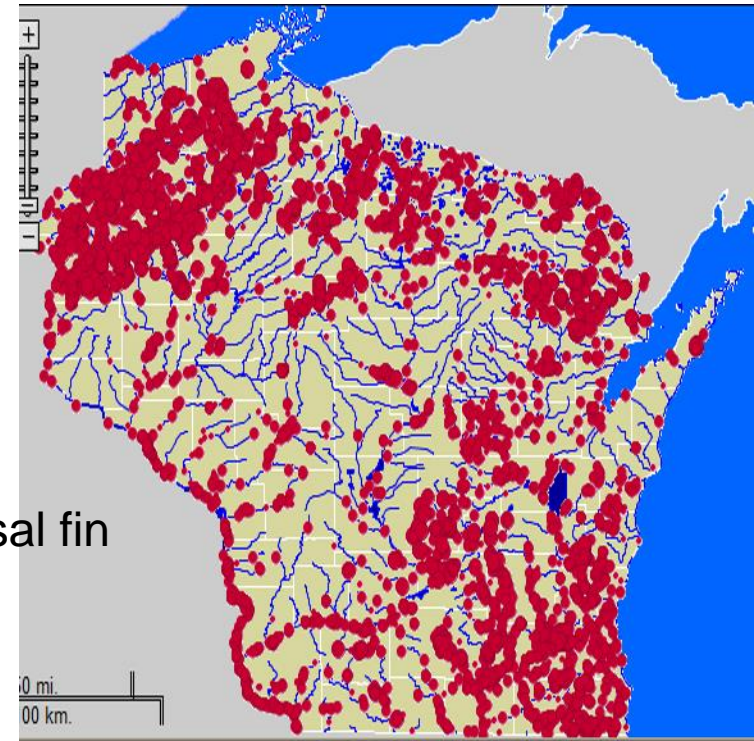
Lepomis macrochirus



- 10 Dorsal spines
- 3 Anal spines
- All dark “ear flap”
- 38-48 Lateral scales

- Dark spot on rear dorsal fin
- Pale blue margin on operculum

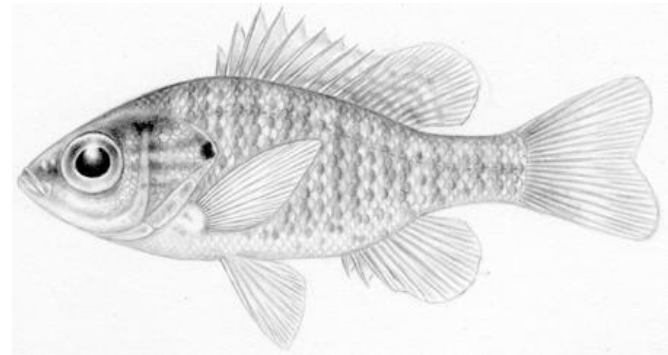
illustrations © J.T. Sipiorski



Family Centrarchidae

Pumpkinseed

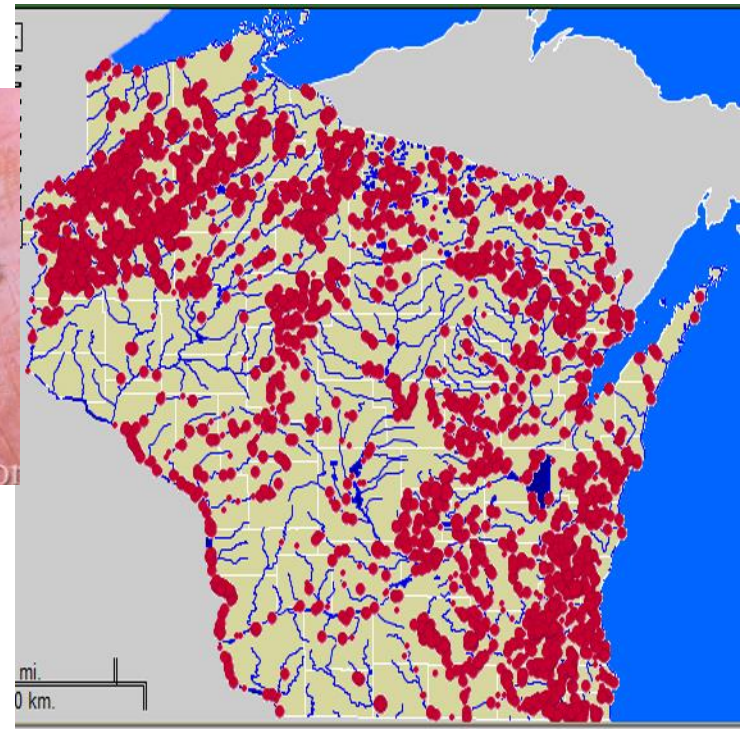
Lepomis gibbosus



John Lyon

- 10 Dorsal spines
- 3 Anal spines
- “Ear flap” dark center with red spot tip
- 35-47 Lateral scales
- Rear dorsal fin blotchy
- Facial stripes

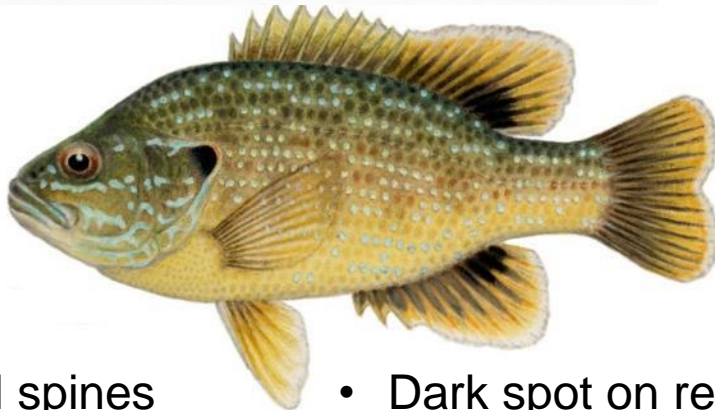
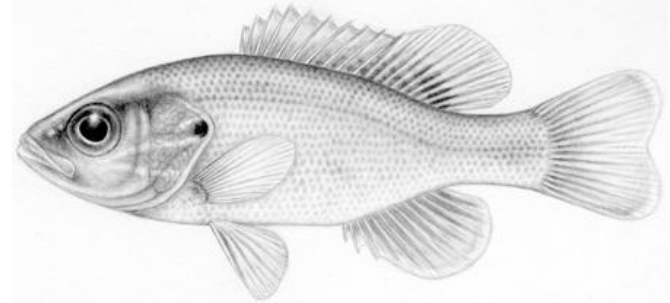
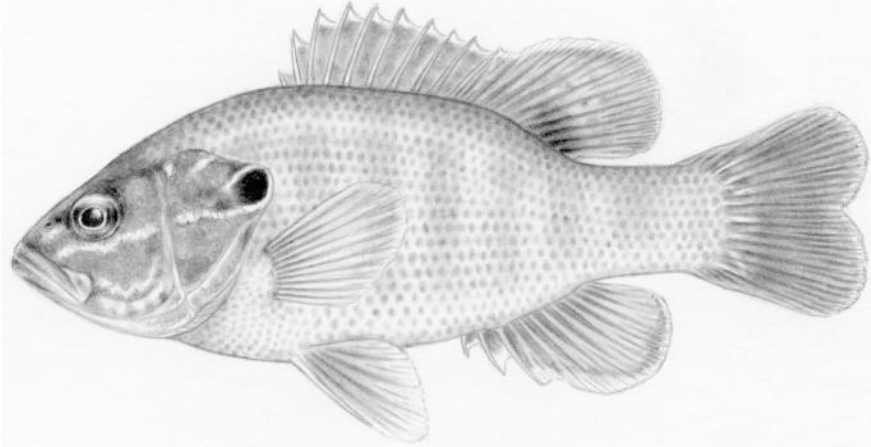
illustrations © J.T. Sipiorski



Family Centrarchidae

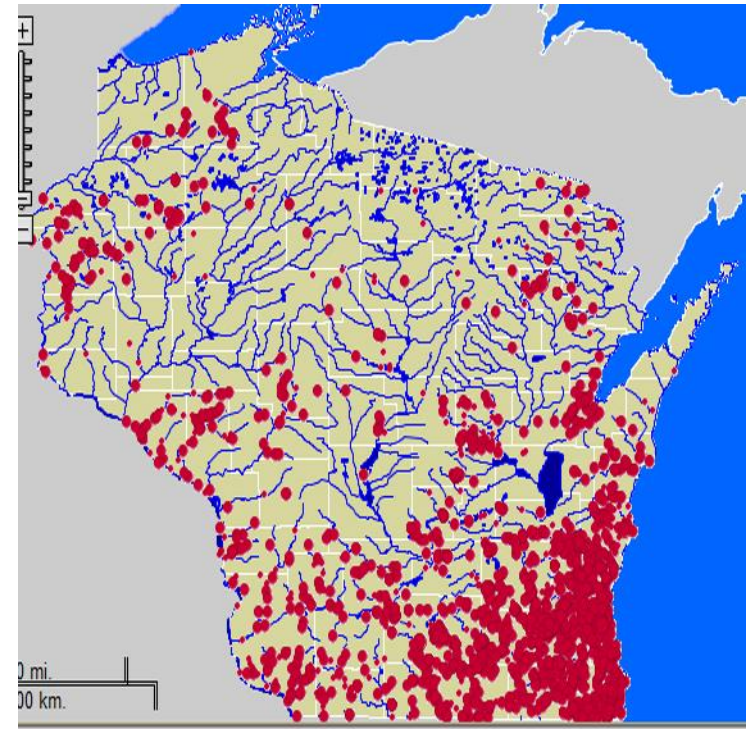
Green Sunfish

Lepomis cyanellus



- 10 Dorsal spines
- 3 Anal spines
- Dark “ear flap” with light fringe (white to orange)
- 41-53 Lateral scales
- Dark spot on rear dorsal fin (sometimes rear anal too)
- Corner of mouth below pupil

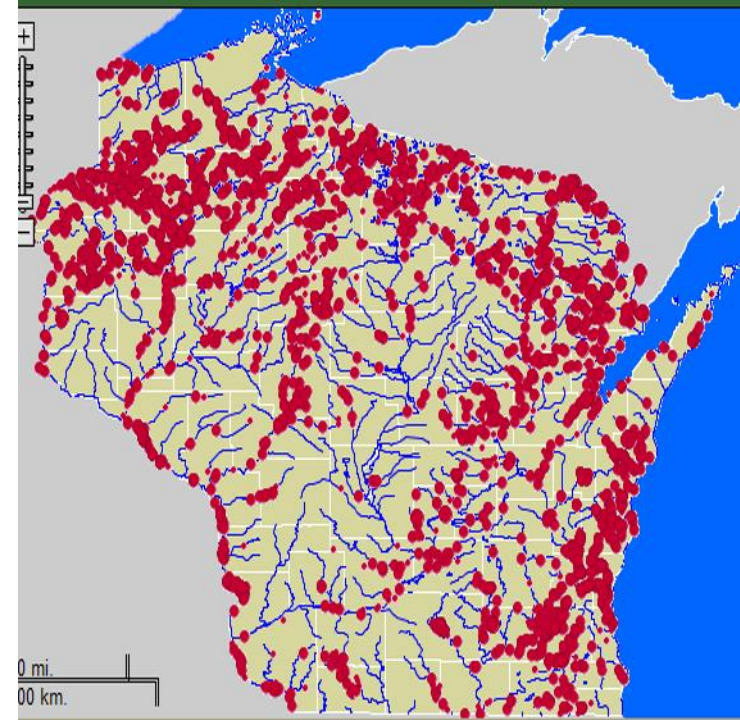
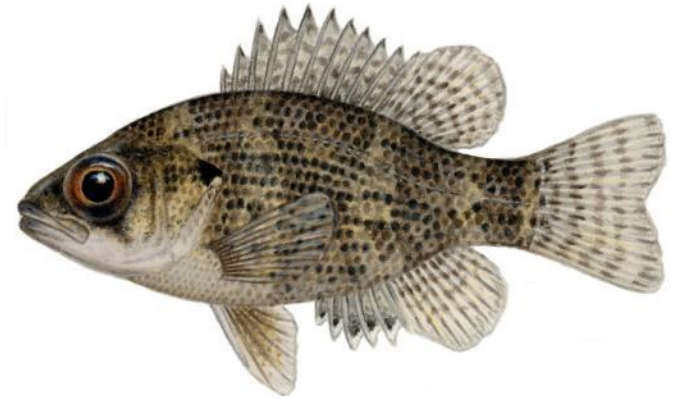
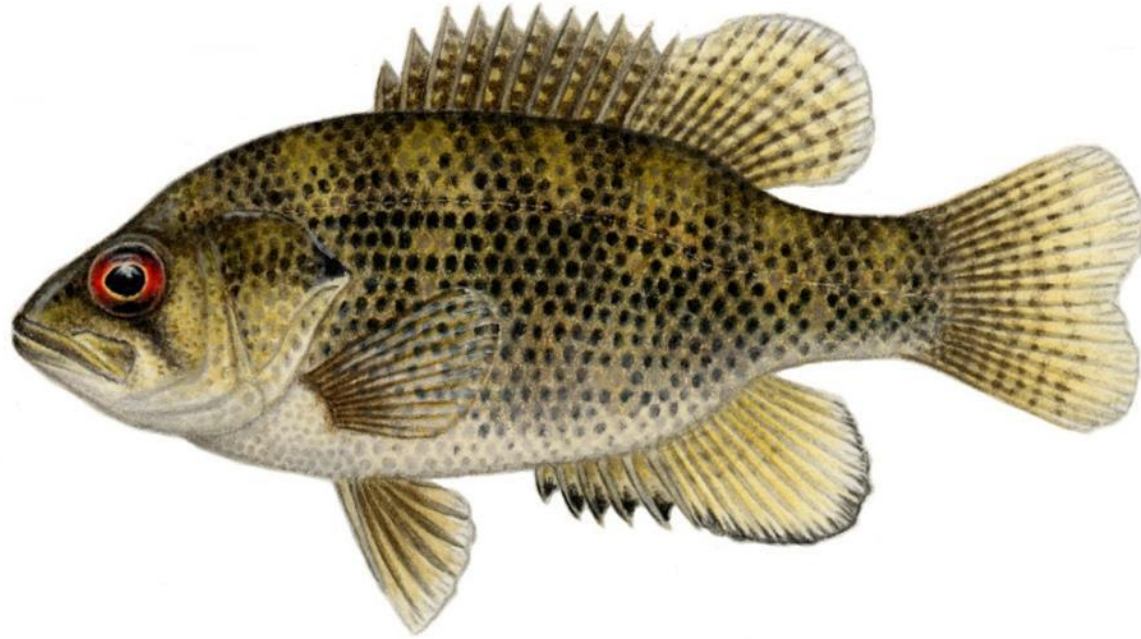
illustrations © J.T. Sipiorski



Family Centrarchidae

Rock Bass

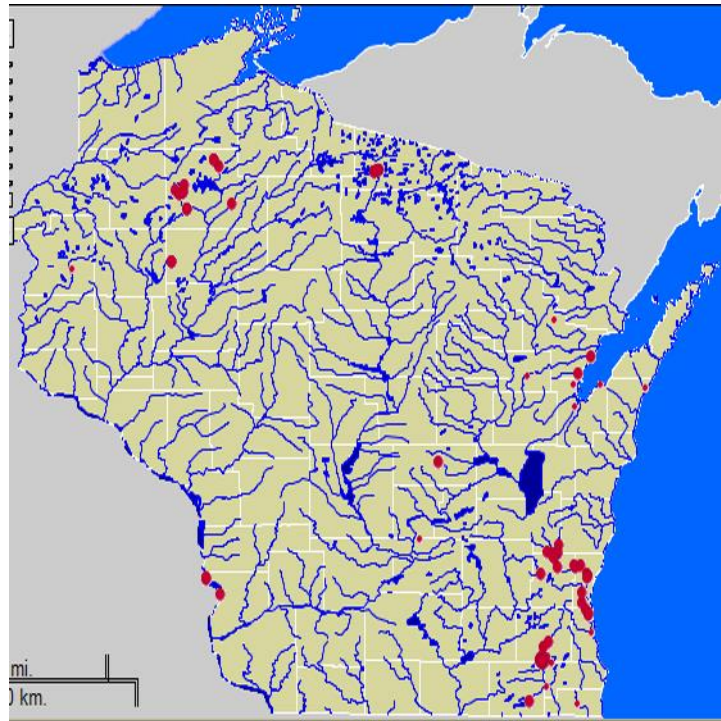
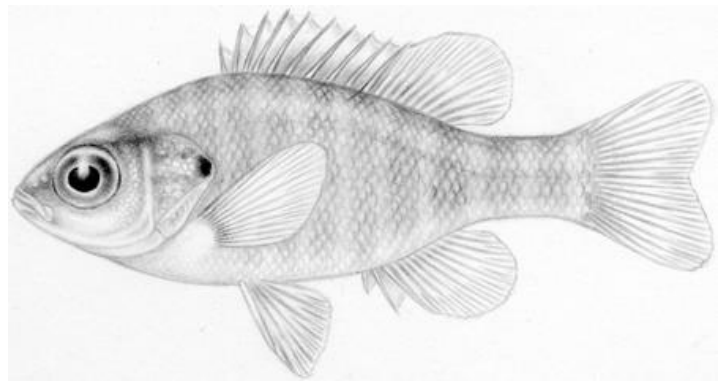
Ambloplites rupestris



Family Centrarchidae

Northern Sunfish

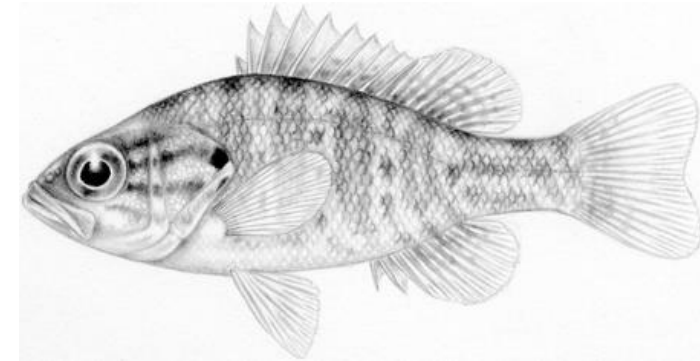
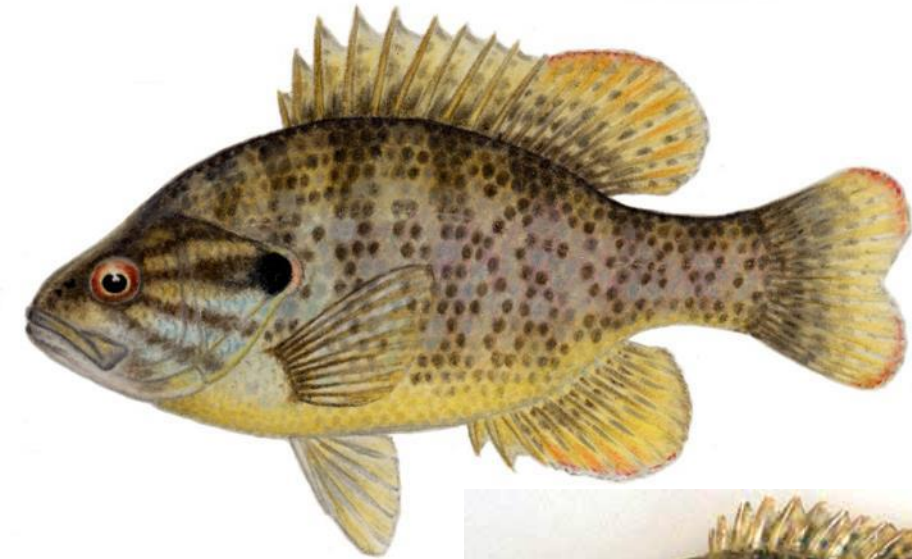
Lepomis peltastes



Family Centrarchidae

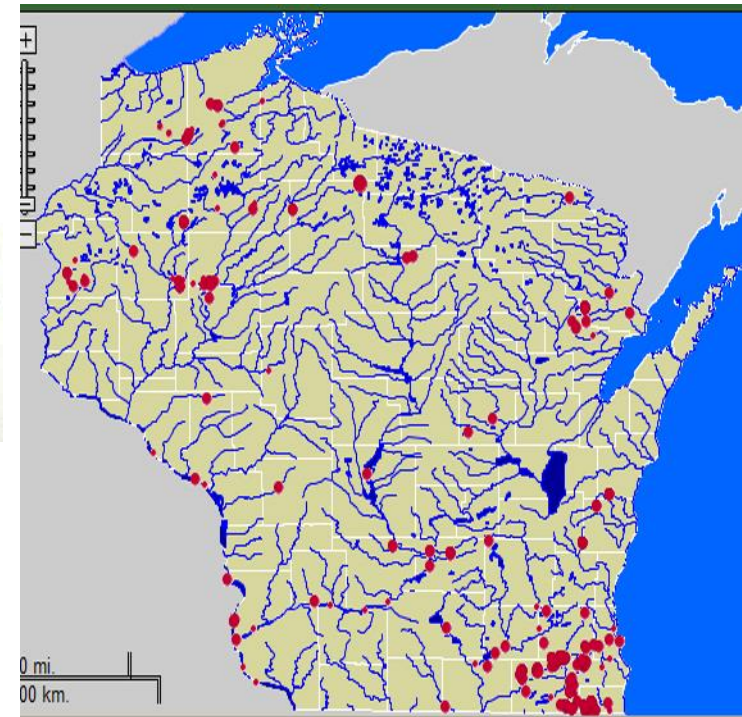
Warmouth

Lepomis gulosus



- 10 Dorsal spines
- 3 Anal spines
- Dark “ear flap” with light fringe (white to orange)
- 36-44 Lateral scales
- Chainlike bars interrupted into blotches
- Corner of mouth below pupil

illustrations © J.T. Sipiorski



Family Percidae

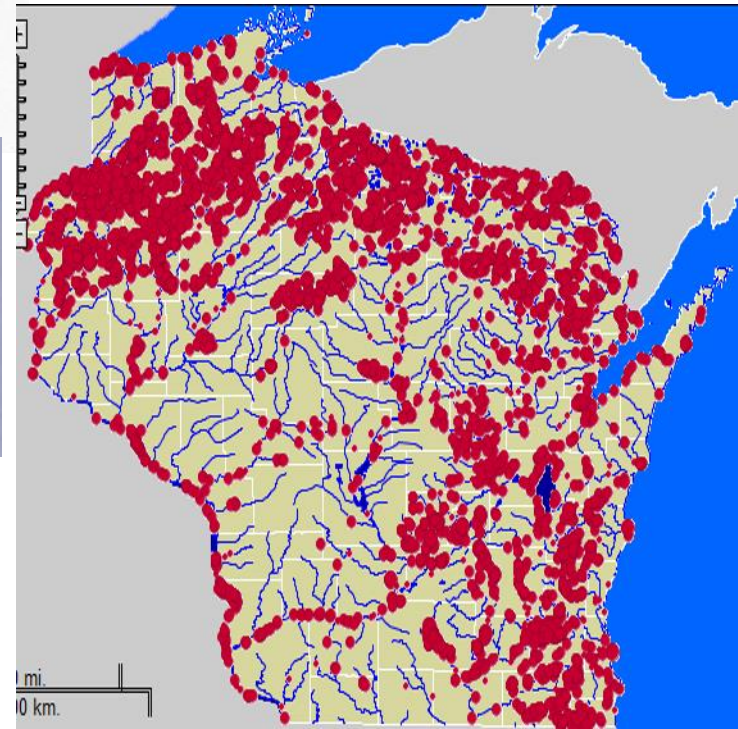
Yellow Perch

Perca flavescens



- Two dorsal fins
- 6-9 dark vertical bars on flank
- Orange tinge to ventral fins

illustrations © J.T. Sipiorski

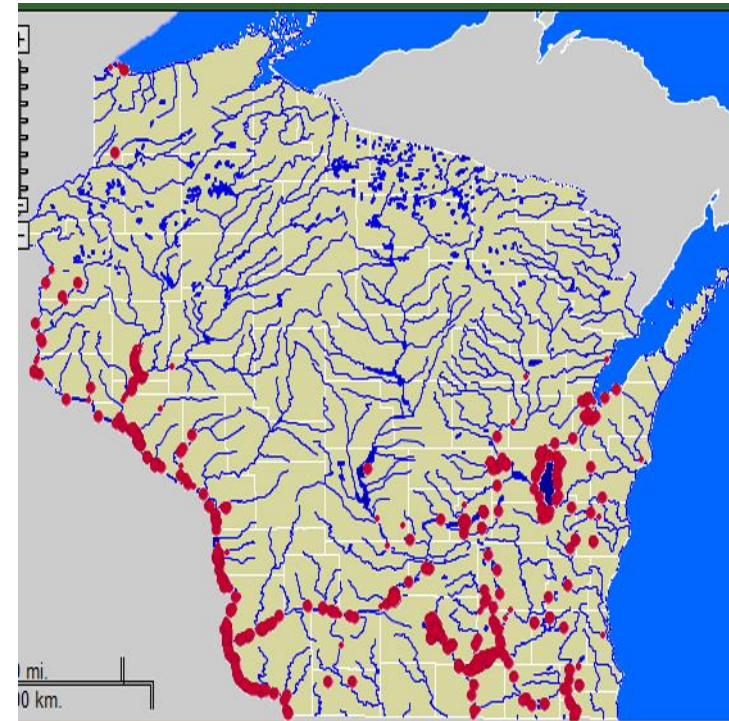
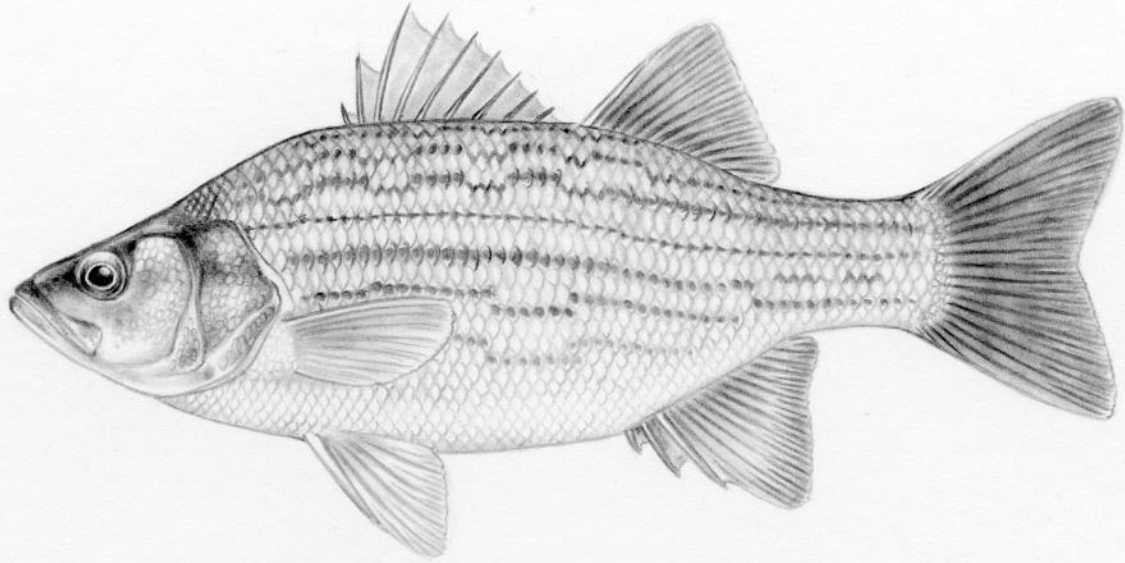


Mid-sized Predators (Mainly Fish Eaters)

Family Moronidae

White Bass

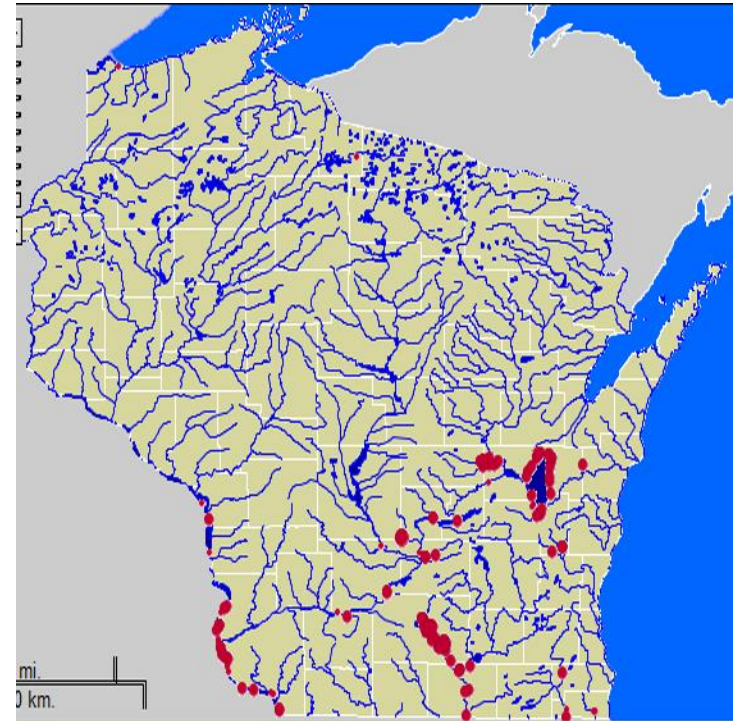
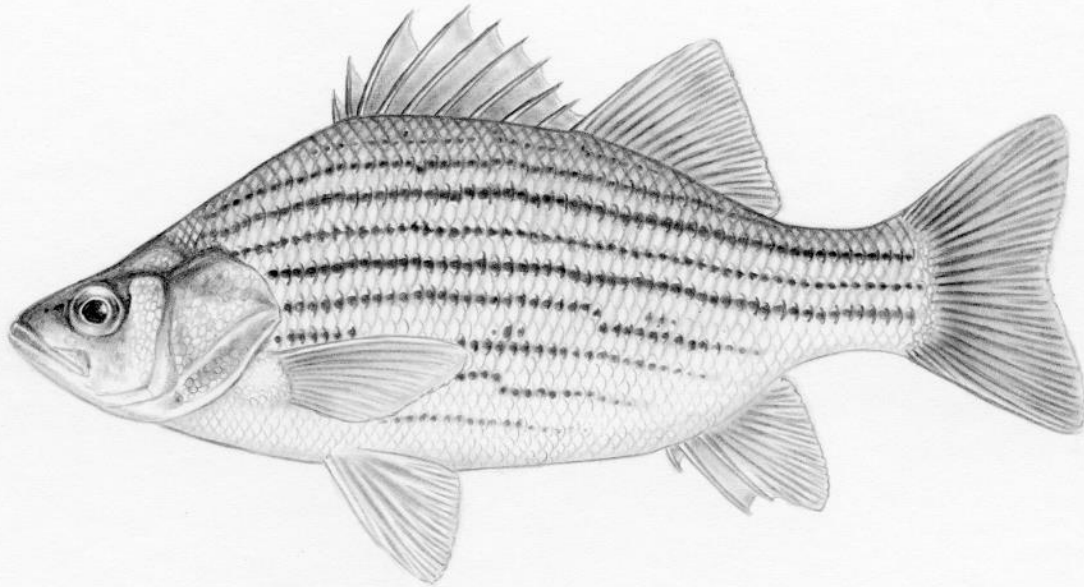
Morone chrysops



Family Moronidae

Yellow Bass

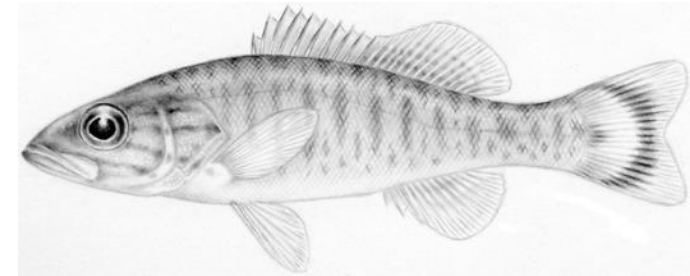
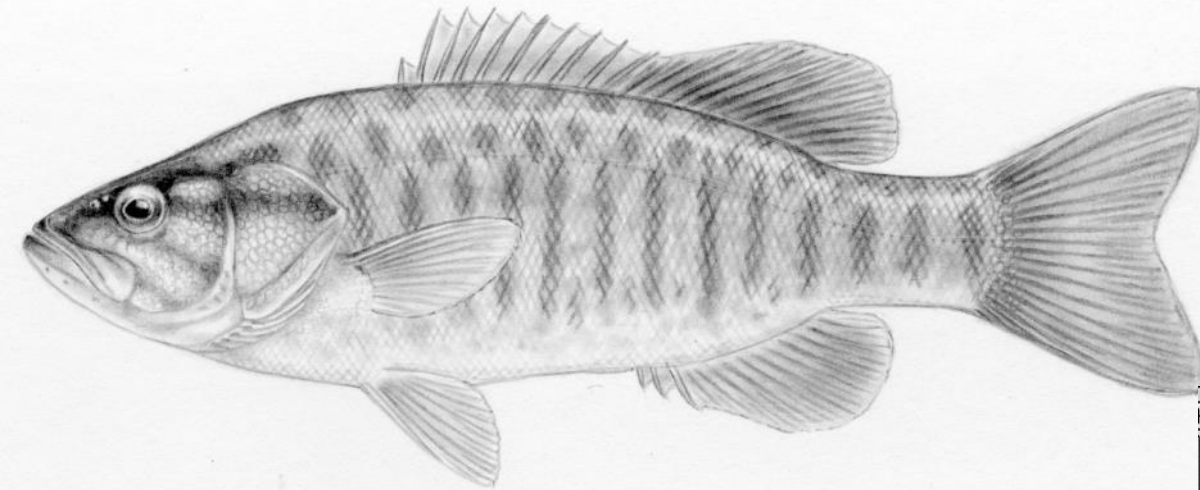
Morone mississippiensis



Family Centrarchidae

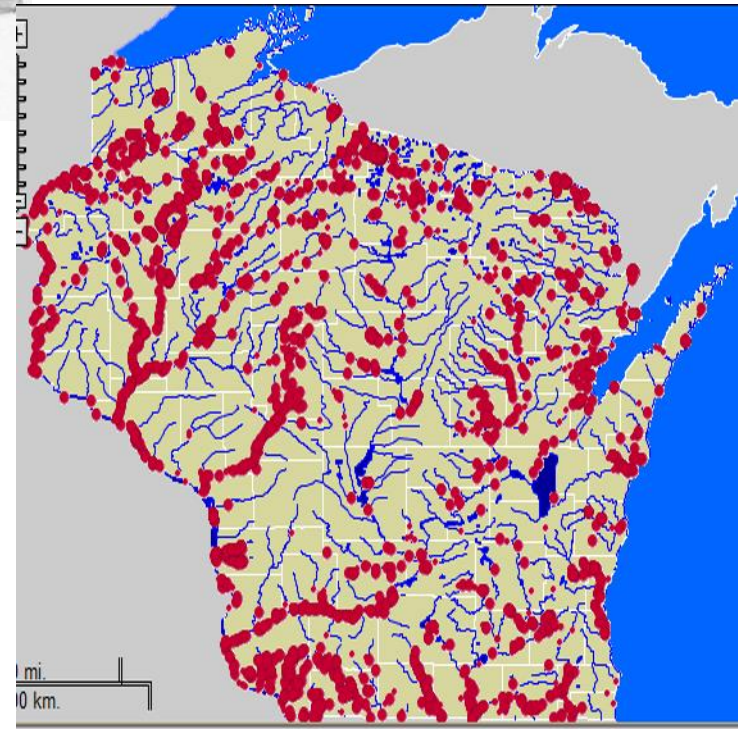
Smallmouth Bass

Micropterus dolomieu



- 10 Dorsal spines
- 3 Anal spines
- Corner of mouth beneath pupil

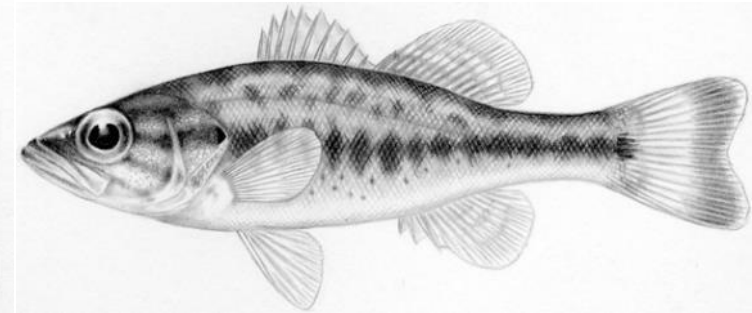
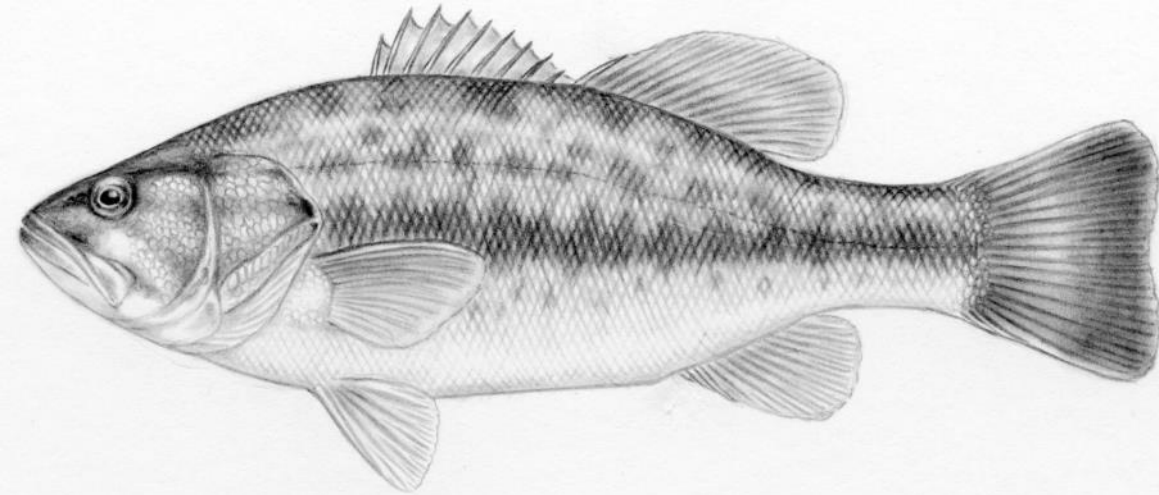
- Broad connection between dorsal fins
 - Brownish with vertical bars
- illustrations © J.T. Sipiorski



Family Centrarchidae

Largemouth Bass

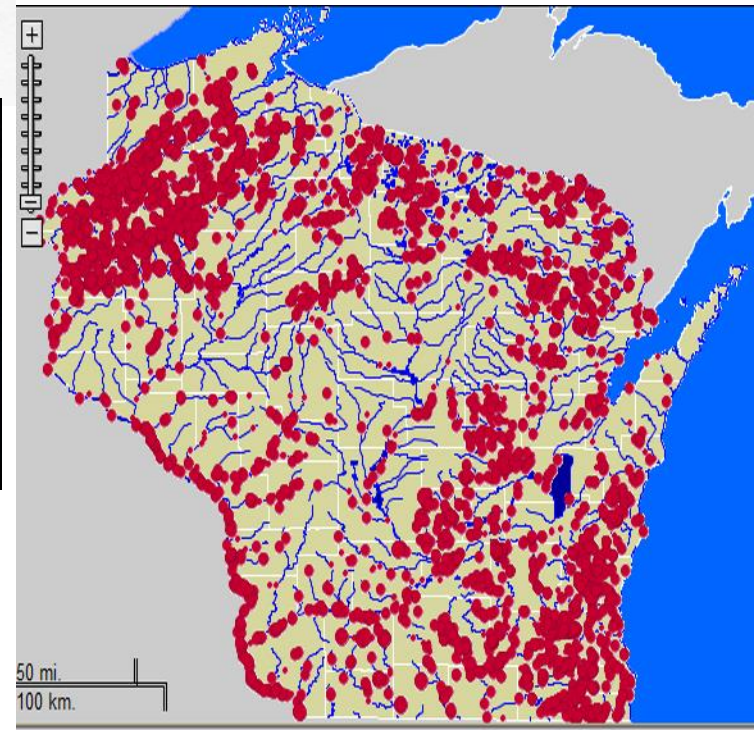
Micropterus salmoides



illustrations © J.T. Sipiorski



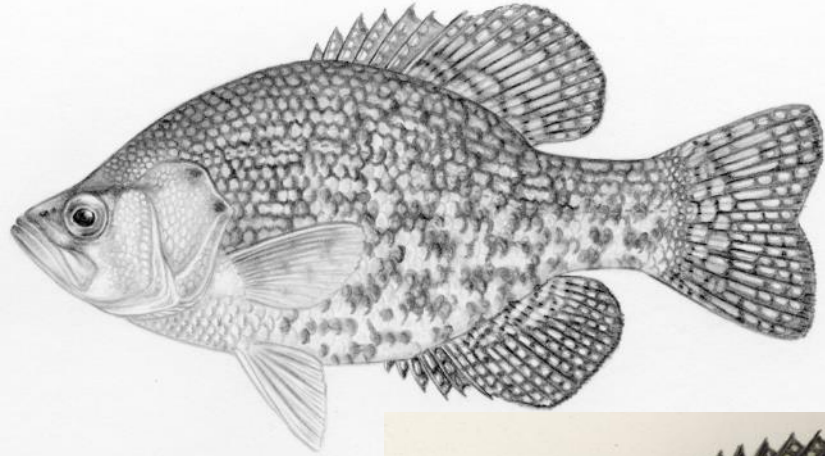
- 10 Dorsal spines
- 3 Anal spines
- Corner of mouth at back of eye
- Minimal connection between dorsal fins
- Greenish with blotchy lateral stripe



Family Centrarchidae

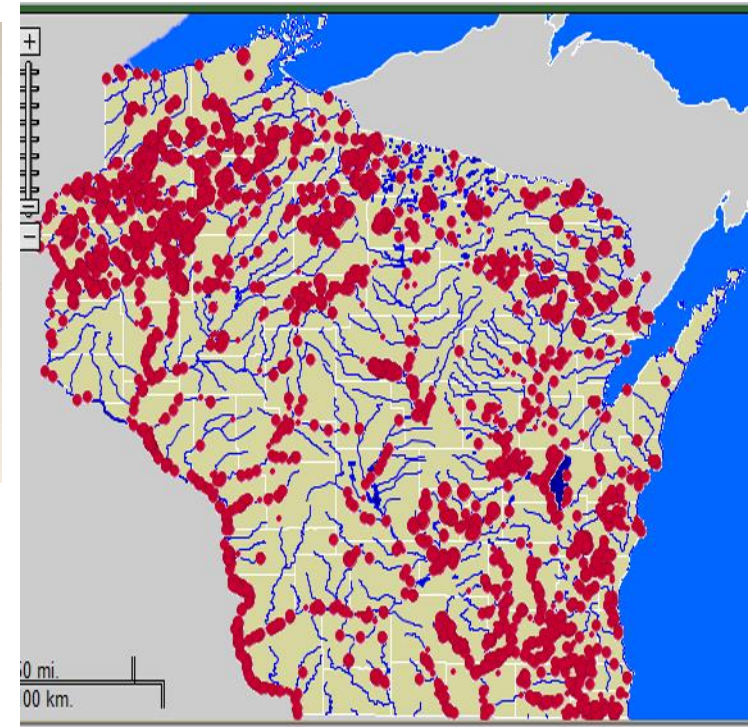
Black Crappie

Pomoxis nigromaculatus



- 7-9 Dorsal spines
- 6 Anal spines
- Forehead same length as dorsal fin base
- Speckled
- Iridescent sheen

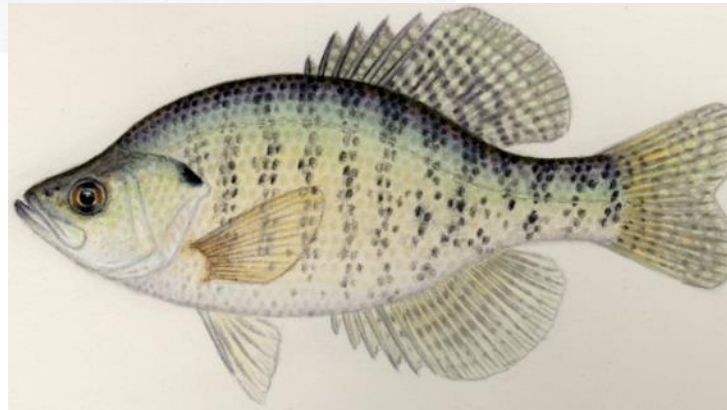
illustrations © J.T. Sipiorski



Family Centrarchidae

White Crappie

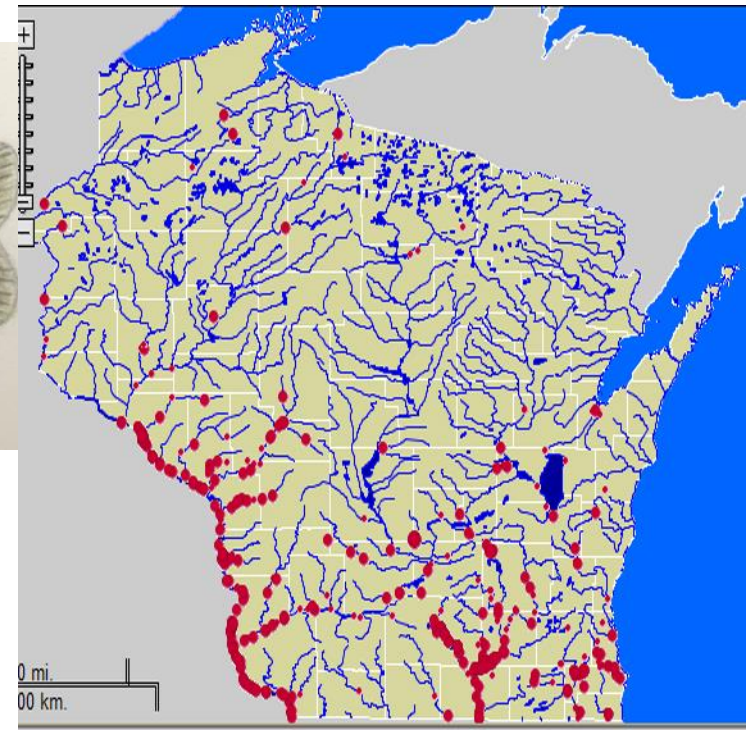
Pomoxis annularis



- 6 Dorsal spines
- 6 Anal spines
- Forehead longer than dorsal fin base

- Often striped
- Iridescent sheen

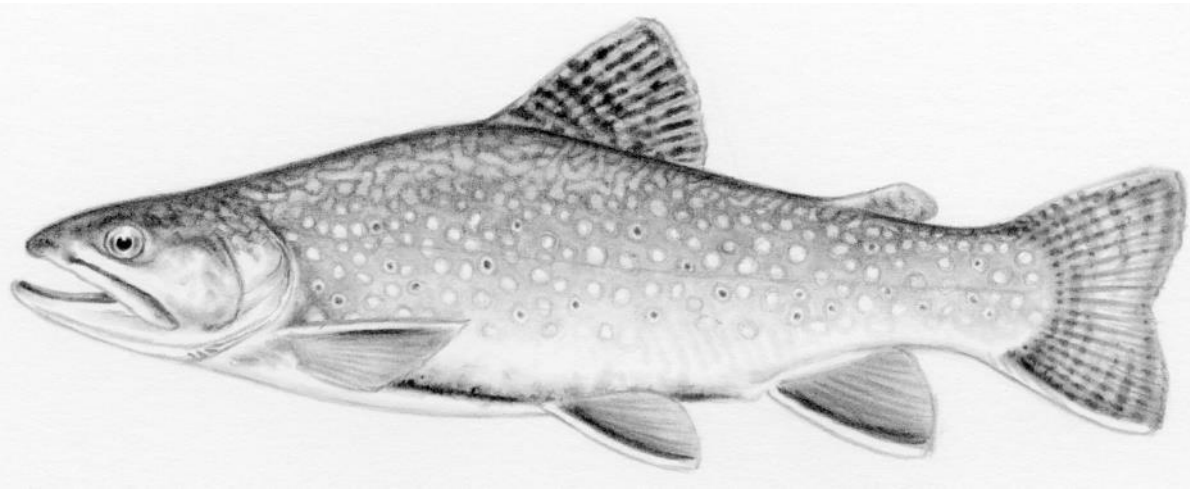
illustrations © J.T. Sipiorski



Family Salmonidae

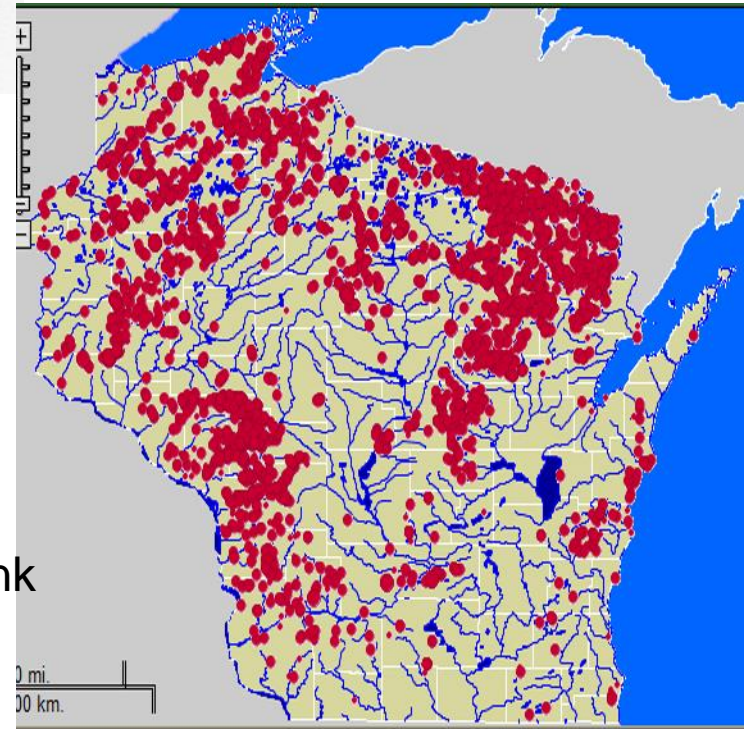
Brook Trout

Salvelinus fontinalis



- Adipose fin
- Axillary process
- Vermiform marks on back
- Light spots on dark background on flank
- Often reddish lower flank

illustrations © J.T. Sipiorski

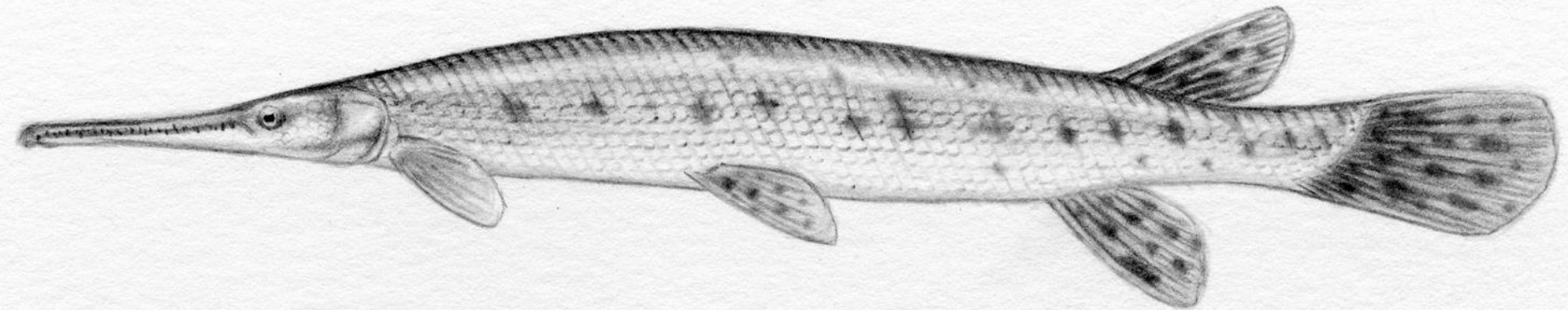


Largest Predatory Fishes (Eat Mainly Fishes)

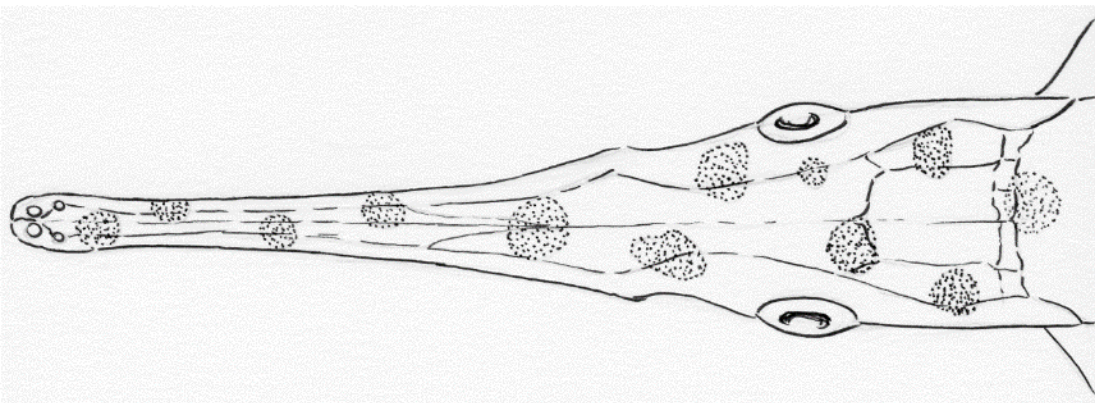
Family Lepisosteidae

Longnose Gar

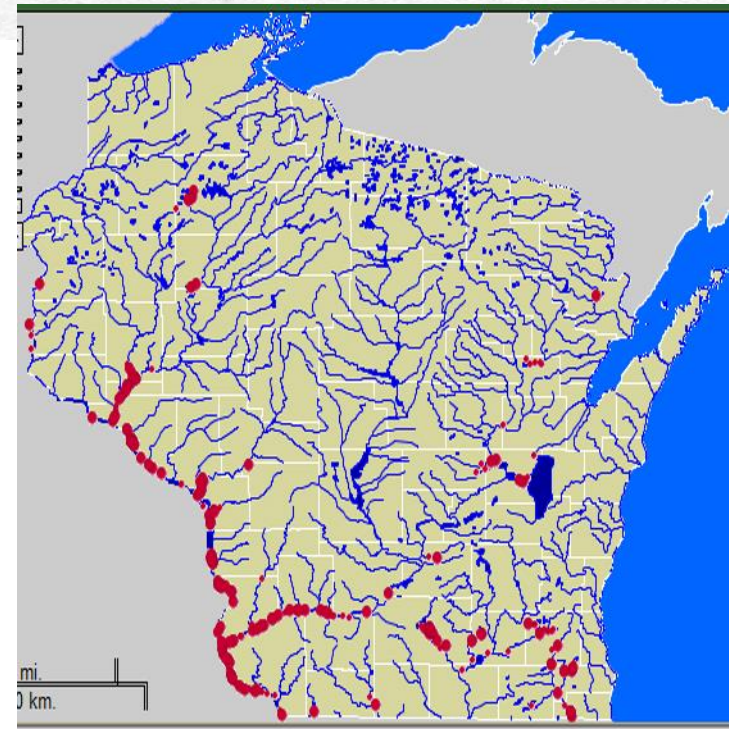
Lepisosteus osseus



- Elongate, pointed snout
- Ganoid scales
- Some with heavy pigmentation



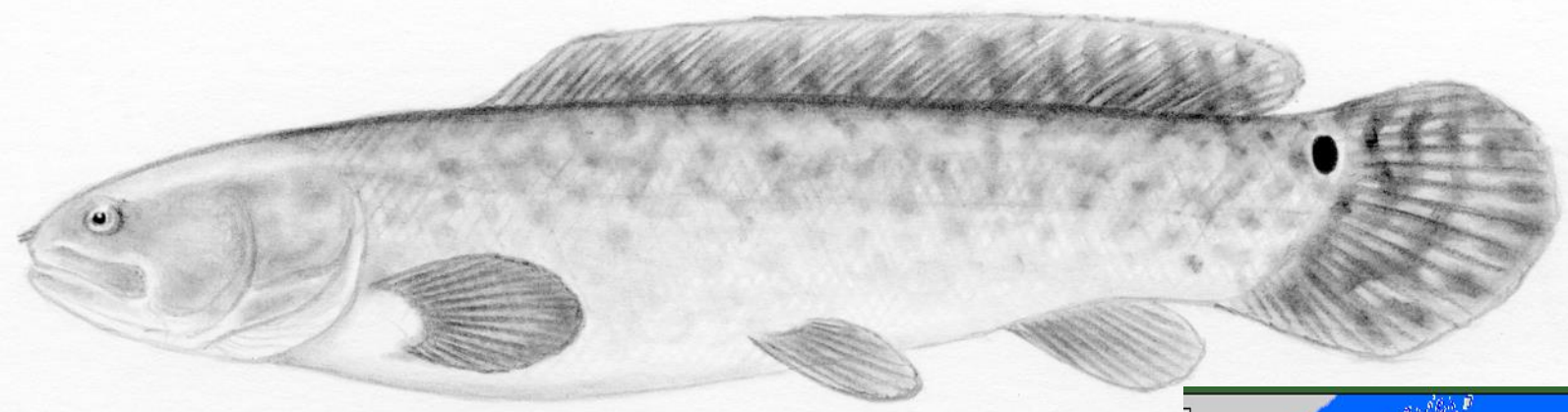
illustrations © J.T. Sipiorski



Family Amiidae

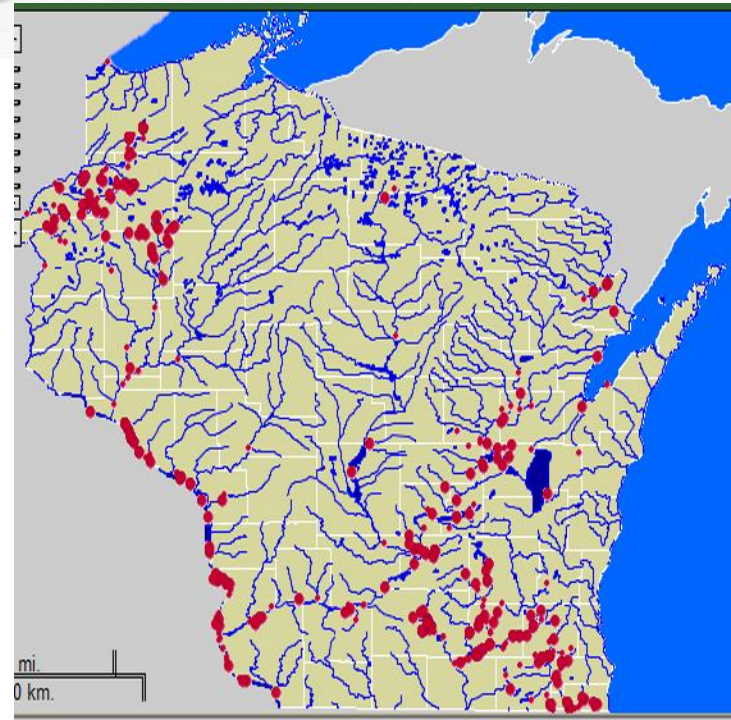
Bowfin

Amia calva



- Elongate dorsal fin
- Ocellus (eye-spot)

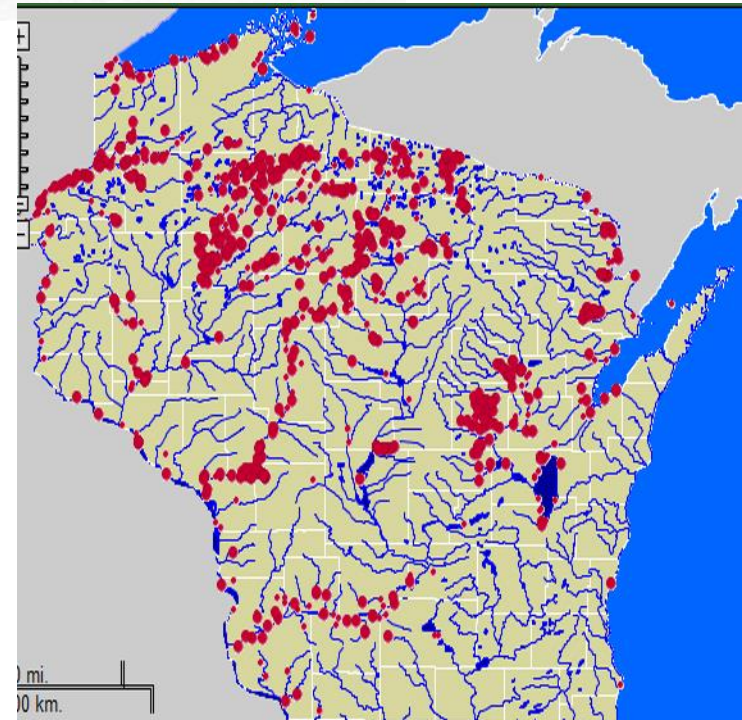
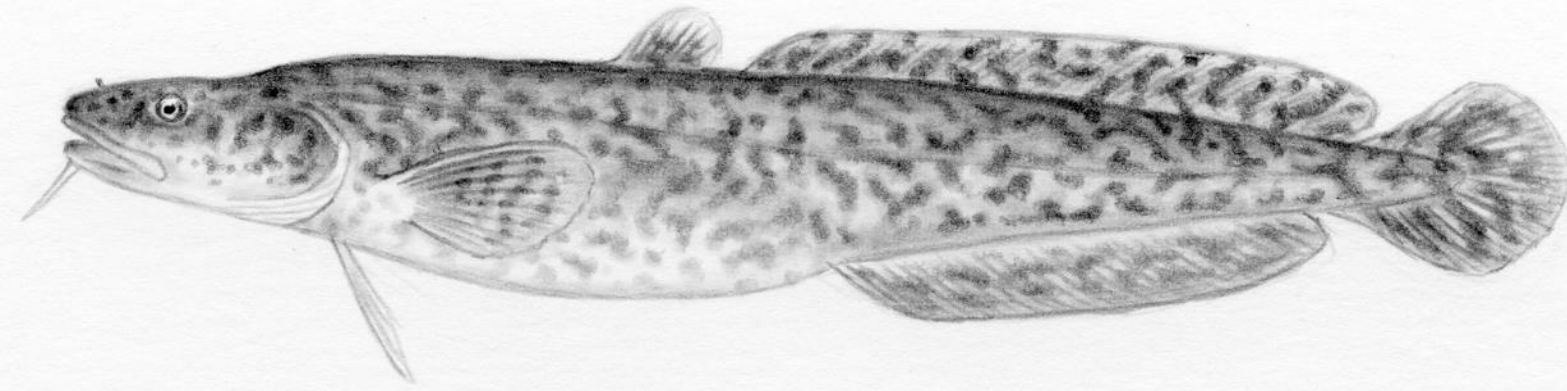
- Abbreviate heterocercal caudal fin



Family Gadidae

Burbot

Lota lota



Family Sciaenidae
Freshwater Drum
Aplodinotus grunniens

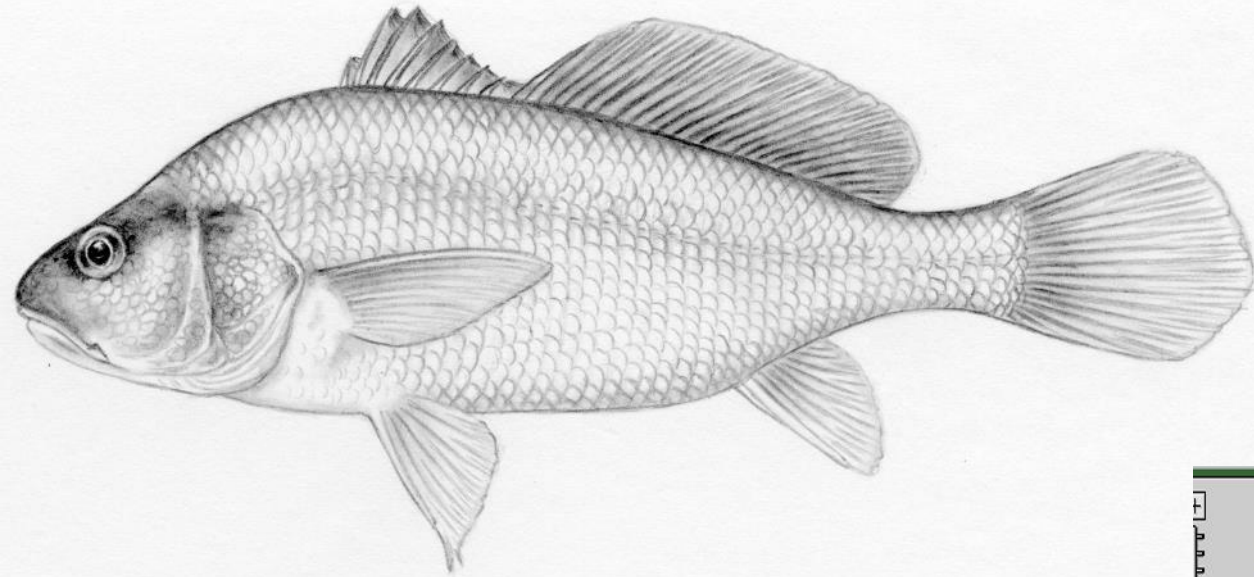
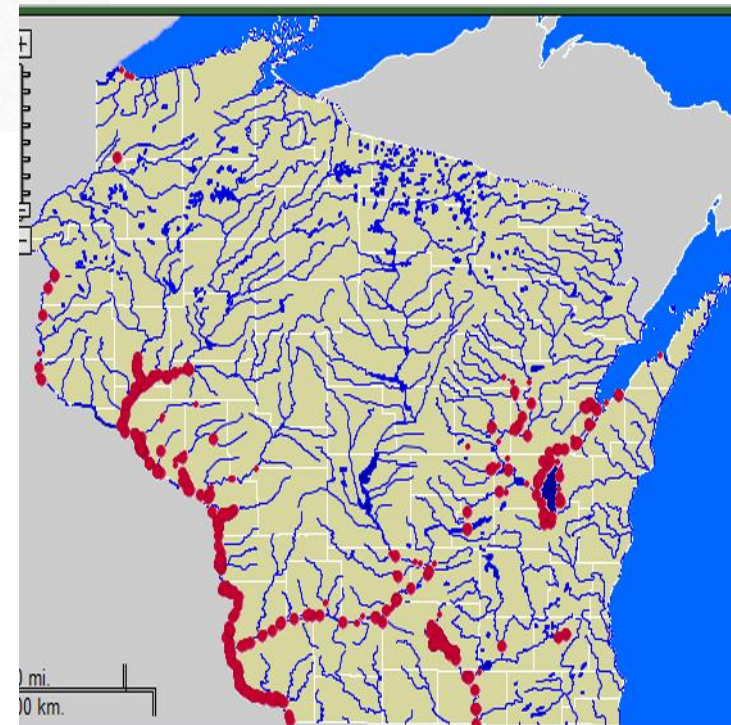


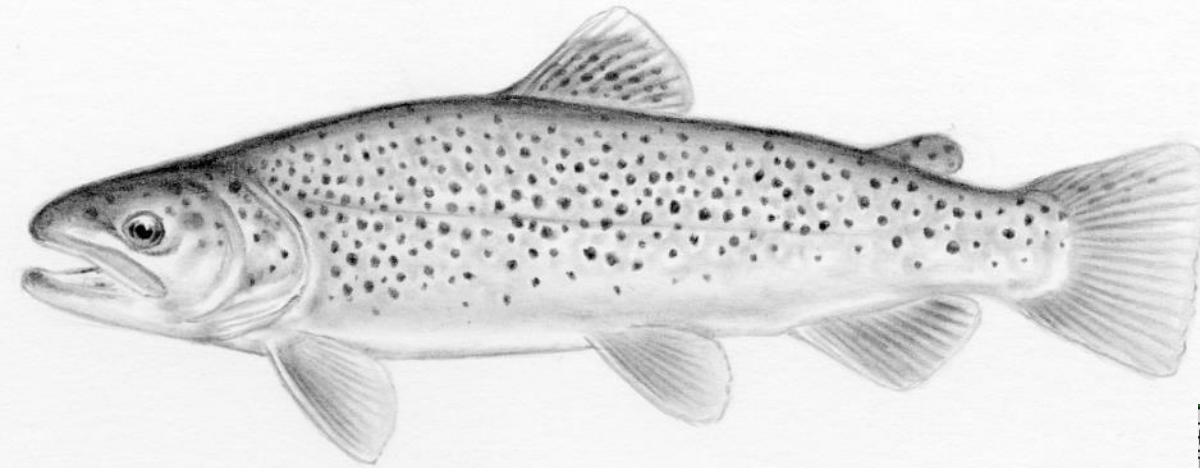
IMAGE HOSTED BY
GALLERY.NANFA.ORG



Family Salmonidae

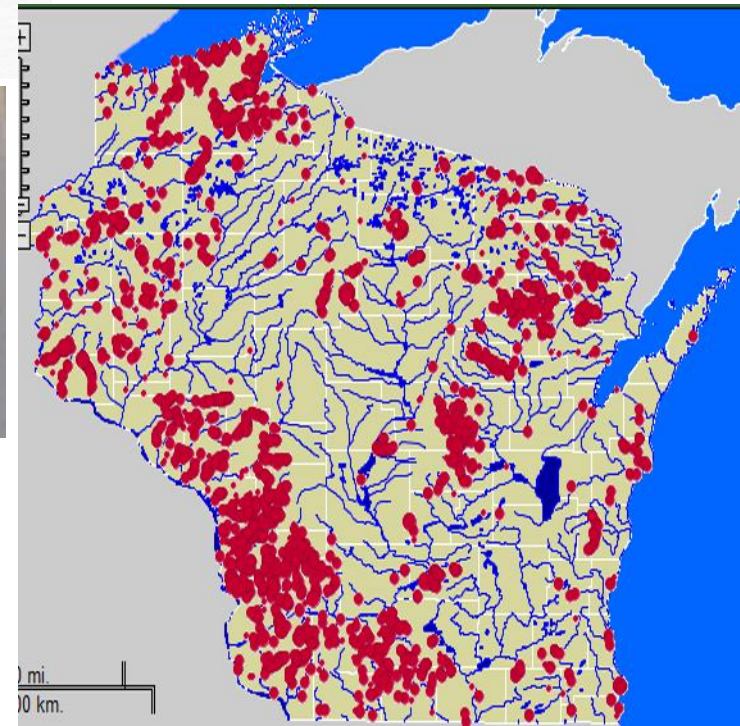
Brown Trout

Salmo trutta



- Adipose fin
- Axillary process
- Large dark spots on light background on flank
- Few spots if any on caudal fin
- Tan to yellow flank

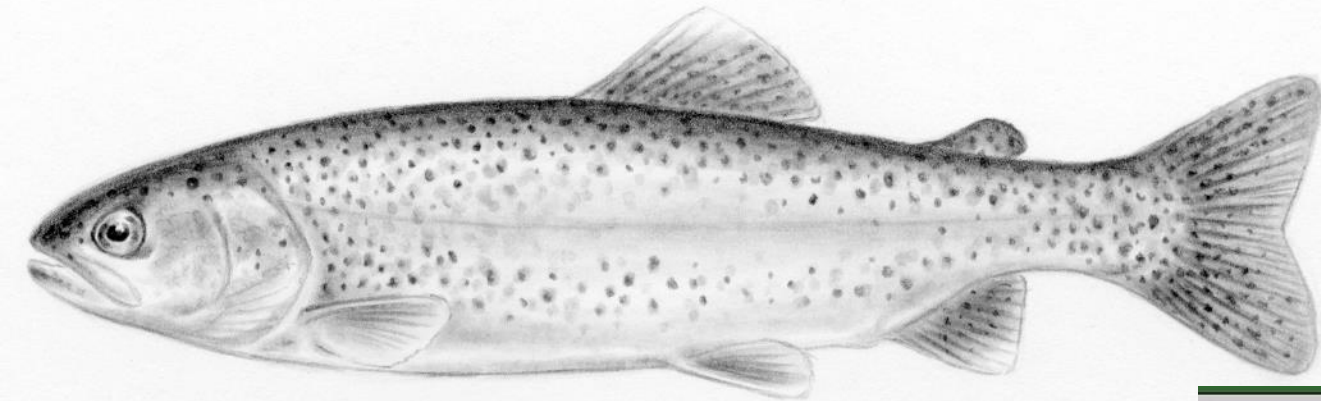
illustrations © J.T. Sipiorski



Family Salmonidae

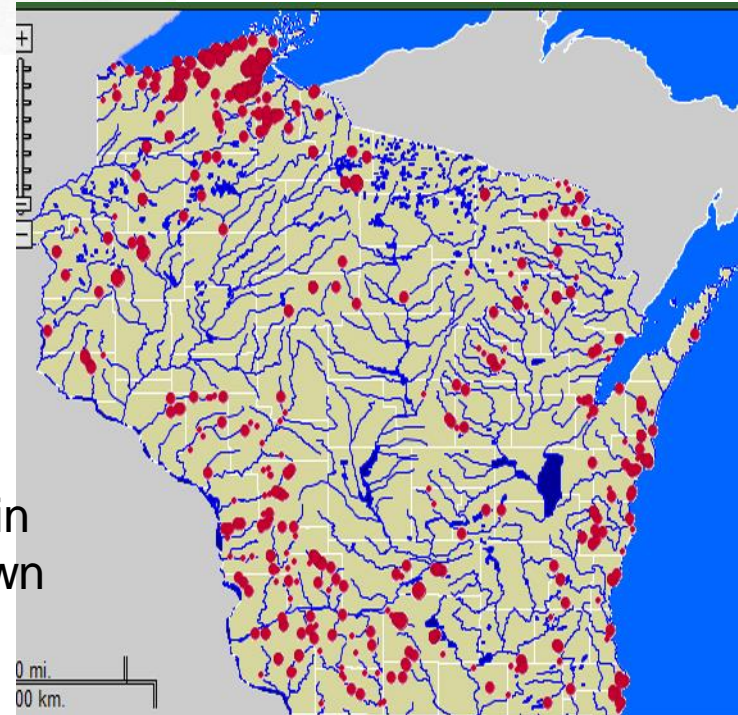
Rainbow Trout

Oncorhynchus mykiss



- Adipose fin
- Axillary process
- Many, small dark spots on light background on flank
- Many spots on caudal fin
- Pinkish lateral band down side

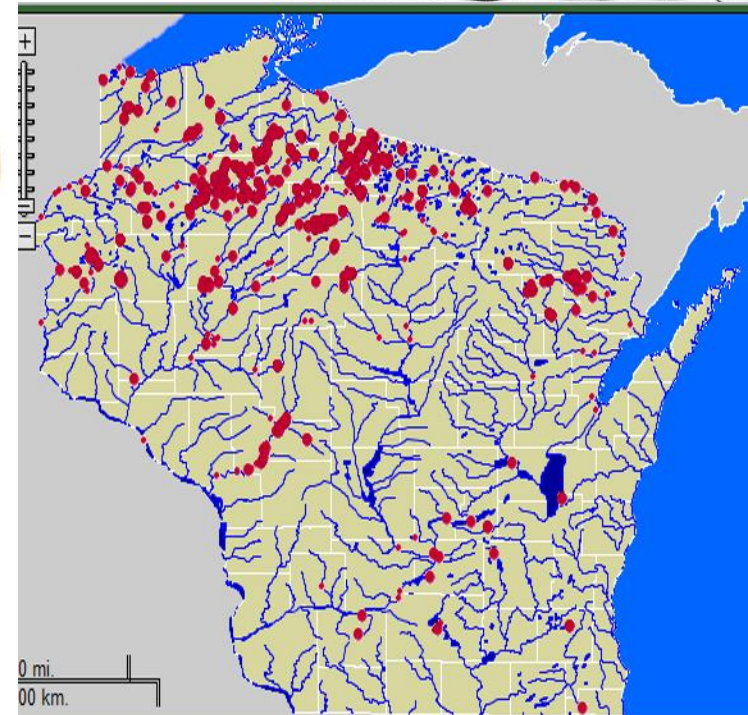
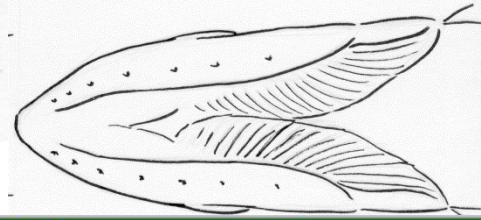
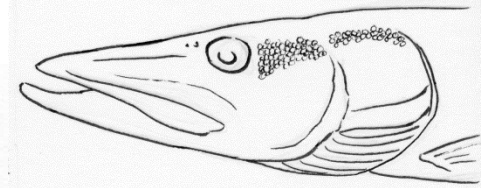
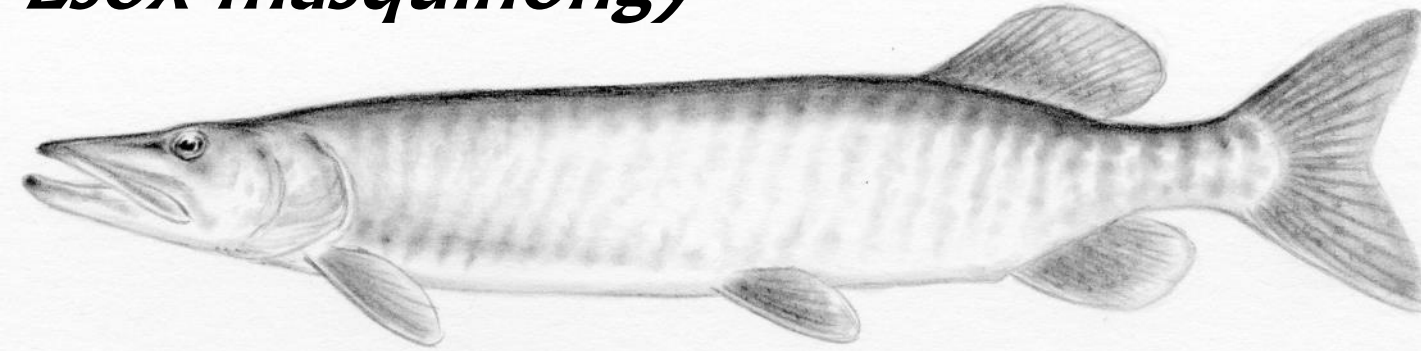
illustrations © J.T. Sipiorski



Family Esocidae

Muskellunge

Esox masquinongy



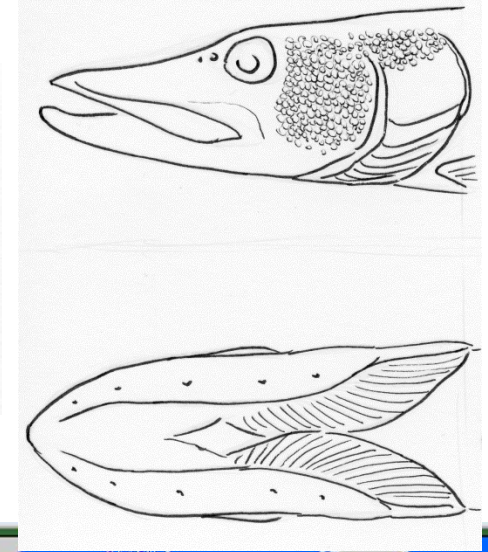
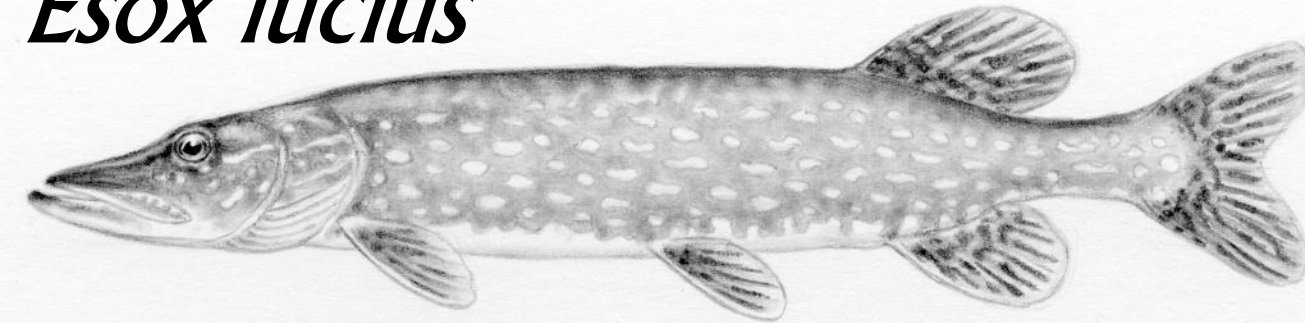
- Dorsal and anal fin far back on body
- 6-9 jaw pores on each side
- NO scales on cheek and operculum
- Dark vertical bars (or spots) on light background
- Light or no tear mark

illustrations © J.T. Sipiorski

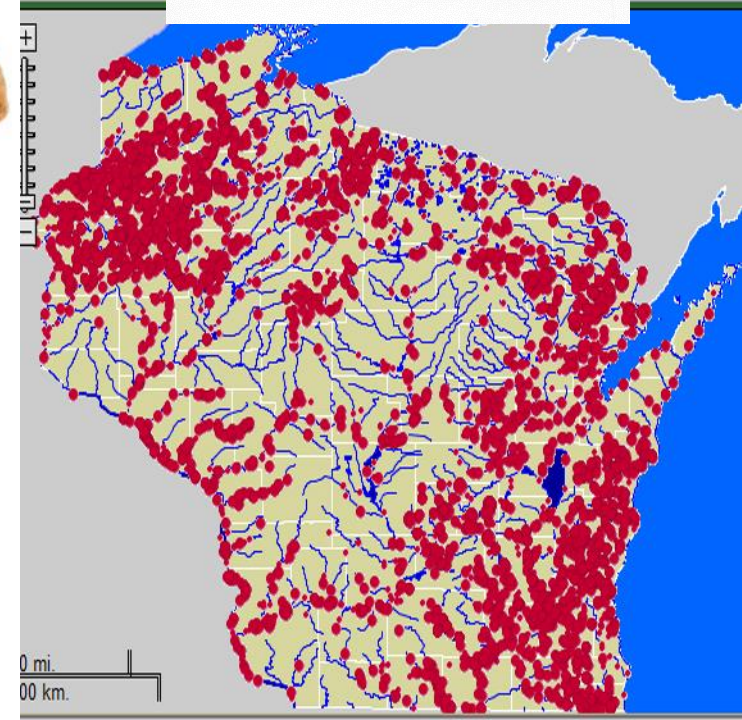
Family Esocidae

Northern Pike

Esox lucius



- Dorsal and anal fin far back on body
- Five jaw pores on each side
- Fully scaled cheek NOT operculum
- Light horizontal bars on darker background
- Light or no tear mark

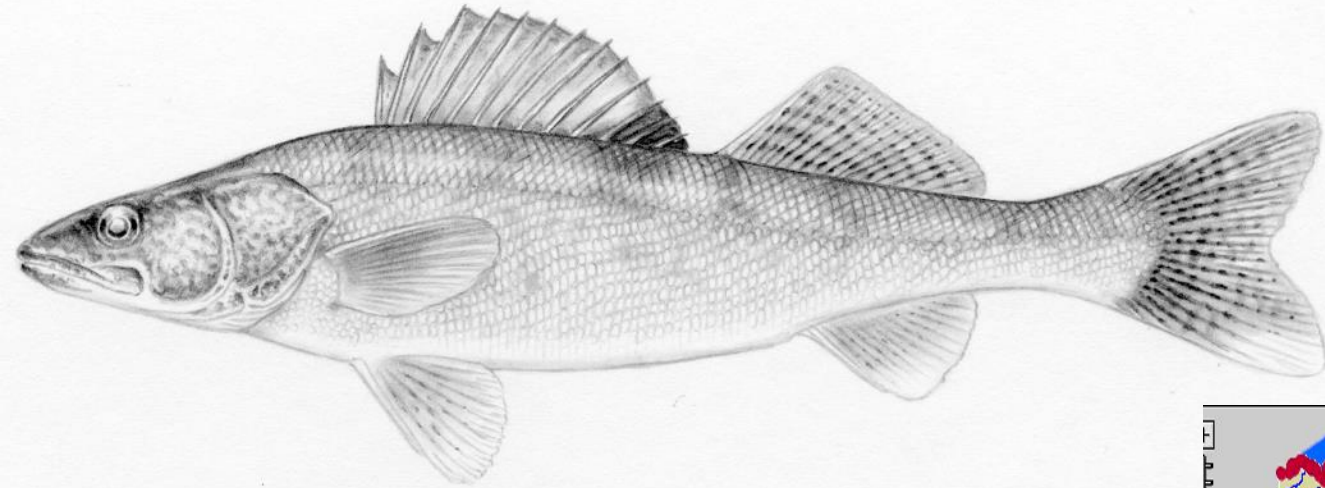


illustrations © J.T. Sipiorski

Family Percidae

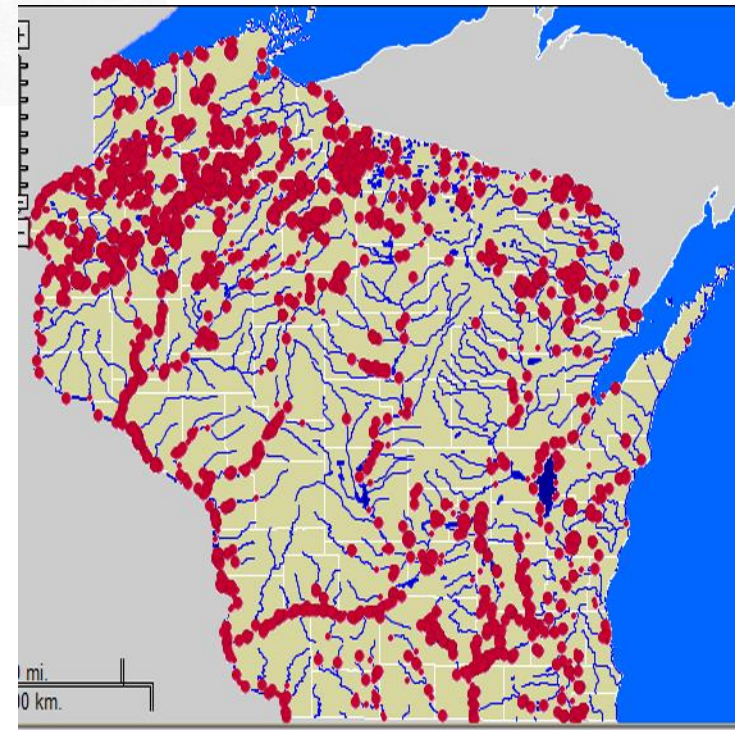
Walleye

Sander vitreus



- Two dorsal fins
- White tips to all ventral fins (pectoral, anal, caudal)
- Dark patch at posterior base of 1st dorsal fin
- Mottled flank

illustrations © J.T. Sipiorski



Data and research . . .

- You can never know how much anything that you manipulate or encourage or regulate matters to the aquatic community without good data and analysis.
- Seek out expertise
- Standardized methods
- Periodic sampling
- Monitor land use/development/pollution

Quality and sustainability . . .

- Diversity of habitats and species
- Quality fishing experiences
- Aesthetics, enjoyability, many pursuits
- Property values
- Cost and sustainability

Wisconsin Fishes found in lake habitats: Distinguishing Features, Maps

Drawings: Justin T. Sipiorski
(Unless otherwise noted)

Most Photographs:

© John Lyons (WisDNR) or

© North American Native Fishes Assoc. (NANFA)

Maps: © WisDNR, U.S. Geological Survey (John Lyons)

Gamefishes & Panfishes

- Gamefishes
 - Muskellunge
 - Northern Pike
 - Walleye
 - Largemouth Bass
 - Smallmouth Bass
 - Brook Trout
 - Brown Trout
 - Rainbow Trout
 - Lake Sturgeon
 - Cisco
 - White Bass
- Yellow Bass
- Channel Catfish
- Panfishes
 - Black Crappie
 - White Crappie
 - Bluegill
 - Pumpkinseed
 - Green Sunfish
 - Yellow Perch
- Usually fishes that are commonly eaten

Reason for this presentation

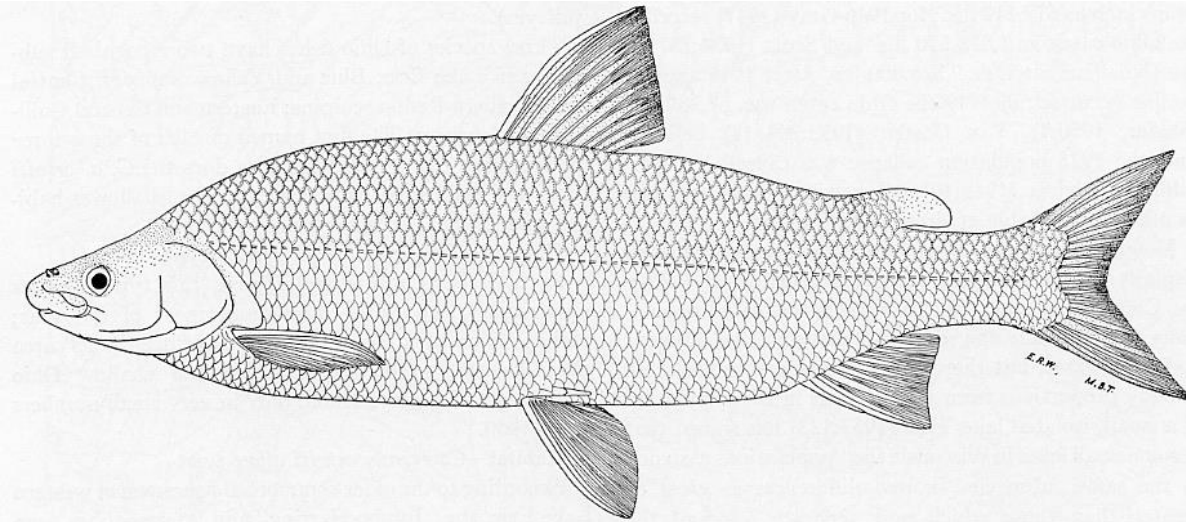
- Non-game
 - Rough fishes
 - Baitfishes
- Lake users multifaceted group
- Professionals in DNR and private sector
- Diversity as an indicator of lake health
- Sustainable options for fisheries mgmt.
- Information on general ecology and vulnerability
- Lyons et al. (several papers), Becker (1983), Littlejohn et al. (1985)

Rarer or more northern species

Family Salmonidae

Whitefish

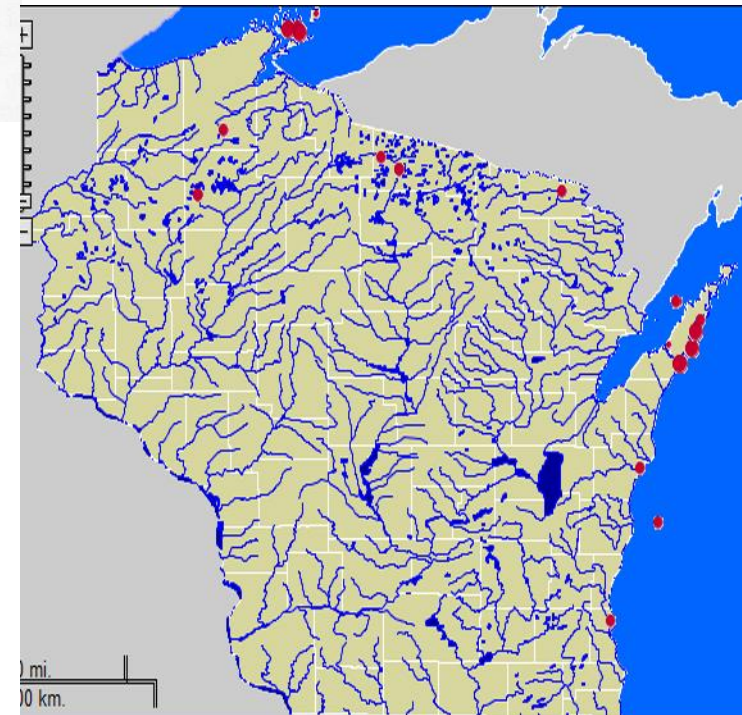
Coregonus clupeaformis



- Silvery, humpbacked
- Adipose fin
- Axillary process

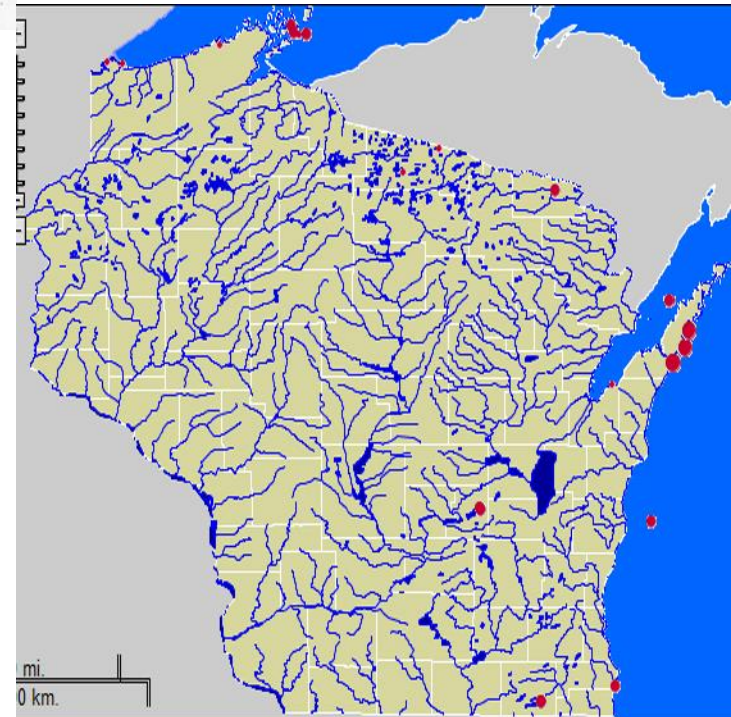
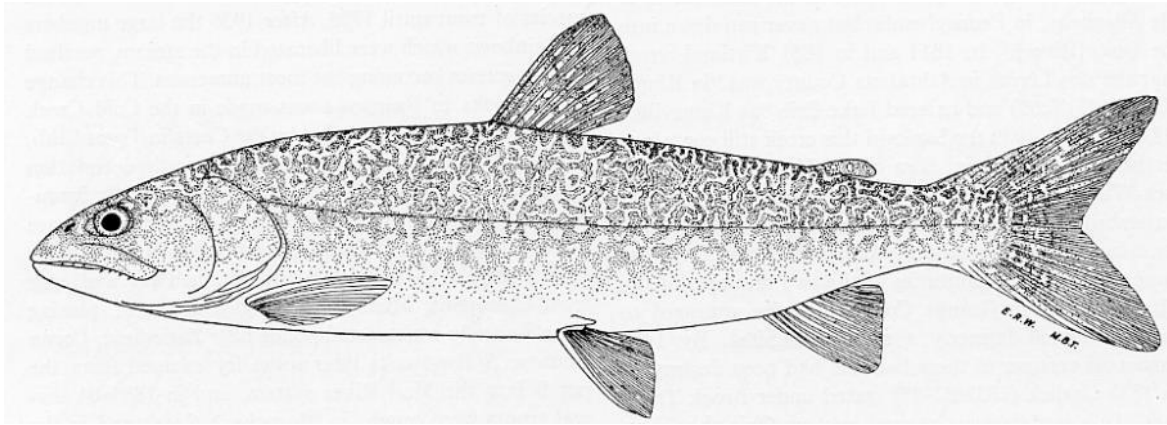
- Subterminal mouth
- Elliptical cross section

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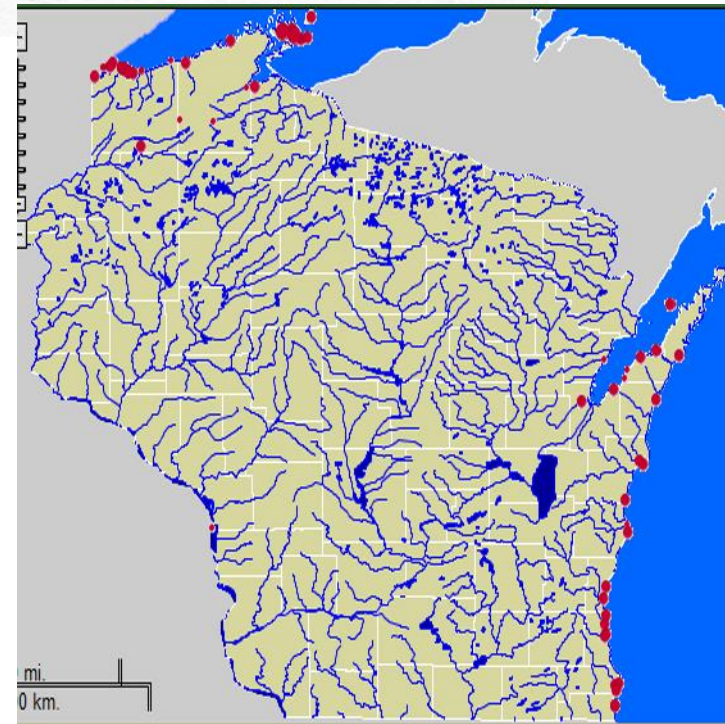
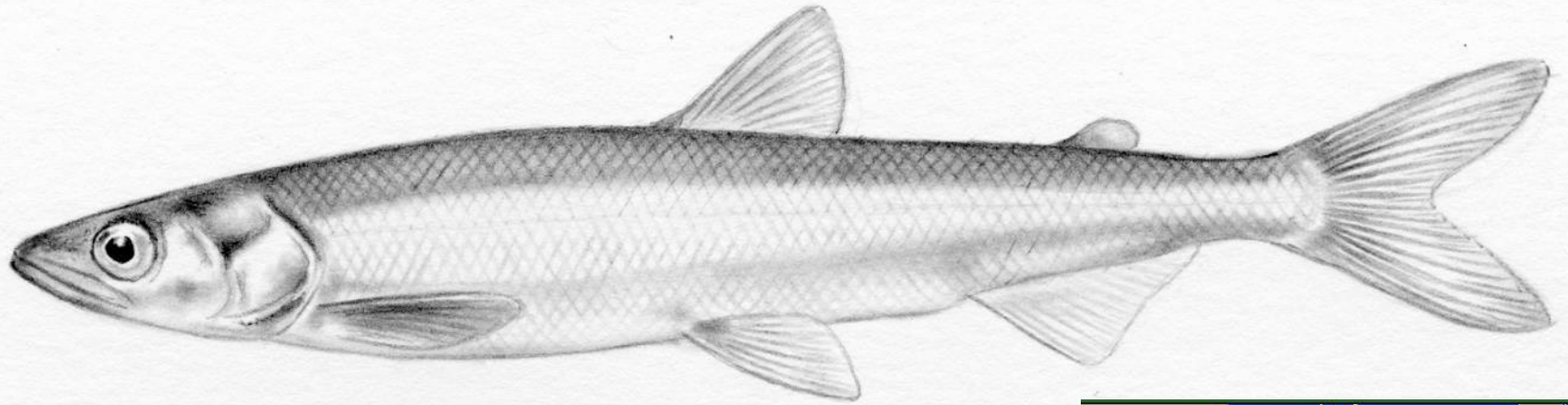
Lake Trout

Salvelinus namaycush



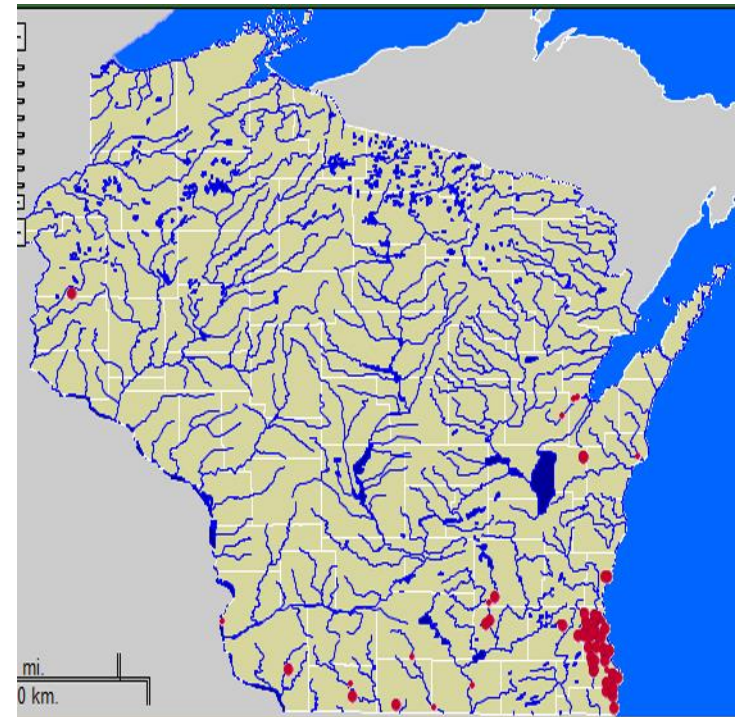
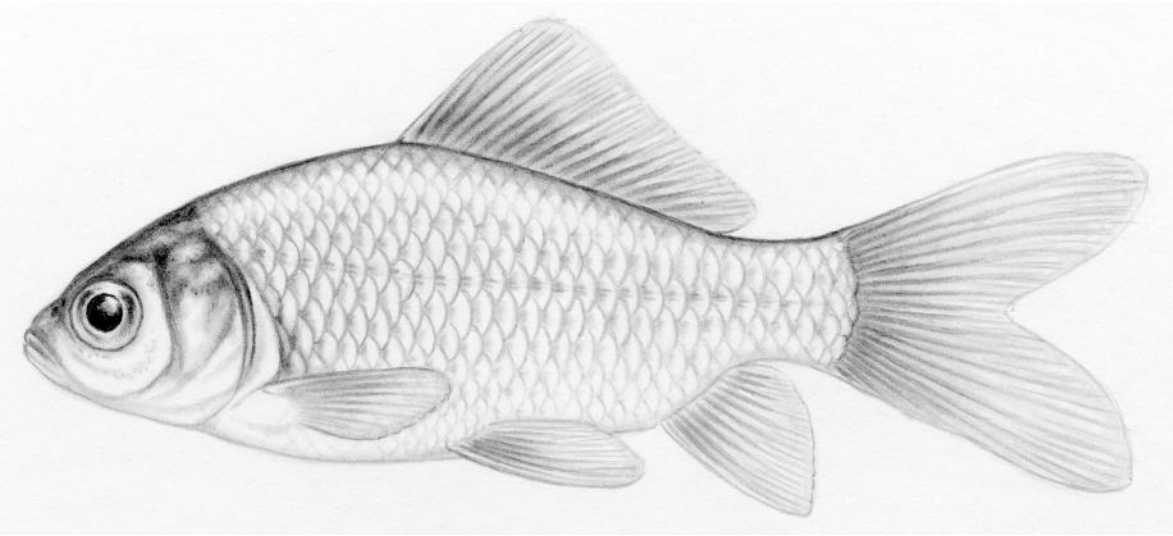
Rainbow Smelt

Osmerus mordax



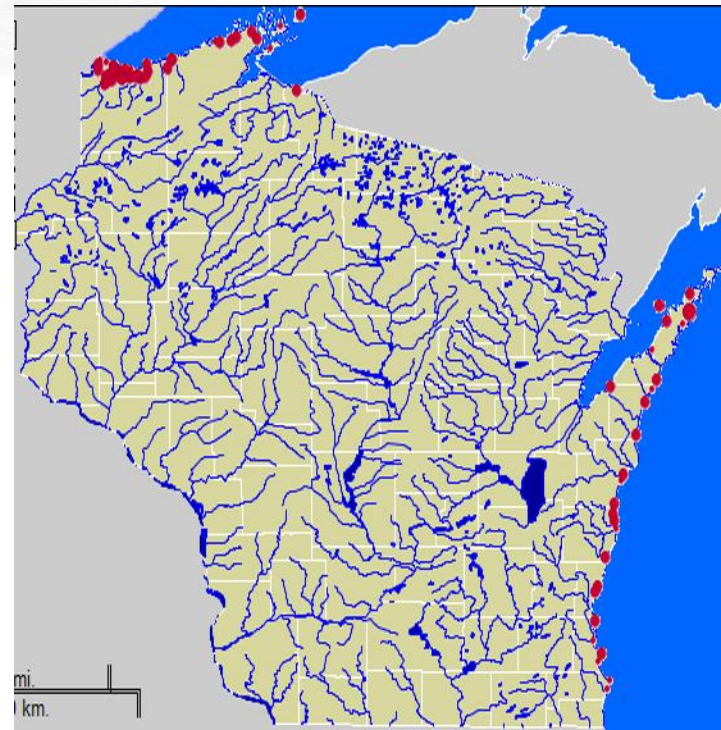
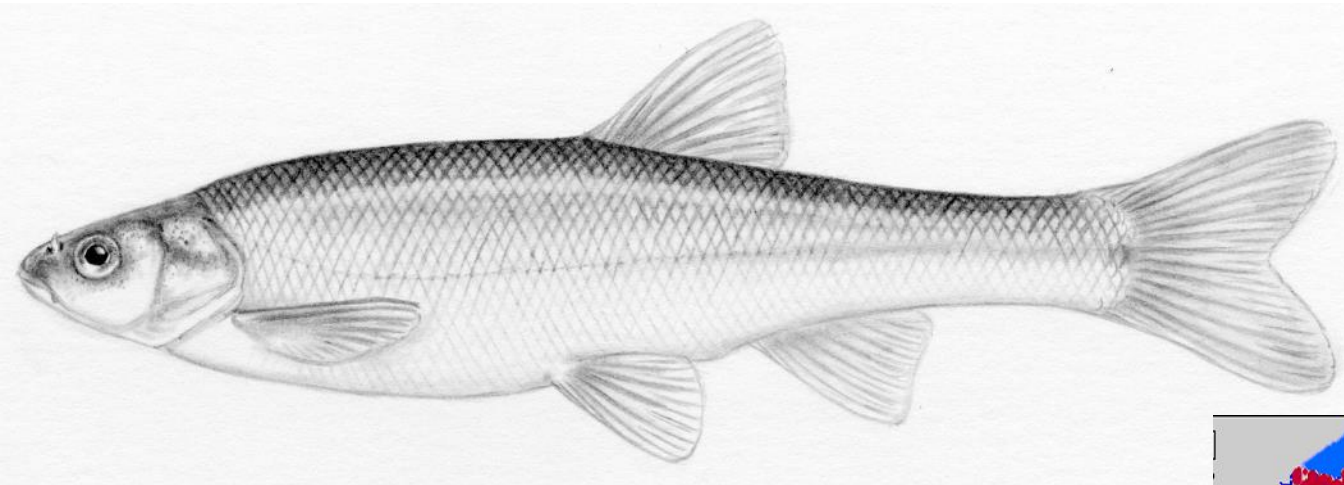
Goldfish

Carassius auratus



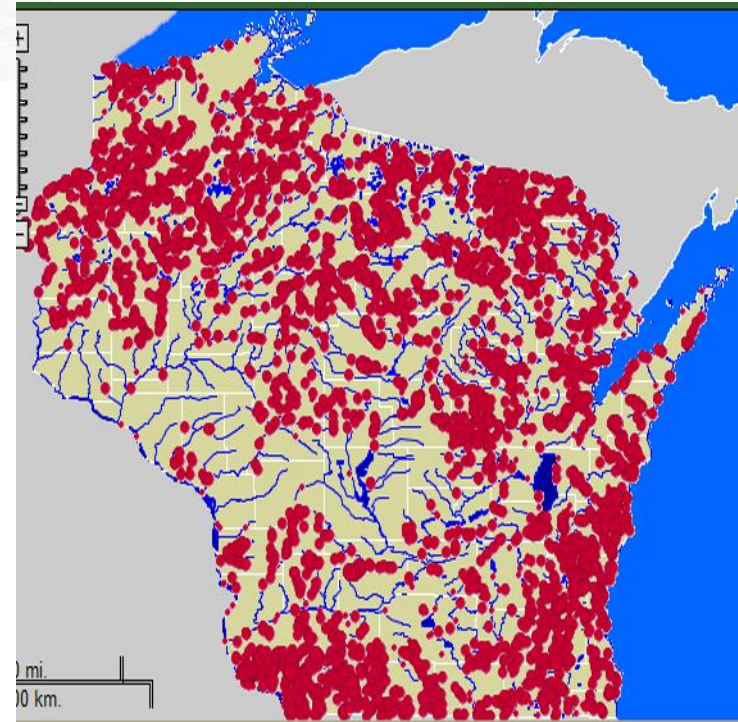
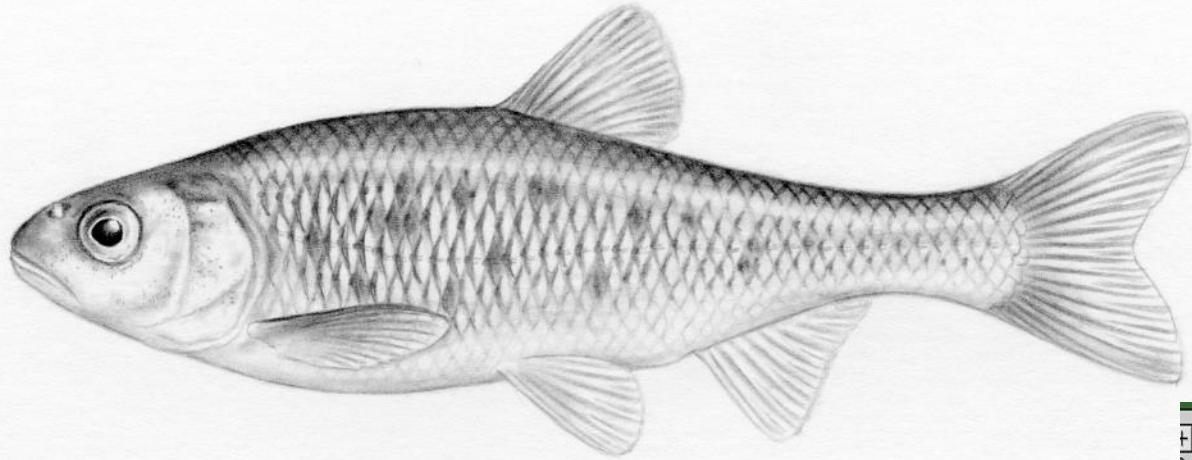
Lake Chub

Couesius plumbeus



Common Shiner

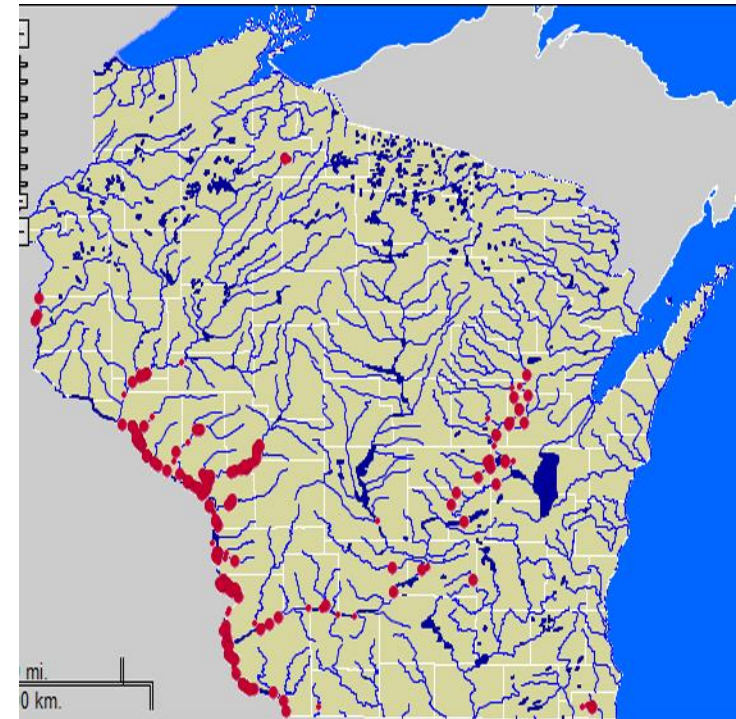
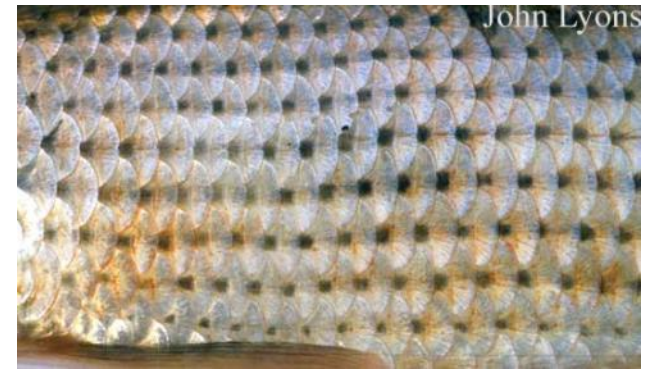
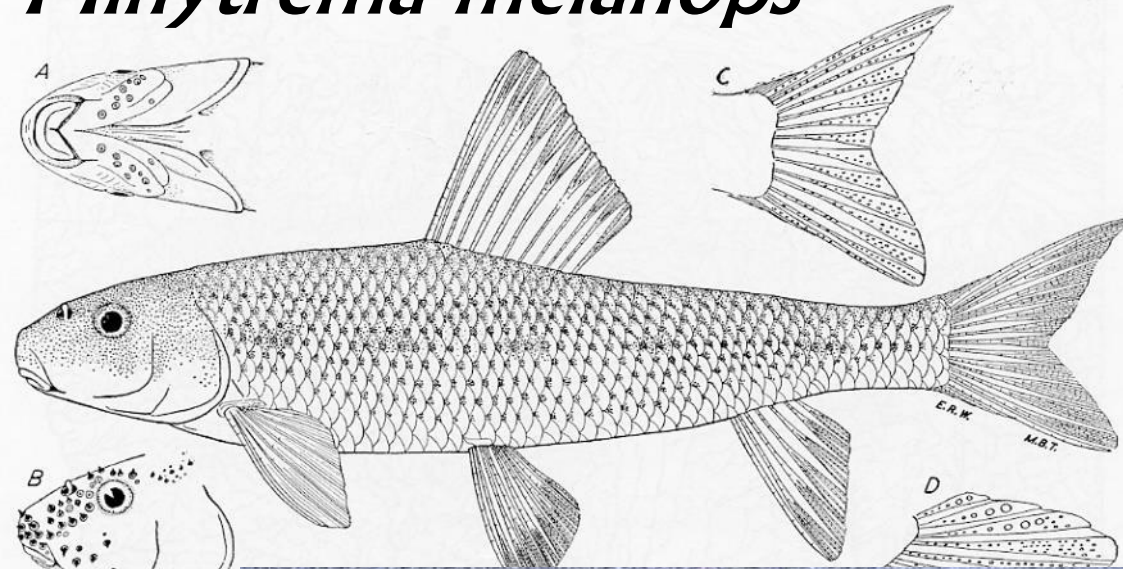
Luxilus cornutus



Family Catostomidae

Spotted Sucker

Minytrema melanops



- Fusiform body
- Short dorsal fin
- Short snout
- NO lateral line

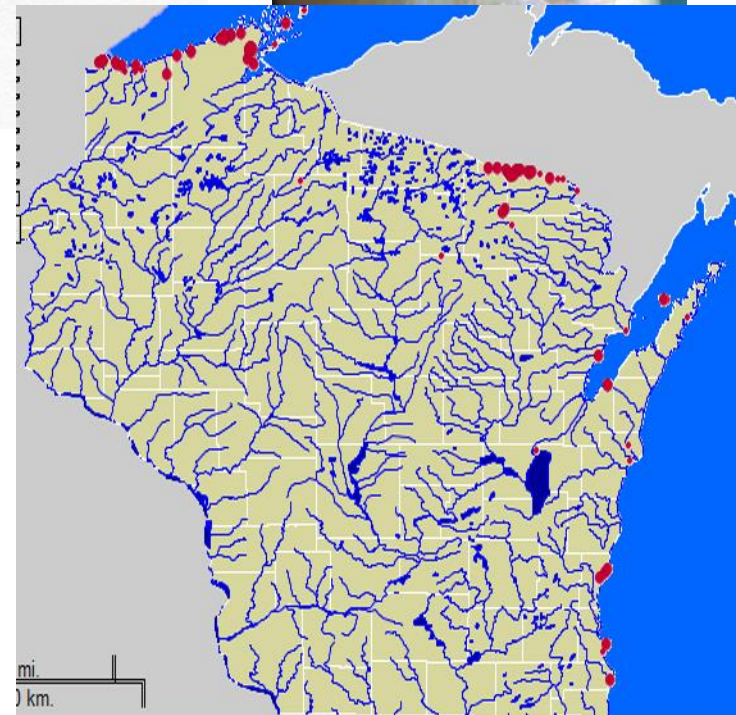
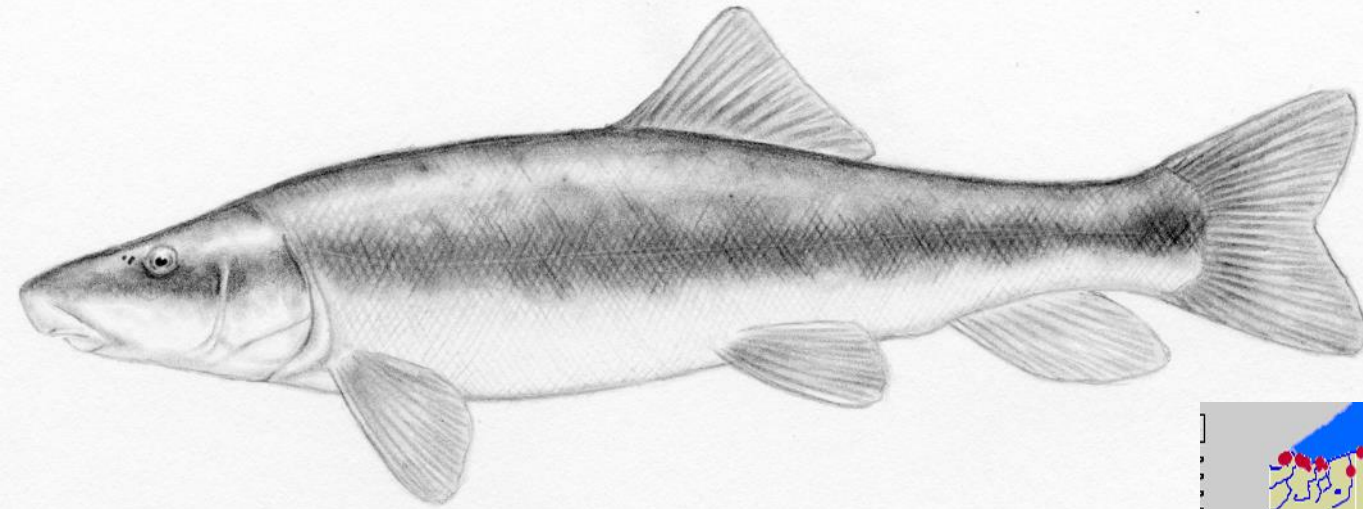
- Plicate lips
- Dark spots on scale junctions

illustrations Milton Trautman

Family Catostomidae

Longnose Sucker

Catostomus catostomus



- Fusiform body
- Short dorsal fin
- Elongate snout

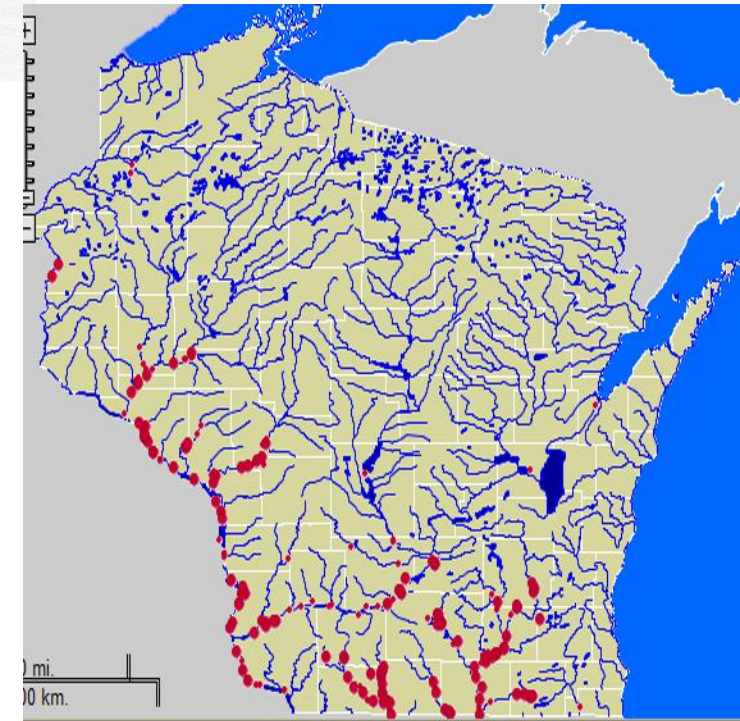
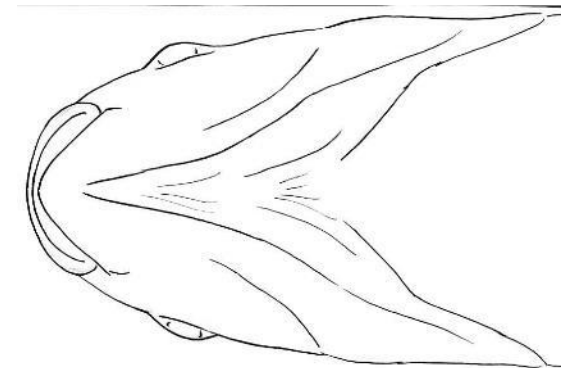
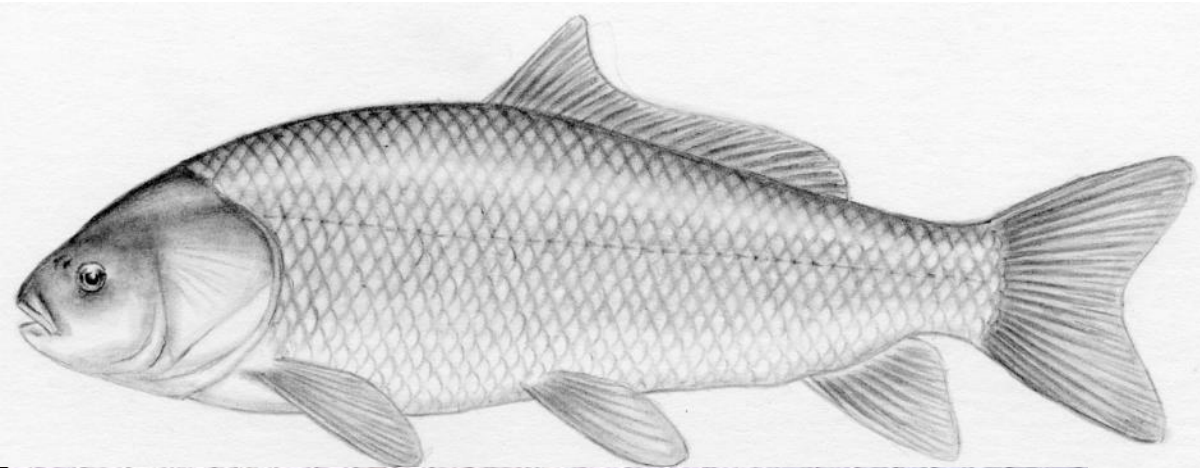
- Pappilose lips
- 95-120 lateral scales

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Family Catostomidae

Bigmouth Buffalo

Ictiobus cyprinellus



- Semicircular subopercle
- Smooth lips
- Olive bronze cast
- rounded nape
- TERMINAL mouth

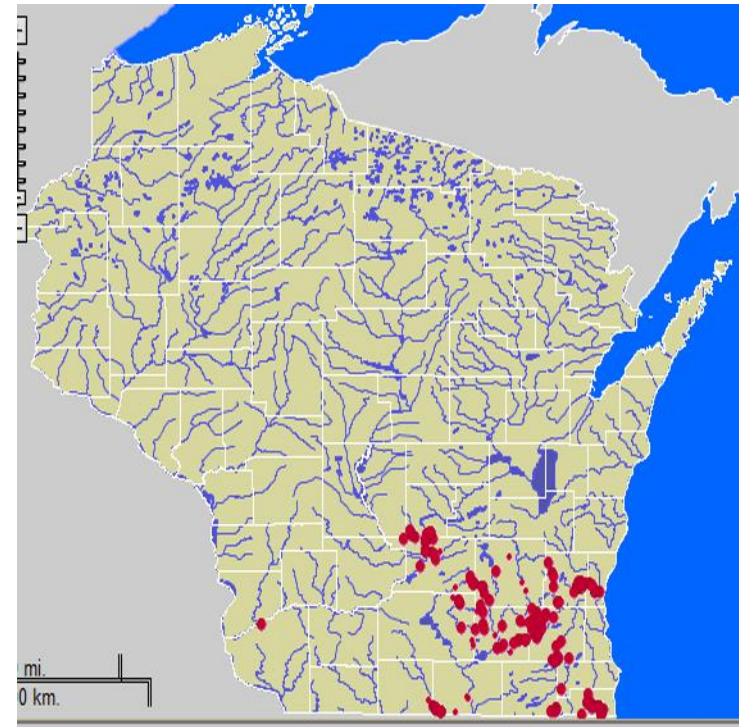
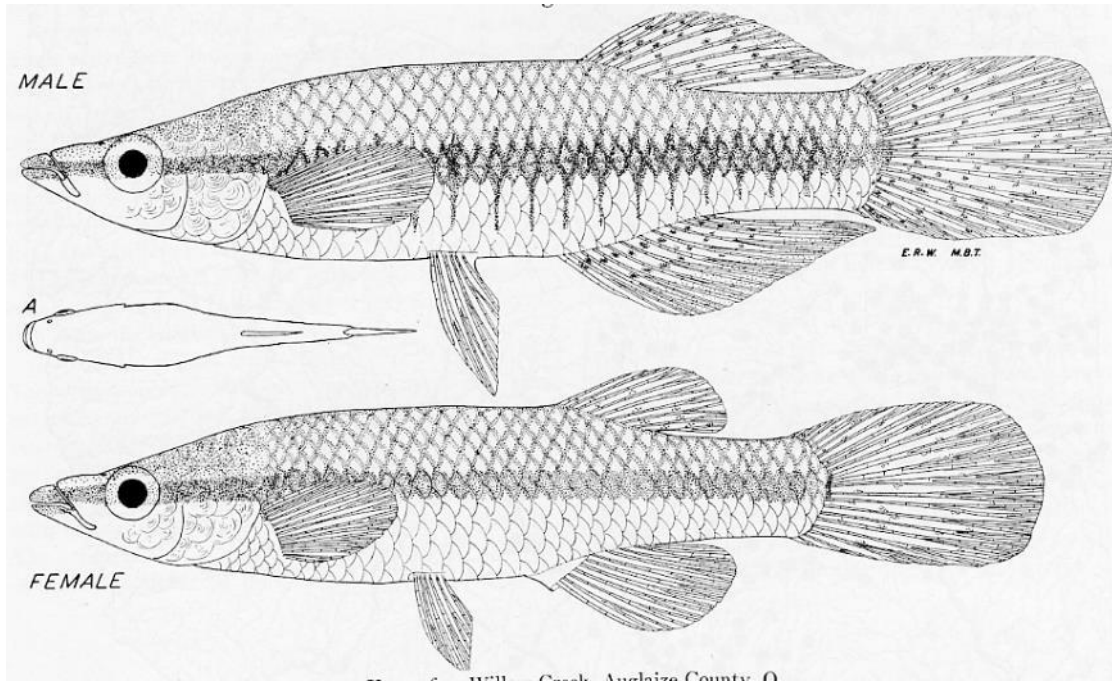
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Blackstripe Topminnow

Fundulus notatus

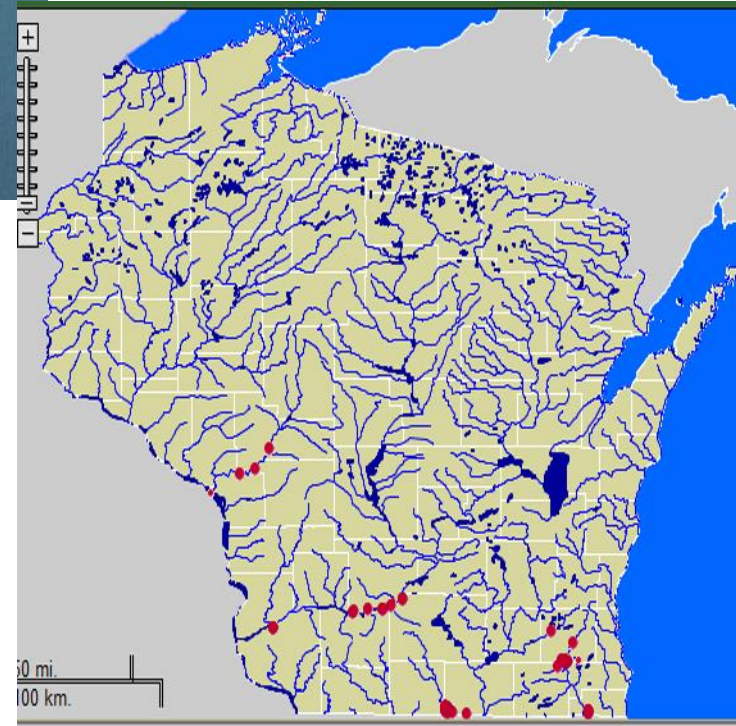


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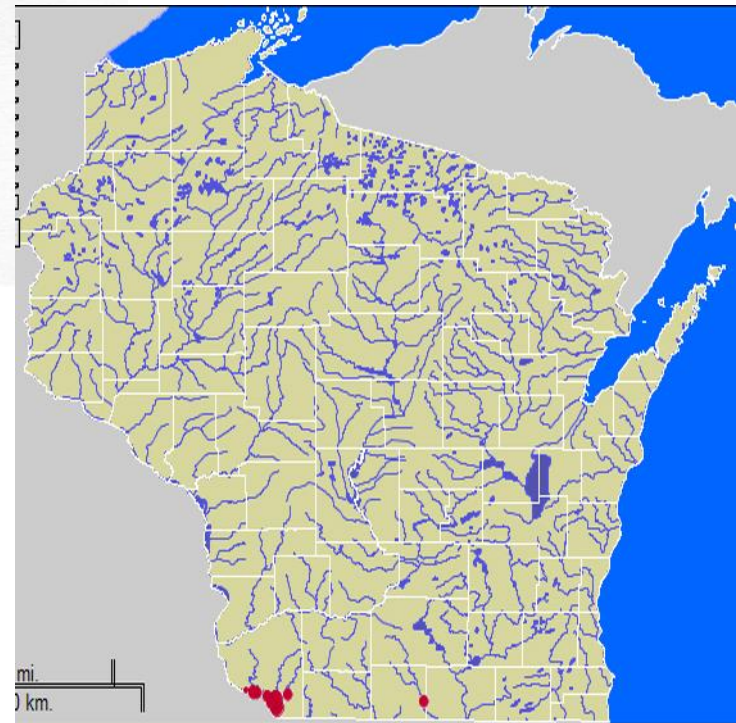
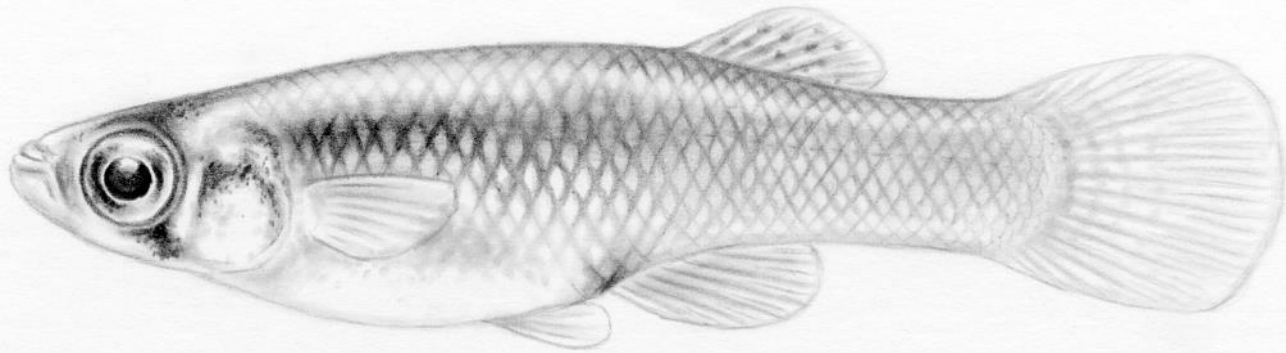
Starhead Topminnow

Fundulus dispar



Western Mosquitofish

Gambusia affinis



Ninespine Stickleback

Pungitius pungitius

