Species Predicted Distribution Maps
Qualifications and Limitations

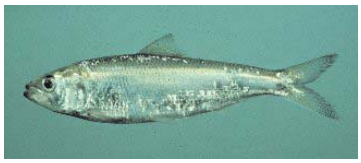
There are three ways of expressing or mapping species distributions: 1) *actual distribution,* which is based on exhaustive, long–term surveys that are very rare; 2) *known distribution*, which is based on current knowledge of where the species has been found and is usually incomplete, and 3) *predicted distribution*, which combines known distributions with quantitative or qualitative models of species-habitat associations to extrapolate to unsampled areas where the species is expected to occur (Csuti and Crist 1998). It is simply impractical to map the distribution of hundreds of species through intensive field surveys across entire states, regions, or nations (Scott et al. 1996). For instance, the nearly 7,000 fish, mussel, and crayfish collection records we compiled for our project only cover 0.03% of the total stream miles in Missouri.

The purpose of our predicted distribution maps is to provide more precise information about the historic and current distribution of individual native and nonnative species within their general ranges. With this information, better estimates can be made about the amount of available habitat for each species, how much has been lost, how much is currently represented within the existing matrix of public lands, and where are the best management options for conserving a particular species. The underlying assumption of our predicted distribution maps is that a species has a relatively high probability of occurring in appropriate habitat types that fall within its known or predicted geographic range (Csuti and Crist 1998).

Most rivers and streams and their associated biological assemblages have been altered by local and watershed disturbances such as impoundments, channelization, urban and agricultural runoff, point-source pollution, and the introduction of exotic species. Even with the significant advancements in our understanding of species-habitatt relations over the last 50 years, we still lack the necessary understanding of how these and other human activities act individually or cumulatively to specifically alter instream habitat and local biological assemblages (Poff 1997). We also lack the necessary geospatial data for some of these human disturbances. Consequently, it is currently impossible to accurately predict the present-day distribution of the vast majority of riverine biota. Due to these and other confounding factors, our predictive distributions reflect the biological potential of a given stream segment and not necessarily the present-day assemblage of species. This means that the assemblage we predict to occur in a given segment of stream will in some instances (e.g., highly disturbed streams) be quite different from the present-day assemblage. However, in relatively undisturbed locations our predictions should be relatively accurate provided our models are accurate.

Our species distribution maps were produced at 1:100,000 and are intended for applications at relatively broad spatial scales (homogeneous areas generally covering 1,000 to 1,000,000 ha and stream segments ranging from 10 to 1000 km, which are made up of multiple local biotic communities). Applications of these data to local site-level analyses are likely to be compromised by finer-grained patterns of environmental heterogeneity not captured within our models. The models presented in this report should be viewed as testable hypotheses as their suitability will vary with each given application.

Because of these and other qualifications and limitations it is imperative that individuals, interested in using these distribution maps for personal or professional means, read Chapter 4 of the Missouri Aquatic GAP Final Report. The USGS Biological Resources Division or the University of Missouri shall not be held liable for improper or incorrect use of these data.



Alabama Shad

Alosa alabamae

Native: Yes

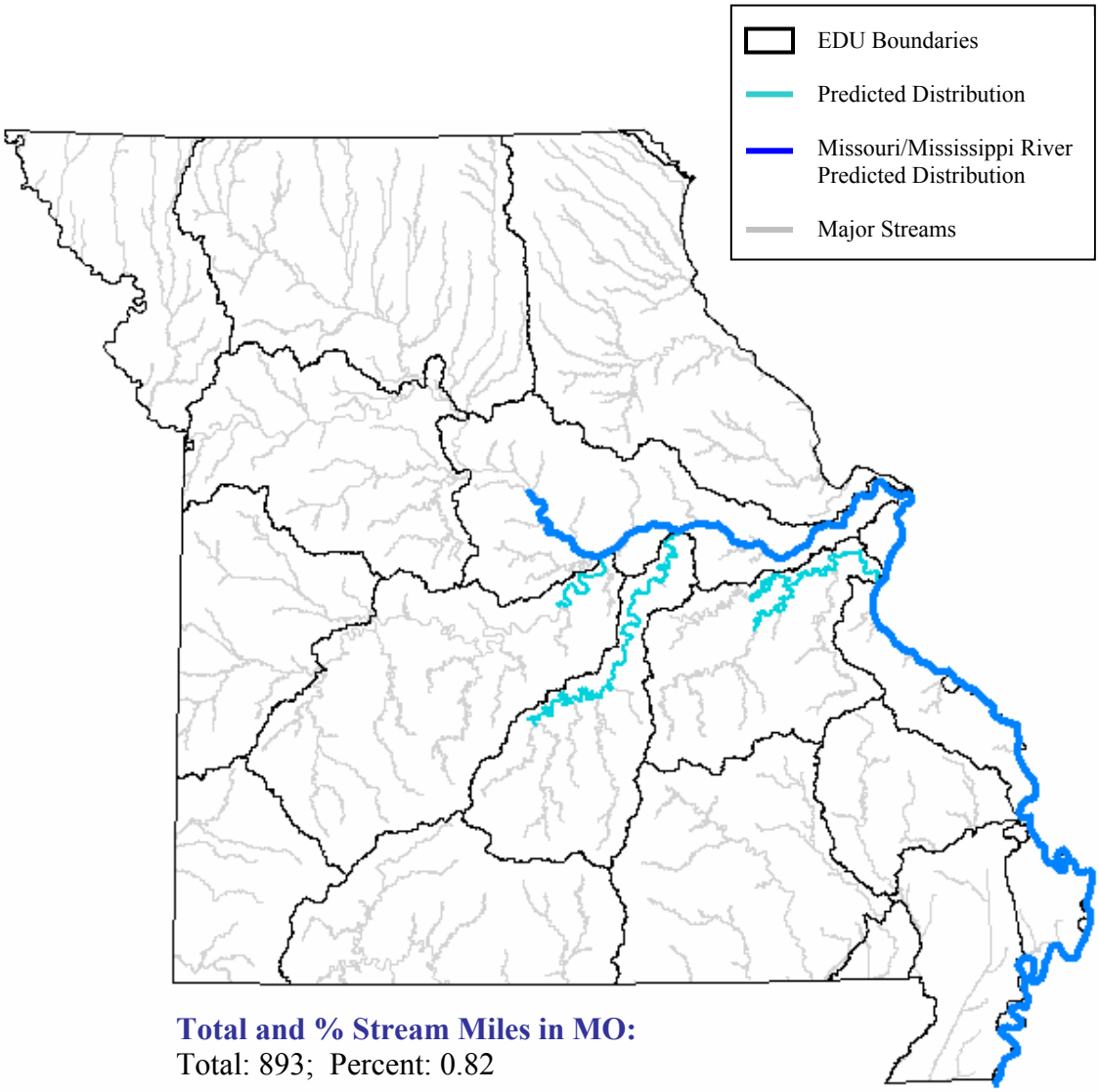
Endemism: Region

State Rank: S2

ITIS Code: 161705

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 893; Percent: 0.82

State Range:
The Alabama shad was not collected in Missouri until 1940 but it has been found in the lower Missouri and Mississippi Rivers (Pflieger 1997) and the major northern flowing streams (Osage, Gasoconade, and Meramec) draining the Ozark Aquatic Subregion (Pflieger 1971). Prior to 1900 the Alabama shad was thought common enough in the Mississippi River system to support a limited commercial fishery (Everman 1902; Coker 1930:169-171) but has declined in abundance since (Pflieger 1971), most likely because it is unable to cope with impoundments (Etnier and Starnes, 1993).

Habitat Affinities:
As an anadromous species the Alabama shad spends most of its adult life in the sea, but spawns in riverine systems. Adults do not feed while in fresh water and spawning generally occurs in large, permanent streams, with moderate currents and sand and gravel substrates (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes 1993). In the Ozark/Osage drainage it occurs in swift water around rock wing dikes. In the Gasconade drainage it also occurs in swift current over rocky shoals (Pflieger 1997). The Alabama shad was widespread throughout Tennessee in pre-impoundment days (Hildebrand 1963) but is now on Tennessee's list of rare vertebrates (Etnier and Starnes 1993). It is continuing to decline in Pearl River system of Louisiana and Alabama (Gunning and Suttkus 1990). Trautman (1957) and Clay (1975) report the Alabama shad as rare in Ohio and Kentucky respectively.

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Upper left: Photo courtesy of the NOAA National Marine Fisheries Service, http://www.nmfs.noaa.gov/prot_res/species/fish/Alabama_shad.html.

Upper right: Photo courtesy of The Native Fish Conservancy, http://www.nativefish.org.

Alligator Gar

Atractosteus spatula

Native: Yes

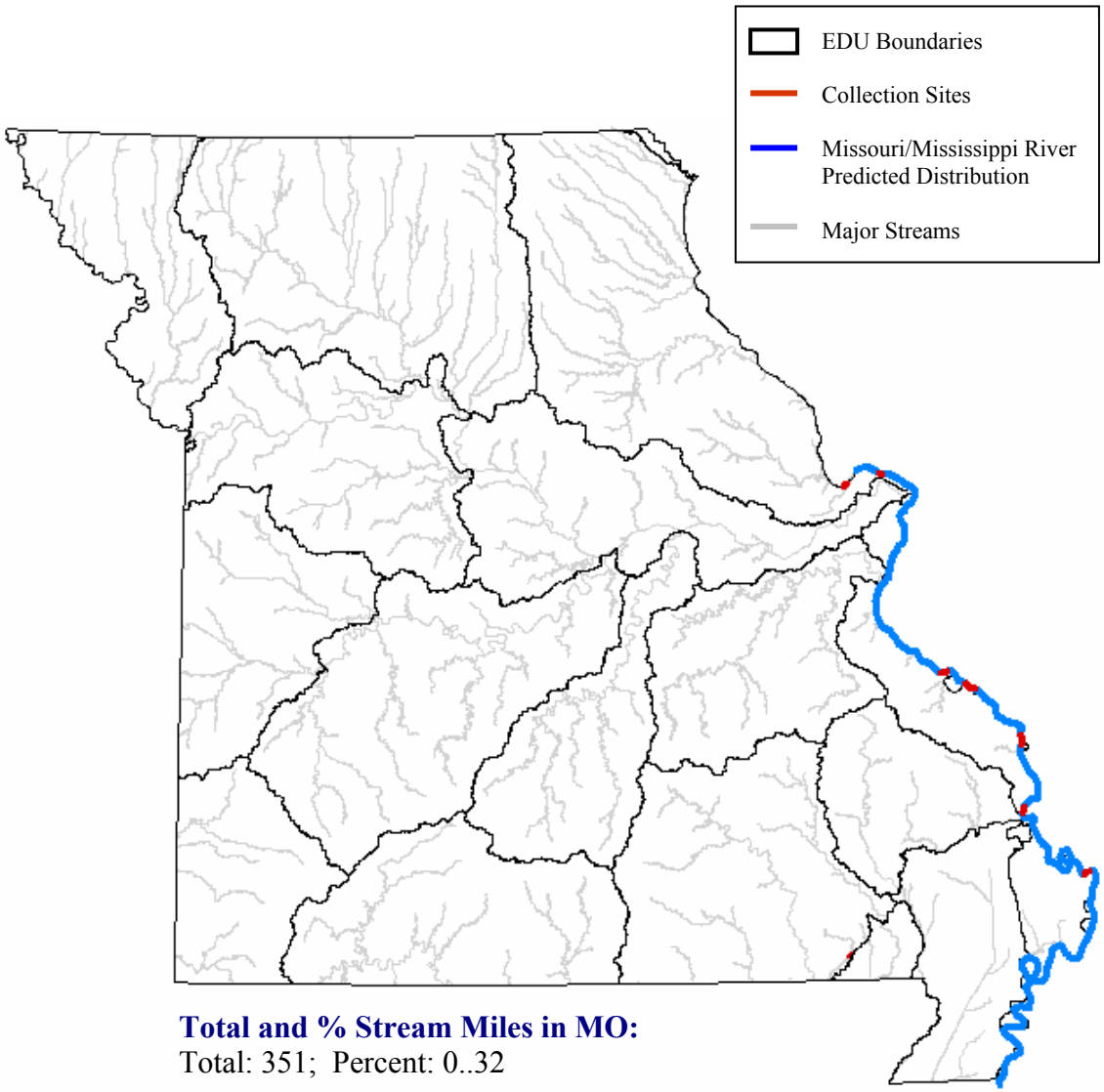
Endemism: Subzone

State Rank: SX

ITIS Code: 201897

Global Rank: G3G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 351; Percent: 0..32

State Range:

Today the alligator gar is found only in the Mississippi River, south of the mouth of the Missouri River, where it is rare (Pflieger 1971). However, Pflieger (1997) describes the report of an alligator gar caught in the Osage Ecological Drainage Unit near Capps in the 1930's.

Habitat Affinities:

Alligator gars are associated with large, warm water, permanent streams, adjacent lowland or oxbow lakes, sluggish pools, or backwaters and brackish water estuaries (Robinson and Buchanan 1988; Clay 1975; Douglas 1974; Etnier and Starnes, 1993; Pflieger 1997). It can tolerate low dissolved oxygen levels and higher salinities than other species of gars (Pflieger 1997). It inhabits large rivers within and just east of the Mississippi Alluvial Basin Aquatic Subregion [reports from Arkansas contradict parts of the mapped distribution] (Robinson and Buchanan 1988). Etnier and Starnes (1993) attribute the decline of this species in Tennessee and elsewhere (Robinson and Buchanan 1988; Trautman 1957) to the leveeing and channelization of Mississippi River lowlands where alligator gars are thought to spawn during the seasonal flooding of bottomland swamps between April and June. However, populations remain high in both lakes and rivers throughout Louisiana (Douglas 1974).

Predictive Model(s):

Great River Model

The Mississippi River distribution is based upon existing collection records and professional review. The distribution includes the Mississippi River downstream from the Illinois River.

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American Brook Lamprey

Lampetra appendix

Native: Yes

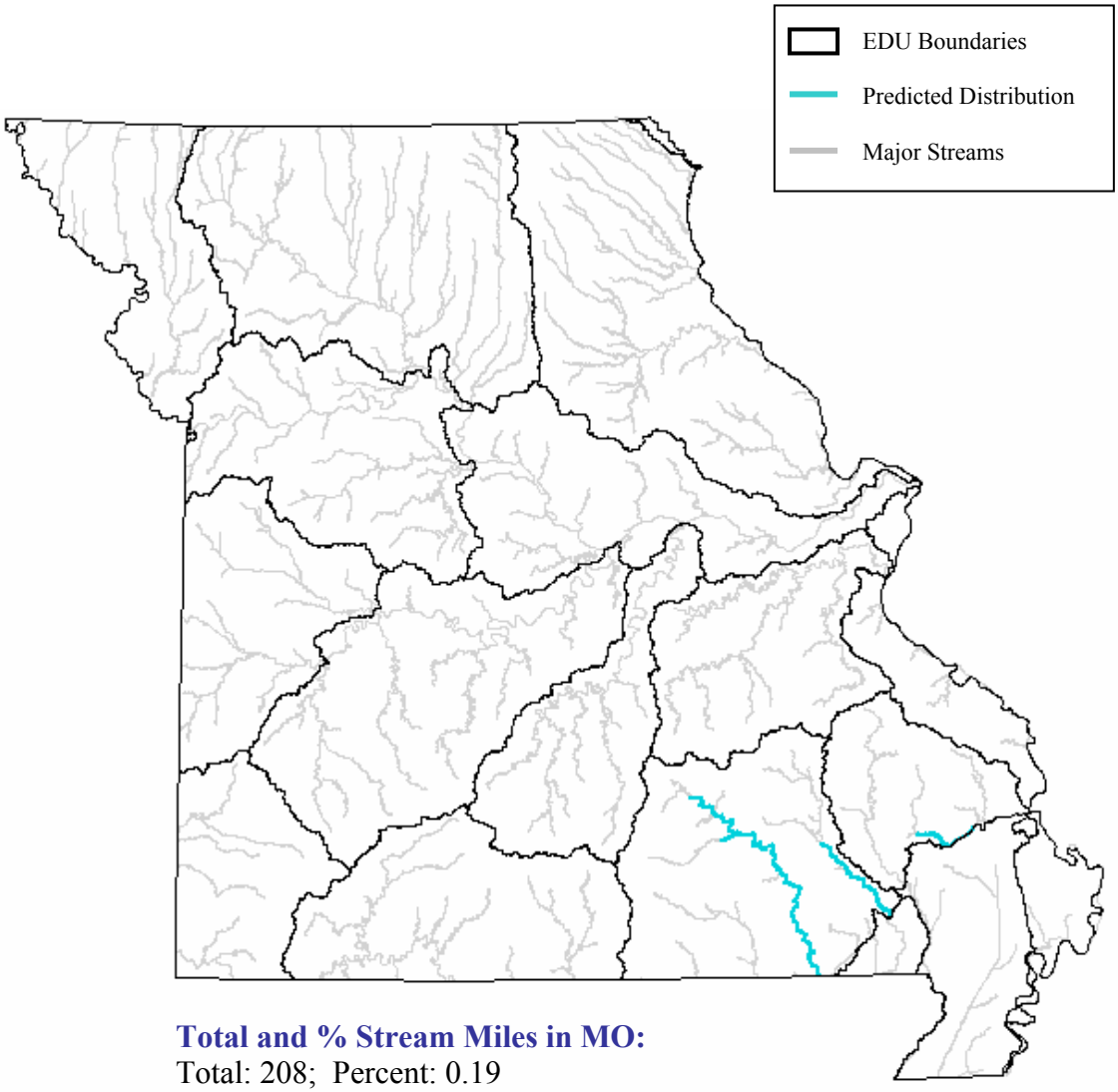
Endemism: Subzone

State Rank: S2

ITIS Code: 159708

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 208; Percent: 0.19

State Range:
The American brook lamprey is the rarest of the four species of brook lamprey found in Missouri. It is known only in the Ozark/Black/Current and Upper St. Francis/Castor Ecological Drainage Units (EDU) (Pflieger 1997).

Habitat Affinities:
American brook lampreys have requirements basic to other brook lampreys and are associated with permanent streams ranging in size from large creeks to medium-sized rivers. It is sensitive to various types of pollution, including turbidity (Robinson and Buchanan 1988) and avoids headwater creeks and large, silty rivers (Pflieger 1997). In the Current, Black and Castor drainages along the southern plateau of the Ozark Aquatic Subregion the American brook lamprey is found in clear water with slow to moderate current. In Ohio the largest populations are found spawning in gravel riffles of upland creeks, at least 15 ft. average width, with high gradient (Trautman 1957). The American brook lamprey is commonly found only in small, upland creeks and rivers of east Tennessee (Etnier and Starnes, 1993) and confined to small, clear streams in southeastern Minnesota (Eddy and Underhill 1974; Phillips et. al. 1982).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

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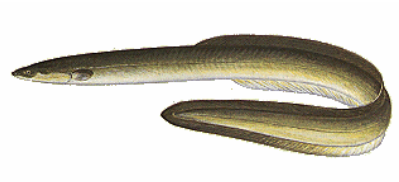


American Eel

Anguilla rostrata

Native: Yes

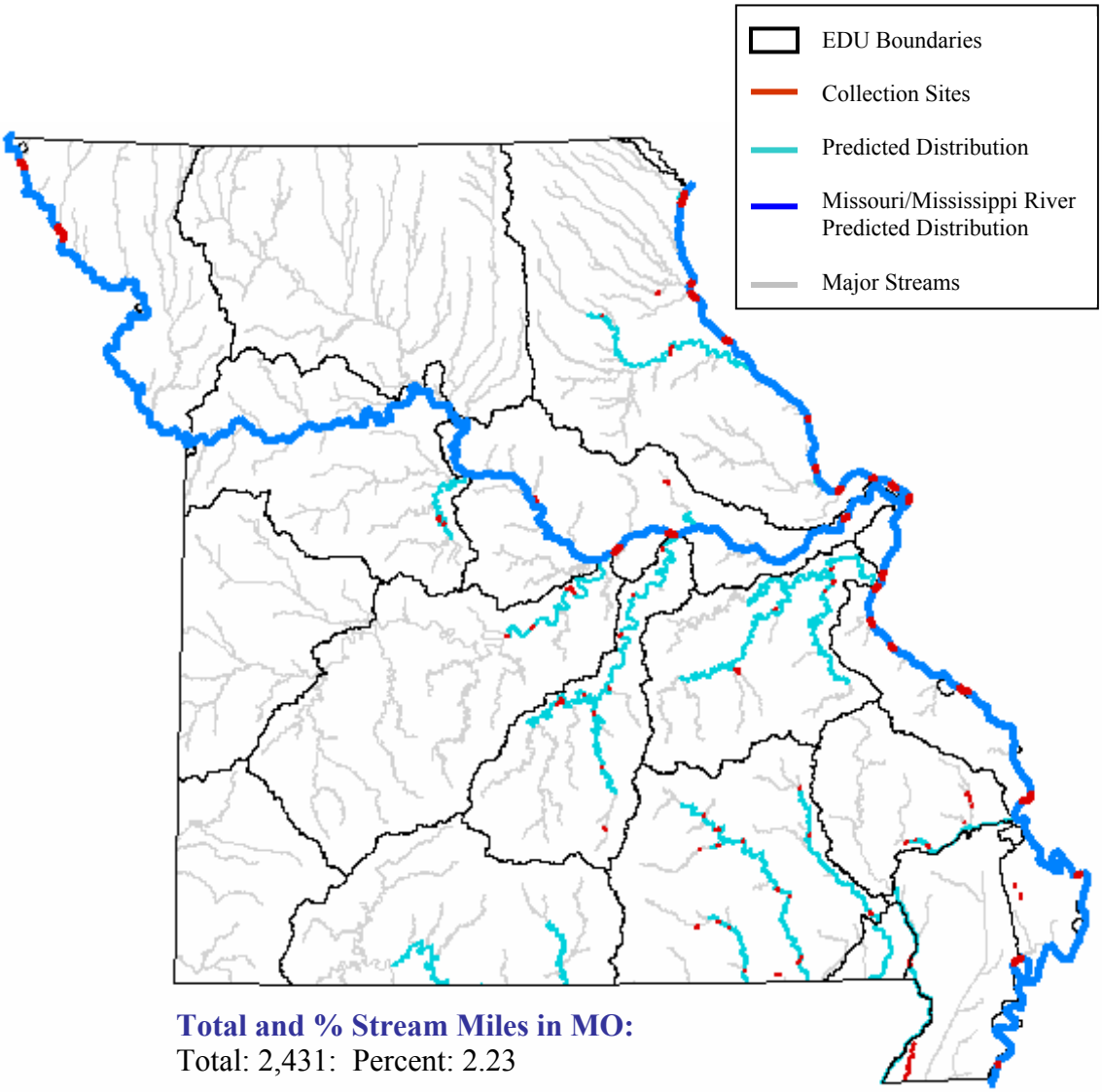
Endemism: Subzone

State Rank: S?

ITIS Code: 161127

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 2,431: Percent: 2.23

State Range:

The American eel is found throughout the Mississippi Alluvial Basin Aquatic Subregion. Although high dams on the Osage and White Rivers have restricted access to large areas of the Ozarks it can still be found in most of the area, excluding the Neosho drainage. It also inhabits large rivers in the northeast sections of the Central Plains Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The American eel is a catadromous species migrating upstream where it settles in pools or backwaters until it reaches sexual maturity (4-7 years). It is able to withstand significant turbidity (Trautman 1957) and is known to venture on land to find prey and circumvent small dams or waterfalls (Eddy and Underhill 1974), although inland migration north of Louisiana has been limited by the construction of large dams (Clay 1975; Cross and Collins 1975; Etnier and Starnes, 1993; Robinson and Buchanan 1988). Pflieger (1997) notes that distribution and abundance are hard to predict because normal sampling equipment used does not work well for this species. As a nocturnal feeder, the American eel spends daytime hours in deep pools near logs, boulders, or other cover (Pflieger 1997). In the Mississippi Alluvial Basin Aquatic Subregion the American eel is commonly found in deep, quiet navigational pools of the Mississippi River. In the Ozark Aquatic Subregion it seeks medium to large-sized streams with continuous flow and moderately clear water (Pflieger 1971).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Linkr] >= 6)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = “MO”)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Arkansas Darter

Etheostoma cragini

Native: Yes

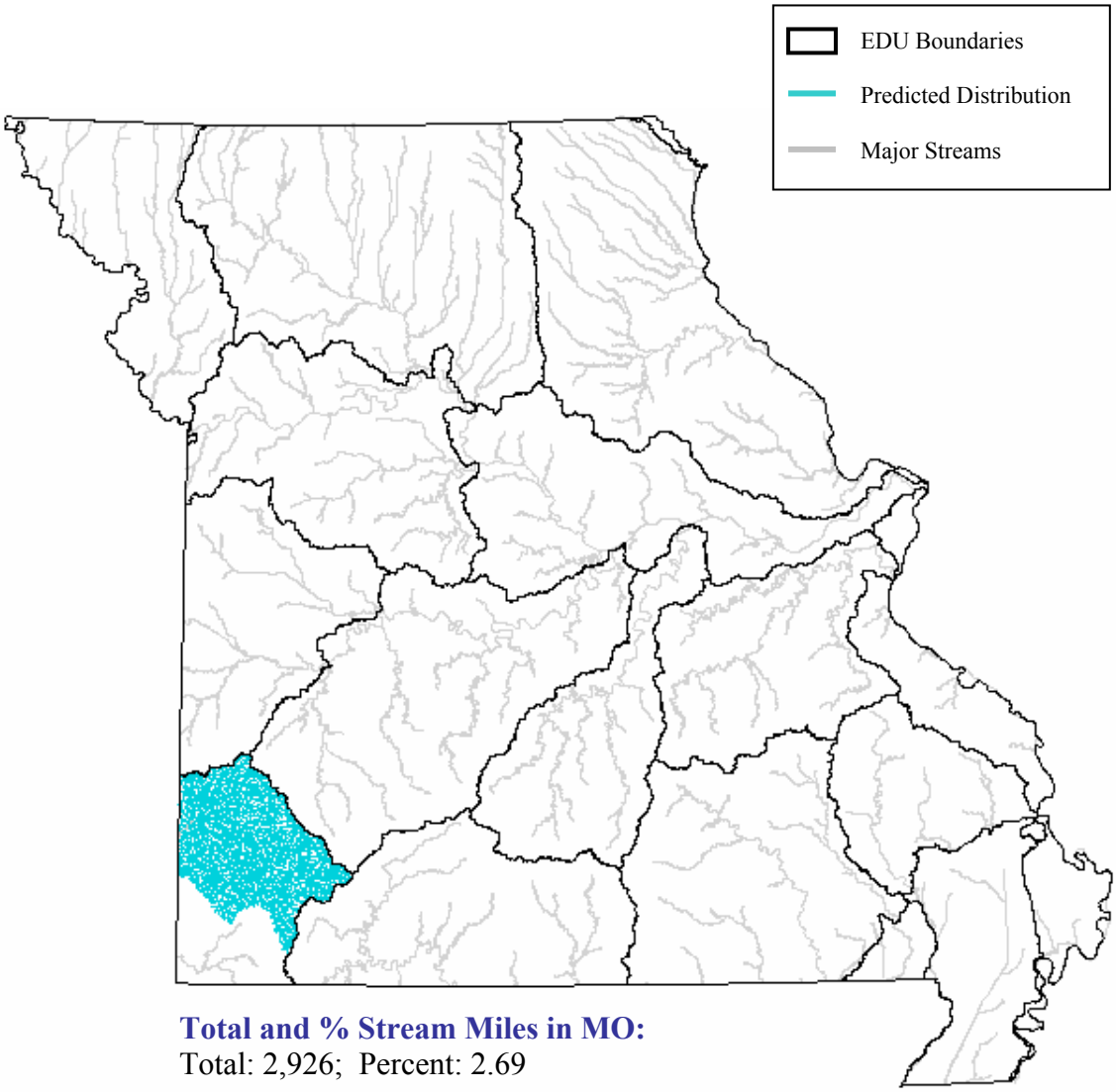
Endemism: Region

State Rank: S3

ITIS Code: 168386

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 2,926; Percent: 2.69

State Range:
In Missouri the Arkansas darter is found only in the Spring River drainage. It occurs along almost the entire lengths of the Spring River, Shoal Creek, and Center Creek, but becomes progressively more abundant toward the headwaters (Pflieger 1997).

Habitat Affinities:
Arkansas darters prefer shallow spring creeks (Pflieger 1997; Robinson and Buchanan 1988; Cross and Collins 1975) where there is not much current (Pflieger 1997; Cross and Collins 1975). In larger streams it remains in channel margins where there are exposed roots and deposits of organic debris (Pflieger 1997). It is commonly found in association with watercress or other aquatic vegetation (Pflieger 1997; Robinson and Buchanan 1988; Cross and Collins 1975), over beds of organic matter, gravel or rocks (Pflieger 1997; Robinson and Buchanan 1988). Matthews and McDaniel (1981) note that the Arkansas darter has been found in several turbid streams and Robinson and Buchanan (1988) assert that it may be a resilient species able to survive in turbid environments during droughts. However, Cross and Collins (1975) state that the species is vulnerable to elimination during drought, and it is a candidate for federal listing as an endangered species (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Ssize_code] >= 1) and ([Ssize_code] <= 3)

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Arkansas Saddled Darter

Etheostoma euzonum

Native: Yes

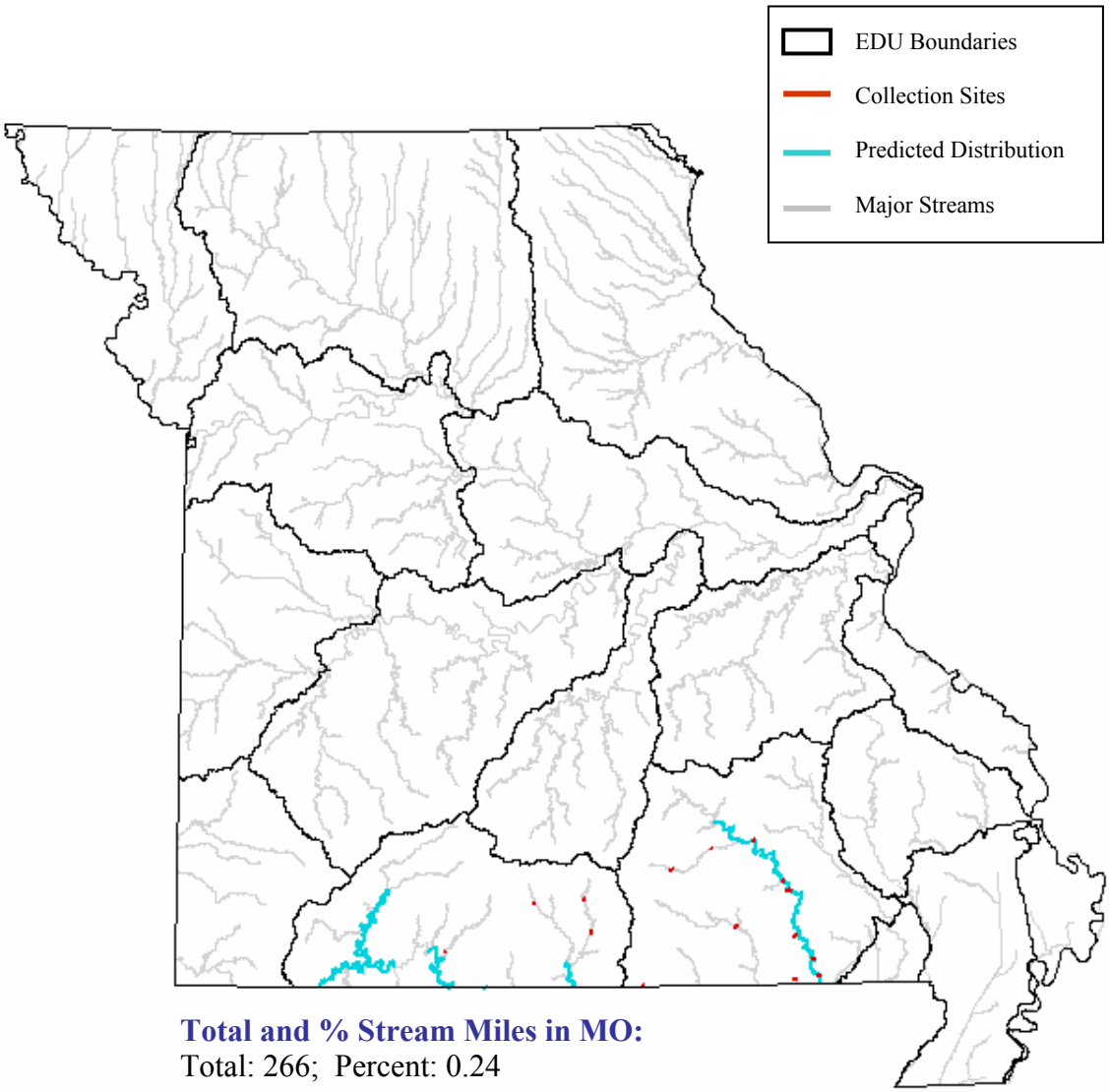
Endemism: Subregion

State Rank: S?

ITIS Code: 168392

Global Rank: G3G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 266; Percent: 0.24

State Range:
Prior to 1968 the Arkansas saddled darter occurred along the southern slope of the Ozark Uplands in the White drainage and the western part of the Current drainage (Pflieger 1971). The range may have been seriously reduced since because much of its habitat was eliminated by the impoundment of Table Rock and Bull Shoals reservoirs (Pflieger 1997).

Habitat Affinities:
The habitat of the Arkansas saddled darter is similar to that of the Missouri saddled darter, both seeking clear, high-gradient streams with continuous strong flow (Pflieger 1997). It avoids extreme headwaters and intermittent streams. In the Current drainage the Arkansas saddled darter is most abundant in moderate to large streams where it lives in deep, swift riffles with course gravel and rubble bottoms (Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

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Banded Darter

Etheostoma zonale

Native: Yes

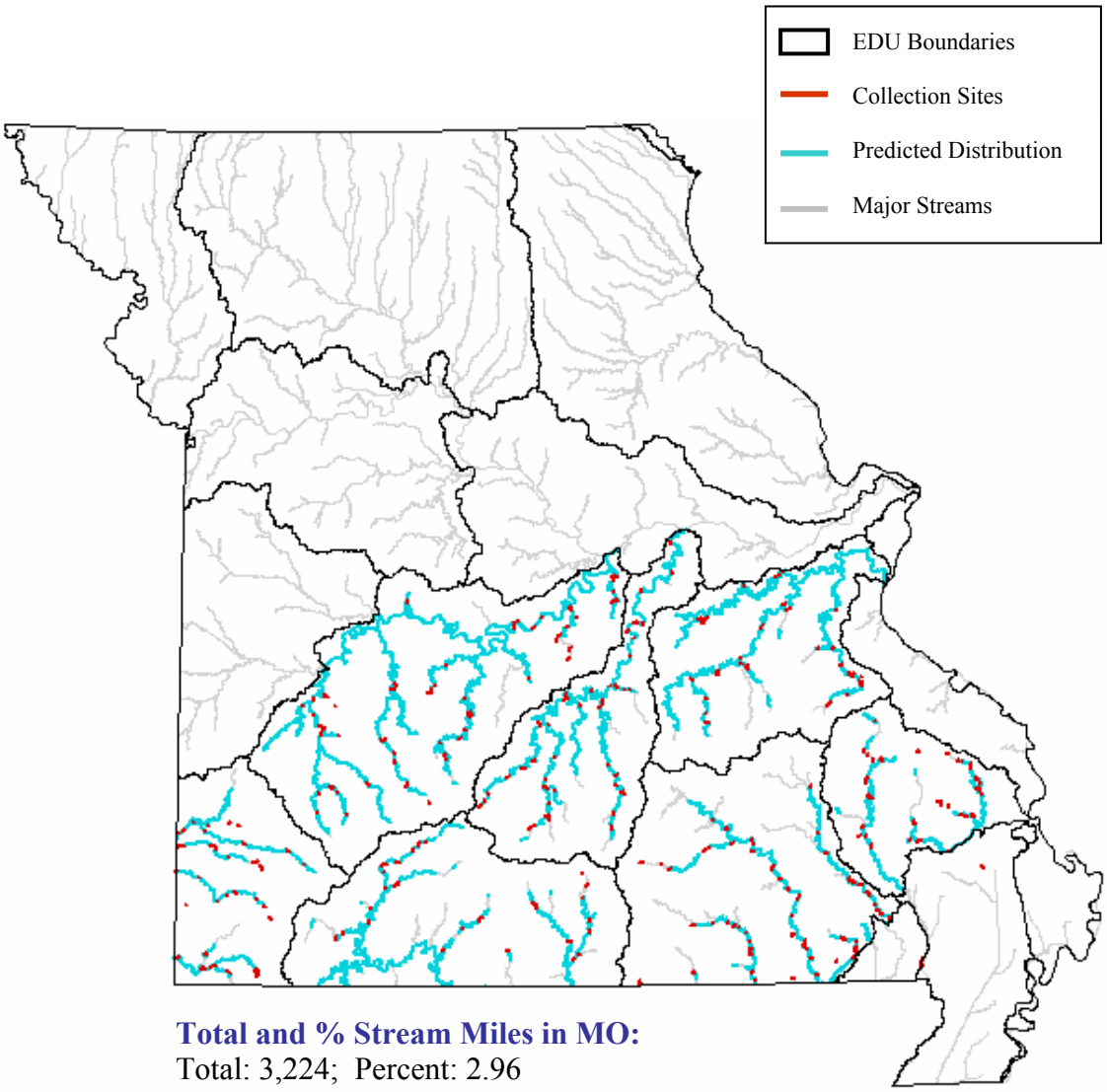
Endemism: Region

State Rank: S?

ITIS Code: 168449

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 3,224; Percent: 2.96

State Range:
The Banded darter can be found in all the principal drainage systems of the Ozarks where it is one of the most abundant and widespread darters (Pflieger 1971). However, it is not found in the short, direct tributaries of the Mississippi River. Its distribution in Missouri is remarkably similar to the greenside darter (Pflieger 1997).

Habitat Affinities:
Adult banded darters are often found in swift riffles over gravel or rubble bottoms (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1971; Robinson and Buchanan 1988). They are found in abundance within rocky riffles having dense growths of filamentous algae (*Cladophora*), eel grass (*Valisneria*) pondweed (*Potamogeton*) (Lachner et al. 1950; Miller and Robinson 1973; Pflieger 1997) or aquatic mosses (Trautman 1957). Juveniles prefer quiet water around emergent aquatic plants such as waterwillow (*Justicia*) (Pflieger 1997) or in accumulations of leaves (Robinson and Buchanan 1988). Trautman (1957) found that spawning concentrations were highest in riffles of streams with moderate to high gradients with a width less than 50 ft. and depth less than 2 ft. Trautman (1957) also found that the banded darter winters in deeper waters.

Predictive Model(s):

Ozark Model
(([Linkr] = 5) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)) or (([Linkr] >= 6))

Mississippi Alluvial Basin Model
The distribution is based upon existing collection records and professional review.

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Banded Pygmy Sunfish

Elassoma zonatum

Native: Yes

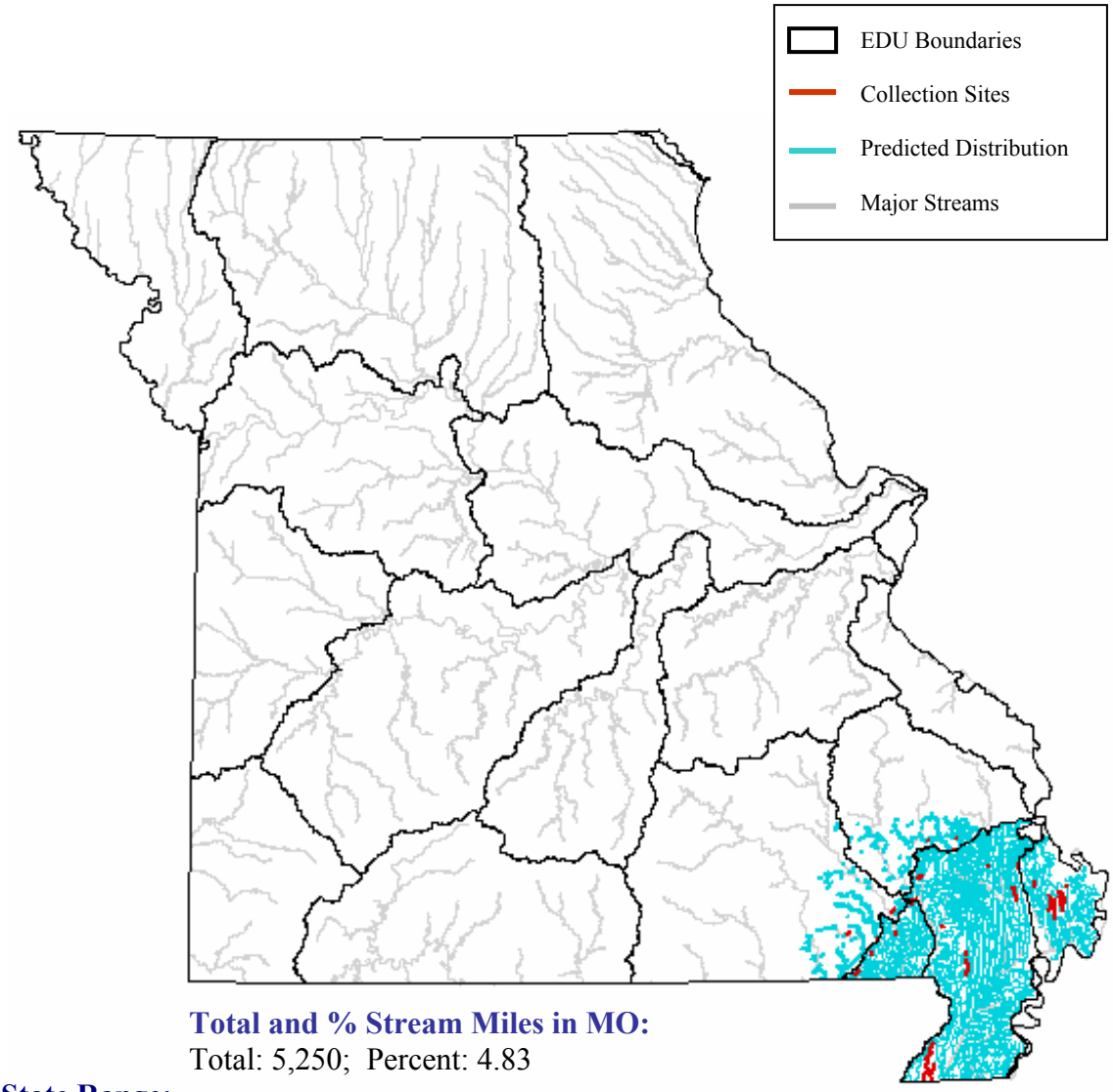
Endemism: Subzone

State Rank: S4

ITIS Code: 168171

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,250; Percent: 4.83

State Range:

The banded pygmy sunfish is found only in lowland areas (Pflieger 1971). It has been collected throughout the Mississippi Alluvial Basin and on the southern edges of the Current and Castor drainages. Pflieger (1971) also notes that the banded pygmy sunfish was more abundant before lowland swamps were ditched and drained.

Habitat Affinities:

The banded pygmy sunfish is a secretive, solitary species (Etnier and Starnes 1993; Robinson and Buchanan 1988) that is sporadic in occurrence and sometimes abundant (Pflieger 1997). It inhabits swamps, bayous, creeks, oxbow lakes, sluggish streams (Clay 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988), backwaters, borrow pits and older ponds (Douglas 1974). In the Mississippi Alluvial Basin the banded pygmy sunfish is found in clear quiet waters with thick growths of aquatic vegetation (Pflieger 1971), particularly coontail, with mud and detritus bottom (Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model

([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 1) and ([Linkr] <= 6) and ([Rgrad_subr] = 1)

Mississippi Alluvial Basin Model

([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model

([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

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Banded Sculpin

Cottus carolinae

Native: Yes

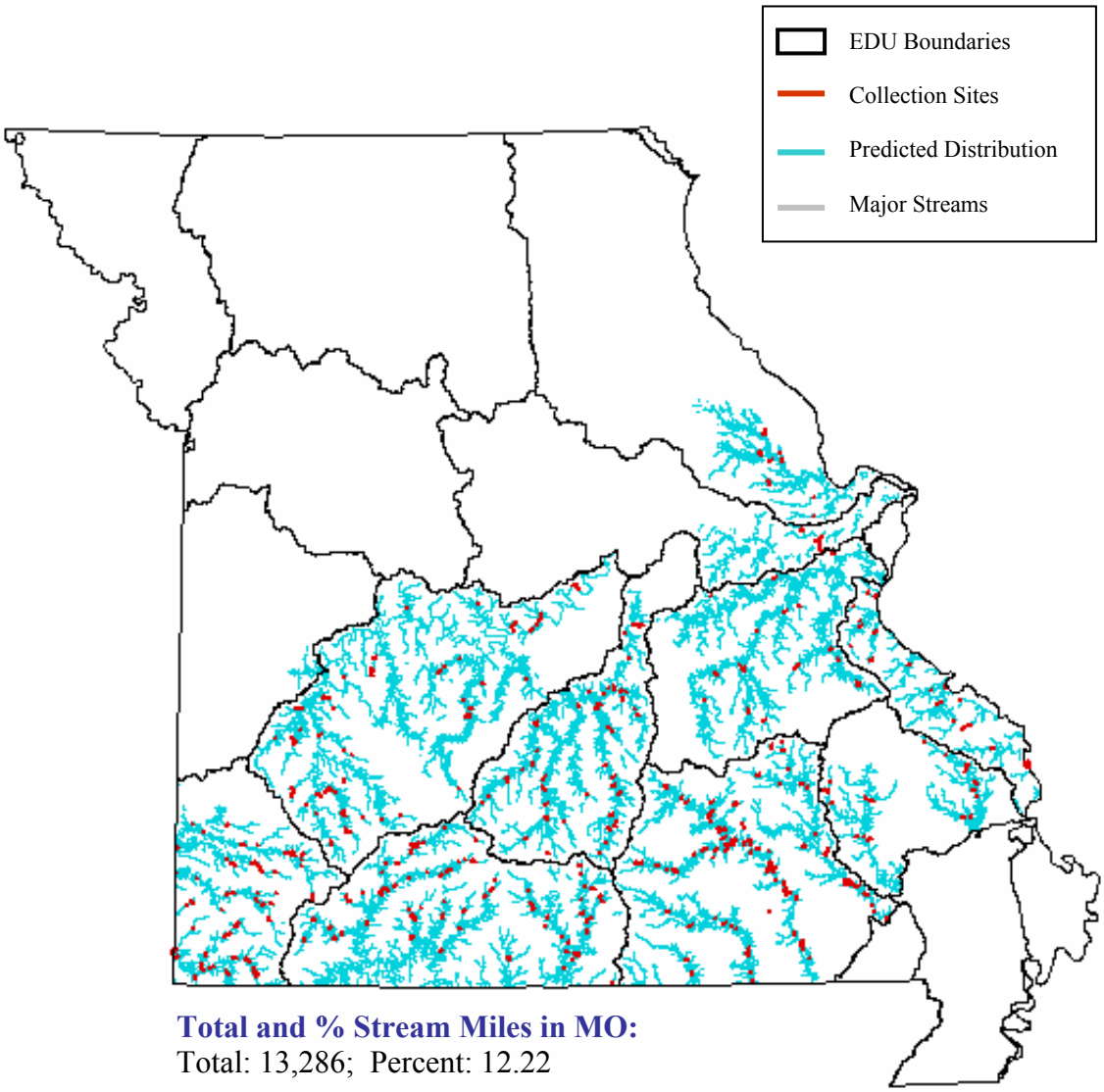
Endemism: Region

State Rank: S?

ITIS Code: 167239

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 13,286; Percent: 12.22

State Range:
The banded sculpin is the most widely distributed Missouri sculpin but does not attain population densities as high as the Ozark and mottled sculpins (Pflieger 1997). It is found throughout the Ozark Aquatic Subregion and in a few isolated places in the eastern plains just north of the Missouri River (Pflieger 1971).

Habitat Affinities:
The banded sculpin can tolerate higher temperatures and is generally most abundant in larger and warmer Ozark streams (Pflieger 1971). However, in Arkansas Robinson and Buchanan (1988) found that it is limited to clear, cold and highly oxygenated spring-fed streams with gravel beds. Etnier and Starnes (1993) found that in Tennessee it is common in streams of all dimensions, from small springs to large upland rivers. In the Ozark Aquatic Subregion the banded sculpin can be found in swift riffles or pools over beds ranging from silt to gravel (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). As a nocturnal species, it is most abundant about cover, such as course rock or thick growths of aquatic vegetation, during the daytime. Investigators have also found that the banded sculpin has adapted to subterranean environments, such as caves (Etnier and Starnes 1993; Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] >= 1) and ([Linkr] <= 2) and ([GradsegR] = 3)) or (([Linkr] >= 1) and ([Linkr] <= 2) and ([DlinkR] >= 5) and ([DlinkR] <= 7)) or (([Linkr] >= 3) and ([Linkr] <= 4) and ([Temp_code] = 1)) or (([Linkr] >= 3) and ([Linkr] <= 4) and ([Temp_code] = 2) and ([Flow] = 1)) or (([Linkr] >= 3) and ([Linkr] <= 4) and ([Temp_code] = 2) and ([DlinkR] >= 5) and ([DlinkR] <= 7)) or (([Linkr] >= 5))

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Bantam Sunfish

Lepomis symmetricus

Native: Yes

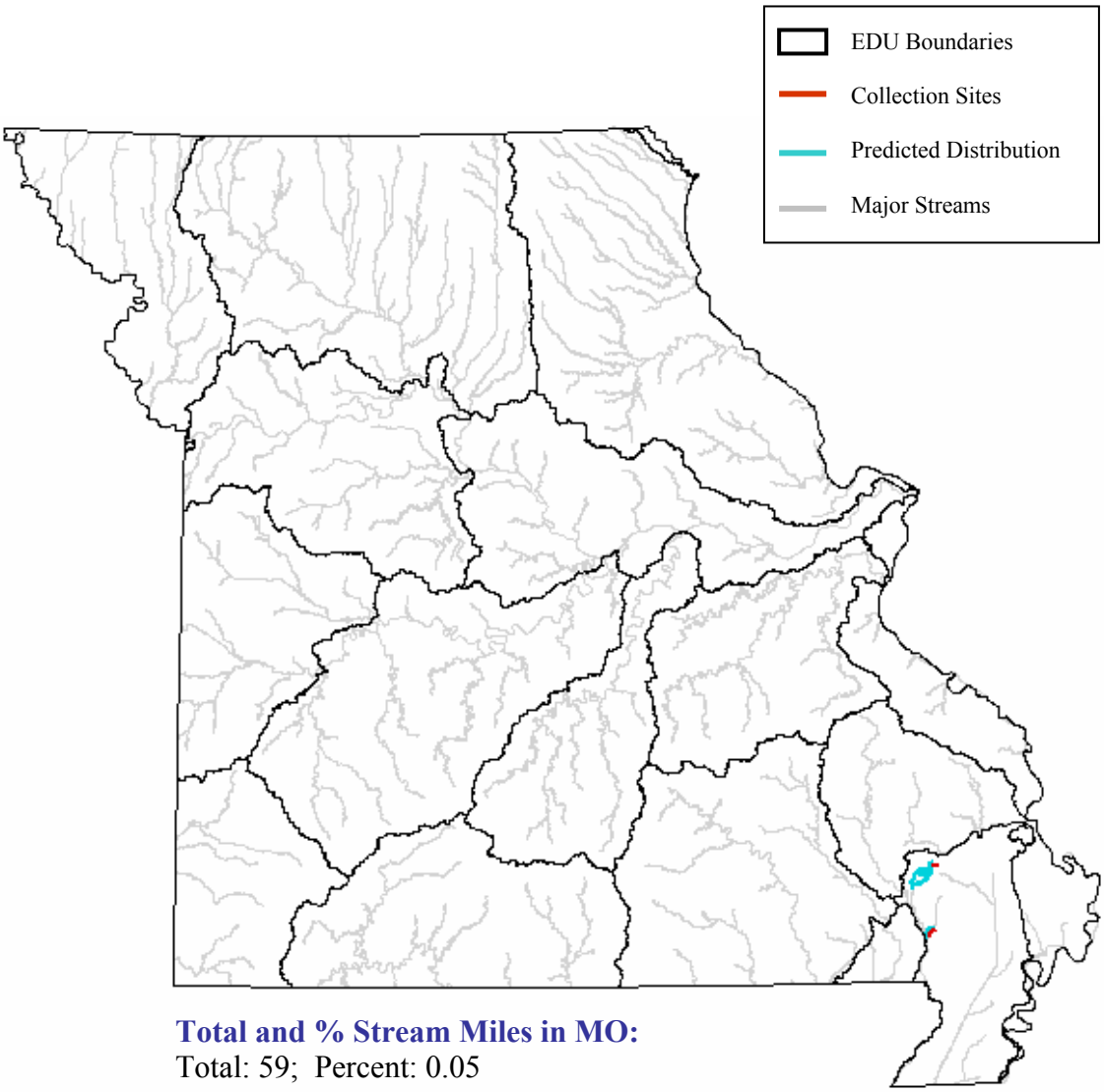
Endemism: Subregion

State Rank: S2

ITIS Code: 168156

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 59; Percent: 0.05

State Range:

The bantam sunfish is found exclusively in the Little Drainage of the Mississippi Alluvial Basin Aquatic Subregion. It has been collected in Otter Slough Conservation Area and Mingo swamp in the contiguous Duck Creek Wildlife Area and Mingo National Wildlife Refuge. Both of these areas represent relatively undisturbed swampland, suggesting a broader distribution within the Mississippi Alluvial Basin Aquatic Subregion before it was ditched and drained (Pflieger 1997).

Habitat Affinities:

The diminutive bantam sunfish inhabits swamps, oxbow lakes and standing or extremely sluggish backwaters (Clay 1975; Douglas 1974). Robinson and Buchanan (1988) determined the bantam sunfish to be highly tolerant of turbidity and siltation but most often found in clear, quiet waters. The bantam sunfish seldom ventures in to deep water, preferring shallow shorelines (Pflieger 1997). It is almost always found in association with submerged aquatic vegetation, such as coontail, or submerged logs and rocks, with mud or detritus bottom (Etnier and Starnes 1993; Robinson and Buchanan 1988).

Predictive Model(s):

Mississippi Alluvial Basin Model

The distribution is based upon existing collection records and professional review. It includes all streams in the Mingo National Wildlife Refuge and Otter Slough.

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Bigeye Chub

Notropis amblops

Native: Yes

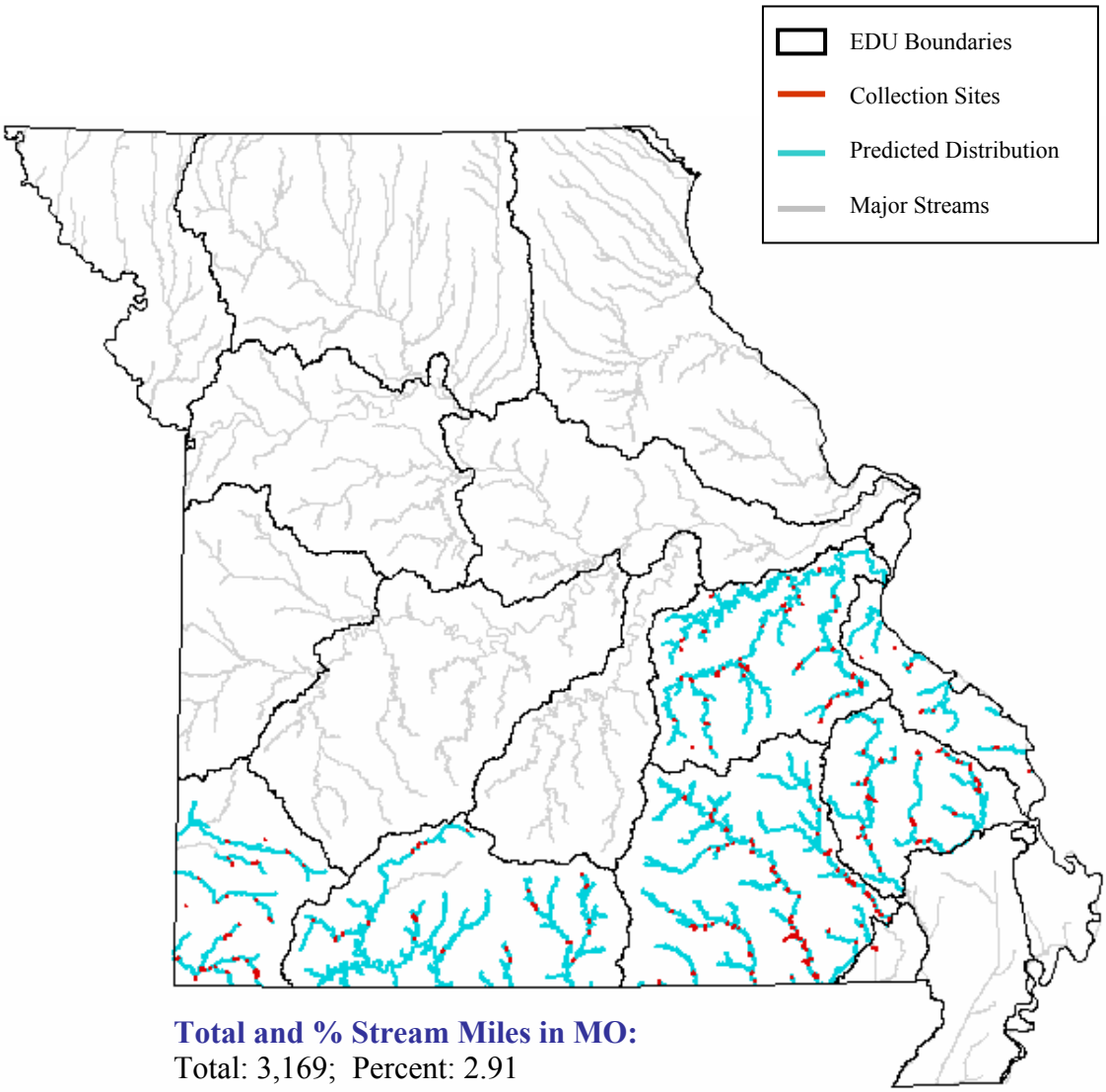
Endemism: Region

State Rank: S?

ITIS Code: 163475

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 3,169; Percent: 2.91

State Range:
The bigeye chub could be found throughout the Ozarks prior until the early 1940's (Pflieger 1971). Since then it has declined drastically in abundance. The largest remaining populations can be found in the southeast Ozarks in the Current, White and Elk drainages (Pflieger 1997).

Habitat Affinities:
The unique habitat requirements of the bigeye chub have been thoroughly investigated by Trautman (1957). He found that high-gradient streams had low populations especially if sand and fine gravel were prevented from accumulating by swift currents. Higher populations were found in low-gradient streams only when currents allowed sand and fine gravel deposition without siltation. Investigators in Arkansas, Missouri and Tennessee also noted that the bigeye chub could not tolerate siltation yet required fine gravel or sand substrates (Pflieger 1971; Robinson and Buchanan 1988; Etnier and Starnes 1993). In the southeastern Ozarks the bigeye chub is often found at the base of riffles where the current slackens or in quiet pools without current (Pflieger 1997). The bigeye chub avoids headwater streams with intermittent flow (Etnier and Starnes 1993; Pflieger 1997). Robinson and Buchanan (1988) report that it is often found associated with aquatic vegetation and prefers clear, highly oxygenated pools.

Predictive Model(s):

Ozark Model
([Linkr] >= 4)

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Bigeye Shiner

Notropis boops

Native: Yes

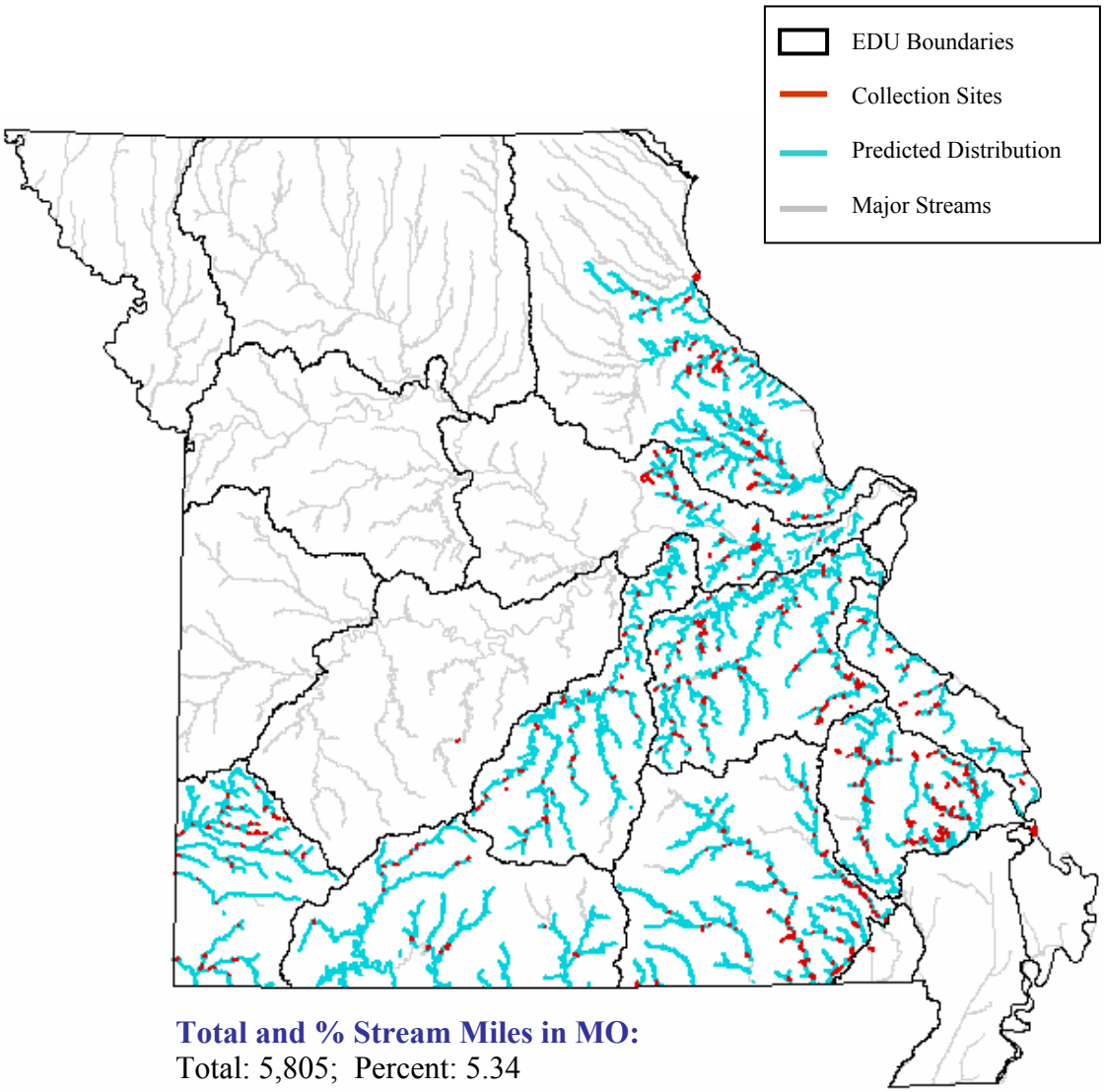
Endemism: Region

State Rank: S?

ITIS Code: 163430

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,805; Percent: 5.34

State Range:
The bigeye shiner is one of the most abundant minnows over its range. After it was introduced in Gasconade River from a bait-bucket around 1950 it has become increasingly abundant and widespread throughout the Gasconade drainage. It can be found in much of the Ozark Aquatic Subregion, excluding most of the Osage drainage. It is also found in the Central Plains/Cuivre/Salt Ecological Drainage Unit (Pflieger 1997).

Habitat Affinities:
The bigeye shiner inhabits clear streams with large, permanent pools lined with aquatic vegetation, such as water willow, and bottoms composed mostly of sand, gravel or rock (Pflieger 1997; Robinson and Buchanan 1988). Its ideal habitat is small creeks along the Ozark border with an abundance of warm, quiet pools. Where Ozark streams are cooled by springs isolated populations of the bigeye shiner can be found in backwaters and overflow pools that are several degrees warmer (Pflieger 1997). However, in Tennessee Etnier and Starnes (1993) find that the bigeye shiner is abundant in clear, cool upland streams. Several investigators note the bigeye shiner's intolerance to siltation and continuous high turbidity (Pflieger 1971; Robinson and Buchanan 1988; and Trautman 1957).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 3)

Ozark Model
(([Linkr] = 3) and ([Rgrad_subr] = 1) and ([Temp_code] = 2)) or (([Linkr] = 4) and ([Temp_code] = 2)) or (([Linkr] >= 5) and ([Linkr] <= 6)) or (([Linkr] >= 7) and ([Temp_code] = 2))

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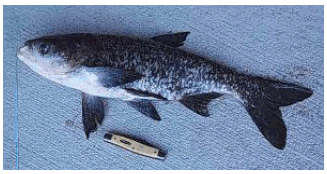


Bighead Carp

Hypophthalmichthys nobilis

Native: No

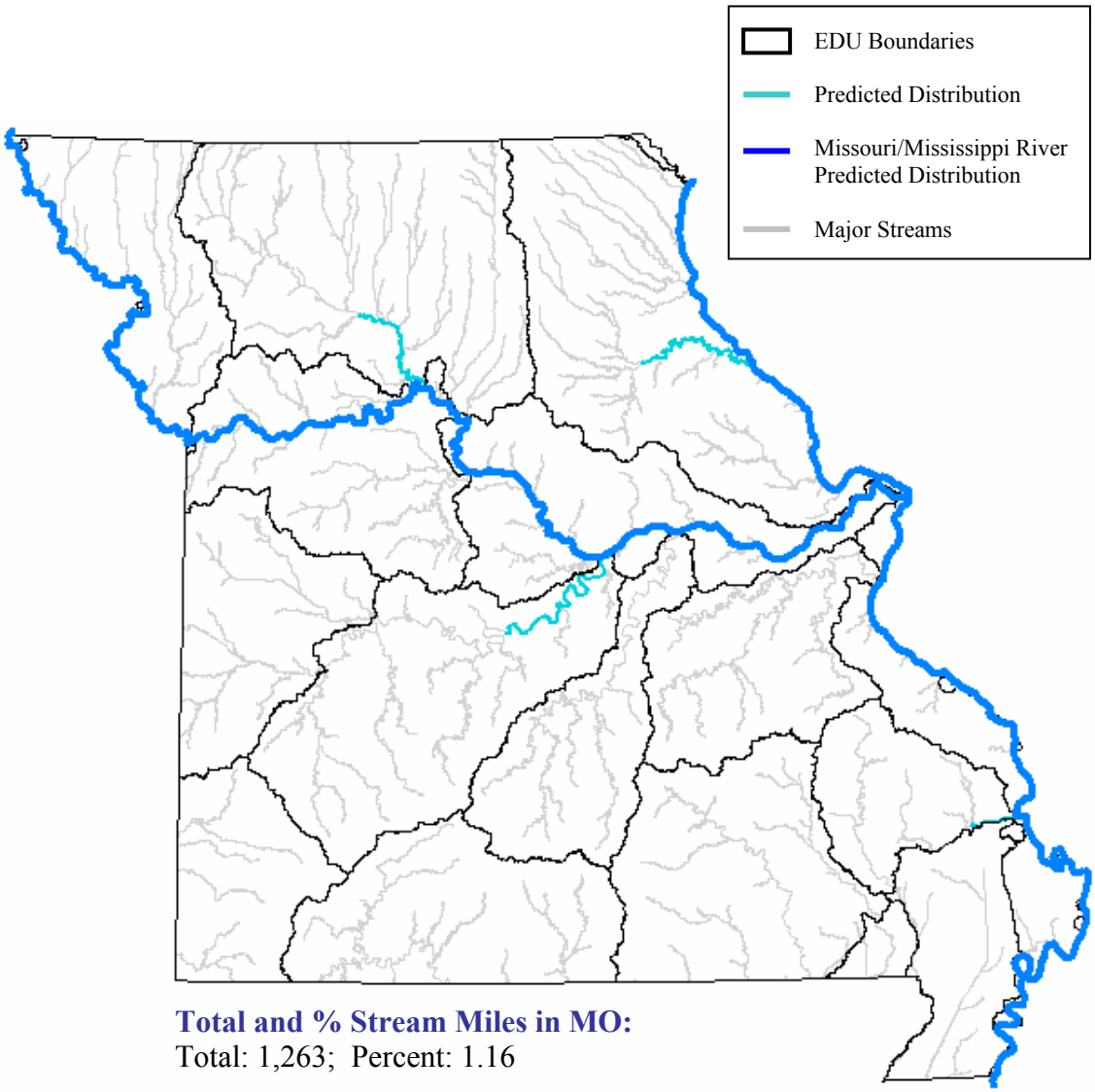
Endemism: NA

State Rank: SE

ITIS Code: 163692

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 1,263; Percent: 1.16

State Range:
The bighead carp was originally introduced in Arkansas in 1973 (Freeze and Henderson 1982) and by 1982 was present in the Missouri and Mississippi Rivers where it is now widely distributed and well established (Pflieger 1997). It can also be found in the lower Grand, Salt, and Osage Rivers.

Habitat Affinities:
The bighead carp is native to the big rivers of eastern China (Yangtze and Huang Ho) so it has adapted well to the Mississippi and Missouri Rivers. Using gill rakers to filter plankton and detritus (Pflieger 1997) the bighead carp is able to adapt to various environments. Both young and adults prefer the lower reaches of tributary streams and overflow waters in the river floodplain. Large concentrations of bighead carp have been observed in the tailwaters of several impoundments (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Ssize_code] = 4)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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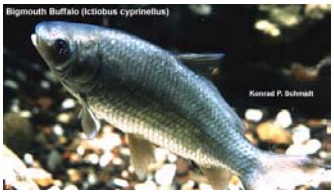
Bigmouth Buffalo

Ictiobus cyprinellus



Native: Yes

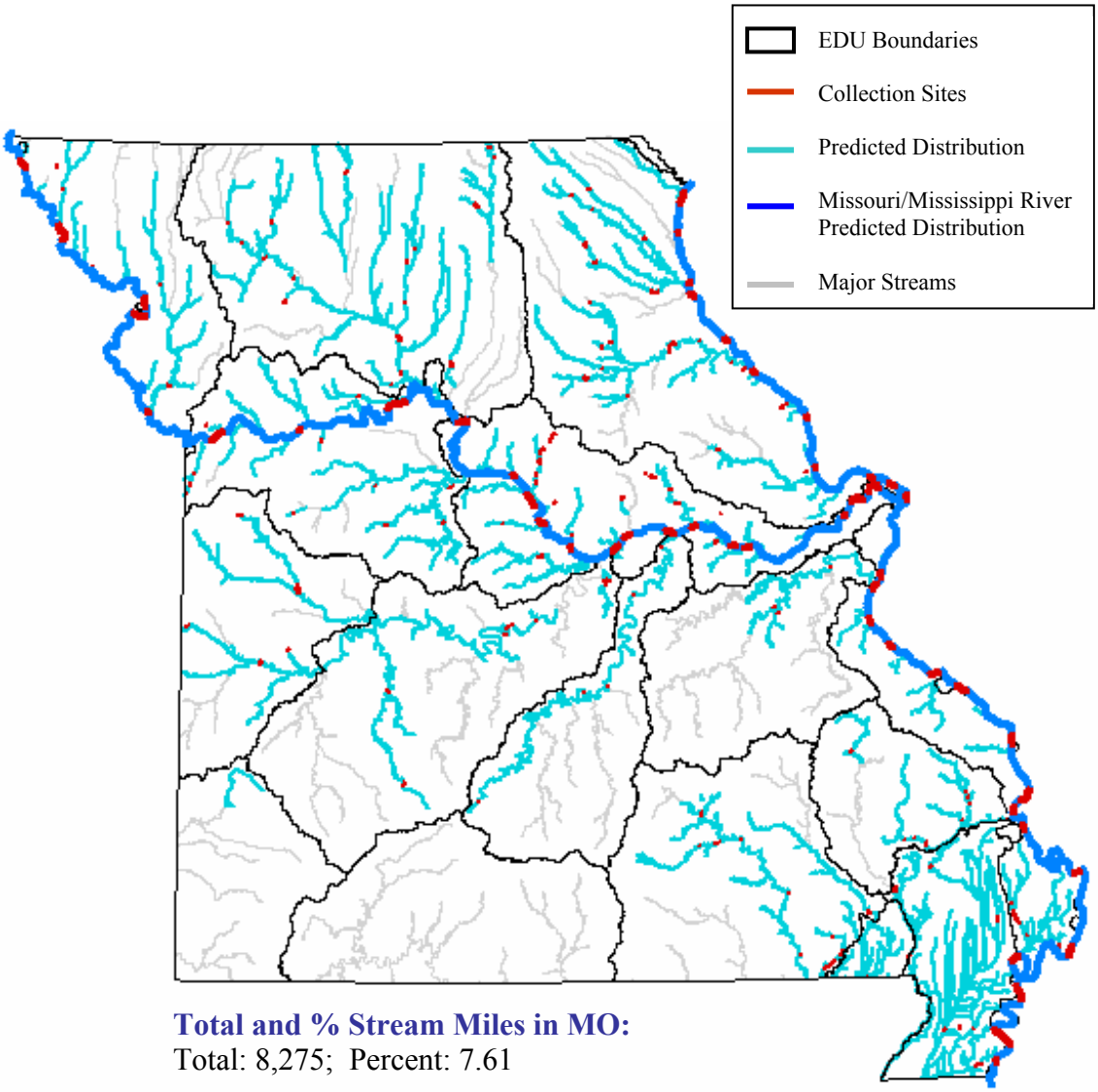
Endemism: Region

State Rank: S?

ITIS Code: 163956

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 8,275; Percent: 7.61

State Range:
The bigmouth buffalo is found throughout most of Missouri, except for the White River drainage. It is most abundant in the Missouri and Mississippi Rivers, the larger streams of the till plains, and in the larger ditches and streams in the Mississippi Alluvial Basin Aquatic Subregion and Current River drainage (Pflieger 1997).

Habitat Affinities:
The bigmouth buffalo lives primarily in quiet waters in pools of large streams, lakes, and reservoirs (Pflieger 1971; Robinson and Buchanan 1988; Trautman 1957). While it is commonly encountered in deep pool regions (Trautman 1957; Robinson and Buchanan 1988), the species can also be found in quiet shallow waters (Etnier and Starnes, 1993; Trautman 1957) and tolerates high water temperatures (Robinson and Buchanan 1988). It is more tolerant of high turbidity and standing water than other species (Pflieger 1997; Etnier and Starnes, 1993; Trautman 1957) and is successful in impoundments (Pflieger 1971; Robinson and Buchanan 1988). It sometimes moves into small streams to spawn, and its young remain in these streams during the first year of life (Pflieger 1997). Flood control has reduced the bigmouth buffalo's distribution in Tennessee (Etnier and Starnes, 1993).

Predictive Model(s):

Central Plains/Ozark Model
([Temp_code] = 2) and ([Linkr] >= 4)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 2) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Bigmouth Shiner

Notropis dorsalis

Native: Yes

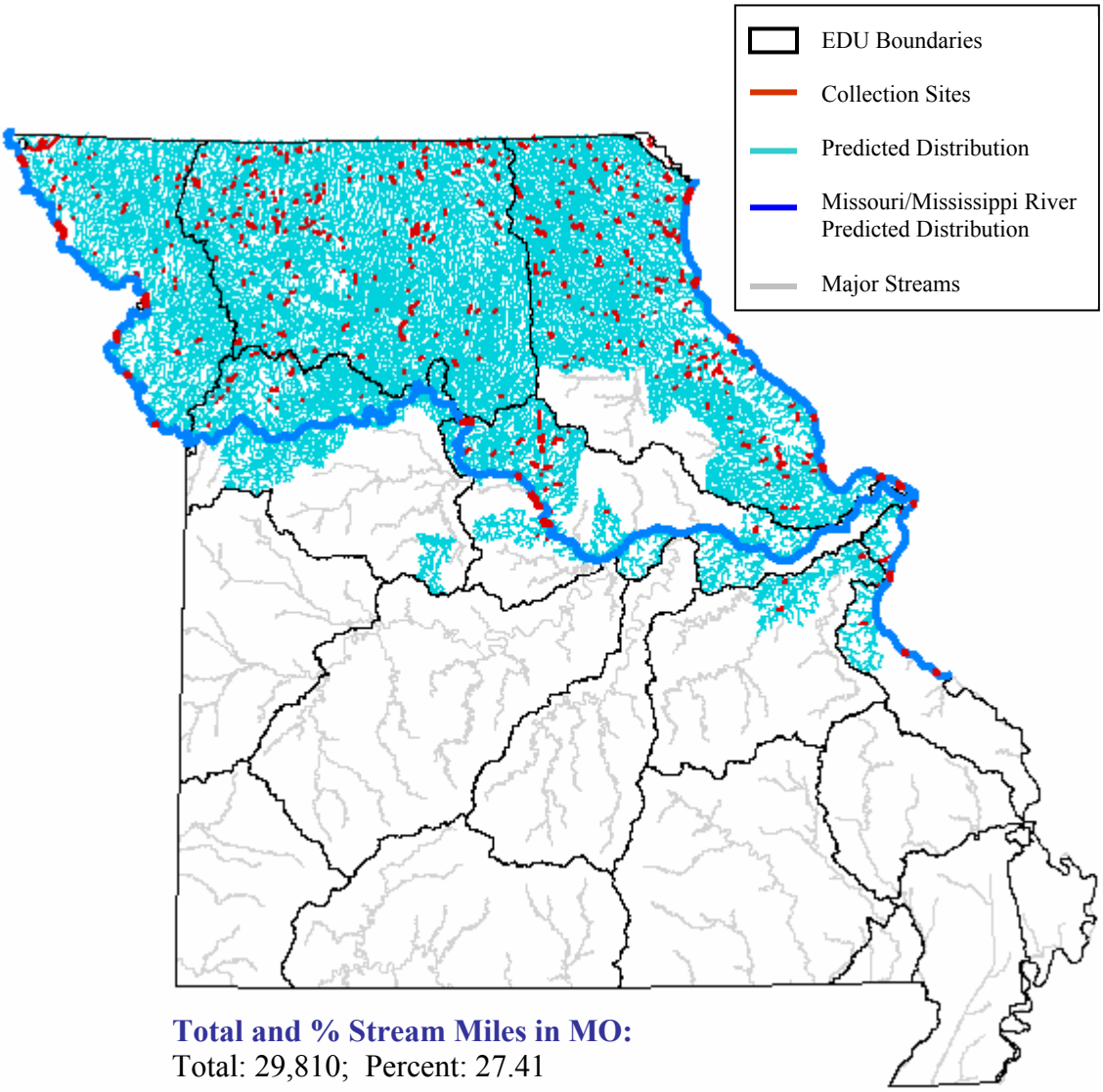
Endemism: Region

State Rank: S?

ITIS Code: 163439

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 29,810; Percent: 27.41

State Range:
The bigmouth shiner primarily inhabits the Central Plains Aquatic Subregion north of the Missouri River, and has been found southward along the Mississippi River (Pflieger 1997).

Habitat Affinities:
Bigmouth shiners are common in small, low to moderate-gradient prairie streams with slight current and unstable sandy bottoms (Pflieger 1997; Cross and Collins 1975; Trautman 1957; Etnier and Starnes, 1993). They are most abundant in streams having permanent flow (Pflieger 1971). They are able to adapt to fluctuating water levels, turbidity, and pollutants, but require a sand substrate not covered with silts (Trautman 1957; Etnier and Starnes, 1993). According to Etnier and Starnes (1993) bigmouth shiners occupy cool creeks but in Ohio (Trautman 1957) they were found to be uncommon or absent in cool streams. Pflieger (1997) states that the species has become more abundant in the past 50 years, due in part to the channelization of prairie streams.

Predictive Model(s):

Central Plains/Ozark Model
([Temp_code] = 2) and ([GradsegR] >= 1) and ([GradsegR] <= 8)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Black Buffalo

Ictiobus niger

Native: Yes

Endemism: Region

State Rank: S?

ITIS Code: 163957

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick

Total and % Stream Miles in MO:
Total: 3,773; Percent: 3.47

State Range:
The black buffalo occurs sporadically throughout the state but is less abundant and widespread than the other two buffalo fishes. It outnumbers the other two species only in the Current River (Pflieger 1997).

Habitat Affinities:
The black buffalo occurs in a variable range of habitats with only occasional abundance. In the Mississippi River Pflieger (1971) found that it is more abundant in the unimpounded section below the mouth of the Missouri River than in the channelized section above. However, investigators in Arkansas and Kansas find that the black buffalo occurs in impoundments and reservoirs (Cross and Collins 1975; Robinson and Buchanan 1988) and in Ohio Trautman (1975) found occasional abundance in turbid, mud-bottomed, shallow overflow ponds and sloughs. Whether in large rivers, shallow riffles or impoundments, the existence of strong current is a common denominator of the black buffalo habitat (Cross 1967; Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988), as evidenced by the nickname "current buffalo" given by commercial fisherman.

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 2) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Black Bullhead

Ameiurus melas

Native: Yes

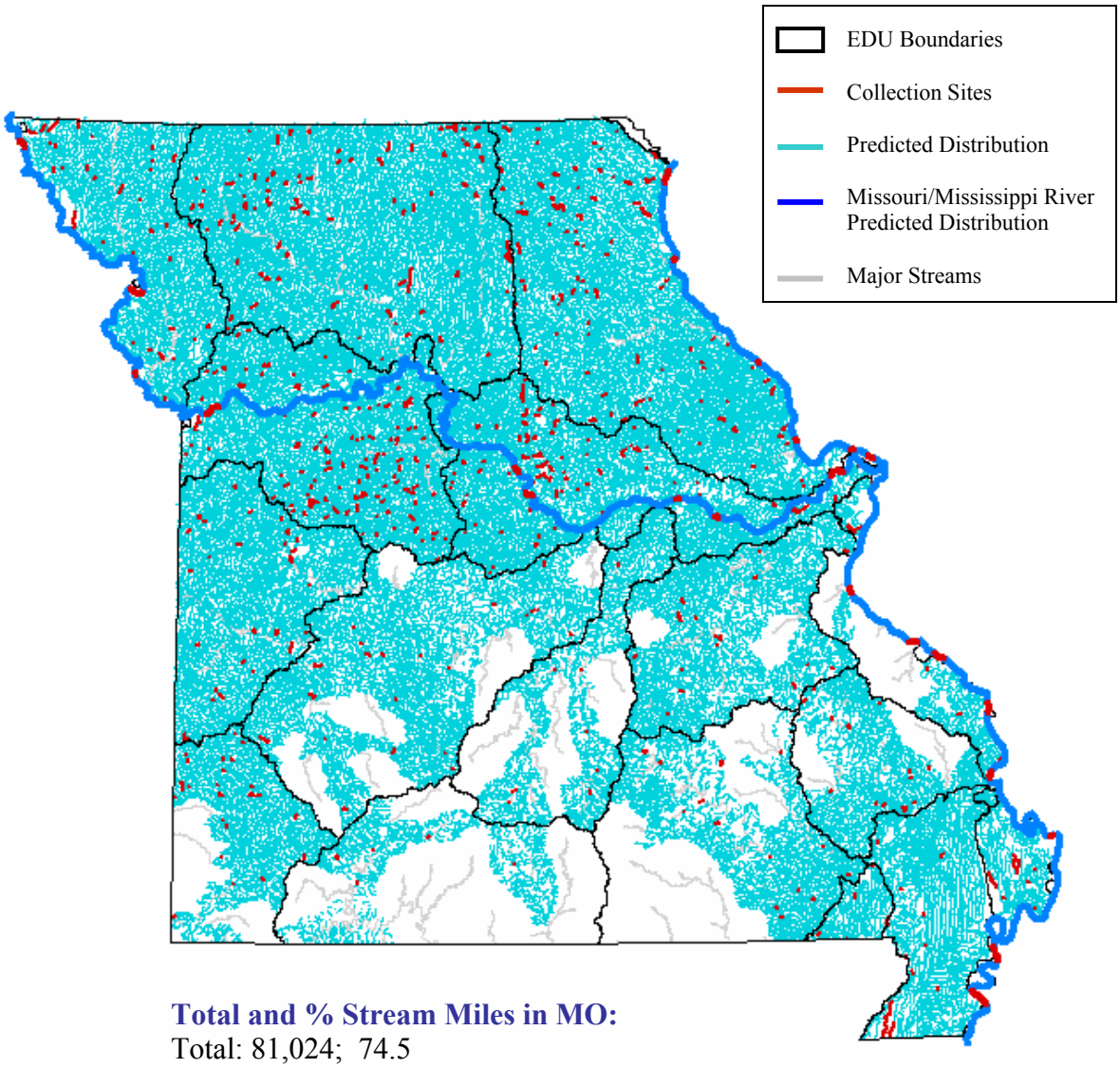
Endemism: Subzone

State Rank: S?

ITIS Code: 164039

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 81,024; 74.5

State Range:

The black bullhead occurs nearly statewide and is found at least occasionally in every principal drainage system in Missouri. However, it is more common in the prairie streams of northwest Missouri and less abundant in streams of the Ozarks and Mississippi Alluvial Basin.

Habitat Affinities:

The black bullhead inhabits a wide range of aquatic habitats including; pools, backwaters, oxbows, sloughs, bayous, swamps, marshes, ponds, lakes, reservoirs, both intermittent and permanent streams, and tributary confluences. It is found in virtually all stream size classes. The largest populations tend to occur in low-gradient segments of small to moderate sized streams. They are often found in quiet silt-bottomed backwater areas and pools of away from strong currents, inhabiting water having low diversity of fish fauna. They are tolerant of high turbidities and temperatures and also areas with low oxygen levels. The black bullhead nests in cleared holes or saucer-shaped depressions and spawns in standing water.

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 1) and ([Linkr] <= 6)

Ozark Model
([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Black Crappie

Pomoxis nigromaculatus

Native: Yes

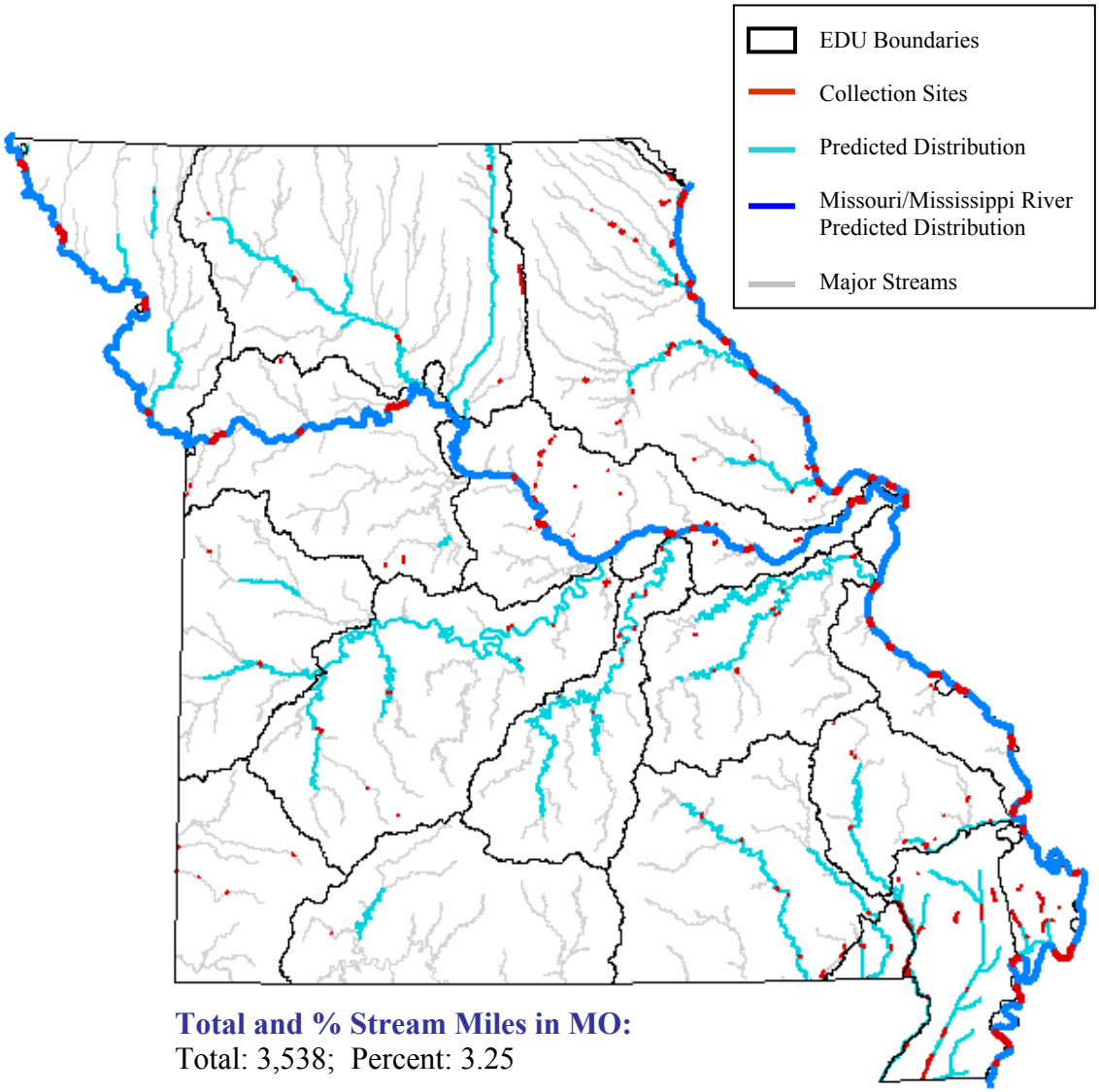
Endemism: Subzone

State Rank: S?

ITIS Code: 168167

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 3,538; Percent: 3.25

State Range:
The black crappie is distributed widely but occurs sporadically partially as a result of escapements from man-made impoundments. It is often found in the large reservoirs of the Ozarks, navigation pools of the upper Mississippi River, and natural lakes and borrow pits of the lowlands (Pflieger 1971).

Habitat Affinities:
The principal requirements of the black crappie are clear water, abundant cover in the form of submerged timber or aquatic vegetation (Pflieger 1971; Robinson and Buchanan 1988) and sandy or mucky bottoms (Trautman 1957). The black crappie has adapted well to impoundments and reservoirs, particularly clear stream-fed arms of reservoirs (Robinson and Buchanan 1988), with extensive growths of aquatic vegetation and little turbidity or siltation (Douglas 1974; Clay 1975; Etnier and Starnes 1993; Trautman 1957). Small populations are also present in low gradient portions of large streams (Trautman 1957).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Black Redhorse

Moxostoma duquesnei

Native: Yes

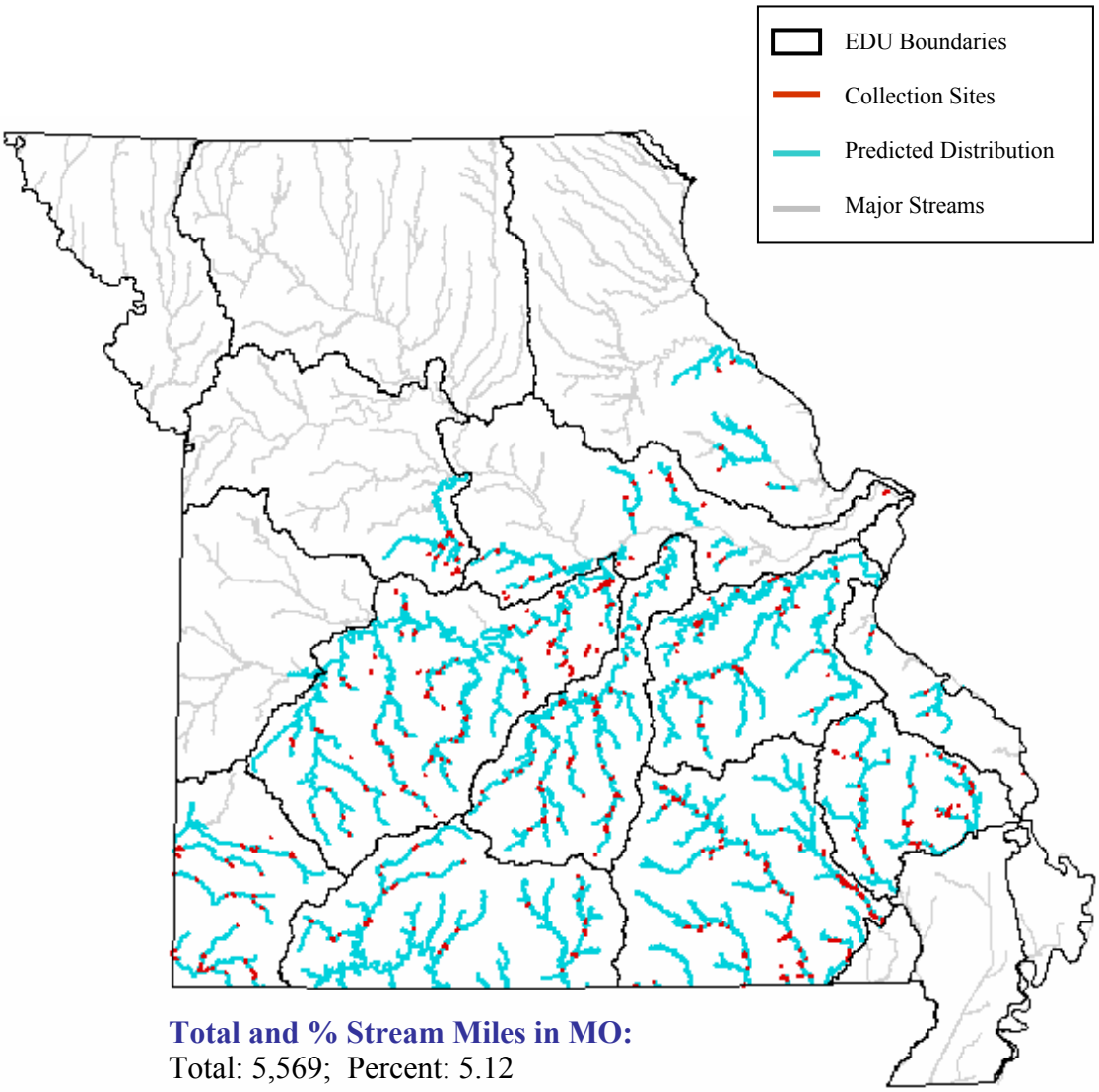
Endemism: Region

State Rank: S?

ITIS Code: 163938

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,569; Percent: 5.12

State Range:
The distribution of the black redhorse is sharply defined by the Ozark Aquatic Subregion. However, it has been found in the Cuivre and Lower Salt drainages within the northeast portion of the Central Plains Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The black redhorse is most abundant in streams of medium size but occurs in streams of all sizes (Pflieger 1997). However, Bowman (1970) found that its abundance in Missouri could be most closely correlated with volume of flow. In headwater creeks and stream branches it is replaced by the white sucker and in larger rivers by golden, shorthead and river redhorses (Pflieger 1997). The black redhorse generally prefers cooler, swifter streams in short, gravelly pools with considerable, but smooth current (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1971; Robinson and Buchanan 1988; Trautman 1957). The black redhorse is intolerant of pollution, siltation, turbidity and low gradients (Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957).

Predictive Model(s):

Central Plains/Ozark Model
([Linkr] >= 4)

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Blacknose Shiner

Notropis heterolepis

Native: Yes

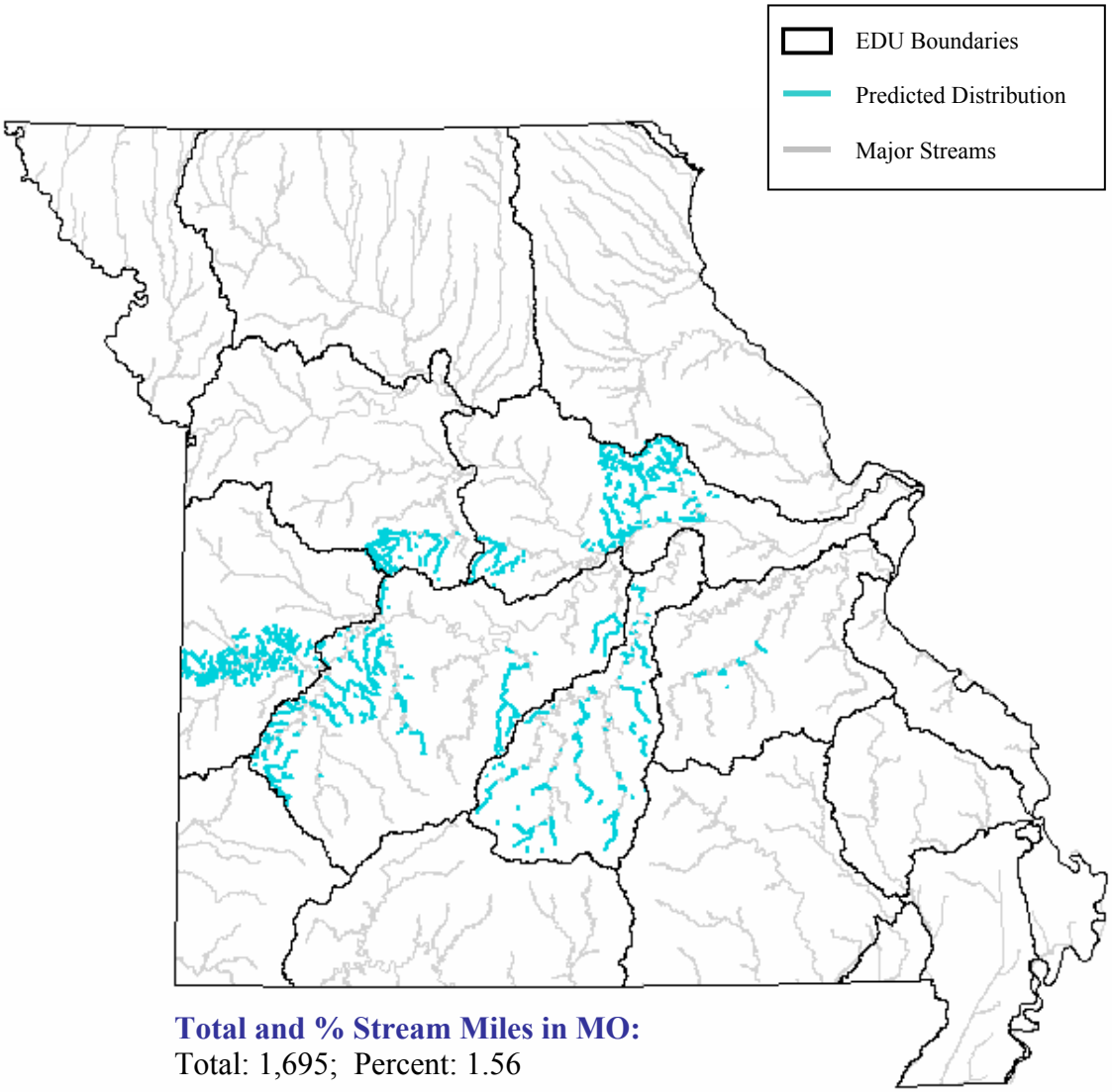
Endemism: Subzone

State Rank: S2

ITIS Code: 163446

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,695; Percent: 1.56

State Range:
The blacknose shiner has its distribution centered in drainages of the northeast portion of the Ozark Aquatic Subregion in Missouri. Early reports indicate that the blacknose shiner was more commonly and widely distributed pre-1900. Within the last 55 years it seems to have been extirpated from streams in the northern Ozarks, specifically the Osage Fork of the Gasconade, tributaries to the Lake of the Ozarks and Lower Osage River (Pflieger 1997).

Habitat Affinities:
Ideal habitats for the blacknose shiner are pools of small clear prairie streams of low gradients, aquatic vegetation and bottoms of clean sand, gravel, marl, muck, peat or organic debris (Pflieger 1997; Trautman 1957). In Minnesota it prefers clean, weedy lakes and streams in the glacial lakes region of the state (Phillips et. al. 1982).
The blacknose shiner is especially vulnerable to extirpation by pollution (Pflieger 1997), siltation and the decline of aquatic vegetation (Trautman 1957; Phillips et. al. 1982).

Predictive Model(s):

Central Plains/Ozark Model
(([Gradsegr] >= 3) and ([Gradsegr] <= 4)) or (([Gradsegr] = 5) and ([Flow] = 2))

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Blackside Darter

Percina maculata

Native: Yes

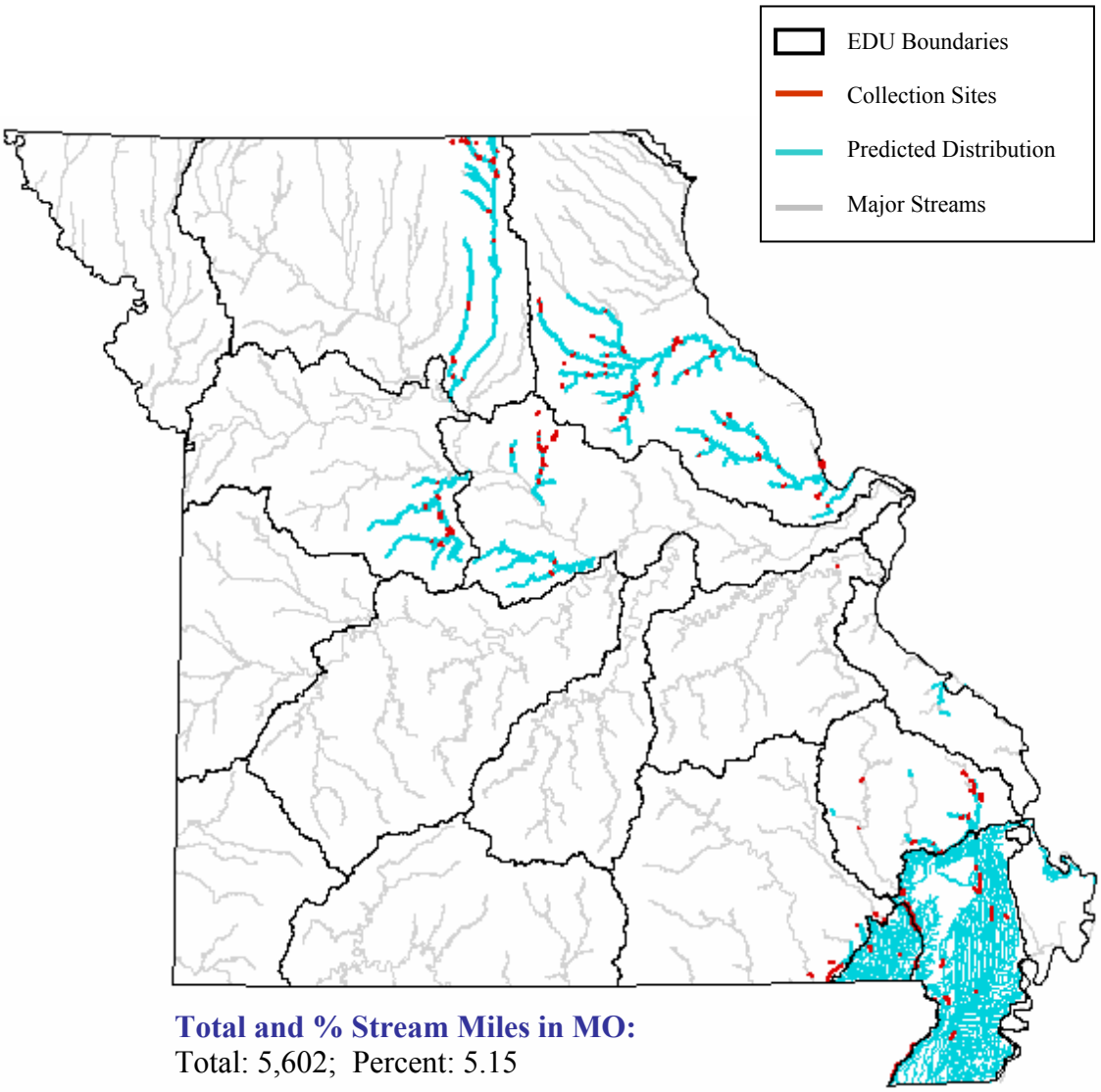
Endemism: Region

State Rank: S?

ITIS Code: 168488

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,602; Percent: 5.15

State Range:

The blackside darter occurs in two distinct regions of Missouri. The ditches and streams of the Mississippi Alluvial Basin Aquatic Subregion and the Prairie and Ozark border streams in central and northeast Missouri. The blackside darter generally exists in low-population densities, but historically with the largest populations in natural lowland rivers of the St. Francis and Castor drainages (Pflieger 1997). Pflieger (1997) also notes that abundance might have been higher prior to the extensive channelization of prairie rivers and the ditching and draining of the Mississippi Alluvial Basin Aquatic Subregion but there were no perceptible changes in distribution and abundance between 1940-1992.

Habitat Affinities:

The main habitat of the blackside darter is in pools and sluggish riffles (Clay 1975), particularly in areas of quickening and lessening currents connecting the pools and riffles, of medium-sized creeks and rivers with substrates ranging from sand to detritus, silt, boulders and rubble (Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Pflieger 1971; Robinson and Buchanan 1988; Trautman 1957). The young occur in backwaters among accumulations of sticks, leaves and other debris (Pflieger 1997). The blackside darter is more tolerant of turbid and warmer waters than other darters (Pflieger 1997) but highly intolerant of considerable siltation (Etnier and Starnes 1993) and organic pollutants such as mine wastes (Trautman 1957). In Kansas the blackside darter is labeled as a threatened species (Cross and Collins 1975).

Predictive Model(s):

Central Plains/Northern Ozark Model
([Temp_code] = 2) and ([Linkr] >= 4)

Southern Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5) and ([Linkr] <= 6) and ([Rgrad_subr] = 1)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

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Blackspotted Topminnow

Fundulus olivaceus

Native: Yes

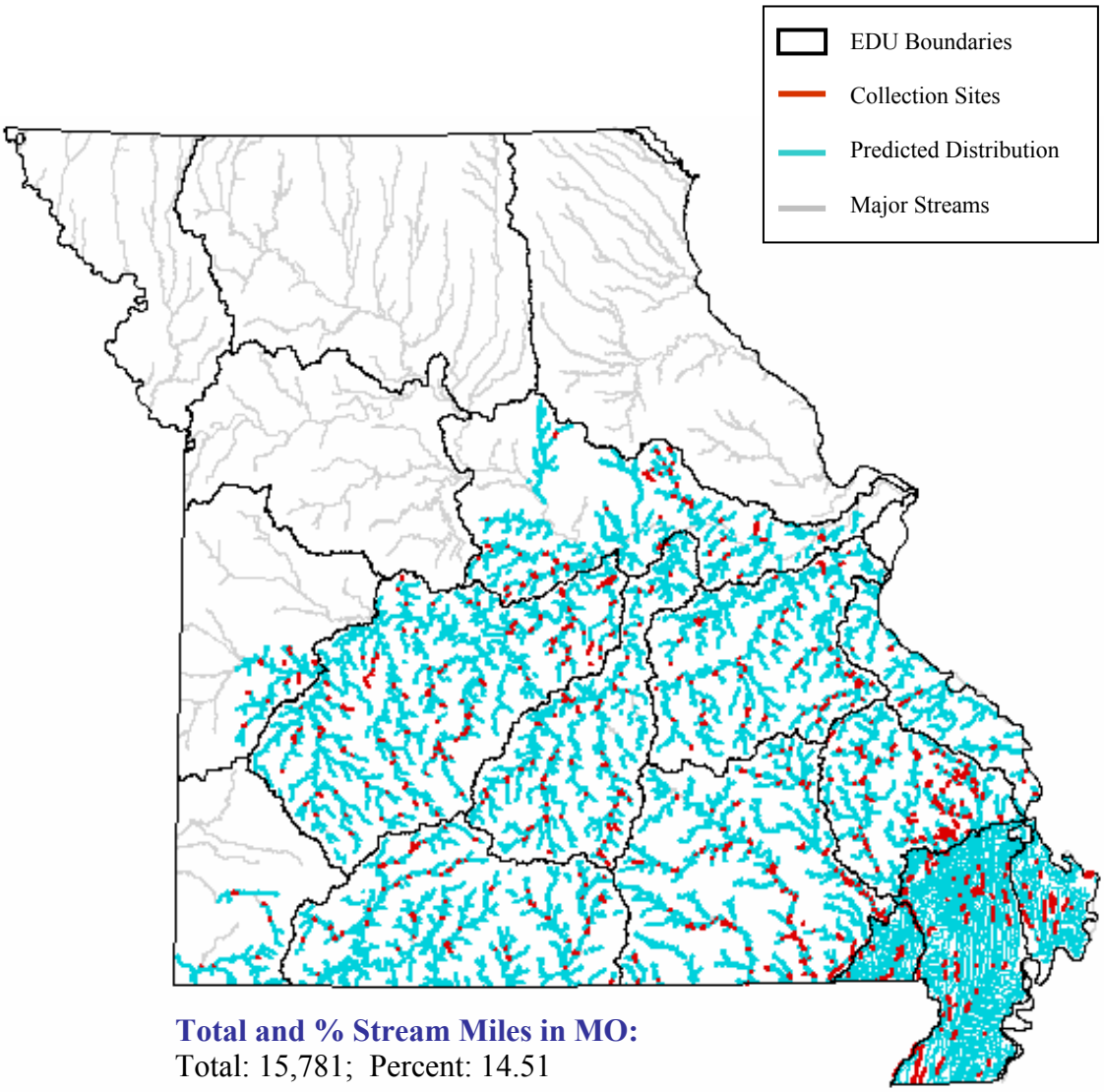
Endemism: Region

State Rank: S?

ITIS Code: 165655

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 15,781; Percent: 14.51

State Range:
The blackspotted topminnow is abundant throughout the Mississippi Alluvial Basin and Ozark Aquatic Subregions. In the Ozarks it is second in abundance only to the studfish (Pflieger 1997).

Habitat Affinities:
The blackspotted topminnow inhabits clear streams and ditches, occurring in quiet pools and backwaters away from strong current. It prefers permanent flowing streams and avoids excessively turbid waters (Pflieger 1997; Robinson and Buchanan 1988). Blackspotted topminnows are highly adaptable and can be found in small streams, large rivers, oxbow lakes, impoundments, and swamps, but they consistently occupy margins near heavy vegetation (Pflieger 1997; Robinson and Buchanan 1988; Douglas 1974). Pflieger (1997) emphasizes its complimentary distribution with the blackstripe topminnow, observing their intense competition and the fact that the blackspotted topminnow is less tolerant of extremes in flow, turbidity, and temperature.

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 2) and ([DlinkR] >= 4) and ([DlinkR] <= 7)) or (([Linkr] = 3) and ([Temp_code] = 2) and ([Flow] = 1)) or (([Linkr] = 4)) or (([Linkr] = 5) and ([Temp_code] = 2)) or (([Linkr] >= 6))
DlinkR is done.

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

References:

Braasch, M. E. and P. W. Smith. 1965. Relationships of the topminnows, *Fundulus notatus,* and *Fundulus olivaceous,* in the upper Mississippi River Valley. *Copeia* 1965:46-53.

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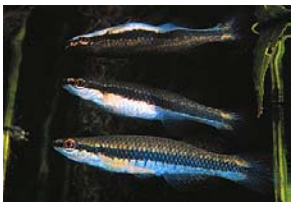
Blackstripe Topminnow

Fundulus notatus



Native: Yes

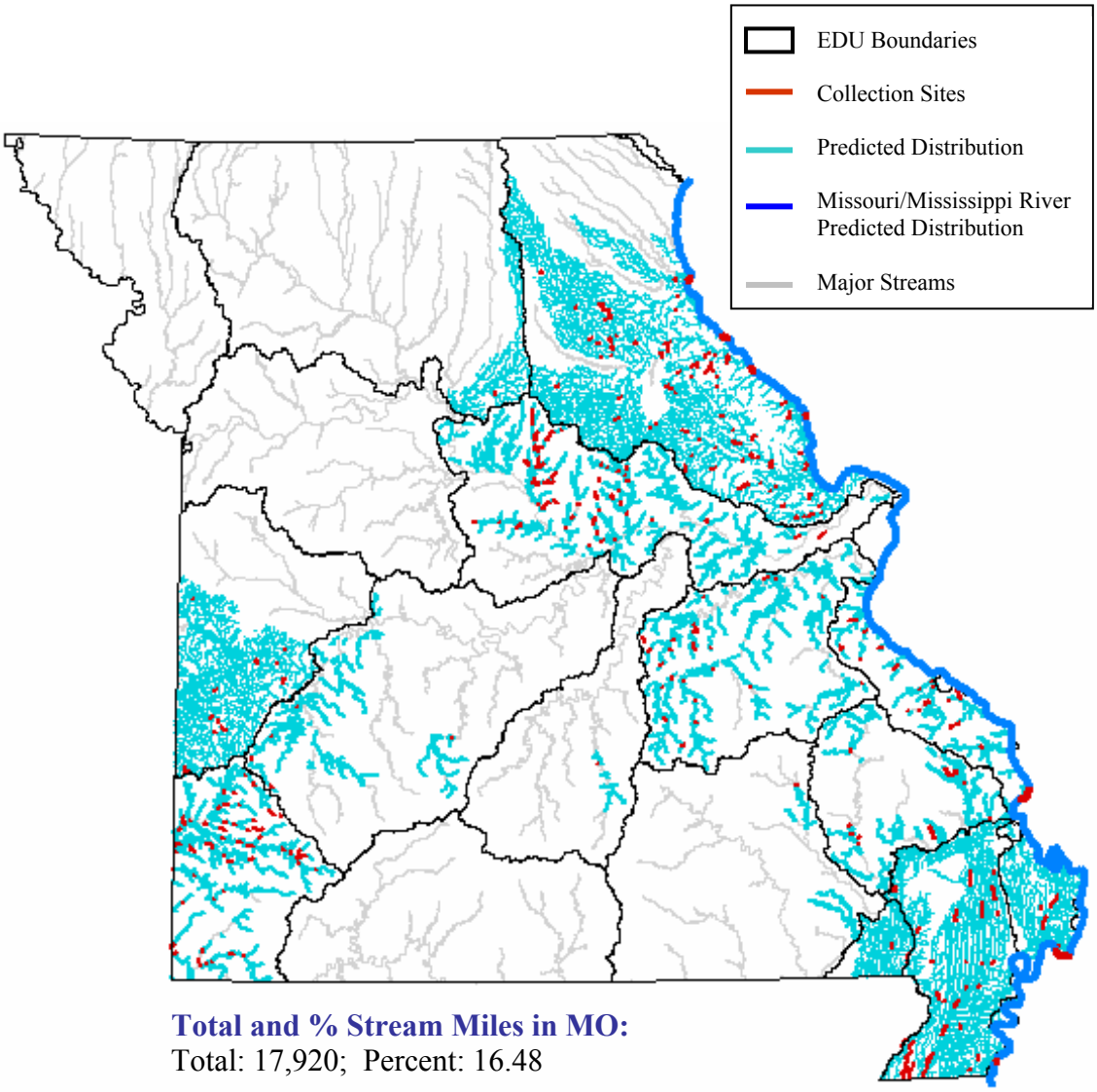
Endemism: Region

State Rank: S?

ITIS Code: 165663

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 17,920; Percent: 16.48

State Range:

The blackstripe topminnow is found in the Mississippi Alluvial Basin Aquatic Subregion, the Mississippi River and its tributaries along the eastern edge of Missouri, the Elk/Spring Drainage, and parts of the Plains Osage and Ozarks Osage Drainages. It is the most abundant and widely distributed topminnow over much of its range, and has increased in distribution since the 1940's (Pflieger 1997).

Habitat Affinities:

The blackstripe topminnow occurs in a variety of habitats, from small streams and ditches to large lowland rivers, sloughs, swamps, and oxbow lakes (Pflieger 1997; Trautman 1957; Etnier and Starnes, 1993). It can be found in clear water but commonly populates low gradient streams of moderate to high turbidity (Pflieger 1997; Trautman 1957; Robinson and Buchanan 1988). The blackstripe topminnow prefers quiet margins and pools without strong current (Pflieger 1997; Robinson and Buchanan 1988; Clay 1975; Cross and Collins 1975; Douglas 1974). It often occurs with some aquatic vegetation, over a variety of bottom types (Pflieger 1997; Trautman 1957; Clay 1975; Douglas 1974; Robinson and Buchanan 1988; Cross and Collins 1975). It competes with the blackspotted topminnow and predominates in waters along the boundary between the Central Plains and Ozark Aquatic Subregions, as well as in the more turbid and less vegetated ditches of the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997).

Predictive Model(s):

Central Plains Model
Query 1: ([Temp_code] = 2)
Query 2: (([Rgrad_subr] = 1)) or (([Rgrad_subr] >= 2) and ([Flow] = 1))

Ozark Model
(([Linkr] >= 1) and ([Linkr] <= 2) and ([Rgrad_subr] = 1) and ([DlinkR] >= 5) and ([DlinkR] <= 7)) or (([Linkr] >= 3) and ([Linkr] <= 5) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)) or (([Linkr] >= 6) and ([Rgrad_subr] >= 2)).

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

References:

Becker, G. C. 1983. Fishes of Wisconsin. University of Wisconsin Press, Madison. 1052 pp.

Braasch, M. E. and P. W. Smith. 1965. Relationships of the topminnows, *Fundulus notatus,* and *Fundulus olivaceous,* in the upper Mississippi River Valley. *Copeia* 1965:46-53.

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Blacktail Shiner

Cyprinella venusta

Native: Yes

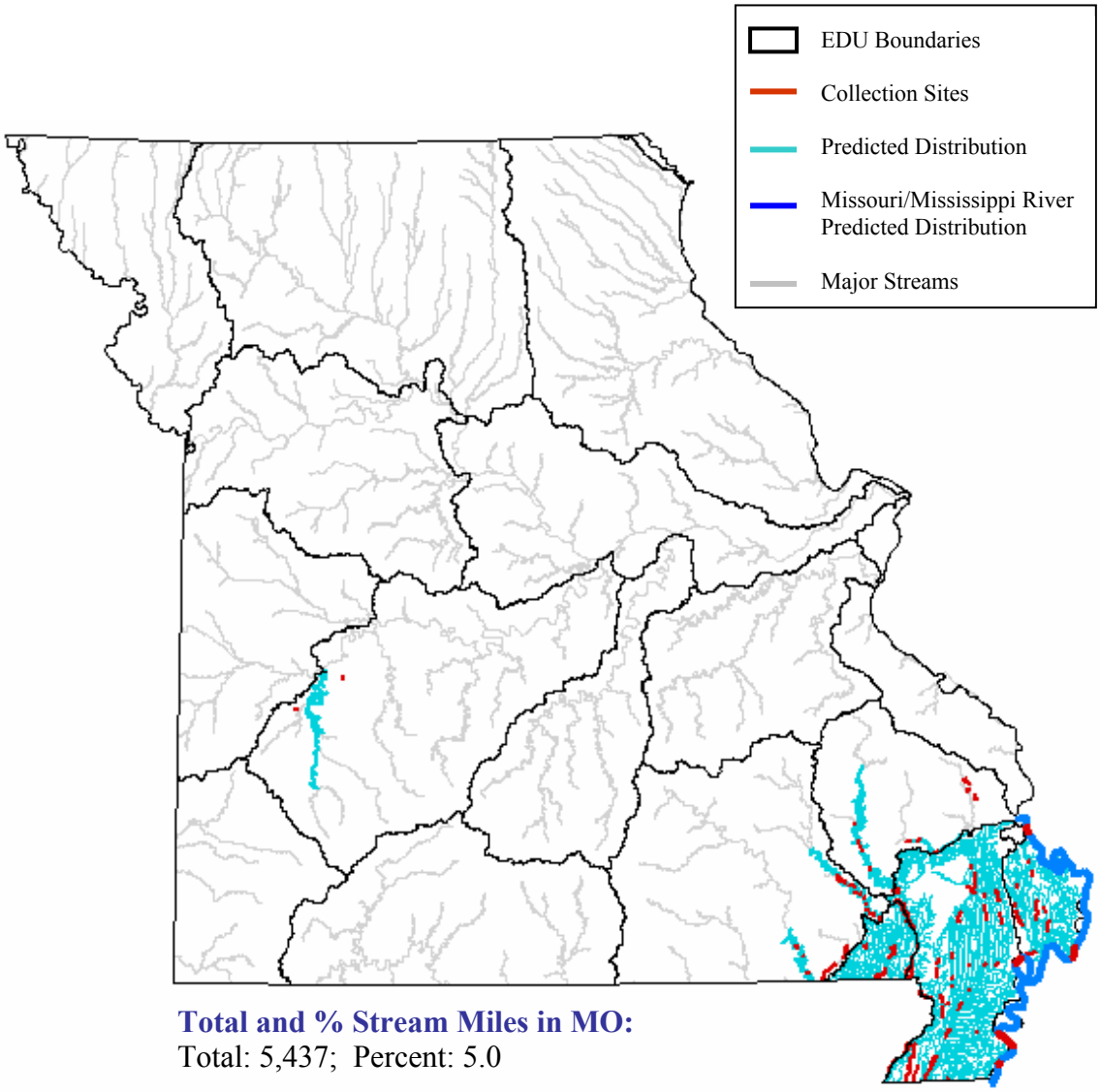
Endemism: Region

State Rank: S?

ITIS Code: 163809

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,437; Percent: 5.0

State Range:

In the Mississippi Alluvial Basin Aquatic Subregion the blacktail shiner is the most abundant and generally distributed minnow. It can also be found on the lower reaches of Ozarks streams entering the Mississippi Alluvial Basin Aquatic Subregion and in the lower Mississippi River (Pflieger 1997). After analyzing preserved samples from the introduction of the inland silverside in Stockton Lake, Pflieger (1997) found that the blacktail shiner was inadvertently introduced and by consequence is now found the Sac River system as well.

Habitat Affinities:

The blacktail shiner has a decided preference for flowing water and is one of the most dominant small fishes in the open channels of large, sparsely vegetated ditches of streams within Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997). It prefers clean water with sandy or gravelly bottom (Clay 1975; Etnier and Starnes 1993; Pflieger 1997), but can also be found in very turbid waters (Robinson and Buchanan 1988). Pflieger (1997) notes that the blacktail shiner is largely replaced by other minnows, such as the ribbon shiner and ironclad shiner, in clear weedy ditches without noticeable current. However, Robinson and Buchanan (1988) found that it occasionally occurs in oxbow lakes and some impoundments in northern Arkansas.

Predictive Model(s):

Ozark Model
Query 1: ([Temp_code] = 2)
Query 2: (([Linkr] >= 1) and ([Linkr] <= 2) and ([DlinkR] >= 7)) or (([Linkr] >= 6)) DlinkR is done.

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

References:

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Heins, D. C., and D. R. Dorsett. 1986. Reproductive traits of the blacktail shiner, *Notropis venustus* (Girard) in southern Mississippi. *Southwest Naturalist* 31:185-189.

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Bleeding Shiner

Luxilus zonatus

Native: Yes

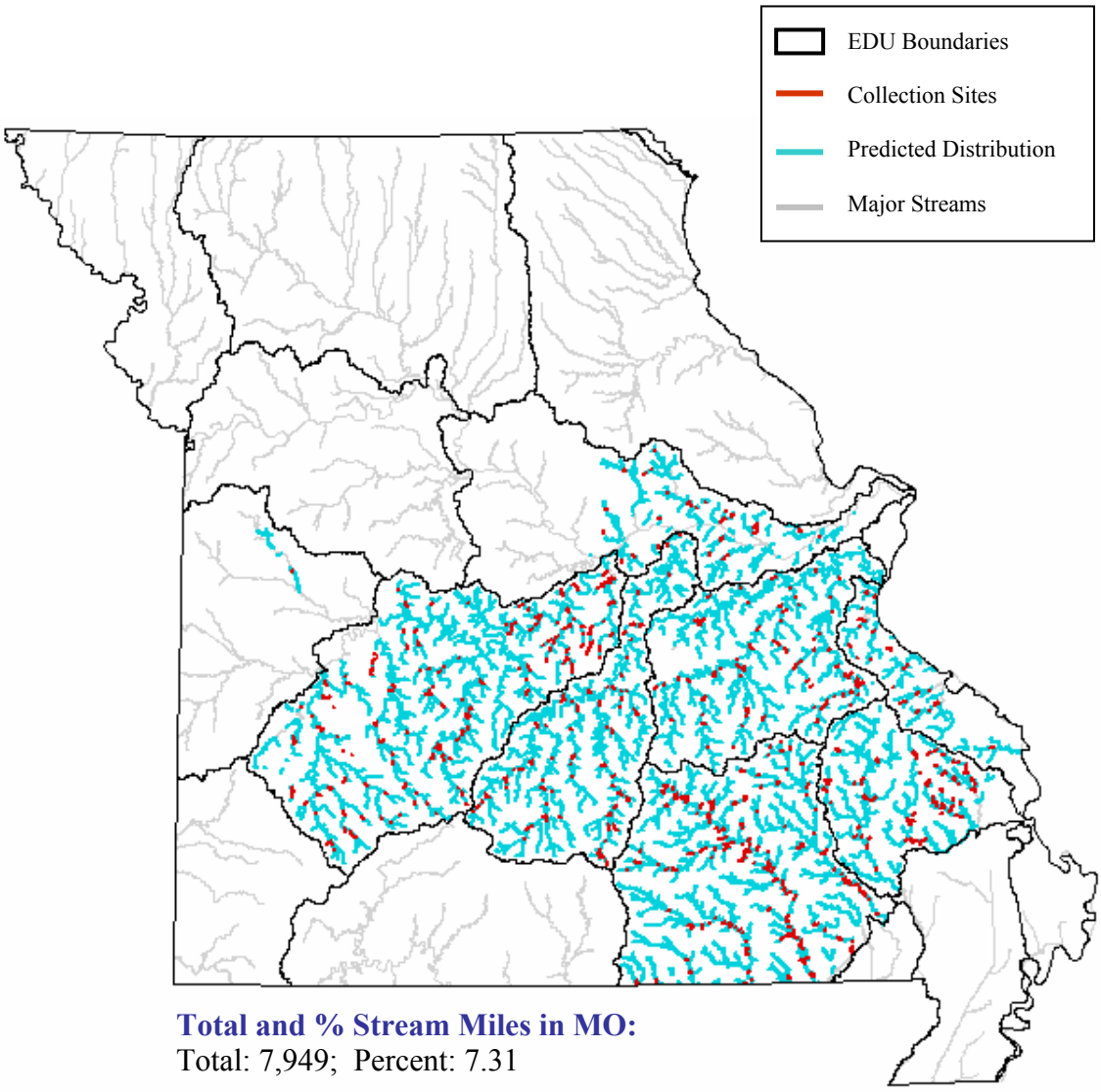
Endemism: Subregion

State Rank: S?

ITIS Code: 163840

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 7,949; Percent: 7.31

State Range:
The bleeding shiner is primarily restricted to the Ozark uplands and occurs in all major drainages not occupied by the closely related cardinal shiner (Pflieger 1997). It avoids streams that are underlain by shale bedrock, probably because of increased turbidity and intermittency of streams (Pflieger 1971).

Habitat Affinities:
The bleeding shiner can be found in permanent, small creeks to large rivers with strong current and clean, gravelly or rocky bottoms of riffles (Pflieger 1997; Robinson and Buchanan 1988). In the Ozark Aquatic Subregion it is often found in small pools with moderate to swift current where riffles and pools alternate in rapid succession (Pflieger 1971). The young are generally found in quieter water than adults (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 3) and ([GradsegR] >= 4)) or (([Linkr] = 4))or (([Linkr] = 5) and ([GradsegR] >= 2)) or (([Linkr] >= 6))

References:

Clay, W. M. 1975. The fishes of Kentucky. Kentucky Department of Fish and Wildlife Resources, Frankfort, KY. 416 pp.

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Blue Catfish

Ictalurus furcatus

Native: Yes

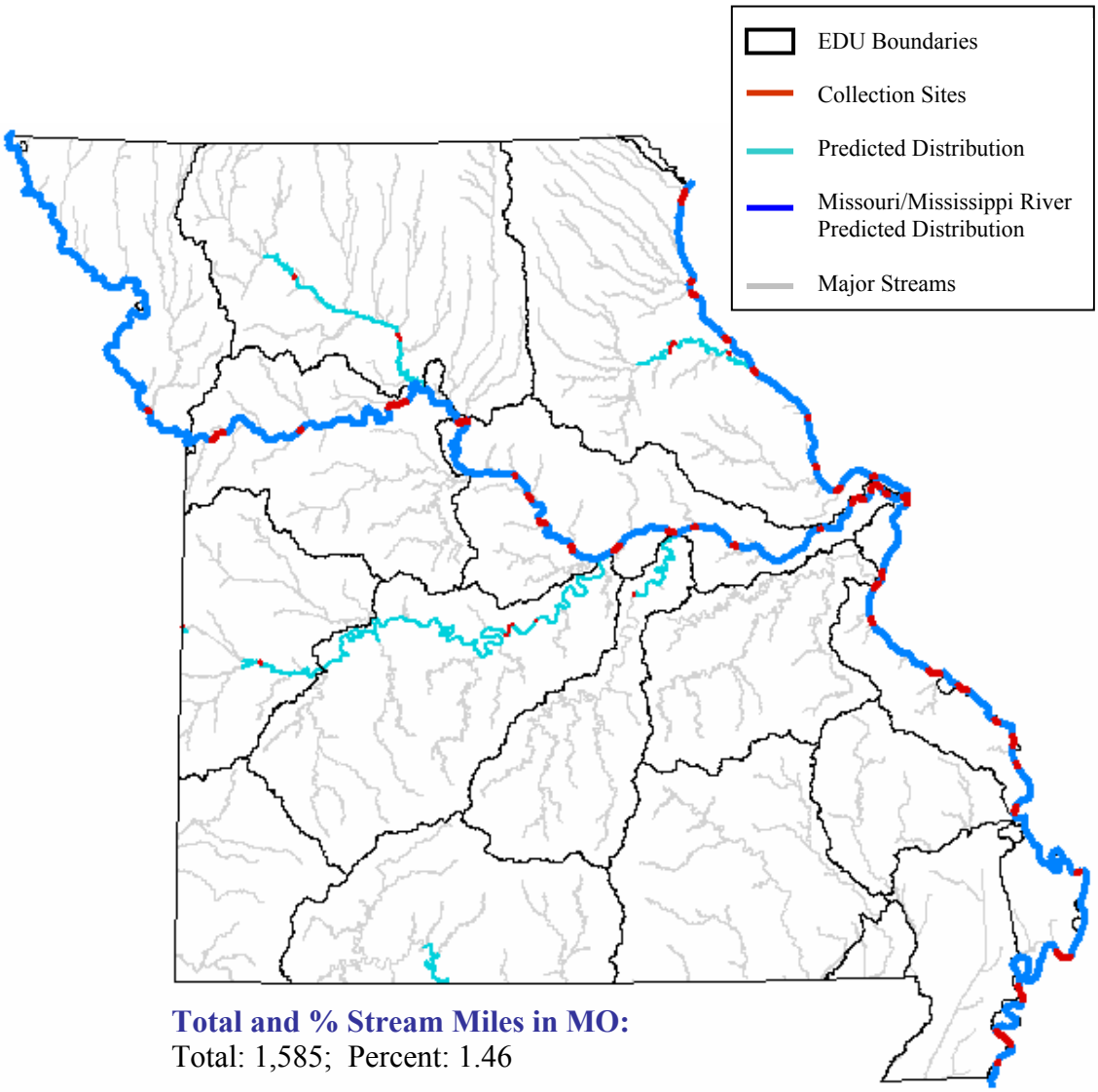
Endemism: Region

State Rank: SU

ITIS Code: 163997

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,585; Percent: 1.46

State Range:
The blue catfish is primarily found in the Missouri, Mississippi, Osage and Grand Rivers and their major tributaries (Pflieger 1971). It was formerly abundant near Keoukuk, Iowa during the summer months but, as a migratory species (Jordan and Everman 1916), it has declined due to the construction of dams (Pflieger 1997; Etnier and Starnes 1993).

Habitat Affinities:
The blue catfish inhabits rivers, large permanent streams, swift chutes, over-bars, pools, runs, raceways, ponds, lakes and oxbows (Douglas 1974; Pflieger 1971; Trautman 1957). It is associated with 8th-9th order streams with moderate to swift current, in the main channel and the main channel border. The blue catfish avoids the silted bottoms of most sluggish pools, preferring firm substrates of bedrock, boulder, sand or gravel, but does inhabit the deep waters of large reservoirs (Etnier and Starnes 1993; Cross and Collins 1975; Pflieger 1971).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

References:

Clay, W. M. 1975. The fishes of Kentucky. Kentucky Department of Fish and Wildlife Resources, Frankfort, KY. 416 pp.

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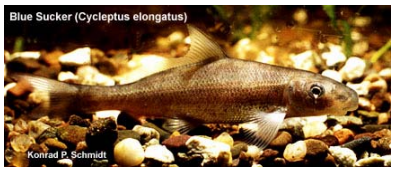


Blue Sucker

Cycleptus elongatus

Native: Yes

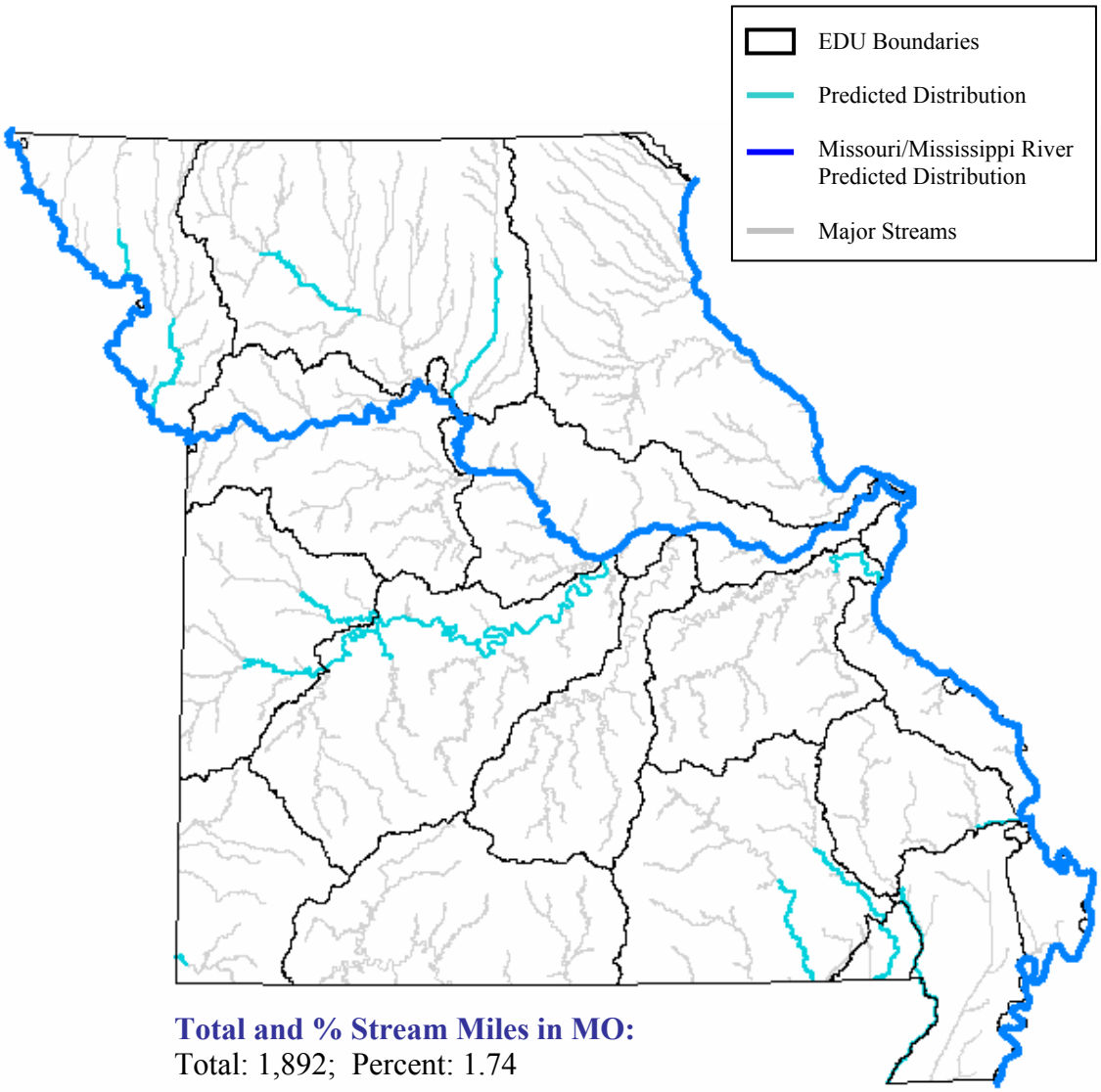
Endemism: Region

State Rank: S3

ITIS Code: 163953

Global Rank: G3G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,892; Percent: 1.74

State Range:

The blue sucker is most widely distributed in the Missouri and Mississippi Rivers and can occasionally be found in their tributaries. There are substantial populations in the Missouri River, the free-flowing section of the Mississippi River downstream from the mouth of the Missouri and the section of the St. Francis River within the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997). Because it is virtually invulnerable to normal collecting most of the year (Etnier and Starnes 1993; Pflieger 1997), the blue sucker is likely more abundant and widespread.

Habitat Affinities:

The blue sucker prefers the swift waters of big rivers overlying firm substrates such as sand, gravel or rock (Etnier and Starnes 1993; Pflieger 1997). Robinson and Buchanan (1988) found that it also inhabits the channels of deep lakes and Trautman (1957) found that it prefers channels and pools with moderate current. In Missouri the blue sucker is typically found where the channel is constricted by natural or artificial obstructions, including bedrock or boulder riffles, the tailwaters of dams, wing dikes and bridge abutments. As a migratory species, the blue sucker has declined in abundance since 1900 as dam construction has increased (Pflieger 1997). Dams have also limited the blue sucker's habitat by decreasing current velocity and increasing siltation (Pflieger 1971).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Bluegill

Lepomis macrochirus

Native: Yes

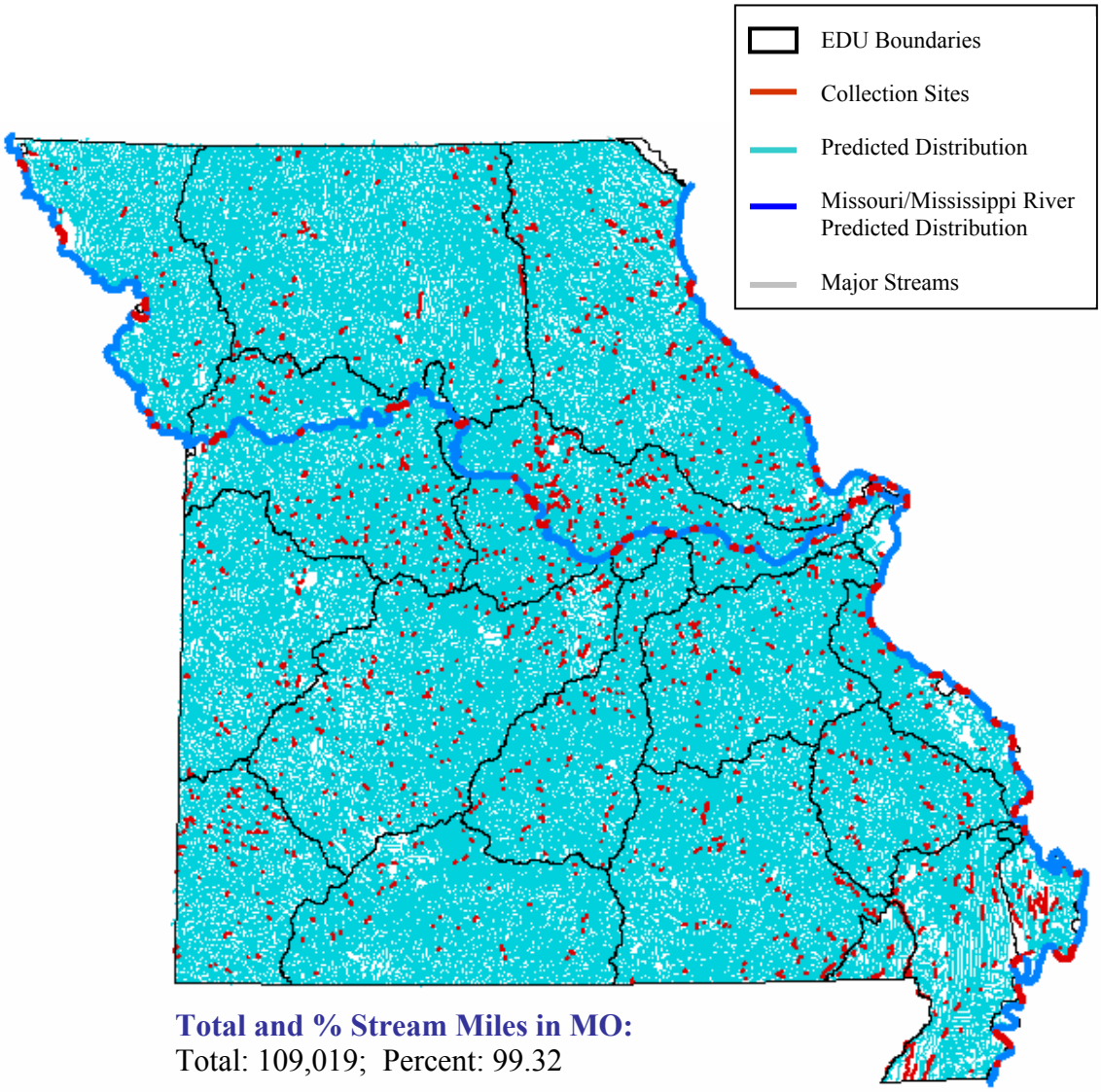
Endemism: Subzone

State Rank: S?

ITIS Code: 168141

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 109,019; Percent: 99.32

State Range:

The earliest statewide survey of Missouri fishes revealed that bluegill existed in small numbers throughout the Ozark and Mississippi Alluvial Basin Aquatic Subregions, but was apparently absent in the western portions of the Central Plains (Pflieger 1997). However, the available habitat of the bluegill has increased dramatically over the last 50 years with the construction of over 250,000 farm ponds in Missouri, most of which contain bluegill. As a result, the bluegill is distributed statewide and it is likely to be encountered in nearly any stream capable of supporting aquatic life (Pflieger 1997).

Habitat Affinities:

Aside from farm ponds and impoundments, the largest populations of bluegill are in warm pools and backwaters of low-gradient streams, and particularly in overflow pools along floodplains with some aquatic vegetation or other cover (Etnier and Starnes 1993; Trautman 1957). Pflieger (1997) notes that stream populations may be sustained by continuous escapement from impoundments. The bluegill is intolerant of continuous high-turbidity, siltation (Clay 1975; Pflieger 1971) and flowing waters (Douglas 1974; Trautman 1957).

Predictive Model(s):

Central Plains/Ozark Model
([GradsegR] >= 1)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Bluestripe Darter

Percina cymatotaenia

Native: Yes

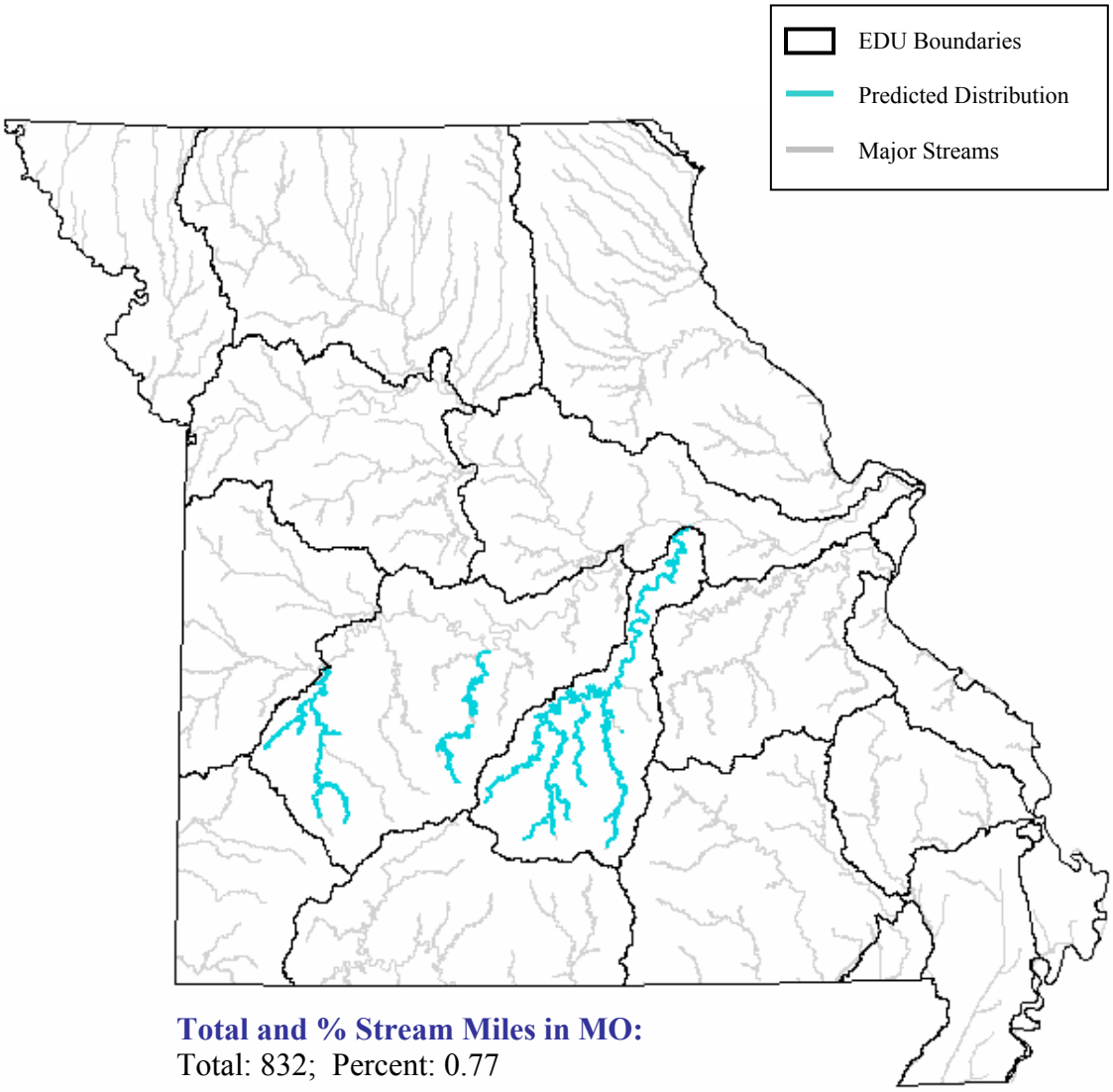
Endemism: EDU

State Rank: S2

ITIS Code: 168482

Global Rank: G2

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 832; Percent: 0.77

State Range:
The bluestripe darter has a localized distribution and is confined to the Osage and Gasconade systems in the northern part of the Ozark Aquatic Subregion. It may have been more abundant before the turn of the century but is now rare in Missouri (Pflieger 1971; Pflieger 1997).

Habitat Affinities:
The bluestripe darter is common in large creeks and small rivers with sand and rubble bottoms mostly free of silt. It prefers pool margins or ledges with little current and thick cover (Clay 1975; Pflieger 1971). The bluestripe darter is strongly associated with dense stands of emergent (*Justica*) and submergent (*Ranunculus, Myriophyllum, Potamogeton* and *Heteranther*) plants, and accumulations of dead leaves, sticks or other organic debris when aquatic plants are dormant (Pflieger 1997). The bluestripe darter spawns in slow, deep riffles and chutes adjacent to quiet backwater areas.

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and([Linkr] >= 5)

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Bluntface Shiner

Cyprinella camura

Native: Yes

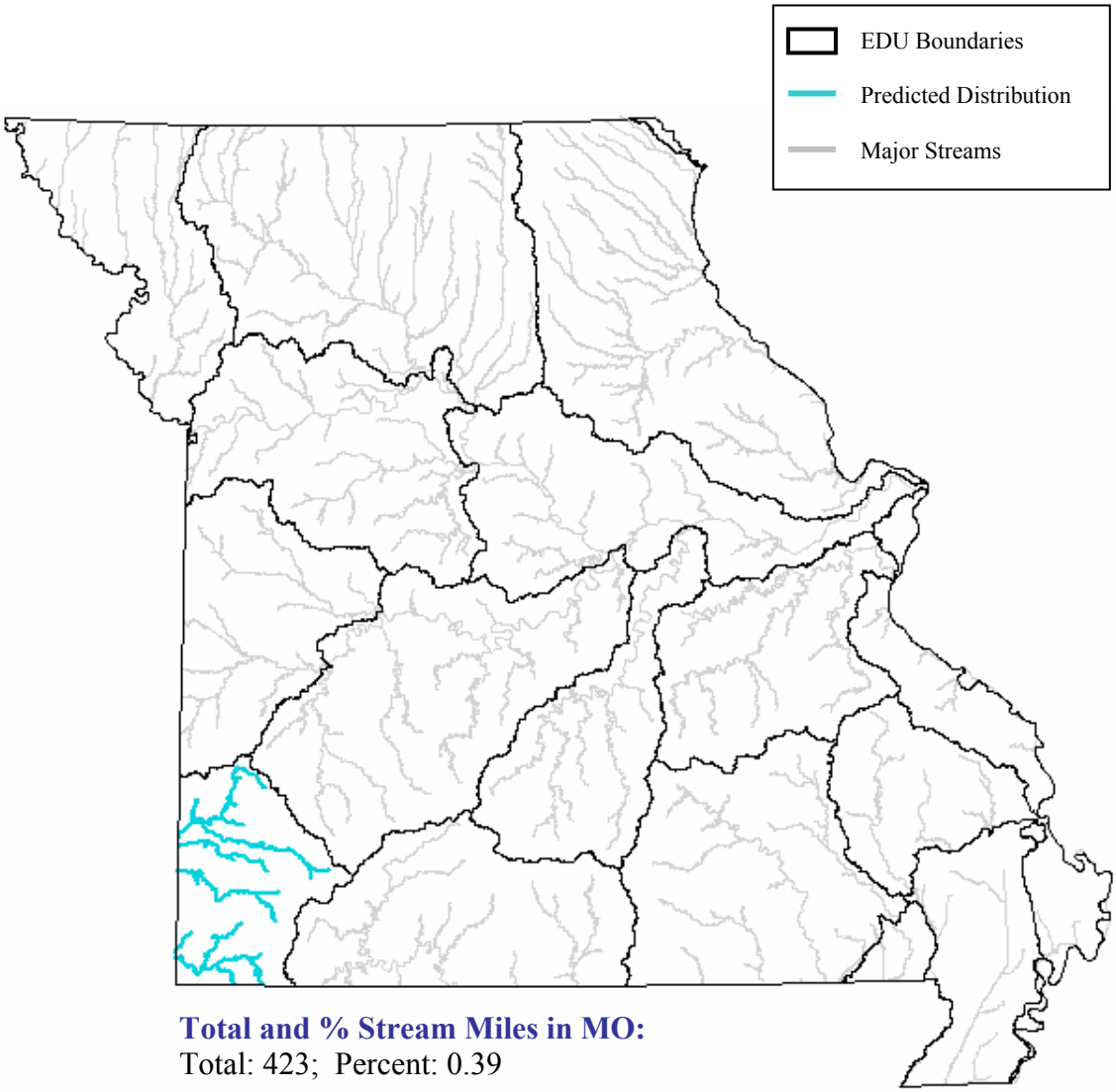
Endemism: Region

State Rank: S2S3

ITIS Code: 163776

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 423; Percent: 0.39

State Range:
The bluntface shiner is confined to the Neosho Ecological Drainage Unit on the southwestern slope of the Ozark Aquatic Subregion (Pflieger 1971). Its distribution has declined over since the late 1950's but it is still common in the lower Spring and Elk drainages.

Habitat Affinities:
The bluntface shiner can be found in clear water with swift current over gravel or rubble bottoms (Cross and Collins 1975; Pflieger 1997). In the Spring-Elk drainage it is commonly found near riffles with noticeable current (Pflieger 1997). It avoids streams with low gradients and sand or mud bottoms (Cross and Collins 1975). In Tennessee it is common in the headwater portions of lowland river systems in moderate to swift current over sand substrates (Etnier and Starnes 1993).

Predictive Model(s):

Ozark Model
Query 1: ([Flow] = 1)
Query 2: ([Linkr] >= 1) and ([Linkr] <= 2) and ([DlinkR] >= 5) or ([Linkr] >= 4).

References:

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Bluntnose Darter

Etheostoma chlorosomum

Native: Yes

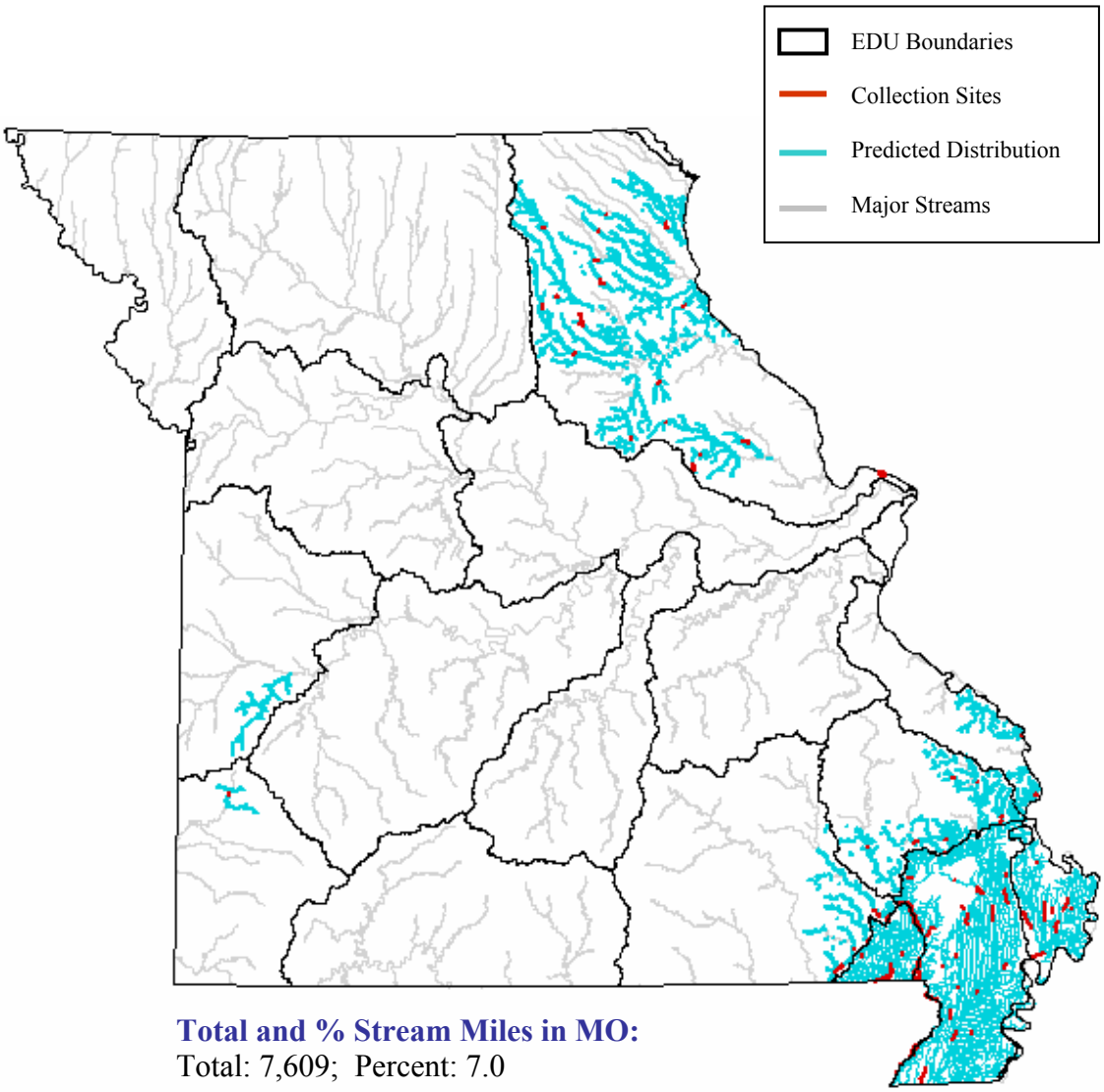
Endemism: Region

State Rank: S4

ITIS Code: 168365

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 7,609; Percent: 7.0

State Range:

Buntnose darters have two principal centers of occurrence in Missouri including the streams and ditches of the southeast Mississippi Alluvial Basin Aquatic Subregion, where it is one of the most common darters, and the northeast part of the Central Plains Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The habitat of the bluntnose darter is typified by quiet water with little or no current, reasonably firm substrates of sand, clay, mud or silt, and organic debris. It can be found in swamps, sloughs, bayous, ditches, intermittent and permanent streams, oxbows and backwaters (Clay 1975; Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). Pflieger (1997) found that the bluntnose minnow avoided clear ditches having dense growths of aquatic vegetation while Cross and Collins (1975) note that in oxbows and overflow pools clear water and vegetation are desirable. The blacknose darter can tolerate high turbidity but its decline from Central Plains Aquatic Subregion streams might be due to high siltation associated with row-crop production and overgrazing in the region (Pflieger 1997).

Predictive Model(s):

Central Plains Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: ([Linkr] >= 1) and ([Linkr] <= 5)

Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] >= 1) and ([Linkr] <= 5) and ([Rgrad_subr] = 1)) or (([Linkr] >= 6))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

References:

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Bluntnose Minnow

Pimephales notatus

Native: Yes

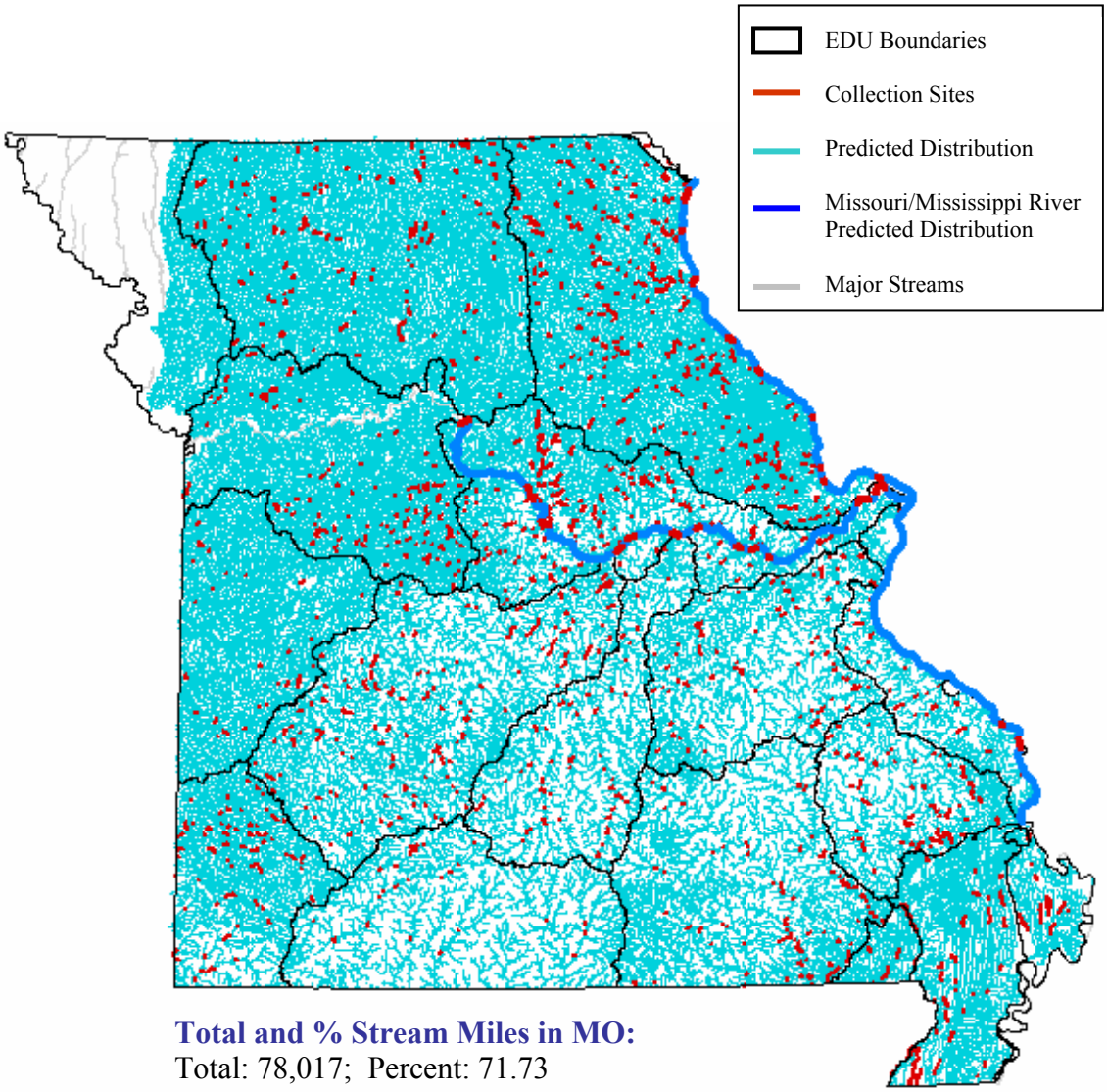
Endemism: Subzone

State Rank: S?

ITIS Code: 163516

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 78,017; Percent: 71.73

State Range:

The bluntnose minnow is one of the most common and generally distributed fishes in Missouri, second in collections only to the green sunfish. It reaches greatest abundance in the northeastern Central Plains Aquatic Subregion and along the northern and western border of the Ozark Aquatic Subregion (Pflieger 1971; Pflieger 1997).

Habitat Affinities:

The bluntnose minnow can be in all types of waters but is most abundant in quiet pools and backwaters of moderate size streams and lakes having clear, warm water, permanent flow, gravel bottoms, and some aquatic vegetation. (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). In the cooler streams of the Ozark Aquatic Subregion the bluntnose minnow prefers warmer backwaters off the main channel. The fathead minnow replaces the bluntnose in turbid and silty plains streams and the bluntnose is far outnumbered by the bullhead minnow in the larger rivers and ditches of the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997). Trautman (1957) found that the bluntnose minnow was most abundant in waters draining lands rich in organic matter and high in phytoplankton populations.

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 1)

Ozark Model
(([Linkr] = 1) and ([Rgrad_subr] = 1)) or (([Linkr] = 2))or (([Linkr] = 3) and ([Temp_code] = 2)) or (([Linkr] >= 4))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Bowfin

Amia calva

Native: Yes

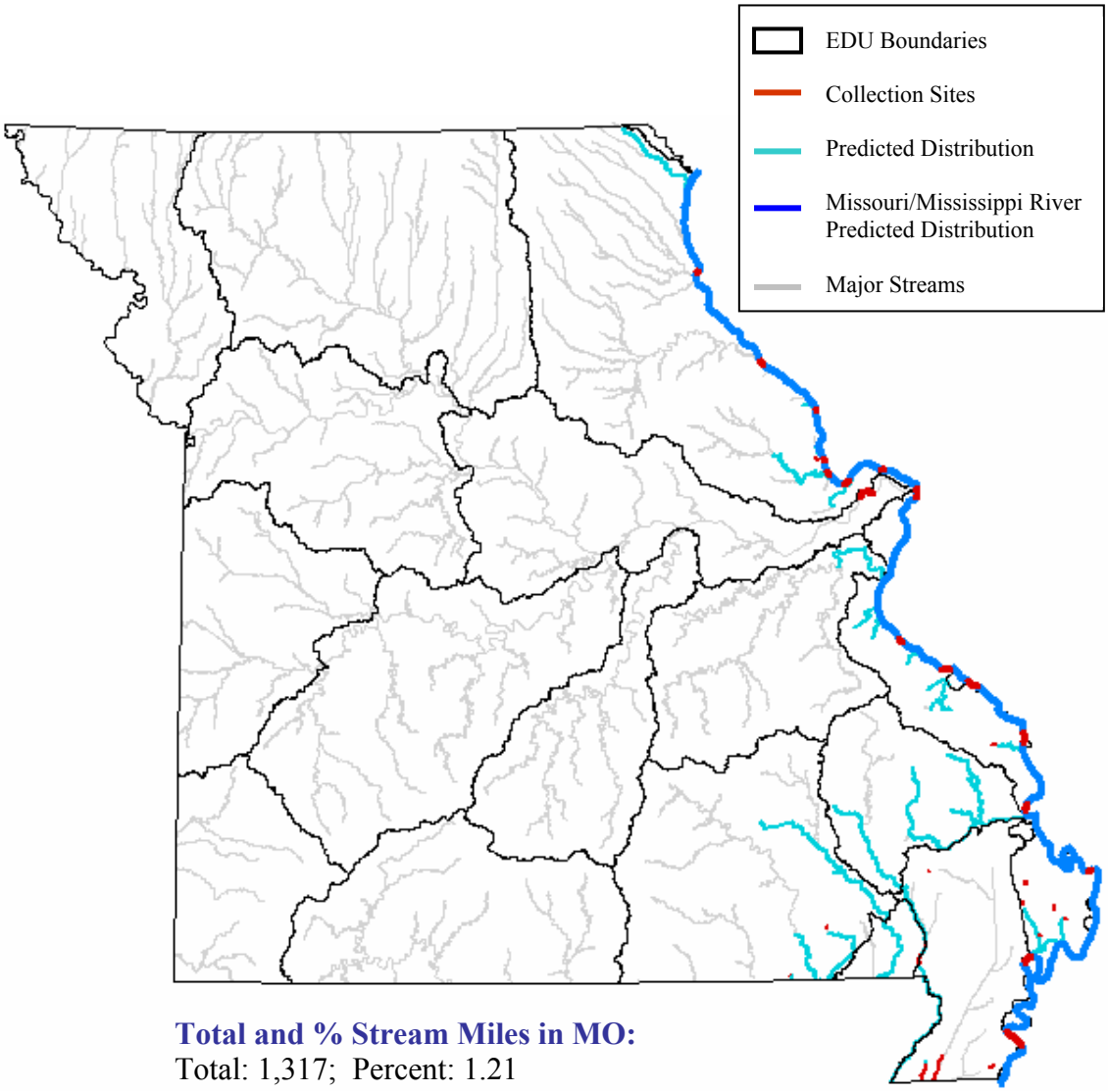
Endemism: Subzone

State Rank: S?

ITIS Code: 161104

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,317; Percent: 1.21

State Range

The bowfin occurs mainly in the southeast corner of Missouri in streams of the Mississippi Alluvial Basin Aquatic Subregion (St. Francis, Little, Black and Current Rivers). It is also found throughout the Mississippi River, but much more common and abundant above the Missouri River confluence (Pflieger 1997).

Habitat Affinities:

The bowfin occurs in a variety of aquatic habitats including; swamps, marshes, sloughs, oxbows, bayous, backwaters, borrow pits, ditches and streams. In the Mississippi Alluvial Basin Aquatic Subregion this species is found in swamps, sloughs, borrow pits, ditches, and abandoned stream channels (Pflieger 1997). In ditches this species is most abundant in sections having thick beds of aquatic vegetation or other cover (Pflieger 1997, Trautman 1957). Along the Mississippi and other large rivers, bowfin are more often found in backwaters and oxbows choked with aquatic vegetation, than in the main channel (Cross and Collins 1975; Douglas 1974; Pflieger 1997). In the Ozark Plateau this species is largely confined to the low gradient sluggish waters and backwaters within the lower sections of relatively large perennial streams. Bowfin tend to avoid areas with strong current and high turbidity (Trautman 1957). Adults breed over sand and gravel substrates avoiding areas with high concentrations of silt substrate. Bowfin are typically found in streams ranging in size from 2nd to 9th order and when not breeding are usually found in pool habitats (MOFWIS 2003).

Predictive Model(s):

Central Plains/Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: ([Linkr] >= 5)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = “MO”)

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Brassy Minnow

Hybognathus hankinsoni

Native: Yes

Endemism: Subzone

State Rank: S3

ITIS Code: 163363

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick

Total and % Stream Miles in MO:
Total: 1,582; Percent: 1.46

State Range:
The brassy minnow's central distribution area is in small tributaries of the Chariton River drainage. Small populations can also be found in two tributaries of the upper Mississippi River, although these may be from recent bait bucket introductions, and westward in the Missouri River (Pflieger 1997).

Habitat Affinities:
The brassy minnow can be found in small weedy pools or small, clear streams with moderate current and sandy bottoms covered with organic sediment (Cross and Collins 1975). In the Chariton drainage the largest populations can be found in small, moderately clear prairie creeks having permanent pools and sandy or gravelly bottoms (Pflieger 1997). The brassy minnow feeds on benthic algae by ingesting the organic-rich ooze that forms over the stream bottom (Eddy and Underhill 1974; Pflieger 1997), and spawns in quiet water in early spring (Eddy and Underhill 1974).

Predictive Model(s):

Central Plains/Ozark Model
Query 1: ([Temp_code] = 2)
Query 2: (([Flow] = 1)) or (([Flow] >= 2) and ([Linkr] >= 2))

Great River Model
The Missouri River distribution is based upon existing collection records and professional review.

References:

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Brindled Madtom

Noturus miurus

Native: Yes

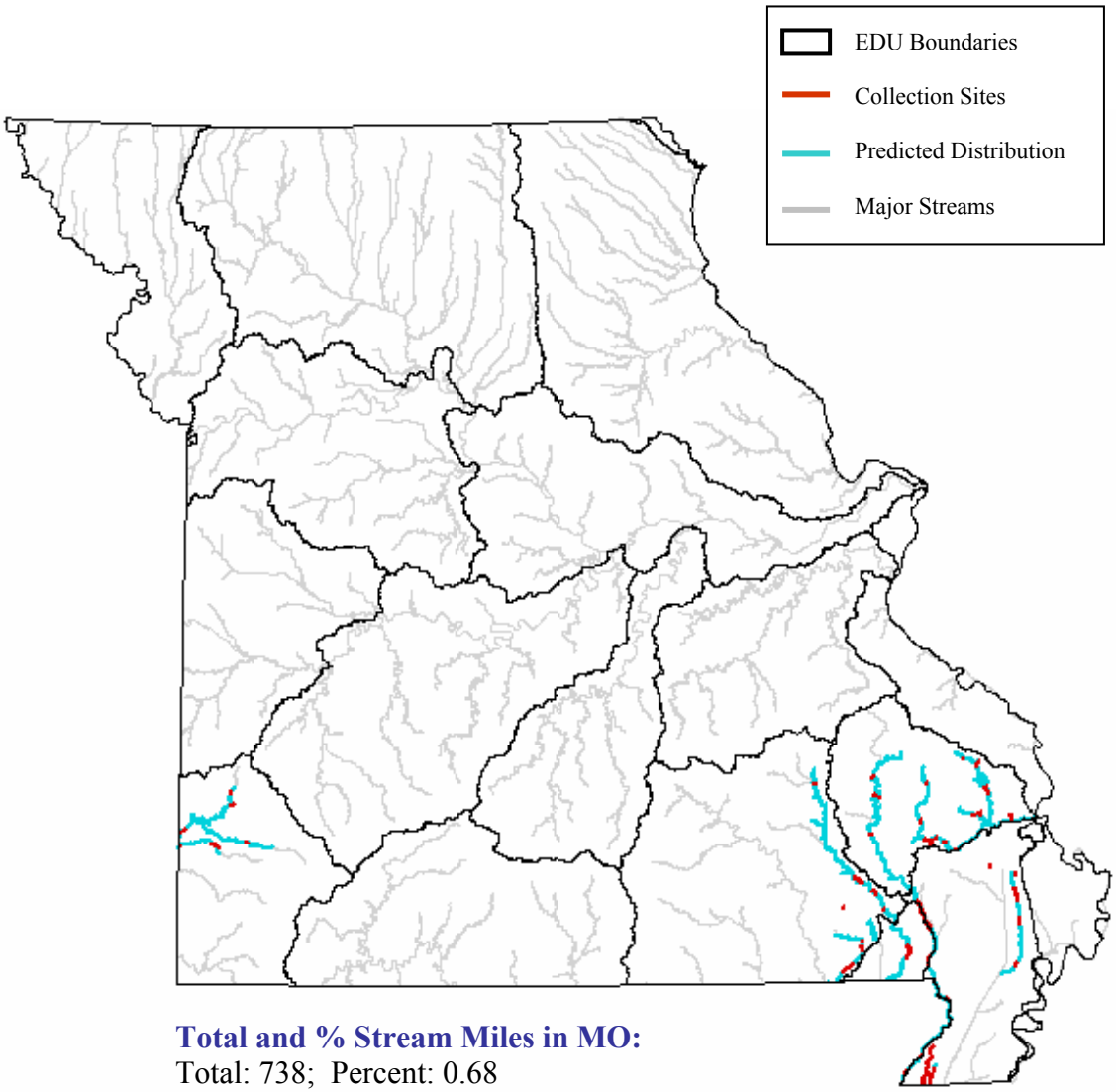
Endemism: Region

State Rank: S?

ITIS Code: 164020

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 738; Percent: 0.68

State Range:

The brindled madton occurs mainly in the southeast part of the Mississippi Alluvial Basin Aquatic Subregion and adjacent parts of the Ozark Aquatic Subregion. It can also be found in the Spring River drainage of southwest Missouri where the Prairie and Ozark Aquatic Subregions meet (Pflieger 1997).

Habitat Affinities:

The brindled madtom is most often found in the flow pools of low to moderate gradient streams having slight current, moderately clear water, silt, mud, gravel or sand bottoms and considerable amounts of detritus such as sticks and leaves (Clay 1975; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). Trautman (1957) also found that it occurs in smaller numbers on riffles of moderate flow but only if sand was present. In Missouri the brindled madtom is often found on gravelly or rocky riffles with slight current and bottoms free of silt (Pflieger 1971). It avoids cool, clear upland streams (Robinson and Buchanan 1988) and viscous clayey silts (Trautman 1957).

Predictive Model(s):

Ozark Model
Query 1: (([Temp_code] = 2))
Query 2: (([Linkr] = 4) and ([DlinkR] >= 5) and ([DlinkR] <= 7)) or (([Linkr] >= 5) and ([Linkr] <= 7)).

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = "MO")

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Brook Darter

Etheostoma burri

Native: Yes

Endemism: EDU

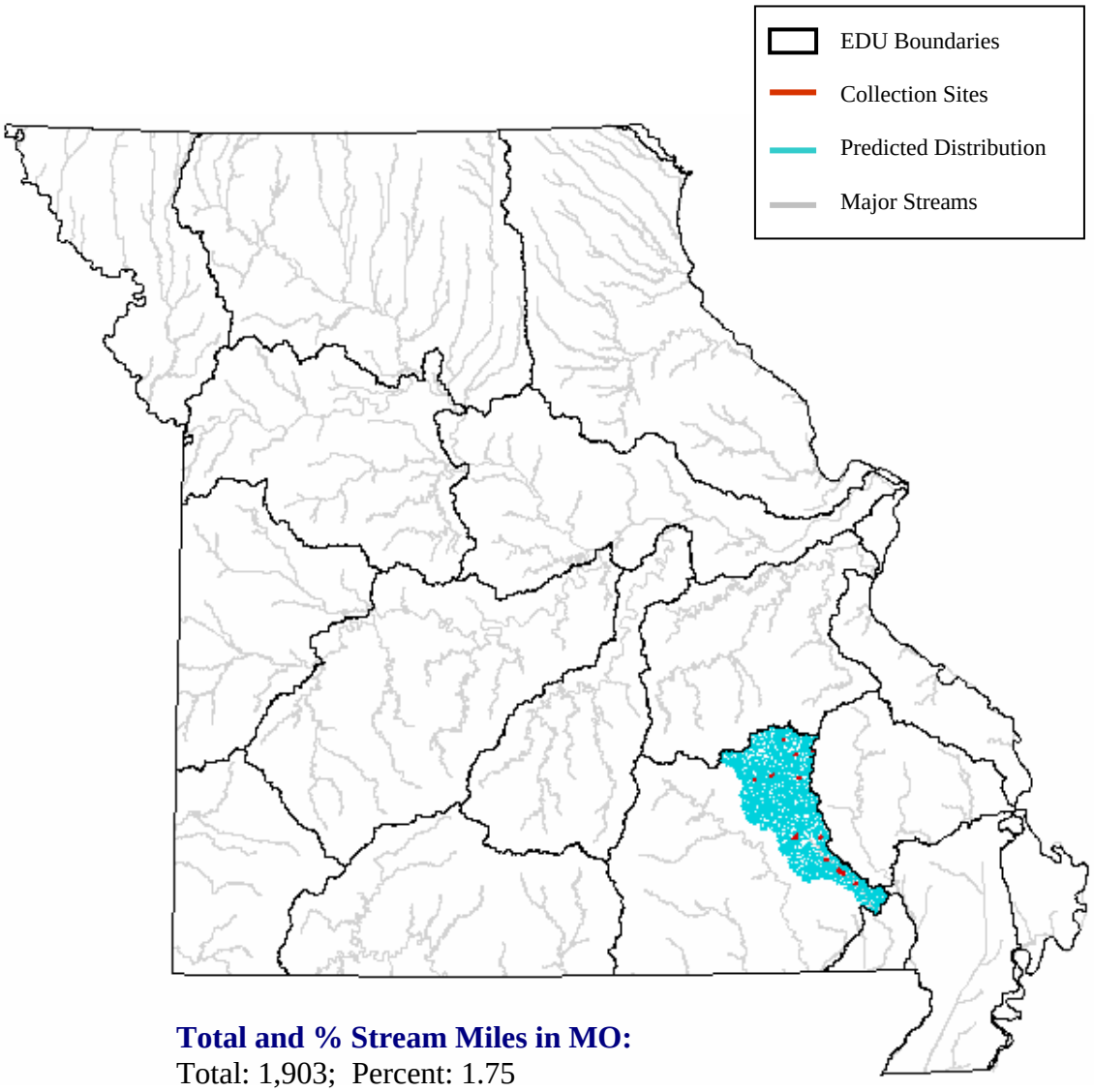
ITIS Code: Not yet available.

State Rank: S?

MoRAP Species ID Code: 9001

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 1,903; Percent: 1.75

State Range:

The brook darter is found only within the Black/Current Ecological Drainage Unit of the Ozark Aquatic Subregion (Ceas and Page 1997). Although Pflieger (1997) notes recent taxonomic changes concerning the brook and orangethroat darters (Ceas and Page 1997), individual range descriptions are not given.

Habitat Affinities:

The brook darter is assumed to have habitat preferences similar to the orangethroat darter, which generally prefers small headwater creeks, spring runs and small to medium streams with clear to moderate turbidity and enough current to prevent considerable silt accumulation (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). However, Ceas and Page (1997) describe the Upper Black River system, the only known area of occurrence for the brook darter in Missouri, as a narrow valley with intermittent creek beds that flow only during sustained rainfall.

Predictive Model(s):

Ozark Model
([Linkr] >= 1) and ([Linkr] <= 6)

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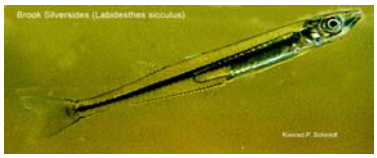


Brook Silverside

Labidesthes sicculus

Native: Yes

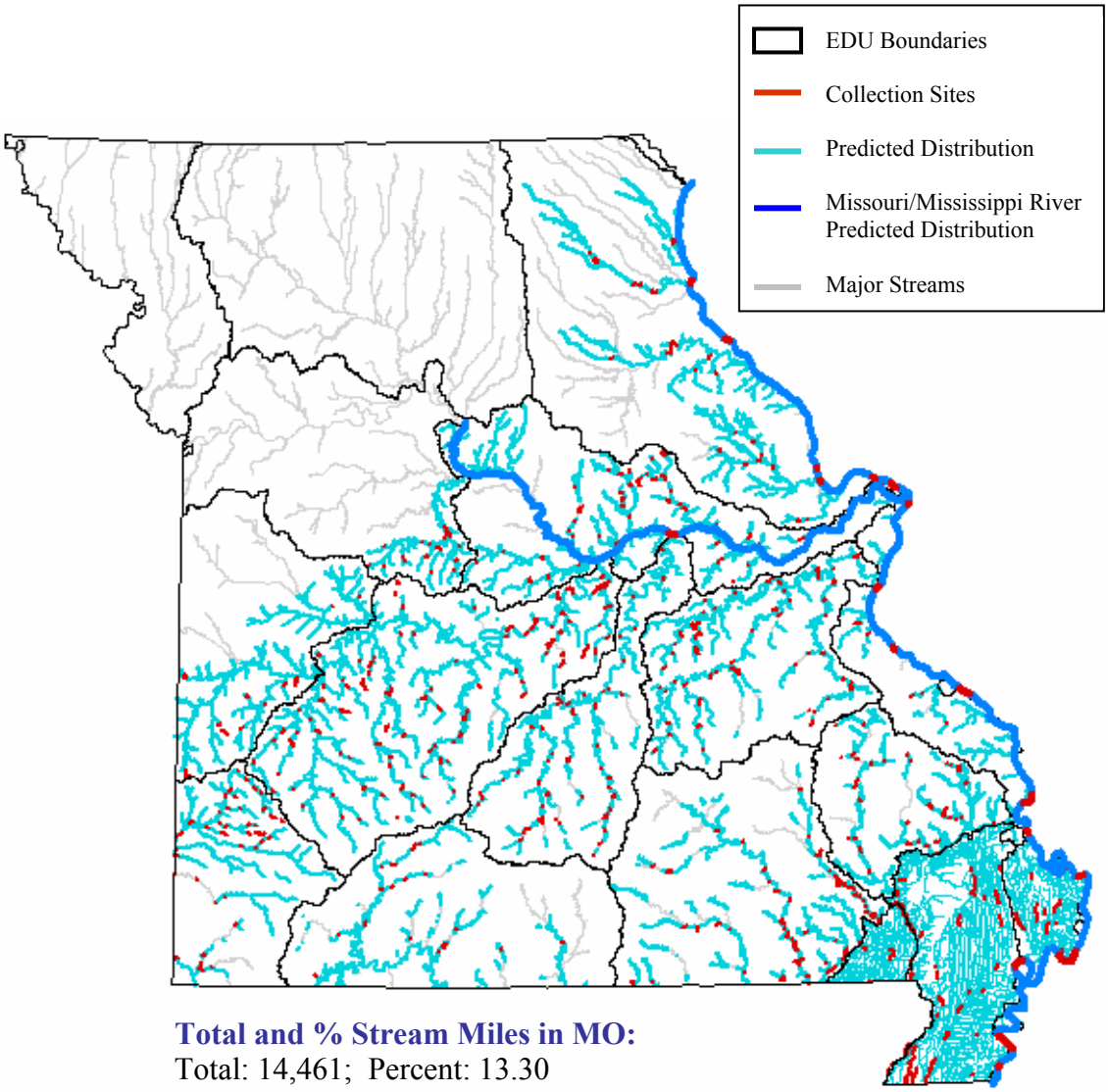
Endemism: Subzone

State Rank: S?

ITIS Code: 166016

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 14,461; Percent: 13.30

State Range:
The brook silverside is widely distributed throughout the Mississippi Alluvial Basin and Ozark Aquatic Subregions (Pflieger 1971). It can also be found northeastward in the Central Plains Aquatic Subregion, to Knox and Lewis Counties (Pflieger 1997).

Habitat Affinities:
The brook silverside prefers clear, warm backwaters of streams, lakes, bayous, oxbows and borrow bits with bottoms composed of clean sand, gravel or organic muck (Cross and Collins 1975; Douglas 1974; Pflieger 1997;Trautman 1957). In the Ozark Aquatic Subregion the brook silverside is most often found in warm, permanent pools of small headwater creeks and overflow pools of larger streams with little current (Pflieger 1971 and 1997). However Cross and Collins 1975 and Clay 1975 report that the brook silverside inhabits small streams with considerable current. In the clear waters of lakes and newly constructed reservoirs it prefers coves or shorelines (Pflieger 1997; Trautman 1957). The brook silverside is sensitive to high turbidity (Clay 1975; Trautman 1957) and siltation (Pflieger 1971).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 3) and ([Linkr] <= 7).

Ozark Model
(([Linkr] = 3) and ([Rgrad_subr] = 1) and ([Temp_code] = 2)) or (([Linkr] = 4) and ([Temp_code] = 2)) or (([Linkr] = 5) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)) or (([Linkr] >= 6))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Brown Bullhead

Ameiurus nebulosus

Native: Yes

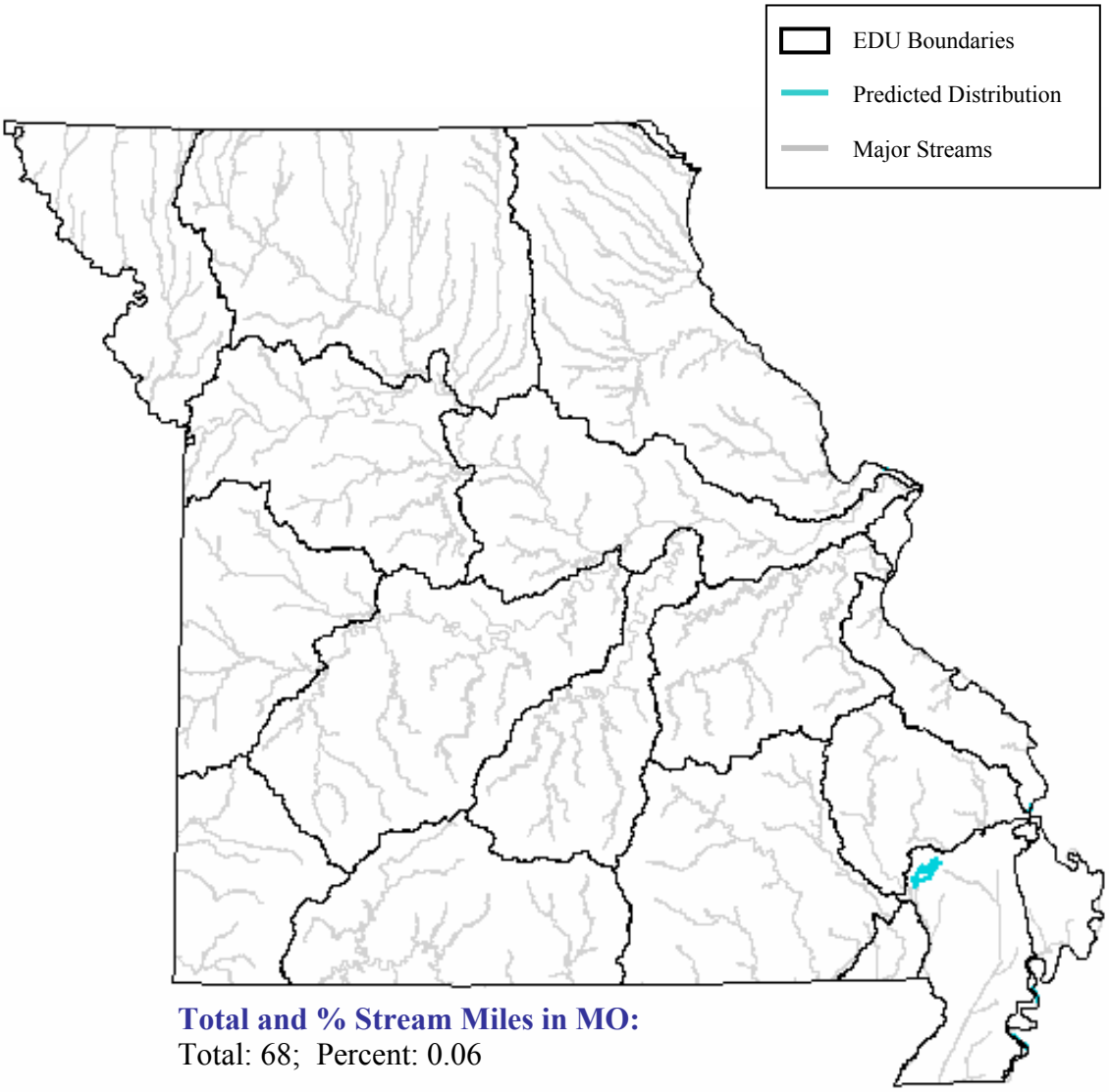
Endemism: Subzone

State Rank: S3?

ITIS Code: 164043

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 68; Percent: 0.06

State Range:
The only self-sustaining natural population of the brown bullhead is in Duck Creek Wildlife Area and the adjacent Mingo National Wildlife Refuge. It also occurs in a 12-acre lake in the floodplain of the Meramec River owned by the City of Arnold (Pflieger 1997). Various Stocking attempts have not produced self-sustaining populations (Pflieger 1971).

Habitat Affinities:
Requirements for the brown bullhead are similar to that of the yellow bullhead but it is more restricted to pond and lake habitats (Etnier and Starnes 1993) and less tolerant of turbid waters (Trautman 1957). It occurs in swamps, ponds, inland pools, lakes reservoirs, impoundments (Robinson and Buchanan 1988;Trautman 1957) and the backwaters and tributaries of larger rivers (Phillips et. al. 1982). The brown bullhead prefers clear, cool, well-vegetated waters with bottoms of sand, gravel or dark muck (Trautman 1957). In protected areas of the Mississippi Alluvial Basin the largest populations occur in quiet, clear waters with moderate to dense amounts of submerged aquatic vegetation (Pflieger 1997). Finally, the brown bullhead spawns in sheltered places (Phillips et. al. 1982) or in nests fanned out in the bottom.

Predictive Model(s):

Mississippi Alluvial Basin Model
The distribution is based upon existing collection records and professional review. The modeled distribution includes the Mingo National Wildlife Refuge.

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Brown Trout

Salmo trutta

Native: No

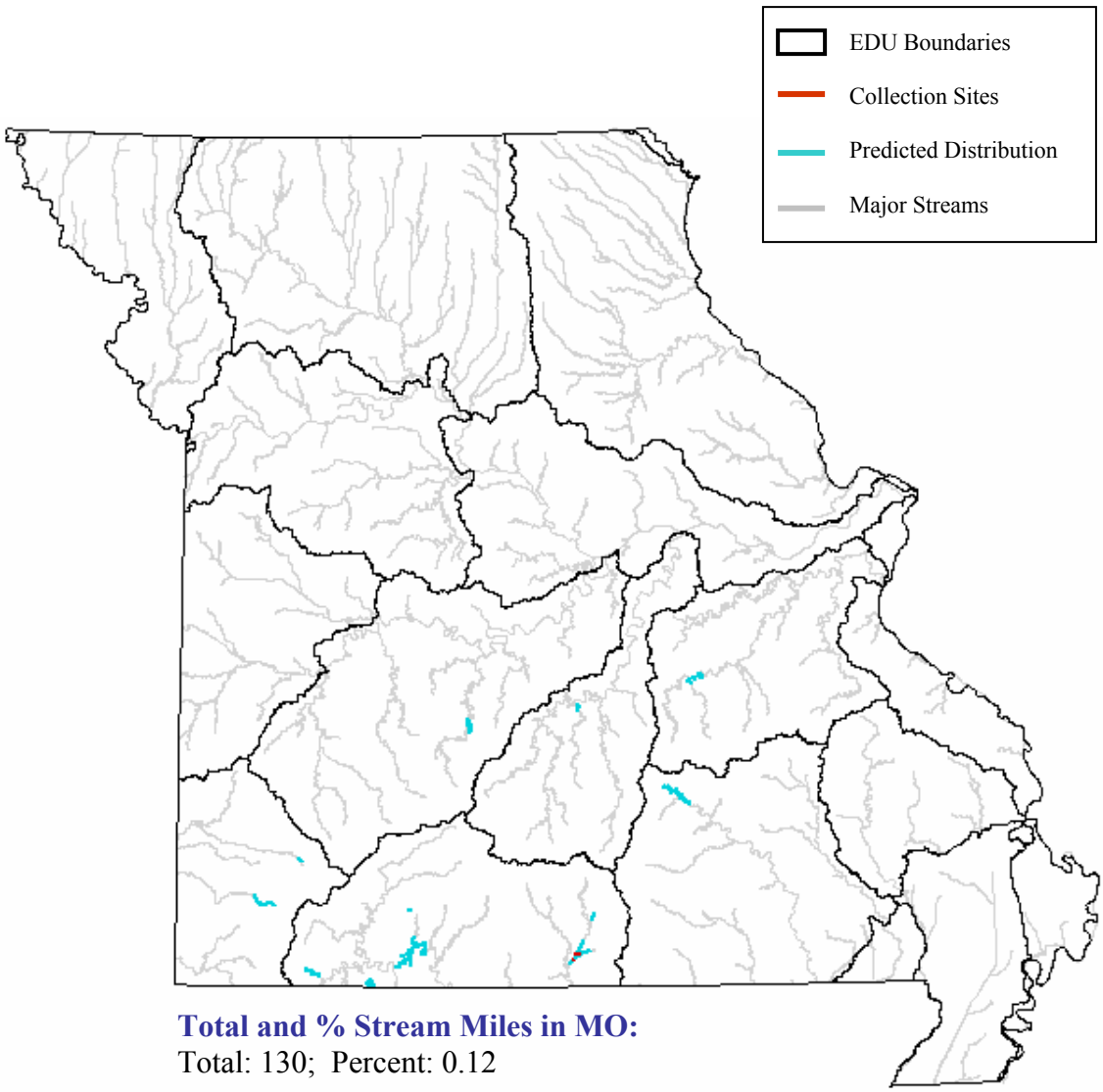
Endemism: NA

State Rank: SE

ITIS Code: 161997

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 130; Percent: 0.12

State Range:
The brown trout was introduced in to the United States as early as 1883 but populations are not self-sustaining. Periodic stocking by the Missouri Department of Conservation has expanded to the Current and North Fork Rivers, the Niangua River downstream from Bennett Spring, the Meramec River downstream from Meramec Spring, Roubidoux Creek and Lake Taneycomo since 1966 (Pflieger 1997).

Habitat Affinities:
The brown trout thrives in clear, coldwater streams and in lakes to a lesser extent. In Missouri it is typically found in streams around dense cover, such as submerged logs, undercut banks or in deep water below riffles (Pflieger 1997). In can be found in similar places throughout the Midwest where it is stocked.

Predictive Model(s):

Ozark Model
The distribution is based upon existing collection records and professional review.

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Bullhead Minnow

Pimephales vigilax

Native: Yes

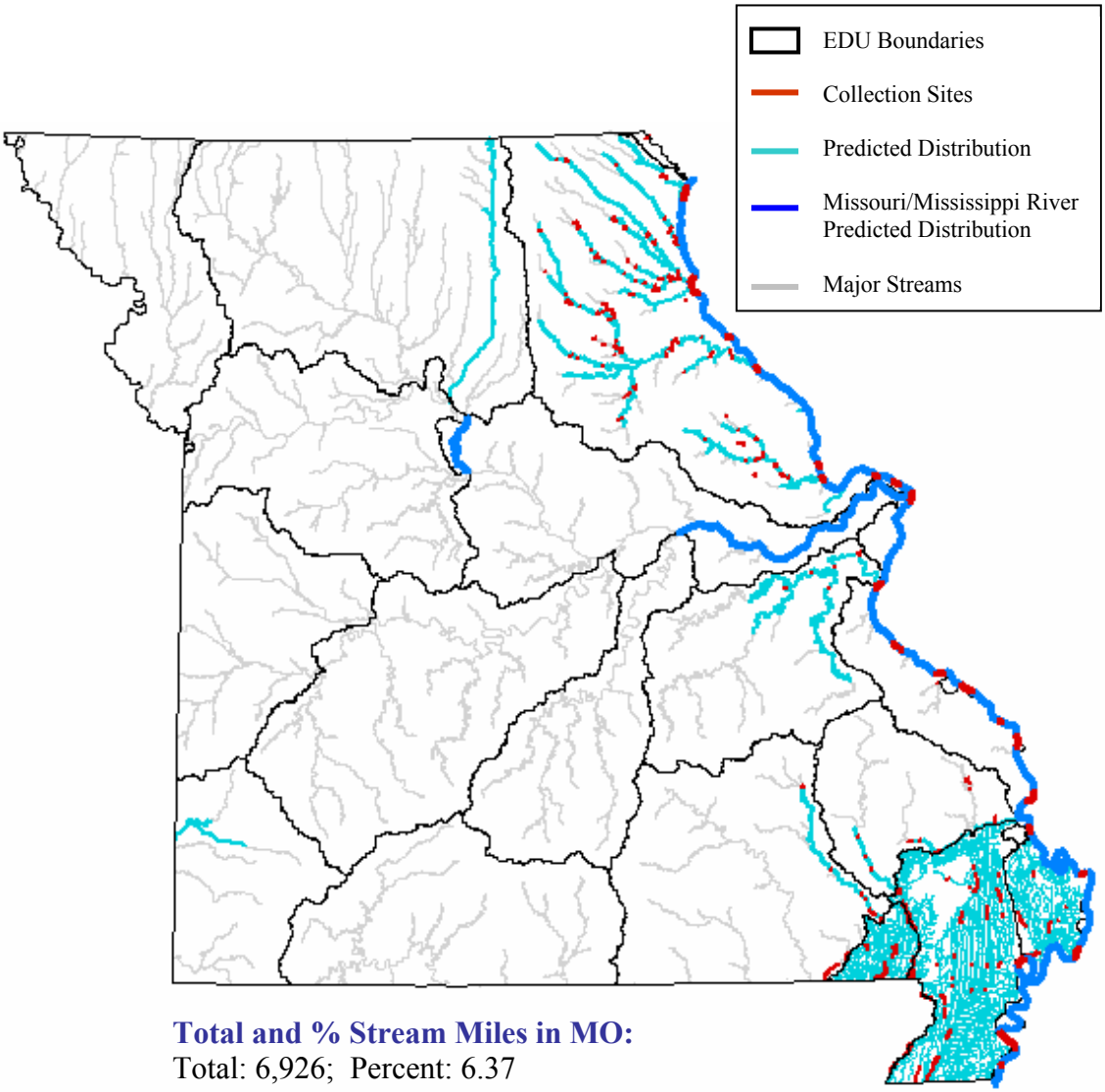
Endemism: Region

State Rank: S?

ITIS Code: 163518

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 6,926; Percent: 6.37

State Range:

The bullhead minnow is widespread in the Mississippi Alluvial Basin Aquatic Subregion, second only in abundance to the blacktail shiner. It also occurs in the Mississippi River and tributaries along the Central Plains Aquatic Subregion (Pflieger 1997). The bullhead minnow occurs sporadically in a few other areas of the state.

Habitat Affinities:

The bullhead minnow avoids upland streams and strong currents but is tolerant of turbidity and siltation (Pflieger 1997; Trautman 1957). It is successful in larger bodies of relatively stagnant water (Clay 1975) with little or no rooted aquatic vegetation and silt-covered gravel, sand or deep mud substrates (Etnier and Starnes 1993; Trautman 1957). In the Mississippi Alluvial Basin Aquatic Subregion the largest populations are found in large, sparsely vegetated ditches and streams with substrates of sand or silt (Pflieger 1997).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 5)

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

References:

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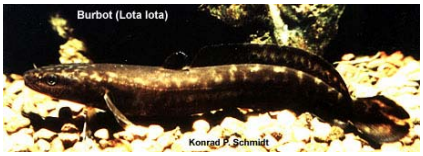
Burbot
Lota lota



Native: Yes

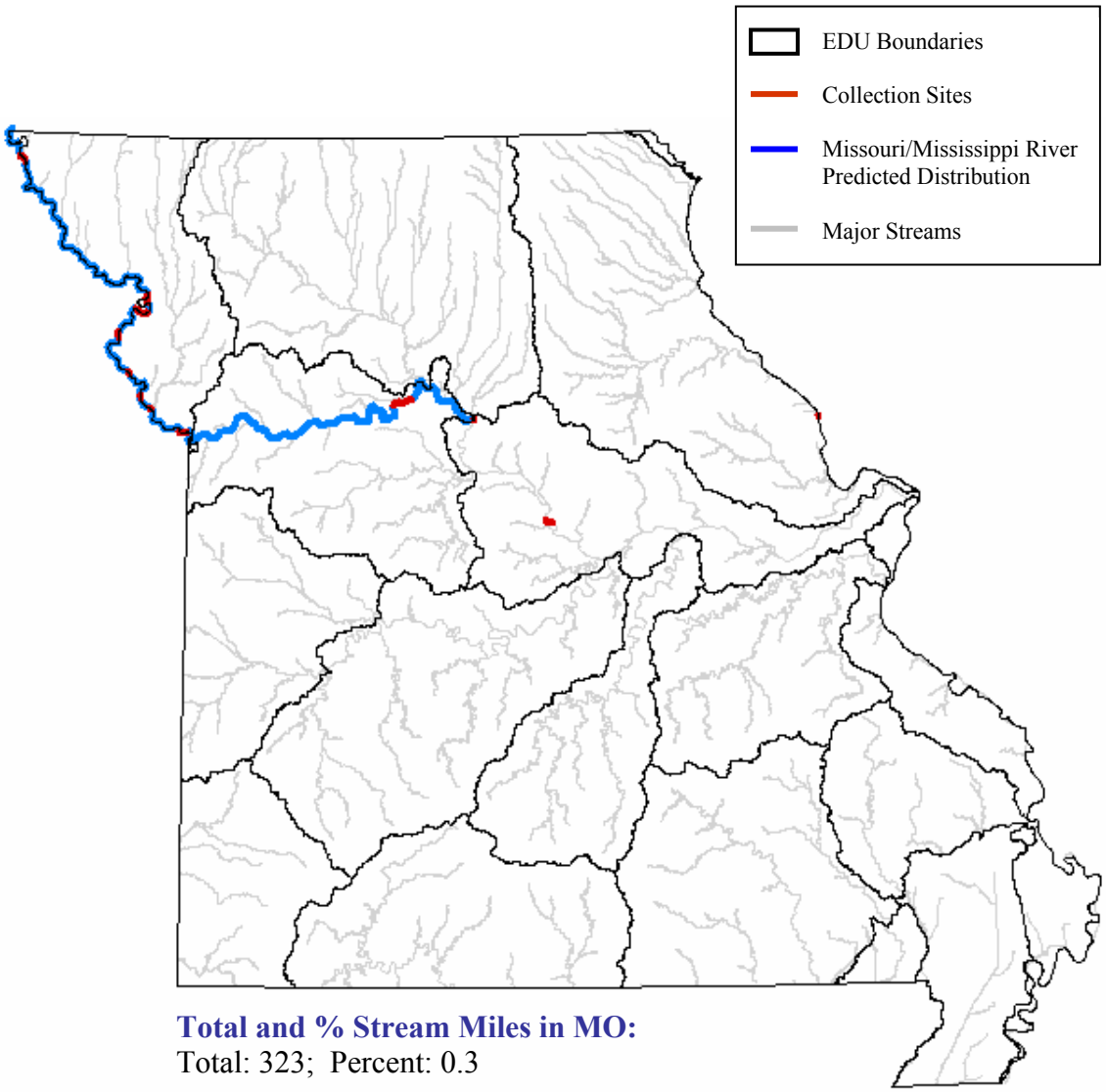
Endemism: Subzone

State Rank: S?

ITIS Code: 164725

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 323; Percent: 0.3

State Range:

The burbot is uncommon in Missouri, but has been collected primarily from the Missouri River above the confluence with the Chariton River. There have been no reports of the burbot in Missouri since 1976. There have been some reports of the burbot in the north but these are though to be escapes from the stocking of commercial fishing lakes in St. Charles and St. Louis (Pflieger 1997).

Habitat Affinities:

The burbot is usually found in deep, cold waters of lakes but may also occur in large rivers (Trautman 1957; Etnier and Starnes 1993). It is secretive, hiding about piles of rocks, submerged logs, undermined bridge supports and beds of aquatic vegetation during the daylight hours (Robins and Deubler 1955). In Ohio it is found in the deep, cold waters of Lake Erie, moving into shallower water near tributary outflows in winter (Trautman 1957). Juveniles are often found along rocky shorelines and in the mouths of tributaries (Scott and Crossman 1973). In Minnesota the burbot is common in large northern lakes and rivers (Phillips et. al. 1982).

Predictive Model(s):

Great River Model

The Missouri River distribution is based upon existing collection records and professional review. The distribution includes the Missouri River upstream from Little Chariton River.

References:

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Cardinal Shiner

Luxilus cardinalis

Native: Yes

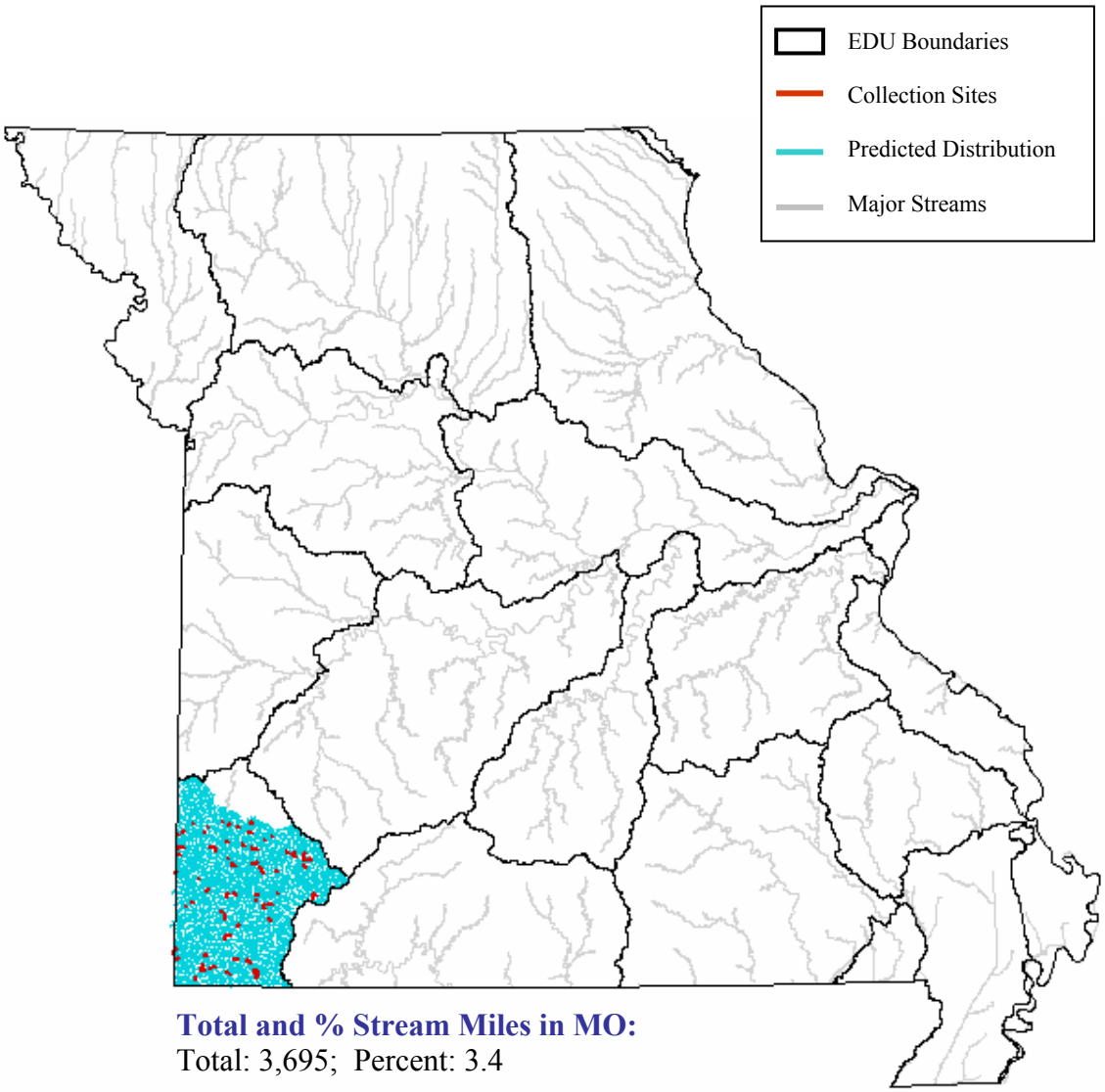
Endemism: Subregion

State Rank: S?

ITIS Code: 163828

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 3,695; Percent: 3.4

State Range:
The cardinal shiner is one of the most abundant fishes in many streams of the Ozark/Neosho Ecological Drainage Unit (Pflieger 1997).

Habitat Affinities:
The cardinal shiner inhabits moderate to small-sized rivers or clear and cool, gravel-bottomed upland streams with permanent flow (Mayden 1988; Pflieger 1997; Robinson and Buchanan 1988). This schooling species is typically associated with current in raceways and swift, deep riffles (Mayden 1988; Robinson and Buchanan 1988). In the Neosho Ecological Drainage Unit it is typically found near riffles or in pools with noticeable current (Pflieger 1997). The cardinal shiner is uncommon in small headwater streams and intolerant of turbid, muddy streams (Pflieger 1997; Robinson and Buchanan 1988). Spawning occurs immediately below moderate to swift riffles (Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model
([Linkr] >= 1) and ([Linkr] <= 7)

References:

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Central Mudminnow

Umbra limi

Native: Yes

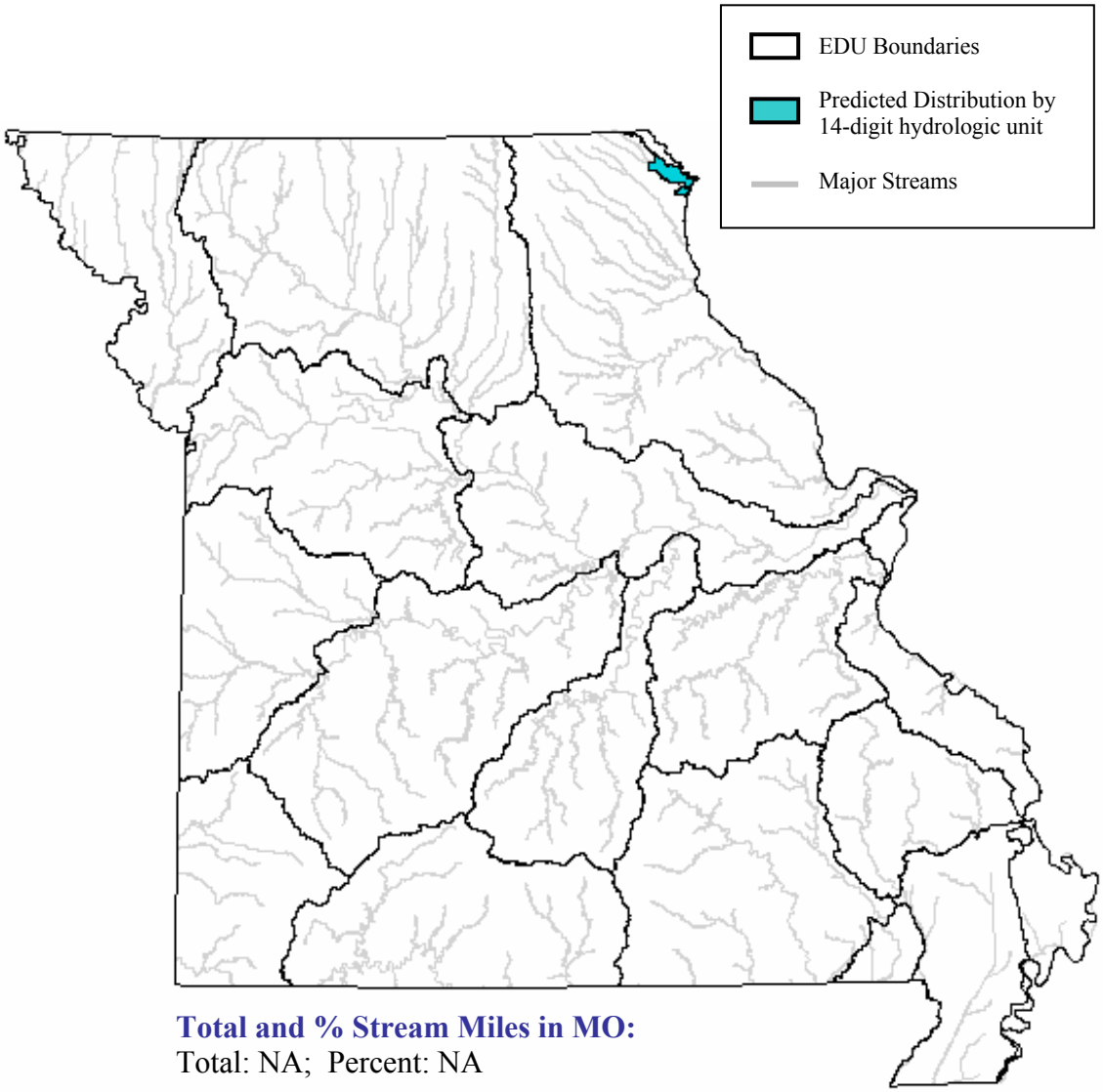
Endemism: Subzone

State Rank: S1

ITIS Code: 162153

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:

The central mudminnow is rare in Missouri but it as been collected in Goose Pond and small populations exist in other marshes along the Upper Mississippi River in the Central Plains Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The central mudminnow inhabits cool creeks, ditches, sloughs and heavily vegetated swamps, ponds, bogs and marshes (Clay 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In the extreme northeast Central Plains Aquatic Subregion the central mudminnow is associated with heavily vegetated marshes of American lotus, watercress, pickerel weed, sedges and cattails, and substrates of deep mud, peat or organic debris overlying sand (Pflieger 1997). The central mudminnow is quite tolerant of high acidity and low oxygen water, as it is able to use its air bladder as a lung (Pflieger 1997; Trautman 1957). Although Scott and Crossman (1973) found that the central mudminnow is able to survive high water temperatures in isolated pools, Clay (1975) cites high temperatures and the advent of agriculture, "which has made the natural waters turbid, silted the bottoms of creeks and ponds and obliterated many habitats by drainage," as reasons for sporadic occurrence in its southern range. Eddy and Underhill (1974) note that the central mudminnow is difficult to collect because it burrows deep into mud substrates where it cannot be seined.

Predictive Model(s):

Central Plains Model

The distribution is based upon existing collection records and professional review.

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Central Stoneroller

Campostoma anomalum

Native: Yes

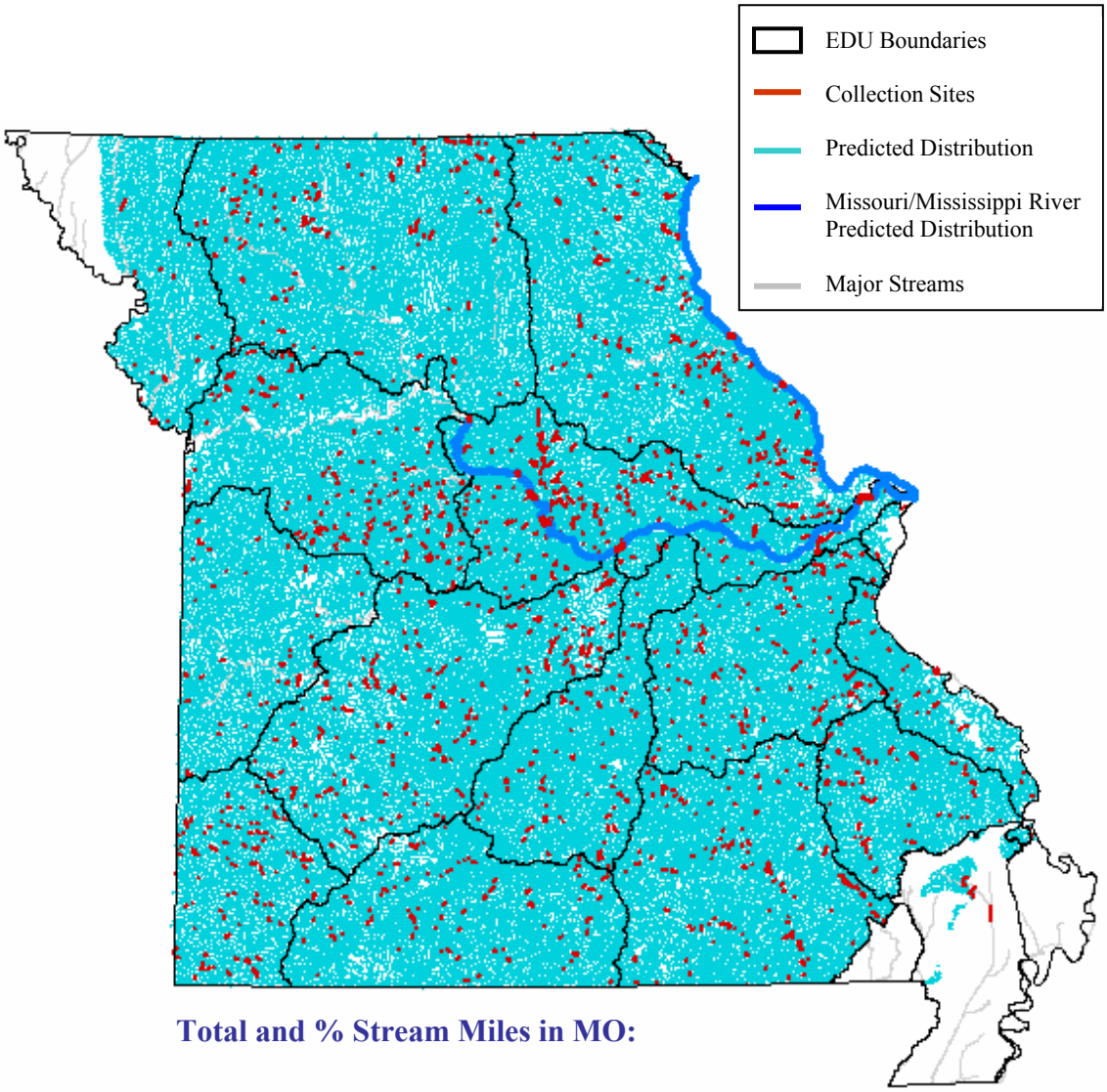
Endemism: Subzone

State Rank: S?

ITIS Code: 163508

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:

Total: 100,374; Percent: 92.29

State Range:

The central stoneroller occurs throughout Missouri excluding most of the Mississippi Alluvial Basin and extreme northwest Central Plains Aquatic Subregions. It is one of the most abundant fishes in the Ozarks and northern Ozark Border (Pflieger 1997).

Habitat Affinities:

The central stoneroller occurs in a variety of habitats ranging from very small streams to large rivers (Etnier and Starnes 1993). However Trautman (1957) noted that the largest populations were found when a combination of habitats was available. These varied habitats include the availability of many small streams having moderate to high gradients with sandy-gravel bottoms in which to spawn, moderate-sized streams with moderate gradients in which to summer, and lower gradients in the larger streams in which to winter. In Missouri the central stoneroller occurs with highest abundance in streams with moderate or high gradients, well-defined rubble or bedrock riffles, and permanent flows (Pflieger 1997). Robinson and Buchanan (1988) found that small populations could occasionally be found in upland impoundments as well. Finally, the central stoneroller prefers clear water but can tolerate turbidity if the bottom is free of silt (Pflieger 1997).

Predictive Model(s):

Central Plains Model

([Temp_code] = 2) and ([Linkr] >= 1) and ([Linkr] <= 6)

Ozark Model

([Linkr] >= 1)

Mississippi Alluvial Basin Model

([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model

The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Chain Pickerel

Esox niger

Native: Yes

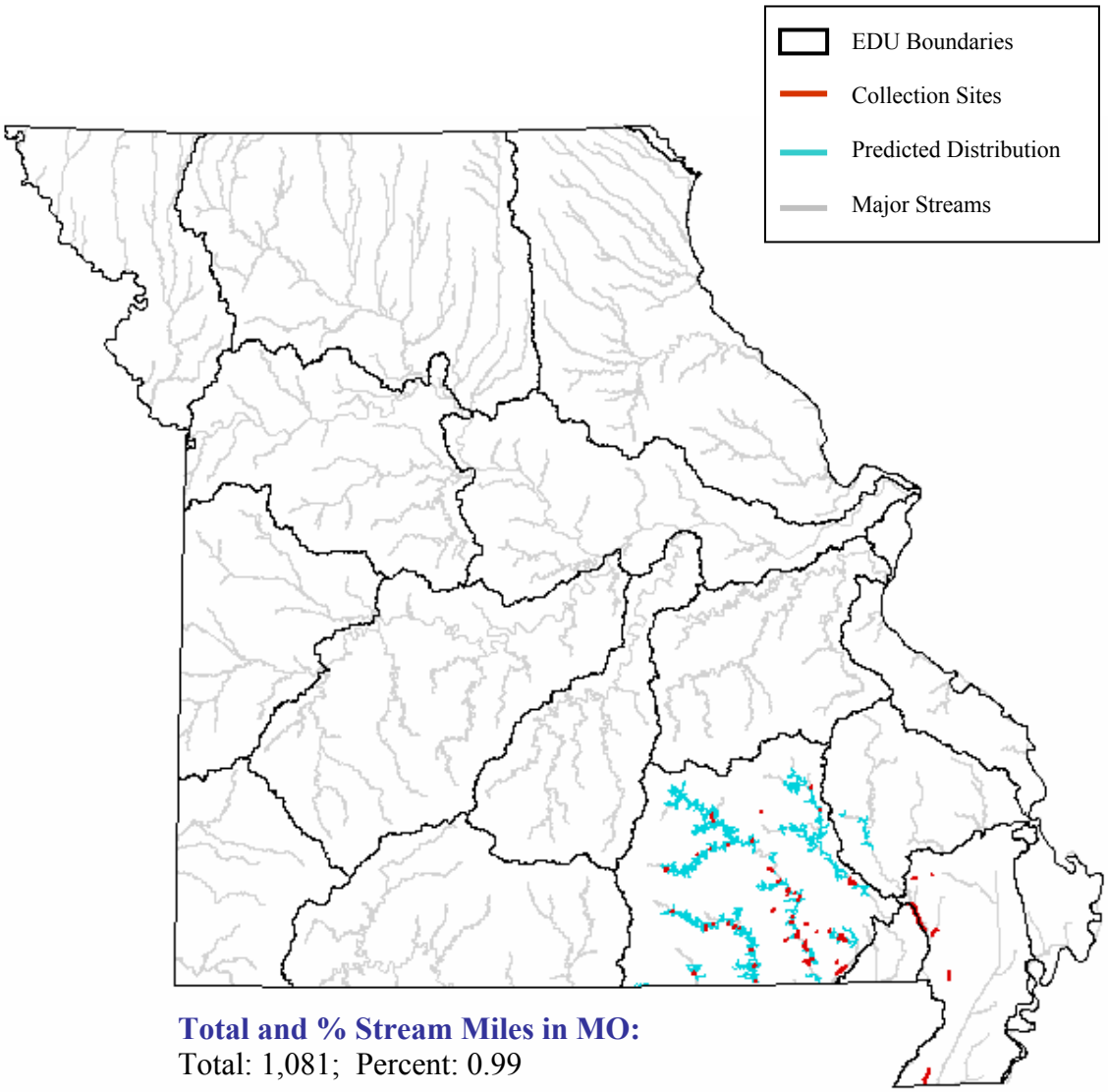
Endemism: Subzone

State Rank: S?

ITIS Code: 162143

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,081; Percent: 0.99

State Range:
The chain pickerel occurs exclusively in the southeastern slope of the Ozark Aquatic Subregion with greatest abundance in the Eleven Point and Current Rivers. It has a complimentary distribution pattern to the grass pickerel, with which it competes intensely (Pflieger 1997).

Habitat Affinities:
The chain pickerel prefers clear, quiet water habitats, from oxbow lakes to spring outflows, with abundant vegetation (Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). It avoids the warm waters of lowland rivers and ditches and the collections in this Aquatic Subregion are likely stray occurrences (Pflieger 1997; Robinson and Buchanan 1988) and does not penetrate into small headwater creeks (Pflieger 1971). In the Ozark Aquatic Subregion the chain pickerel prefers the deeper pools of creeks, often near beds of spatterdock (*Nuphar*), and the backwaters of major rivers in dense beds of aquatic vegetation. Especially favorable habitats are cut-off pools and the pools of springs (Etnier and Starnes 1993; Pflieger 1997). In Arkansas the largest populations are found in lakes in the southern part of the Coastal Plain (Robinson and Buchanan 1988) and it is distributed statewide in non-flowing, heavily vegetated waters of Louisiana (Douglas 1974).

Predictive Model(s):

Ozark Model
(([GradsegR] >= 2) and ([GradsegR] <= 3)) or (([GradsegR] = 1) and ([Temp_code] = 2) and ([Linkr] = 6)) or (([GradsegR] = 1) and ([Temp_code] = 1)) or (([GradsegR] >= 4) and ([Flow] = 2) and ([DlinkR] >= 5) and ([DlinkR] <= 7))

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Photo Credits:

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Channel Catfish

Ictalurus punctatus

Native: Yes

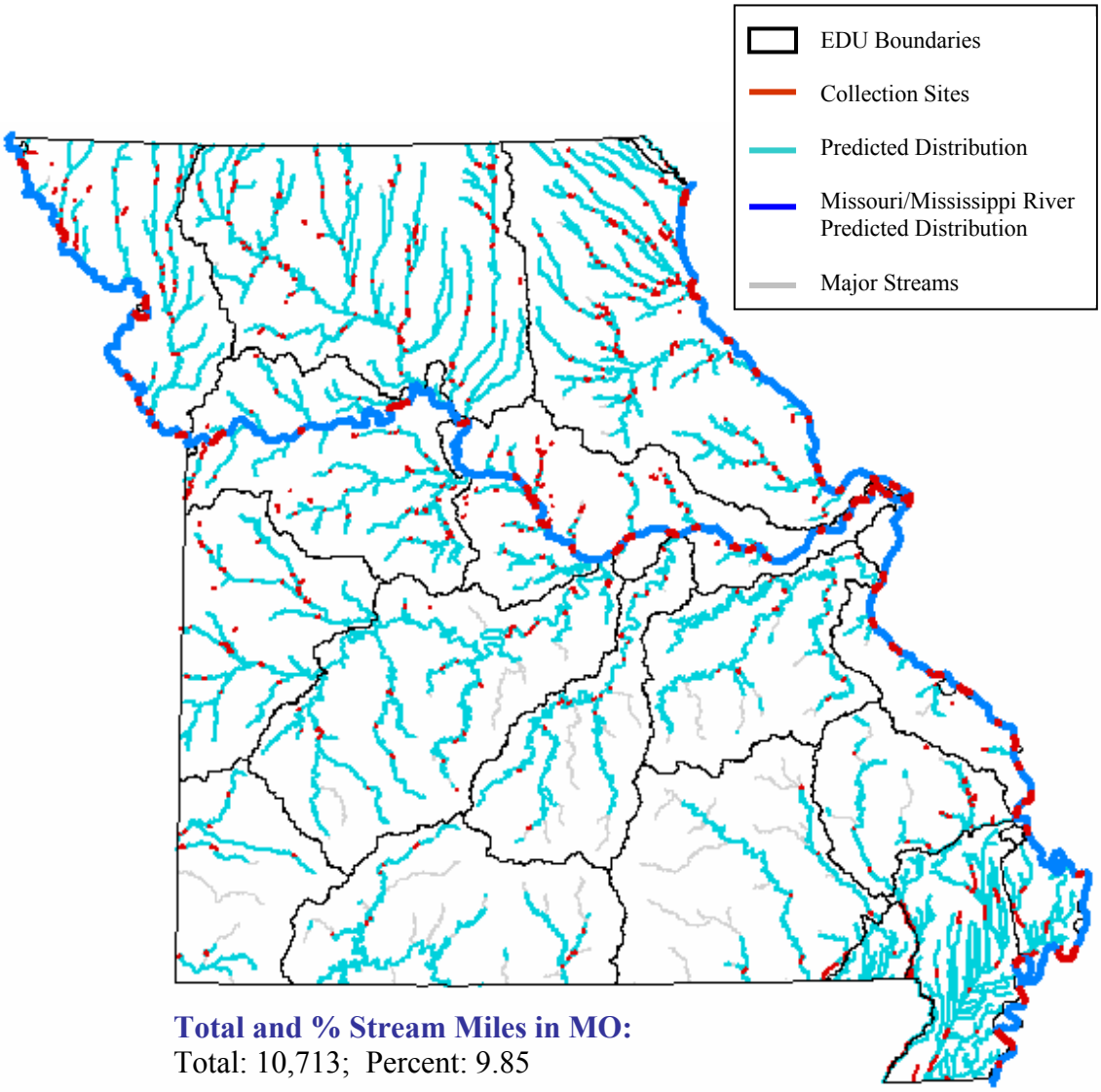
Endemism: Subzone

State Rank: S?

ITIS Code: 163998

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 10,713; Percent: 9.85

State Range:

The channel catfish is the most abundant and widely distributed of the larger catfishes of Missouri. It is common throughout Missouri but is less common in the central Ozark Aquatic Subregion. The channel catfish occurs naturally but is also stocked in artificial impoundments throughout the state (Pflieger 1997).

Habitat Affinities:

The channel catfish is found in many types of habitats ranging from ponds, lakes and reservoirs to rivers, oxbows and bayous. It is highly abundant in the deeper waters of impoundments and large streams having moderately clear bottoms of sand, gravel or boulders and sometimes silt, provided the rate of deposition is low (Pflieger 1997; Trautman 1957). The channel catfish is extremely adaptable (Etnier and Starnes 1993; Robinson and Buchanan 1988), as it does not require flowing water at any point in its life cycle or the availability of live food (Cross and Collins 1975). Adults seek cover around submerged logs, steep cutbanks or drift piles during the day (Cross and Collins 1975; Pflieger 1997), and feed in riffles and shallow pools at night (Robinson and Buchanan 1988). The channel catfish avoids clear cool streams, streams with high gradient (Pflieger 1971), and dense beds of aquatic vegetation (Trautman 1957). Yearlings can tolerate considerable current and are often found in riffles or shallow pools (Trautman 1957; Pflieger 1971).

Predictive Model(s):

Central Plains/Ozark Model
([Temp_code] = 2)
([Linkr] >= 3) and ([Rgrad_subr] = 1)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

References:

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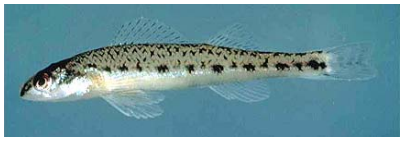


Channel Darter

Percina copelandi

Native: Yes

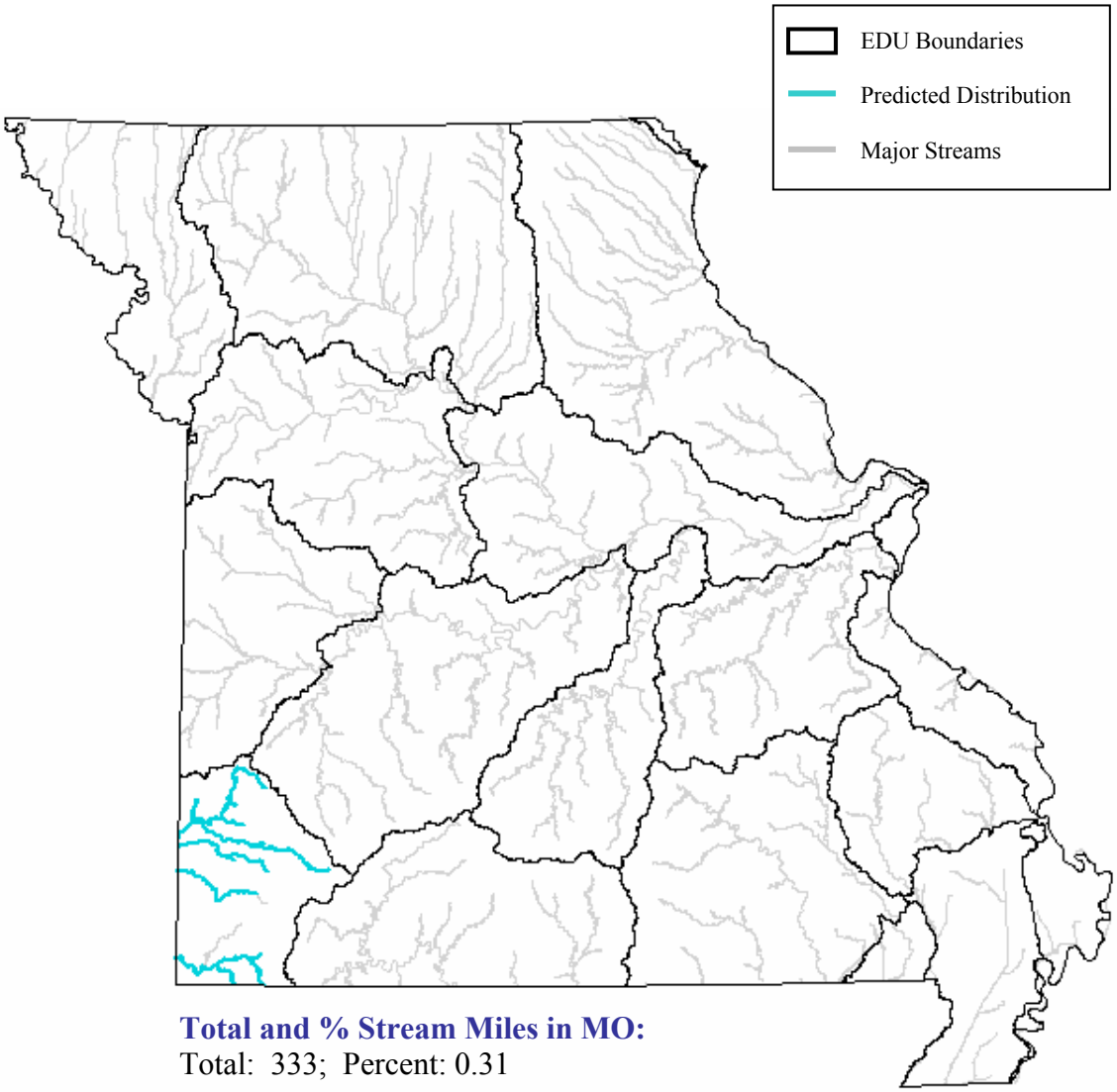
Endemism: Subzone

State Rank: S3

ITIS Code: 168480

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 333; Percent: 0.31

State Range:
The channel darter occurs in the principle streams of the Ozark/Neosho Ecological Drainage Unit (EDU) (Pflieger 1997).

Habitat Affinities:
The channel darter mainly inhabits the clear pools and bars of larger rivers with sandy, gravelly or rocky bottoms and enough current to prevent silt deposition (Clay 1975; Cross and Collins 1975; Pflieger 1997; Etnier and Starnes 1993). In lakes it prefers the cleanest course sand and fine gravel of beaches (Trautman 1957). In the Ozark/Neosho EDU it is found in sluggish riffles and pools with silt-free, gravelly or rocky bottoms (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 4)

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Channel Shiner

Notropis wickliffi

Native: Yes

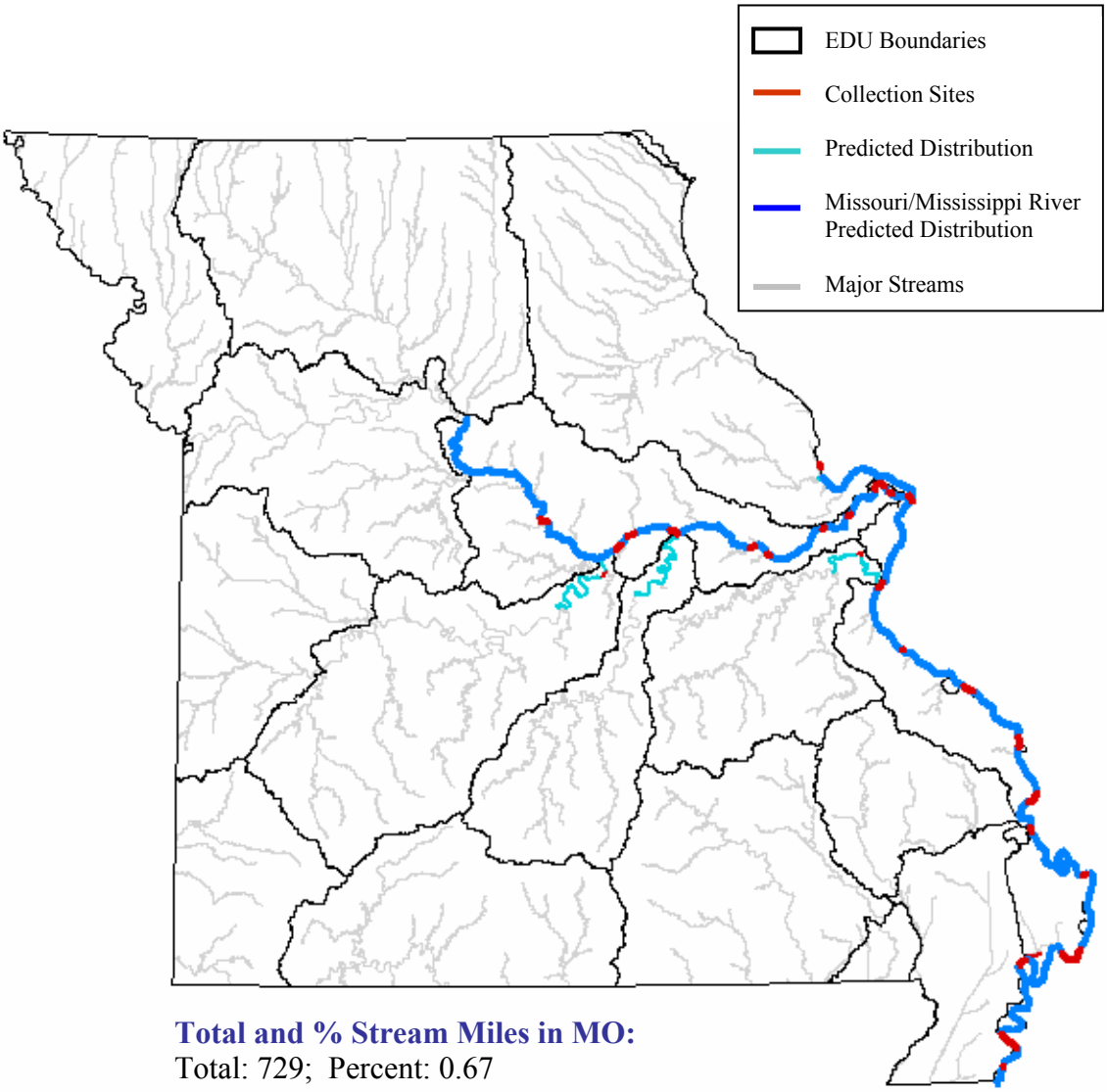
Endemism: Region

State Rank: S?

ITIS Code: 163491

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 729; Percent: 0.67

State Range:
The channel shiner can be found in the Missouri and Mississippi Rivers, and in the lower few miles of their larger tributaries. It is most predominant in the Middle and Lower sections of the Mississippi River (Pflieger 1997).

Habitat Affinities:
Channel shiners inhabit the open channels of large rivers, and can occasionally be found in the mouths of tributaries. They occur in pools with little to moderate current, over a substrate of silt, sand, or gravel (Pflieger 1997; Trautman 1957; Etnier and Starnes, 1993).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Checkered Madtom

Noturus flavater

Native: Yes

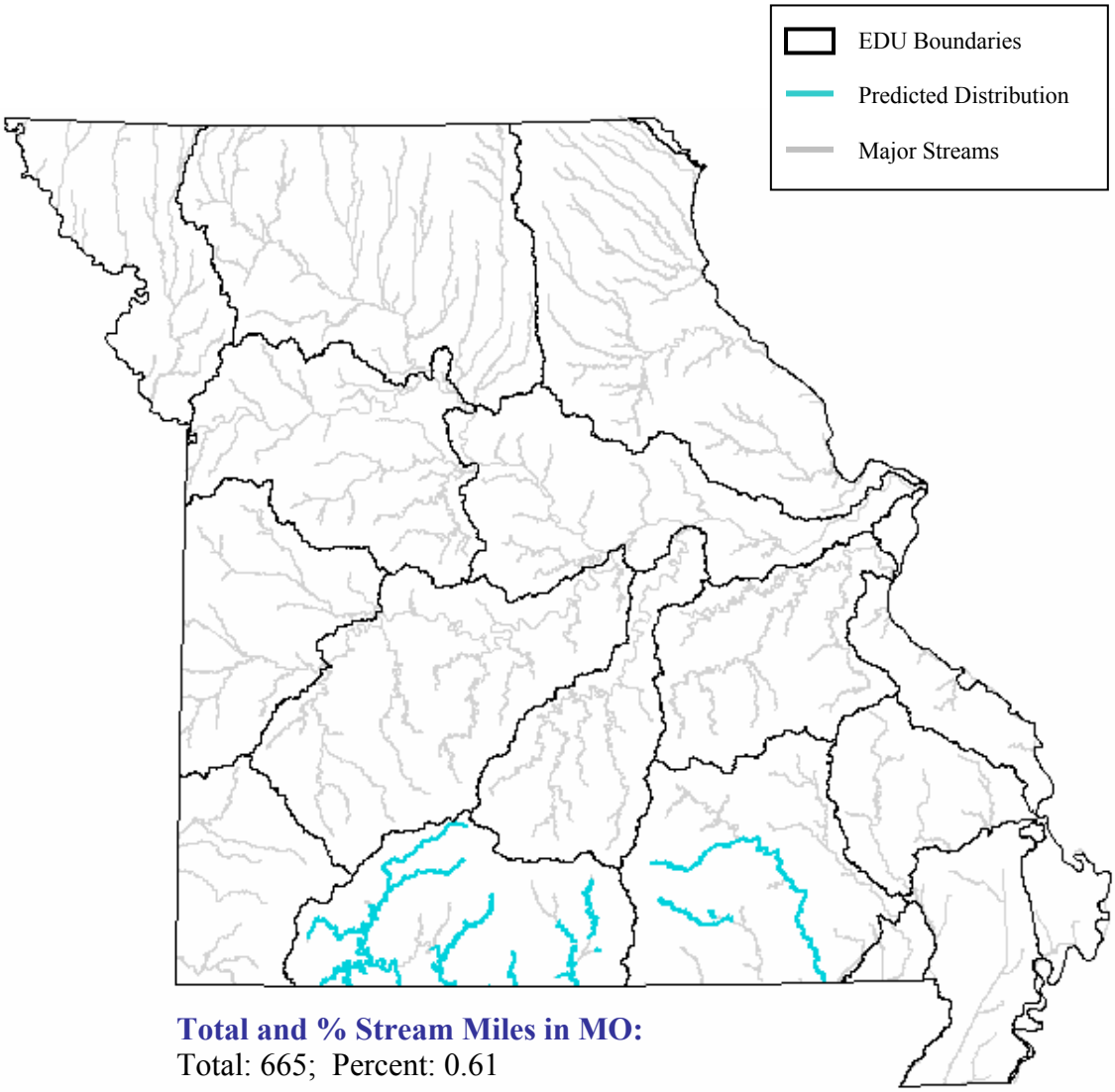
Endemism: Subregion

State Rank: S3S4

ITIS Code: 164011

Global Rank: G3G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 665; Percent: 0.61

State Range:
The checkered madtom occurs in the southern portion of the Ozark Aquatic Subregion, in the Black/Current and White Ecological Drainage Units (Pflieger 1997).

Habitat Affinities:
The checkered madtom is normally found in clear, cool Ozark streams with permanent strong flow and high gradients. When spawning, it occurs in quiet pool margins or backwaters. It is found over a substrate of gravel, flat rocks, or boulders, often overlain with deposits of sticks, leaves, and other organic debris (Pflieger 1997; Robinson and Buchanan 1988). It may be declining in the White River system due to reservoir construction, but continues to appear in Lake Norfolk (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

References:

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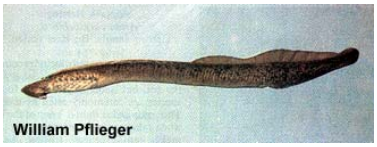
Chestnut Lamprey

Ichthyomyzon castaneus



Native: Yes

Endemism: Region

State Rank: S?

ITIS Code: 159725

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick

Total and % Stream Miles in MO:
Total: 3,315; Percent: 3.05

State Range:
The chestnut lamprey, the most abundant and widely distributed lamprey in Missouri, is common in the lower Missouri and Mississippi Rivers but uncommon farther northward. Larvae and spawning adults occur only in the Ozarks, but in its parasitic phase the chestnut lamprey can be found in large rivers and reservoirs outside the spawning region (Pflieger 1997).

Habitat Affinities:
The chestnut lamprey moves among different habitats through its life cycle. Adults are common in large streams and reservoirs, where, as parasites, they can find an abundance of fishes on which to feed (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes, 1993; Cross and Collins 1975). Spawning adults can be found in medium creeks to large rivers, and larvae need clear streams with permanent flow, with stable bars of sand, silt, and organic matter (Pflieger 1997). The chestnut lamprey's variety of habitat is illustrated by the fact that Cross and Collins (1975) assert that it is found in large rivers, while Phillips et. al. (1982) state that it tends to occupy smaller rivers and streams.

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([LinkR] >= 5)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

References:

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Common Carp

Cyprinus carpio

Native: No

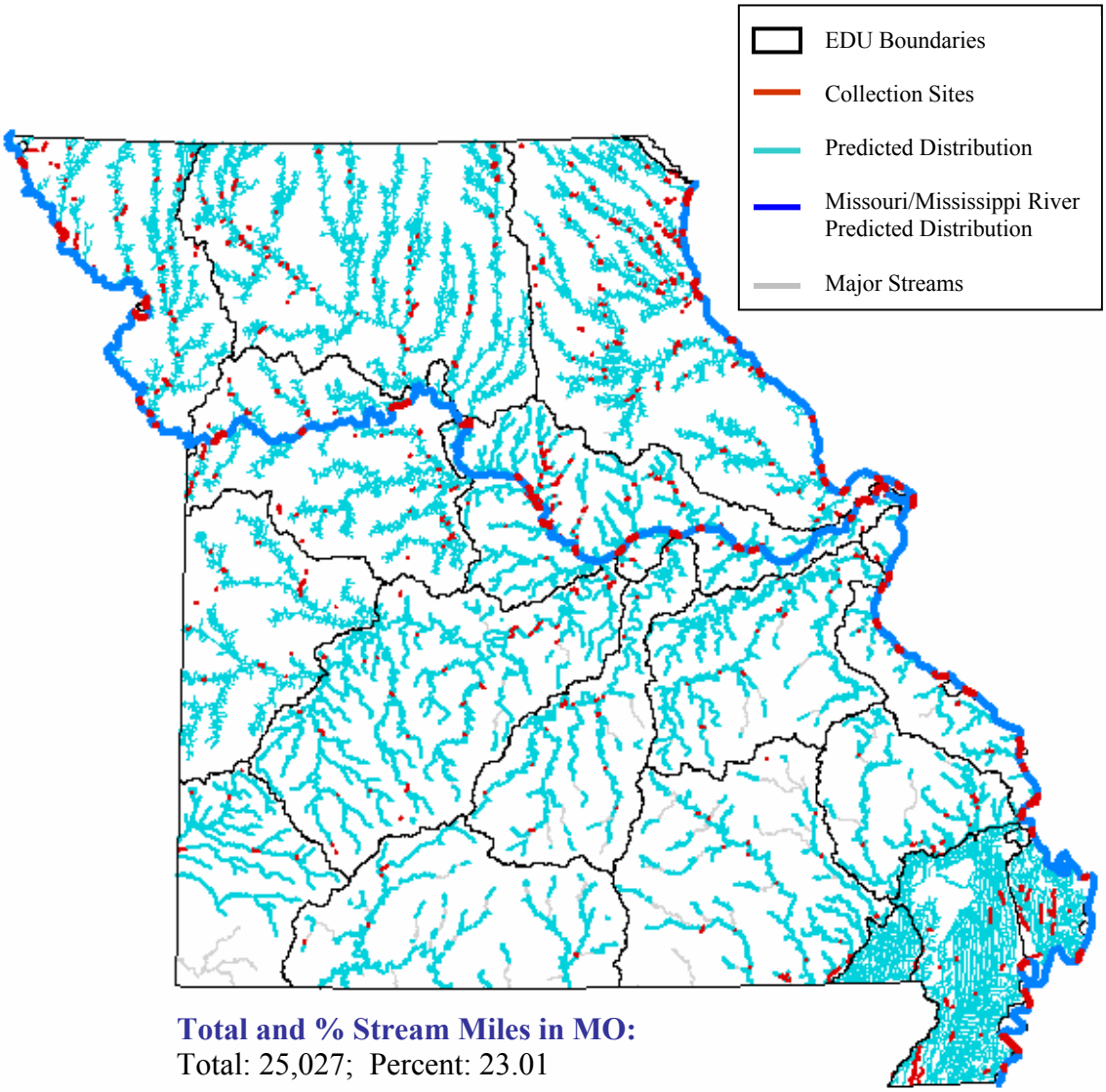
Endemism: NA

State Rank: SE

ITIS Code: 163344

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 25,027; Percent: 23.01

State Range:
The common carp was introduced in 1879 and is now one of the most widespread and abundant large fishes in Missouri. It is least abundant in the central Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The common carp is extremely adaptable and can be found in a variety of habitats, however it is least successful in clear, high gradient streams. It is abundant in low-gradient, warm waters of lakes, reservoirs (Pflieger 1997), and the soft-bottomed, weedy pools of streams (Robinson and Buchanan 1988). Especially high populations can be found in lakes and reservoirs that are artificially fertilized with organic wastes or runoff from farmlands with essentially eutrophic conditions (Pflieger 1997; Trautman 1957). The common carp is often found about piles of drift, logs or other submerged cover. It is tolerant of a wide range of turbidities, bottom types and temperatures (Pflieger 1997).

Predictive Model(s):

Central Plains Model
Query 1: ([Temp_code] = 2)
Query 2: (([Linkr] >= 4)) or (([Linkr] >= 1) and ([Linkr] <= 3) and ([DlinkR] >= 4))
DlinkR is done.

Ozark Model
(([Ssize_code] = 4)) or (([Ssize_code] = 3) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)) or (([Ssize_code] = 2) and ([Rgrad_subr] = 1))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Common Shiner

Luxilus cornutus

Native: Yes

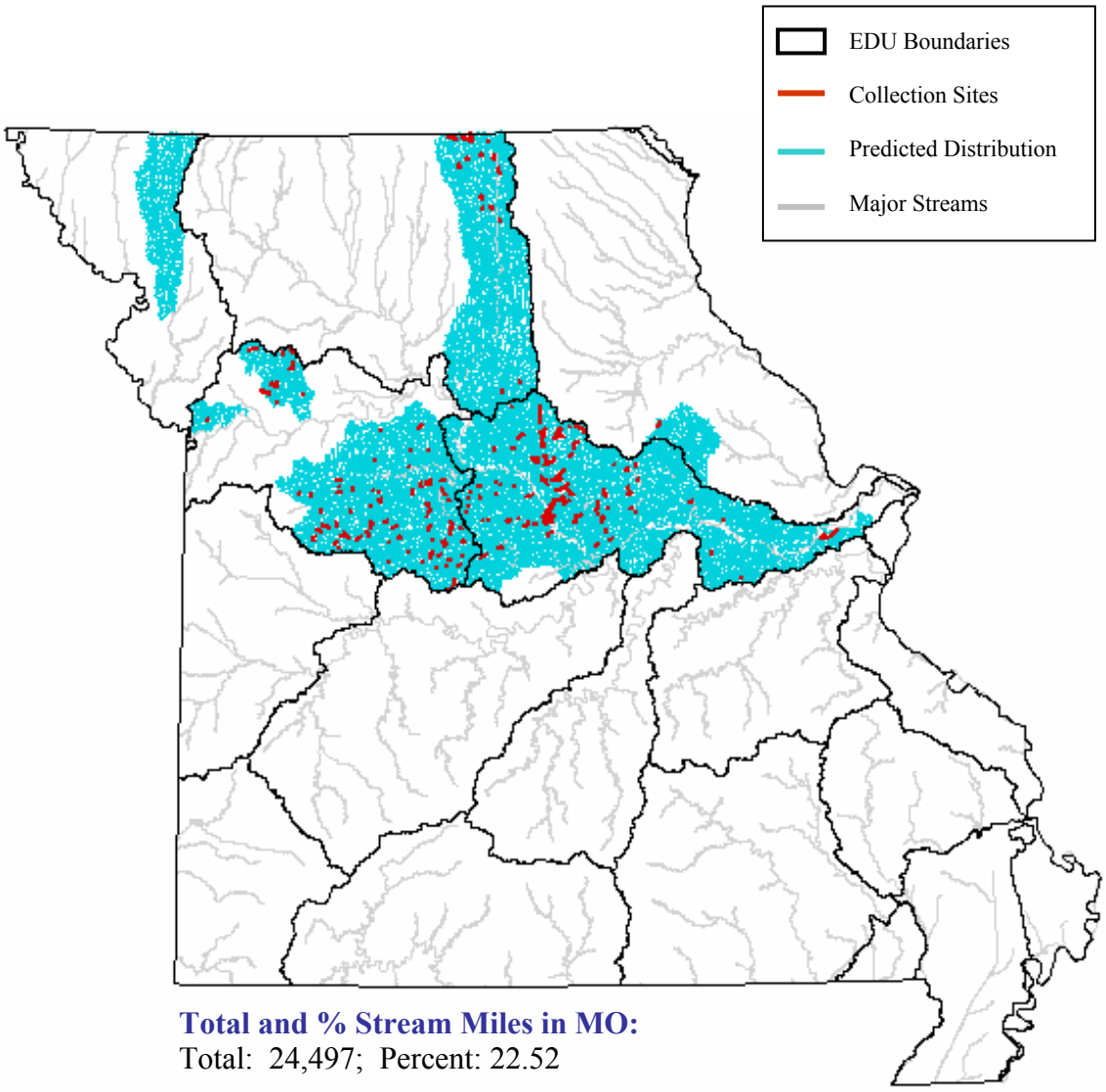
Endemism: Subzone

State Rank: S?

ITIS Code: 163836

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 24,497; Percent: 22.52

State Range:
The common shiner principally occurs in short, direct tributaries of the Missouri River in central and western Missouri. Isolated populations can be found in tributaries of the Upper Chariton River and a few other locations throughout the northern part of the state. Since 1980 the common shiner has become less abundant and is being replaced by the striped shiner parts of its range (Pflieger 1997).

Habitat Affinities:
The common shiner inhabits high-gradient streams of medium-size with moderate to swift current, clear, cool, weedless water, bottoms of gravel, rubble and bedrock. It is found in the pools of streams where riffles and pools alternate in rapid succession (Cross and Collins 1975; Pflieger 1997). As flow decreases late into summer, streams of this type are reduced to a series of isolated pools but water continues to percolate through the gravel between pools (Pflieger 1997). Adults and young migrate downstream after spawning to winter in larger, deeper waters with lower gradients (Trautman 1957).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 1) and ([Linkr] <= 6)

Ozark Model
Query 1: ([Temp_code] = 2)
Query 2: (([Linkr] >= 1) and ([Linkr] <= 4)) or (([Linkr] = 5) and ([Rgrad_subr] = 1))

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Creek Chub

Semotilus atromaculatus

Native: Yes

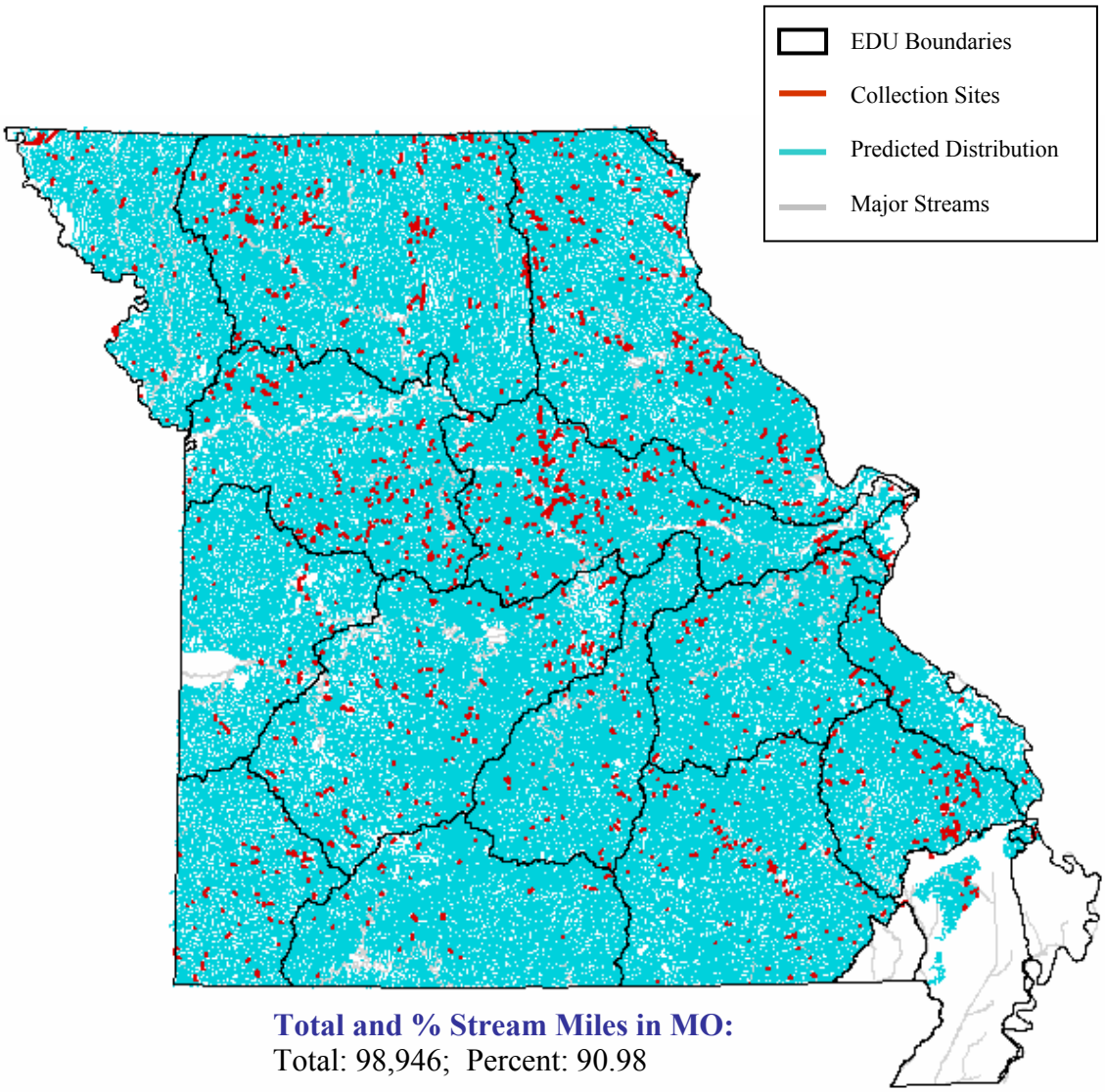
Endemism: Subzone

State Rank: S?

ITIS Code: 163376

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 98,946; Percent: 90.98

State Range:
The creek chub is one of the most widely distributed minnows in Missouri, occurring in almost all Ecological Drainage Units. It is most common in central and east-central Missouri. It can be found in western Missouri, with spottier distribution but abundance where it does occur. It is present throughout the Ozark Aquatic Subregion but less common in the White Drainage. It occurs infrequently in the Mississippi Basin Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
Trautman (1957) states that the creek chub was found in all ponds, reservoirs, and lakes, but concurs with other researchers that the majority of creek chubs inhabit small, often intermittent, headwater creeks where few other fishes are present (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes 1993; Douglas 1974; Cross and Collins 1975; Eddy and Underhill 1974; Clay 1975). Its population may increase when human activity reduces the population of competing species (Robinson and Buchanan 1988). The creek chub frequents streams with alternate riffles and pools rather than continuous strong flow, occurring where there are sufficient holes, brush, roots, or other cover for retreat if threatened (Pflieger 1997; Clay 1975; Trautman 1957; Etnier and Starnes 1993). It is most abundant in streams of high gradient with gravelly bottoms, requiring flow for spawning and gravel in which to build nests (Douglas 1974; Pflieger 1997; Trautman 1957; Clay 1975; Robinson and Buchanan 1988). It can tolerate turbidity if there is enough gradient to create gravelly areas, noting that a scarcity of gravelly bottoms may limit the creek chub's distribution (Pflieger 1997).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2)
(([Linkr] >= 1) and ([Linkr] <= 4)) or (([Linkr] = 5) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2))

Ozark Model
([Linkr] >= 1) and ([Linkr] <= 6)

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

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Creek Chubsucker

Erimyzon oblongus

Native: Yes

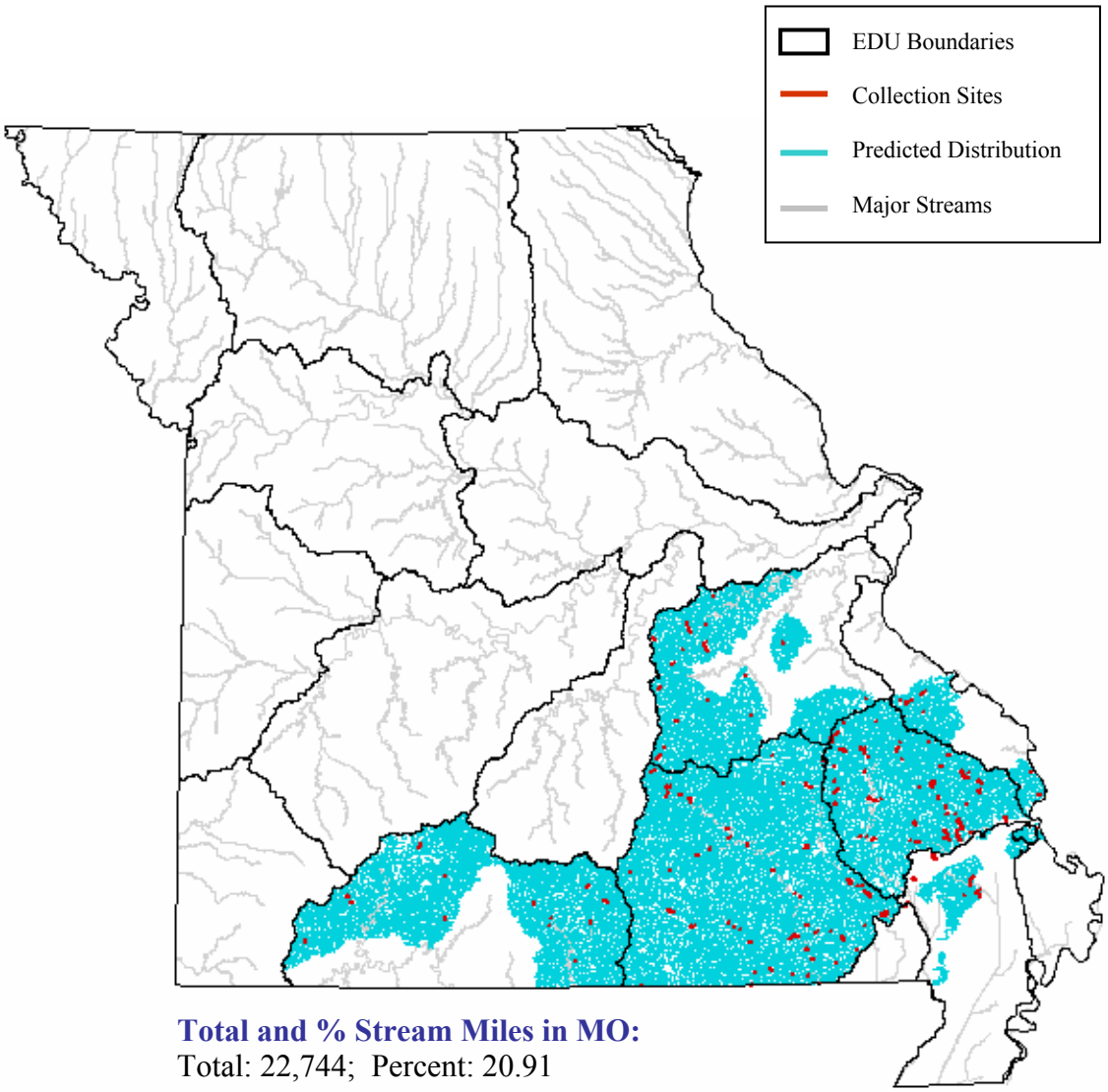
Endemism: Subzone

State Rank: S?

ITIS Code: 163924

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 22,744; Percent: 20.91

State Range:
The creek chubsucker occurs throughout the southern and eastern Ozarks. It is not found in the Neosho Ecological Drainage Unit, but does inhabit a few creeks draining Crowley's Ridge in the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
Creek chubsuckers are found in small, widely scattered populations, preferring smaller streams of moderate to high gradient with clear, quiet waters and substrates of sand, gravel, or debris covered with thick vegetation (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). Trautman (1957) found that creek chubsuckers inhabit streams with little clayey silt and cannot survive extreme turbidity, which packs their gills and suffocates them. The creek chubsucker frequently occurs in sluggish pools of small streams, spring pools, backwater areas, and in overflow pools of any size stream but seldom in impoundments (Pflieger 1997; Etnier and Starnes 1993; Robinson and Buchanan 1988). After spawning adults may migrate to larger streams (Trautman 1957).

Predictive Model(s):

Ozark Model
(([Flow] = 1) and ([Linkr] >= 1) and ([Linkr] <= 5)) or (([Flow] = 1) and ([Linkr] >= 6) and ([Temp_code] = 1)) or (([Flow] = 2))

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

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Crystal Darter

Crystallaria asprella

Native: Yes

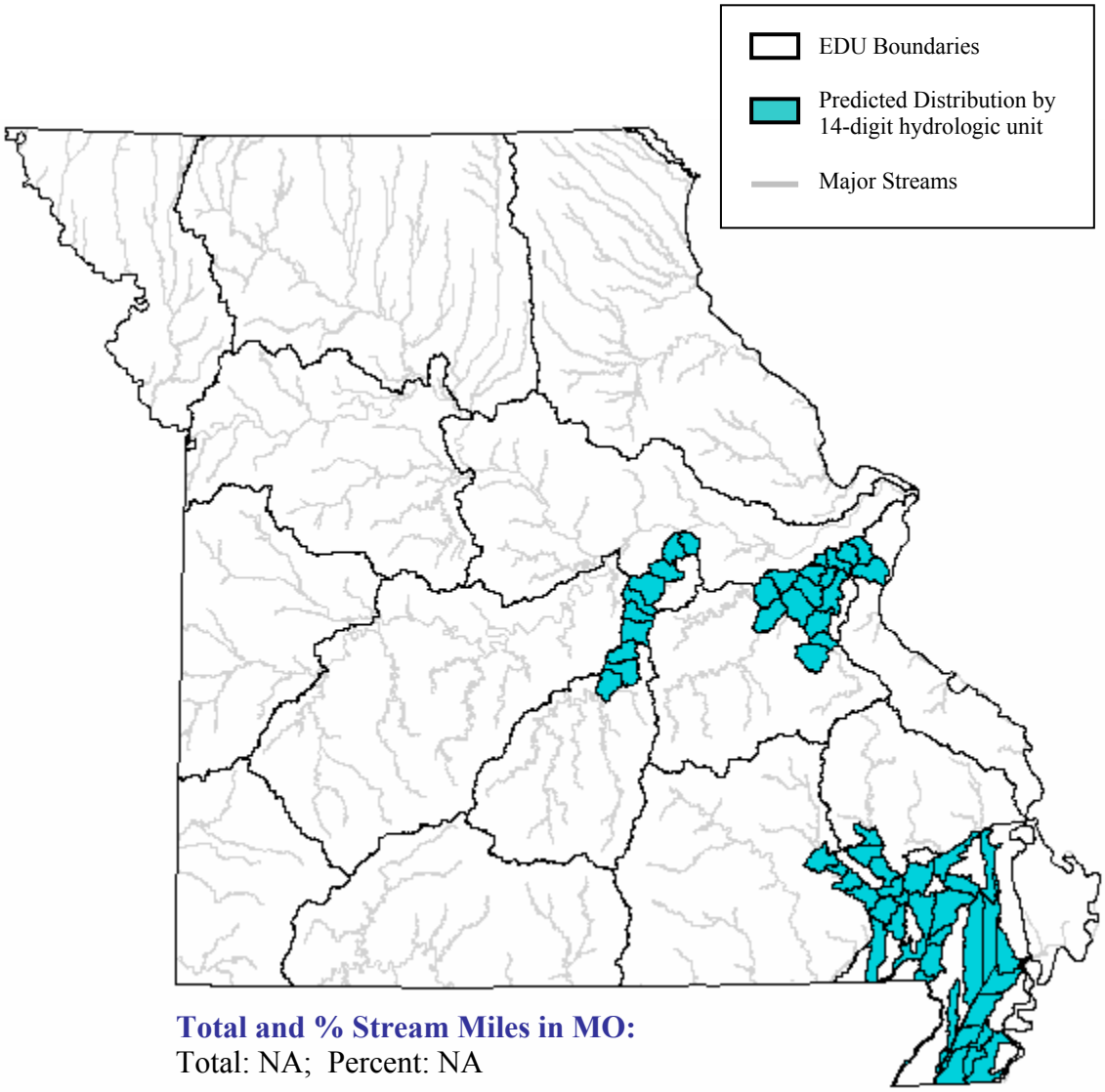
Endemism: Region

State Rank: S1

ITIS Code: 201982

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The crystal darter has been found in the Gasconade, Meramec, Black, St. Francis, and Little Drainages, but may have disappeared from all but the Gasconade and Black Drainages (Pflieger 1997).

Habitat Affinities:
The crystal darter occurs sporadically, with only a few specimens found at a time. It inhabits open channels of large clear streams over silt-free sand and gravel bottoms (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes 1993; Clay 1975; Phillips et. al. 1982; Trautman 1957; Douglas 1974). It is found in deeper streams with strong current and low to moderate gradients (Pflieger 1997; Trautman 1957; Robinson and Buchanan 1988; Etnier and Starnes 1993).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

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Current Darter

Etheostoma uniporum

Native: Yes

Endemism: EDU

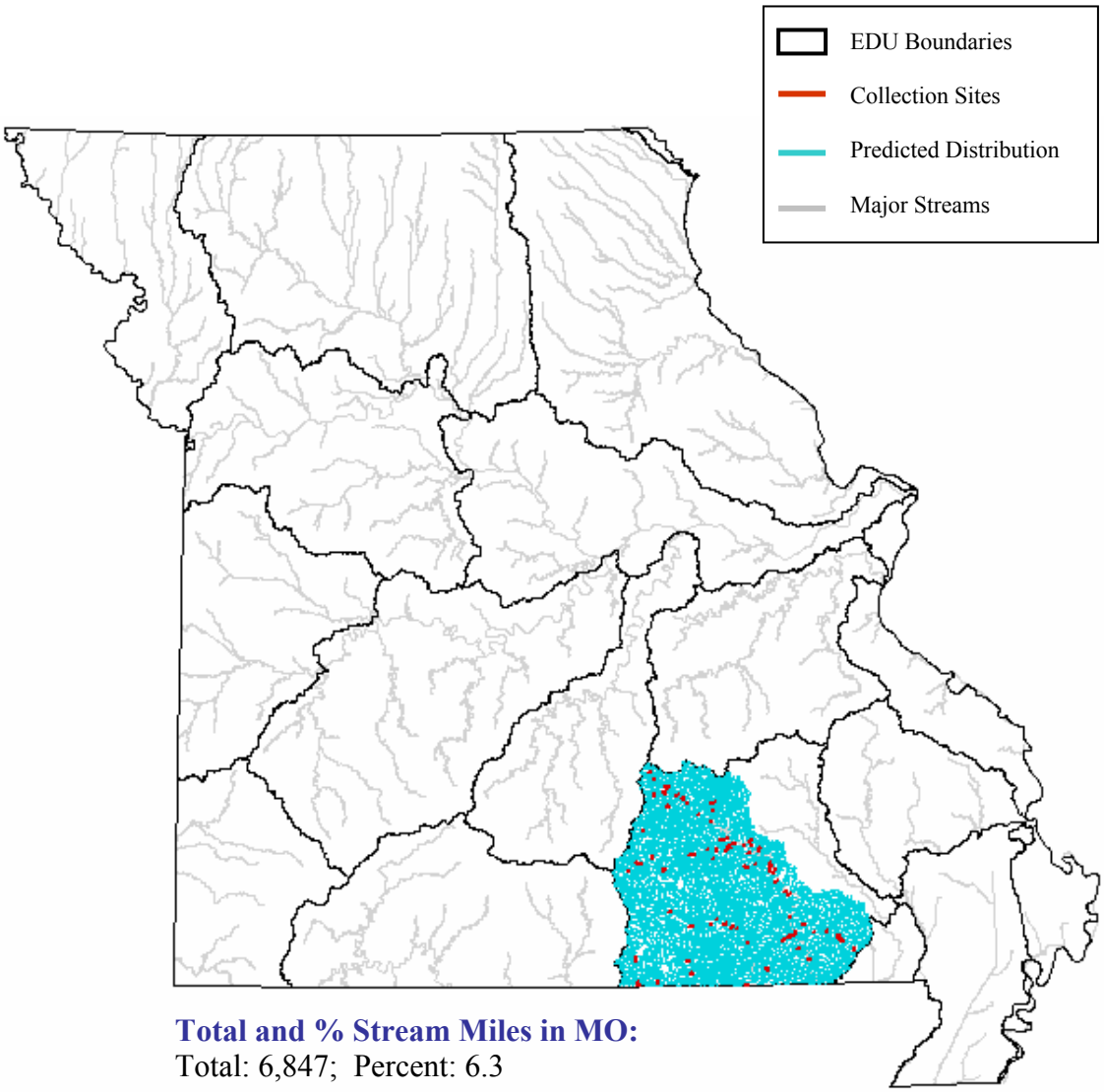
ITIS Code: Not yet available.

State Rank: S?

MoRAP Species ID Code: 9002

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 6,847; Percent: 6.3

State Range:
The current darter is found only within the Black/Current Ecological Drainage Unit of the Ozark Aquatic Subregion, but its distribution excludes the Black River drainage itself (Ceas and Page 1997). Although Pflieger (1997) notes recent taxonomic changes concerning the current and orangethroat darters (Ceas and Page 1997), individual range descriptions are not given.

Habitat Affinities:
The habitat of the current darter is assumed similar to that of the orangethroat darter; preferring small headwater creeks, spring runs and small to medium streams with clear to moderate turbidity and enough current to prevent considerable silt accumulation (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). Microhabitats include runs, pools, shallow riffles, or riffle margins with bottoms of rubble, fine gravel, or mixed gravel and sand (Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model
([Linkr] >= 1) and ([Linkr] <= 6)

References:

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Cypress Darter

Etheostoma proeliare

Native: Yes

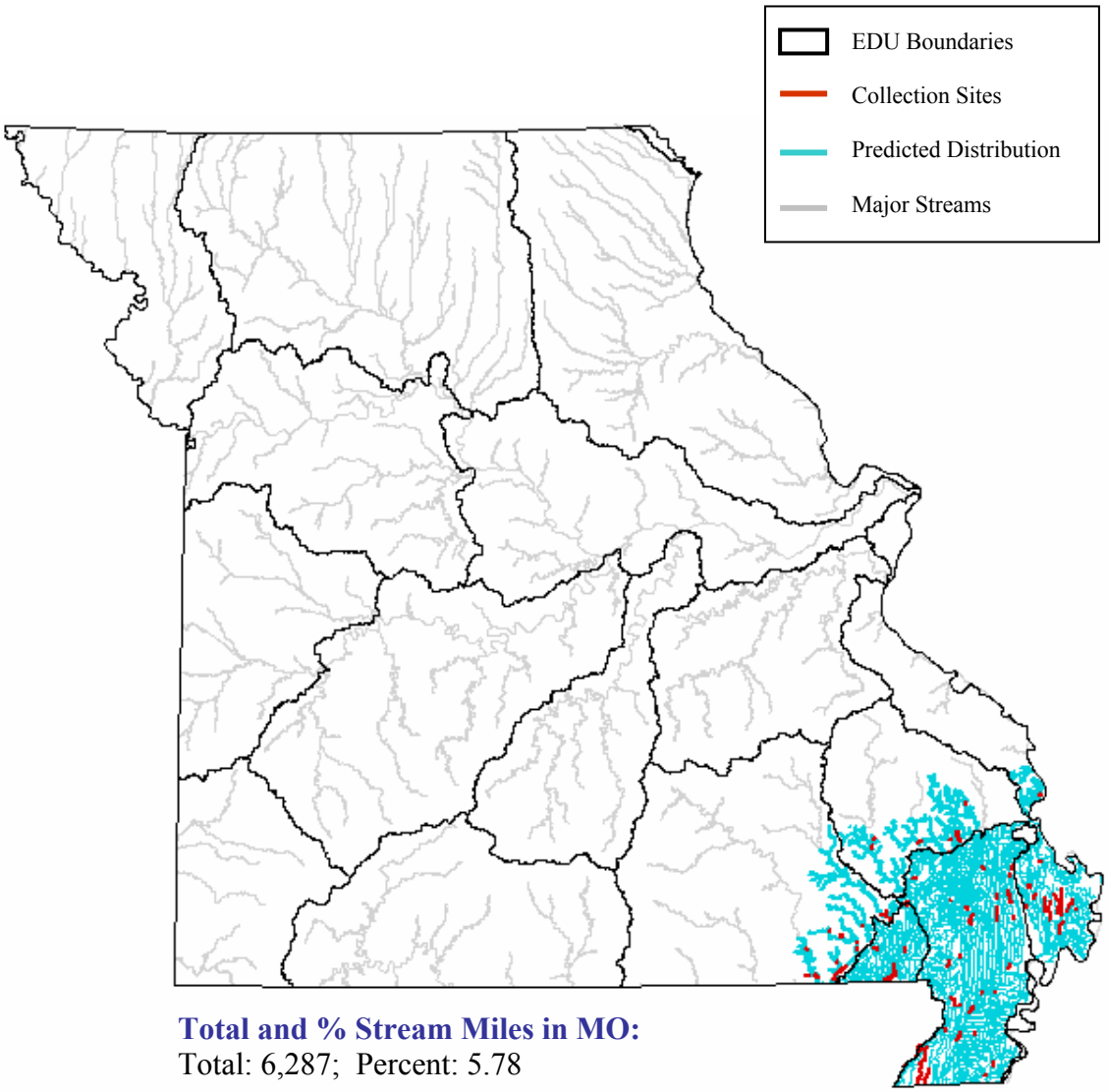
Endemism: Region

State Rank: S?

ITIS Code: 168424

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 6,287; Percent: 5.78

State Range:

The cypress darter range in Missouri is restricted to the Mississippi Alluvial Basin, with some specimens penetrating short distances into adjacent Ozark streams (Pflieger 1997).

Habitat Affinities:

The cypress darter occupies clear, sluggish waters in heavily vegetated ditches, swamps, and oxbow lakes (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes 1993; Clay 1975; Douglas 1974). It can sometimes be found in faster-flowing ditches but is restricted to margins with cover such as waterwillow, undercut roots, and organic debris. In Missouri it usually occurs over substrates of soft mud or detritus (Pflieger 1997), but Etnier and Starnes (1993) state it is generally found in hard-bottomed streams, and Robinson and Buchanan (1988) found that in upland areas the cypress darter inhabits pools of creeks with gravel and sand bottoms and moderate to low gradients.

Predictive Model(s):

Ozark Model

The distribution is based upon existing collection records, contingency tables, habitat affinity and professional review.

([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 1)

Mississippi Alluvial Basin Model

([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Plain Crowley's Ridge Model

([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

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Cypress Minnow

Hybognathus hayi

Native: Yes

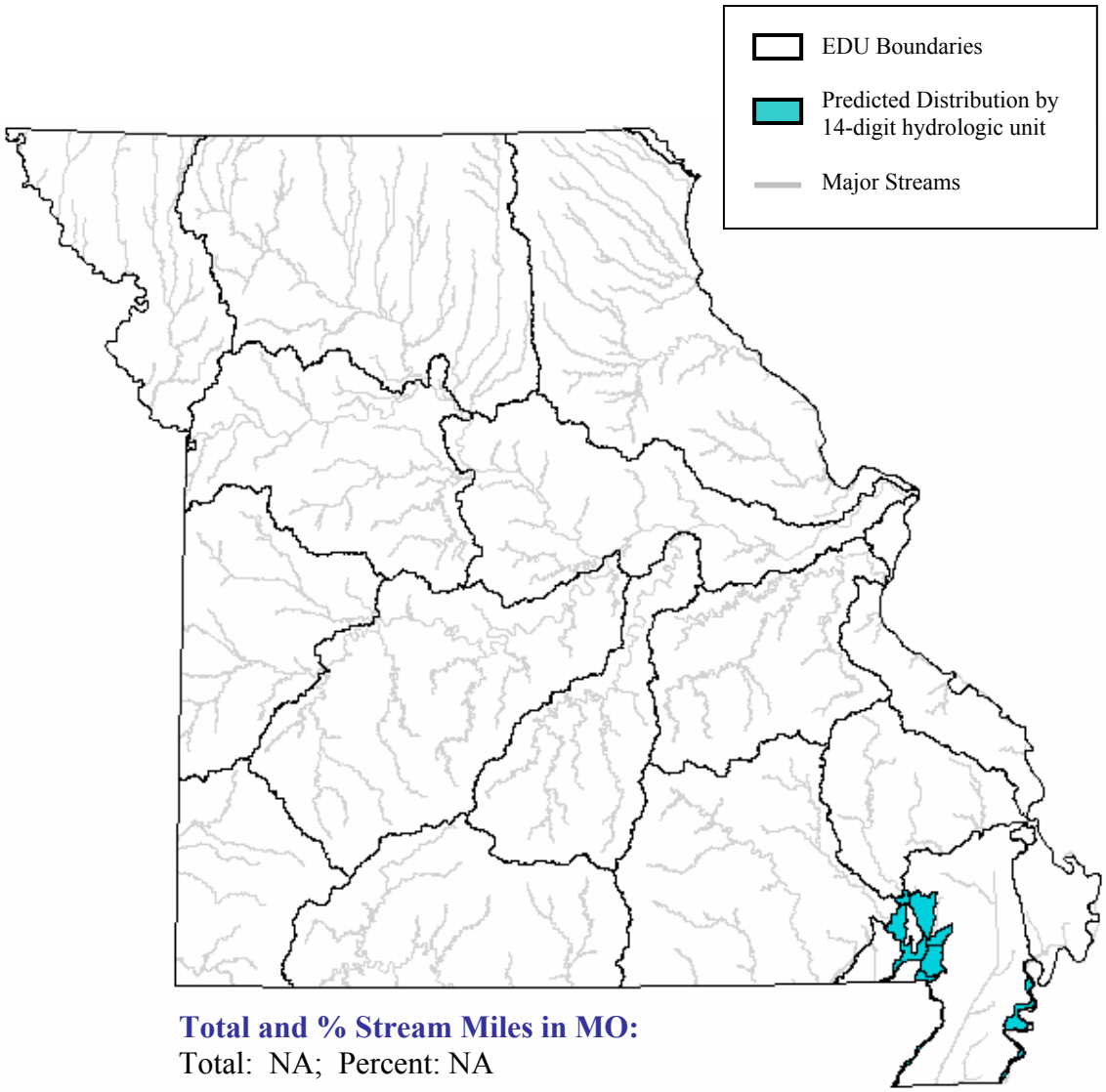
Endemism: Region

State Rank: S1

ITIS Code: 163364

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The cypress minnow was common 50 years ago but has only recently been collected from the St. Francis river in the Cash Memorial Conservation Area and the Wolf Bayou Conservation Area near the Mississippi River (Pflieger 1997).

Habitat Affinities:
The cypress minnow inhabits sand, silt, soft detritus or mud-bottomed, quiet backwaters and oxbows of large, sluggish rivers, lagoons, and swamps (Fingerman and Suttkus 1961; Etnier and Starnes 1993;Pflieger 1997). It is often associated with cypress-lined oxbows in Arkansas (Robinson and Buchanan 1988), and sluggish, turbid water with muddy or silty bottoms in Kentucky (Clay 1975). The cypress minnow is on the verge of extirpation in Illinois; it's decline here and in other places is thought to be due to habitat alterations linked to agricultural practices (Burr and Mayden 1982c; Warren and Burr 1989).

Predictive Model(s):

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = "MO") and one known location.

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Dollar Sunfish

Lepomis marginatus

Native: Yes

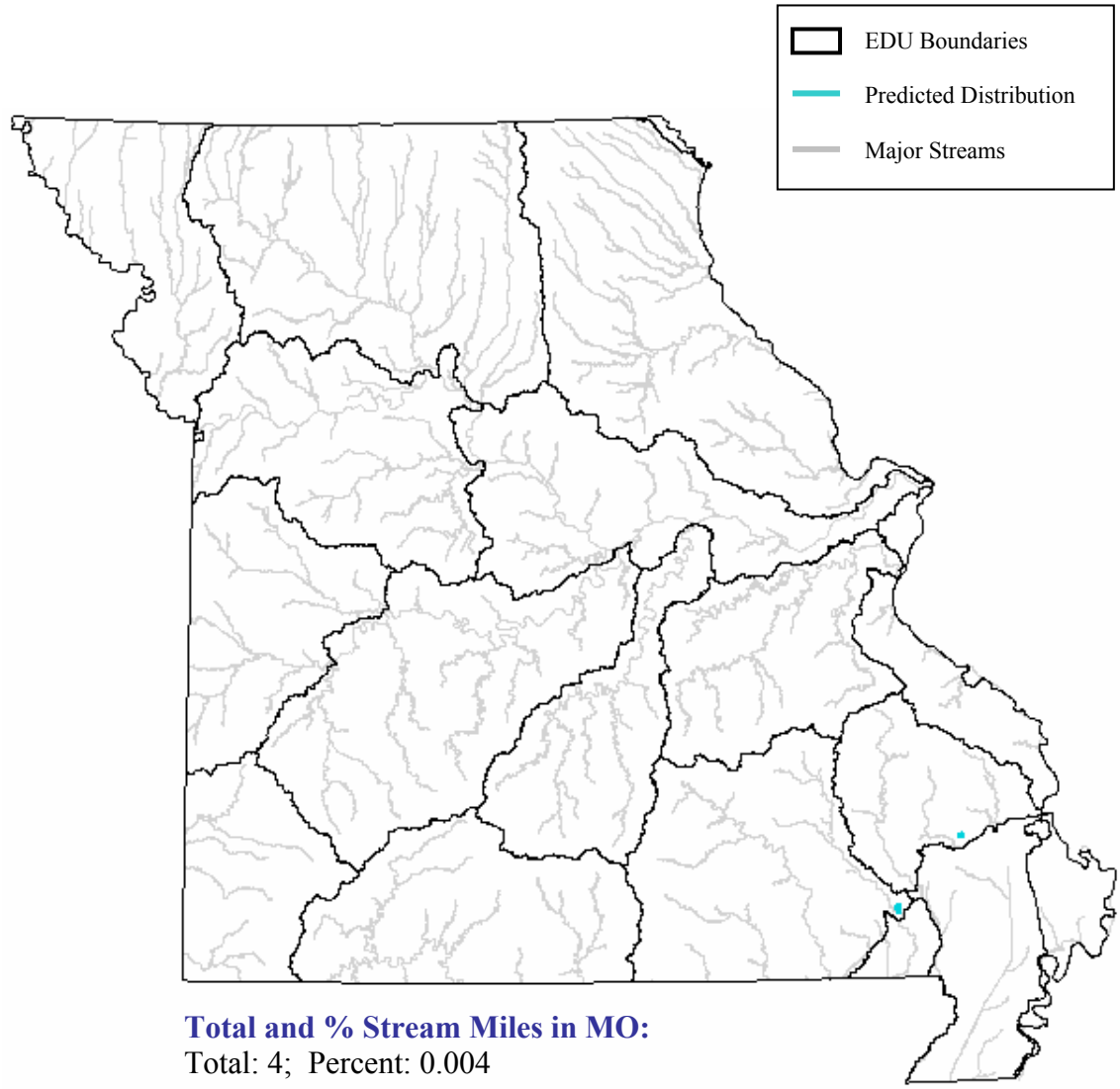
Endemism: Subzone

State Rank: SU

ITIS Code: 168152

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 4; Percent: 0.004

State Range:
The dollar sunfish has only been collected recently (1995) from Hickory Creek and Hawker River, on the northwestern edge of the Mississippi Alluvial Basin Aquatic Subregion. However, its occurrence was anticipated because it is found in adjoining sections of Kentucky and Tennessee. The dollar sunfish may have occurred in early collections but due to its similarity with the longear sunfish it was overlooked (Pflieger 1997).

Habitat Affinities:
The dollar sunfish is found in clear, unaltered swamps, small creeks, sluggish streams, bayous, and natural lakes among moderate to heavy vegetation over substrates of sand, mud, or detritus (Etnier and Starnes 1993; Robinson and Buchanan 1988). In Missouri it was collected from quite pools in low-gradient sections of moderately small streams that drain the southeastern Ozarks into the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997). The dollar sunfish inhabits deeper waters in winter and moves to shallow waters to spawn from May to August (Lee and Burr 1985).

Predictive Model(s):

Ozark Model
The distribution is based upon existing collection records and professional review.

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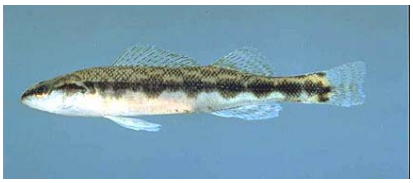
Dusky Darter

Percina sciera



Native: Yes

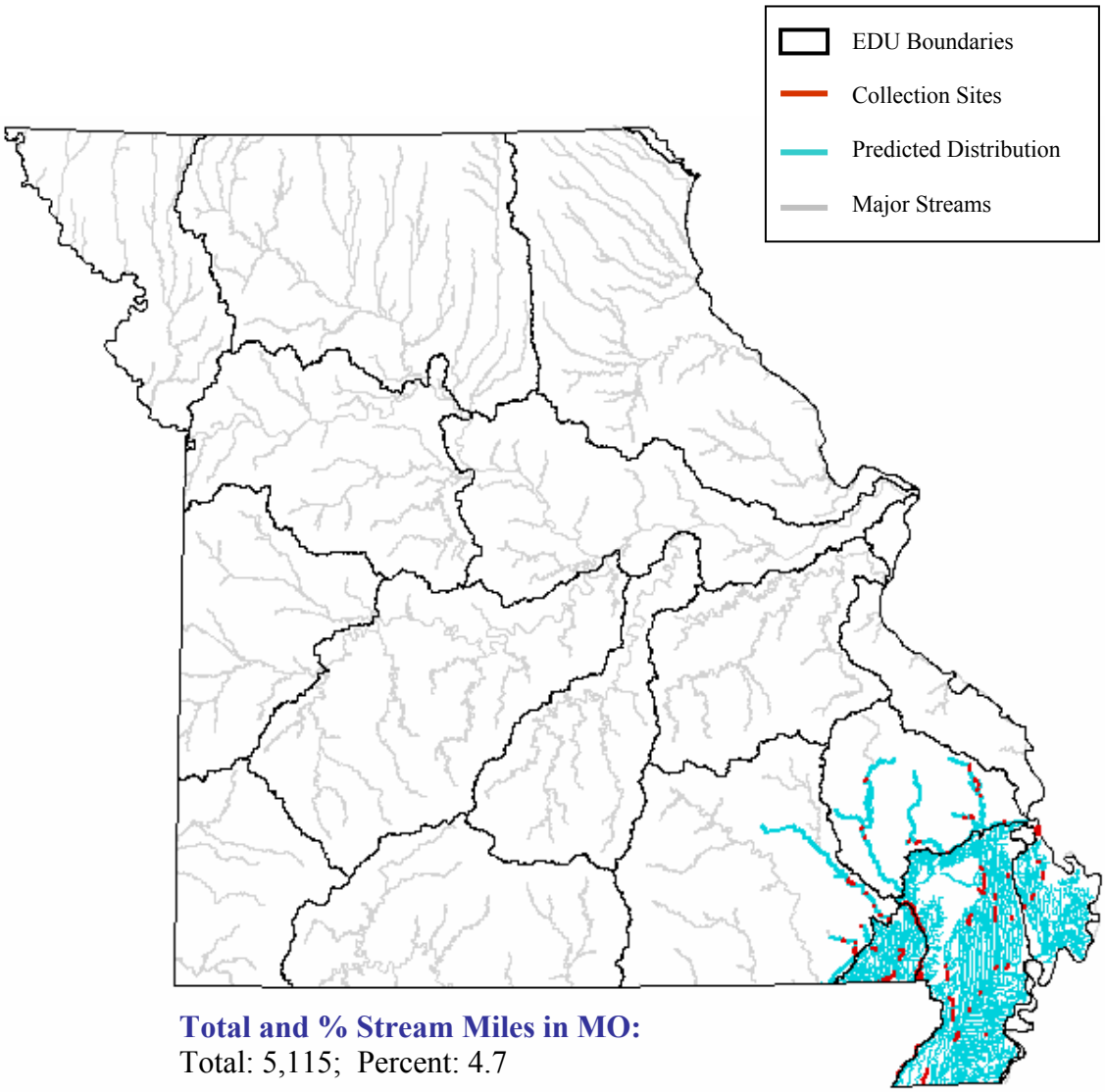
Endemism: Region

State Rank: S?

ITIS Code: 168475

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,115; Percent: 4.7

State Range:
The dusky darter is common in the Mississippi Alluvial Basin Aquatic Subregion and penetrates into adjacent streams from the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The dusky darter is associated with moving waters of clear, moderate to large–sized streams, with low gradient and moderate current. It is often associated with beds of aquatic vegetation such as pondweed, accumulations of sticks and leaves, undercut banks, or brush over silt-free sand or gravel riffles (Clay 1975; Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In the Mississippi Alluvial Basin Aquatic Subregion the dusky darter's most abundant populations are found along the cutting edge of gravelly riffles where water is at least a foot deep and there is an accumulation of aquatic vegetation (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

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Duskystripe Shiner

Luxilus pilsbryi

Native: Yes

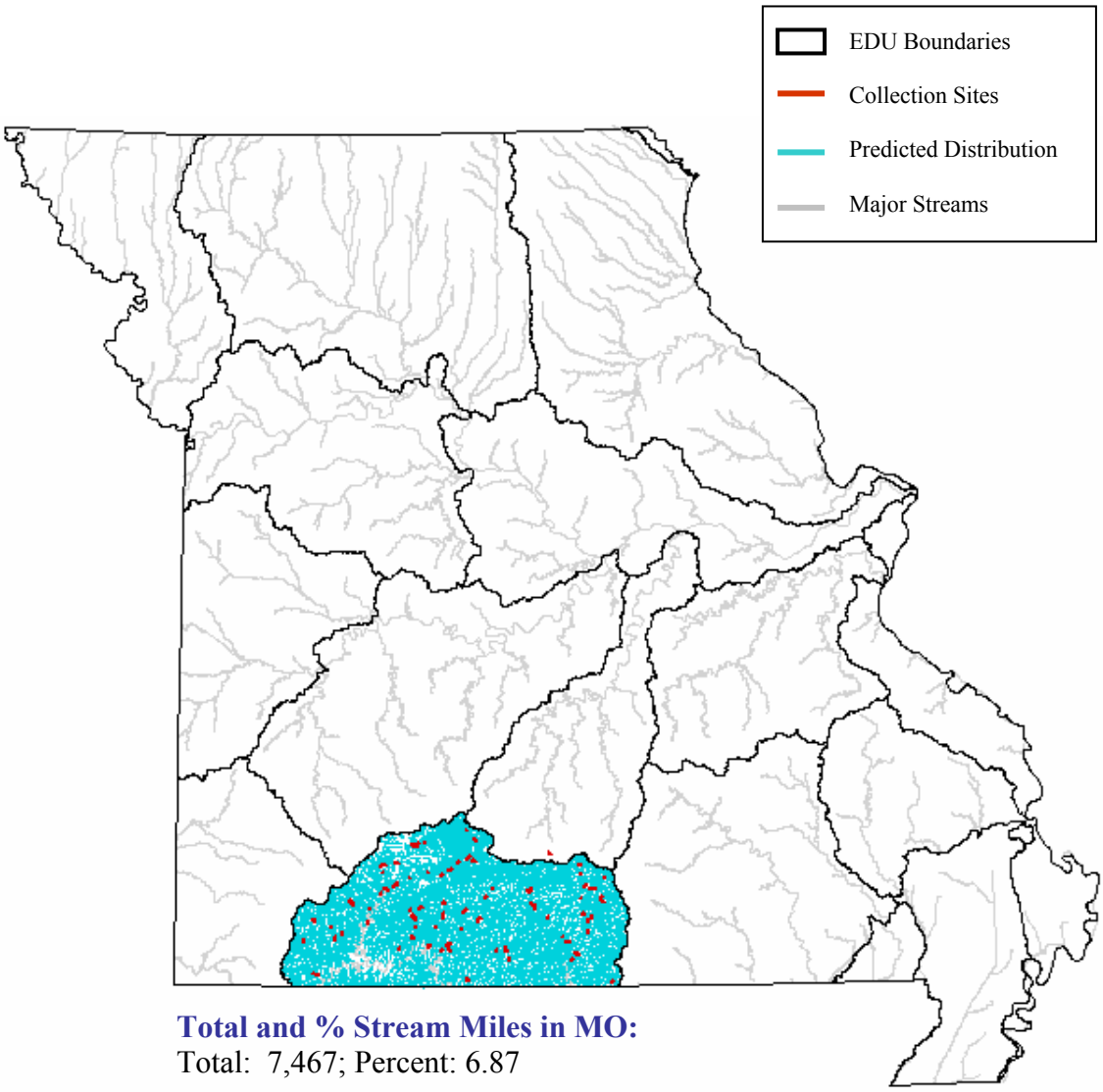
Endemism: EDU

State Rank: S?

ITIS Code: 163838

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 7,467; Percent: 6.87

State Range:
The duskystripe shiner is found throughout the White Ecological Drainage Unit (EDU) in the Ozark Aquatic Subregion. Here it is one of the most dominant minnows in small and medium-sized streams but has been eliminated from impoundment reaches of the White River mainstem (Pflieger 1997).

Habitat Affinities:
The habitat of the duskystripe shiner is similar to the cardinal shiner, but is found more often in headwaters. In the White River EDU it is frequently found in the riffles or pools of clear, small creeks to moderately large rivers with gravel bottoms and noticeable current (Pflieger 1997). Clay (1975) and Robinson and Buchanan (1988) note that the duskystripe shiner inhabits upland streams with swift riffles or clear, cool pools with moderate current and bottoms of limestone rubble or gravel.

Predictive Model(s):

Ozark Model
([Linkr] >= 1) and ([Linkr] <= 6)

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Emerald Shiner

Notropis atherinoides

Native: Yes

Endemism: Subzone

State Rank: S?

ITIS Code: 163412

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick

Total and % Stream Miles in MO:
Total: 4,817; Percent: 4.43

State Range:
The emerald shiner is common in larger ditches of the Mississippi Alluvial Basin Aquatic Subregion and the larger rivers of the northern Central Plains Aquatic Subregion but absent from high-gradient streams of the central Ozark Aquatic Subregion. It is the most abundant minnow in the Mississippi and Missouri Rivers. The dramatic increase in the occurrence of the emerald shiner since the 1940's is related to the reduction in turbidity created by reservoir construction (Pflieger 1997).

Habitat Affinities:
The emerald shiner occurs in a variety of habitats, as it is tolerant of a wide range of turbidities, bottom types, and current velocities (Pflieger 1997). This shiner is characteristic of large, open channels of medium to large-sized, clear rivers and streams with sandy substrates (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). It is often found in the middle or uppers layers of water over firm bottoms (Clay 1975) and noticeable current (Pflieger 1997). It also inhabits reservoirs in some parts of its range but has not been found in any Missouri reservoirs yet (Pflieger 1997).

Predictive Model(s):

Central Plains Model Central Plains Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

Ozark Model
([Temp_code] = 2) and ([Linkr] >= 7)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 2) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Fantail Darter

Etheostoma flabellare

Native: Yes

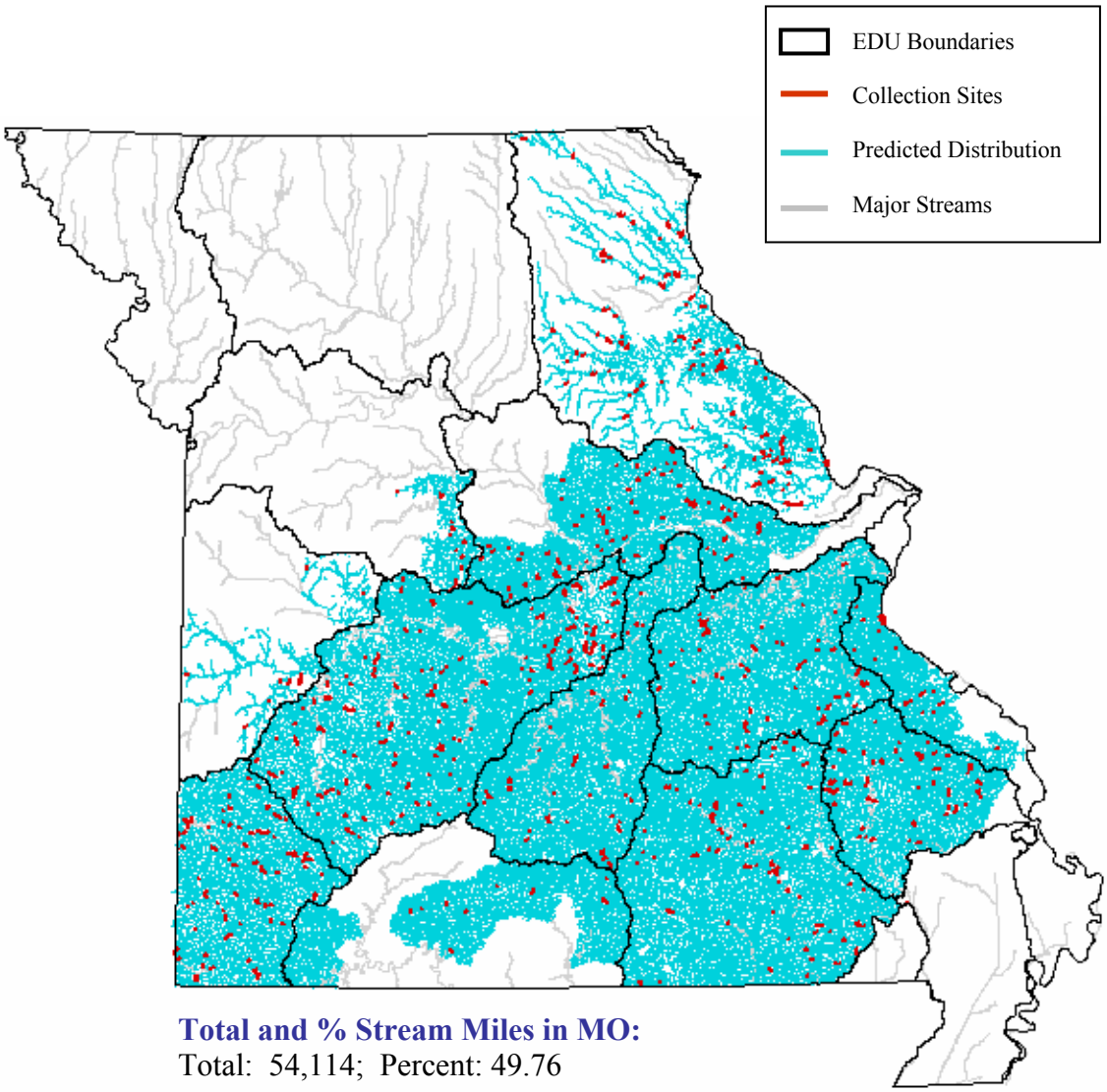
Endemism: Subzone

State Rank: S?

ITIS Code: 168394

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 54,114; Percent: 49.76

State Range:
The fantail darter is found in most of the Ozark Aquatic Subregion and tributaries of the upper Mississippi River along the northeastern extension of the Ozark Border. Over much of its Missouri range it is the most abundant darter, but in the White River drainage it is uncommon and highly localized (Pflieger 1997).

Habitat Affinities:
The fantail darter is found in the shallow riffles or flowing pools of clear, small creeks to small rivers with permanent flow, moderate or high-gradients and bottoms of gravel, rubble, flat stones or boulders (Clay 1975; Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). In Missouri the fantail darter is generally more abundant in small rivers. It does not penetrate into the headwaters of Plains streams but is much more abundant in the headwaters of Ozarks streams, probably due to better base flow (Pflieger 1997). It can tolerate more turbidity and pollution than most darters (Pflieger 1997; Trautman 1957). Young are sometimes found in pools (Robinson and Buchanan 1988) and adults winter in larger and deeper waters (Trautman 1957).

Predictive Model(s):

Central Plains Model
Query 1: ([Temp_code] = 2)
Query 2: (([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2) and ([Linkr] >= 3)) or (([Rgrad_subr] = 3))

Ozark Model
([Linkr] >= 1) and ([Linkr] <= 5)

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Fathead Minnow

Pimephales promelas

Native: Yes

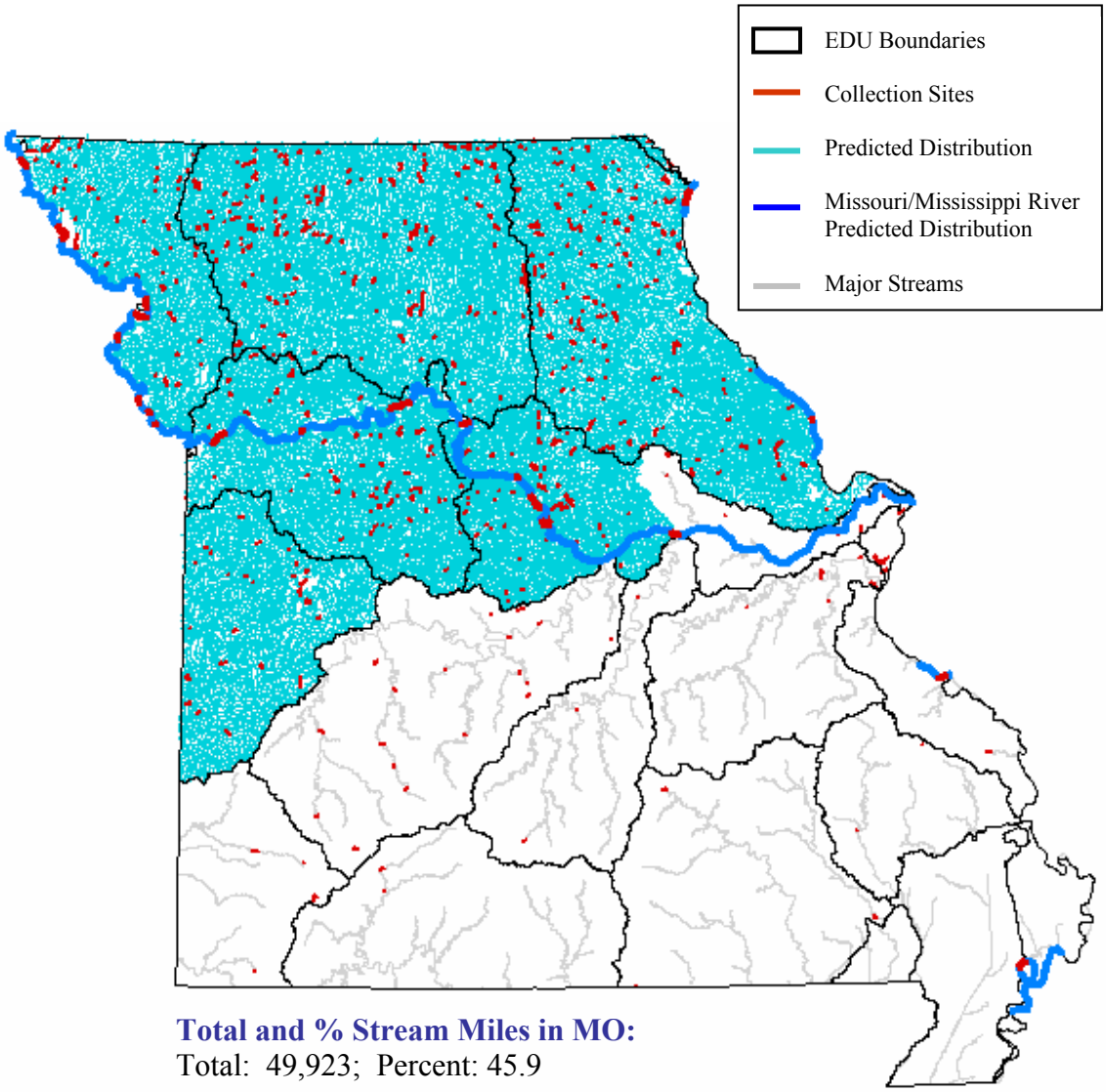
Endemism: Subzone

State Rank: S?

ITIS Code: 163517

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 49,923; Percent: 45.9

State Range:
The flathead minnow is common and characteristic in the Central Plains Aquatic Subregion but rare in the Mississippi Alluvial Basin and natural waters of the Ozark Aquatic Subregion. It is most abundant in waters draining the eastern edge of the Grand/Chariton Ecological Drainage Unit (EDU) (Pflieger 1997).

Habitat Affinities:
The fathead minnow can be found in streams of various sizes but is only abundant in sluggish, intermittent streams, ditches and ponds with soft, silty mud or firm clay substrates (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). It is intolerant of competition and predation but uniquely adapted to stagnant pools, acid bog-ponds, and alkaline streams where extremes in pH, low oxygen levels, high turbidity, and high temperatures decrease fish diversity (Pflieger 1971; Trautman 1957). In the Central Plains Aquatic Subregion it is found along floodplains in shallow, silty sloughs. During extended dry periods it seeks refuge in stagnant pools of small Plains streams (Pflieger 1997).

Predictive Model(s):

Central Plains Model
([Linkr] >= 1)

Ozark Model in Hydrologic Unit 10300102
([Linkr] >= 1)

Ozark Model for the remainder of the Ozarks
The distribution is based upon existing collection records and professional review.

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Flathead Catfish

Pylodictis olivaris

Native: Yes

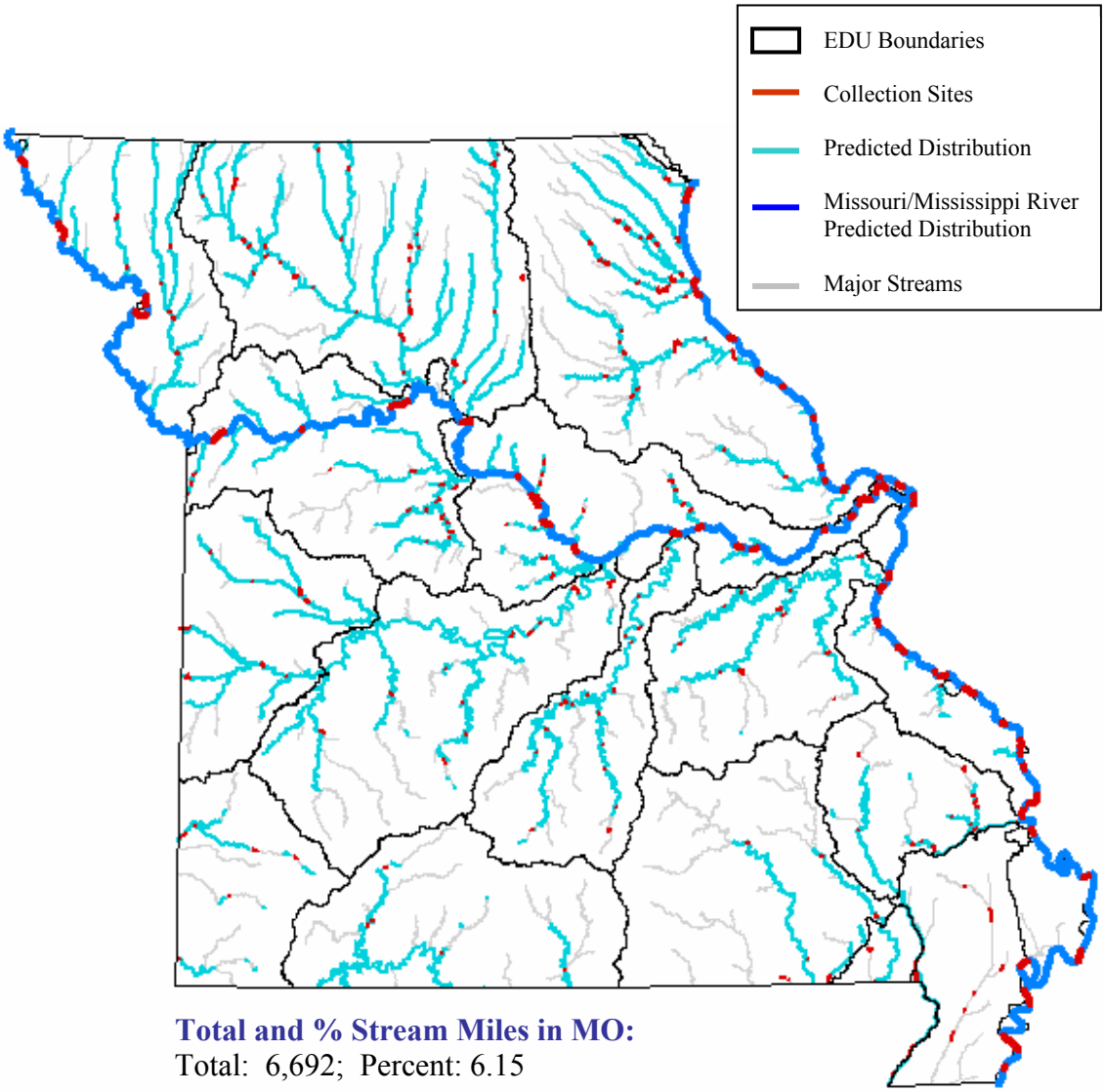
Endemism: Region

State Rank: S?

ITIS Code: 164029

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 6,692; Percent: 6.15

State Range:

The flathead catfish can be found in most large streams of Missouri and is one the most abundant large catfishes of the Mississippi and Missouri Rivers. It is rare in the Ozark Aquatic Subregion with the exception of large reservoirs and downstream sections of large streams, and abundant in principal tributaries of the Central Plains Aquatic Subregion and larger streams and ditches of the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The flathead catfish inhabits a wide variety of habitats and can tolerate extreme turbidity (Robinson and Buchanan 1988; Trautman 1957) but avoids headwater creeks and high-gradient streams (Pflieger 1997). During the daylight hours it is typically found adjacent to deep pools created by strong current in large sluggish rivers (Clay 1975; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Trautman 1957), or low gradient tributaries of large streams (Eddy and Underhill 1974; Etnier and Starnes 1993). The flathead catfish also inhabits reservoirs (Robinson and Buchanan 1988; Etnier and Starnes 1993), but is more plentiful below dams of major impoundments (Eddy and Underhill 1974; Douglas 1974). It is usually found about drift piles, submerged logs or fallen trees with hard-bottomed substrates of sand or silt (Clay 1975; Pflieger 1997; Trautman 1957). Riffles are used by nocturnally feeding adults and are the main habitat of young, which also stay in pools, backwaters and sheltered places as they mature (Clay 1975; Pflieger 1997; Phillips et. al. 1982; Trautman 1957).

Predictive Model(s):

Central Plains Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

Ozark Model
(([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] = 5) and ([Rgrad_subr] = 1)) or (([Linkr] >= 6))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = “MO”)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Flathead Chub

Platygobio gracilis

Native: Yes

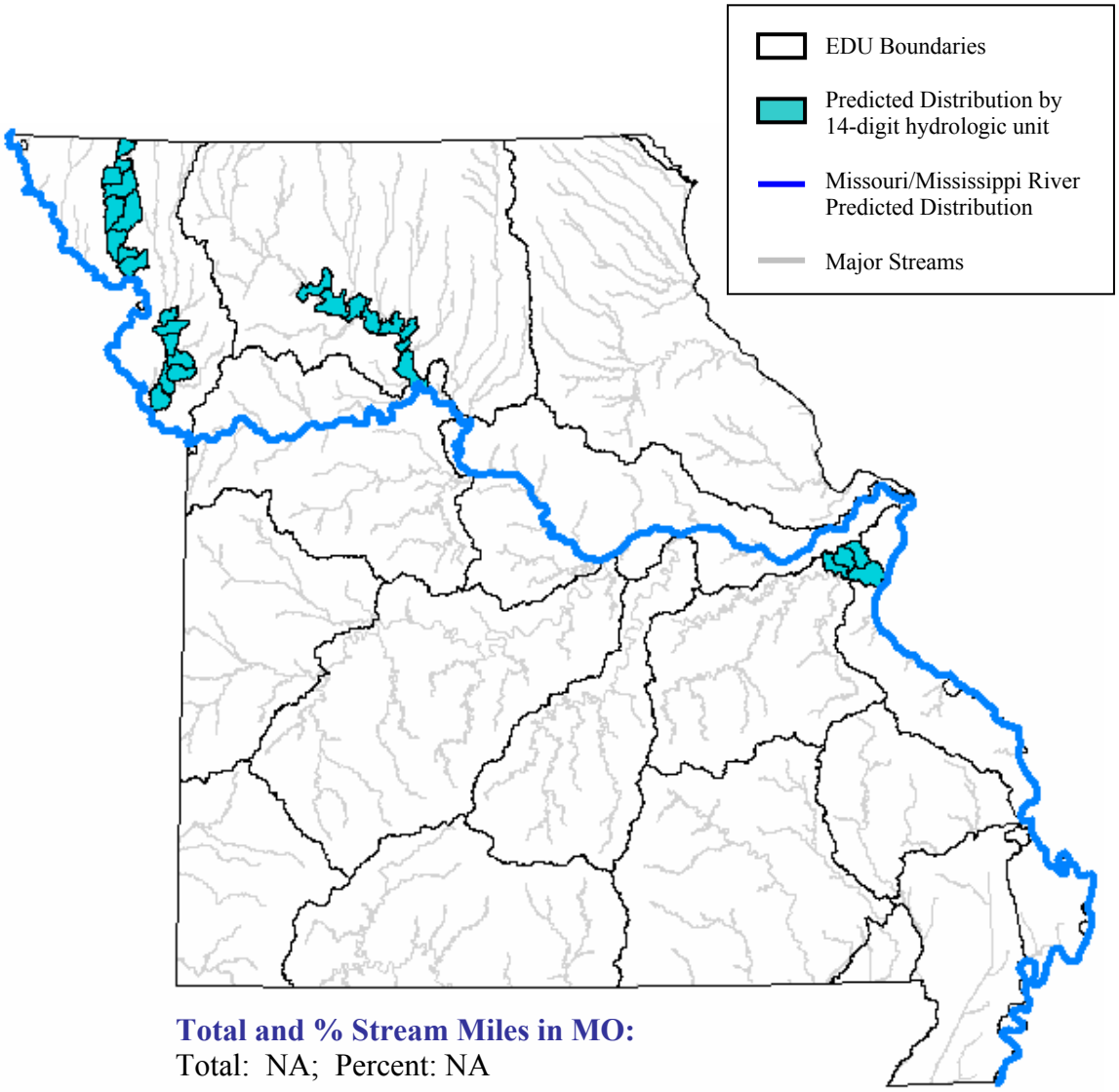
Endemism: Subzone

State Rank: S1

ITIS Code: 163882

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The flathead chub is known from the Missouri River and in the Mississippi River south of the confluence with the Missouri. It has also been found in portions of the lower Ozark/Meramec, Central Plains/Grand/Chariton, and the Central Plains/Nishnabotna/Platte Ecological Drainage Units (EDU). The flathead chub has nearly been extirpated from Missouri. Its rapid decline since the 1940's is related to the reduction of bed load and turbidity in the Missouri River from the construction of six large reservoirs upstream from the state (Pflieger 1997).

Habitat Affinities:
The flathead chub is typically found in the main channel of turbid, flowing streams and rivers with firm sand or gravel substrates (Etnier and Starnes 1993; Robinson and Buchanan 1988; Pflieger 1997). In northwestern Missouri it is was found in moderately clear, small creeks with slack current and gravel and bedrock substrates (Pflieger 1997). Cross and Collins (1975) typically found the flathead chub in shallow pools but also collected it in strong currents over sand.

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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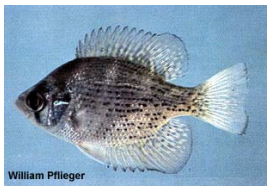


Flier

Centrarchus macropterus

Native: Yes

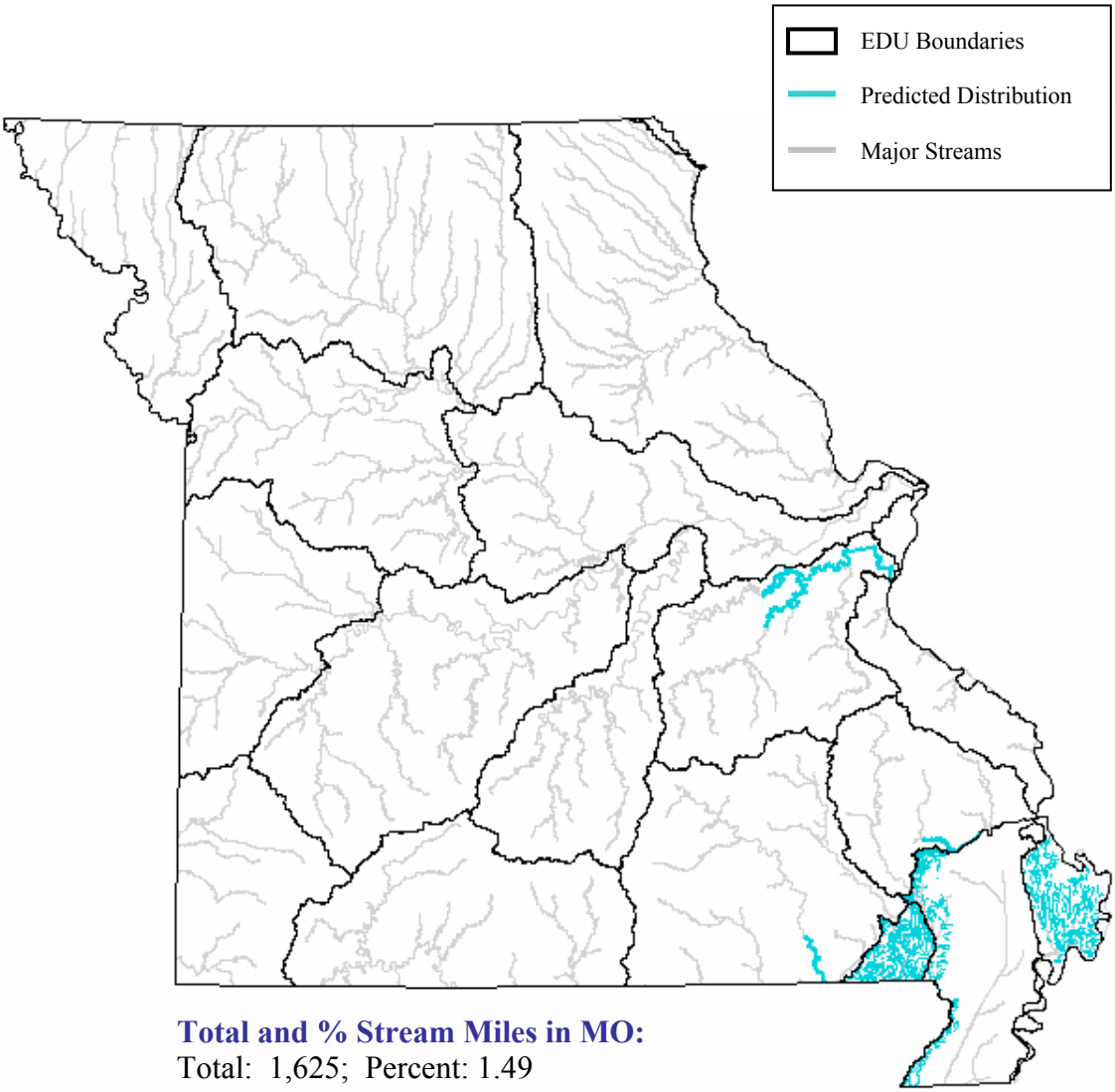
Endemism: Subzone

State Rank: S3

ITIS Code: 168102

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,625; Percent: 1.49

State Range:
The flier is found almost exclusively in the Mississippi Alluvial Basin Aquatic Subregion where it uncommon and distributed sporadically. Ditching and draining of swamps has considerably limited populations to nature preserves such as the Duck Creek Wildlife Area and Mingo National Wildlife Refuge (Pflieger 1997).

Habitat Affinities:
The flier in habits various lowland habitats such as creeks, oxbows, lakes, bayous, swamps, and the sluggish backwaters of rivers (Clay 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). In the Mississippi Alluvial Basin Aquatic Subregion it prefers clear water with little current and heavy vegetation (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 1) and ([State] = "MO")

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Freckled Madtom

Noturus nocturnus

Native: Yes

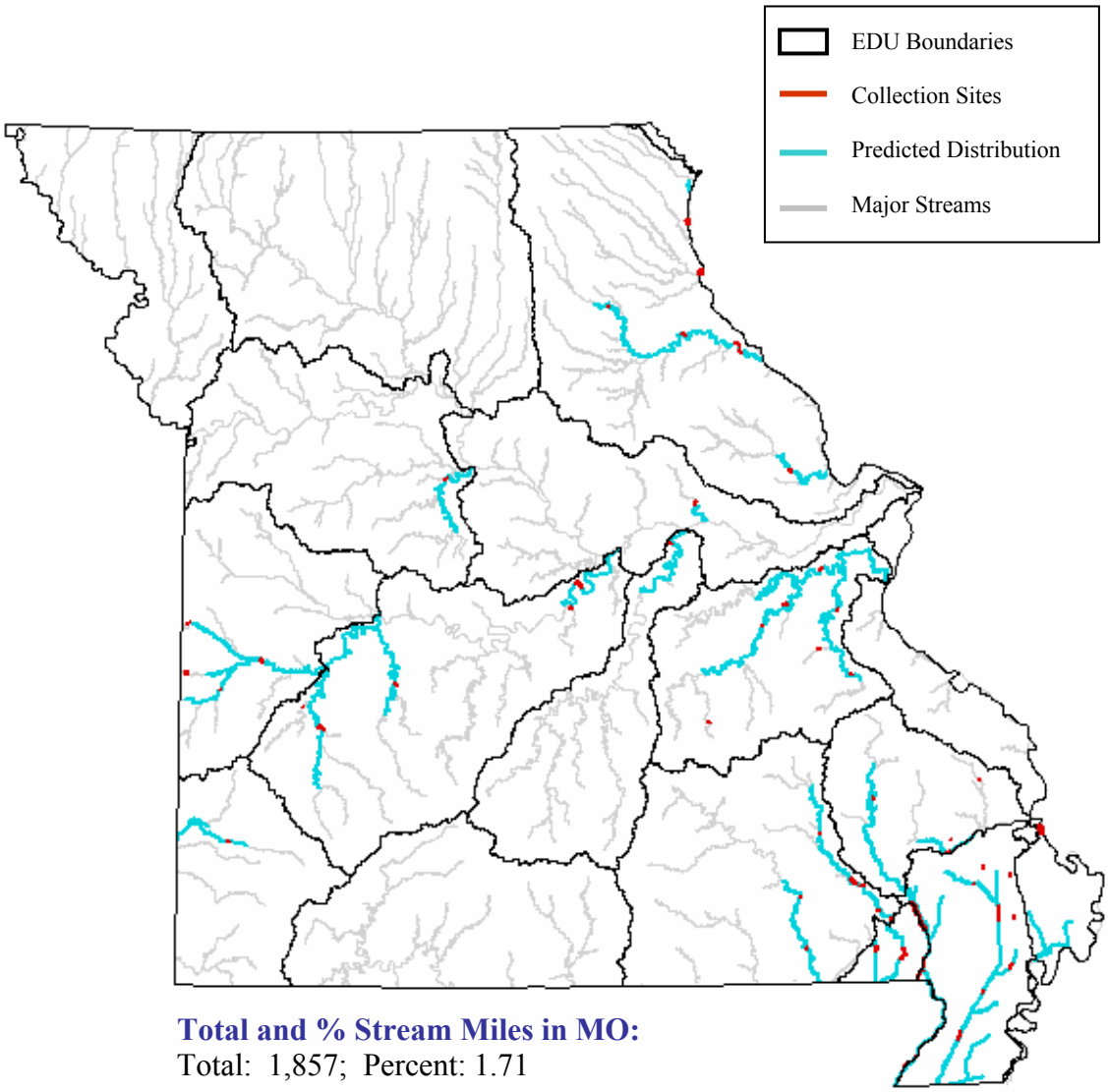
Endemism: Region

State Rank: S?

ITIS Code: 164005

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,857; Percent: 1.71

State Range:
The freckled madtom is found to a limited extent in each of the Aquatic Subregions of Missouri. Highest populations are found in the upper Osage and Marmaton Rivers of the Central Plains Aquatic Subregion, the upper Mississippi River, and various ditches in the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997; Robinson and Buchanan 1988).

Habitat Affinities:
The freckled madtom prefers medium-sized creeks to large rivers of low to moderate gradient with clear to moderate turbidity and silty-gravel or sand-gravel substrates (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). It is often found in riffles and pools where organic debris such as leaves or twigs tend to accumulate (Pflieger 1997). Cross and Collins (1975) found the freckled madtom in trash piles against streambanks or in shallow pools underneath rocks.

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

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Freshwater Drum

Aplodinotus grunniens

Native: Yes

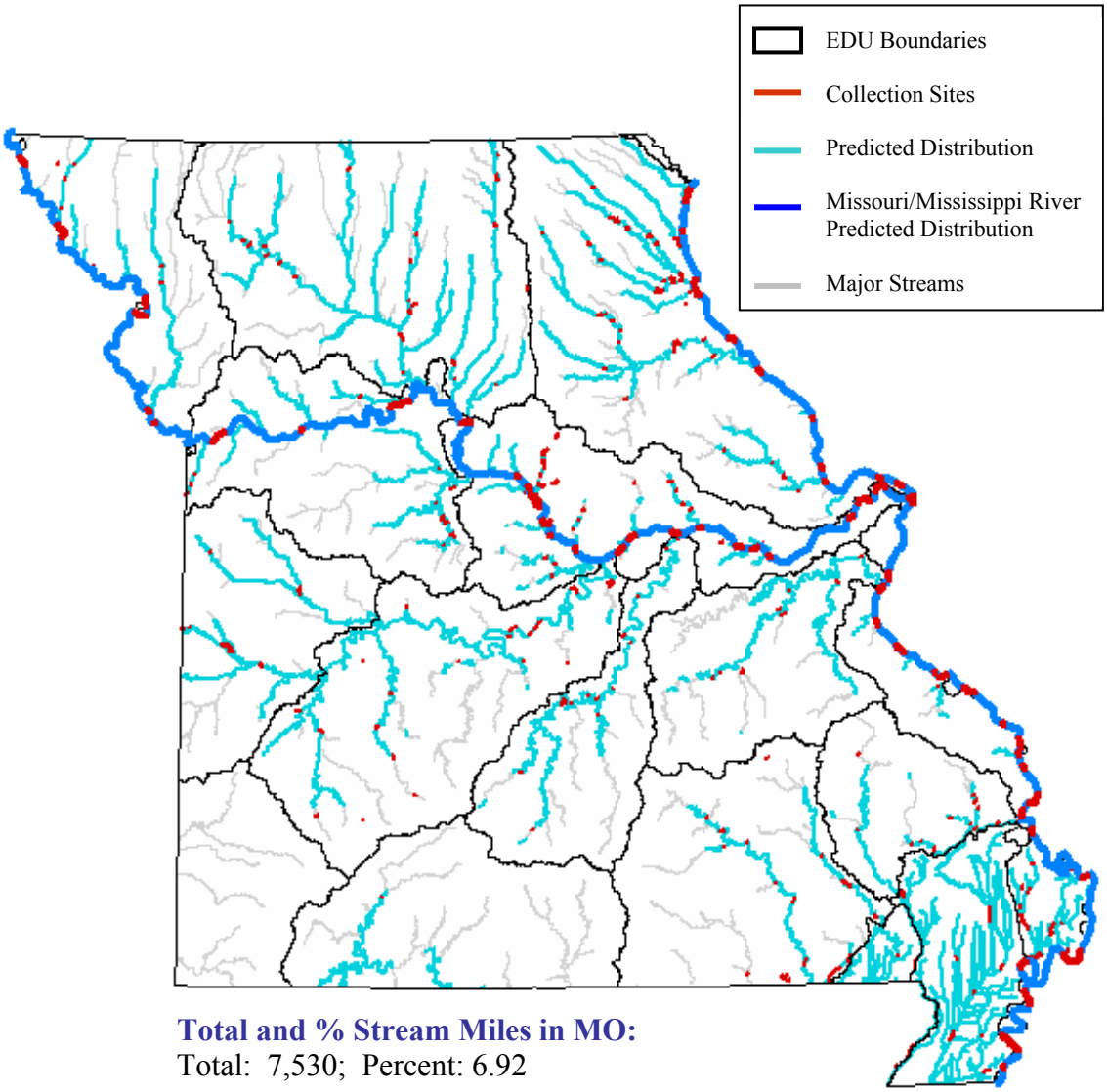
Endemism: Region

State Rank: S?

ITIS Code: 169364

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 7,530; Percent: 6.92

State Range:
The freshwater drum reaches greatest abundance in large rivers, such as the Missouri and Mississippi, and can also be found in larger streams of the Central Plains Aquatic Subregion. It is only common in reservoirs of the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The freshwater drum is usually found in shallow or muddy areas of large lakes (Douglas 1974; Eddy and Underhill 1974), deep backwater pools of large rivers (Etnier and Starnes 1993; Robinson and Buchanan 1988), and in reservoirs at depths of 30 ft or more (Pflieger 1997). The freshwater drum avoids high-gradient streams (Clay 1975), but can tolerate high turbidity (Pflieger 1997; Trautman 1957). The freshwater drum feeds near the bottom and spawns in open waters (Phillips et. al. 1982).

Predictive Model(s):

Central Plains Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] = 5) and ([Rgrad_subr] = 1)) or (([Linkr] >= 6))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Ghost Shiner

Notropis buchanani

Native: Yes

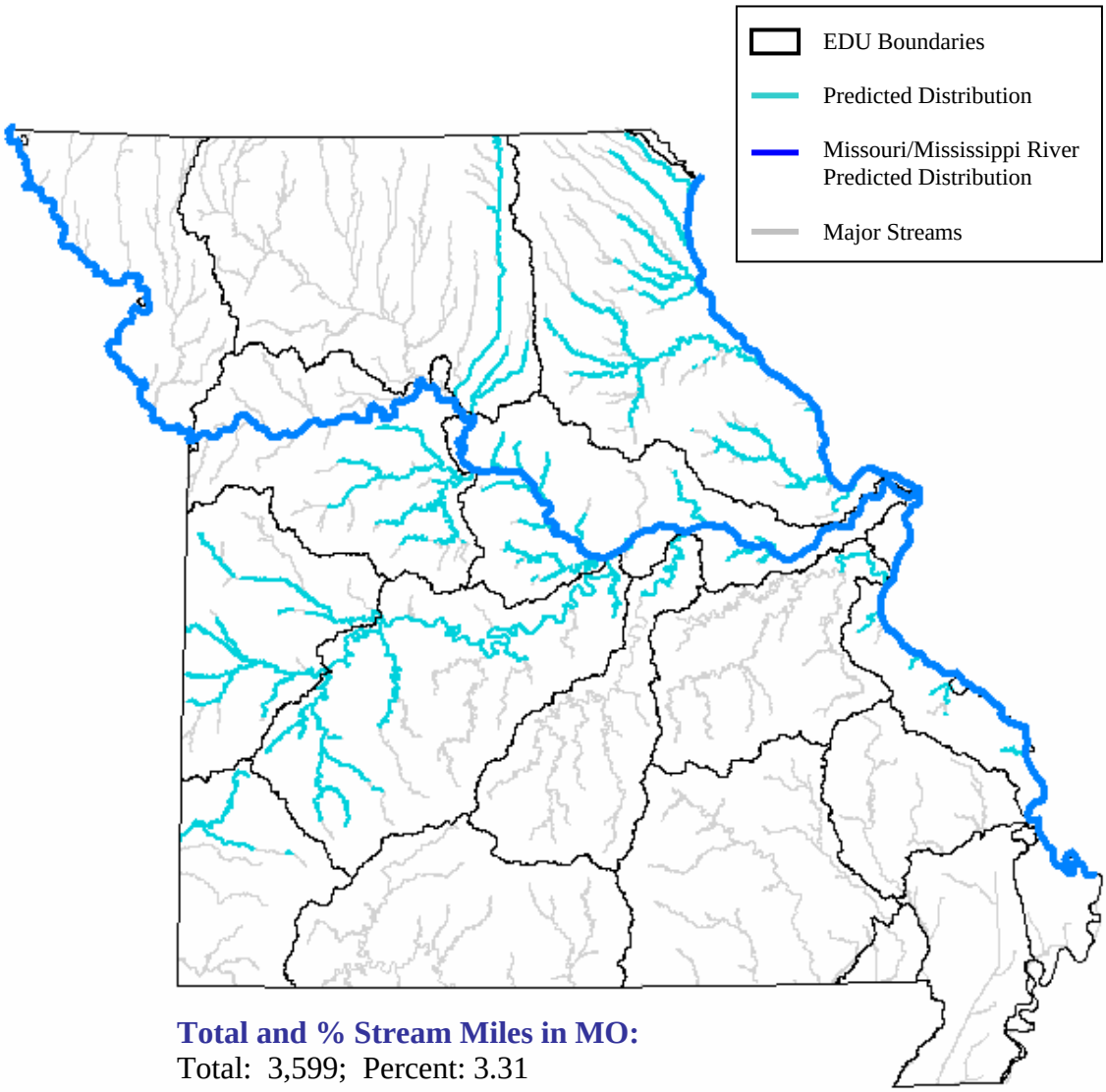
Endemism: Region

State Rank: S2

ITIS Code: 163414

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 3,599; Percent: 3.31

State Range:

The ghost shiner was once common in the lower Missouri River as far upstream as Boone County. Although once present the ghost shiner has now disappeared from the upper Missouri River and declined drastically in the Mississippi River (Pflieger 1997). It reaches greatest abundance in westcentral, central and northeastern border streams between the Ozark and Plains Aquatic Subregions (Pflieger 1971).

Habitat Affinities:

The ghost shiner seeks clear, quiet midwaters of large creeks and rivers with low-gradients (Etnier and Starnes 1993; Pflieger 1997), with clean sand and gravel bottoms and submergent vegetation, such as pondweed (*Potamogeton*) (Trautman 1957). Cross and Collins (1975) noted a preference for gentle eddies adjacent to strong current in pools where intermittent creeks joined rivers or gravel bars in the mainstream caused a reversal of current. In Missouri the ghost shiner is found along with the mimic, red and redfin shiners, inhabiting large, clear pools and protected backwaters with slack current and permanent flow (Pflieger 1997). In Tennessee Etnier and Starnes (1993) found the ghost shiner in habitats ranging "from moderately clear waters and firm substrates to silt-covered gravel in pool areas, and turbid waters with silty-sand substrates in large rivers." The ghost shiner may have some initial resistance to reservoir construction but has been extirpated in some places following impoundment (Etnier and Starnes 1993; Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] = 5) and ([GradsegR] >= 1) and ([GradsegR] <= 2)) or (([Linkr] >= 6))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Gilt Darter

Percina evides

Native: Yes

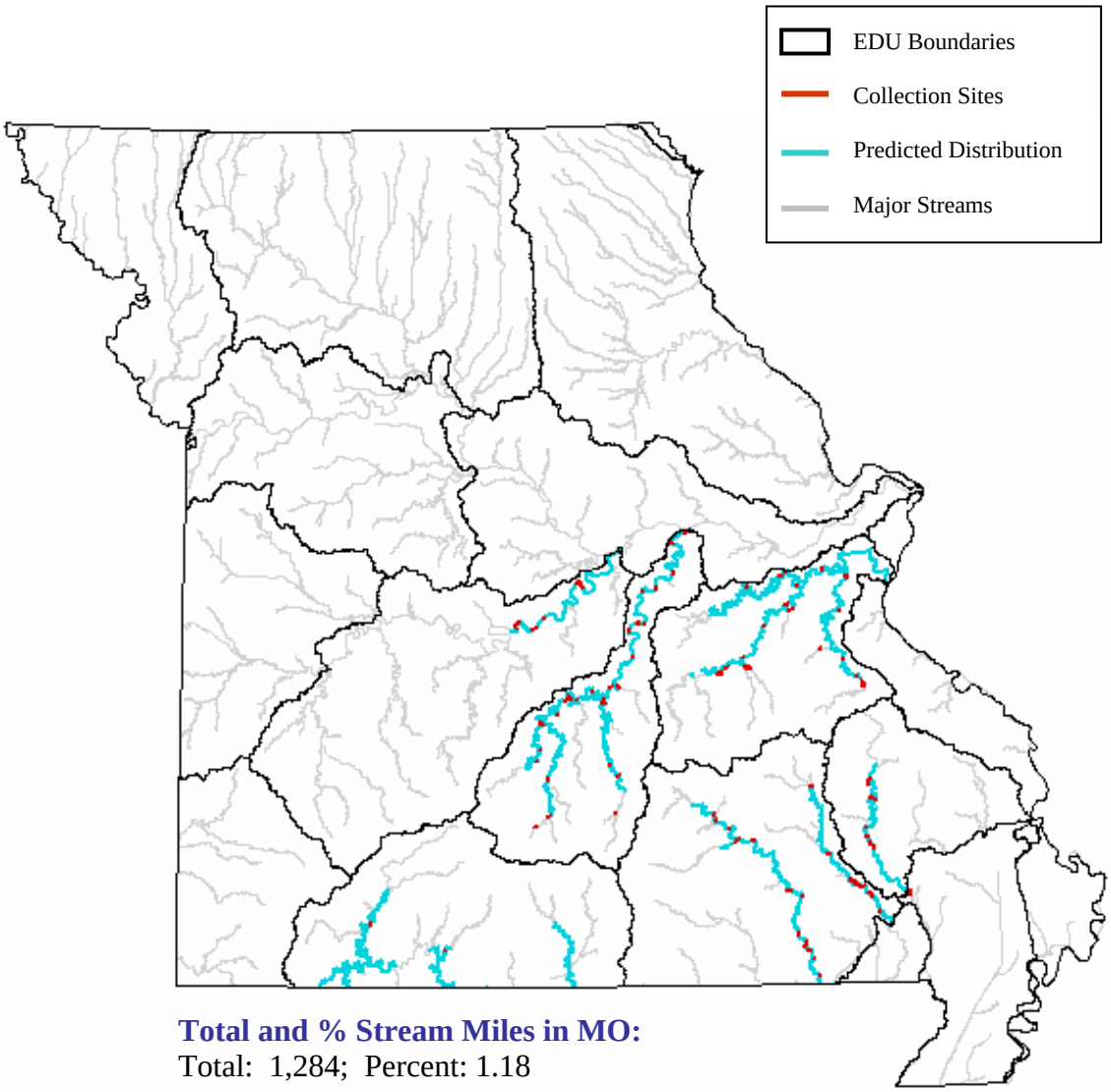
Endemism: Region

State Rank: S?

ITIS Code: 168483

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,284; Percent: 1.18

State Range:

The gilt darter is common and widespread in the eastern and southern parts of the Ozark Aquatic Subregion and is often the most abundant darter in its preferred habitat. Following construction of North Fork, Table Rock, and Bull Shoals reservoirs the gilt darter is now rare in the Black River and has apparently vanished from the White River Basin (Pflieger 1997).

Habitat Affinities:

The gilt darter generally inhabits clear, large creeks and small to medium-sized rivers with moderate to swift current and substrates of rubble, gravel, sand and scattered rubble free of vegetation and silt (Etnier and Starnes 1993; Pflieger 1997). It is found in deep, fast, rocky riffles and chutes (Pflieger 1997; Trautman 1957). In the Ozark Aquatic Subregion the gilt darter is found in the strong current of deep riffles and chutes with predominantly gravel bottoms and occasionally near beds of eel grass (*Valisnaria*) and pondweed (*Potamogeton*) (Pflieger 1997). Etnier and Starnes (1993) report that the gilt darter spawns in the upper portions of riffles with sand and gravel substrates interspersed with larger cobbles and boulders. The range of the gilt darter has been reduced in many states due to impoundment, excessive siltation and industrial pollutants (Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

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Gizzard Shad

Dorosoma cepedianum

Native: Yes

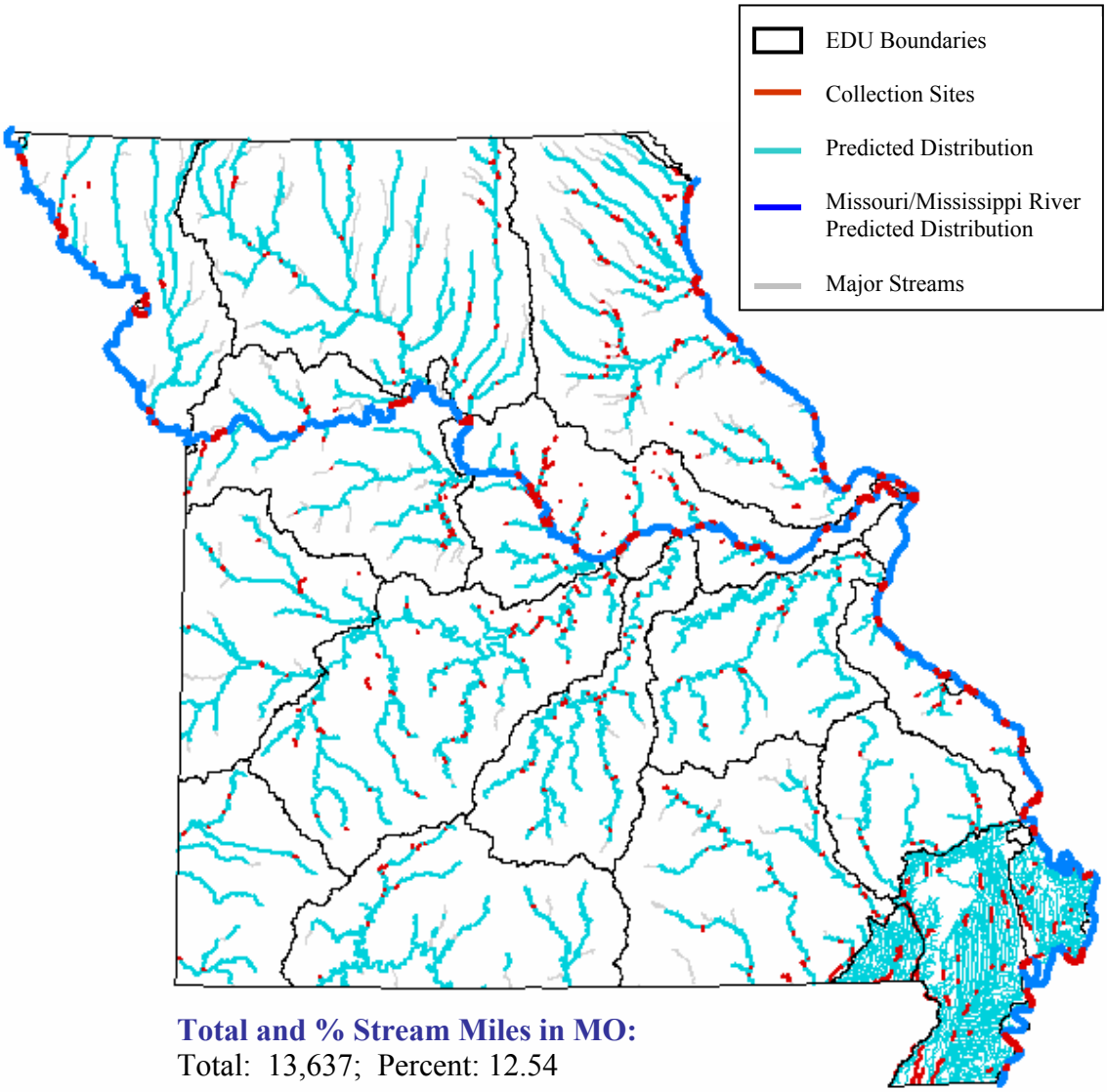
Endemism: Subzone

State Rank: S?

ITIS Code: 161737

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 13,637; Percent: 12.54

State Range:
The gizzard shad is one of the most widespread and abundant of Missouri's larger fishes. It is most abundant in overflow waters and low-gradient tributaries of the Missouri and Mississippi Rivers but can also be found in ditches of the Mississippi Alluvial Basin Aquatic Subregion and large reservoirs across the state (Pflieger 1997).

Habitat Affinities:
The gizzard shad is common in lakes, oxbows, impoundments, sloughs and large rivers with basic or low gradients (Etnier and Starnes 1993; Trautman 1957), but reaches greatest abundance in waters where fertility and productivity are high (Pflieger 1997; Robinson and Buchanan 1988). It avoids high gradient streams and rivers in the mountains and rivers without large, permanent pools, but can tolerate moderately turbid and occasionally even brackish or salt waters (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). In Missouri, the gizzard shad is usually found in the deep calm waters of natural lowland lakes, ponds, artificial impoundments, or in the pools and backwaters of streams. It has benefited from the decreased turbidity in the Missouri River since the construction of upstream reservoirs (Pflieger 1997). The gizzard shad spawns in shallow backwaters or near the shore (Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] >= 6)) or (([Linkr] = 5) and ([GradsegR] >= 1) and ([GradsegR] <= 3))
A very widespread species. A few 8's look like they should be added, but were not.

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Golden Redhorse

Moxostoma erythrurum

Native: Yes

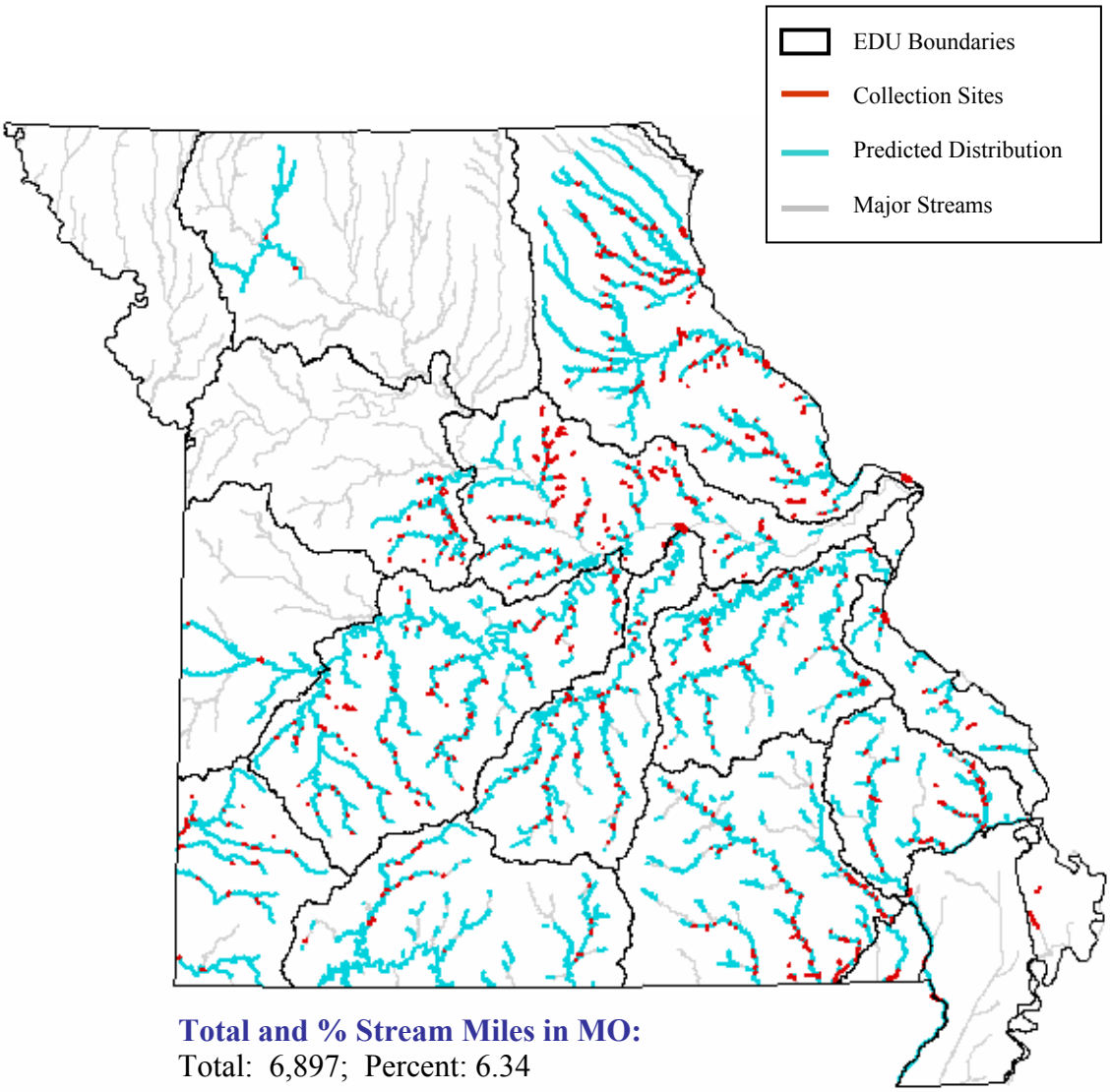
Endemism: Subzone

State Rank: S?

ITIS Code: 163939

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 6,897; Percent: 6.34

State Range:
The golden redhorse inhabits each of the three Aquatic Subregions of Missouri and is the most abundant redhorse over most of the Ozarks and northeast sections of the Central Plains Aquatic Subregions. It is least common in the Mississippi Alluvial Basin Aquatic Subregion and in high-gradient or spring fed streams draining the southern slope of the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The golden redhorse prefers pools and low raceways with clear, gravelly or rocky bottoms in streams of medium gradient and enough current to prevent rapidly accumulating silt (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). The habitat of the golden redhorse is similar to that the black redhorse but prefers slightly warmer waters with less current, and is more tolerant of large rivers, turbidity, and intermittent flow (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Missouri, it reaches highest abundance in streams with large permanent pools and firm, well-defined rocky or gravelly riffles (Pflieger 1997). Trautman (1957) notes that the golden redhorse is intolerant of continuous turbidity, rapid siltation, and industrial pollutants, but because of its highly migratory nature, it is able to penetrate streams with considerable industrial pollution. In early spring the golden redhorse penetrates small creeks to spawn in shallow riffles (Clay 1975; Eddy and Underhill 1974; Phillips et. al. 1982).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 4)

Ozark Model
(([Linkr] = 4) and ([Temp_code] = 2)) or (([Linkr] = 5) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)) or (([Linkr] >= 6))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = “MO”)

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Golden Shiner

Notemigonus crysoleucas

Native: Yes

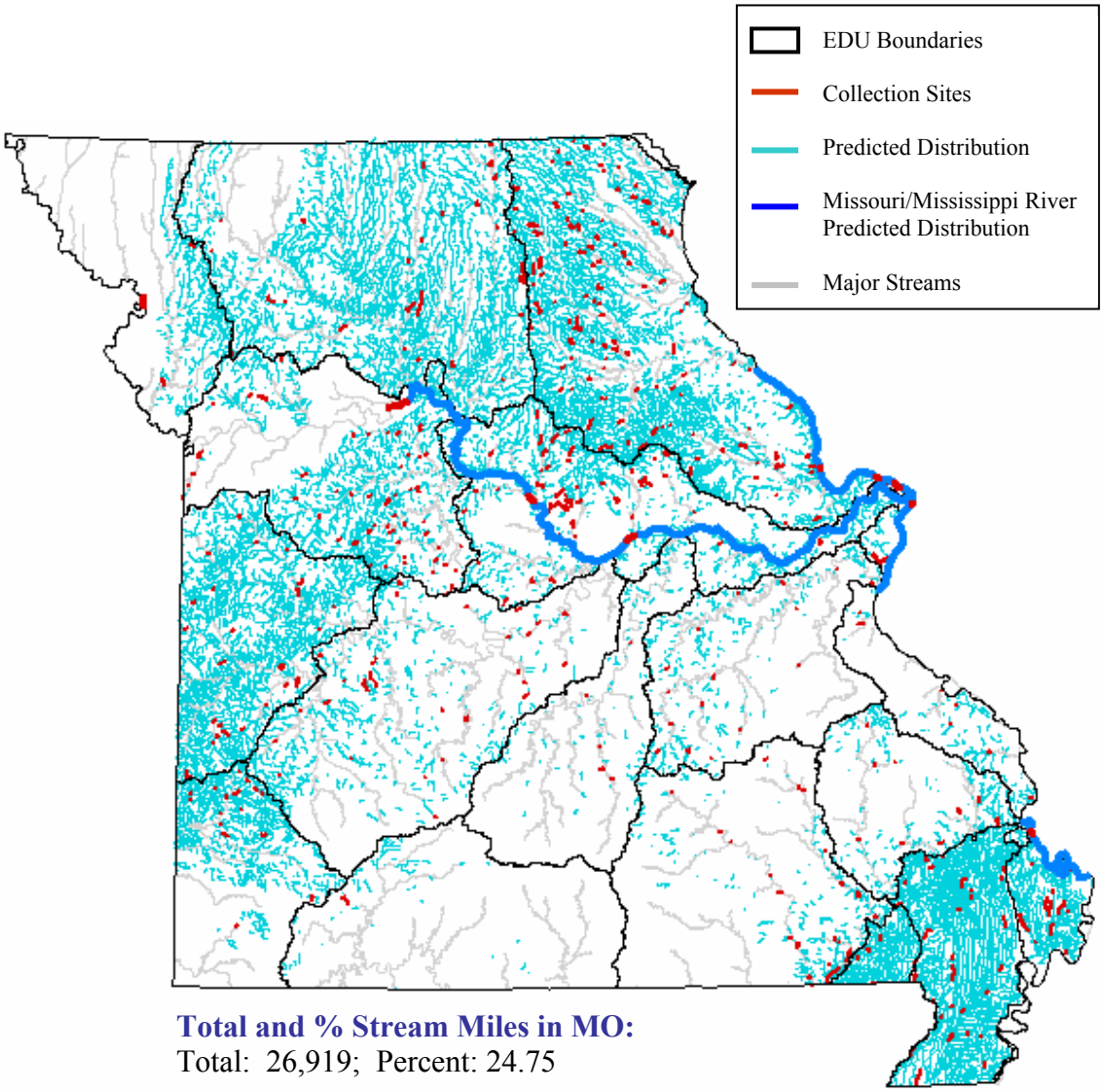
Endemism: Subzone

State Rank: S?

ITIS Code: 163368

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 26,919; Percent: 24.75

State Range:

The golden shiner seldom attains high population densities but is widespread in Missouri. It occurs sporadically in the Ozark Aquatic Subregion but is common in reservoirs and most abundant in streams on the west-central border of the Central Plains Aquatic Subregion. The golden shiner has expanded its range probably as a result of bait-bucket introductions (Pflieger 1997).

Habitat Affinities:

The golden shiner can be found in a variety of clear, quiet water habitats but reaches greatest abundance in sloughs, ponds, reservoirs, clear lakes, canals, ditches and the quiet pools of low-gradient streams (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It thrives in areas with dense growths of aquatic vegetation and bottoms composed mainly of organic debris or sand (Trautman 1957). In the west-central border regions of the Ozark Aquatic Subregion, the golden shiner is commonly found in the permanent pools of clear, heavily vegetated, intermittent upland creeks (Pflieger 1997). The golden shiner is more tolerant of low oxygen levels, nutrient enrichment, turbidity and pollution than other minnows (Phillips et. al. 1982; Robinson and Buchanan 1988), but Trautman (1957) has recorded decreases in abundance as drainage, turbidity, siltation and pollution have increased in Ohio.

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] >= 1) and ([Linkr] <= 2) and ([GradsegR] >= 1) and ([GradsegR] <= 6)) or (([Linkr] >= 3) and ([Linkr] <= 4) and ([GradsegR] >= 2) and ([GradsegR] <= 3))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

References:

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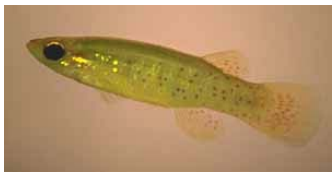
Golden Topminnow

Fundulus chrysotus



Native: Yes

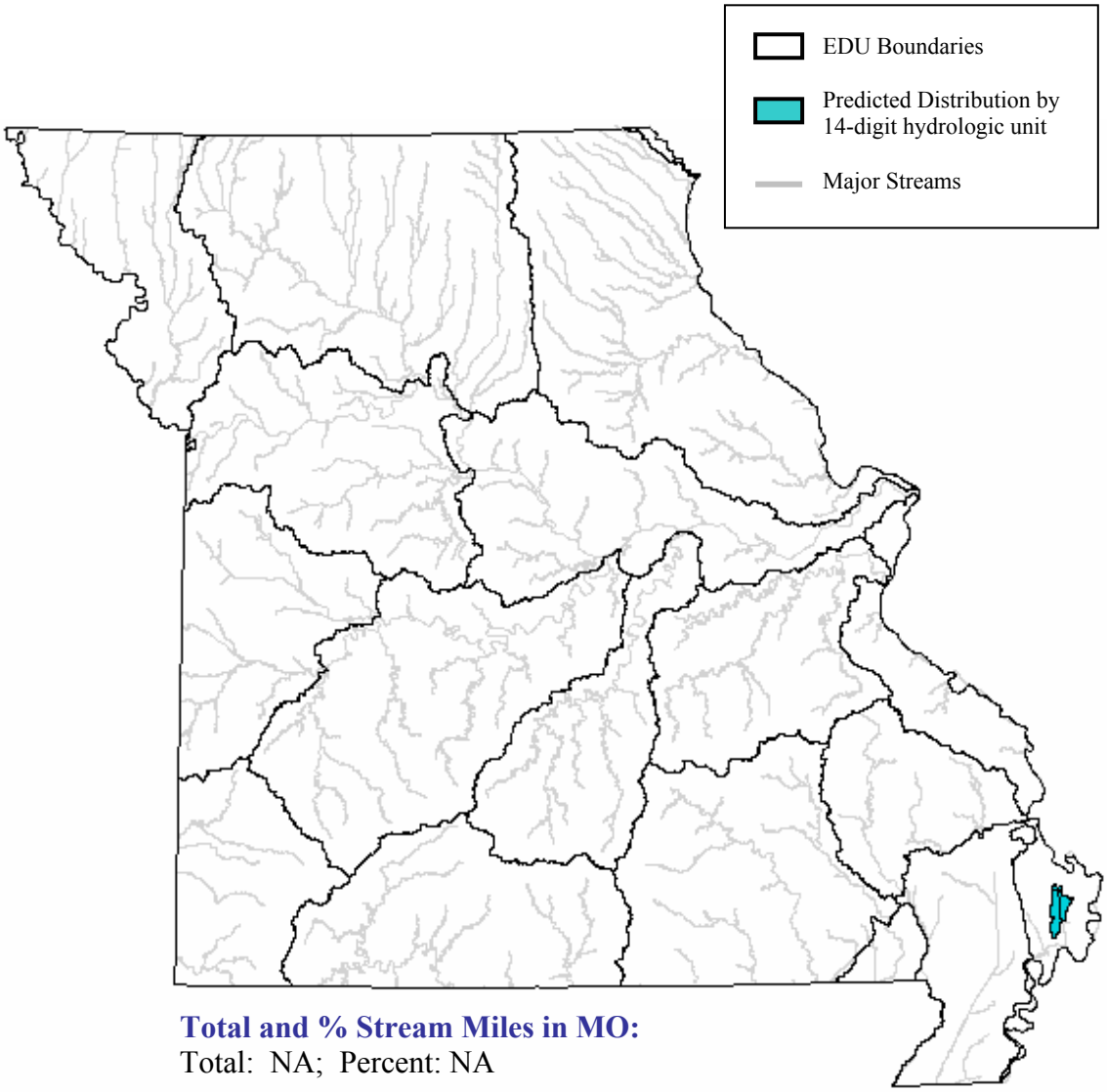
Endemism: Region

State Rank: S1

ITIS Code: 165652

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The golden topminnow was last collected in 1946 from two localities in the Mississippi Alluvial Basin Aquatic Subregion. It probably no longer exists in Missouri (Pflieger 1997).

Habitat Affinities:
The golden topminnow is a lowland species occupying clear, vegetated swamps, lakes, oxbows, and the sluggish backwaters of streams and rivers (Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). It is commonly found in quiet, shallow water in or around dense submerged aquatic vegetation, overlying soft mud and detritus (Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Mississippi Alluvial Basin Model
The distribution is based upon existing collection records and professional review.

References:

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Goldeye

Hiodon alosoides

Native: Yes

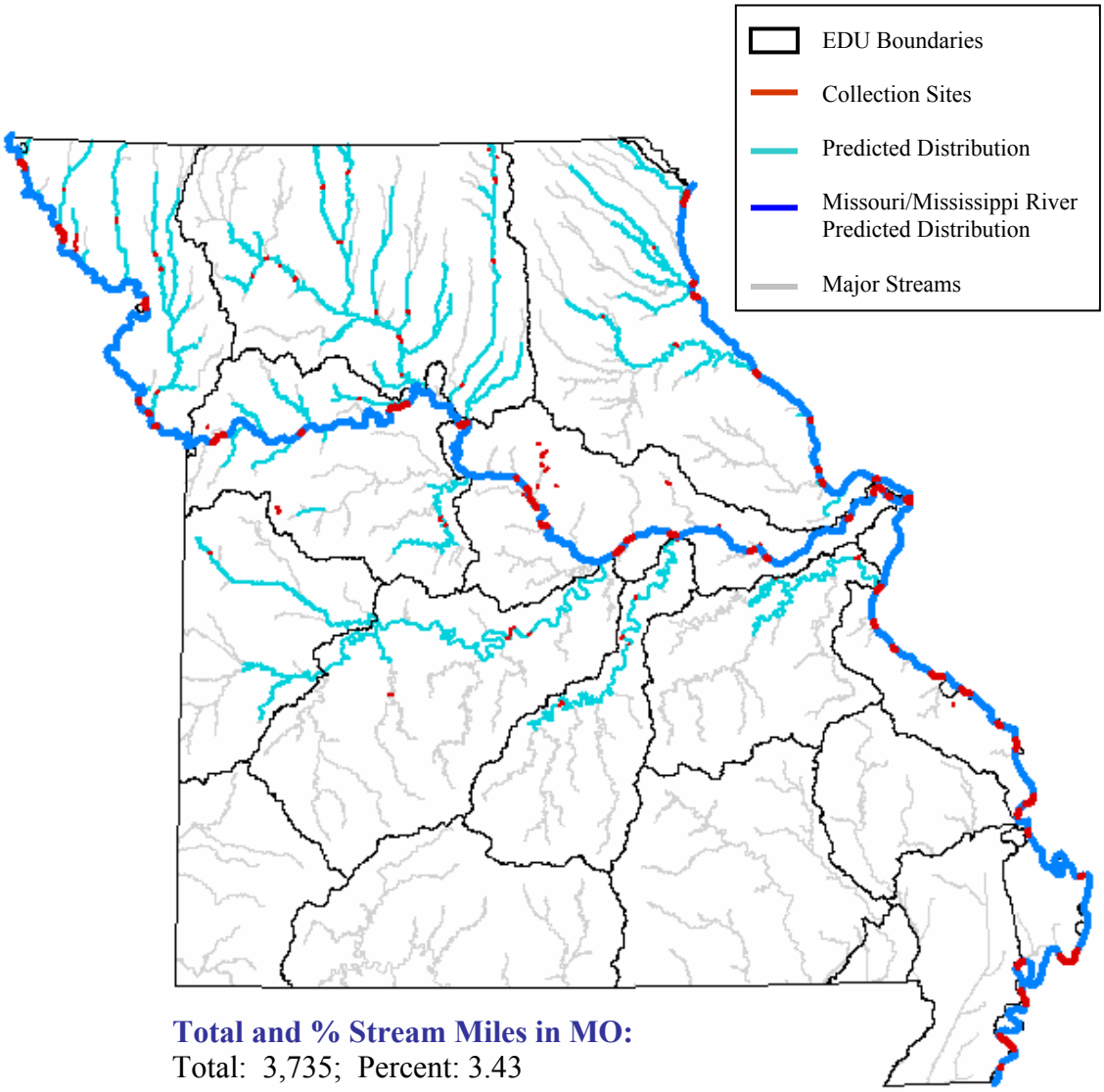
Endemism: Subzone

State Rank: S?

ITIS Code: 161905

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 3,735; Percent: 3.43

State Range:
The goldeye is most common in larger streams of the central and northwest Central Plains Aquatic Subregion, the Missouri River, and the Mississippi River below the mouth of the Missouri River (Pflieger 1997).

Habitat Affinities:
The goldeye is most common in the muddy, open waters of medium to large-sized rivers with low gradient and firm sand substrates (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Missouri, it is found in both large rivers with strong current and the quiet pools of small rivers and creek tributaries to large rivers (Pflieger 1997). The goldeye is more tolerant of turbidity than the mooneye (Clay 1975; Pflieger 1997; Robinson and Buchanan 1988) but avoids turbidity caused by industrial pollutants, as opposed to clay suspension (Trautman 1957). The habitat of the goldeye has been reduced by impoundment (Etnier and Starnes 1993) but it is often found hunting smaller fishes in the swift waters below dams (Trautman 1957). The goldeye is primarily nocturnal and seeks gravelly, shallow shoal areas in flowing water or lakes to spawn (Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Goldfish

Carassius auratus

Native: No

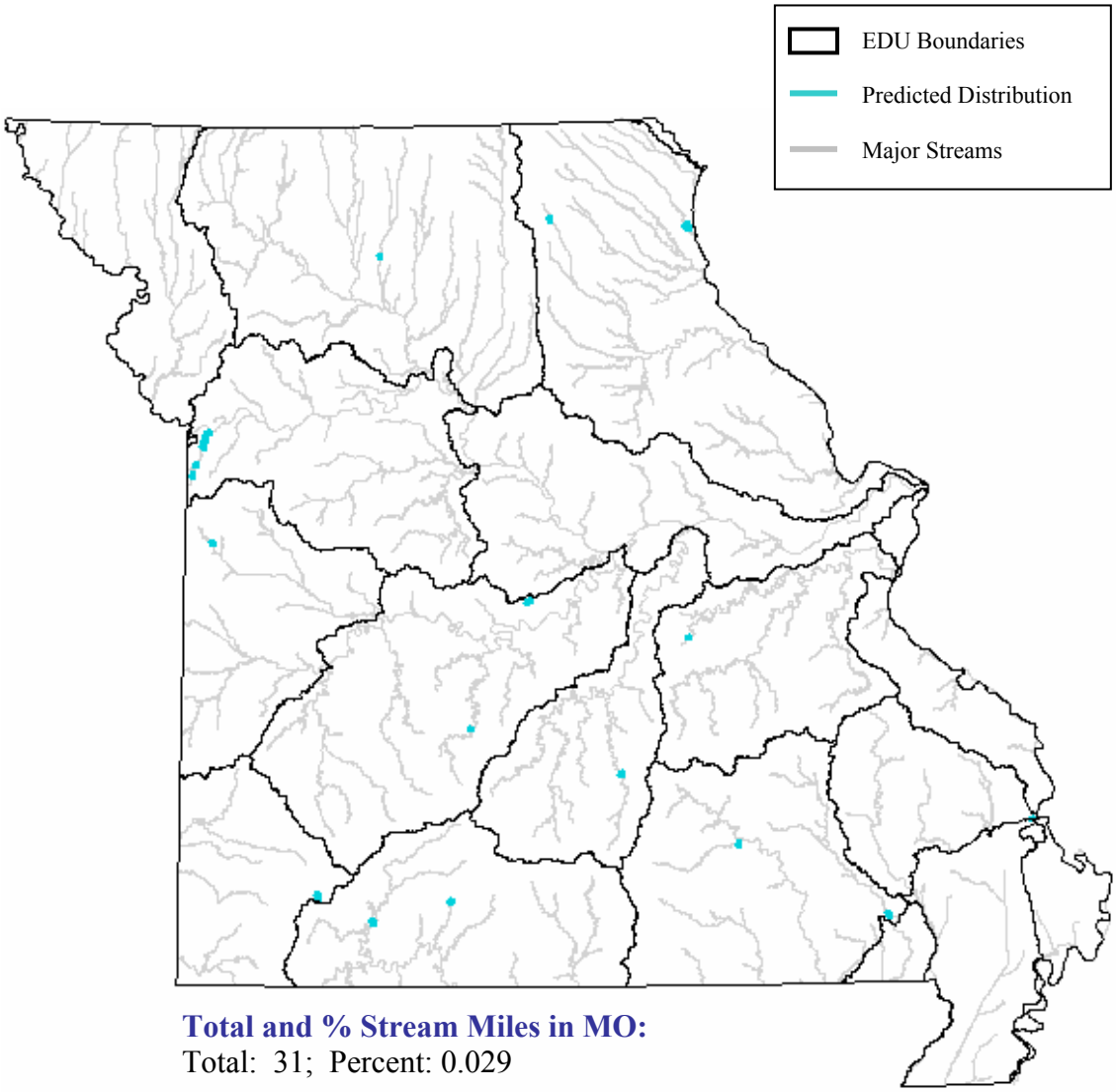
Endemism: NA

State Rank: SE

ITIS Code: 163350

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 31; Percent: 0.029

State Range:
There are very few self-sustaining populations of goldfish in Missouri but small populations do occur below fish hatcheries, in large impoundments, and artificial lakes (Pflieger 1997).

Habitat Affinities:
Self-sustaining populations of goldfish can be found in natural standing water habitats along streams and below hatcheries where large populations are maintained by escape. They can also be found in large impoundments where they are often used as bait (Pflieger 1997). Robinson and Buchanan (1988) found the most successful populations in small pools with dense vegetation.

Predictive Model(s):

Central Plains/Ozark Model
The distribution is based upon existing collection records and professional review.

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Goldstripe Darter

Etheostoma parvipinne

Native: Yes

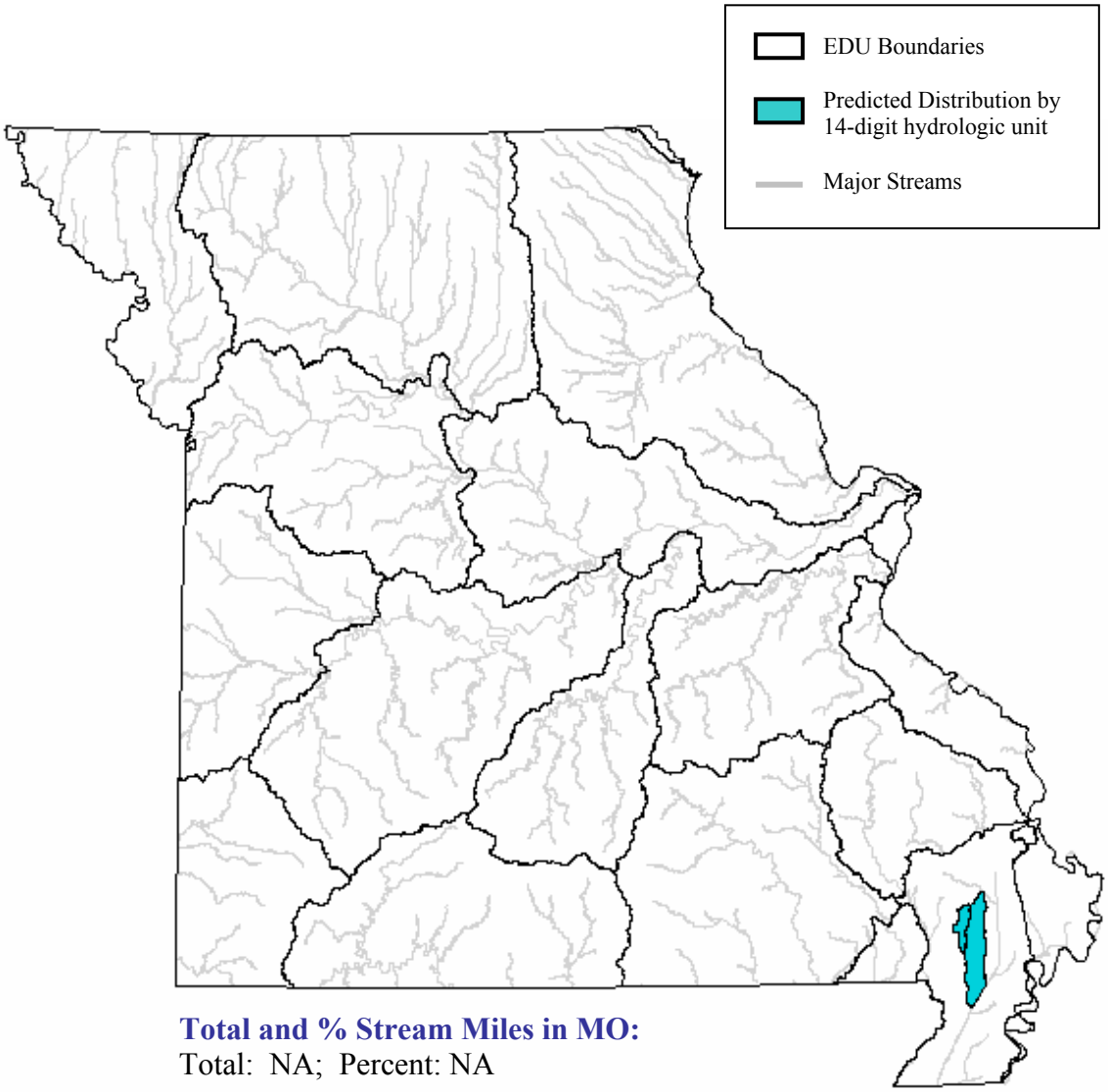
Endemism: Region

State Rank: S1

ITIS Code: 168421

Global Rank: G4G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:

The goldstripe darter is the rarest of Missouri darters. It has only been collected in or near protected areas of the Mississippi Alluvial Basin Aquatic Subregion, such as Holly Ridge natural area (Pflieger 1997).

Habitat Affinities:

The goldstripe darter has very specific habitat requirements described in detail by Robison (1977). It was found in narrow, spring-fed, shallow feeder streams or spring branches of low to moderate gradient, with sand bottoms free of rooted aquatic vegetation because of shading from dense tree canopies. It was most often collected small, shallow pools with slight to moderate current around cover such as fallen twigs and decaying leaves. This description fit well with Pflieger's (1997) except he noted an abundance of watercress (*Nasturium*) as well. Etnier and Starnes (1993) also described the goldstripe darters spring habitat as heavily vegetated and also found it below undercut banks in shallow streams with barren, shifting sand bottoms.

Predictive Model(s):

Mississippi Alluvial Basin Model

The distribution is based upon existing collection records and professional review, and is supplemented by more recent collections taken from 1999-2002 by Matthew Winston, Missouri Department of Conservation.

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Grass Carp

Ctenopharyngodon idella

Native: No

Endemism: NA

State Rank: SE

ITIS Code: 163537

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick

Total and % Stream Miles in MO:
Total: 1,035; Percent: 0.95

State Range:
The grass carp was introduced in Arkansas around 1963 and is now established throughout the Missouri and Mississippi Rivers. The grass carp is primarily a big river fish but can occasionally be found almost anywhere in the state as they often escape from impoundments where they are stocked (Pflieger 1997).

Habitat Affinities:
The grass carp is most often found in large rivers but is stocked in impoundments, rice fields, ponds and lakes (Robinson and Buchanan 1988). It prefers swift, warm waters (Phillips et. al. 1982) with slack current and aquatic vegetation.

Predictive Model(s):

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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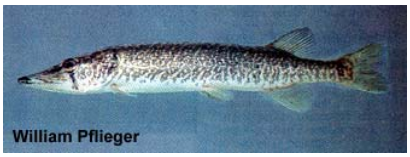
Grass Pickerel

Esox americanus



Native: Yes

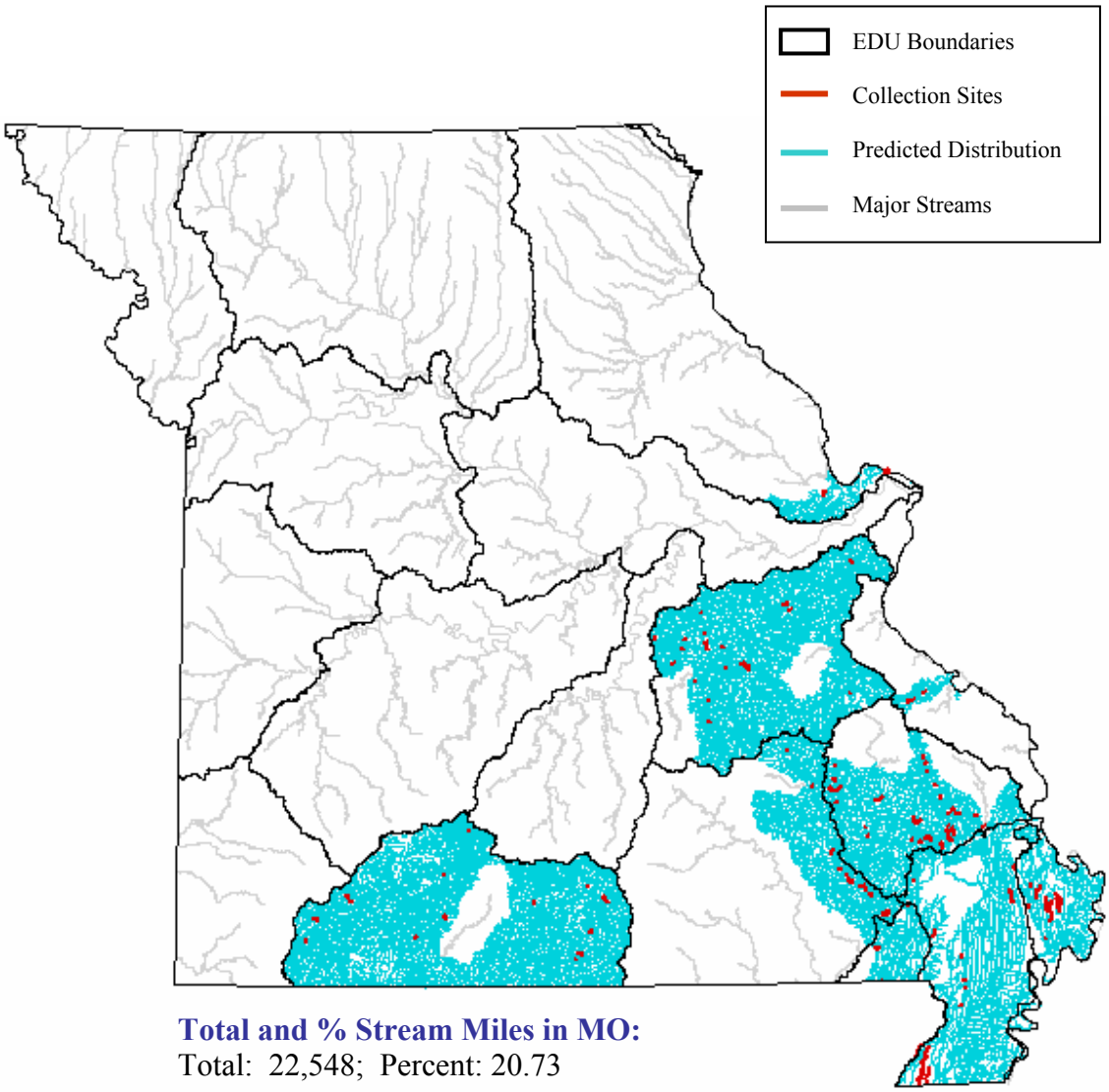
Endemism: Subzone

State Rank: S?

ITIS Code: 162140

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 22,548; Percent: 20.73

State Range:
The grass pickerel is common in the Mississippi Alluvial Basin Aquatic Subregion, and locally abundant in streams draining the Ozark/White Ecological Drainage Unit (EDU) along with the southern and eastern slopes of the Ozarks (Pflieger 1997).

Habitat Affinities:
The grass pickerel, the most common and widely distributed pike in Missouri, occurs from natural lakes, sloughs, swamps and the sluggish parts of ditches in the Mississippi Alluvial Basin Aquatic Subregion, to creeks draining undissected uplands, protected inlets, and overflow waters of larger streams in the Ozark Aquatic Subregion (Pflieger 1997). It inhabits clear waters with low gradient and little current, most often around thick vegetation (Pflieger 1997; Trautman 1957; Robinson and Buchanan 1988; Etnier and Starnes 1993; Clay 1975; Douglas 1974). The grass pickerel population decreases when turbidity or ditching reduces aquatic vegetation and clear water (Pflieger 1997), and may increase in range with the spread of aquatic vegetation (Etnier and Starnes 1993).

Predictive Model(s):

Central Plains/Ozark Model
([Linkr] >= 1)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

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Gravel Chub

Erimystax x-punctatus

Native: Yes

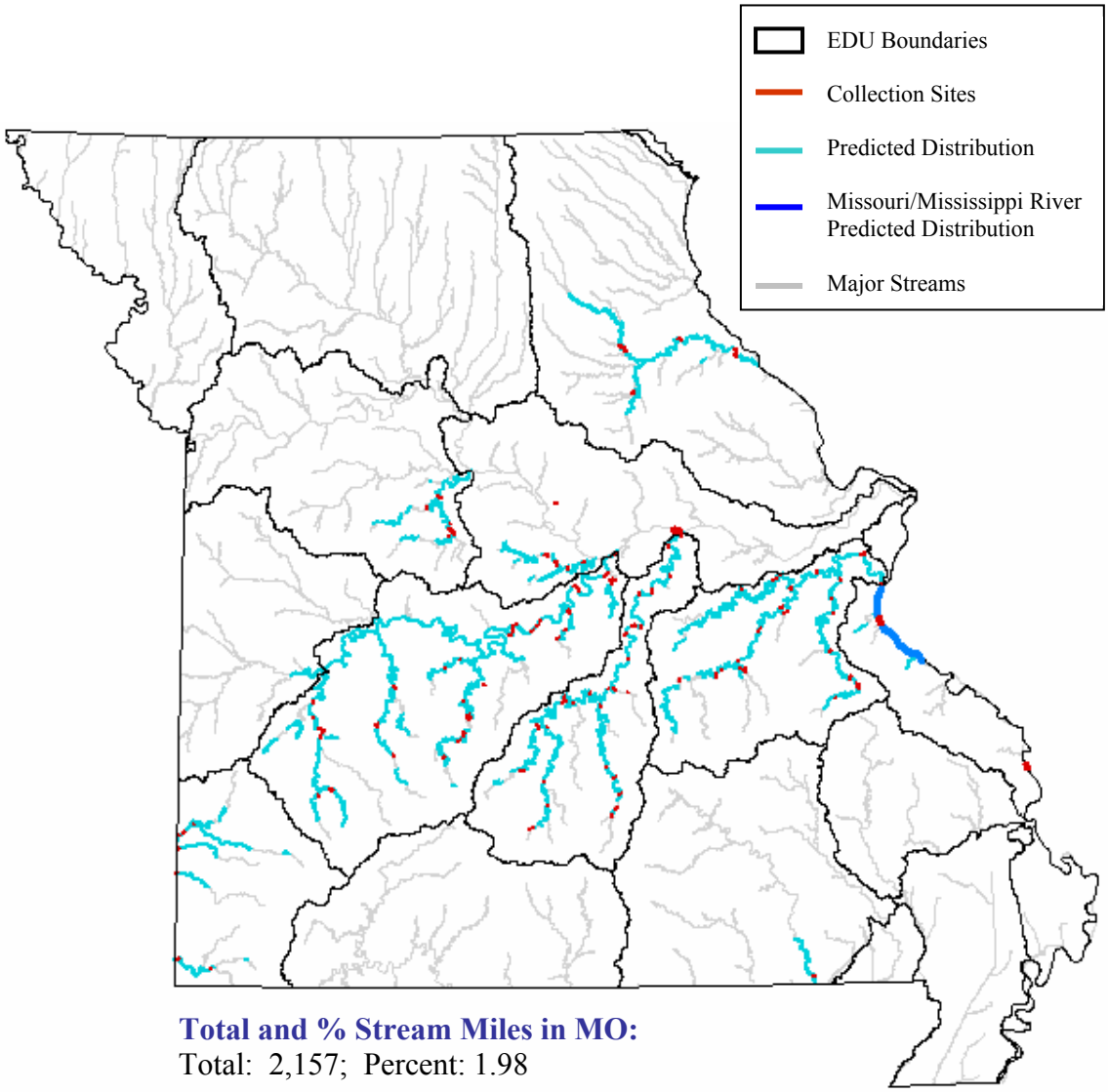
Endemism: Region

State Rank: S?

ITIS Code: 163824

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 2,157; Percent: 1.98

State Range:
The gravel chub is characteristic of the Ozark Aquatic Subregion and commonly found in the northern and western regions. It was found with considerable abundance in the Salt River System but no sampling has been done since the construction of the Cannon Dam (Pflieger 1997).

Habitat Affinities:
The gravel chub inhabits large, deep riffles and raceways of moderate- or large-sized streams with swift current and substrates of sand and gravel without clayey silt (Robinson and Buchanan 1988; Trautman 1957). If siltation is rapid, the gravel chub may be found in shallower waters with stronger current as long as its preferred substrate exists (Trautman 1957). In the Ozarks, the gravel chub is locally abundant in the downstream areas of large streams with lower gradients and warmer water (Pflieger 1997; Robinson and Buchanan 1988). It is tolerant of moderate turbidity (Pflieger 1997) and avoids rooted aquatic plants and larger varieties of algae and aquatic mosses (Trautman 1957).

Predictive Model(s):

Central Plains/Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] = 5) and ([GradsegR] = 2)) or ([Linkr] >= 6)

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Green Sunfish

Lepomis cyanellus

Native: Yes

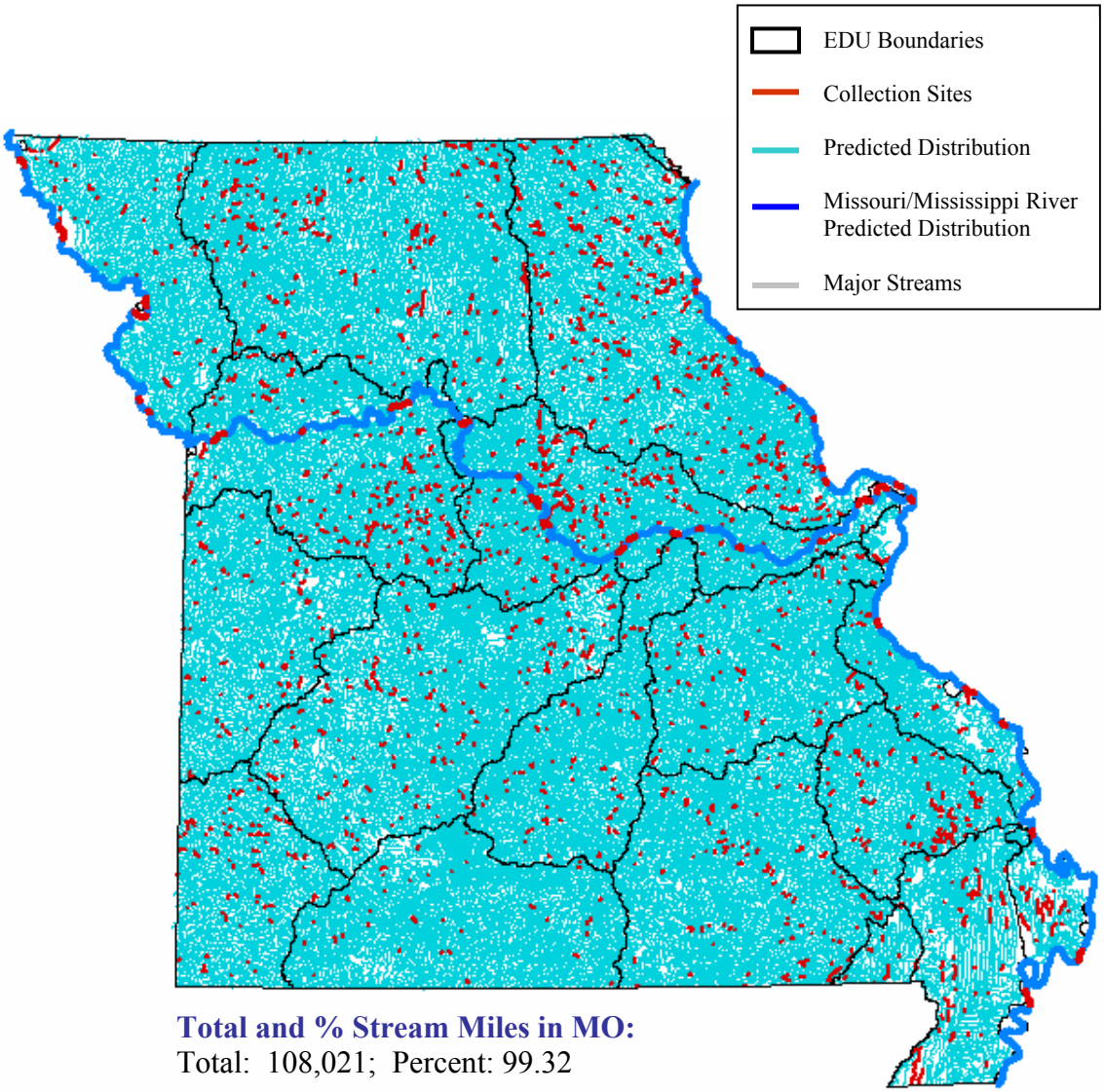
Endemism: Region

State Rank: S?

ITIS Code: 168132

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 108,021; Percent: 99.32

State Range:
The green sunfish is undoubtedly the most widely distributed fish in Missouri. In headwaters of the Ozark Aquatic Subregion and most streams of the Plains Aquatic Subregion, it is the most dominant sunfish. It is also found in the Mississippi and Missouri river but only as stays (Pflieger 1997).

Habitat Affinities:
The green sunfish can be found in a wide variety of habitats ranging from small muddy creeks and weedy backwaters with temporary flow to overflow ponds, shallow lakes, impoundments and occasionally, the margins of large rivers (Cross and Collins 1975; Eddy and Underhill 1974; Phillips et. al. 1982; Trautman 1957). The green sunfish is commonly found near shore and around cover such as stems of vegetation, woody debris, or rocks (Cross and Collins 1975), and has no specific substrate preference (Robinson and Buchanan 1988; Trautman 1957). Its high tolerance for extremes in turbidity, siltation, low oxygen, temperature and flow allow it to inhabit, and reach greatest abundance, in areas that do not support other sunfishes (Clay 1975; Pflieger 1997; Robinson and Buchanan 1988). In the Plains Aquatic Subregion, the green sunfish is well adapted for survival in small streams with intermittent flow that become stagnant pools later in the summer and fall. After droughts, it is often the first fish to repopulate Plains streams (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Linkr] >= 1)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Greenside Darter

Etheostoma blennioides

Native: Yes

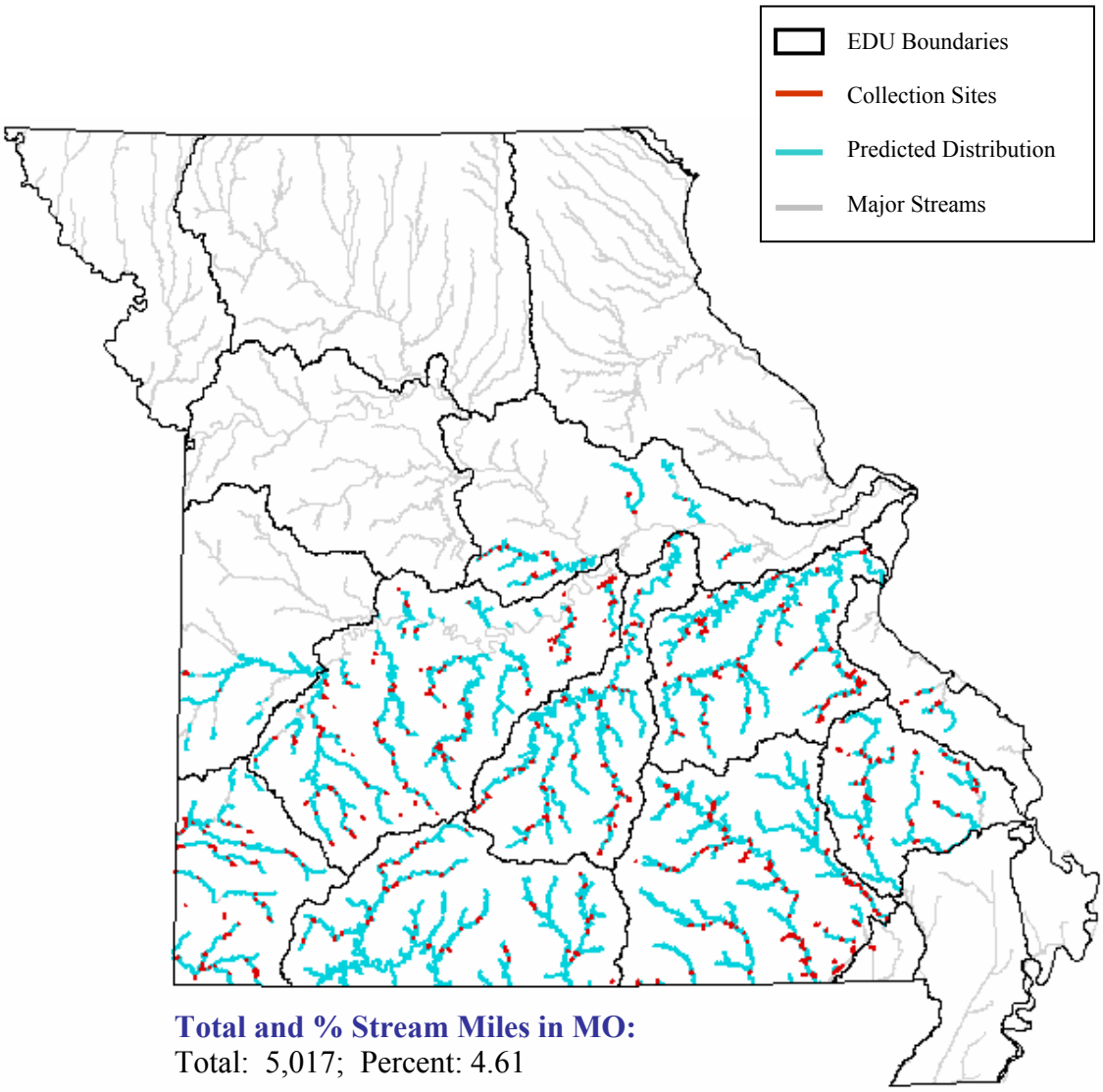
Endemism: Region

State Rank: S?

ITIS Code: 168375

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,017; Percent: 4.61

State Range:
The range of the greenside darter is delineated well by the boundaries of the Ozark Aquatic Subregion, where it is one of the most abundant and widespread darters (Pflieger 1997). The greenside darter is also found in the Plains portion of the Osage River drainage.

Habitat Affinities:
The greenside darter inhabits the deep swift riffles of small creeks to moderate-sized rivers and upland streams and boulder, course rubble or gravel substrates (Clay 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988). It is often associated with clear, cool riffles containing mats of green algae (*Cladophora*) and aquatic moss (*Fontinalis*) (Cross and Collins 1975; Robinson and Buchanan 1988; Trautman 1957). In the Ozark Aquatic Subregion, it only avoids the smallest headwater creeks and reaches greatest abundance in moderate-sized rivers (Pflieger 1997). Adults forage over boulders and logs in slack current while the young are associated with submerged vegetation or accumulations of organic debris in quiet water (Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 4)) or (([Linkr] = 5) and ([GradsegR] >= 2)) or (([Linkr] >= 6) and ([Linkr] <= 7))

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Harlequin Darter

Etheostoma histrio

Native: Yes

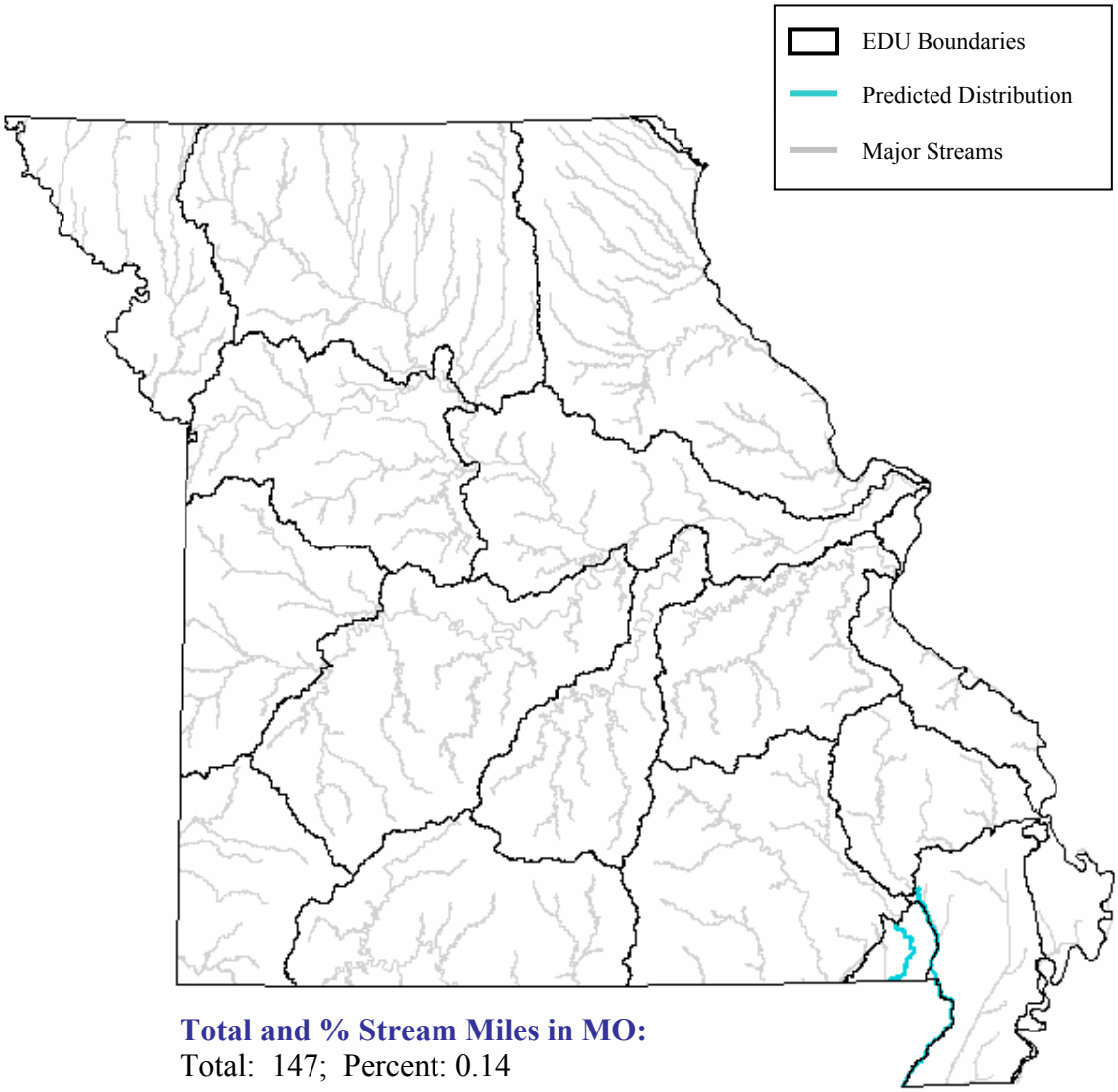
Endemism: Region

State Rank: S2

ITIS Code: 168398

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 147; Percent: 0.14

State Range:
The harlequin darter is found strictly within the Mississippi Alluvial Basin Aquatic Subregion. It has maintained its distribution since the late 1940's even though it is the most rare Missouri darter (Pflieger 1997). The range of the harlequin darter is hard to predict because it often inhabits areas that are difficult to sample, such as large rivers (Etnier and Starnes 1993).

Habitat Affinities:
The harlequin darter is found most often in the swift riffles of small to moderate streams and rivers with firm bottoms of fine sand, coarse gravel, or broken shale (Clay 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). Hubbs and Pigg (1972) found that it has a definite preference for sandy bottoms with logs, sticks and other organic debris and Etnier and Starnes (1993) note that it avoids small streams. In the Mississippi Alluvial Basin Aquatic Subregion, the harlequin darter was always found in flowing water and young were collected along the shoreline in tree roots and in accumulations of organic debris along quiet, pool margins (Pflieger 1997).

Predictive Model(s):

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = "MO")

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Highfin Carpsucker

Carpiodes velifer

Native: Yes

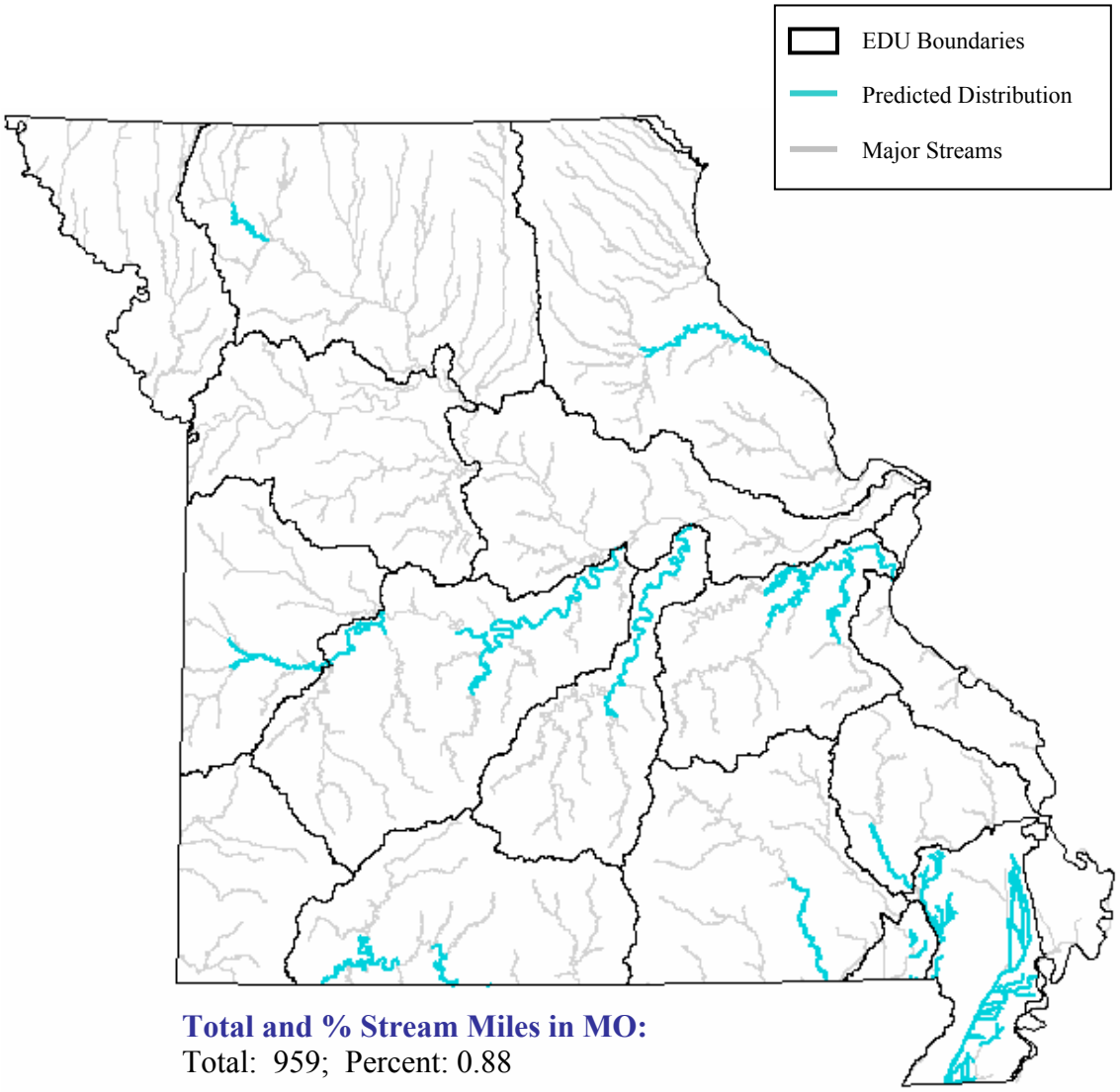
Endemism: Region

State Rank: S2

ITIS Code: 163920

Global Rank: G4G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 959; Percent: 0.88

State Range:
The highfin carpsucker can be found sporadically in all the Aquatic Subregions but is rare and its habitat is not well understood (Pflieger 1997).

Habitat Affinities:
The largest populations of highfin carpsuckers are found in moderately deep waters of relatively clear, medium to large rivers with firm substrates of gravel (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). It also inhabits lowland ponds, oxbows and sloughs, but in smaller populations (Trautman 1957). Of the carpsuckers, the highfin is least tolerant of turbidity, siltation and impoundment (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Missouri, the highfin carpsucker was found in clearer water with firmer bottoms than river carpsucker and spawning adults were found in deep gravelly riffles (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

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Hornyhead Chub

Nocomis biguttatus

Native: Yes

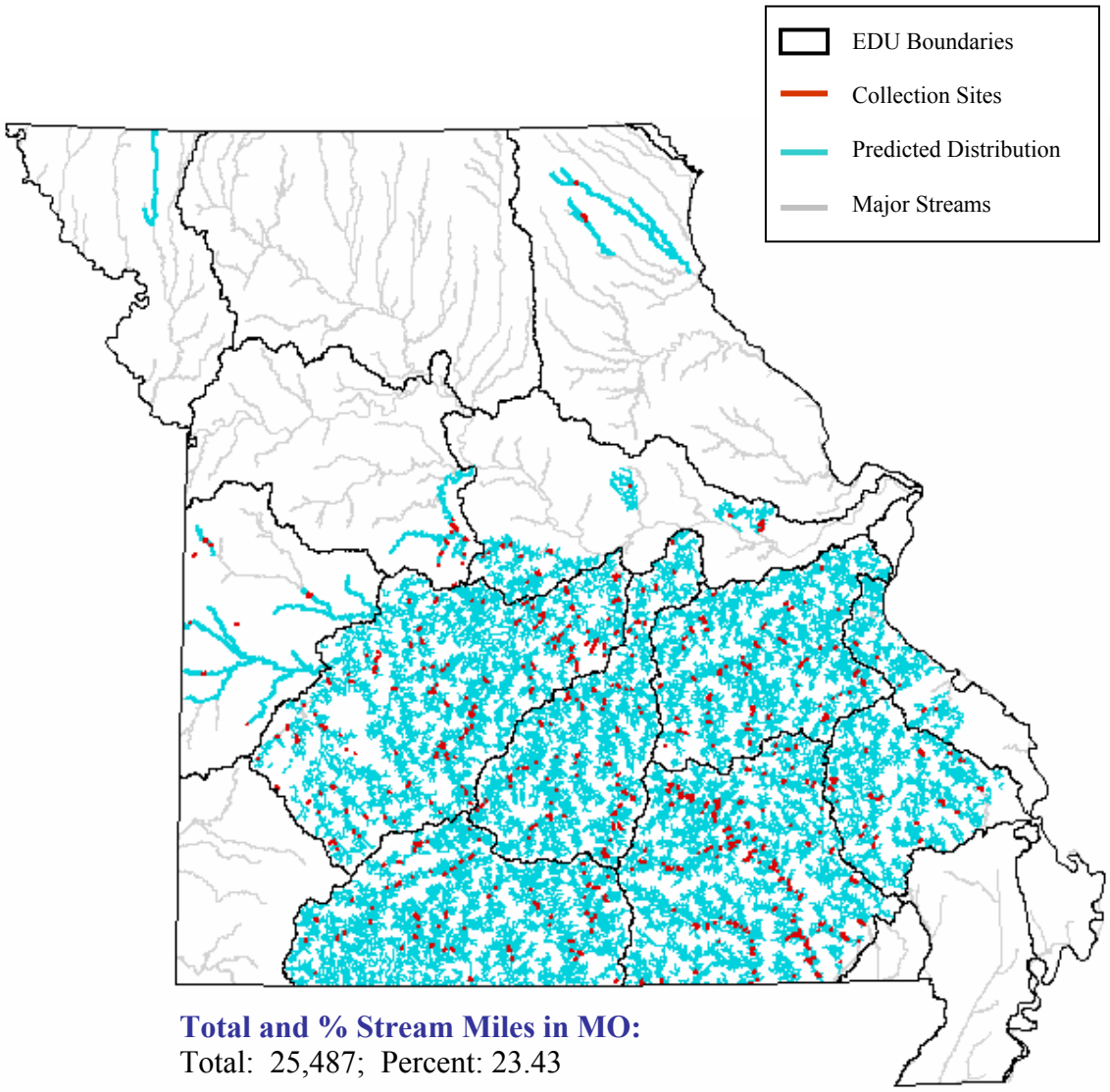
Endemism: Region

State Rank: S?

ITIS Code: 163395

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 25,487; Percent: 23.43

State Range:
The hornyhead chub is common and characteristic in streams of the Ozark Aquatic Subregion and was present in the Plains Aquatic Subregion but is thought to be on the verge of extirpation in that region. Its decline is probably due to increased siltation and intermittent flow resulting from intensive cultivation (Pflieger 1997).

Habitat Affinities:
The hornyhead chub requires clear, cool mid-sized to large stream and river habitats with steady flow, moderate or sluggish current and substrates of clean sand or gravel (Cross and Collins 1975; Robinson and Buchanan 1988; Trautman 1957). It is often collected in small streams lined with attached algae or aquatic vegetation such as pondweed (*Potamogeton*), lizard's tail (*Saururus*), turtlehead (*Chelone*), or water-willow (*Justicia*) (Cross and Collins 1975; Trautman 1957). In the Ozark Aquatic Subregion, hornyhead chub adults are most often found adjacent to riffles where the current is moderate (Pflieger 1997; Robinson and Buchanan 1988). Young are ecologically separated, preferring water without current and abundant water-willow lining the area (Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains Model
([Flow] = 1) and ([Temp_code] = 2)
([Linkr] >= 4) and ([GradsegR] >= 1) and ([GradsegR] <= 5)

Ozark Model
(([Linkr] >= 6)) or (([Linkr] = 5) and ([GradsegR] >= 2)) or (([Linkr] = 4)) or (([Linkr] = 3) and ([GradsegR] >= 4)) or (([Linkr] = 2) and ([GradsegR] >= 8)) or (([Linkr] = 1) and ([DlinkR] >= 2))

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Inland Silverside

Menidia beryllina

Native: Yes

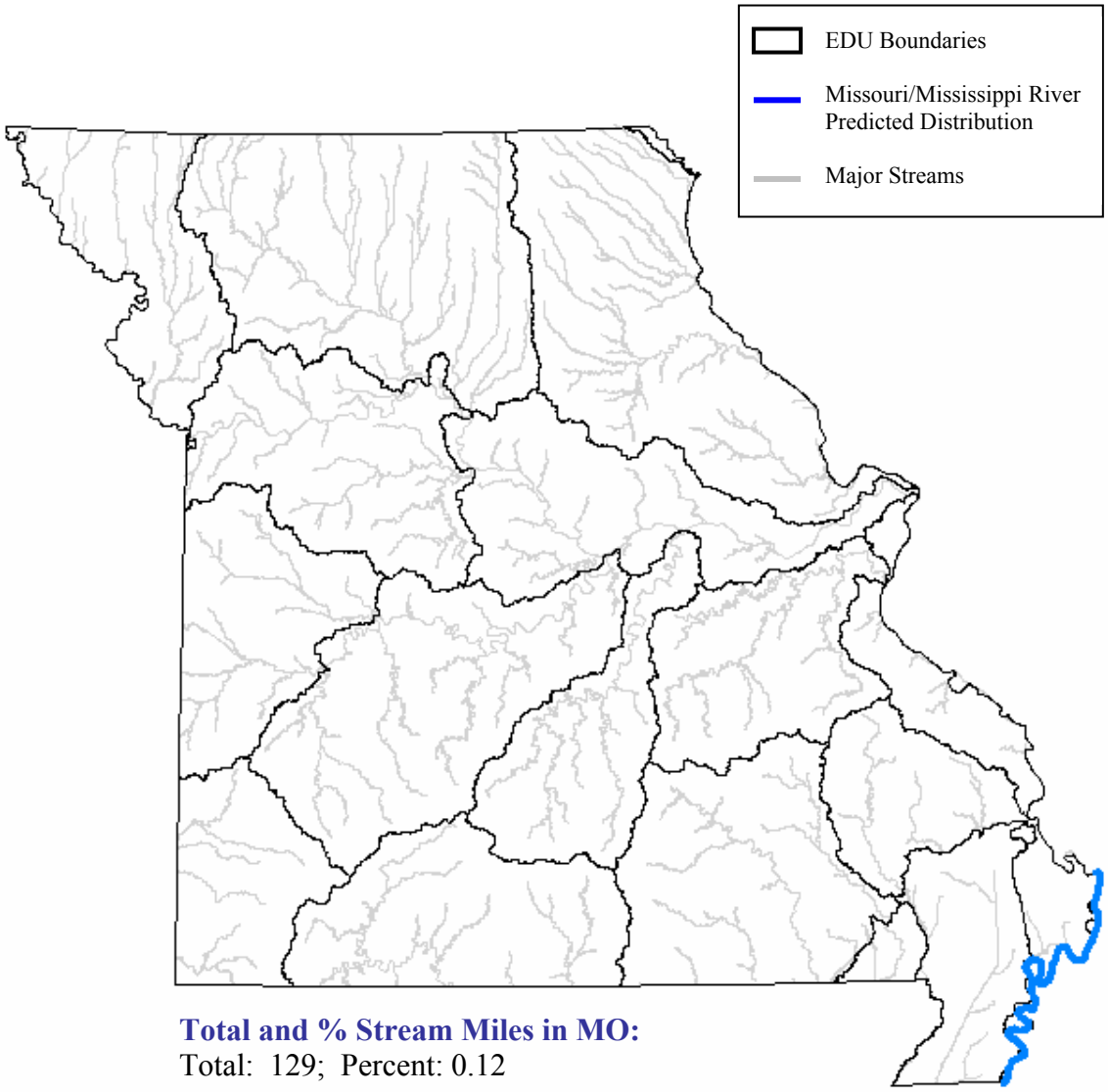
Endemism: Subzone

State Rank: S3

ITIS Code: 165993

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 129; Percent: 0.12

State Range:
Natural populations of the inland silverside are found only in the section of the Mississippi River adjacent to the Mississippi Alluvial Basin Aquatic Subregion. It has been stocked in some reservoirs but none of these has self-sustaining populations (Pflieger 1997).

Habitat Affinities:
The inland silverside inhabits both estuarine and freshwater habitats, and is most often found in large, moderately clear streams and rivers with moderate current (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). The inland silverside schools at the surface frequenting sandbars adjacent to the main river channel at night and retreating to deeper waters during the daytime (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review. The distribution includes the Mississippi River adjacent to the Mississippi Alluvial Basin Aquatic Subregion.

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Ironcolor Shiner

Notropis chalybaeus

Native: Yes

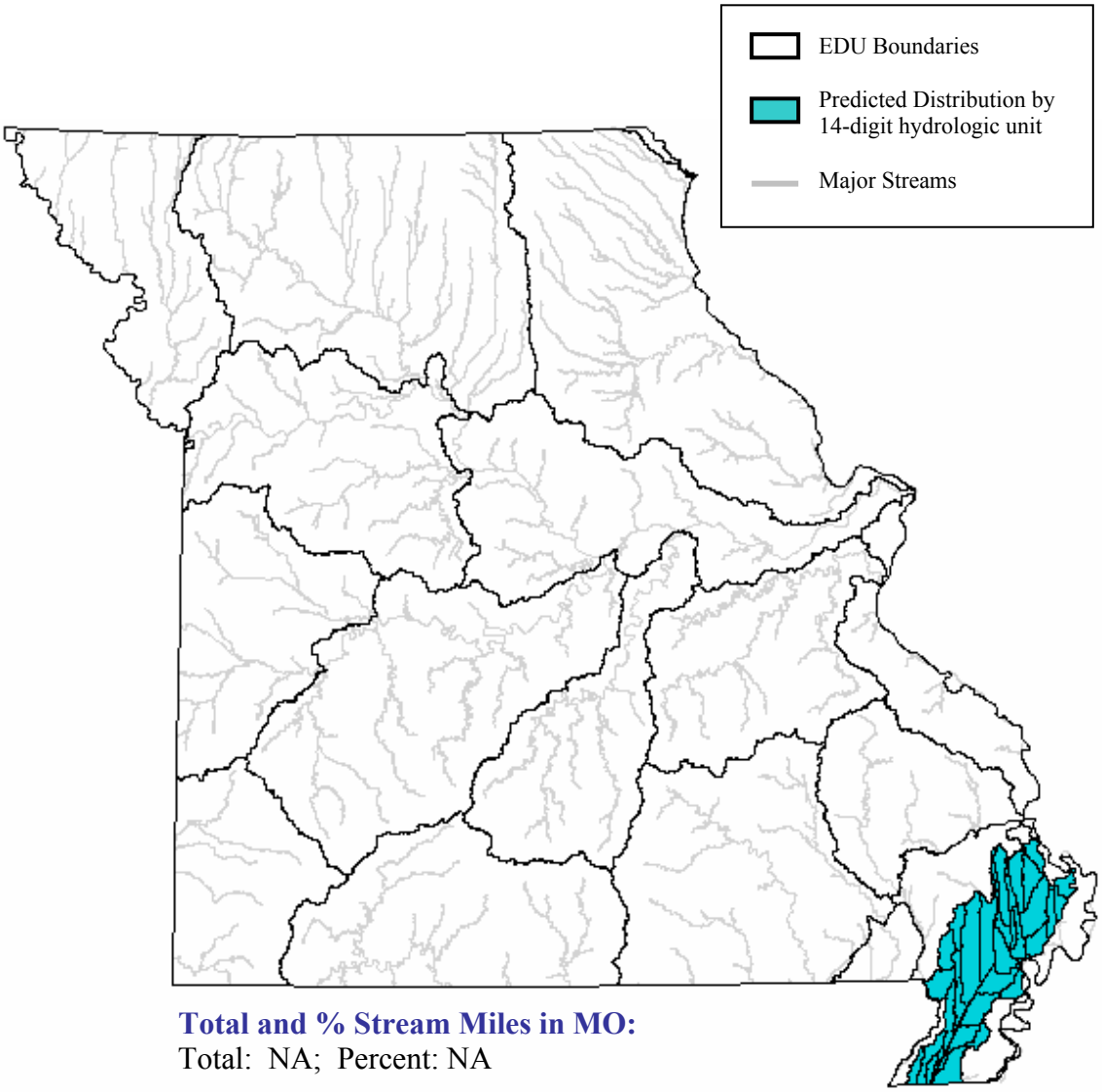
Endemism: Subzone

State Rank: S1

ITIS Code: 163403

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The ironcolor shiner is found exclusively within the central Mississippi Alluvial Basin Aquatic Subregion. Populations tend to be isolated and sporadic but it does reach high abundance in some places. In the past, the ironcolor shiner may have been distributed northward along the Mississippi River, but it has declined since the late 1960's (Pflieger 1997).

Habitat Affinities:
The ironcolor shiner is a common inhabitant of clear, acidic, tannin-stained, sluggish streams and rivers with low to moderate gradients, abundant vegetation and clean sandy bottoms (Lee et. al. 1980; Robinson and Buchanan 1988). In the Mississippi Alluvial Basin Aquatic Subregion, it is only found in clean, clear and calm ditches choked with submerged aquatic vegetation (Pflieger 1997).

Predictive Model(s):

Mississippi Alluvial Basin Model
([Ssize_code] = 1)

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Johnny Darter

Etheostoma nigrum

Native: Yes

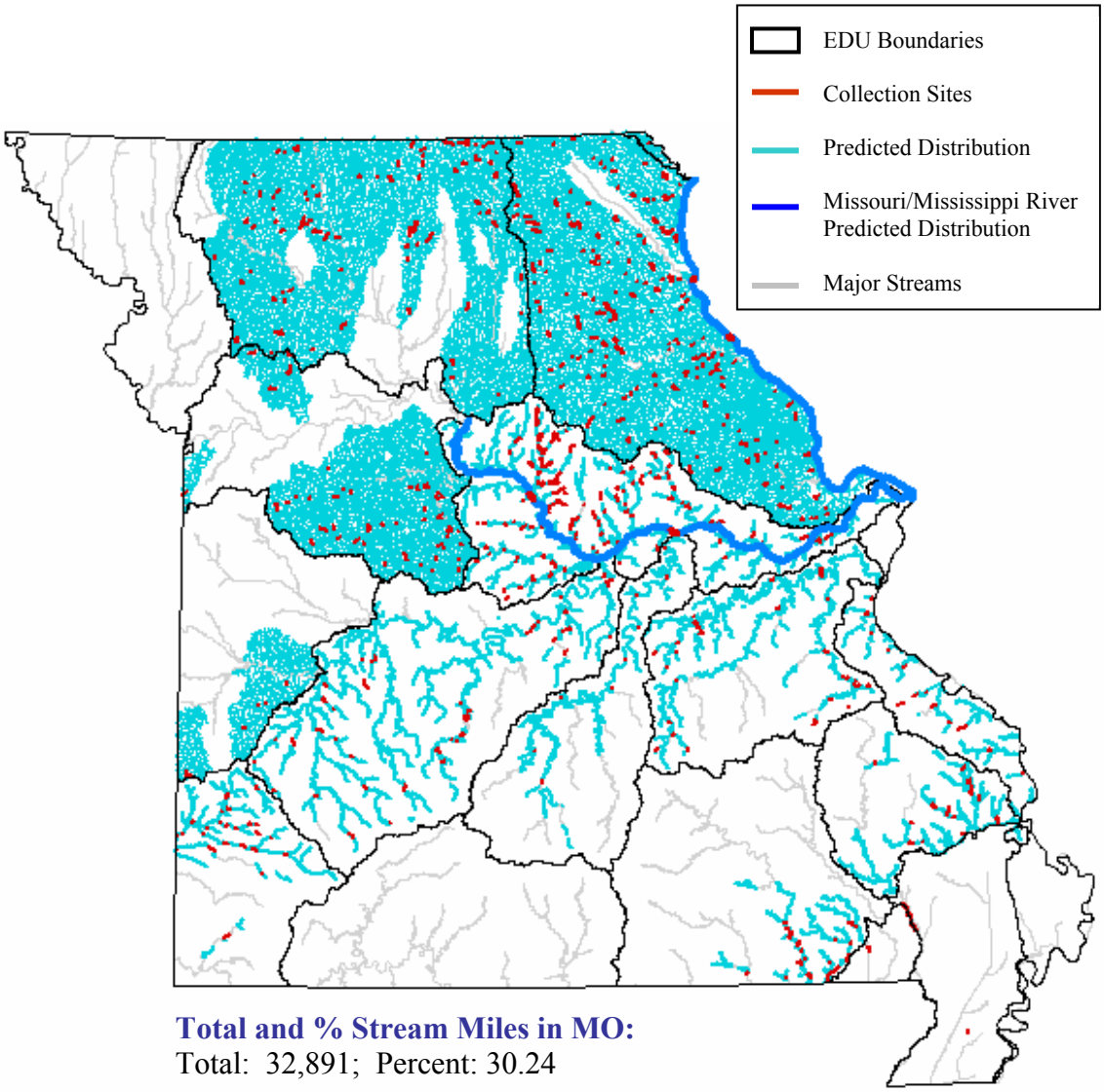
Endemism: Subzone

State Rank: S?

ITIS Code: 168369

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 32,891; Percent: 30.24

State Range:
The johnny darter is one of the most common and widespread darters spanning all the Aquatic Subregions. It is absent only from the Mississippi Alluvial Basin Aquatic Subregion, and the Ozark\White and Plains\Nishnabotna\Platte Ecological Drainage Units (EDU). The johnny darter reaches greatest abundance in northeastern Plains and Plain-Ozark border streams along the Ozark\Moreau\Loutre EDU. (Pflieger 1971; Pflieger 1997)

Habitat Affinities:
Unlike most darters, the johnny darter is a generalist, allowing for a wide range of habitat preferences (Phillips et. al. 1982). It is most often found in creeks and small rivers with moderate gradients and sand or sand-gravel substrates (Etnier and Starnes 1993; Trautman 1957). The johnny darter prefers the edges of shallow pools with little current (Clay 1975; Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988), and is often observed perched on logs, patches of sand, small rocks or adjacent to large boulders (Phillips et. al. 1982). It is intolerant of submerged aquatic vegetation, excessive turbidity or siltation, and high gradients with continuous strong flow (Pflieger 1997; Trautman 1957). In the northern regions, the johnny darter is more widespread, inhabiting the firm shorelines of lakes and all flowing waters, including large rivers (Etnier and Starnes 1993; Phillips et. al. 1982). The johnny darter spawns in May and is known to use human refuse, such as bottles and cans, for nesting (Phillips et. al. 1982).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 1) and ([Linkr] <= 6)

Ozark Model
Query 1: ([Temp_code] = 2)
Query 2: (([Linkr] = 3) and ([Rgrad_subr] = 1)) or (([Linkr] >= 4) and ([Linkr] <= 6) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)) or (([Linkr] >= 7))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Lake Chubsucker

Erimyzon sucetta

Native: Yes

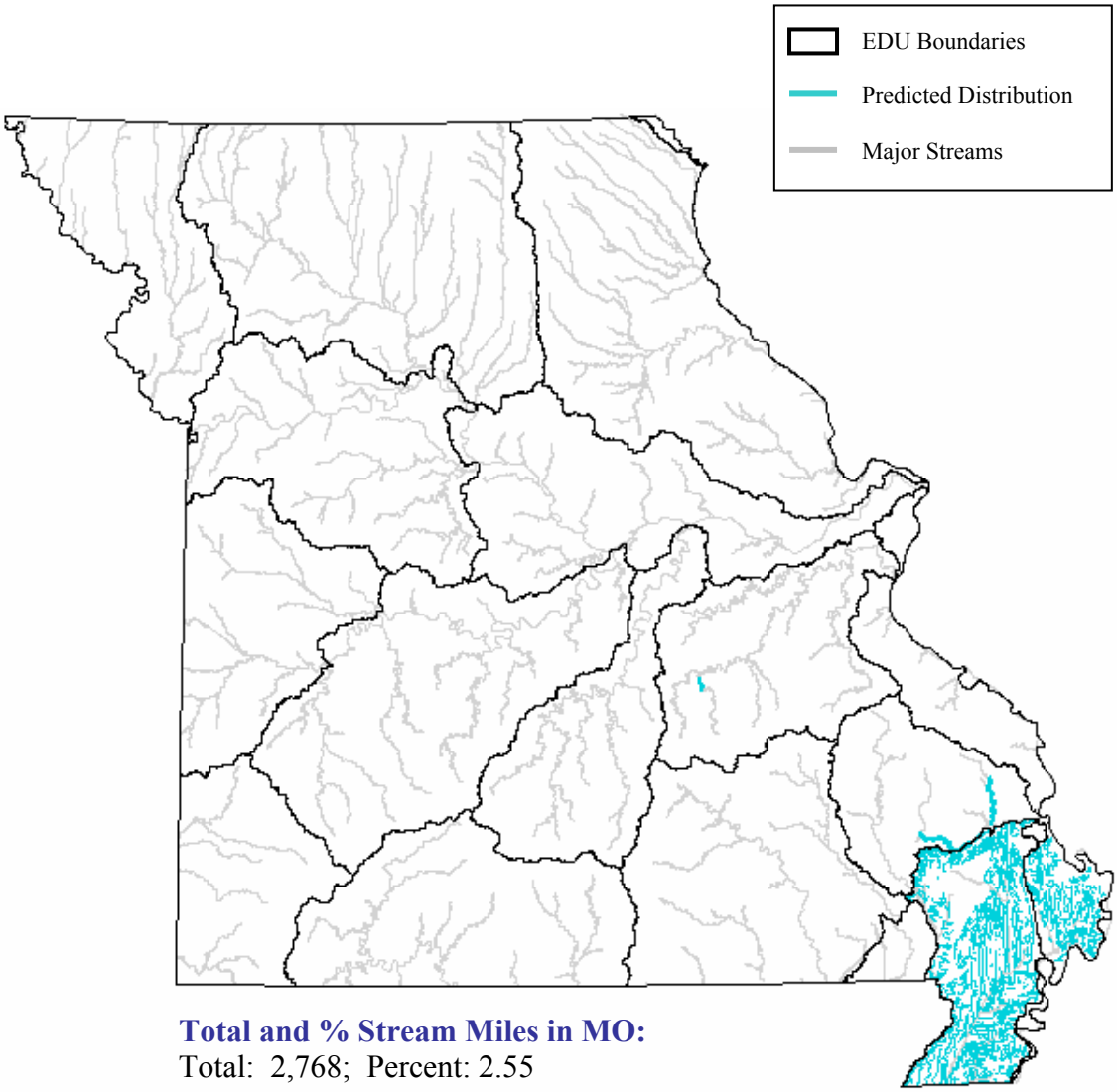
Endemism: Subzone

State Rank: S2

ITIS Code: 163922

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 2,768; Percent: 2.55

State Range:
The lake chubsucker has been collected in the Ozark/Upper St. Francis/Castor and Ozark/Meramec Ecological Drainage Units (EDU) but is generally restricted to the Mississippi Alluvial Basin Aquatic Subregion. The lake chubsucker may be on the verge of extirpation as swamps in the region have been ditched and drained, and populations have become rare and localized (Pflieger 1997).

Habitat Affinities:
The lake chubsucker is found in the clear, quiet, heavily vegetated pools of oxbow lakes, sloughs of large rivers and sluggish stream backwaters with soft bottoms of fine gravel, sand, or a mixture of organic detritus, mud and sand (Robinson and Buchanan 1988; Trautman 1957). It is highly intolerant of turbidity, siltation and high gradients (Etnier and Starnes 1993; Trautman 1957). In the Mississippi Alluvial Basin Aquatic Subregion, the lake chubsucker prefers clear, sluggish ditches with abundant submerged aquatic vegetation and substrates of sand or mixed silt and organic debris. In the Ozark/Meramec EDU, it inhabits overflow pools off the main channels of large streams (Pflieger 1997). In Louisiana, it is often found in the impounded waters of lakes, bayous and oxbows and only occasionally in flowing waters with abundant vegetation (Douglas 1974).

Predictive Model(s):

Ozark Model
([Temp_code] = 2) and ([Flow] = 1) and ([Ssize_code] = 3) and ([Rgrad_subr] = 1)

Mississippi Alluvial Basin Model)
([Core_Crowley] = 0) and ([Ssize_code] = 1) and ([State] = "MO")

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Lake Sturgeon

Acipenser fulvescens

Native: Yes

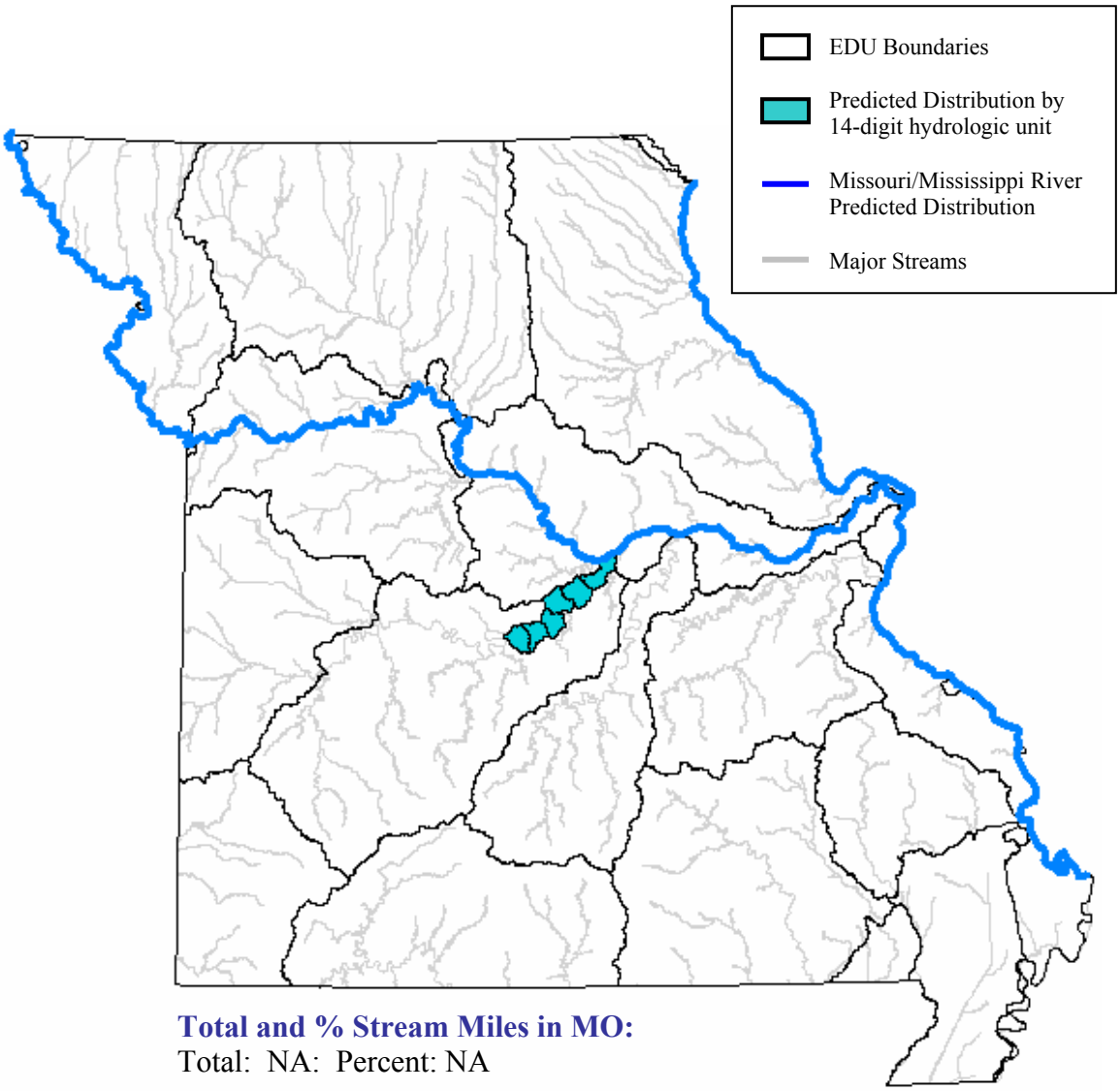
Endemism: Subzone

State Rank: S1

ITIS Code: 161071

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA: Percent: NA

State Range:

Pflieger (1997) indicates that most natural occurrences of the lake sturgeon in Missouri are from the Mississippi and Missouri Rivers. Lake sturgeon have also been taken from the lower Osage River, although these fish are thought to be the result of stockings that took place in the Missouri River near Hermann (Pflieger 1997).
The lake sturgeon is has become rare in Missouri steadily decreasing in abundance since 1900. The prime reason for its decline seems to be over harvest but others include pollution and dam construction, which fragment the lake sturgeon's habitat and stifle migration (Pflieger 1997).

Habitat Affinities:

The lake sturgeon is a bottom dweller inhabiting the quiet waters of large rivers and lakes. It prefers shallow shoals in lakes and the deepest parts of large rivers (Eddy and Underhill 1974; Robinson and Buchanan 1988). In the Mississippi and Missouri Rivers, the lake sturgeon seeks firm, silt-free bottoms of sand, gravel and rock (Pflieger 1997). The lake sturgeon is known to migrate as far as 200km upstream to spawn while lake populations are non-migratory (Etnier and Starnes 1993). Populations of lake sturgeon are declining in most states from dam construction (Trautman 1957), exploitation, or pollution (Clay 1975; Etnier and Starnes 1993; Phillips et. al. 1982).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 8)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Largemouth Bass

Micropterus salmoides

Native: Yes

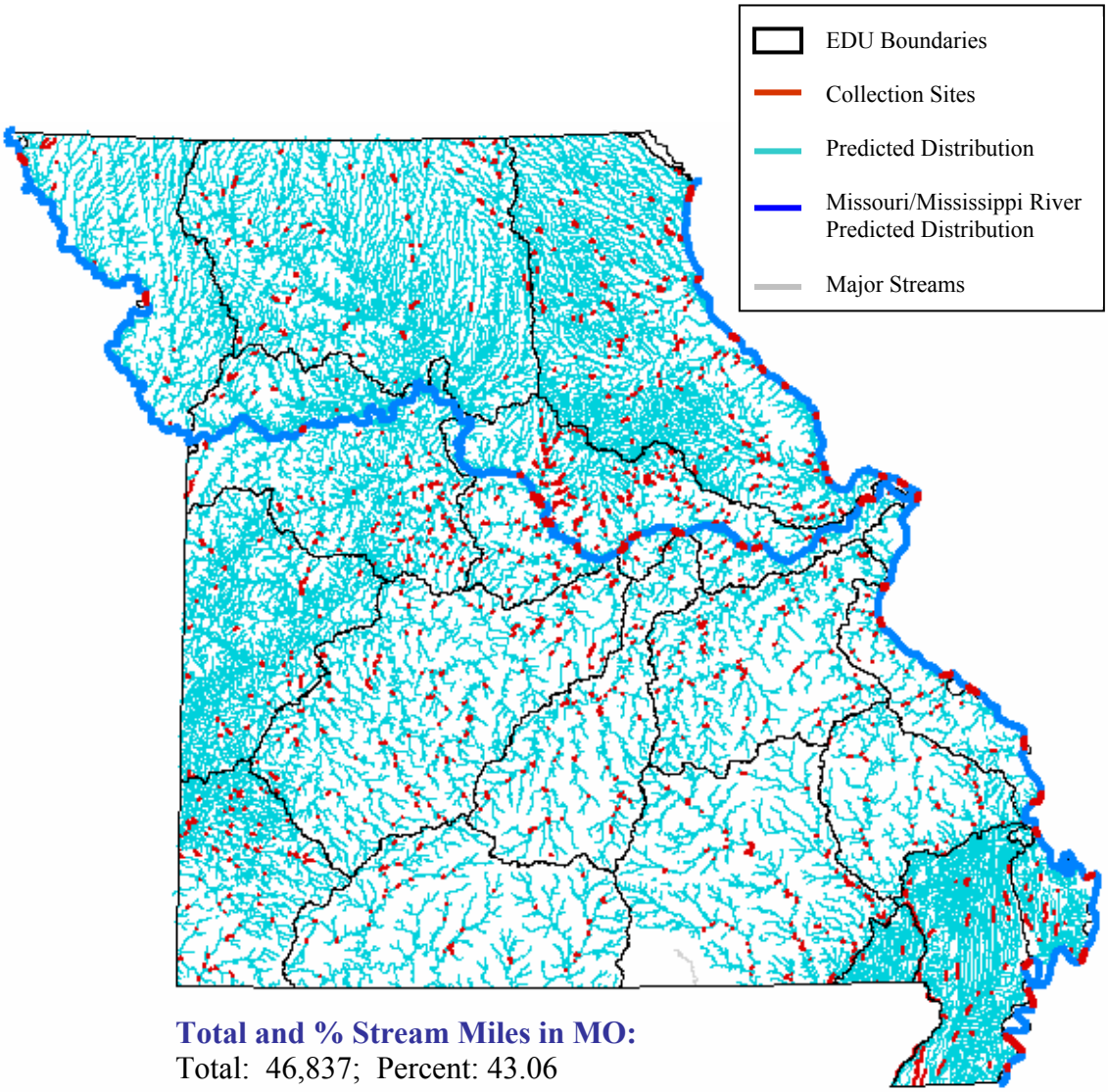
Endemism: Subzone

State Rank: S?

ITIS Code: 168160

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 46,837; Percent: 43.06

State Range:
Of the black basses, the largemouth is most abundant in standing waters throughout the state and in Central Plains streams containing permanent pools and heavy substrates exhibiting minimal base flow (Pflieger 1997).

Habitat Affinities:
The largemouth bass is found in a wide range of non-flowing, freshwater habitats from small creeks and large rivers to ponds, large lakes and impoundments (Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Trautman 1957). It thrives in moderately clear, warm, lentic waters with aquatic vegetation and substrates of mud, organic debris, gravel, sand or hard, non-flocculent clays (Cross and Collins 1975; Pflieger 1997; Trautman 1957). Pflieger (1997) and Robinson and Buchanan (1988) found that the largemouth bass is intolerant of high turbidity and siltation but Etnier and Starnes (1993) report that it is more tolerant of turbidity and salinity than other basses. In Missouri, the largemouth bass is found most often in natural lakes of the Mississippi Alluvial Basin Aquatic Subregion and artificial impoundments throughout the state (Pflieger 1997). In the northern states, the largemouth bass is most common in small to medium-sized lakes with clear water, sandy shores and abundant aquatic vegetation (Eddy and Underhill 1974; Phillips et. al. 1982). The largemouth bass requires non-shifting gravel or pebble substrates for spawning (Cross and Collins 1975; Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model
([GradsegR] >= 1) and ([GradsegR] <= 6)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Largescale Stoneroller

Campostoma oligolepis

Native: Yes

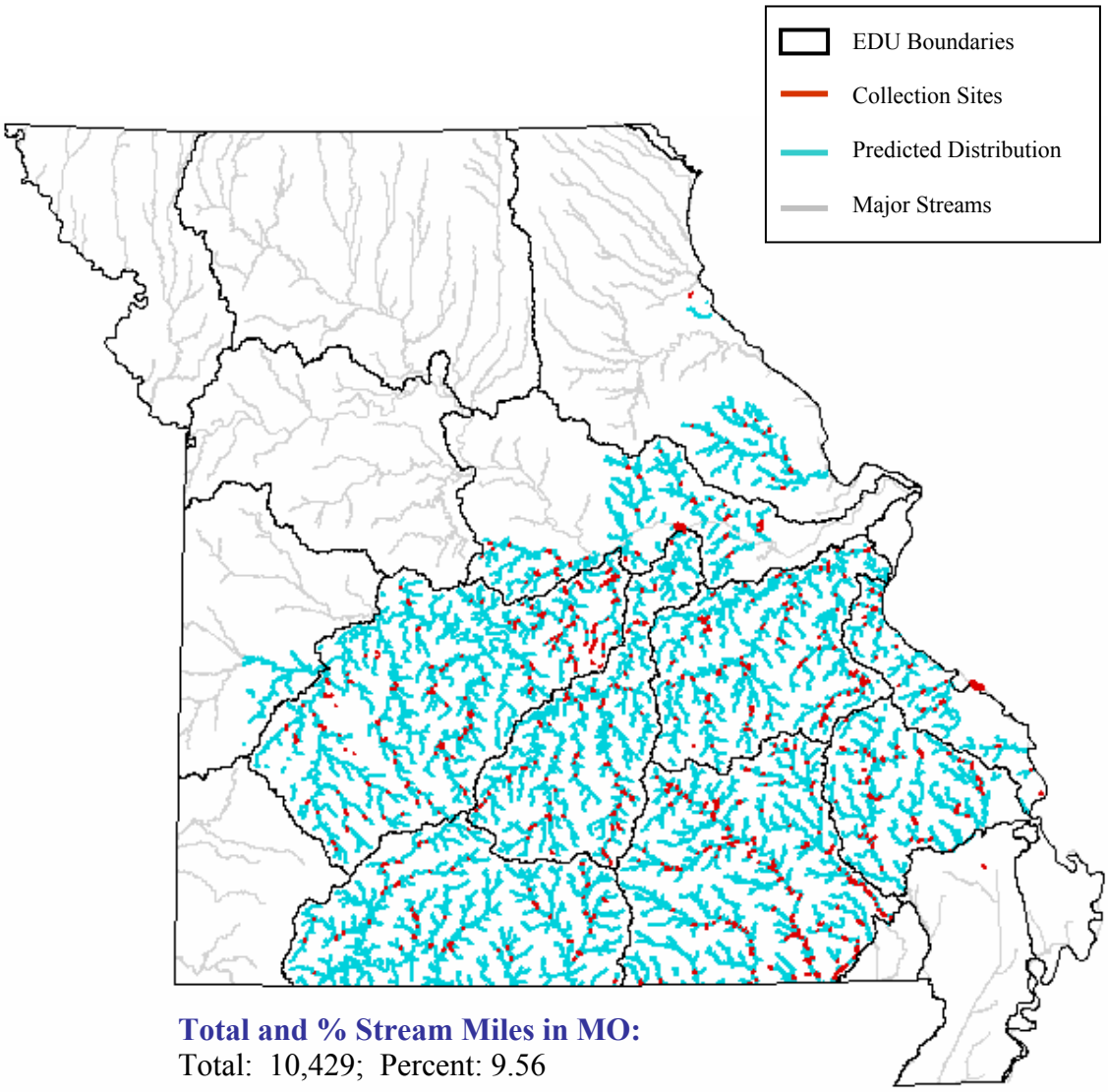
Endemism: Region

State Rank: S?

ITIS Code: 163509

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 10,429; Percent: 9.56

State Range:
The largescale stoneroller is one of the most abundant minnows of large to medium sized streams of the Ozarks Aquatic Subregion, occurring in all but the Ozark/Neosho Ecological Drainage Unit (EDU). Its only other area of occurrence is in the Cuivre River drainage (Pflieger 1997), and a few other isolated locations in the Central Plains/Cuivre/Salt EDU

Habitat Affinities:
The largscale stoneroller is found most often in pools adjacent to riffles in large streams and rivers (Robinson and Buchanan 1988). Its habitat is similar to the central stoneroller but it prefers faster waters and larger riffles, and is less tolerant of headwaters, turbidity and reduced flow (Pflieger 1997; Robinson and Buchanan 1988). In the Ozarks Aquatic Subregion, the largescale stoneroller is most abundant in medium to large-sized streams with moderate gradient and substrates of well-defined gravel, rubble or bedrock riffles (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Linkr] = 3) and ([GradsegR] >= 4) or ([Linkr] >= 4)

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Least Brook Lamprey

Lampetra aepyptera

Native: Yes

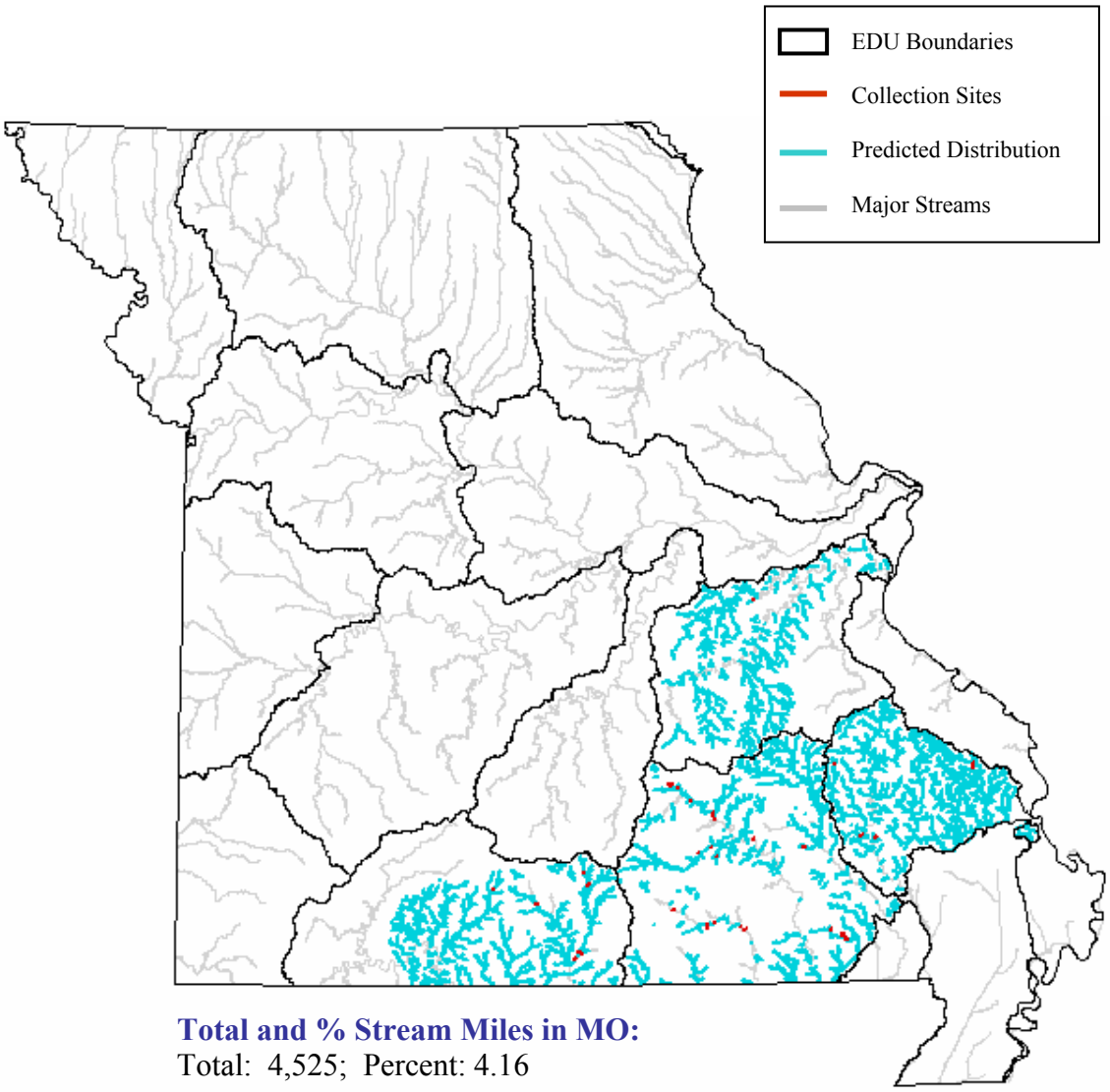
Endemism: Region

State Rank: S4

ITIS Code: 159705

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 4,525; Percent: 4.16

State Range:
The least brook lamprey is widespread in the southeastern Ozark Aquatic Subregion but may be more abundant than is currently recognized because fairly intensive sampling is necessary to adequately determine its range (Pflieger 1997).

Habitat Affinities:
The least brook lamprey inhabits headwater streams and spring branches with clean gravel or sand-gravel riffles, which is required for spawning (Robinson and Buchanan 1988; Trautman 1957). In the Ozark Aquatic Subregion, the least brook lamprey is distinctly a creek fish, inhabiting clear waters with permanent flow and clean gravelly riffles (Pflieger 1997). During early development, least brook lamprey larvae, called ammocoetes, live in the mixed sand and organic debris or silty detrital accumulations of areas with sluggish current (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 3)

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Least Darter

Etheostoma microperca

Native: Yes

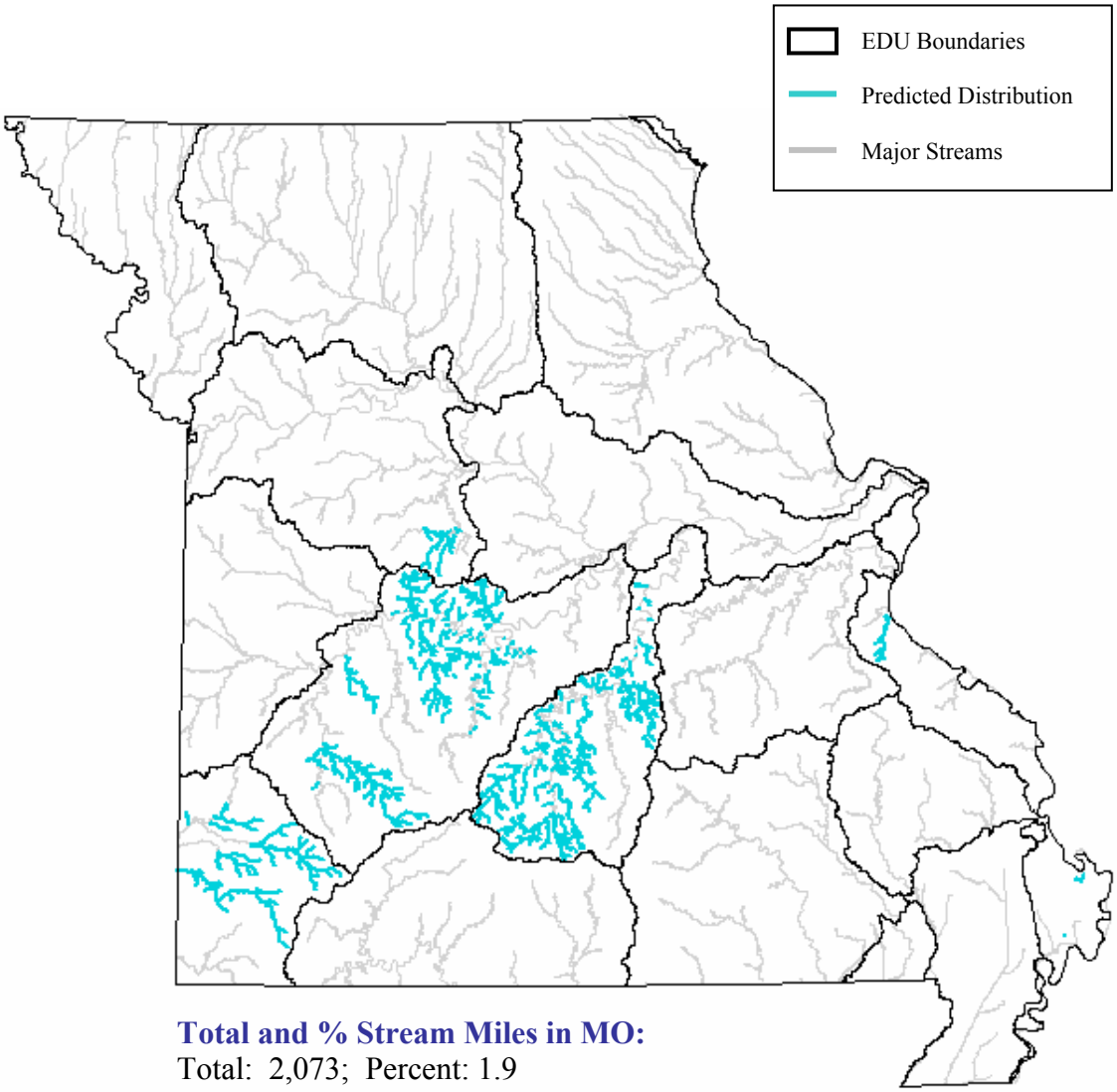
Endemism: Subzone

State Rank: S2

ITIS Code: 168411

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 2,073; Percent: 1.9

State Range:
Least darter populations are sporadic and localized in the central and southeastern Ozark Aquatic Subregion but the least darter is often the most abundant darter in its preferred habitat (Pflieger 1997). The least darter is sporadic in Minnesota as well but Phillips et. al. (1982) notes that this species is difficult to sample.

Habitat Affinities:
The least darter inhabits a wide variety of habitats from clear streams and springs to sluggish pools, ponds and lakes but the existence of abundant filamentous algae or thick growths of aquatic vegetation are essential (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). The least darter tolerates a variety of substrate types as well but avoids yellow clayey silts (Trautman 1957) and is susceptible to localized habitat destruction from stream alterations such as gravel mining (Pflieger 1997). In the Ozark Aquatic Subregion, the least darter is found in clear, quiet pools, seeps and small creeks with permanent flow and dense vegetation (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
The distribution is based upon existing collection records, contingency tables, habitat affinity and professional review.
([Flow] = 1) and ([Linkr] >= 1) and ([Linkr] <= 5)

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Logperch

Percina caprodes

Native: Yes

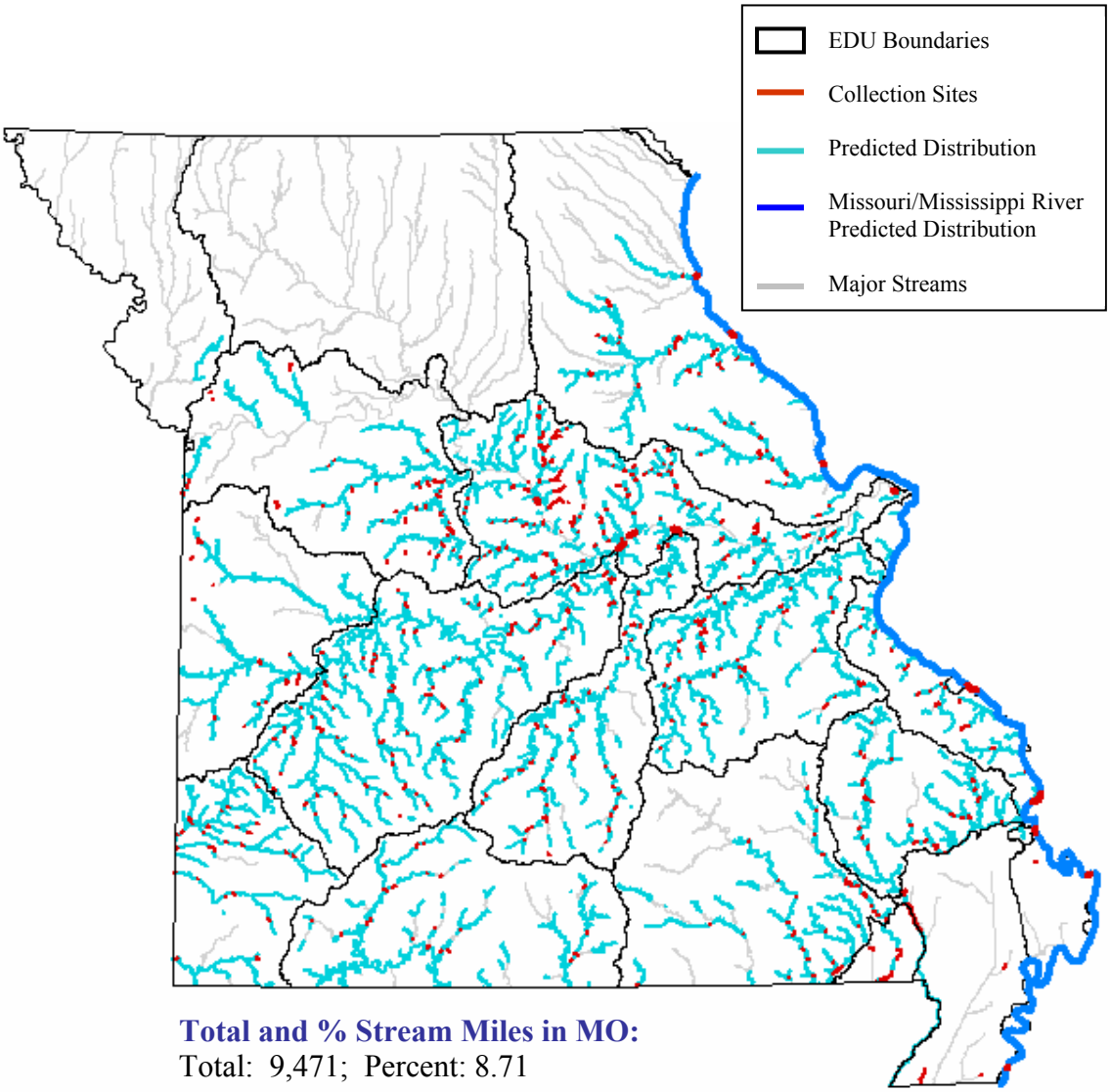
Endemism: Subzone

State Rank: S?

ITIS Code: 168472

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 9,471; Percent: 8.71

State Range:

The logperch reaches greatest abundance in streams along the border of the Central Plains and Ozark Aquatic Subregions. Unlike most darters, the logperch is also able to persist in impoundments (Pflieger 1997).

Habitat Affinities:

The logperch is an adaptable darter avoiding only headwaters lacking large pools, poorly defined gravel or rubble riffles, and streams with continuous turbidity, excessive siltation or bottoms covered with industrial wastes (Clay 1975; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). The logperch is known to repopulate areas after an environmental disturbance has been removed (Robinson and Buchanan 1988). The most abundant populations of logperch were found in deep, clear riffles, bars and adjacent pools of larger creeks and rivers with medium to low gradients and bottoms of clean sand, gravel, or mud (Clay 1975; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). In the border area of the Central Plains and Ozark Aquatic Subregions, the logperch is most often found in the deep, sluggish sections of riffles over silt-free substrates, and the gravelly shores of impoundments (Pflieger 1997). On sunny days, in clear water habitats, the logperch has been observed hiding under rocks in deeper water (Trautman 1957).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2)
(([Linkr] = 3) and ([DlinkR] >= 4) and ([DlinkR] <= 8)) or (([Linkr] >= 4))
DlinkR is done.

Ozark Model
(([Linkr] = 3) and ([Rgrad_subr] = 1) and ([Temp_code] = 2)) or (([Linkr] = 4)) or (([Linkr] = 5) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)) or (([Linkr] >= 6))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = “MO”)

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Longear Sunfish

Lepomis megalotis

Native: Yes

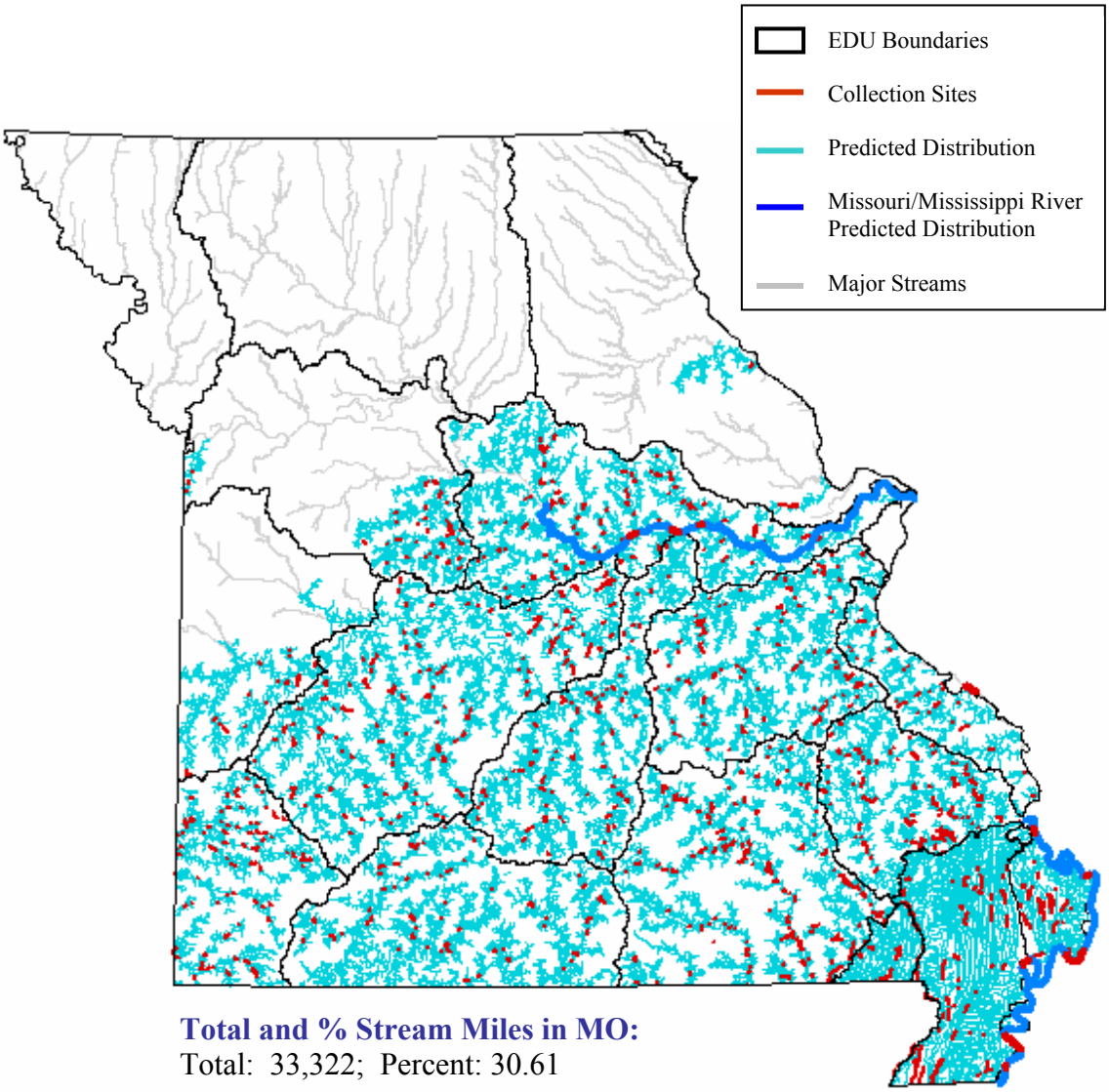
Endemism: Subzone

State Rank: S?

ITIS Code: 168153

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 33,322; Percent: 30.61

State Range:

The longear sunfish is abundant throughout the Ozark and Mississippi Alluvial Basin Aquatic Subregions. The northern and western limits of its range have increased to include parts of the Missouri River and its tributaries (Pflieger 1997).

Habitat Affinities:

Longear sunfishes proliferate in pools, reservoirs, farm ponds, and streams of all sizes, except extreme headwaters (Pflieger 1997; Robinson and Buchanan 1988; Clay 1975; Douglas 1974; Trautman 1957; Etnier and Starnes 1993; Cross and Collins 1975). They are most often found in clear, permanent flowing streams with moderate current and low gradient, avoiding turbidity (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes 1993; Cross and Collins 1975), but Trautman (1957) and Clay (1975) report that the longear sunfish was only consistently abundant in sluggish pools and low gradient streams. Longear sunfishes are found over rocky or sandy bottoms, often near aquatic vegetation at the margins of streams and pools (Pflieger 1997; Robinson and Buchanan 1988; Douglas 1974; Trautman 1957; Etnier and Starnes 1993; Cross and Collins 1975). In the Missouri River, the longear sunfish is commonly encountered along the stream channel in adjacent pools, inlets and overflow waters. It is also abundant along the shorelines of most reservoirs in the Ozark Aquatic Subregion (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 1) and ([DlinkR] >= 3) and ([DlinkR] <= 7)) or (([Linkr] = 3) and ([Temp_code] = 2) and ([Flow] = 1)) or (([Linkr] >= 4))
DlinkR is done.

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Longnose Darter

Percina nasuta

Native: Yes

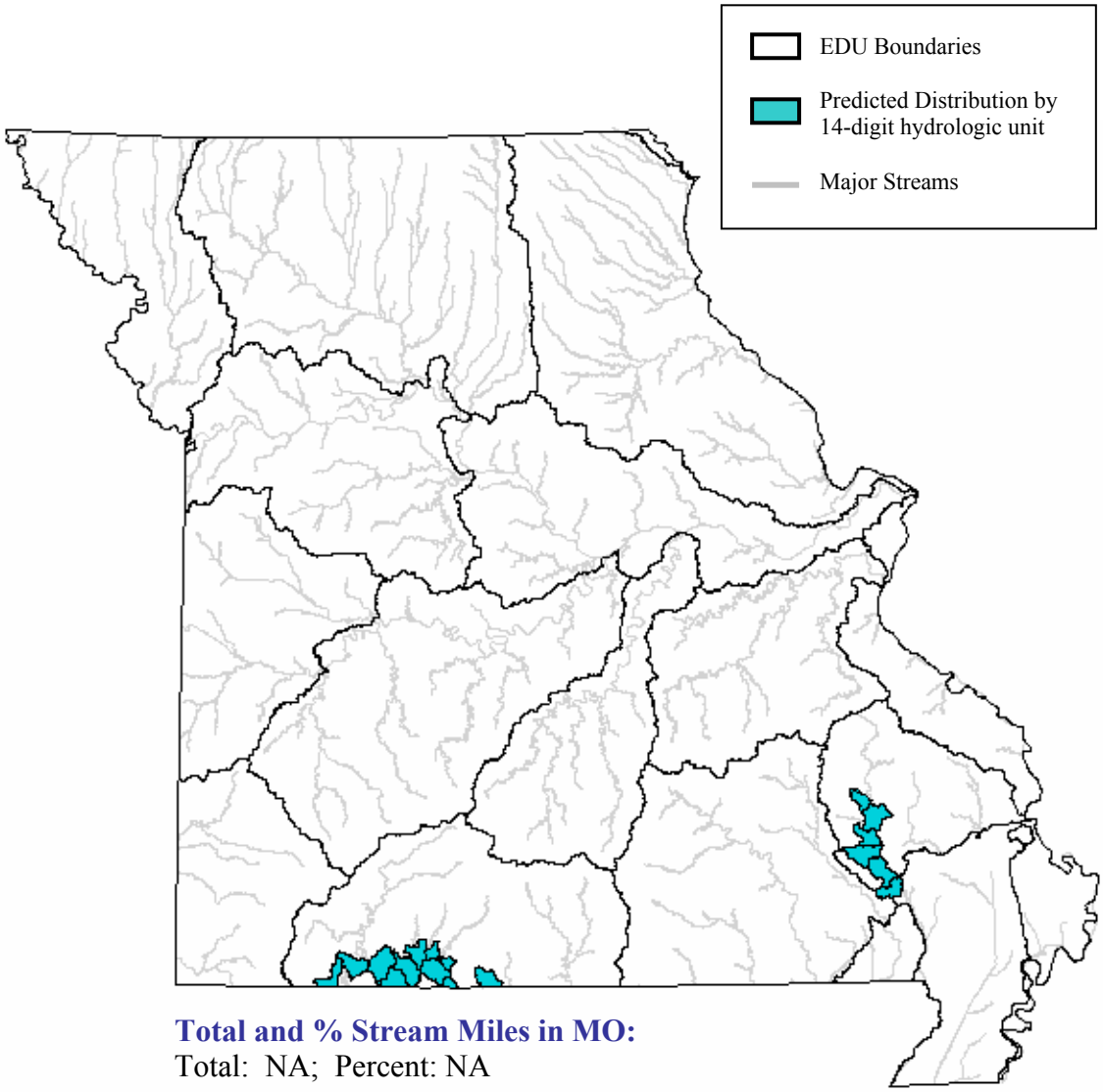
Endemism: Subregion

State Rank: S1

ITIS Code: 168489

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The longnose darter has only been collected from two rivers in the Ozark Aquatic Subregion. The section of White where it was collected in the 1950's is now covered by Table Rock Lake and its occurrence in the St. Francis River is rare (Pflieger 1997).

Habitat Affinities:
The longnose darter is found in clear, silt-free pools and backwaters of large streams and small rivers with firm substrates of cobble and gravel (Pflieger 1997; Robinson and Buchanan 1988). Its spring habitat is the swift raceways of pools from 1-3ft in depth. In late summer and fall the longnose darter retreats to deep pools with slack current, sand substrates and dense growths of aquatic vegetation (Pflieger 1997; Robinson and Buchanan 1988). The longnose darter is extremely sensitive to environmental disturbance and the construction of reservoirs has destroyed much of its habitat (Robinson and Buchanan 1988). Pflieger (1997) notes that there have been some reports of the longnose darter from reservoirs but states that these may be strays, unable to maintain self-sustaining populations. Little is known about the natural history of this species.

Predictive Model(s):

Ozark Model
The distribution is based upon existing collection records and professional review.

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Longnose Gar

Lepisosteus osseus

Native: Yes

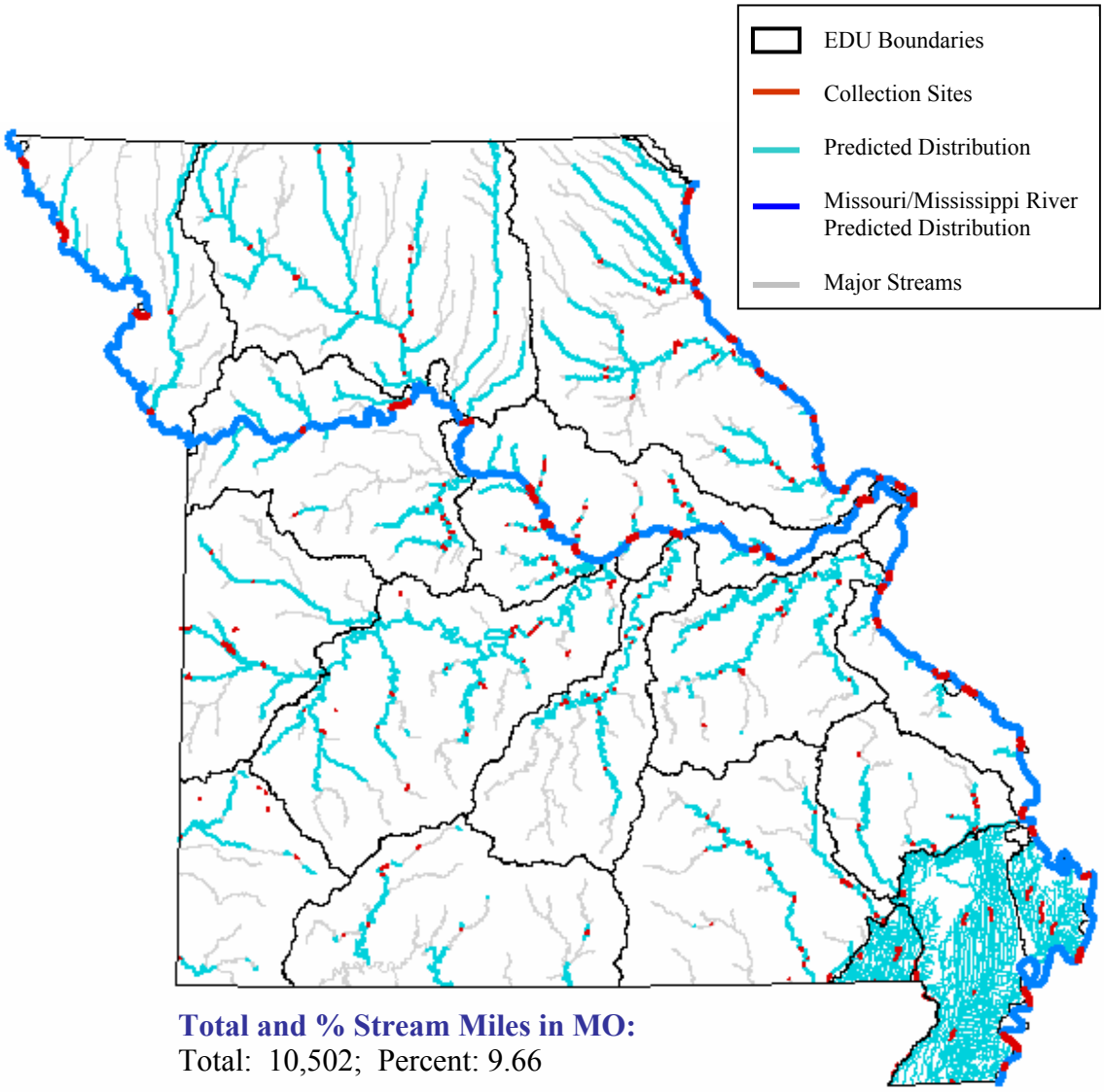
Endemism: Subzone

State Rank: S?

ITIS Code: 161094

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 10,502; Percent: 9.66

State Range:
The longnose gar is widely distributed in Missouri, and reaches greatest abundance in impoundments of the Ozark Aquatic Subregion. It is the only gar known to inhabit the clear, high gradient streams of the central Ozarks (Pflieger 1997).

Habitat Affinities:
The longnose gar prefers the clearest waters of creeks, low gradient streams, oxbows and especially large rivers and impoundments where it typically inhabits sluggish pools and backwaters (Clay 1975; Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It also inhabits the overflow ponds, river bayous and swamps of lowland areas (Etnier and Starnes 1993; Robinson and Buchanan 1988), and shallow lakes and the tributaries of large rivers in the north (Eddy and Underhill 1974; Phillips et. al. 1982). In Missouri, the longnose gar adults thrive in the large, deep pools of artificial impoundments and young prefer shallow backwaters, usually containing dense aquatic vegetation (Pflieger 1997). The longnose gar migrates upstream to spawn in smaller streams with higher gradient and gravelly, weedy substrates (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains Model)
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

Ozark Model
([Temp_code] = 2)
(([LinkR] = 5) and ([Rgrad_subr] = 1)) or (([LinkR] >= 6))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Mimic Shiner

Notropis volucellus

Native: Yes

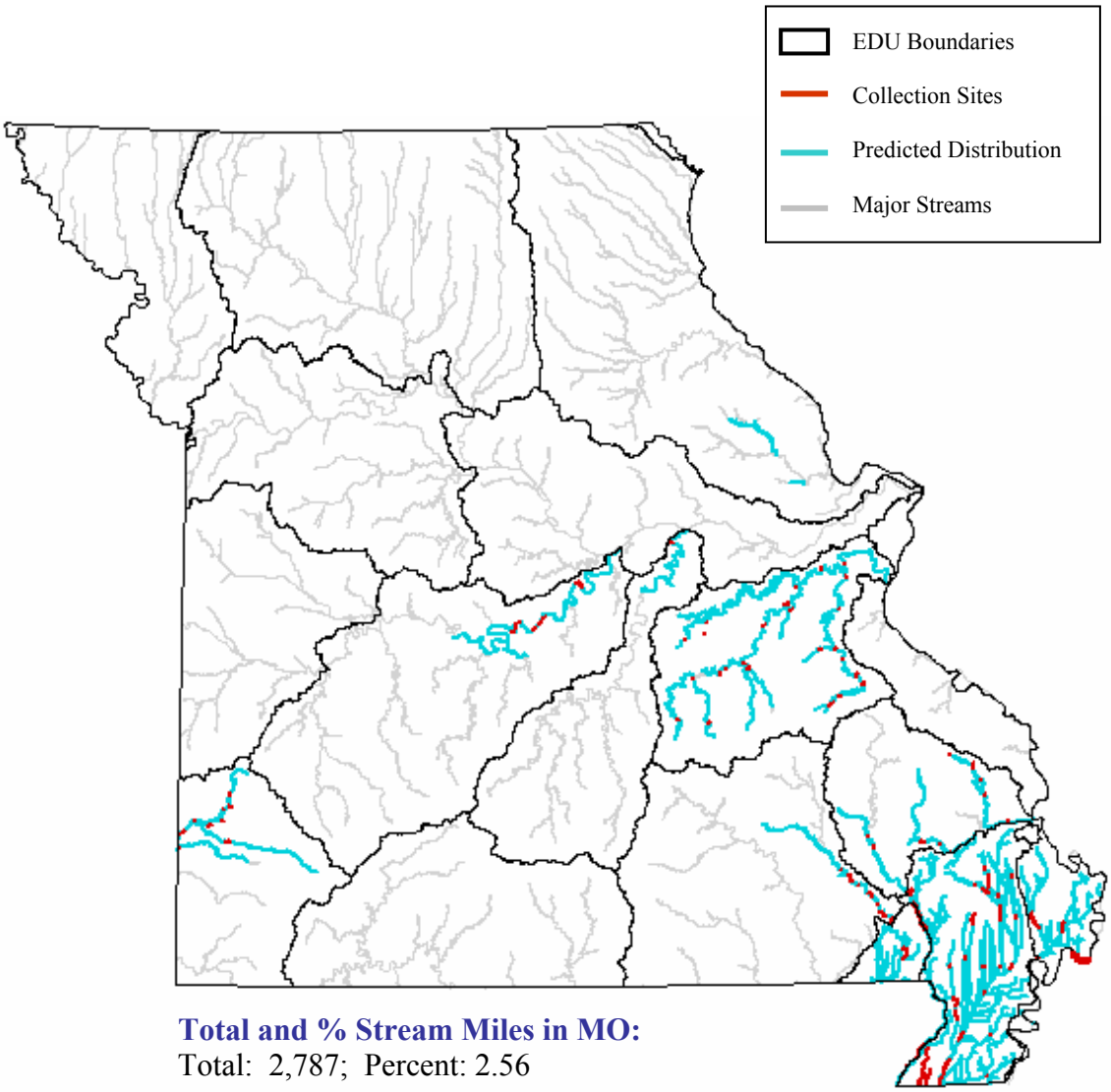
Endemism: Subzone

State Rank: S?

ITIS Code: 163421

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 2,787; Percent: 2.56

State Range:

In the Mississippi Alluvial Basin Aquatic Subregion the mimic shiner is commonly found in large ditches and low-gradient streams entering from the Ozark Aquatic Subregion. It also exists throughout the Meramec Ecological Drainage Unit (EDU) and in the Osage, Gasconade, and Spring River drainages of the Ozark Aquatic Subregion. In the Plains it has been taken from the Cuivre River system (Pflieger 1997).

Habitat Affinities:

The mimic shiner is most often found in clear, medium streams and large rivers with low to moderate gradients, and firm substrates composed of gravel, sandy silt, or clayey silt, as long as silt deposition is minimal (Robinson and Buchanan 1988; Trautman 1957). In streams, it prefers gently flowing riffles or pools with little current (Clay 1975, Trautman 1957), while in large rivers it is often taken near creek mouths over sandy bottoms (Robinson and Buchanan 1988). In its northern range, the mimic shiner is more common in lakes, preferring sheltered areas with silty bottoms (Eddy and Underhill 1974; Pflieger 1997; Trautman 1957). Etnier and Starnes (1993) found that the mimic shiner was quite tolerant of reservoirs and consistently avoided small creeks and marshy or swampy lowland areas. In Missouri, the mimic shiner prefers ditches with moderately clear water and noticeable current or the main channel of large, moderately turbid rivers flowing from upland areas (Pflieger 1971; Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 2) and ([Ssize_code] <= 4) and ([State] = "MO")

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Mississippi Silvery Minnow

Hybognathus nuchalis

Native: Yes

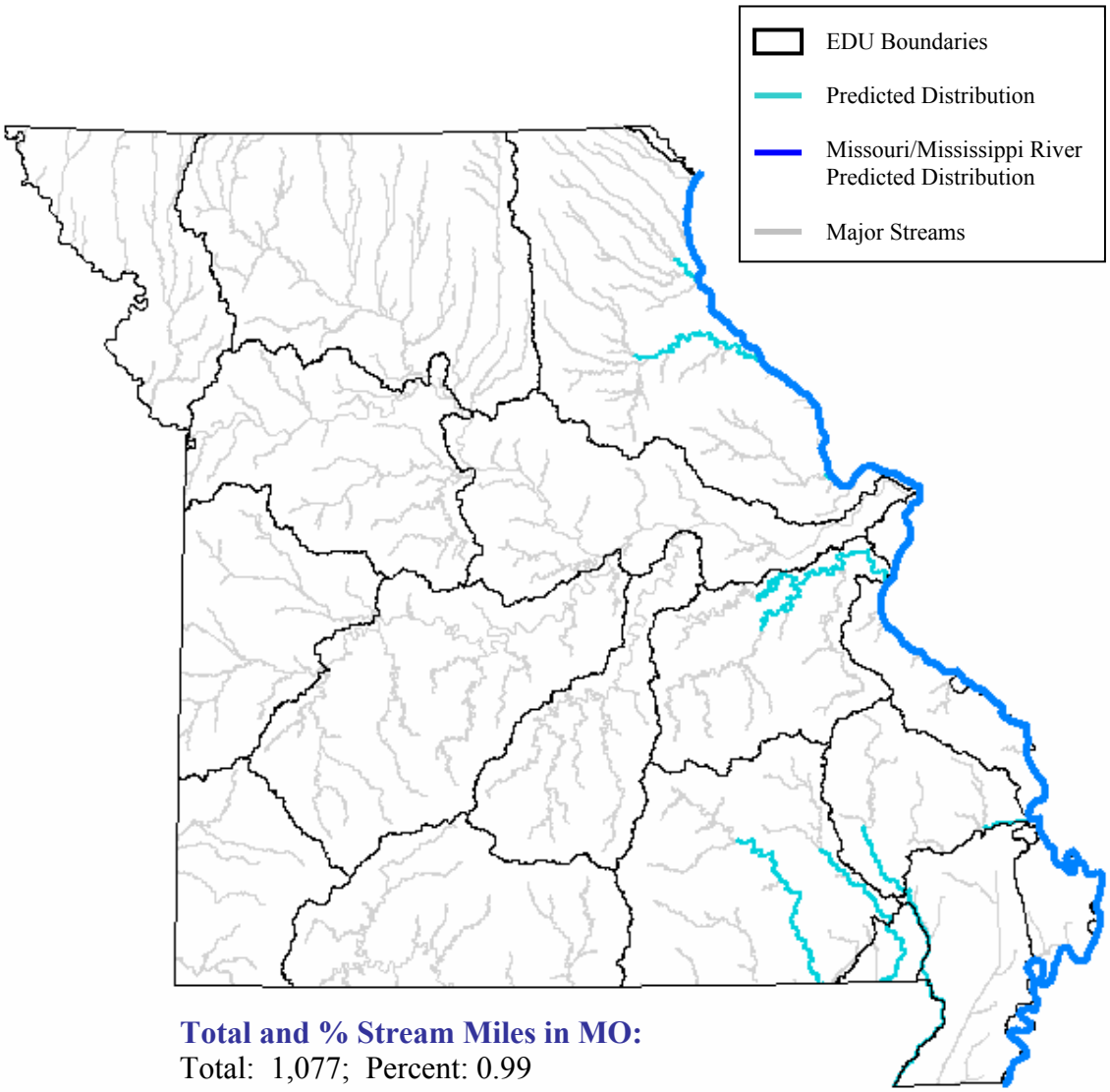
Endemism: Region

State Rank: S3S4

ITIS Code: 163360

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,077; Percent: 0.99

State Range:
The Mississippi silvery minnow is found along the entire length of the Mississippi River, large rivers draining the southeastern plateau of the Ozark Aquatic Subregion, and the lower reaches of large ditches within Mississippi Alluvial Basin Aquatic Subregion. In the Mississippi River it is much more common below the mouth of the Ohio River because turbidity is greatly reduced at the confluence (Pflieger 1997).

Habitat Affinities:
In Missouri, the Mississippi silvery minnow prefers clear, moderately large streams with low gradients and is most abundant in pools and backwaters with substrates of silt or sand (Pflieger 1997). Elsewhere it is found in bayous, oxbow lakes, lowland lakes and silty creeks and rivers where the current is gentle or non-existent and bottoms are composed of gravelly-sand, silty-sand, organic debris, or muck (Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). Trautman (1957) found that Mississippi silvery minnow was most abundant in waters rich in phytoplankton. He also notes that excessive turbidity, or the smothering of aquatic vegetation and substrates by silt, can negatively impact the Mississippi silvery minnow.

Predictive Model(s):

Central Plains/Ozark Model
([Temp_code] = 2) and ([Linkr] >= 7)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = "MO")

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

References:

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Missouri Saddled Darter

Etheostoma tetrazonum

Native: Yes

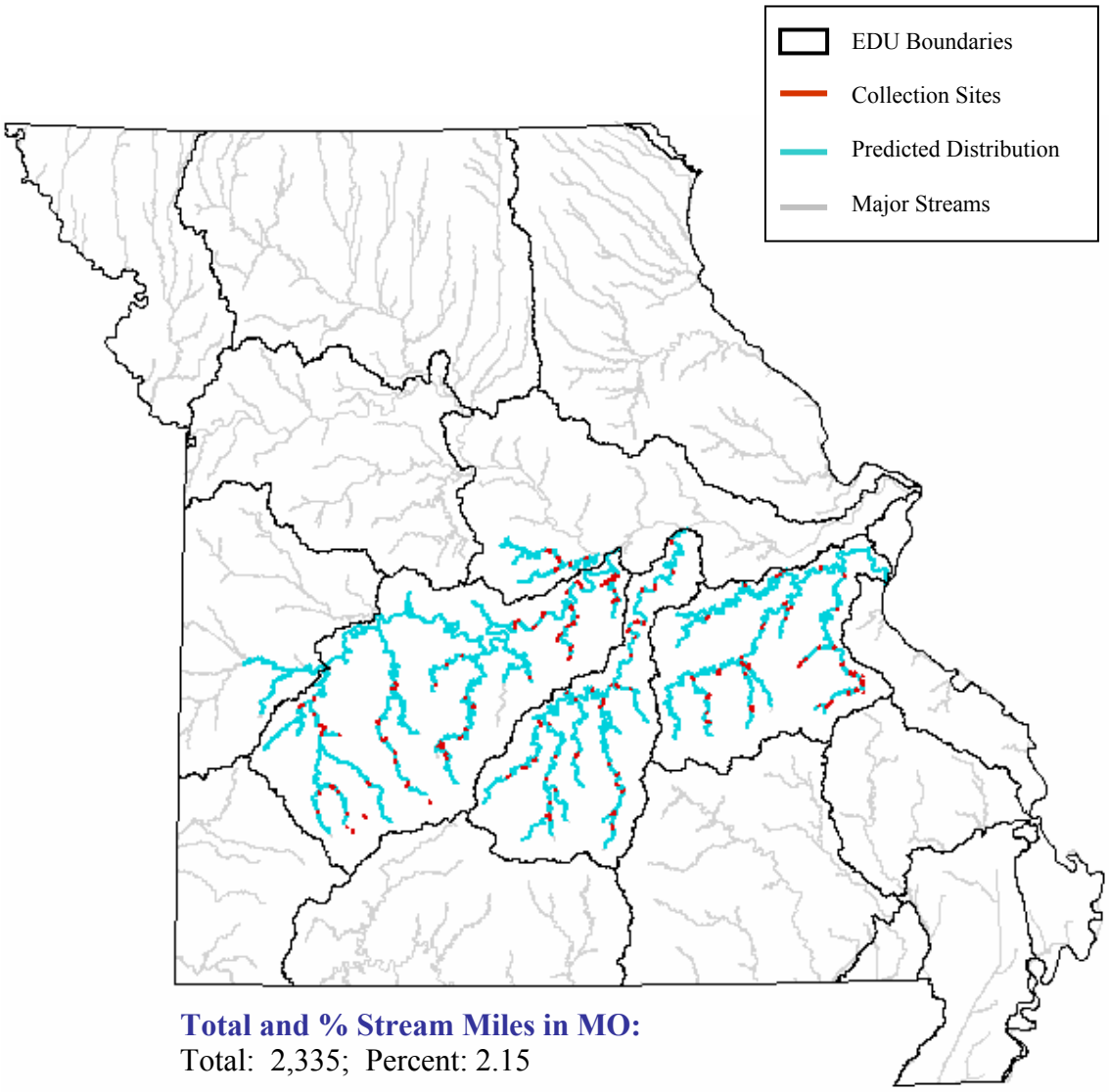
Endemism: Subregion

State Rank: S?

ITIS Code: 168441

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 2,335; Percent: 2.15

State Range:
The Missouri saddled darter can be found throughout the Osage, Gasconade, and Meramec Ecological Drainage Units (EDU), while a population also exists in the Moreau River drainage of the Ozark/Moreau/Loutre EDU. It is an endemic to Missouri and is one of the most abundant darters in its area of occurrence (Pflieger 1971; Pflieger 1997).

Habitat Affinities:
The Missouri saddled darter is found in clear, moderately large, high-gradient streams with continuous strong flow. It prefers deep pools with swift current and substrates of course gravel or rubble (Pflieger 1971; Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Linkr] >= 5)

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Mooneye

Hiodon tergisus

Native: Yes

Endemism: Subzone

State Rank: S3

ITIS Code: 161906

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick

Total and % Stream Miles in MO:
Total: 2,118; Percent: 1.95

State Range:
The mooneye occurs sporadically and never reaches high abundance in Missouri. It is most common in reservoirs and large streams of the southeastern Ozarks Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The mooneye inhabits the clearest rivers, lakes and large reservoirs (Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982). It is often found in backwaters and other quiet areas (Eddy and Underhill 1974; Phillips et. al. 1982), but feeds in swift current over firm bottoms, such as dam outflows (Robinson and Buchanan 1988; Trautman 1957). It is a surface feeder and requires an abundant supply of small fish (Robinson and Buchanan 1988; Trautman 1957). In Missouri, it is found in the offshore waters of reservoirs and larger pools of streams (Pflieger 1997). The mooneye does not tolerate excessive turbidity and high gradients (Clay 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Linkr] >= 7)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Mottled Sculpin

Cottus bairdi

Native: Yes

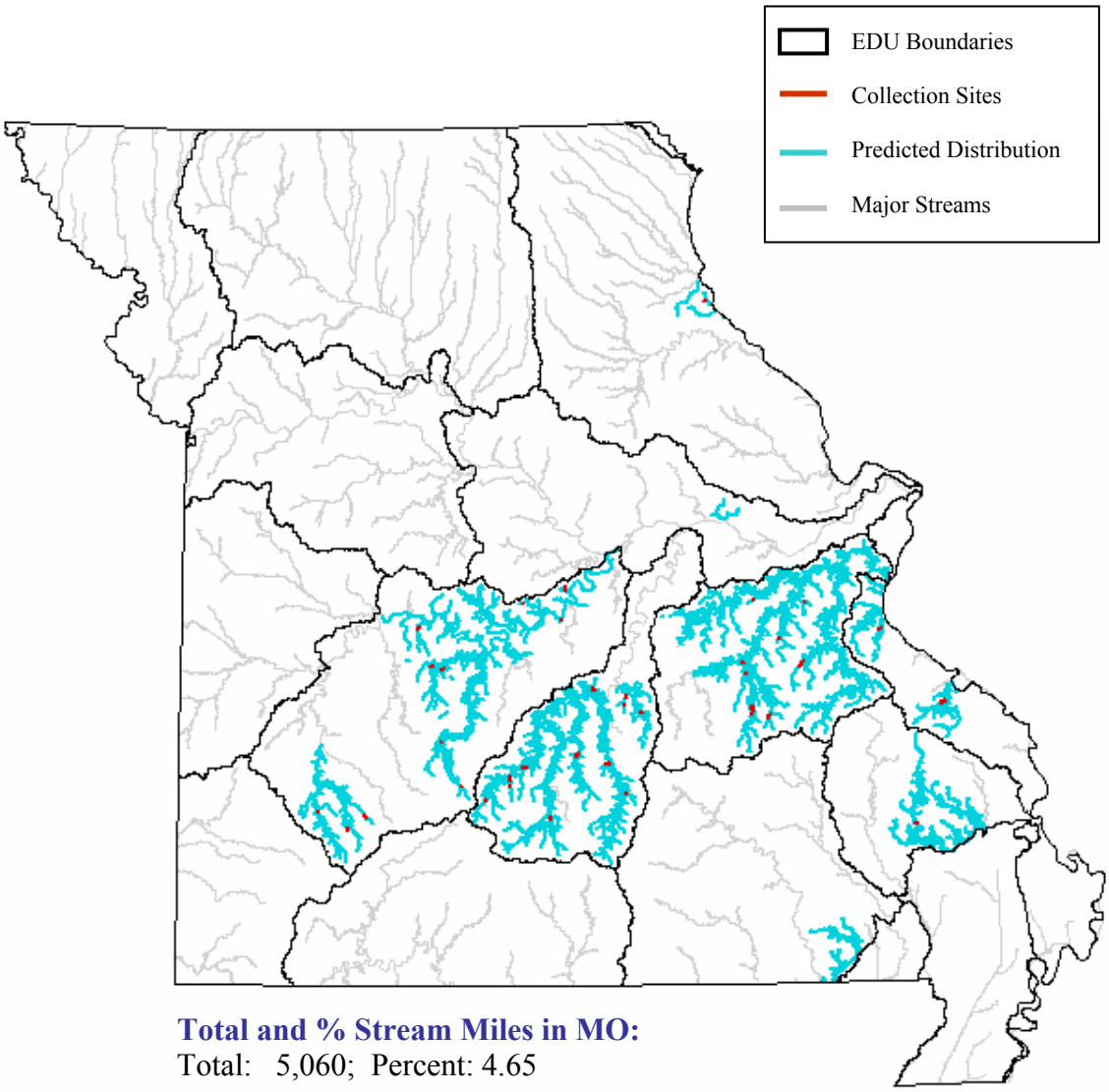
Endemism: Subzone

State Rank: S4

ITIS Code: 167237

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,060; Percent: 4.65

State Range:
The mottled sculpin has been collected in all of the Ecological Drainage Units (EDU) of the Ozark Aquatic Subregion except the White and Neosho. It is often the most abundant fish in its area of occurrence (Pflieger 1997). An isolated populations also exists in the Ozark/Moreau/Loutre and Central Plains/Cuivre/Salt Ecological Drainage Units.

Habitat Affinities:
The densest populations of mottled sculpin are found in cold, upland rivers with high gradient, and small, quiet brooks and streams having permanent flow (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Trautman 1957). It can also be found in the boulder-lined shores of northern lakes (Eddy and Underhill 1974), and swift, cool tailwaters of reservoirs (Etnier and Starnes 1993). The mottled sculpin occurs in deep riffles and occasionally pools, with gravel, rubble, or boulder substrates free of clayey silts and other pollutants (Etnier and Starnes 1993; Pflieger 1997; Trautman 1957). The mottled sculpin is a bottom dweller and hides among rocks, between bedrock crevices filled with gravel, or debris (Phillips et. al. 1982; Trautman 1957). In Missouri, the mottled sculpin is most abundant in spring-fed streams with abundant cover, such as rock or dense vegetation (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] >= 1) and ([Linkr] <= 2) and ([GradsegR] = 3)) or (([Linkr] >= 1) and ([Linkr] <= 2) and ([DlinkR] >= 5) and ([DlinkR] <= 7)) or (([Linkr] >= 3) and ([Linkr] <= 4) and ([Temp_code] = 1)) or (([Linkr] >= 3) and ([Linkr] <= 4) and ([Temp_code] = 2) and ([Flow] = 1)) or (([Linkr] >= 3) and ([Linkr] <= 4) and ([Temp_code] = 2) and ([DlinkR] >= 5) and ([DlinkR] <= 7)) or (([Linkr] >= 5))

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Mountain Madtom

Noturus eleutherus

Native: Yes

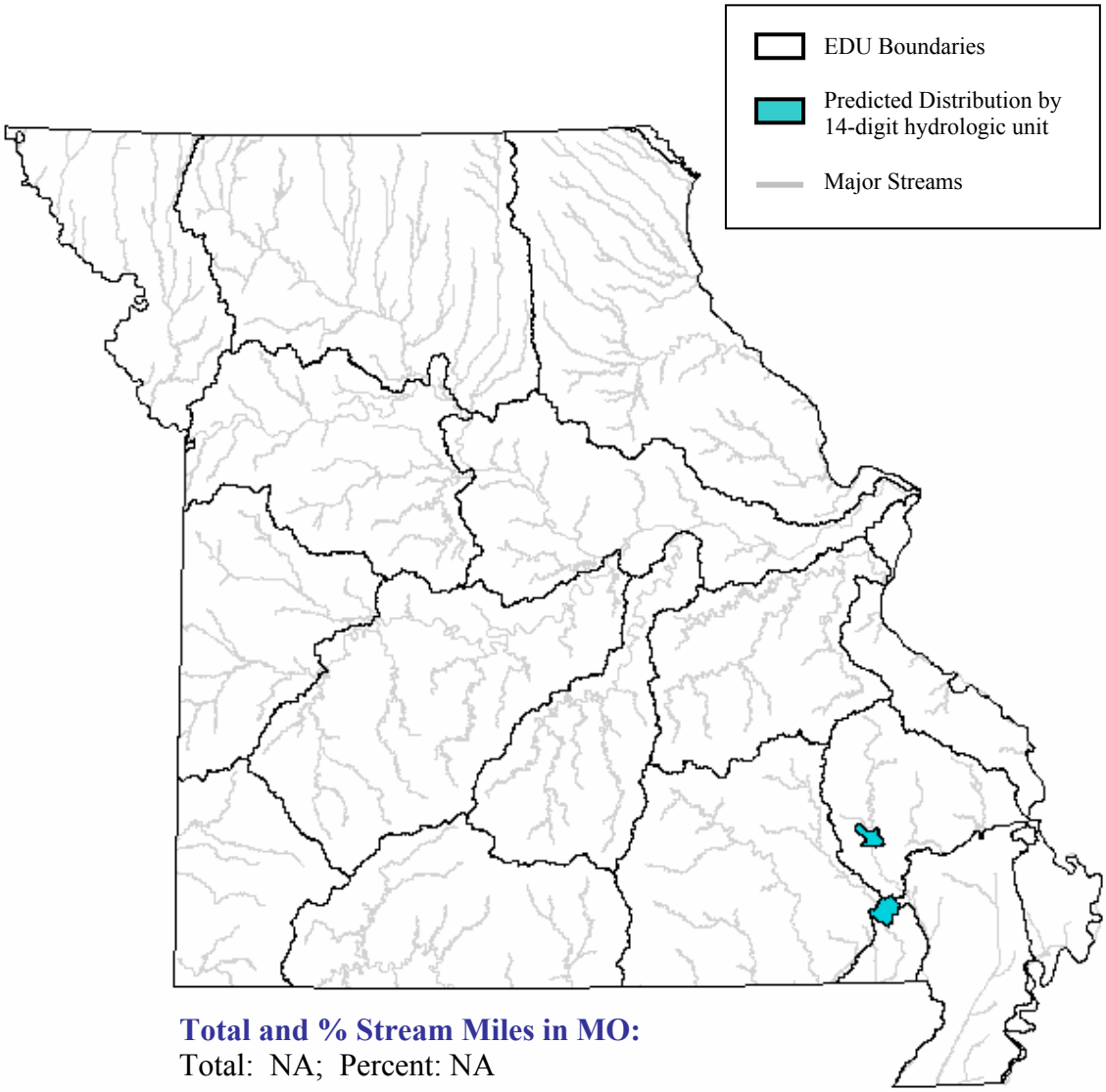
Endemism: Region

State Rank: S1S2

ITIS Code: 164009

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The mountain madtom is rare in the state and has only recently been collected from the Ozark/Black/Current and Ozark/Upper St. Francis/Castor Ecological Drainage Units (EDU) adjacent to the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The mountain madtom prefers the swiftly flowing waters of streams and medium to large rivers (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). It inhabits deep, wide riffles or shoal areas with sand, course gravel, rubble, or boulders, and is often associated with aquatic vegetation (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). The mountain madtom avoids small creeks and impounded rivers (Etnier and Starnes 1993; Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model
The distribution is based upon existing collection records and professional review.

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Mud Darter

Etheostoma asprigene

Native: Yes

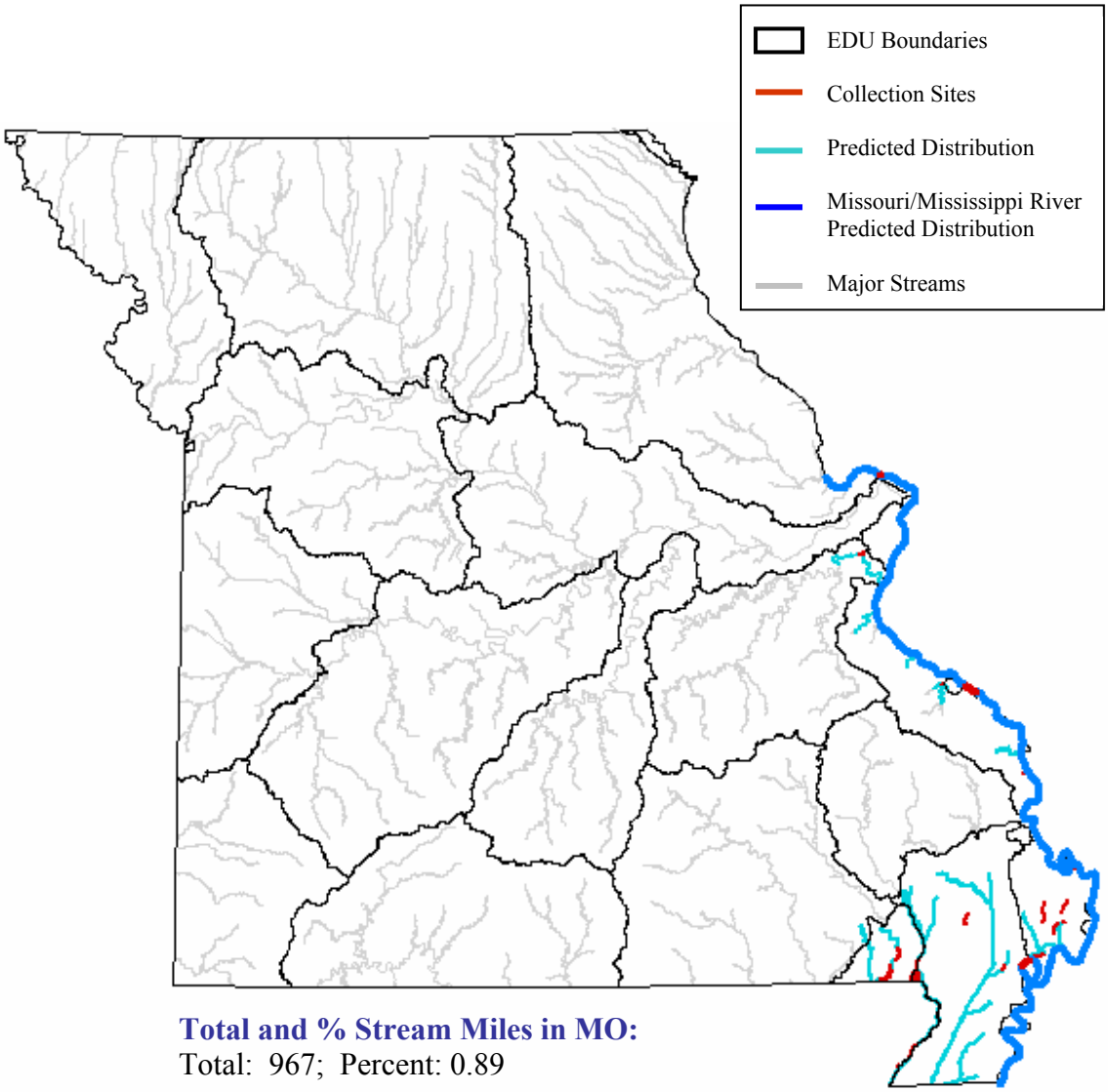
Endemism: Region

State Rank: S?

ITIS Code: 168372

Global Rank: G4G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 967; Percent: 0.89

State Range:

The mud darter is found sporadically throughout the Mississippi Alluvial Basin Aquatic Subregion and occasionally in the Mississippi River and its larger tributaries below the Cuivre River along the southern half of the state (Pflieger 1997).

Habitat Affinities:

The mud darter inhabits a variety of habitats including bayous of moderate size, overflow pools, creeks, slow flowing streams, and especially quiet, muddy sloughs and the mouths of tributary streams to large rivers (Clay 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988). The mud darter is most abundant in clear lowland waters with sluggish to moderate current over substrates ranging from sand and detritus to mixtures of sand, gravel, and silt (Eddy and Underhill 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). In the Mississippi Alluvial Basin Aquatic Subregion, the mud darter is most abundant in river-bottom lakes, ponds, sluggish riffles, pools and backwaters of ditches with fine gravel, sand and hardpan substrates often mixed with abundant organic debris. In large rivers and low gradient streams of Missouri, it reaches high abundance within "dense mats of finely divided tree roots" along the shoreline (Pflieger 1997). Etnier and Starnes (1993) found that the mud darter migrates from riffles during daytime to pools at night.

Predictive Model(s):

Ozark Model
([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([Rgrad_subr] = 1)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Muskellunge

Esox masquinongy

Native: No

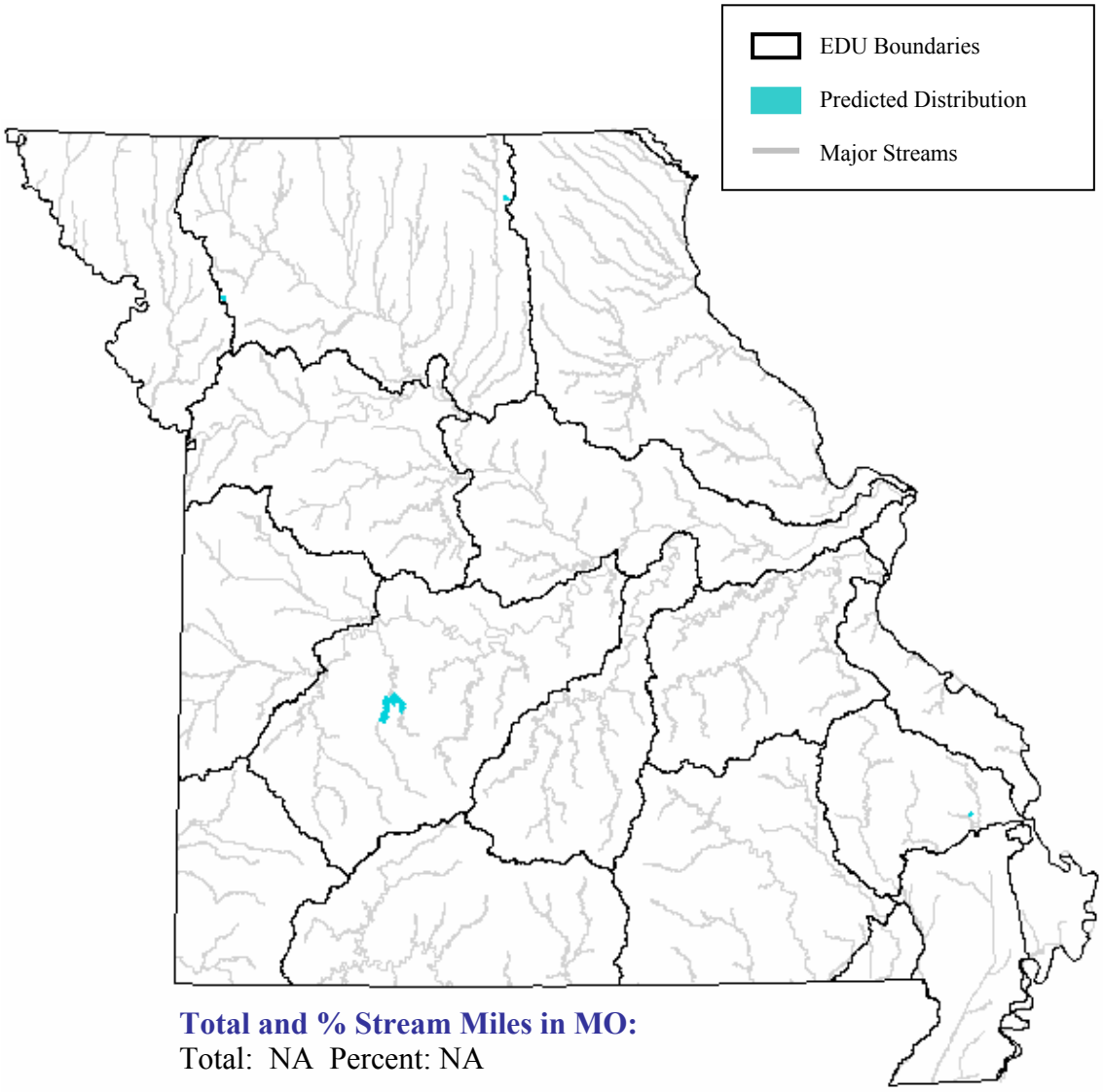
Endemism: NA

State Rank: SE

ITIS Code: 162144

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA Percent: NA

State Range:
The muskellunge was introduced to Missouri in 1966. It has been stocked in Pomme de Terre Reservoir, the Lake of the Ozarks, Pony Express Lake, Hazel Creek Lake and Lake Girardeau (Pflieger 1997).

Habitat Affinities:
The muskellunge is a native of clear, northern lakes and the backwaters of moderately clear upland rivers but much of its habitat has been destroyed by impoundment, pollution and other types of streams degradation (Clay 1975; Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988). In sluggish streams and rivers, the muskellunge prefers large, cool, rocky pools with beds of aquatic vegetation and sandy bottoms (Etnier and Starnes 1993; Pflieger 1997; Trautman 1957). The muskellunge is often stocked in Missouri reservoirs but it never maintains self-sustaining populations (Pflieger 1997).

Predictive Model(s):

Lake Model
The distribution is based upon professional review.

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Neosho Madtom

Noturus placidus

Native: Yes

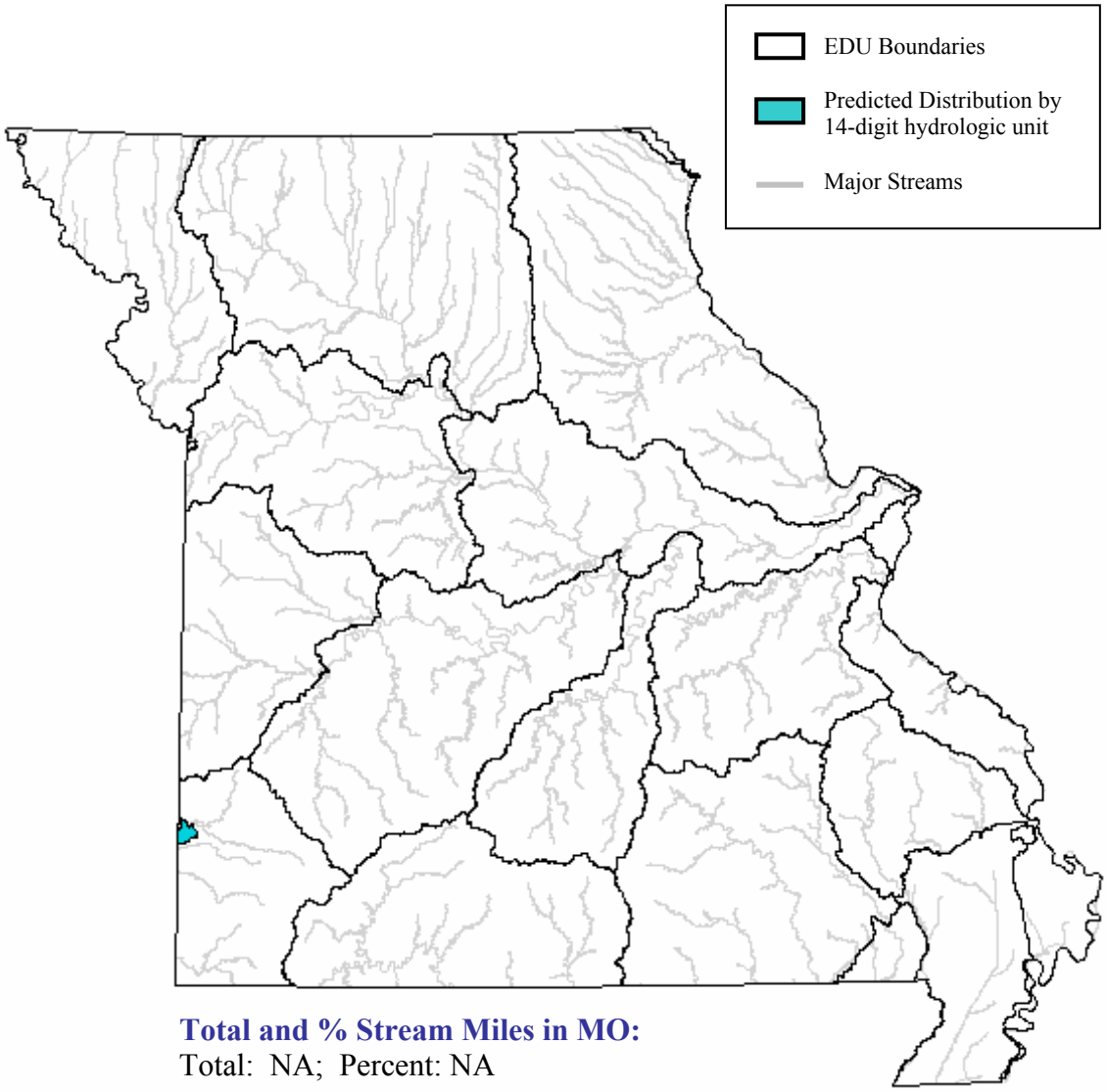
Endemism: EDU

State Rank: S2

ITIS Code: 164023

Global Rank: G2

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The Neosho madtom is only found in the mainstem of the Spring River in the Ozark/Neosho Ecological Drainage Unit (EDU) and is rare (Pflieger 1997).

Habitat Affinities:
In moderately large streams of the Spring River drainage, the Neosho madtom inhabits sloping gravel bars, gravelly riffle margins, or downstream pools with moderate gradient, clear water, and permanent flow (Moss 1981; Pflieger 1997; Robinson and Buchanan 1988). In Missouri, Neosho madtom adults are commonly found in crevices created by the shifting gravel of riffle margins (Pflieger 1997).

Predictive Model(s):

Ozark Model
The distribution is based upon existing collection records and professional review.

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Niangua Darter

Etheostoma nianguae

Native: Yes

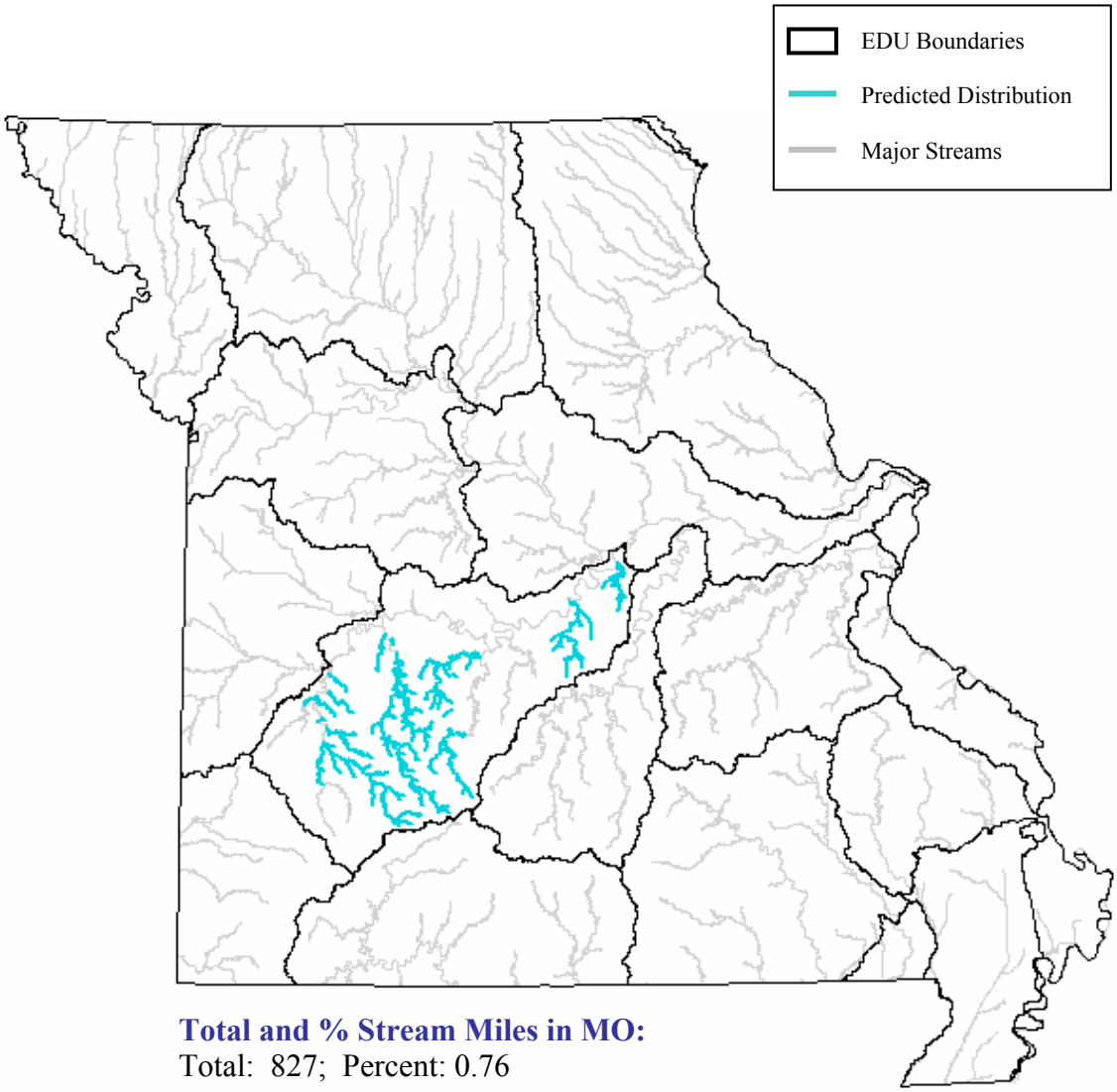
Endemism: EDU

State Rank: S2

ITIS Code: 168414

Global Rank: G2

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 827; Percent: 0.76

State Range:
The Niangua darter is found exclusively within the Ozark/Osage Ecological Drainage Unit (EDU), reaching highest abundance in the Niangua and Little Niangua Rivers. Gravel mining, reservoir construction, and nutrient enrichment from livestock production have been major factors in the decline of the Niangua darter in Missouri (Pflieger 1997).

Habitat Affinities:
In the Osage EDU, the Niangua darter is usually found in shallow pools and runs with silt-free gravel or rock substrates and slight current (Pflieger 1997). It is also found in clear, high gradient creeks and small rivers with bottoms of cherty, dolomitic bedrock (Pflieger 1971; Pflieger 1997). Spawning occurs in gravelly riffles where the stream channel is constricted, creating very strong current (Pflieger 1978).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 3) and ([Linkr] <= 6)

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Northern Brook Lamprey

Ichthyomyzon fossor

Native: Yes

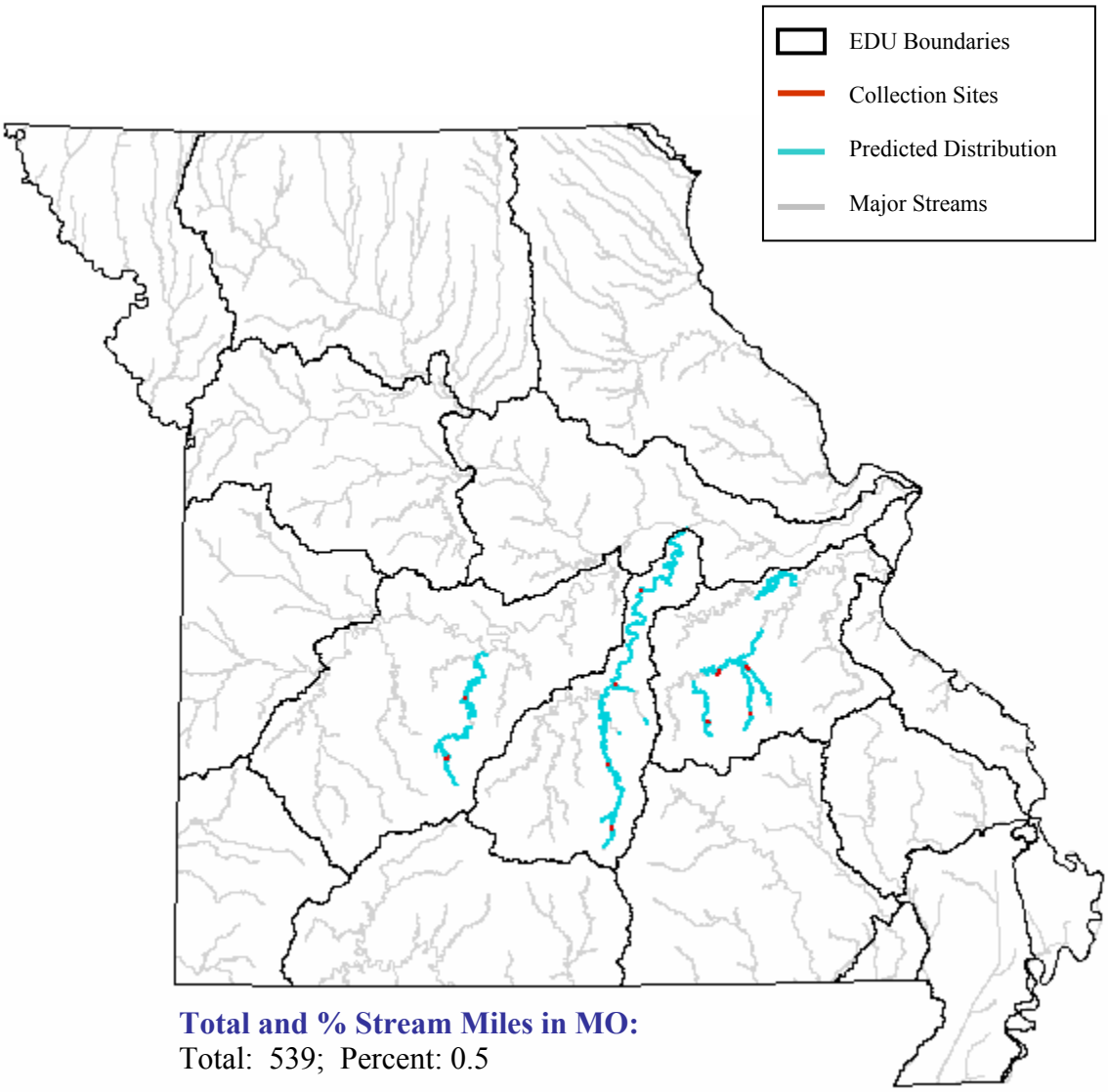
Endemism: Subzone

State Rank: S4

ITIS Code: 159726

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 539; Percent: 0.5

State Range:
The northern brook lamprey has been collected from the Ozark/Osage, Ozark/Gasconade and Ozark/Meramec Ecological Drainage Units (EDU), and is the most common and widely distributed brook lamprey in the northern Ozark Aquatic Subregion. It is quite possible that the northern brook lamprey is distributed more widely because adults only occur seasonally and no other life-stage can be used for identification (Pflieger 1997).

Habitat Affinities:
The northern brook lamprey only inhabits clear, permanent flowing streams of medium size and requires clean sand-gravel riffles for spawning. Developing larvae need low gradient, permanent waters with bars and beds of mixed sand, silt and organic debris (Pflieger 1997; Trautman 1957).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

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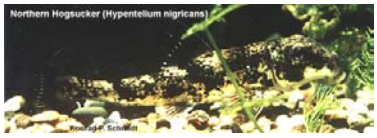


Northern Hog Sucker

Hypentelium nigricans

Native: Yes

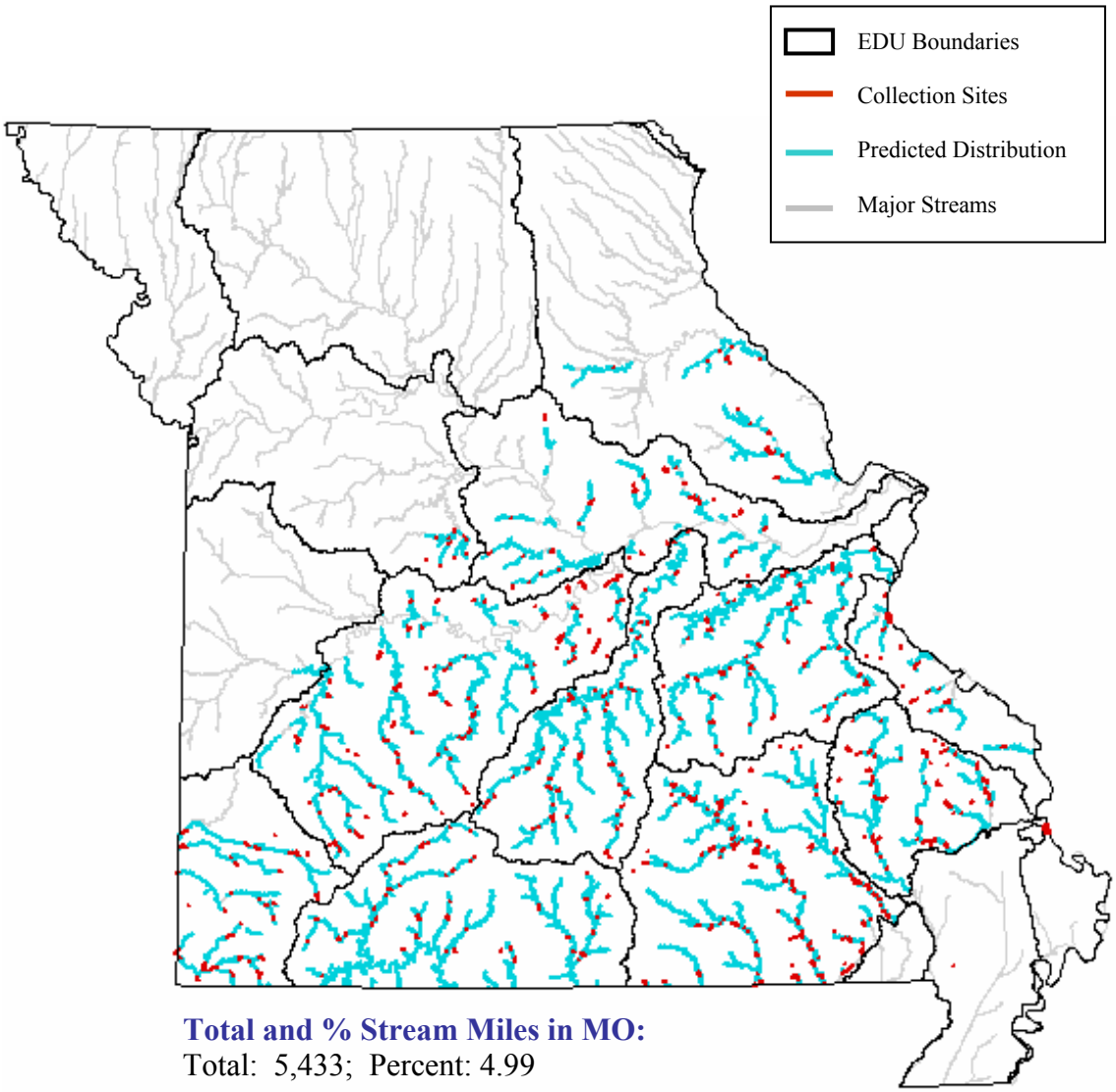
Endemism: Subzone

State Rank: S?

ITIS Code: 163949

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,433; Percent: 4.99

State Range:
The northern hog sucker is widely distributed throughout the Ozark Aquatic Subregion and is often the most abundant stream fish of the region. The range of the northern hog sucker has extended northeastward into the Central Plains Aquatic Subregion as well (Pflieger 1997).

Habitat Affinities:
The northern hog sucker lives in warm, deep, riffles of medium-sized creeks and small rivers with moderate to high gradients and substrates of clean sand, gravel, rubble and bedrock (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Trautman 1957). In the Ozark Aquatic Subregion, the northern hog sucker prefers long, deep riffles, runs, or pools of streams with permanent flow and clean sand, gravel, or rock bottoms (Pflieger 1997). Etnier and Starnes (1993) occasionally found the northern hog sucker in reservoirs, and Eddy and Underhill (1974) report that it avoids heavily polluted agricultural or industrial waters but does inhabit waters with moderate nutrient enrichment. The northern hog sucker does not tolerate continuous turbidity or low gradient stream sections where industrial and domestic pollutants accumulate on the bottom (Trautman 1957).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 3) and ([Flow] = 1) and ([Temp_code] = 1)) or (([Linkr] = 4)) or (([Linkr] = 5) and ([GradsegR] >= 2)) or (([Linkr] >= 6) and ([Linkr] <= 7))

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Northern Pike

Esox lucius

Native: Yes

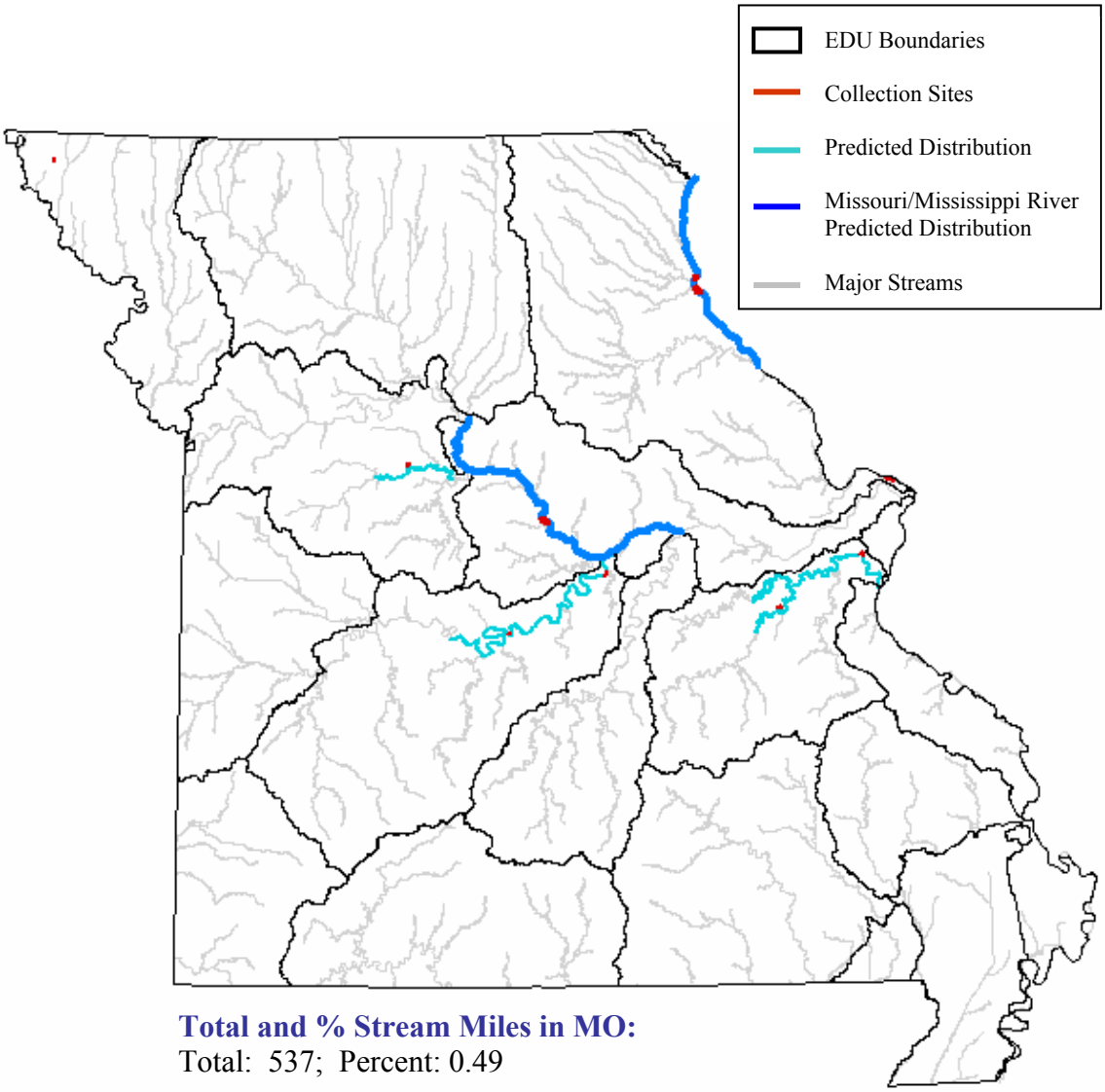
Endemism: Subzone

State Rank: S4

ITIS Code: 162139

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 537; Percent: 0.49

State Range:
Missouri is at the southern edge of the northern pike's range, and it has historically been found mainly in the lower Osage River. However, there is evidence that stocking programs may have created viable populations in the Missouri and Upper Mississippi Rivers (Pflieger 1997).

Habitat Affinities:
The northern pike mainly inhabits the clear, cool, quiet, and densely vegetated areas of bays, marshes, lakes, and pools of low-gradient streams and rivers of the northern United States (Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). In Missouri, it reaches highest density in heavily vegetated borrow pits and drainage ditches of the Mississippi River floodplain in the northeastern Plains Aquatic Subregion (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Northern Studfish

Fundulus catenatus

Native: Yes

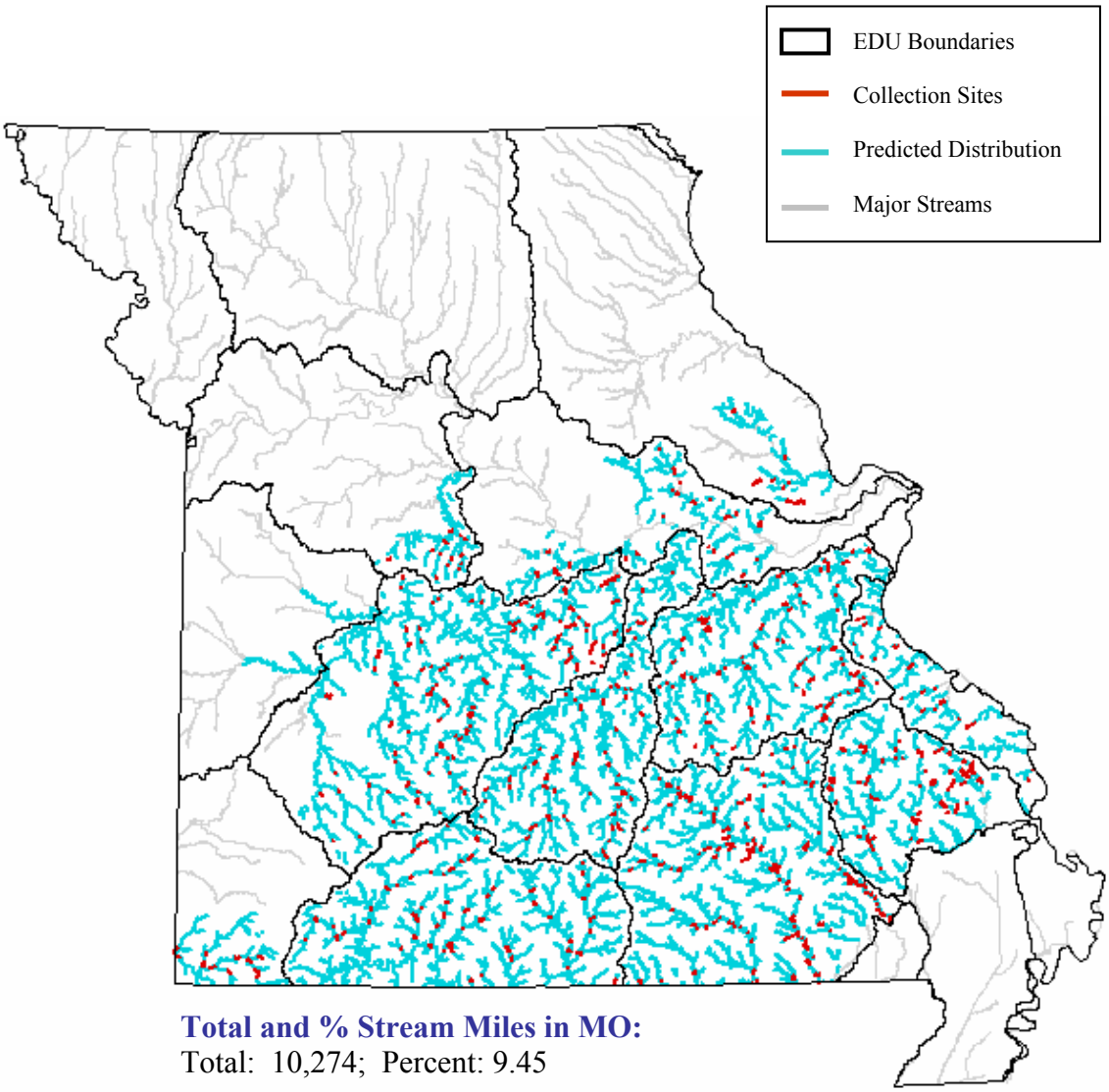
Endemism: Region

State Rank: S?

ITIS Code: 165660

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 10,274; Percent: 9.45

State Range:
The northern studfish is widely distributed and common in streams throughout the Ozark Aquatic Subregion with the exception of the Neosho River system. Pflieger (1997) indicates that its presence in the Elk River drainage is likely the result of introductions. The northern studfish has increased considerably in abundance over the latter half of the 20th century, expanding its range past the northern edges of the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The northern studfish prefers clear upland tributaries with moderate to high gradients, permanent flow and silt-free sand, gravel, or rock bottoms (Clay 1975; Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). It is often found in quiet shallow waters along pool and riffle margins with sluggish to moderate current (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In the Ozark Aquatic Subregion, the northern studfish favors streams with large gravelly shoals carrying heavy bedloads of chert gravel and is more tolerant of channelization, overgrazing, and destabilized riparian vegetation than other Ozark stream fishes (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 3) and ([GradsegR] = 4)) or (([Linkr] = 3) and ([GradsegR] >= 5) and ([Temp_code] = 2)) or (([Linkr] = 4)) or (([Linkr] = 5) and ([GradsegR] >= 2)) or (([Linkr] >= 6))

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Orangespotted Sunfish

Lepomis humilis

Native: Yes

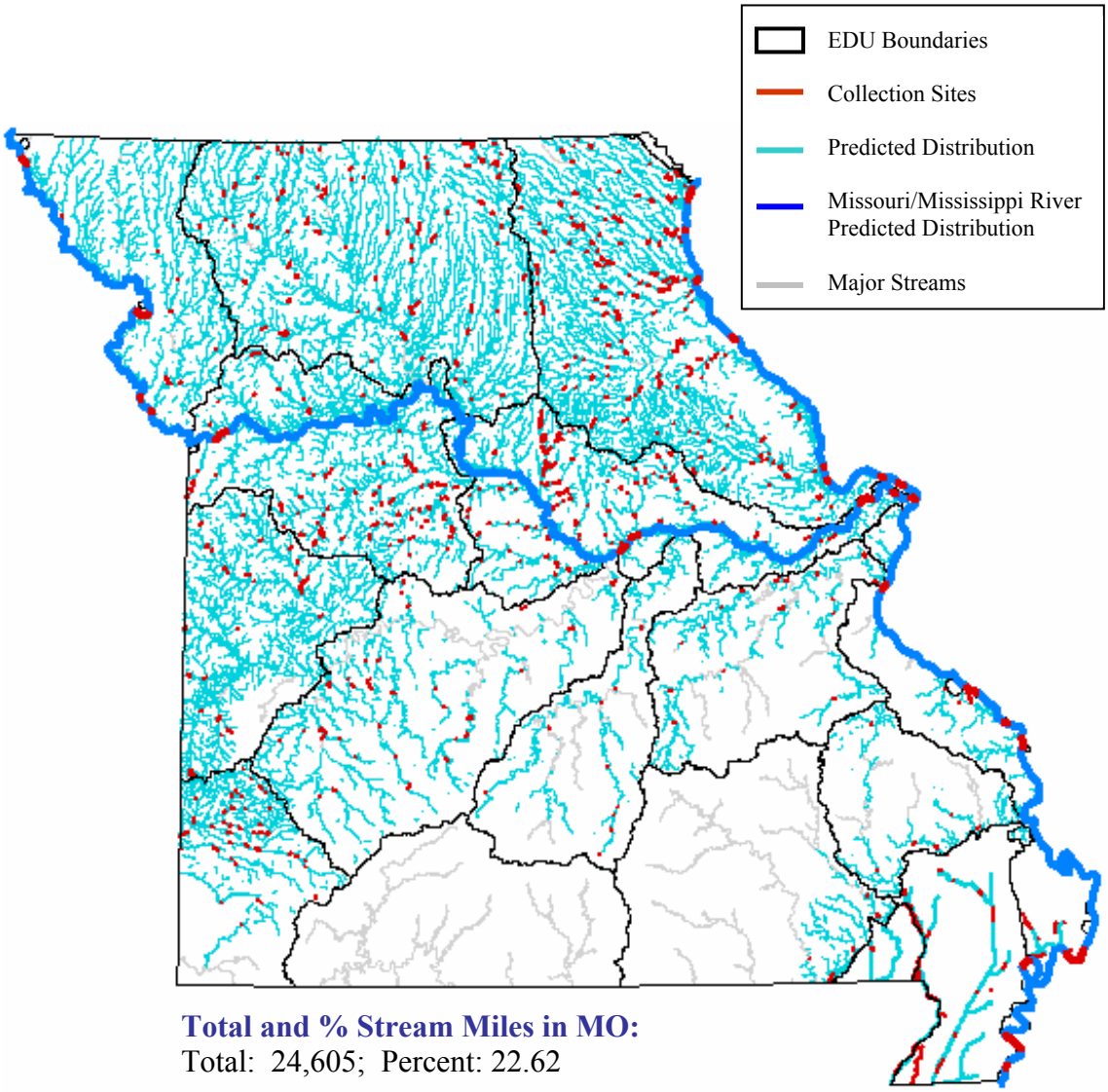
Endemism: Region

State Rank: S?

ITIS Code: 168151

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 24,605; Percent: 22.62

State Range:

The orangespotted sunfish is widely distributed in the Central Plains Aquatic Subregion and all but the central Ozark Aquatic Subregion. It can also be found in larger ditches and natural streams of the Mississippi Alluvial Basin Aquatic Subregion.

Habitat Affinities:

The orangespotted sunfish is primarily a lowland stream fish, occupying slow flowing, muddy or turbid waters with silted gravel, sand, mud, or detritus bottoms (Clay 1975; Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). It also inhabits borrow pits, drainage ditches, small bayous (Douglas 1974), natural lakes, lowland oxbows, impoundments and niche reservoirs (Eddy and Underhill 1974; Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). In Missouri, the orangespotted sunfish commonly inhabits the pools and backwaters of intermittent creeks and larger streams within the Central Plains Aquatic Subregion (Pflieger 1997). The orangespotted sunfish avoids clear, cool and high gradient waters (Pflieger 1997; Trautman 1957), but Clay (1975) notes that it may invade high-gradient streams that have been subject to erosion and siltation (Clay 1975).

Predictive Model(s):

Central Plains/Ozark Model

(([Gradsegr] = 1) and ([Linkr] >= 1) and ([Linkr] <= 7)) or (([Gradsegr] = 2) and ([Linkr] >= 1) and ([Linkr] <= 6)) or (([Gradsegr] = 3) and ([Linkr] >= 3)) or (([Gradsegr] = 4)) or (([Gradsegr] = 5) and ([Linkr] >= 1) and ([Linkr] <= 2))

Mississippi Alluvial Basin Model

([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model

The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Orangethroat Darter

Etheostoma spectabile

Native: Yes

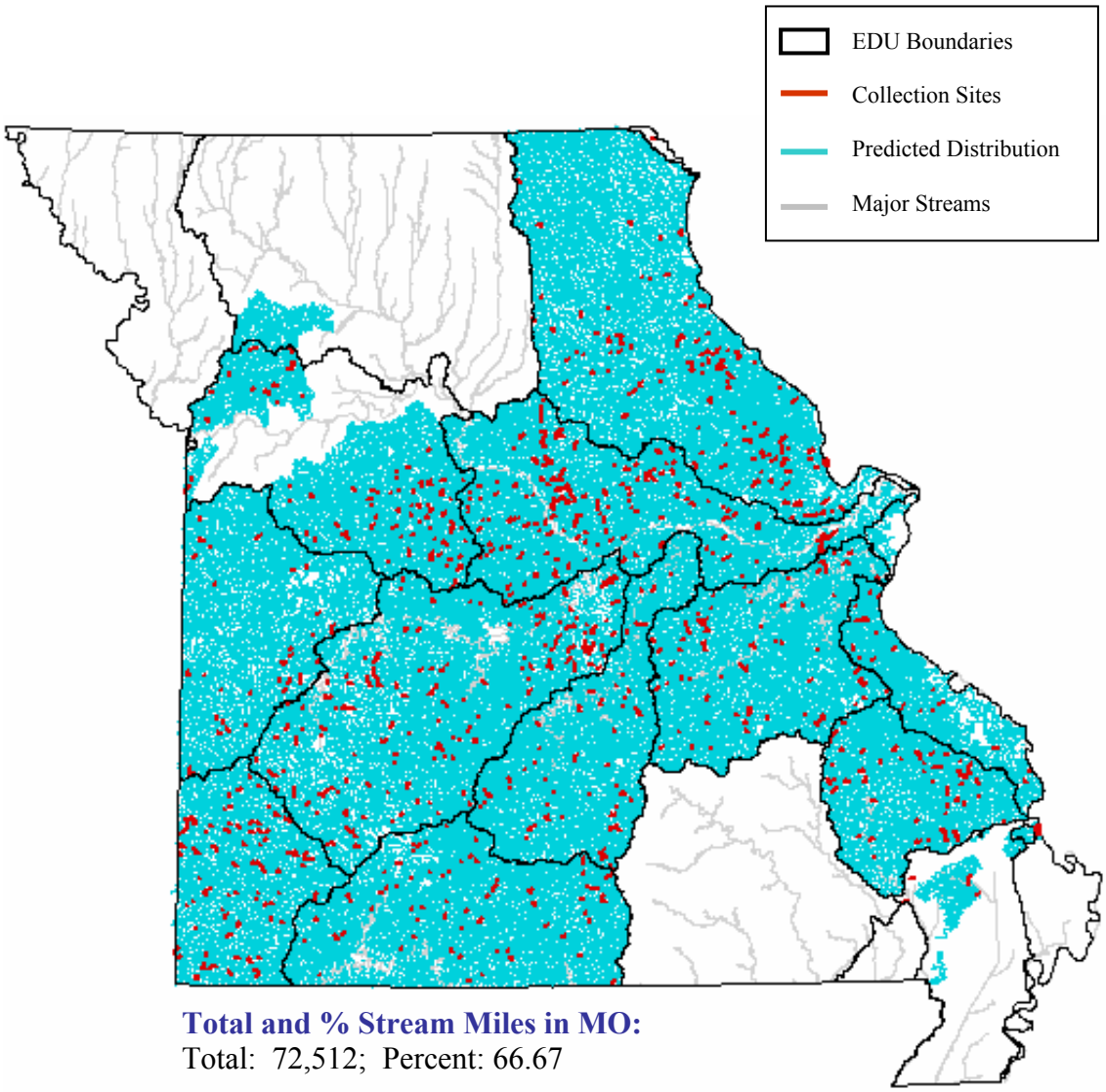
Endemism: Region

State Rank: S?

ITIS Code: 168368

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 72,512; Percent: 66.67

State Range:
The orangethroat darter is one of the most abundant darters over the Ozarks and much of the Central Plains Aquatic Subregions. In the Ozark Aquatic Subregion it is only absent from the Black/Current Ecological Drainage Unit (EDU) (Pflieger 1997). However, the current and brook darters, formerly considered subspecies of the orangethroat darter, are restricted to the Current EDU (Ceas and Page 1997).

Habitat Affinities:
The orangethroat darter is primarily an upland species; preferring small headwater creeks, spring runs and small to medium streams with clear to moderate turbidity and enough current to prevent considerable silt accumulation (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). Microhabitats include runs, pools, shallow riffles, or riffle margins with bottoms of rubble, fine gravel, or mixed gravel and sand (Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988). In Missouri, the rainbow darter has direct influence on the habitat range of the orangethroat darter. In the Ozark/Neosho EDU and throughout the Central Plains Aquatic Subregion, where the rainbow darter is absent, the orangethroat darter is abundant in habitats from headwater springs to small rivers. However, in areas where the rainbow darter occurs, it replaces the orangethroat darter in streams with continuous strong flow (Pflieger 1997). The orangethroat darter inhabits the rocky shorelines of some lakes in Kansas (Cross and Collins 1975), and small, localized populations can occasionally be found in the spring-fed backwaters of larger Ozark streams (Pflieger 1997).

Predictive Model(s):

Model 1: EDUs within the range of the rainbow darter in order to account for species interactions that affect the orangethroat darter's distribution (See Pflieger 1997).
([Edu_code] = 29) or ([Edu_code] = 27) or ([Edu_code] = 23) or ([Edu_code] = 25) or ([Edu_code] = 28) or ([Edu_code] = 24)
([Linkr] >= 1) and ([Linkr] <= 6)

Model 2: *EDUs outside the range of the rainbow darter to account for species interactions that affect the orangethroat darter's distribution (See Pflieger 1997).*
([Edu_code] = 11) or ([Edu_code = 12]) or ([Edu_code] = 15) or ([Edu_code] = 16) or ([Edu_code] = 22)
([Linkr] >= 1)

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

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Ozark Bass

Ambloplites constellatus

Native: Yes

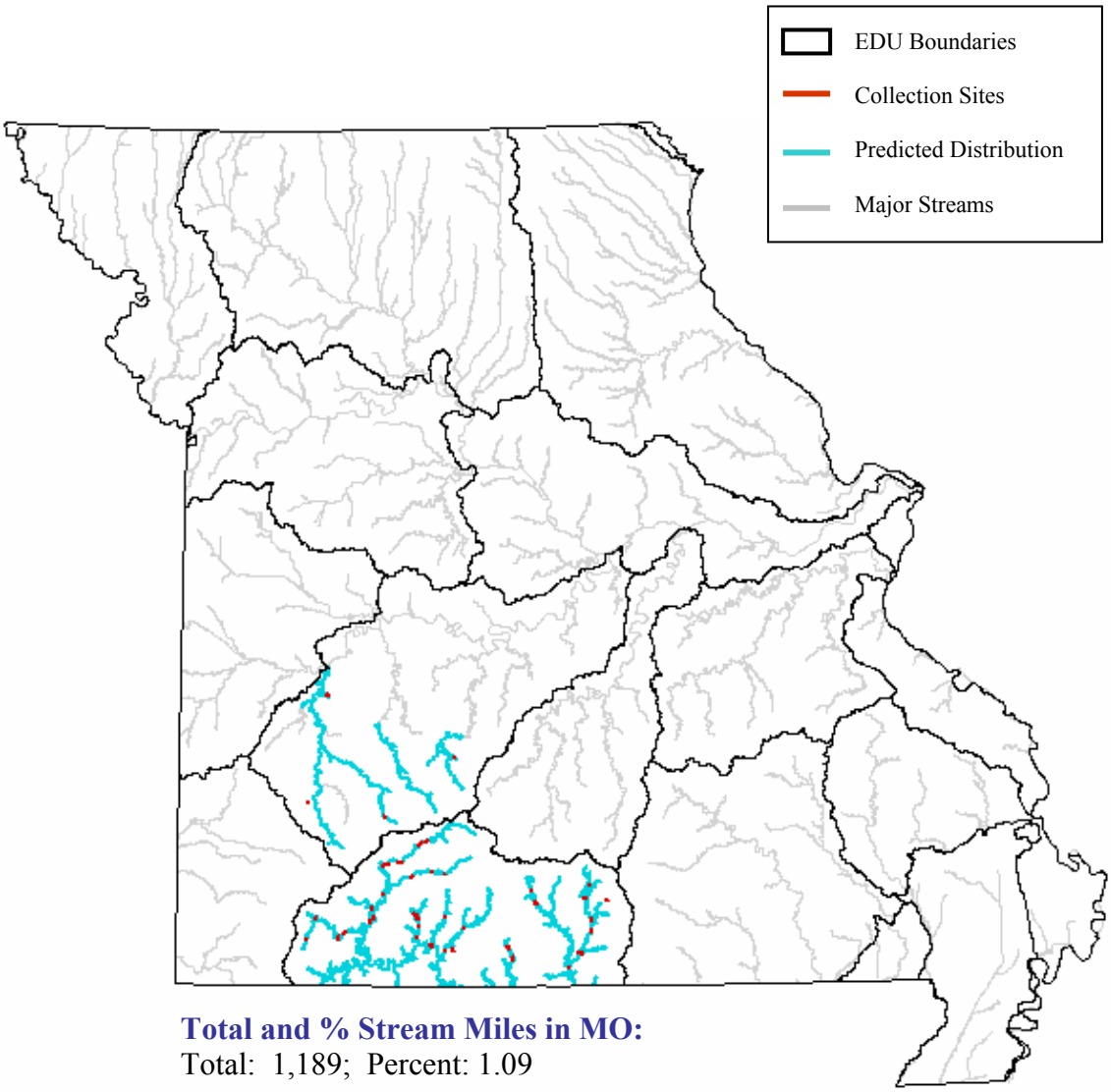
Endemism: Subregion

State Rank: S4

ITIS Code: 168100

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,189; Percent: 1.09

State Range:
The Ozark bass is endemic to the Ozark Aquatic Subregion of Missouri. It is common in the White River Ecological Drainage Unit (EDU) and occurs in the Sac and Pomme de Terre drainages of the Ozark/Osage EDU (Pflieger 1997).

Habitat Affinities:
The Ozark bass inhabits clear streams of small to moderate size having permanent flow, low turbidity, high dissolved oxygen, dense vegetation and silt-free bottoms (Pflieger 1997; Robinson and Buchanan 1988). The Ozark bass is commonly found in pools just below riffles with slow to moderate current, around cover such as boulders, submerged logs, or beds of water willow (*Justicia*) (Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 3) and ([GradsegR] >= 5) and ([Flow] = 1) and ([DlinkR] >= 4) and ([DlinkR] <= 7)) or (([Linkr] >= 4) and ([Linkr] <= 7))
DlinkR is done.

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 3) and ([State] = "MO")

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Ozark Cavefish

Amblyopsis rosae

Native: Yes

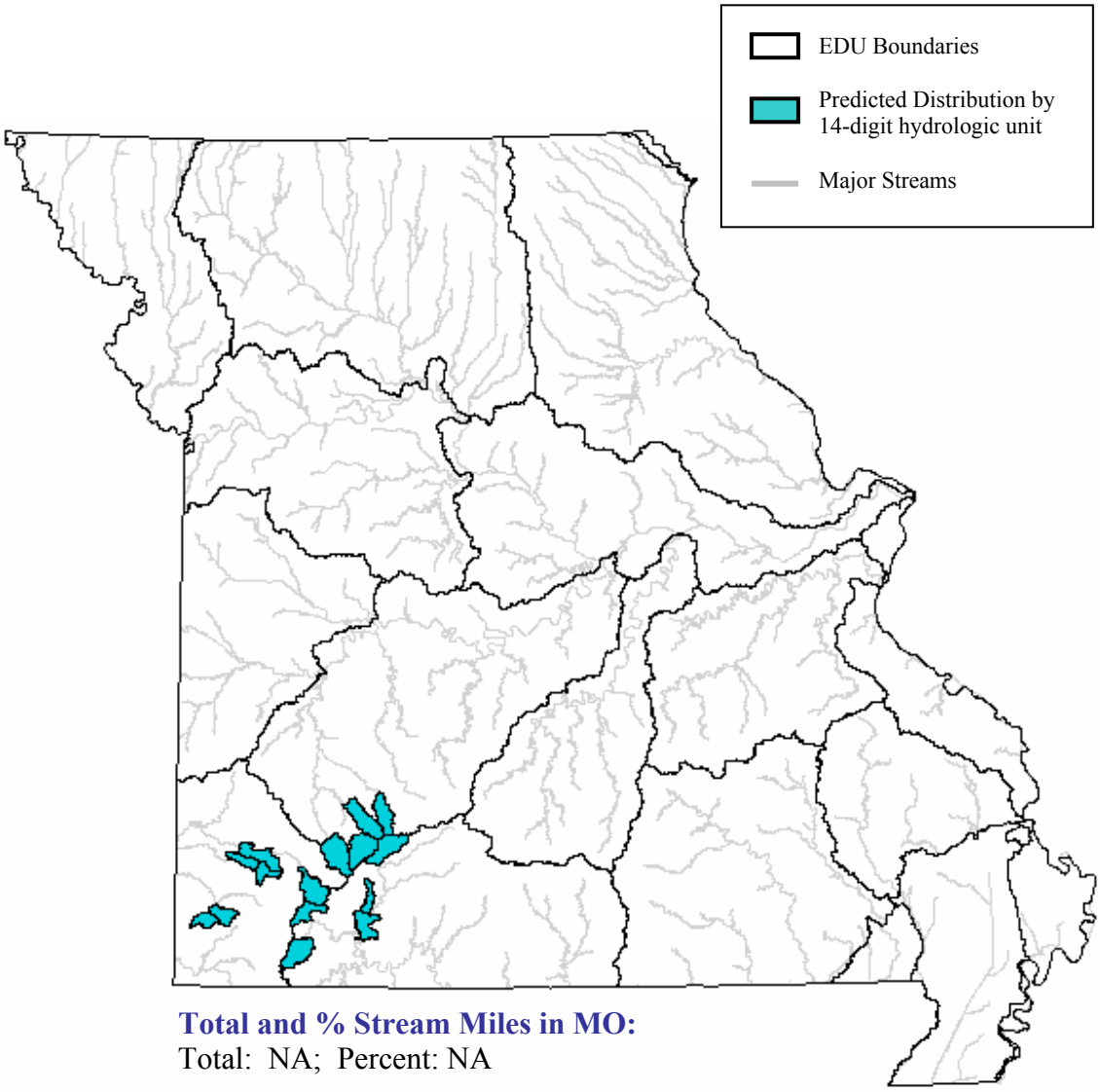
Endemism: EDU

State Rank: S2

ITIS Code: 164394

Global Rank: G2G3

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
Populations of the Ozark cavefish are highly localized in the Springfield Plateau of the Ozark Aquatic Subregion, where the Osage, White, and Neosho Ecological Drainage Units (EDU) join (Pflieger 1997).

Habitat Affinities:
The Ozark cavefish has been designated a nationally threatened species. Over-sampling and habitat destruction from degrading of groundwater quality, lowered water tables, sealing of caves, and reservoir construction are major threats to populations in Missouri and Arkansas (Pflieger 1997; Robinson and Buchanan 1988). The Ozark cavefish is never found at the surface inhabiting only permanently dark caves, underground passages, wells and spring outlets with constant temperature (Pflieger 1997; Robinson and Buchanan 1988). It is found in clear pools and quiet cave streams with rubble substrates (Poulson 1963; Robinson and Buchanan 1988). The Ozark cavefish relies on leaf litter or bat guano from maternity colonies of the endangered gray bat, that provide food for the invertebrates it feeds on.

Predictive Model(s):

Ozark Model
The distribution is based upon habitat affinity and professional review.

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Ozark Chub

Erimystax harryi

Native: Yes

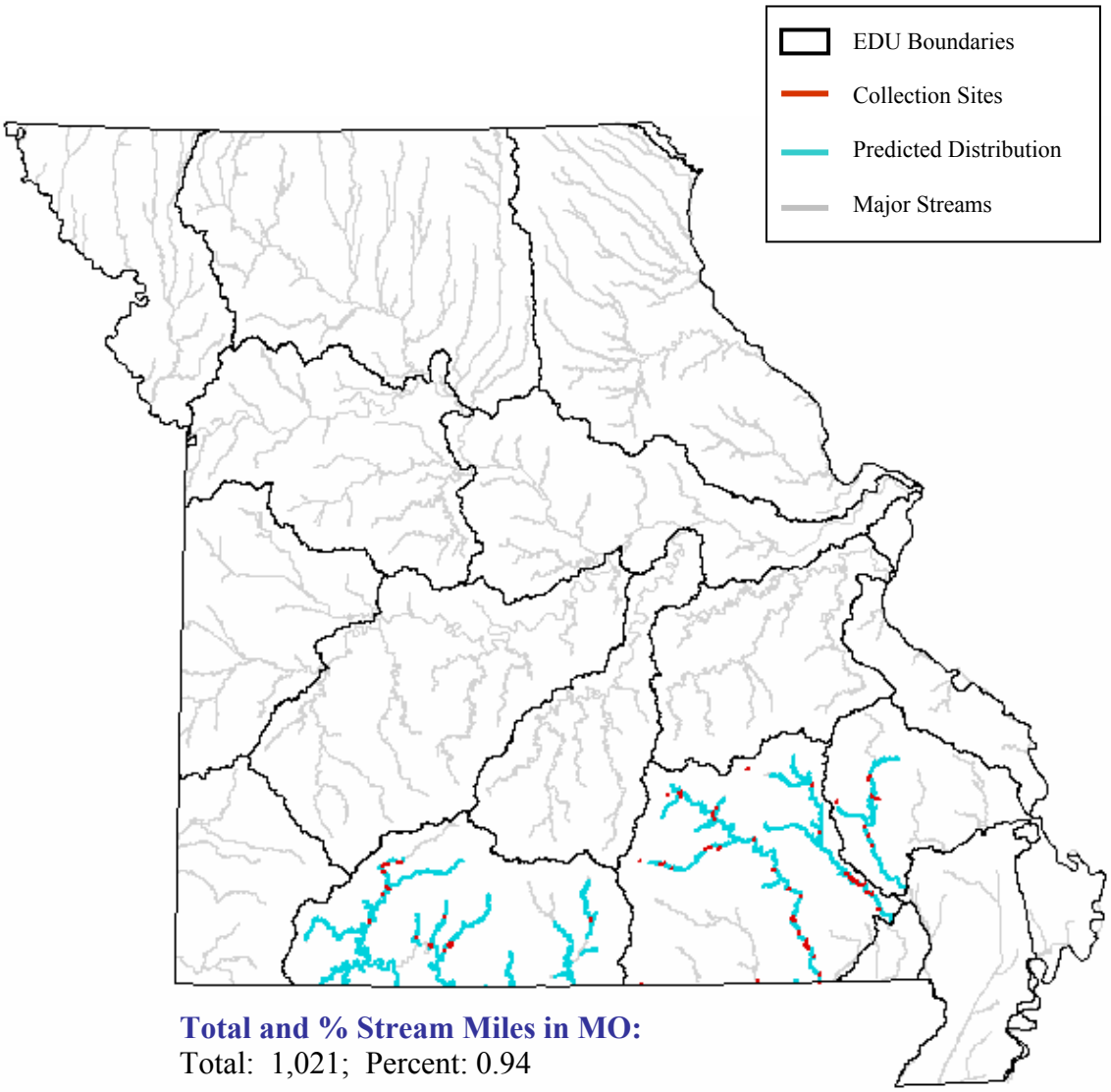
Endemism: Subregion

State Rank: S?

ITIS Code: 163822

Global Rank: G3G4Q

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,021; Percent: 0.94

State Range:
The Ozark chub is restricted to streams in the White, Black/Current, and Upper St. Francis/Castor Ecological Drainage Units (EDU), along the southern edge of the Ozark Aquatic Subregion. However, populations of the Ozark chub have declined considerably since the construction of reservoirs on the Black, White and, St. Francis River systems. The most successful populations left are in the Current and Jacks Fork Rivers (Pflieger 1997).

Habitat Affinities:
The Ozark chub requires large, clear streams with steep gradient, permanent strong flow and substrates of clean rock or gravel. Its preferred microhabitat is riffle margins or pools with slack current (Pflieger 1997).

Predictive Model(s):

Ozark Model
(([Linkr] = 5)) or (([Linkr] >= 6) and ([Temp_code] = 2))

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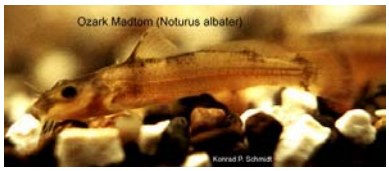


Ozark Madtom

Noturus albater

Native: Yes

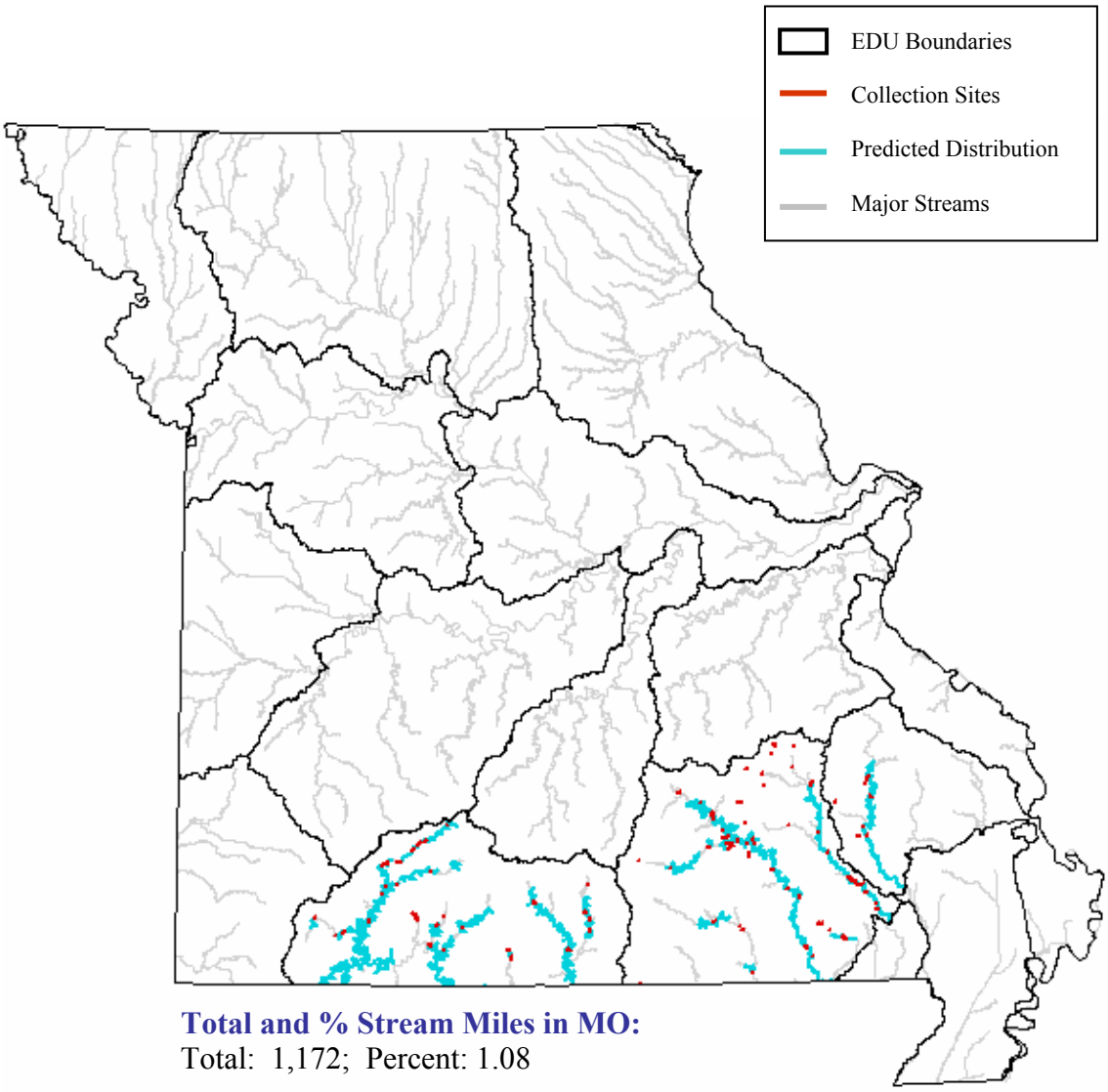
Endemism: Subregion

State Rank: S?

ITIS Code: 164006

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,172; Percent: 1.08

State Range:
The Ozark madtom is endemic to the Ozark Aquatic Subregion and is found in streams of the White, Black/Current, and Upper St. Francis/Castor Ecological Drainage Units (EDU). It is one of the most abundant madtoms of the region (Pflieger 1997).

Habitat Affinities:
The Ozark madtom inhabits the clear, swift waters of medium-sized to moderately large, high gradient streams with permanent strong flow (Pflieger 1997; Robinson and Buchanan 1988). Its preferred microhabitat is shallow riffles and rocky pools with substrates of gravel, rubble, or rock (Pflieger 1997; Robinson and Buchanan 1988). The Ozark madtom avoids headwater creeks and those kept cool by springs. It hides beneath large pieces of gravel and rubble during daylight hours and moves out to shallow riffles and pools to feed at night (Pflieger 1997).

Predictive Model(s):

Ozark Model
(([Linkr] >= 1) and ([Linkr] <= 4) and ([Rgrad_subr] = 3) and ([DlinkR] >= 5)) or (([Linkr] >= 6) and ([Temp_code] = 2)) or (([Linkr] = 5) and ([Rgrad_subr] = 2) and ([Temp_code] = 2)).

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Ozark Minnow

Notropis nubilus

Native: Yes

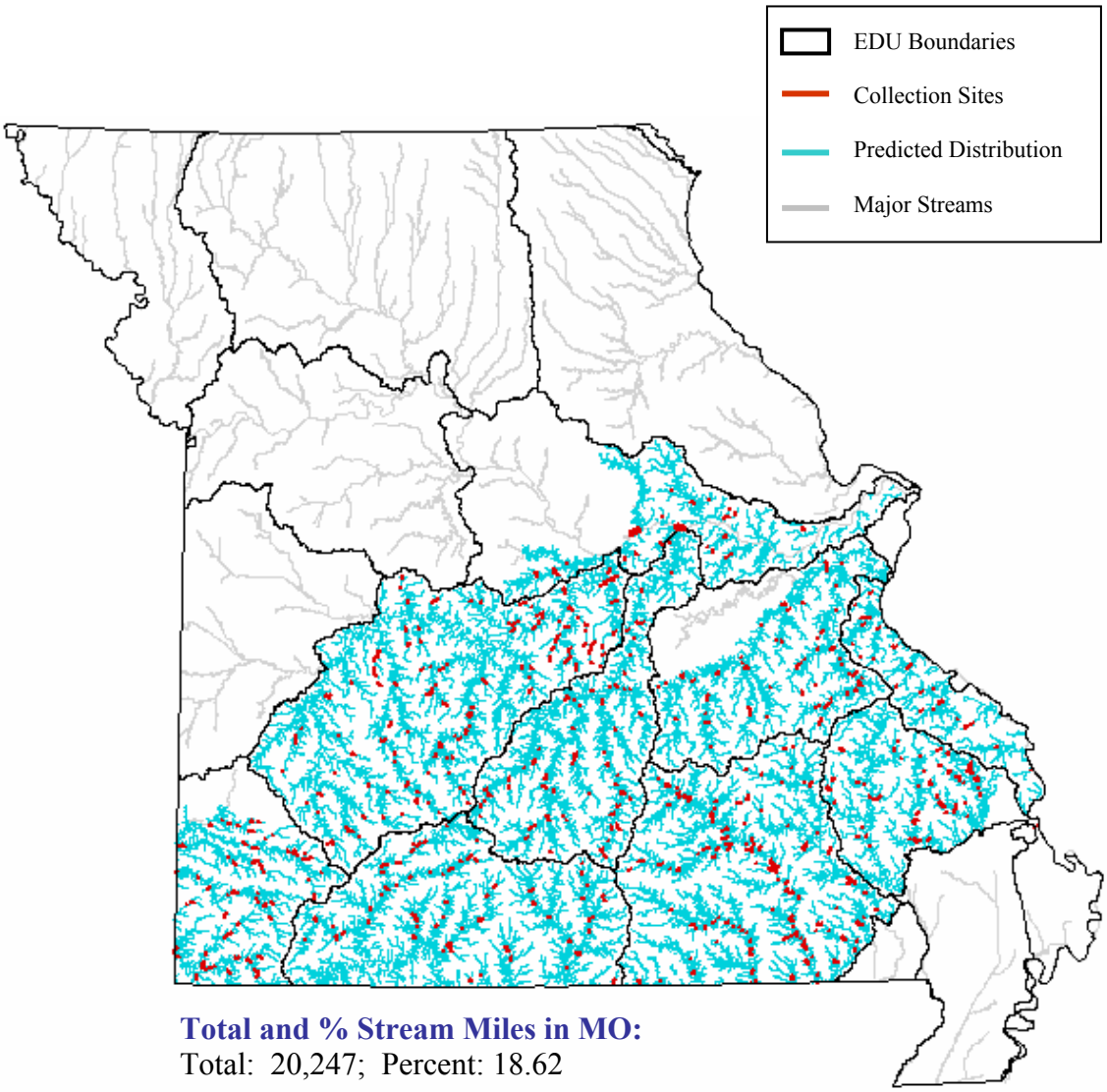
Endemism: Subregion

State Rank: S?

ITIS Code: 163456

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 20,247; Percent: 18.62

State Range:
The Ozark minnow is abundant and widely distributed across the most of the Ozark Aquatic Subregion, where it is one of the most common and characteristic minnows (Pflieger 1997).

Habitat Affinities:
The Ozark minnow inhabits stream of all sizes but reaches greatest abundance clear, spring-fed creeks and small rivers with permanent strong flow, high gradient and gravel or rubble substrates (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). It is found in pools with moderate gradient and is intolerant of siltation and turbidity (Robinson and Buchanan 1988). In Missouri, the Ozark minnow is typically found in protected backwater pools below riffles, where the current is moderate (Pflieger 1997).

Predictive Model(s):

Ozark Model
(([Linkr] = 1) and ([DlinkR] >= 4) and ([DlinkR] <= 8)) or (([Linkr] >= 2)).

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Ozark Sculpin

Cottus hypselurus

Native: Yes

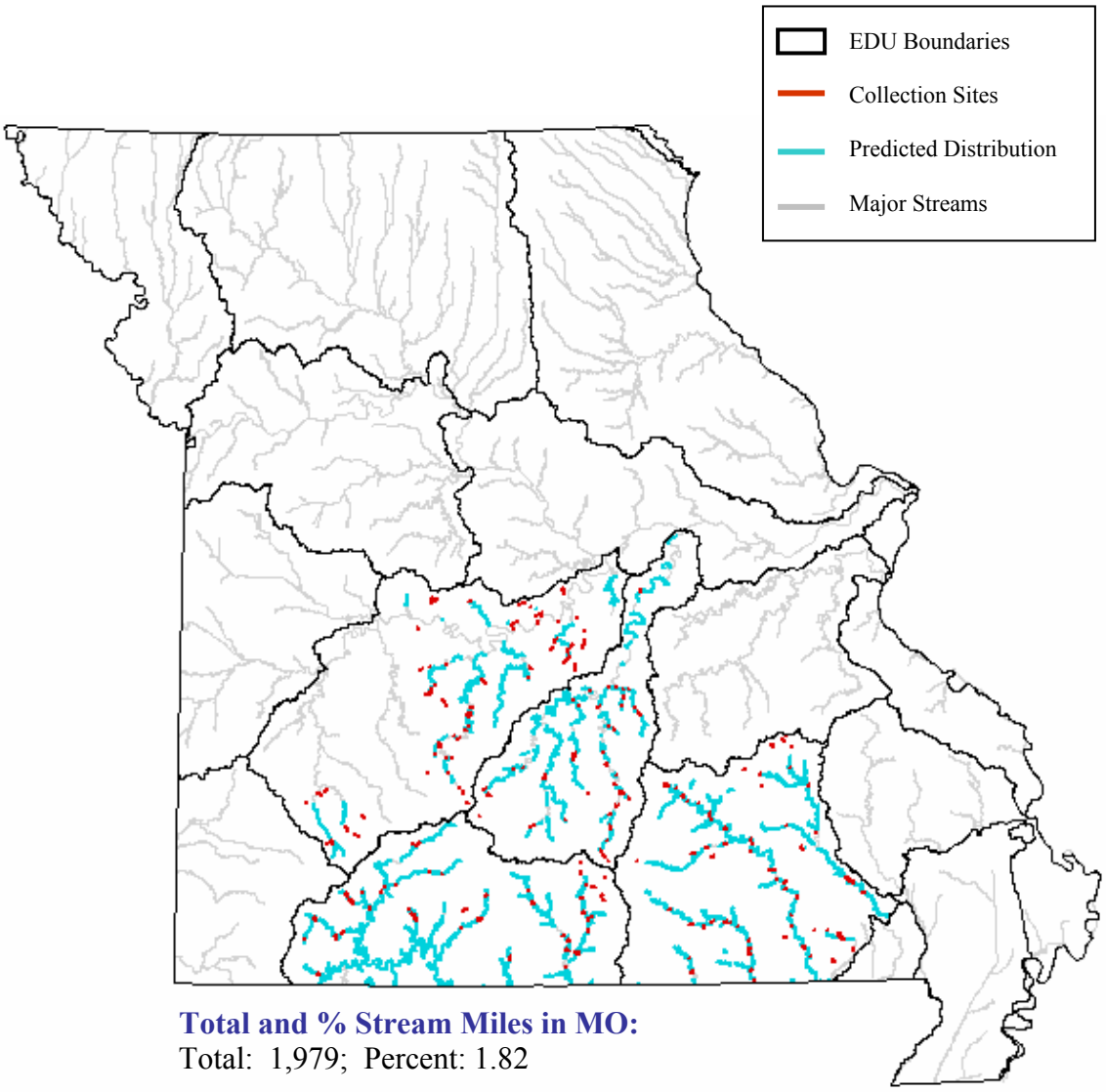
Endemism: Subregion

State Rank: S?

ITIS Code: 167263

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,979; Percent: 1.82

State Range:
The Ozark sculpin is endemic to the Ozark Aquatic Subregion and occurs in Osage, Gasconade, White, and Black/Current Ecological Drainage Units (EDU). The Ozark sculpin is often the most abundant benthic fish in spring-fed streams of the region (Pflieger 1997).

Habitat Affinities:
The Ozark sculpin is typically found in clear, coldwater streams with strong current (Robinson and Buchanan 1988). It prefers shallow riffle or shoal regions with bottoms ranging from silt to gravel or rock, and often hides among rocks or dense vegetation, such as beds of watercress (*Nasturium*) or pondweed (*Potamogeton*) (Pflieger 1997; Robins and Robison 1985; Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model
(([Temp_code] = 1)) or (([Temp_code] = 2) and ([Rgrad_subr] >= 2) and ([Linkr] >= 4) and ([Linkr] <= 7))

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Ozark Shiner

Notropis ozarcanus

Native: Yes

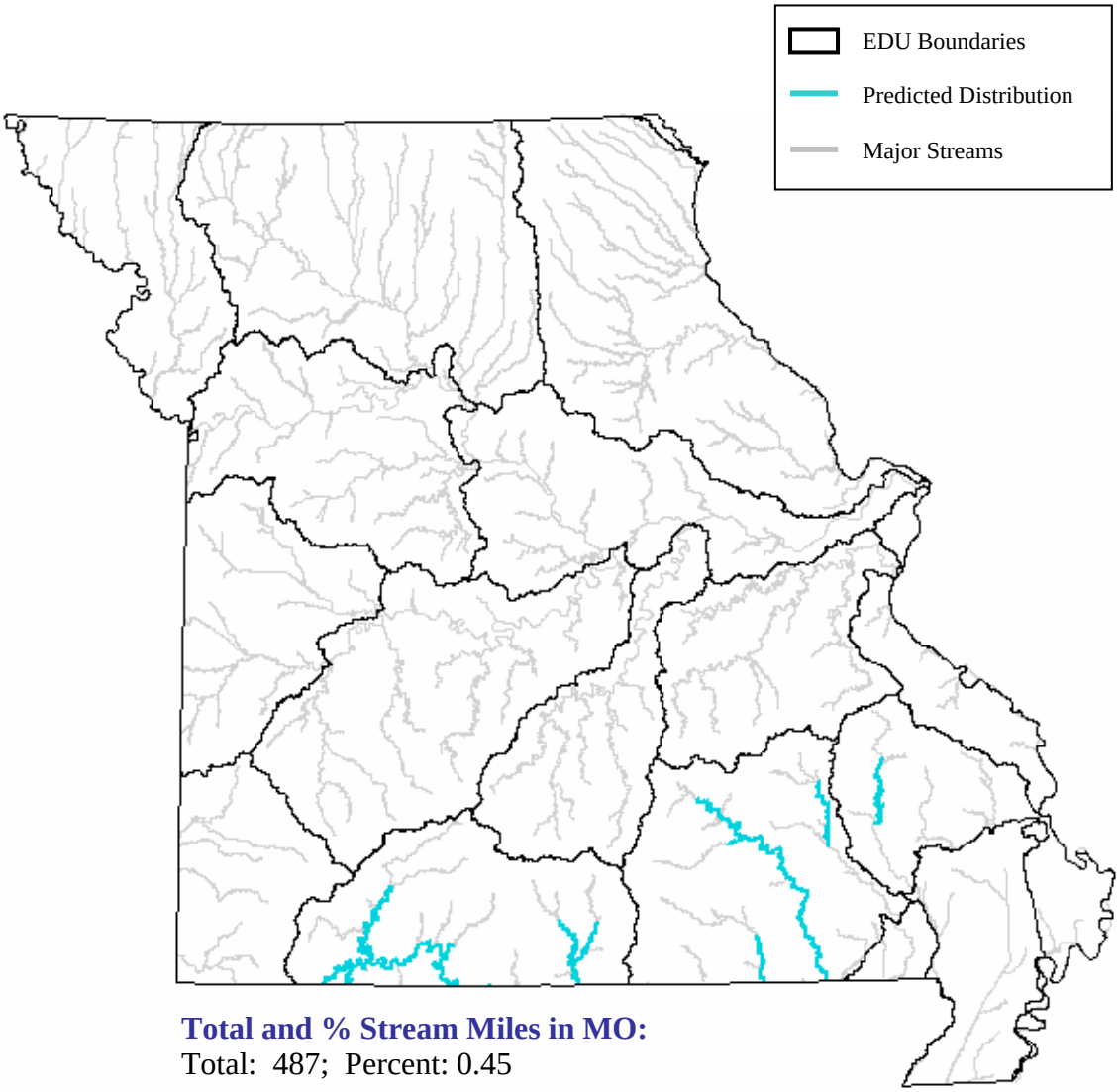
Endemism: Subregion

State Rank: S2

ITIS Code: 163458

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 487; Percent: 0.45

State Range:
The Ozark shiner is endemic to the Ozark Aquatic Subregion and is found in clear streams of the White, Black/Current, and Upper St. Francis/Castor Ecological Drainage Units (EDU). However, with the construction of reservoirs, its habitat has become fragmented and stable populations now only exist in the Current River and its tributary, the Jacks Fork (Pflieger 1997).

Habitat Affinities:
The Ozark shiner inhabits high-gradient stream sections below riffles with permanent strong flow and moderate current (Pflieger 1997; Robinson and Buchanan 1988). In Missouri, the Ozark shiner is most abundant in high-gradient streams around riffles where current slackens and substrates are free of silt (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Linkr] >= 6)

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Paddlefish

Polyodon spathula

Native: Yes

Endemism: Region

State Rank: S3

ITIS Code: 161088

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick

Total and % Stream Miles in MO:
Total: 2,414; Percent: 2.22

State Range:

Historically, the Missouri, Mississippi and Osage Rivers supported good populations of the paddlefish, although stray individuals could be found in many other streams across the state of Missouri (Pflieger 1997). Since the 1900's, Mississippi Valley populations of the paddlefish have declined drastically as damming has impeded migration and overfishing has depleted stocks. A large, self-sustaining population in Lake of the Ozarks and upper Osage River was destroyed when the Truman Dam was constructed, destroying paddlefish spawning grounds. Paddlefish populations in Lake of the Ozarks area are now maintained through stocking operations (Pflieger 1971; Pflieger 1997).

Habitat Affinities:

The paddlefish is a highly mobile species spending most of its life in sluggish pools, bayous, lowland oxbow lakes, impoundments, reservoirs and large, low-gradient rivers with rich growths of phytoplankton for feeding (Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). However, there must be a river with extensive gravel bars attached to these habitats in order for spawning to occur (Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988). In Missouri, the largest paddlefish populations exist in artificial impoundments having a river with adequate spawning habitat attached (Pflieger 1997). Much of its natural habitat has been destroyed by stream channelization, levee construction, impoundment, pollution and drainage of streams and bottomland lakes (Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Pallid Shiner

Notropis amnis

Native: Yes

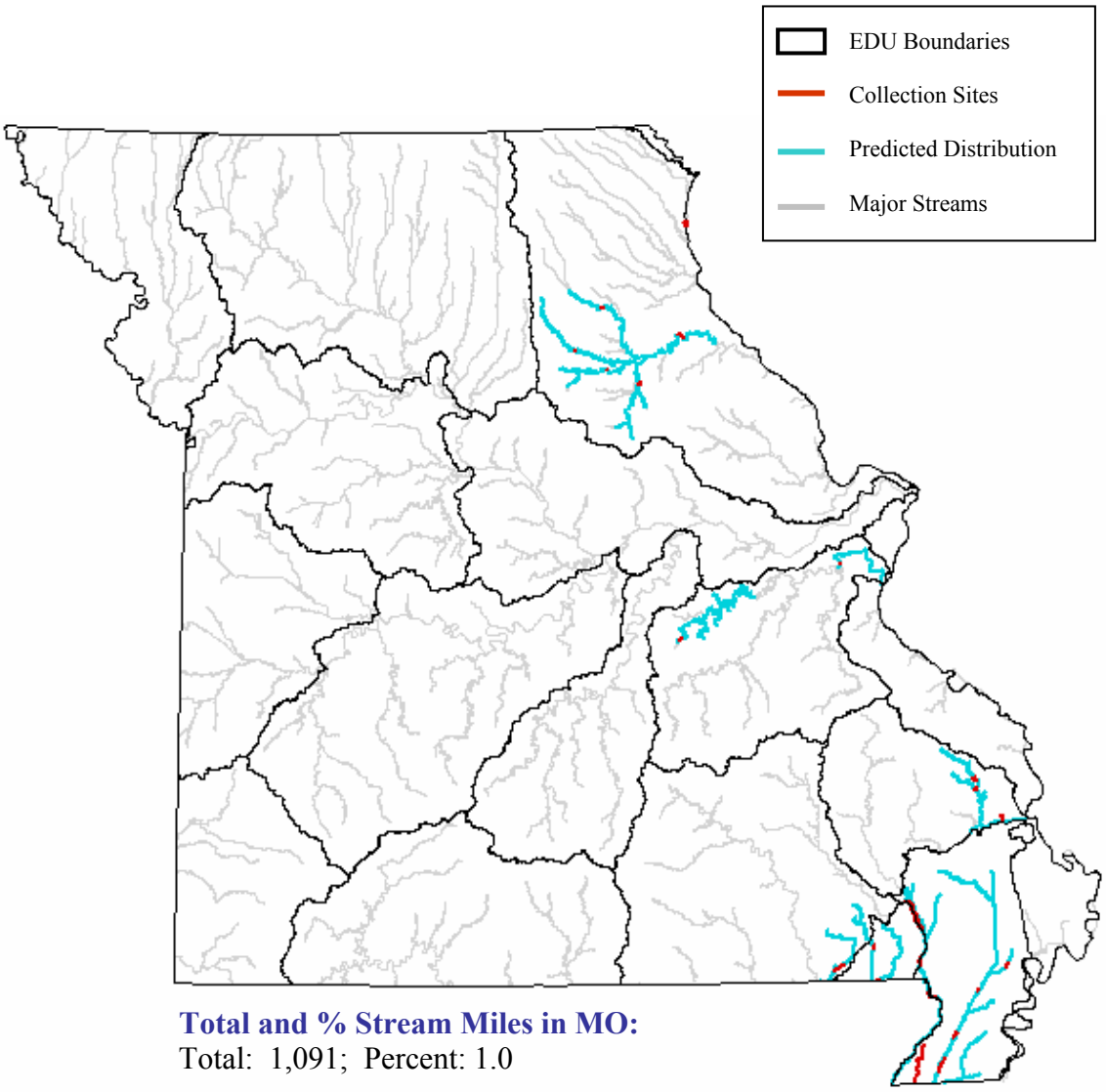
Endemism: Region

State Rank: SX

ITIS Code: 163411

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,091; Percent: 1.0

State Range:

The pallid shiner was common in the eastern parts of Missouri until the 1940's with the primary area of its occurrence being the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997). The pallid shiner has likely been extirpated from Missouri with the last known collection from the Meramec River in 1956. The most likely reason for its decline is changes in land use practices, which cause excessive siltation and turbidity (Pflieger 1997).

Habitat Affinities:

The pallid shiner is found in sloughs, backwaters, reservoirs and oxbow lakes but is most common in medium to large, muddy streams of lowland areas (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). It's preferred microhabitat is shallow, moderately clear and well-oxygenated waters with slight current and substrates of sand or mud (Kwak 1991; Robinson and Buchanan 1988). In Missouri, the pallid shiner was mainly found in streams of the Mississippi Alluvial Basin Aquatic Subregion and occasionally in sluggish streams draining level uplands (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 4)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

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Pallid Sturgeon

Scaphirhynchus albus

Native: Yes

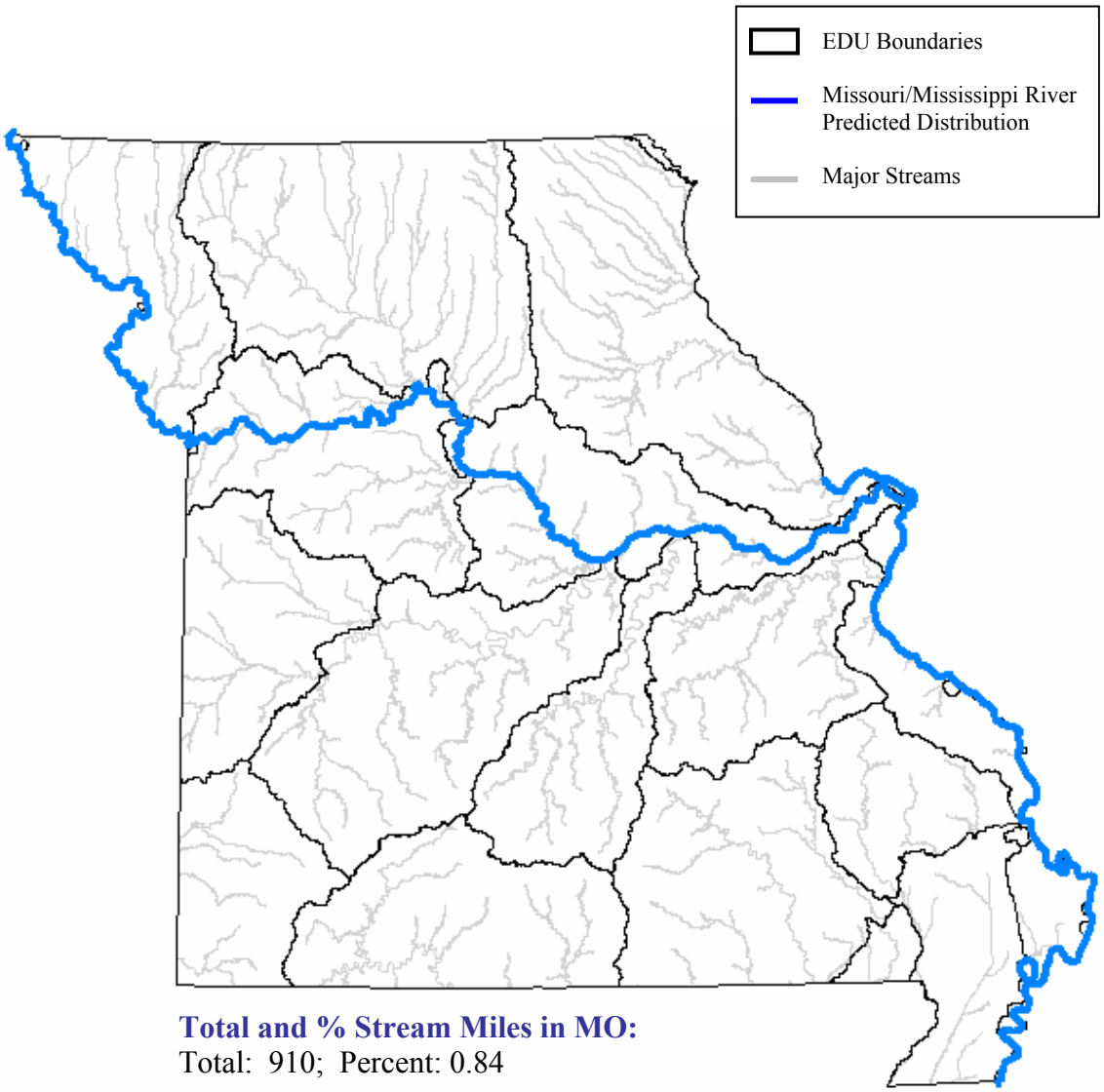
Endemism: Region

State Rank: S1

ITIS Code: 161081

Global Rank: G1

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 910; Percent: 0.84

State Range:
The pallid sturgeon is found in the Missouri River and the section of the Mississippi River south of the mouth of the Cuivre River. Overfishing, habitat destruction, and hybridization pressures have caused it to be listed as a nationally threatened species (Pflieger 1997).

Habitat Affinities:
The pallid sturgeon inhabits mainstreams of large turbid rivers with swift current and substrates of firm sand or gravel (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). However, it is rare throughout most of its range (Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Missouri, the pallid sturgeon most common along sand bars and in deeply scoured trenches below wing dams (Pflieger 1997).

Predictive Model(s):

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Pirate Perch

Aphredoderus sayanus

Native: Yes

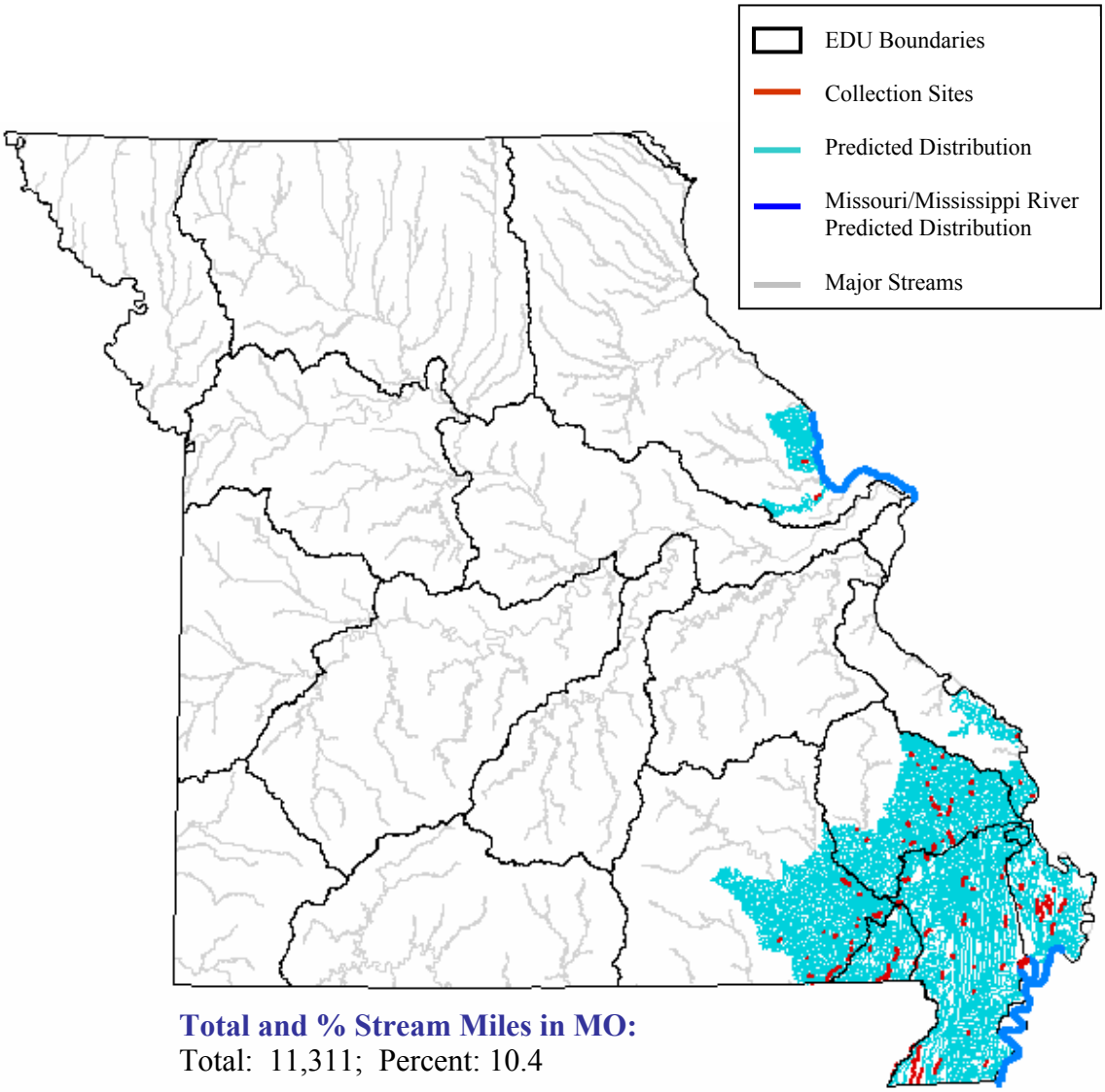
Endemism: Subzone

State Rank: S?

ITIS Code: 164405

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 11,311; Percent: 10.4

State Range:

The pirate perch occurs most commonly in the Mississippi Alluvial Basin Aquatic Subregion and low-gradient streams draining the southeastern plateau Ozark Aquatic Subregion. In addition, it has been collected in the Mississippi River and tributaries in the southeast corner of the Central Plains/Cuivre/Salt Ecological Drainage Unit (Pflieger 1997).

Habitat Affinities:

The pirate perch is found in many lowland habitats from natural lakes, overflow ponds and low-gradient streams to marshes, swamps, and roadside pools (Clay 1975; Douglas 1974; Eddy and Underhill 1974; Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). The pirate perch is associated with dense cover such as aquatic vegetation, debris, or undercut banks and bottoms of decomposing organic matter underlain by soft mud or silt (Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). In Missouri, the pirate perch is found in the stagnant areas of lowland lakes, overflow ponds, and backwaters with warm, clear water, dense vegetation and organic debris (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Temp_code] = 2) and ([Linkr] >= 1)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Plains Killifish

Fundulus zebrinus

Native: Yes

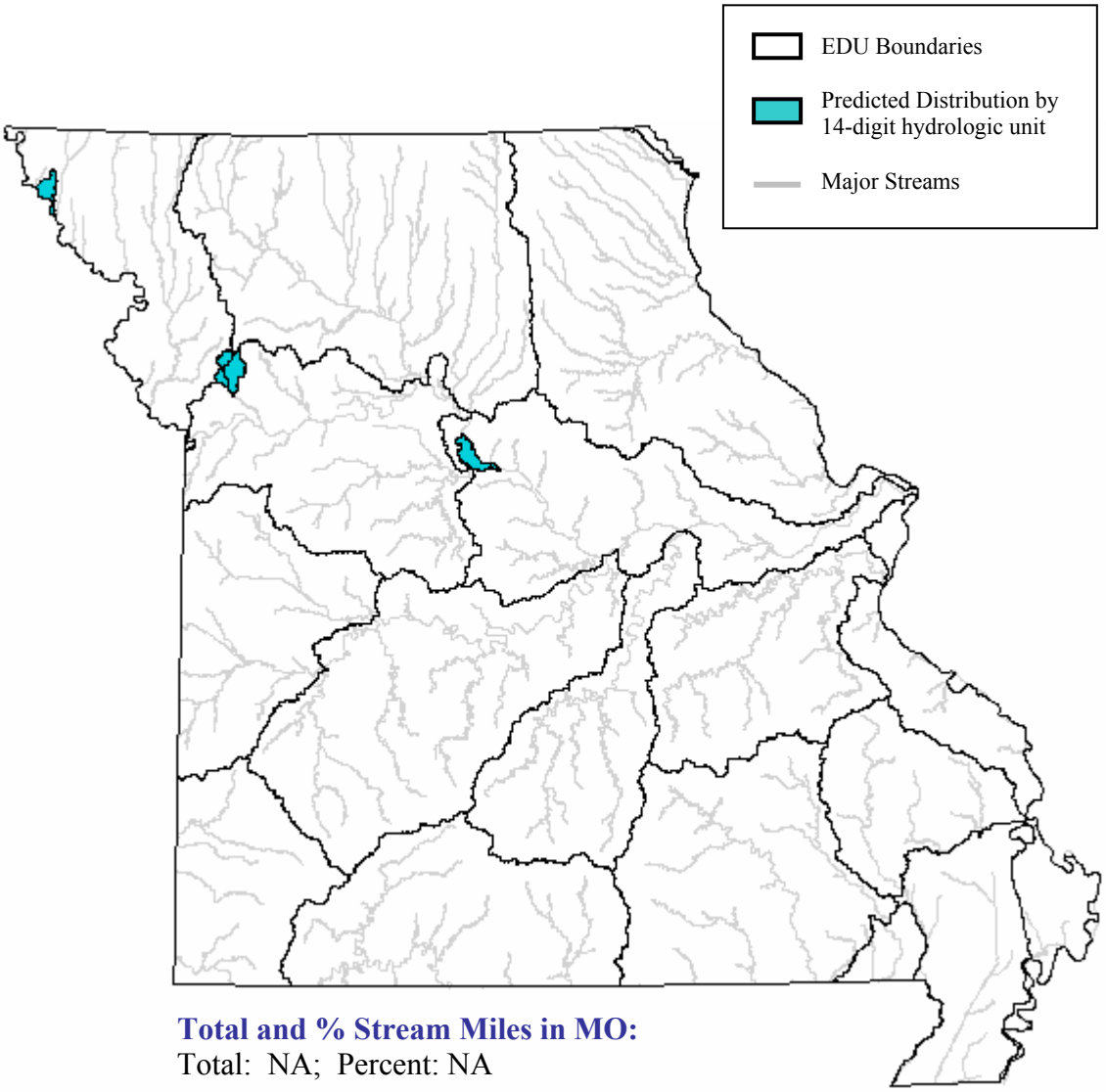
Endemism: Region

State Rank: S2

ITIS Code: 165658

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The plains killifish has been collected from Salt Creek below Boone's Lick Spring (Howard County), Clear Creek (Clay County) and another location in the northeast corner of the Central Plains/Nishnabotna/Platte Ecological Drainage Unit (EDU). Several specimens were collected in the lower Missouri River in 1945, but it has not been collected since. Populations fluctuate depending on rainfall; it prefers alkaline or saline waters so abundance is highest in years with low rainfall (Pflieger 1997).

Habitat Affinities:
The plains killifish does not compete well in areas with high fish diversity and is limited to saline or alkaline habitats (Pflieger 1997). If these conditions are met, it can be found in many different habitats from shallow, sandy streams with strong current to pools and backwaters lacking current (Cross and Collins 1975; Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
The distribution is based upon existing collection records and professional review.

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Plains Minnow

Hybognathus placitus

Native: Yes

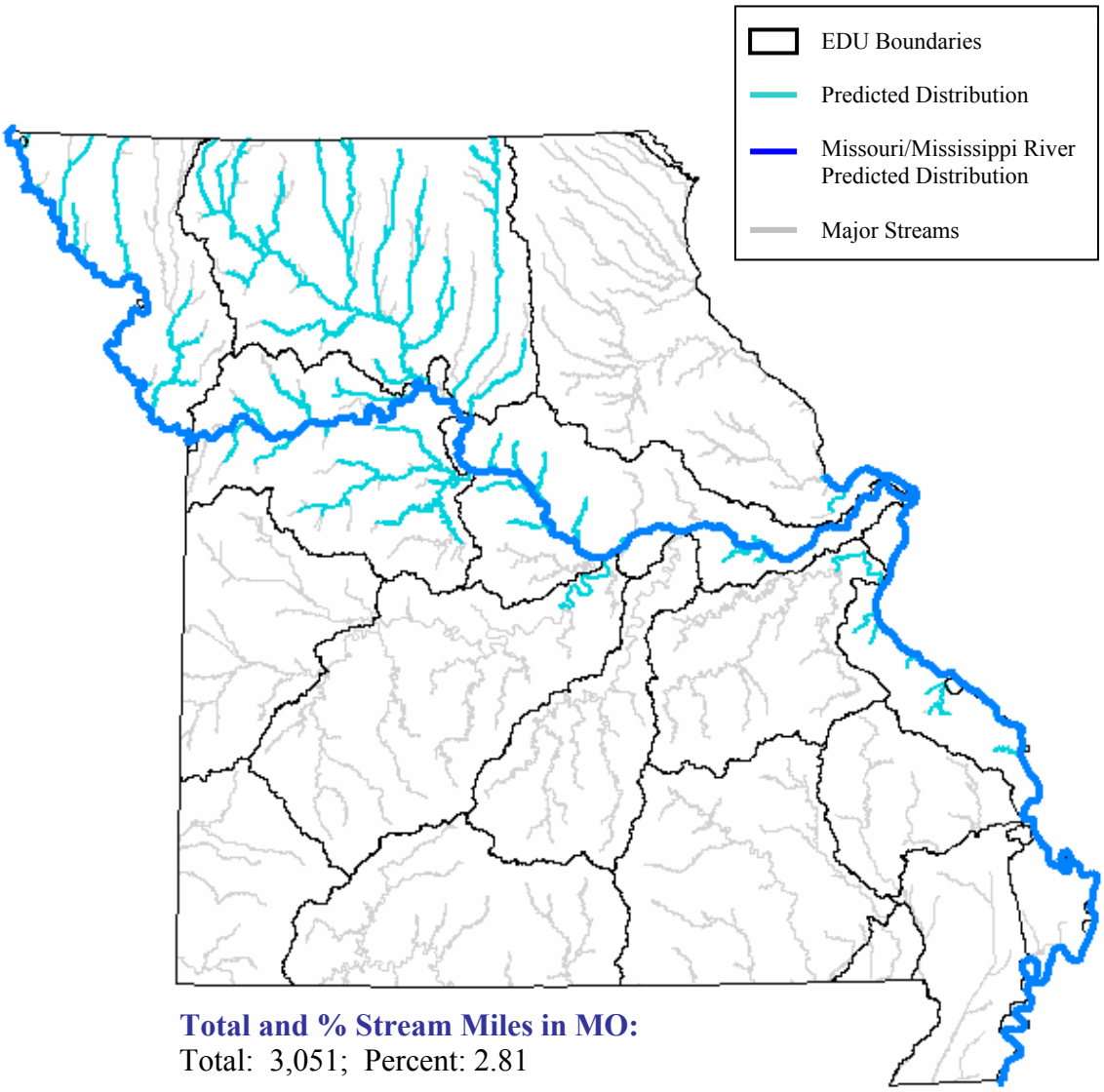
Endemism: Region

State Rank: S2

ITIS Code: 163361

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 3,051; Percent: 2.81

State Range:

The plains minnow is known from the Missouri and Mississippi Rivers and Central Plains streams of the Nishnabotna/Platte, Blackwater/Lamine and Grand/Chariton Ecological Drainage Units (EDU). It had also been collected from the lower portions of some tributaries to the Missouri River in the Ozarks and in mouths of tributaries to the Mississippi River below the Cuivre River. The survival of the plains minnow is in jeopardy as it has declined drastically throughout its Missouri range. The most substantial populations left are in the upper Missouri River (Pflieger 1971; Pflieger 1997).

Habitat Affinities:

The plains minnow is characteristic of broad, shallow, sandy or silty beds in turbid streams and rivers (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It reaches highest abundance in shallow backwaters and pools with gentle current and sediment accumulation, but may also be found in shallow runs with moderate current (Cross and Collins 1975; Tomelleri, 1990). Irrigation and dewatering of rivers have eliminated the plains minnow in much of its former range (Tomelleri, 1990).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Plains Topminnow

Fundulus sciadicus

Native: Yes

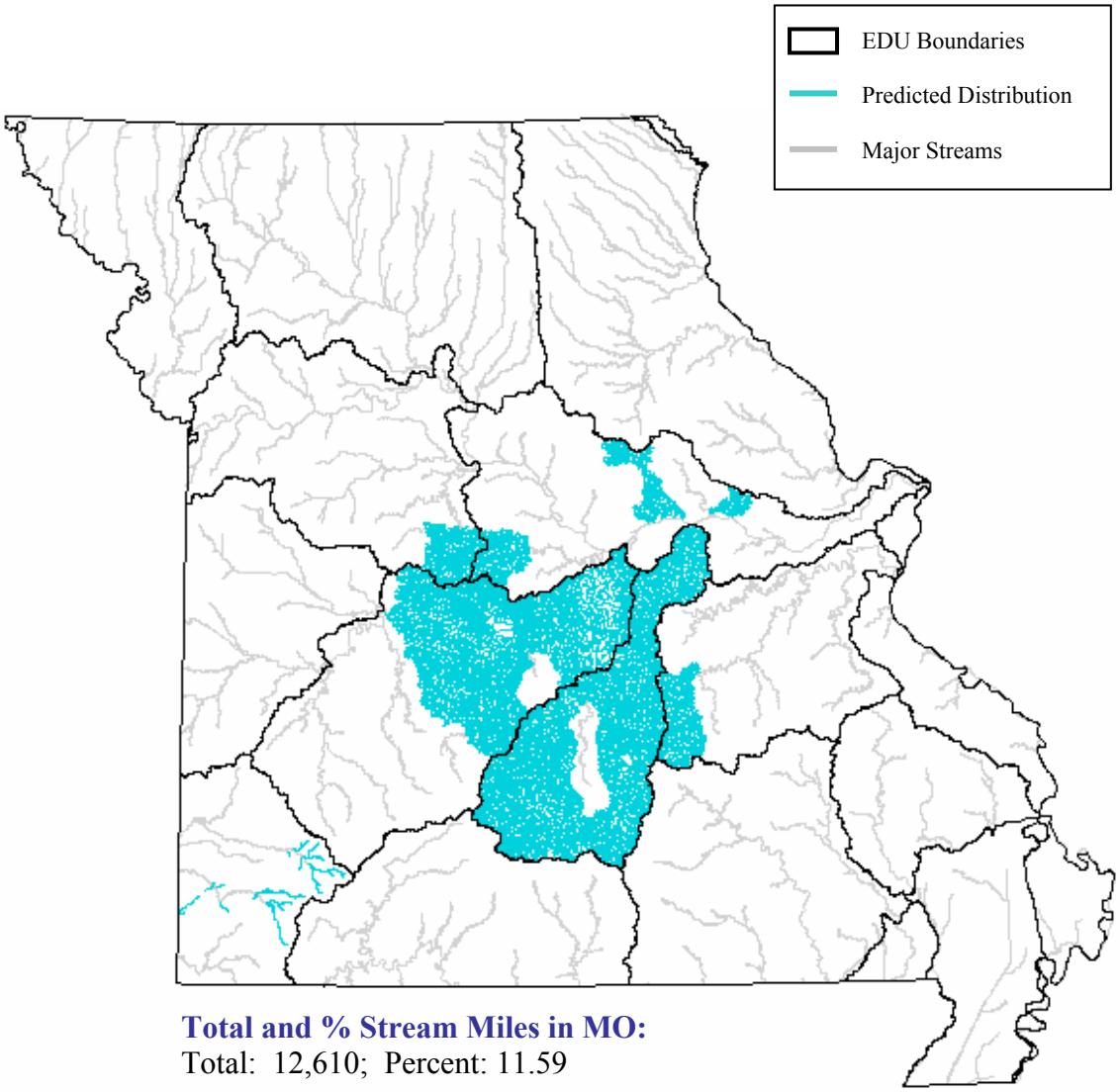
Endemism: Region

State Rank: S3

ITIS Code: 165666

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 12,610; Percent: 11.59

State Range:
The main area of occurrence of the plains topminnow is the central Ozark Aquatic Subregion, but isolated colonies can also be found in the Neosho Ecological Drainage Unit (EDU). The plains topminnow tends to occur in isolated populations because of its exacting habitat requirements, but it is common in preferred areas (Pflieger 1997).

Habitat Affinities:
The plains topminnow inhabits the clear, quiet pools, backwaters, and overflow pools of small creeks and larger streams with abundant submerged aquatic vegetation and moderate current (Cross and Collins 1975; Pflieger 1997; Phillips et. al. 1982). In Missouri, its distribution is similar to the least darter (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
Outside the Ozark/ Elk / Spring Ecological Drainage Unit:
([Linkr] >= 1)

The distribution in the Ozark/Neosho Ecological Drainage Unit was adjusted to include low and medium gradient creeks near springs, based upon habitat affinity and professional review.

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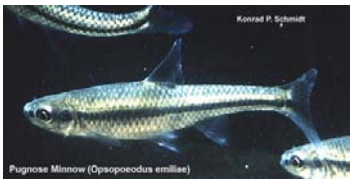


Pugnose Minnow

Opsopoeodus emiliae

Native: Yes

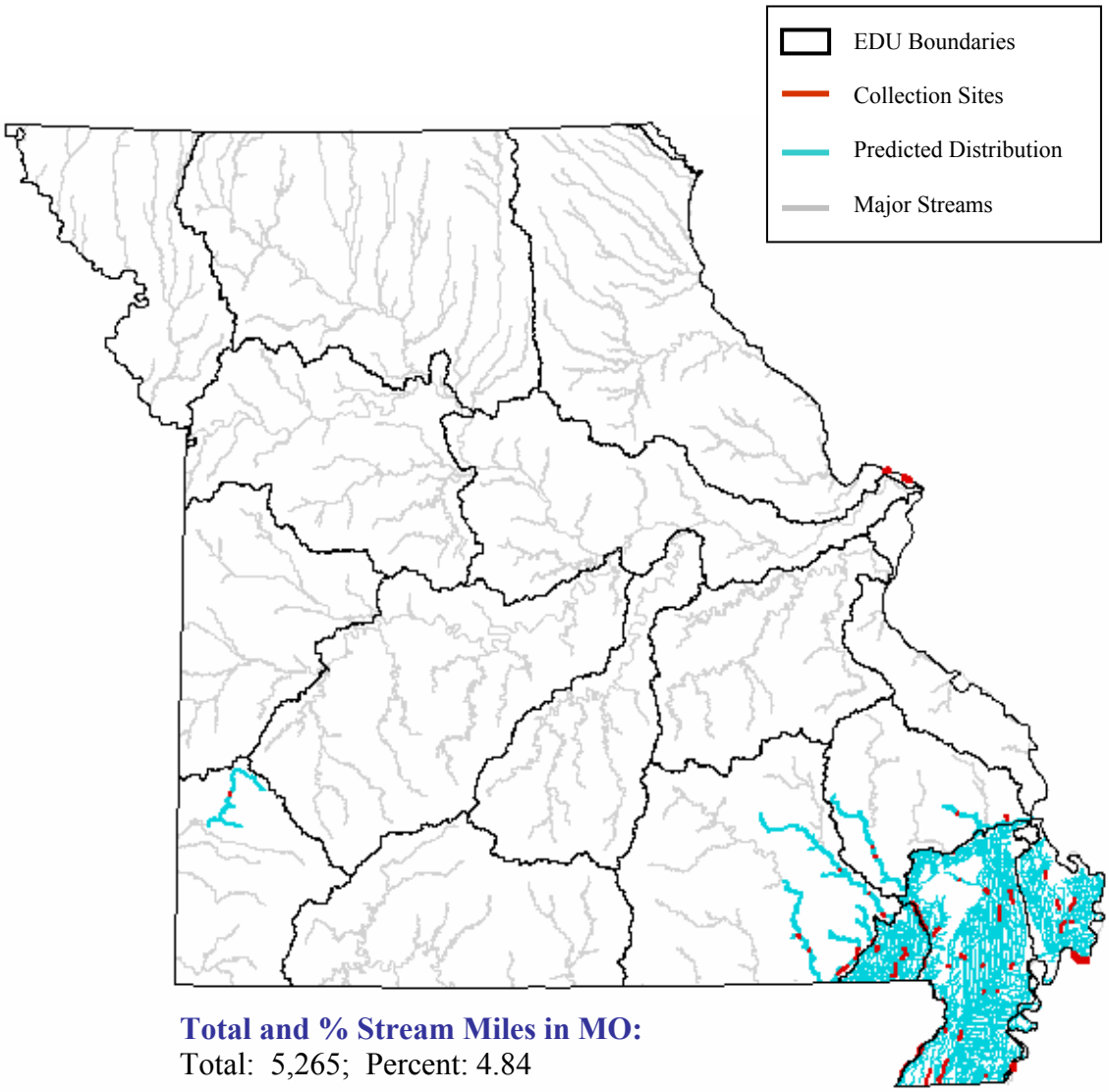
Endemism: Region

State Rank: S4

ITIS Code: 163876

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 5,265; Percent: 4.84

State Range:
The pugnose minnow is found primarily within the Mississippi Alluvial Basin Aquatic Subregion and to a lesser degree in the major streams draining the southeast portion of the Ozarks. It was once found in the Neosho Ecological Drainage Unit (EDU) and Mississippi River just above the mouth of the Missouri River but has not been collected since the 1950's (Pflieger 1997).

Habitat Affinities:
The pugnose minnow inhabits a wide variety of sluggish water habitats including low-gradient streams, natural lakes, bayous, sloughs, ditches, borrow pits, oxbows, harbors, bays and human-made canals (Clay 1975; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It is most commonly found in clear or tannin-stained pools with dense aquatic vegetation and bottoms of fine mud, sand, or organic debris (Clay 1975; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). In Missouri, the highest concentrations of the pugnose minnow are in lentic areas of the Mississippi Alluvial Basin Aquatic Subregion where they compose 8.5% of small nektonic fish (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 4)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

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Pumpkinseed

Lepomis gibbosus

Native: Yes

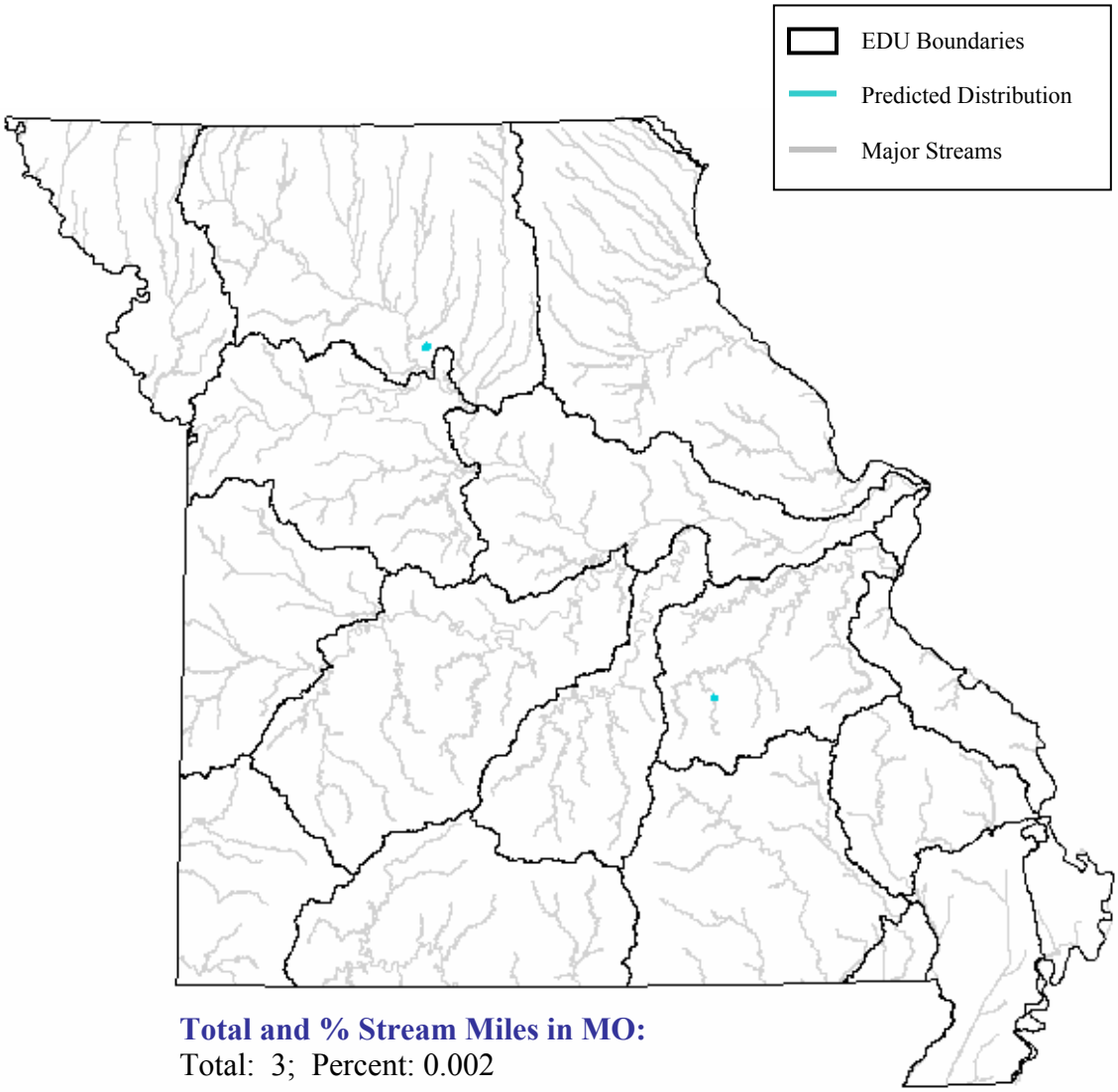
Endemism: Subzone

State Rank: S?

ITIS Code: 168144

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 3; Percent: 0.002

State Range:
The pumpkinseed is extremely rare in Missouri and the only two collections made in natural waters are thought to have been strays from stocked pools (Pflieger 1997). These two locations include an overflow pool along the upper Meramec River and Salt Creek a tributary of the Grand River (Pflieger 1997).

Habitat Affinities:
The pumpkinseed is an inhabitant of clear, quiet sluggish water with large stands of rooted aquatic vegetation and bottoms of muck or sand covered with organic debris (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Trautman 1957). The pumpkinseed is common in clear, northern lakes and large streams (Eddy and Underhill 1974l; Phillips et. al. 1982), and has been successfully introduced into two reservoirs in Tennessee (Etnier and Starnes 1993).

Predictive Model(s):

Central Plains/Ozark Model
The distribution is based upon existing collection records and professional review.

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Quillback

Carpiodes cyprinus

Native: Yes

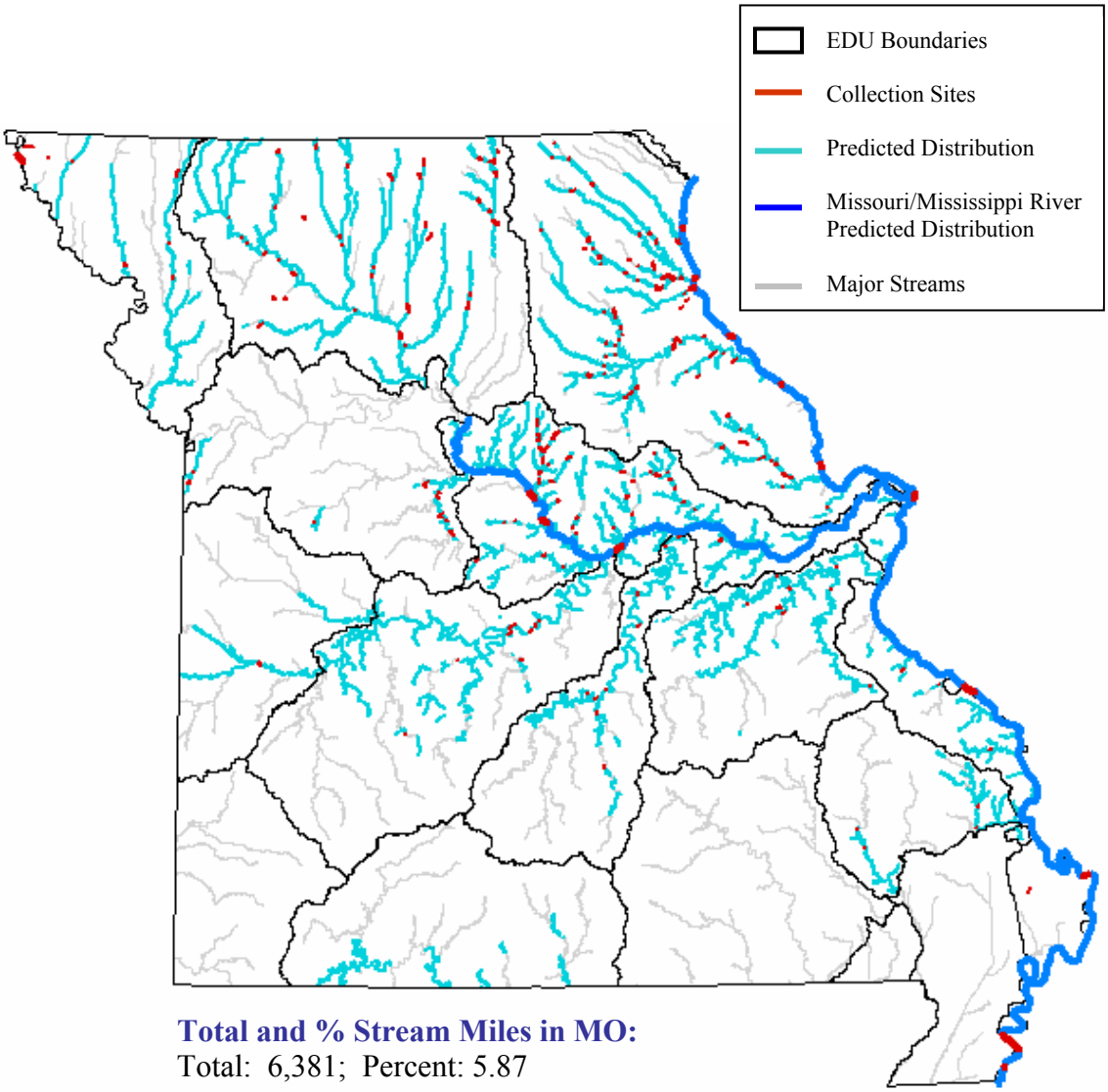
Endemism: Subzone

State Rank: S?

ITIS Code: 163917

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 6,381; Percent: 5.87

State Range:
The quillback is distributed throughout most of Missouri and is common in the Central Plains Aquatic Subregion (Pflieger 1997). It is most widespread in the Central Plains/Cuivre/Salt, Central Plains/Grand/Chariton, and also the Ozark/Moreau/Loutre Ecological Drainage Units (EDU).

Habitat Affinities:
The quillback inhabits reservoirs, lakes and low gradient parts of streams with large, permanent pools and coarse bottom material (Clay 1975; Pflieger 1997; Etnier and Starnes 1993). In Kansas, it is found only in sandy-bottomed rivers (Cross and Collins 1975). While the quillback normally lives in quiet waters, it moves to deep gravelly riffles to spawn (Pflieger 1997; Phillips et. al. 1982).

Predictive Model(s):

Central Plains Model
Query 1: ([Temp_code] = 2)
Query 2: ([Linkr] = 4) and ([Rgrad_subr] = 3) or ([Linkr] >= 5)

Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Ssize_code] >= 2) and ([Ssize_code] <= 3) and ([Rgrad_subr] = 1)) or (([Ssize_code] = 4))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Rainbow Darter

Etheostoma caeruleum

Native: Yes

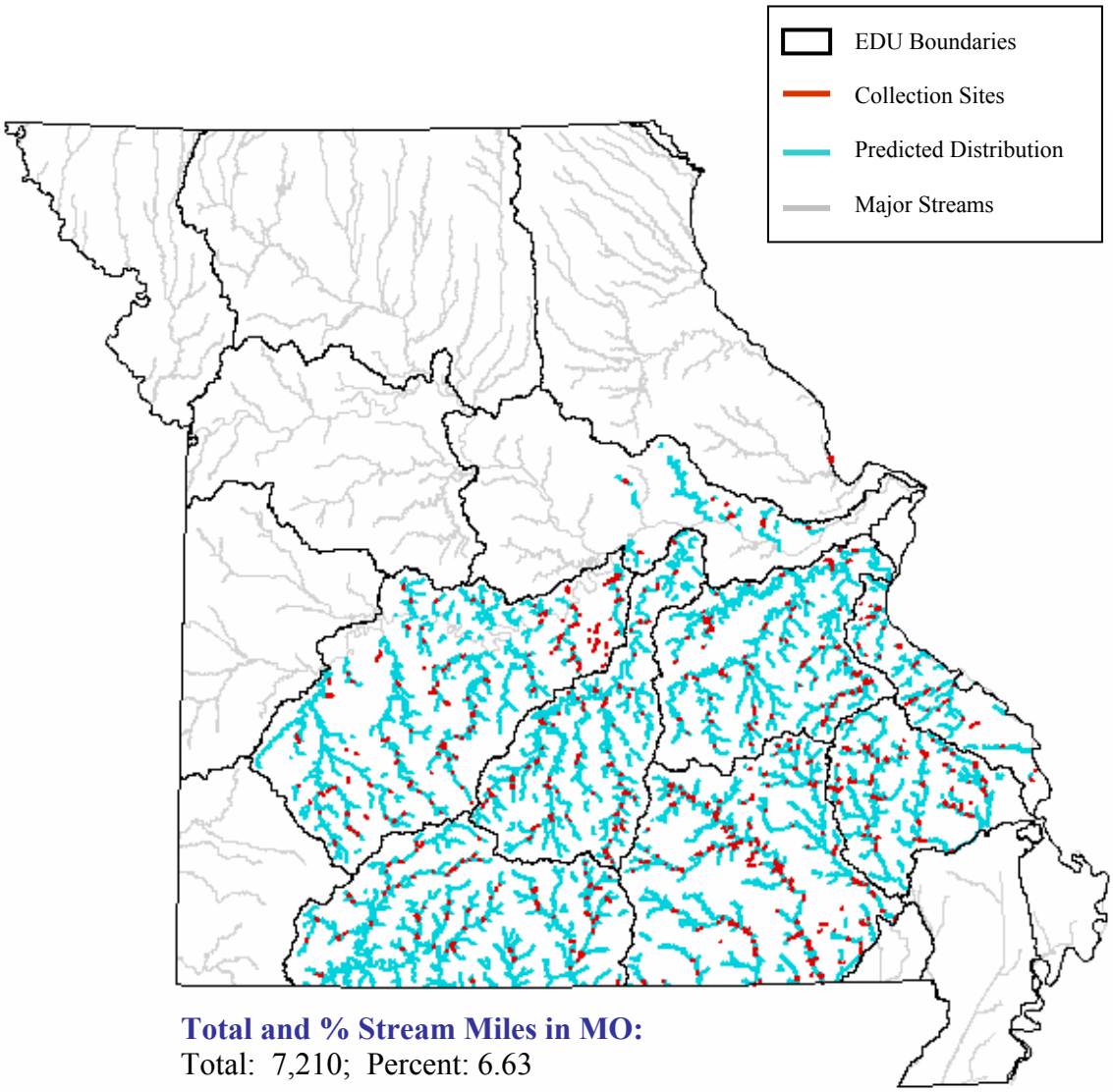
Endemism: Subzone

State Rank: S?

ITIS Code: 168378

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 7,210; Percent: 6.63

State Range:
The rainbow darter is abundant throughout the Ozark Aquatic Subregion except Neosho Ecological Drainage Unit (EDU) (Pflieger 1997) and the western two-thirds of the Moreau/Loutre (EDU).

Habitat Affinities:
The rainbow darter is a stream fish occupying all stream sizes except for small headwater creeks. It prefers higher gradient swift streams with permanent flow and clean gravel, rubble or sandy bottoms (Pflieger 1997; Eddy and Underhill 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). Areas with wide, medium gradient riffles often have larger populations ((Pflieger 1997; Clay 1975; Trautman 1957). The rainbow darter, while somewhat tolerant, shows sensitivity to turbidity, pollution and irregular flow (Robinson and Buchanan 1988; Trautman 1957; Phillips et. al. 1982). In Missouri, the rainbow darter occurs in higher numbers where the bottom substrate is mixed boulder and gravel than where it is just gravel (Pflieger 1997).

Predictive Model(s):

Ozark Model
(([Linkr] = 3) and ([Rgrad_subr] >= 2) and ([Flow] = 1)) or (([Linkr] >= 4) and ([Linkr] <= 7))

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Rainbow Smelt

Osmerus mordax

Native: No

Endemism: NA

State Rank: SE

ITIS Code: 162041

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick

Total and % Stream Miles in MO:
Total: 779; Percent: 0.72

State Range:
The rainbow smelt was first collected in 1978 and is now common in the Missouri River along the Kansas border and the Mississippi River downstream from St. Louis (Pflieger 1997).

Habitat Affinities:
The rainbow smelt prefers cool water, it has been found in the deep waters of freshwater lakes, ponds, reservoirs and along sandbars in major river channels in some current (Trautman 1957; Pflieger 1997; Etnier and Starnes 1993). The rainbow smelt migrates up smaller tributaries in springtime to spawn over bars with current (Pflieger 1997).

Predictive Model(s):

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Rainbow Trout

Oncorhynchus mykiss

Native: No

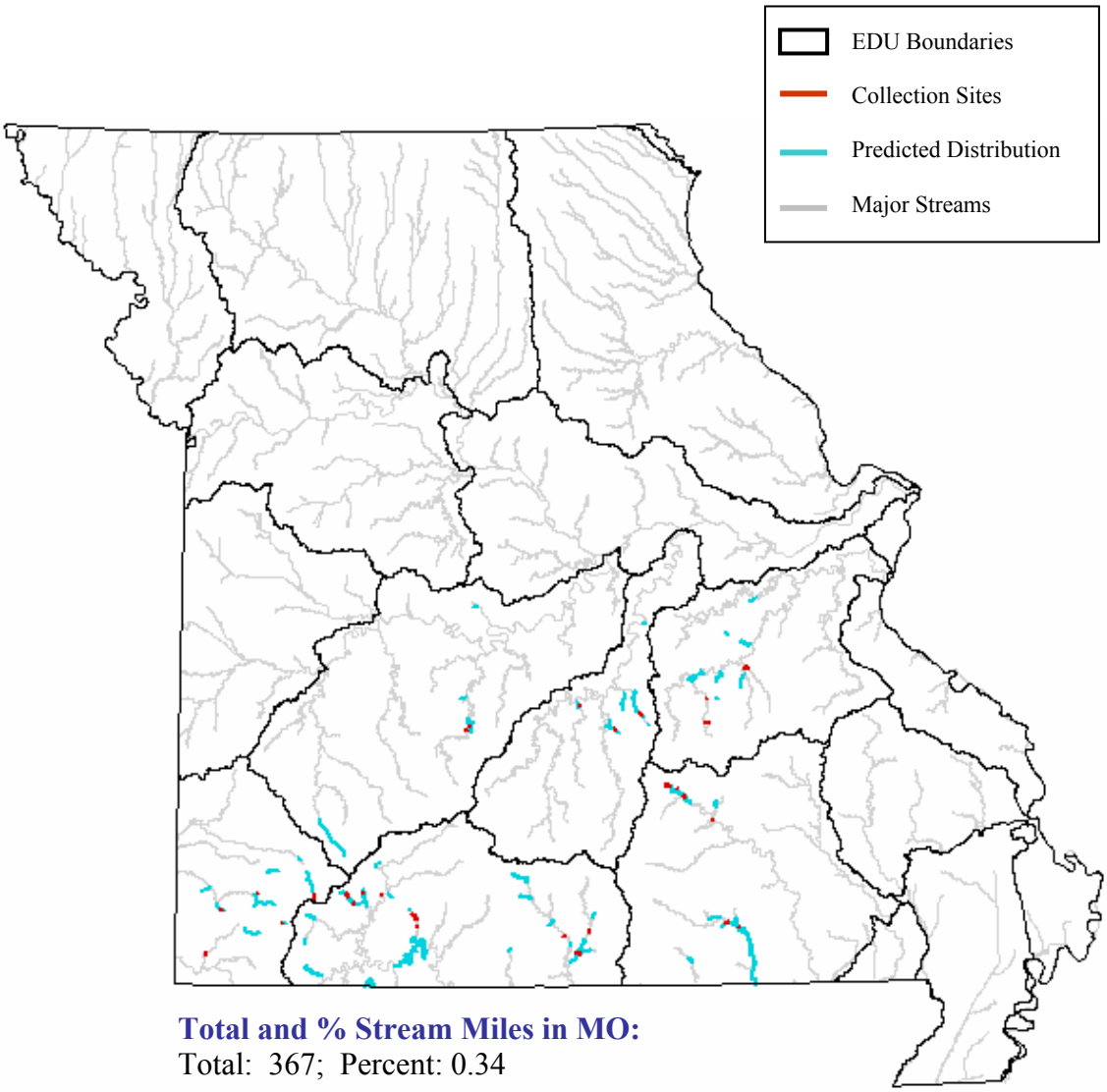
Endemism: NA

State Rank: SE

ITIS Code: 161989

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 367; Percent: 0.34

State Range:
The rainbow trout is found in central and southwestern portions of the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
While the rainbow trout tolerates slightly higher water temperatures than other trout, it prefers temperatures below 70˚ F, which in Missouri is typically within 1 to 2 miles of a spring. It inhabits streams where there are stable riffles of rocks and gravel, for nursery and spawning areas; deep pools, overhead cover, and swift current (Pflieger 1997). Rainbow trout have adapted to areas of cool, deep reservoirs as well as cold tailwaters below dams (Etnier and Starnes 1993; Robinson and Buchanan 1988). In Minnesota, rainbow trout migrate downstream after spending its first 1-3 years in smaller headwaters (Phillips et. al. 1982).

Predictive Model(s):

Ozark Model
The distribution is in cold-water streams based upon professional review.

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Red Shiner

Cyprinella lutrensis

Native: Yes

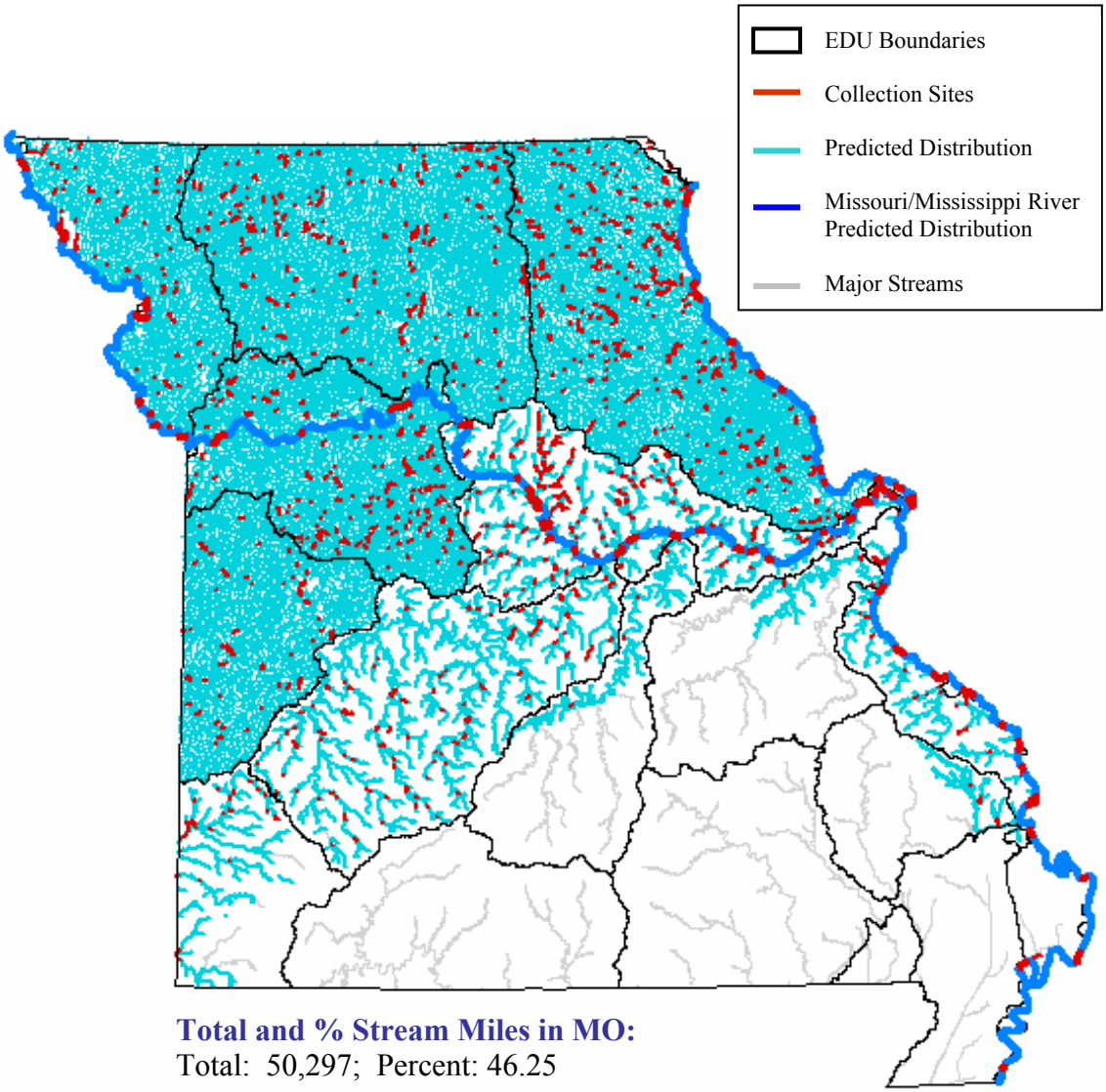
Endemism: Region

State Rank: S?

ITIS Code: 163792

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 50,297; Percent: 46.25

State Range:

The red shiner is found along the Missouri and Mississippi rivers throughout the Central Plains Aquatic Subregion and is common throughout major streams of the north and west Ozark border (Pflieger 1997). Additionally, it is found along tributaries to the Mississippi River in the Ozark/Apple/Joachim Ecological Drainage Unit (EDU) and the Whitewater River drainage in the Ozark/Upper St. Francis/Castor EDU.

Habitat Affinities:

The red shiner is primarily a stream fish and is most abundant in larger creeks and rivers; although it flourishes when introduced into impoundments it (Pflieger 1997). Microhabitats include still pools and riffles, slow moving streams, and backwaters over a range of bottom types (Robinson and Buchanan 1988). The red shiner is tolerant of conditions where few other fish occur such as irregular flow, siltation, turbidity and pollution (Cross and Collins 1975) and avoids streams where the water is continuously cool and clear (Pflieger 1997).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 1)

Ozark Model
(([Linkr] = 3) and ([Rgrad_subr] = 1) and ([Temp_code] = 2)) or (([Linkr] = 3) and ([Rgrad_subr] >= 2)) or (([Linkr] >= 4) and ([Linkr] <= 5) and ([Rgrad_subr] = 1)) or (([Linkr] >= 4) and ([Linkr] <= 5) and ([Rgrad_subr] >= 2) and ([Temp_code] = 2)) or (([Linkr] >= 6))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Redear Sunfish

Lepomis microlophus

Native: Yes

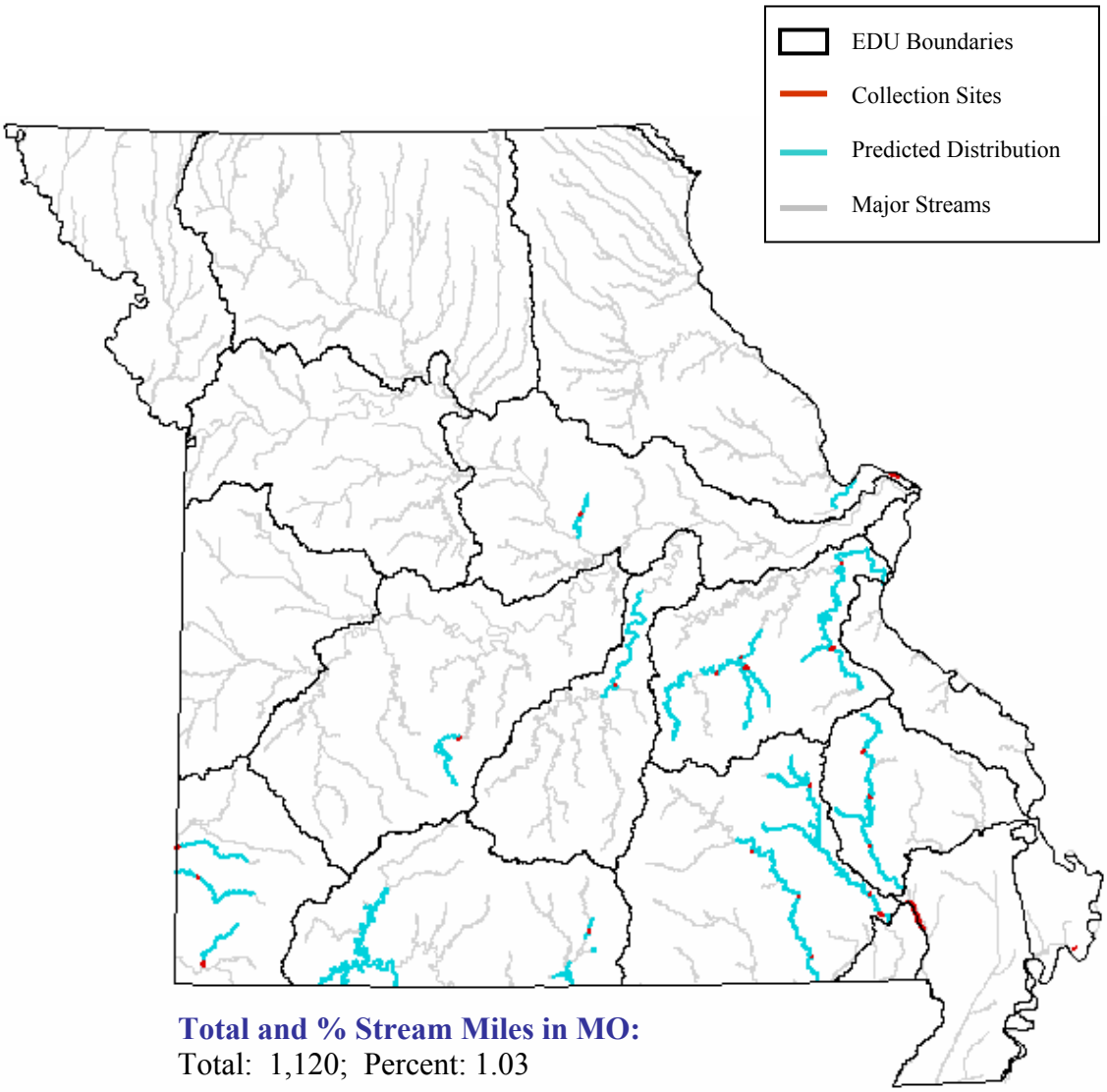
Endemism: Subzone

State Rank: S?

ITIS Code: 168154

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,120; Percent: 1.03

State Range:
The redear sunfish is found across the southern and eastern portions of the Ozark Aquatic Subregion. It is uncommon in natural waters but has been successfully introduced into ponds and smaller reservoirs around the state (Pflieger 1997).

Habitat Affinities:
The redear sunfish prefers the warm clear water of stream overflow areas, lakes, lowland oxbows, and other non-flowing areas with abundant logs, stumps, brush and aquatic vegetation (Douglas 1974; Etnier and Starnes 1993; Clay 1975). It tolerates silt (Robinson and Buchanan 1988) and occupies deeper water than most sunfishes (Cross and Collins 1975). In Missouri, the redear sunfish is most successful in clear, warm, lentic waters with dense vegetated but is also found in protected bays and overflow pools of streams (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

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Redfin Darter

Etheostoma whipplei

Native: Yes

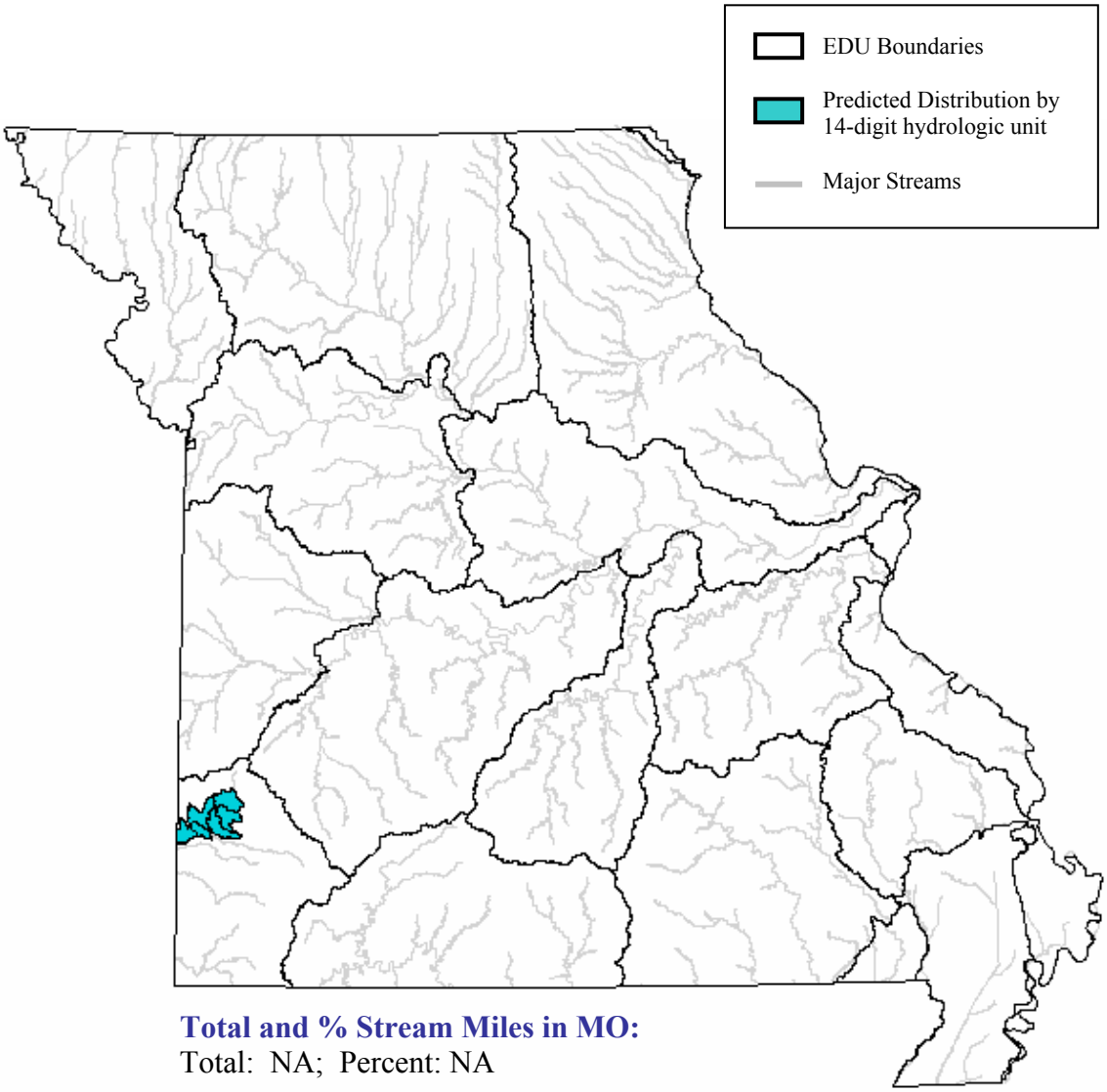
Endemism: Region

State Rank: S1

ITIS Code: 168448

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
One of the rarest Missouri darters, it is currently found only in the lower Spring River in Jasper and Barton Counties and its North Fork (Pflieger 1997).

Habitat Affinities:
The redfin darter prefers the clear waters of medium to small streams with shale, sand and gravel riffles (Pflieger 1997; Robinson and Buchanan 1988). It has been found in major river drainages over sand in Louisiana and Arkansas, and in impoundments in Arkansas (Douglas 1974; Robinson and Buchanan 1988). The redfin darter is not tolerant of siltation and is only able to tolerate moderate turbidity (Robinson and Buchanan 1988). In Missouri, its preferred habitat are the small to medium-sized rivers between the Plains and Ozark Aquatic Subregion in the Ozark/Neosho Ecological Drainage Unit (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

References:

Bailey, R. M., J. E. Fitch, E.S. Herald, E. A. Lachner, C. C. Lindsey, C.R. Robins, & W. B. Scott. 1970. A list of common and scientific names of fishes from the United States and Canada American Fisheries Society Special Publication No. 6. 149 pp.

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Redfin Shiner

Lythrurus umbratilis

Native: Yes

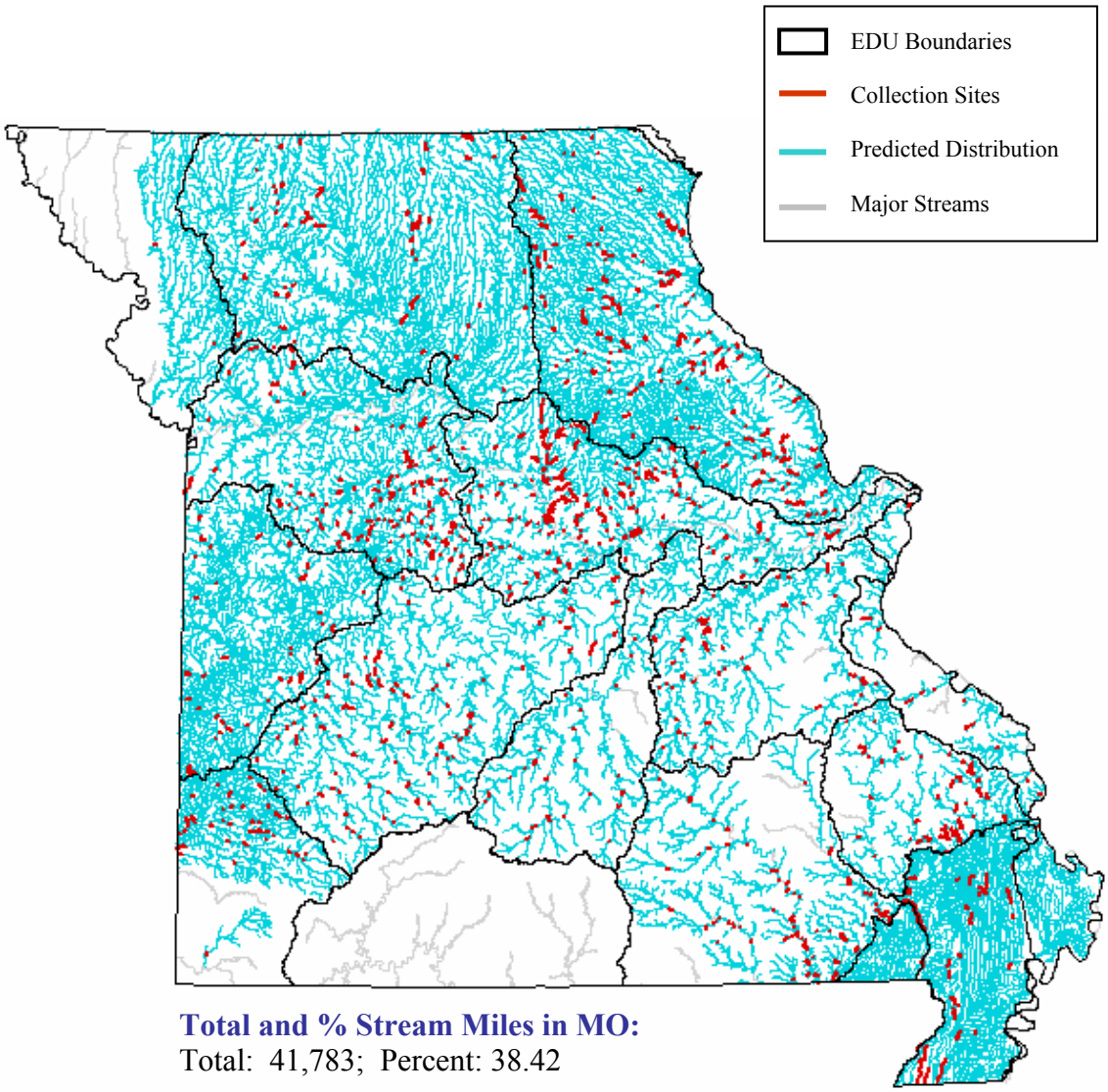
Endemism: Region

State Rank: S?

ITIS Code: 163861

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 41,783; Percent: 38.42

State Range:

The redfin shiner is found over nearly all of Missouri excluding the Ozark/White Ecological Drainage Unit (EDU) (Pflieger 1997). It is absent from the western drainages within the Central Plains/Nishnabotna/Platte EDU.

Habitat Affinities:

The redfin shiner's habitat requirements are warm, quiet pools of high gradient streams with relatively low turbidity and siltation (Pflieger 1997, Robinson and Buchanan 1988; Cross and Collins 1975). The redfin shiner is most commonly found over sand or gravel bottoms and in association with aquatic plants such as water willow (*Justicia americana*) (Trautman 1957; Robinson and Buchanan 1988). In the Plains Aquatic Subregion of Missouri, it is found in creeks with high gradient and intermittent or low flow over rocky bottoms. In Ozark Aquatic Subregion, warmer overflow areas and backwaters are its preferred habitat. The redfin shiner occurs with submerged aquatic vegetation in the slow ditches of the Mississippi Alluvial Basin Aquatic Subregion. Across its range in Missouri, the redfin shiner exists in a complex of two subspecies: the western redfin shiner (*Lythrurus umbratilis umbratilis*), in the Missouri and Neosho River drainages, with a population in the Salt River; and the eastern redfin shiner (*Lythrurus umbratilis cyanocephalus*) in the remainder of its range (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
(([GradsegR] >= 1) and ([GradsegR] <= 2)) or (([GradsegR] = 3) and ([Linkr] >= 1) and ([Linkr] <= 6)) or (([GradsegR] >= 4) and ([GradsegR] <= 6) and ([Temp_code] = 2))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

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Redspot Chub

Nocomis asper

Native: Yes

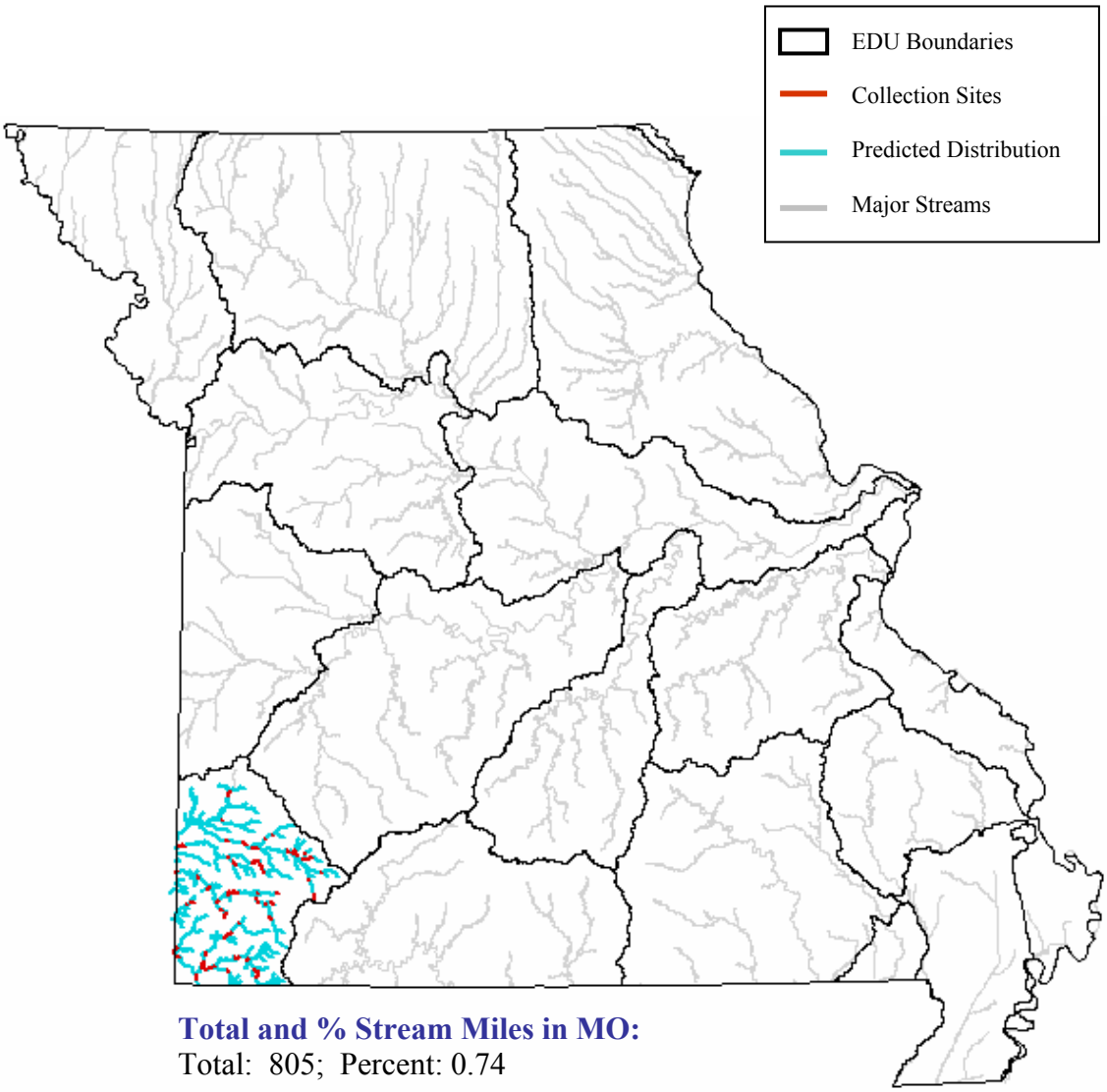
Endemism: EDU

State Rank: S?

ITIS Code: 163394

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 805; Percent: 0.74

State Range:
The redspot chub is found in the Neosho Ecological Drainage Unit (EDU) within the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The redspot chub is found in smaller clear, cool, upland streams with permanent flow in Missouri and Arkansas (Pflieger 1997; Robinson and Buchanan 1988), and small streams edged with aquatic plants. Adults are frequently associated with riffles outside of the swifter current and the young with areas having aquatic plants and no current (Pflieger 1997). As adults cannot tolerate turbid waters, excessive runoff has reduced their range in Kansas (Cross and Collins 1975). However, in Missouri its range and number has not changed significantly over the later half of the 20th century (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Linkr] >= 1)

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Redspotted Sunfish

Lepomis miniatus

Native: Yes

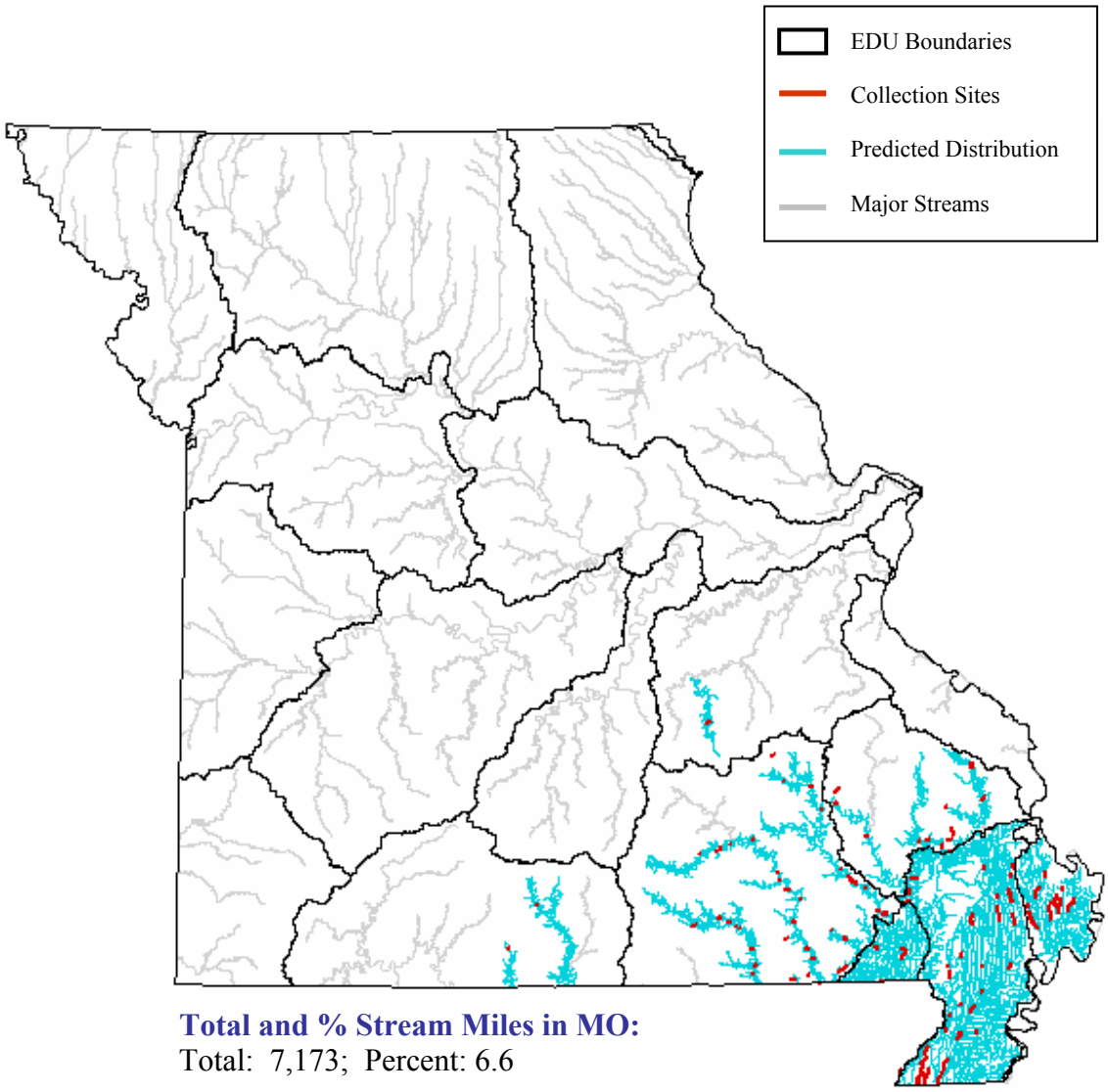
Endemism: Region

State Rank: S4S5

ITIS Code: 168157

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 7,173; Percent: 6.6

State Range:
The redspotted sunfish is found in the Mississippi Alluvial Basin Aquatic Subregion and adjoining regions of the Ozark Aquatic Subregion. A few localized populations can also be found in the White Ecological Drainage Unit (EDU) and the Meramec EDU of the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The redspotted sunfish is found in the clear, quiet waters of streams, oxbow lakes, swamps, and bayous, and moderately brackish coastal estuaries (Desselle et al., 1978; Douglas 1974; Pflieger 1997; Robinson and Buchanan 1988). It prefers organic debris or mud-bottomed pools with cover, such as boulders or logs, and dense submergent vegetation, such as water willow (*Justicia*) (Douglas 1974; Pflieger, 1997; Etnier and Starnes 1993; Robinson and Buchanan 1988). In the Mississippi Alluvial Basin Aquatic Subregion of Missouri, it is most abundant in clear, sluggish ditches choked with aquatic vegetation. In Missouri and Arkansas, its upland microhabitat is currentless pools with fallen timber, boulders, and thick stands of water willow (*Justicia*) (Pflieger, 1997; Robinson and Buchanan 1988). This sunfish is moderately tolerant of turbidity (Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model
(([Linkr] >= 4)) or (([Linkr] >= 1) and ([Linkr] <=3) and ([DlinkR] >= 5))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

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Ribbon Shiner

Lythrurus fumeus

Native: Yes

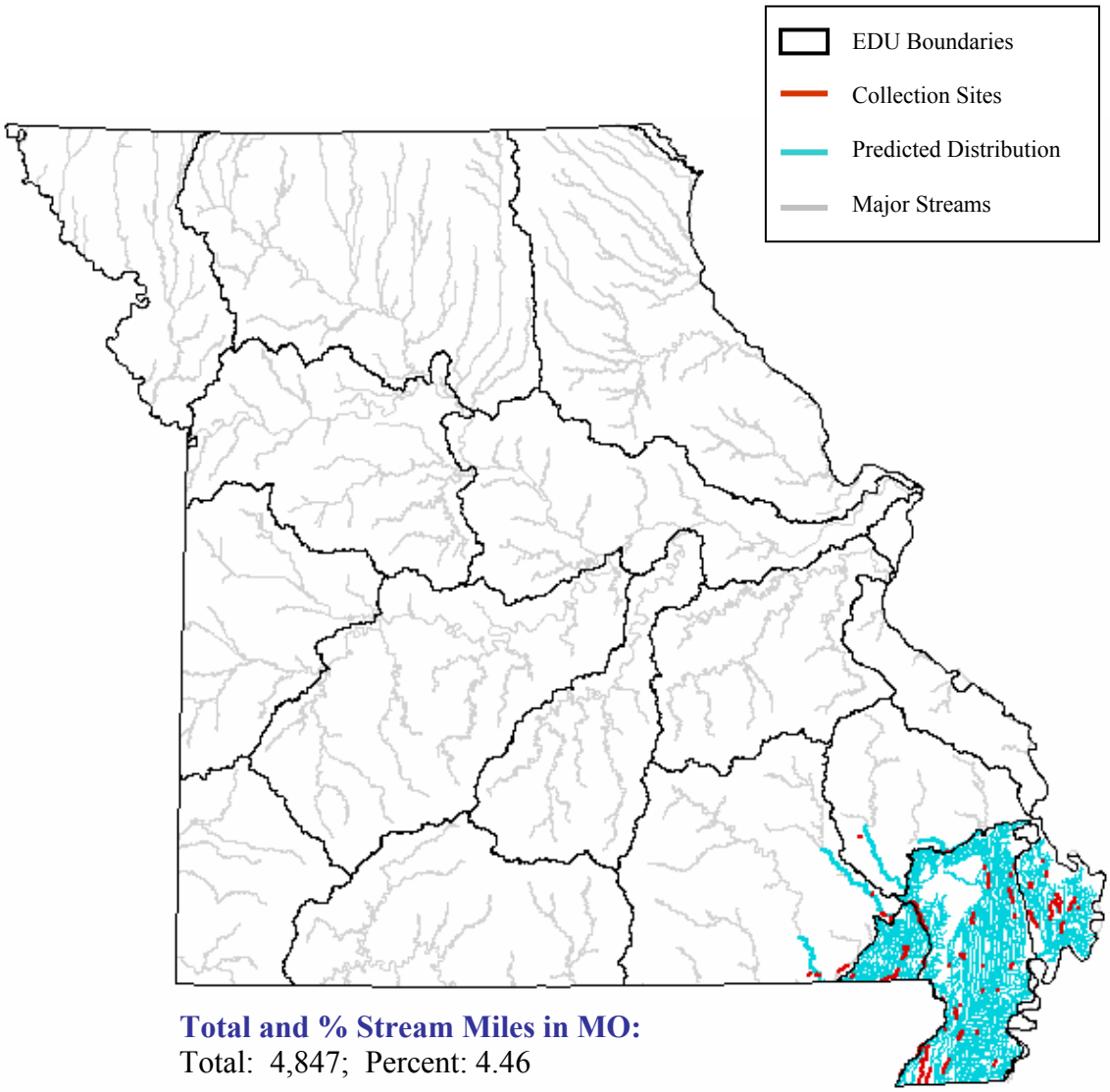
Endemism: Region

State Rank: S?

ITIS Code: 163853

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 4,847; Percent: 4.46

State Range:

The ribbon shiner is a common and characteristic inhabitant of the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997). It also occurs in some of the streams draining into the Mississippi Alluvial Basin from the Ozark/Black/Current and Ozark/Upper St. Francis/Castor Ecological Drainage Units (EDU).

Habitat Affinities:

The ribbon shiner inhabits small to medium sized sand, silt, detritus or firm mud bottomed creeks or streams with low to moderate gradient (Douglas 1974; Pflieger 1997; Snelson 1973). Its prefers quiet tannin-stained pools and backwaters and can tolerate siltation (Snelson 1973; Etnier and Starnes 1993). The ribbon shiner is uncommon in swamps, and sloughs and avoids turbidity or agricultural runoff (Pflieger 1997; Robinson and Buchanan 1988). In Missouri, it is most common in clear ditches with dense vegetation and prefers mild current and sandy bottoms (Pflieger 1997).

Predictive Model(s):

Ozark Model

([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6) and ([Linkr] <= 7)

Mississippi Alluvial Basin Model

([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

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River Carpsucker

Carpiodes carpio

Native: Yes

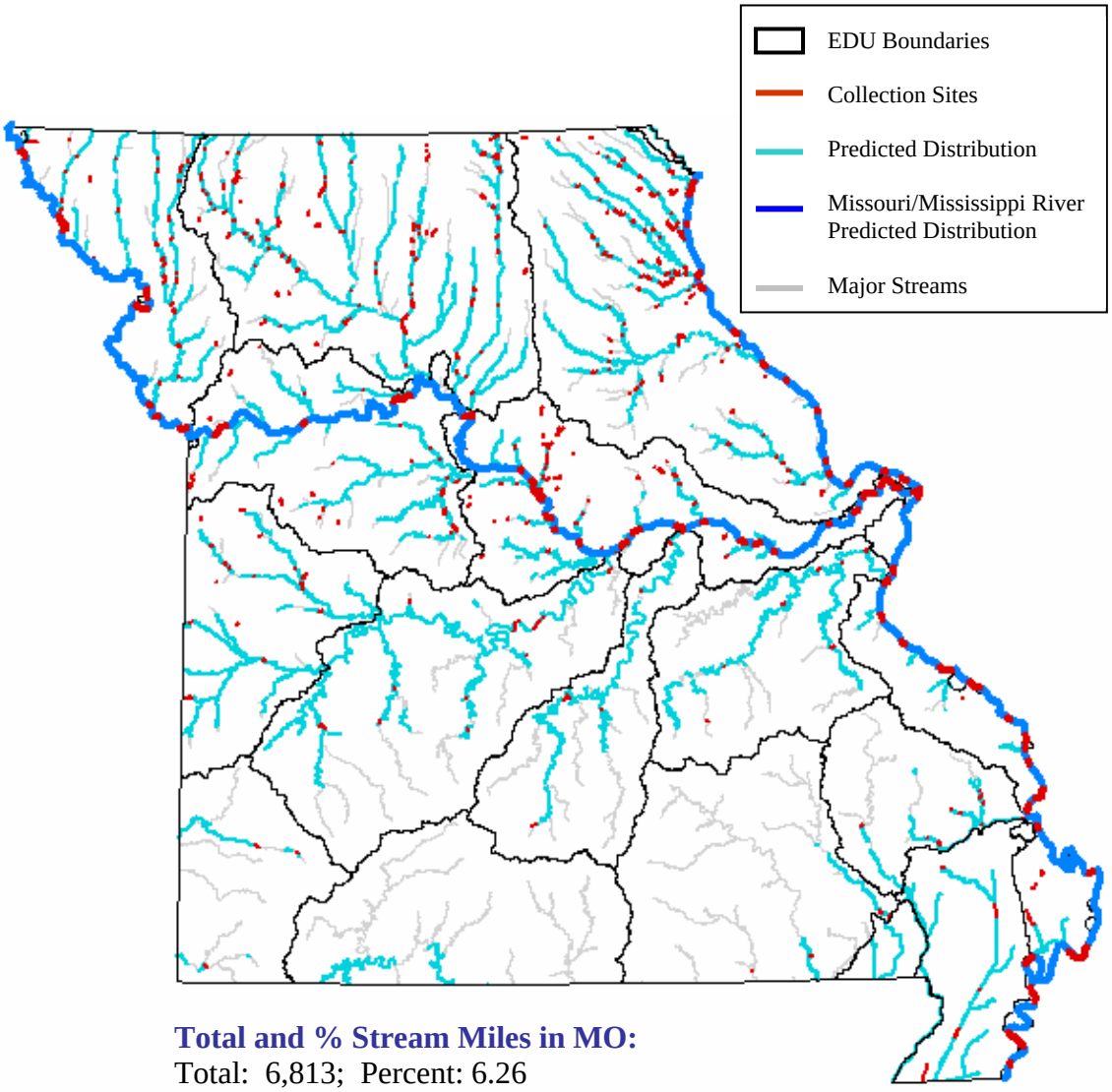
Endemism: Region

State Rank: S?

ITIS Code: 163919

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 6,813; Percent: 6.26

State Range:

The river carpsucker is found in the Missouri and Mississippi rivers and in their major tributaries throughout the Central Plains Aquatic Subregion. Populations in the Ozark and Mississippi Alluvial Basin Aquatic Subregions tend to be less common and more scattered and (Pflieger 1997).

Habitat Affinities:

The river carpsucker is found in quiet ponds, pools, and oxbows of major lowland rivers having low to moderate gradient (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes 1993). In the Ohio River the largest populations occurred in the deeper waters (Trautman 1957). This carpsucker thrives in the silty, turbid waters of reservoirs and slow currents where soft bottoms of sand, clay, and gravel occur (Cross and Collins 1975). In turbid waters of Missouri, the river carpsucker is often the most populous large fish (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
Query 1: ([Temp_code] = 2)
Query 2: ([Linkr] >= 5) and ([GradsegR] >= 1) and ([GradsegR] <= 2)

Mississippi Alluvial Basin Model)
([Core_crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")
The Mississippi Alluvial Basin query is based upon existing collection records and professional review.

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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River Darter

Percina shumardi

Native: Yes

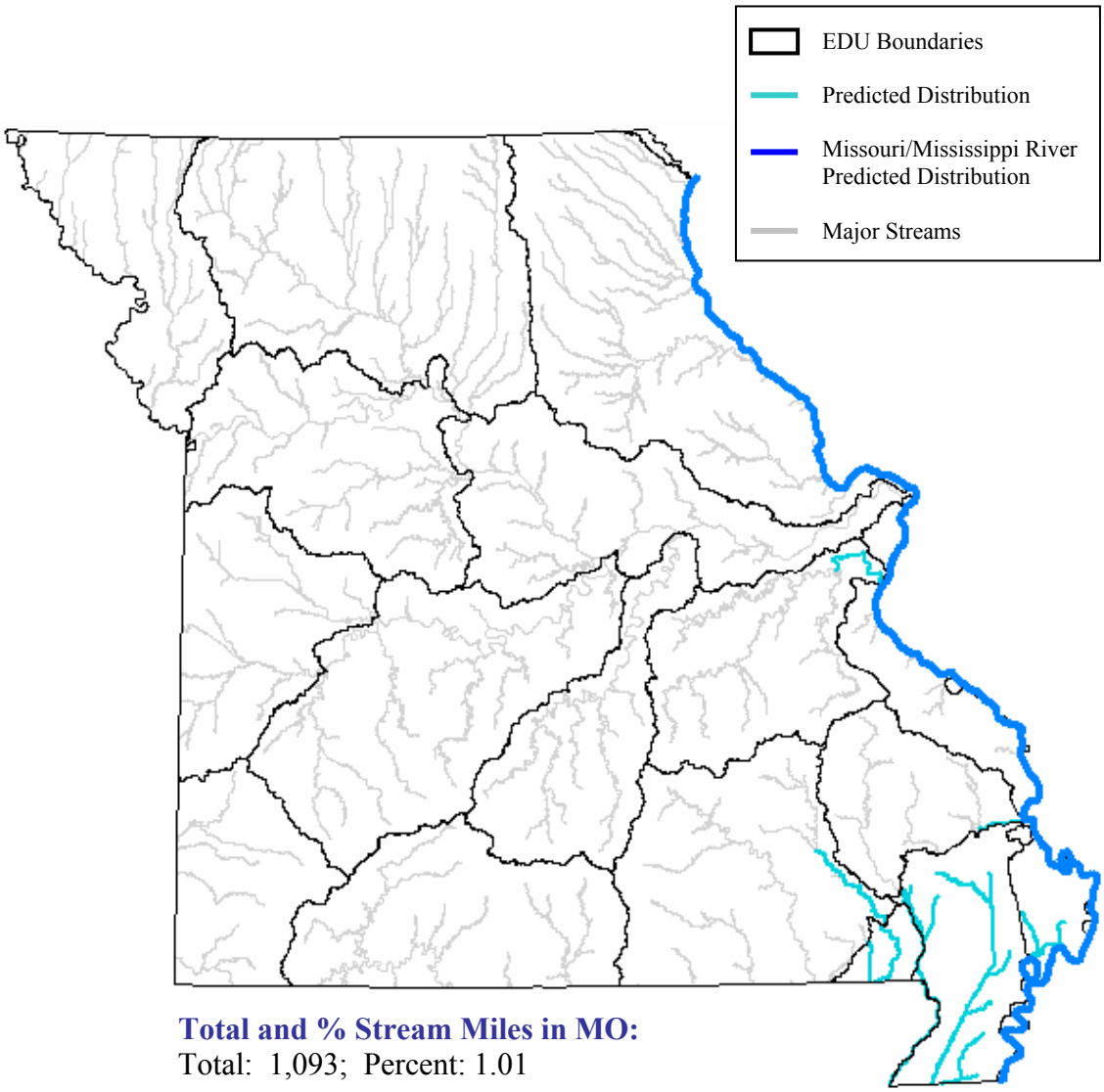
Endemism: Region

State Rank: S3

ITIS Code: 168497

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,093; Percent: 1.01

State Range:

The river darter is found in most of the Mississippi River, and throughout the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997). Populations also occur in the lower portions of the Meramec River, the Black River, and the Diversion Channel that drains the Castor and Whitewater River of the Ozark/Upper St. Francis/Castor Ecological Drainage Unit (EDU).

Habitat Affinities:

The river darter is found in the moderate to swift current of deep chutes and riffles of major rivers and the mouths of adjoining tributaries over sand, gravel, and rocky bottoms (Douglas 1974; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It also inhabits backwaters adjacent to the main current (Robinson and Buchanan 1988), "flow through" reservoir environments (Etnier and Starnes 1993), and river lakes in the north (Phillips et. al. 1982). The river darter is tolerant of turbidity and is found at greater depth in clear water inhabits (Pflieger 1997; Trautman 1957). In Missouri, it is common in both deep, swift chutes and riffles of the Mississippi River and sparsely vegetated ditches and streams of the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

References:

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River Redhorse

Moxostoma carinatum

Native: Yes

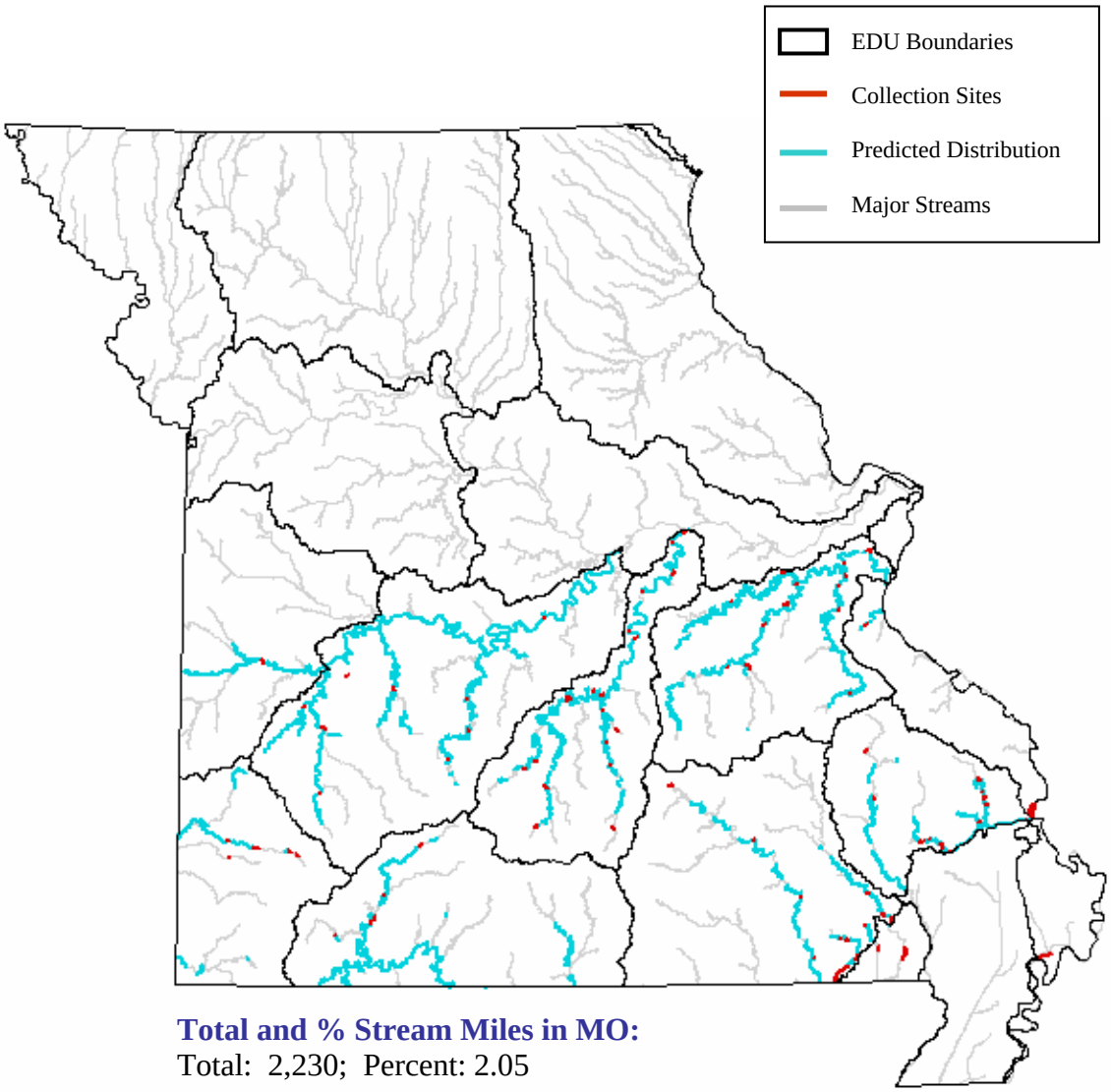
Endemism: Region

State Rank: S?

ITIS Code: 163936

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 2,230; Percent: 2.05

State Range:
The river redhorse is common in much of the Ozark Aquatic Subregion but never reaches high abundance (Pflieger, 1997).

Habitat Affinities:
The river redhorse is found in the swift waters and deep pools of medium and large upland streams of the Mississippi Alluvial Basin having strong permanent flow and clean gravel or rock bottoms (Pflieger 1997; Robinson and Buchanan 1988). It is intolerant to pollution and turbidity (Cross and Collins 1975), and the significant decrease in its range may be due to the fragmentation effects of impoundments (Eddy and Underhill 1974). During spawning season small populations can be found in lesser tributaries (Trautman 1957; Etnier and Starnes 1993). In the Ozark Aquatic Subregion of Missouri, the range and abundance of this sucker have remained stable (Pflieger 1997) while elsewhere a marked decline has been observed in range and number (Robinson and Buchanan 1988; Robinson and Buchanan 1988; Cross and Collins 1975).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Linkr] >= 5) and ([GradsegR] >= 1) and ([GradsegR] <= 2)

References:

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River Shiner

Notropis blennius

Native: Yes

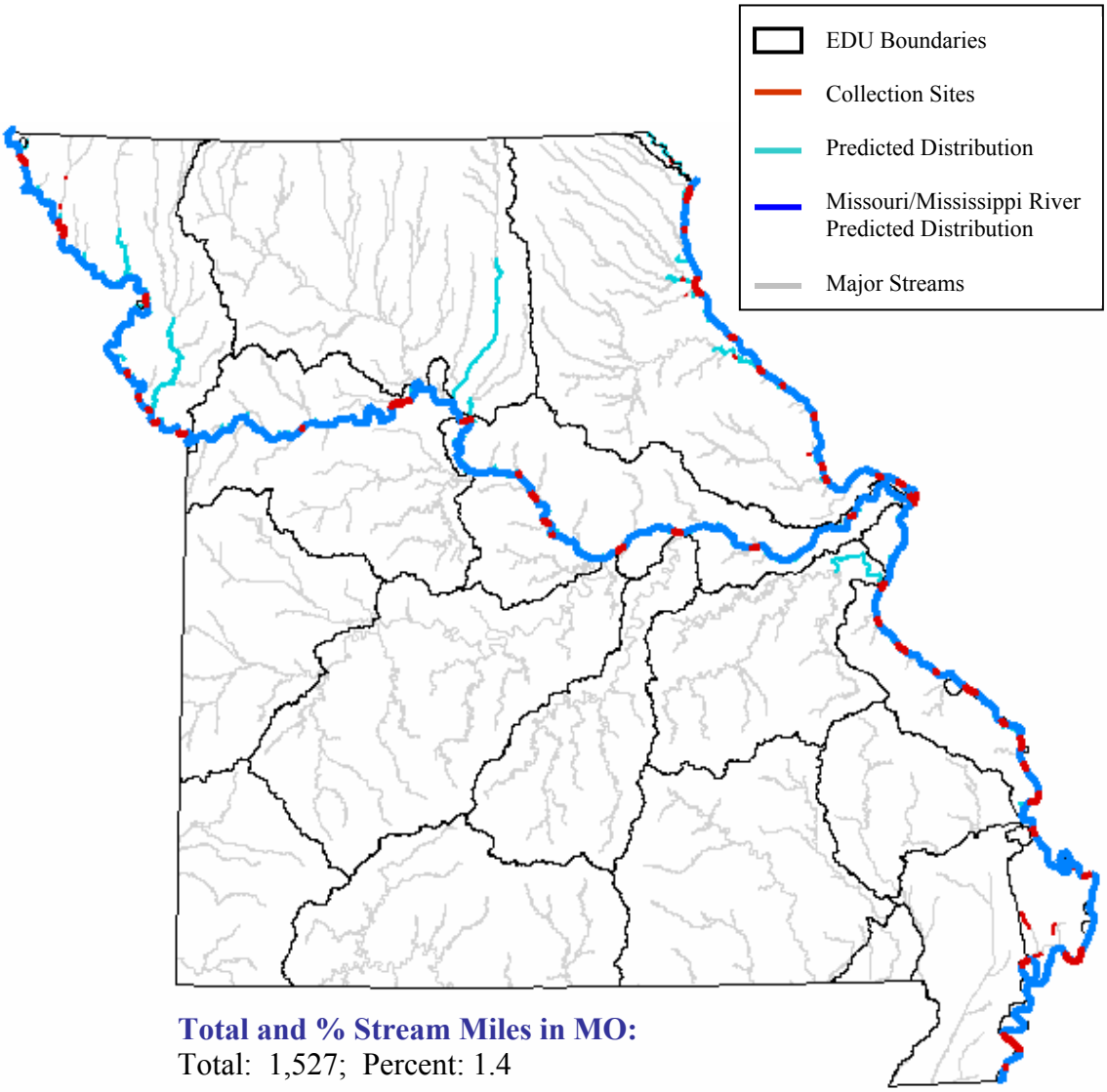
Endemism: Subzone

State Rank: S?

ITIS Code: 163429

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,527; Percent: 1.4

State Range:
The river shiner occurs in the waters of the Mississippi and Missouri rivers, and is very rarely found in tributaries of these rivers (Pflieger, 1997). It is more common upstream from Lexington, MO than downstream.

Habitat Affinities:
The river shiner is found in major rivers, avoiding areas of strong current and still backwaters (Pflieger 1997; Robinson and Buchanan 1988). While the river shiner occurs over substrates of all types, larger populations are found in less turbid, flowing water over sand and gravel bottoms (Cross and Collins 1975; Eddy and Underhill 1974; Pflieger 1997; Trautman 1957). River shiner numbers in the Missouri River have increased from less than 0.1% of small fishes collected in the early 1940s to 7.7% in the early 1980s (Pflieger,1987).

Predictive Model(s):

Central Plains/Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] >= 1) and ([Linkr] <= 5) and ([DlinkR] = 9)) or (([Linkr] >= 6))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

References:

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Rock Bass

Ambloplites rupestris

Native: Yes

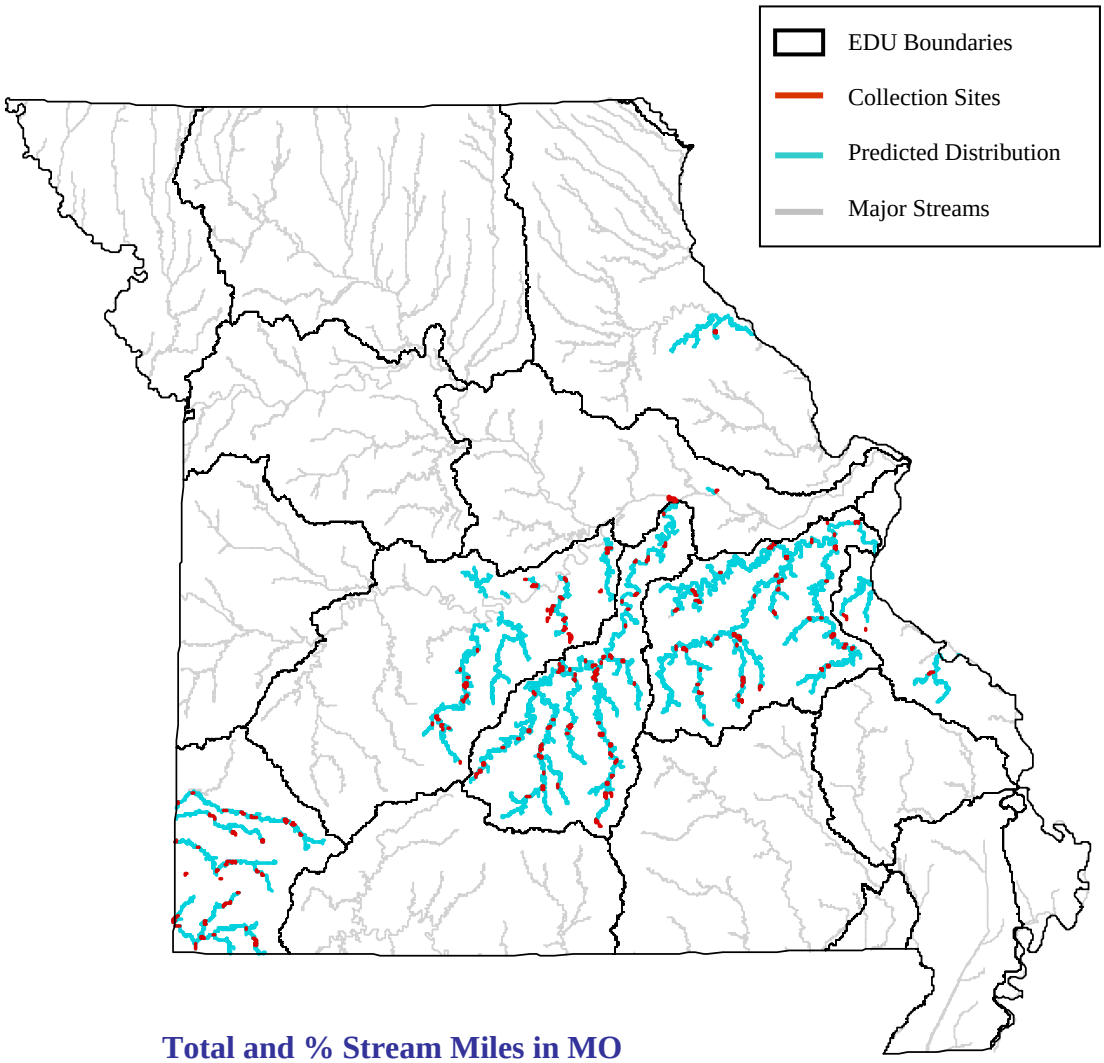
Endemism: Subzone

State Rank: S?

ITIS Code: 168097

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO

Total: 2,445; Percent: 2.25

State Range:

The rock bass is found throughout much of the northern Ozark Aquatic Subregion. Its range continues northeast in a band beginning and encompassing nearly all of Gasconade and Meramec EDUs, as well as adjoining portions of Ozark/Osage and Moreau/Loutre EDUs. In addition, it is quite common in the southern two-thirds of the Ozark/Neosho EDU. Rock bass populations except those in the Meramec basin are likely the result of Missouri Department of Conservation introduction efforts in the 1930s and 1940s (Pflieger1997).

Habitat Affinities:

The rock bass is found in deep pools, and undercut banks of clear, small to moderate sized permanent flow streams with unsilted bottoms of bedrock, gravel, boulders or limestone ledges **(**Douglas 1974; Cross and Collins 1975; Clay 1975; Robinson and Buchanan 1988; Trautman 1957; Pflieger 1997). In its northern range the rock bass is found in lakes and reservoirs with cover provided by fallen timber, rocky shores or dense weeds (Etnier and Starnes 1993; Robinson and Buchanan 1988; Cross and Collins 1975; Eddy and Underhill 1974). In Minnesota, it can also be found in creeks and lakes with mud bottoms (Phillips et. al. 1982; Eddy and Underhill 1974). In the Ozarks Aquatic Subregion, it prefers deep rocky-bottomed pools below riffles and is associated with water willow (*Justicia*), boulders or submerged logs. The rock bass avoids reservoirs and its young prefer protected backwaters and dense aquatic vegetation, such as parrotfeather (*Myriophyllum*) (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 3) and ([GradsegR] >= 5) and ([Flow] = 1) and ([DlinkR] >= 4) and ([DlinkR] <= 7)) or (([Linkr] >= 4) and ([Linkr] <= 7))
DlinkR is done.

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 3) and ([State] = “MO”)

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Rosyface Shiner

Notropis rubellus

Native: Yes

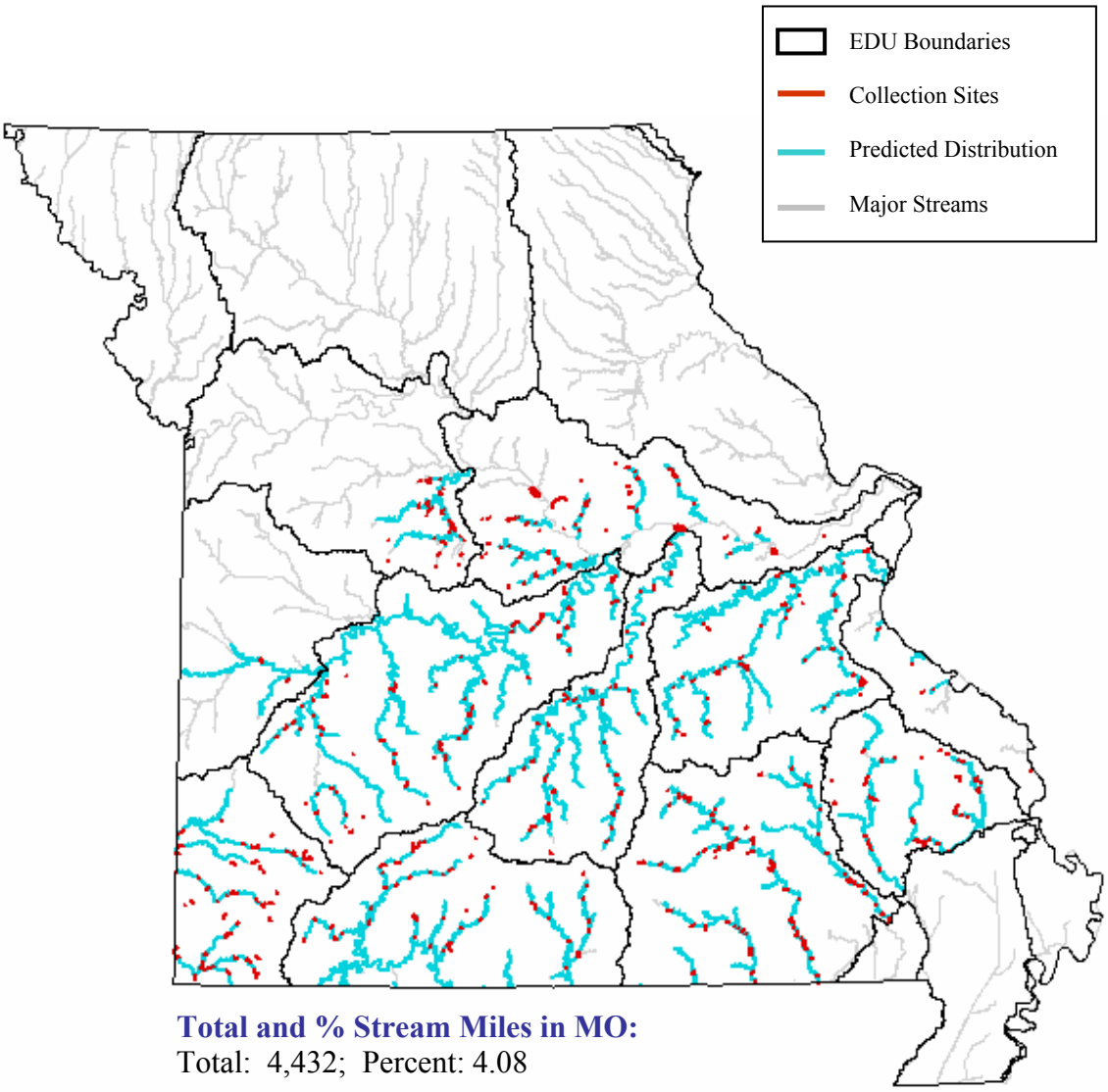
Endemism: Subzone

State Rank: S?

ITIS Code: 163409

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 4,432; Percent: 4.08

State Range:
One of the most abundant minnows of the Ozarks, the rosyface shiner occurs throughout the primary stream drainages of the Ozark Aquatic Subregion. It is also occurs in the Plains Aquatic Subregion; in southern tributaries to the Missouri River adjacent to the Moreau/Loutre Ecological Drainage Unit (EDU) and border in the western edge of the Ozark/Osage EDU (Pflieger 1997).

Habitat Affinities:
The rosyface shiner inhabits permanent, clear streams with moderate to high gradient and bottoms of clean gravel, sandy gravel, rock, bedrock, or boulders (Pflieger 1997; Trautman 1957; Robinson and Buchanan 1988; Cross and Collins 1975). It avoids extreme headwater areas and is intolerant of excessive turbidity and silt-covered bottoms (Pflieger 1971; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). However, Etnier and Starnes (1993) note that it is much more likely to occur in large silty rivers than other members of its genus. In Missouri, the rosyface shiner is most populous in medium to medium-large rivers close to riffles and pools with current (Pflieger 1997). The distribution of this shiner has been negatively affected by siltation and reservoir construction (Pflieger 1997, Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 5) and ([GradsegR] >= 1) and ([GradsegR] <= 4)) or (([Linkr] >= 6))

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Rudd

Scardinius erythrophthalmus

Native: No

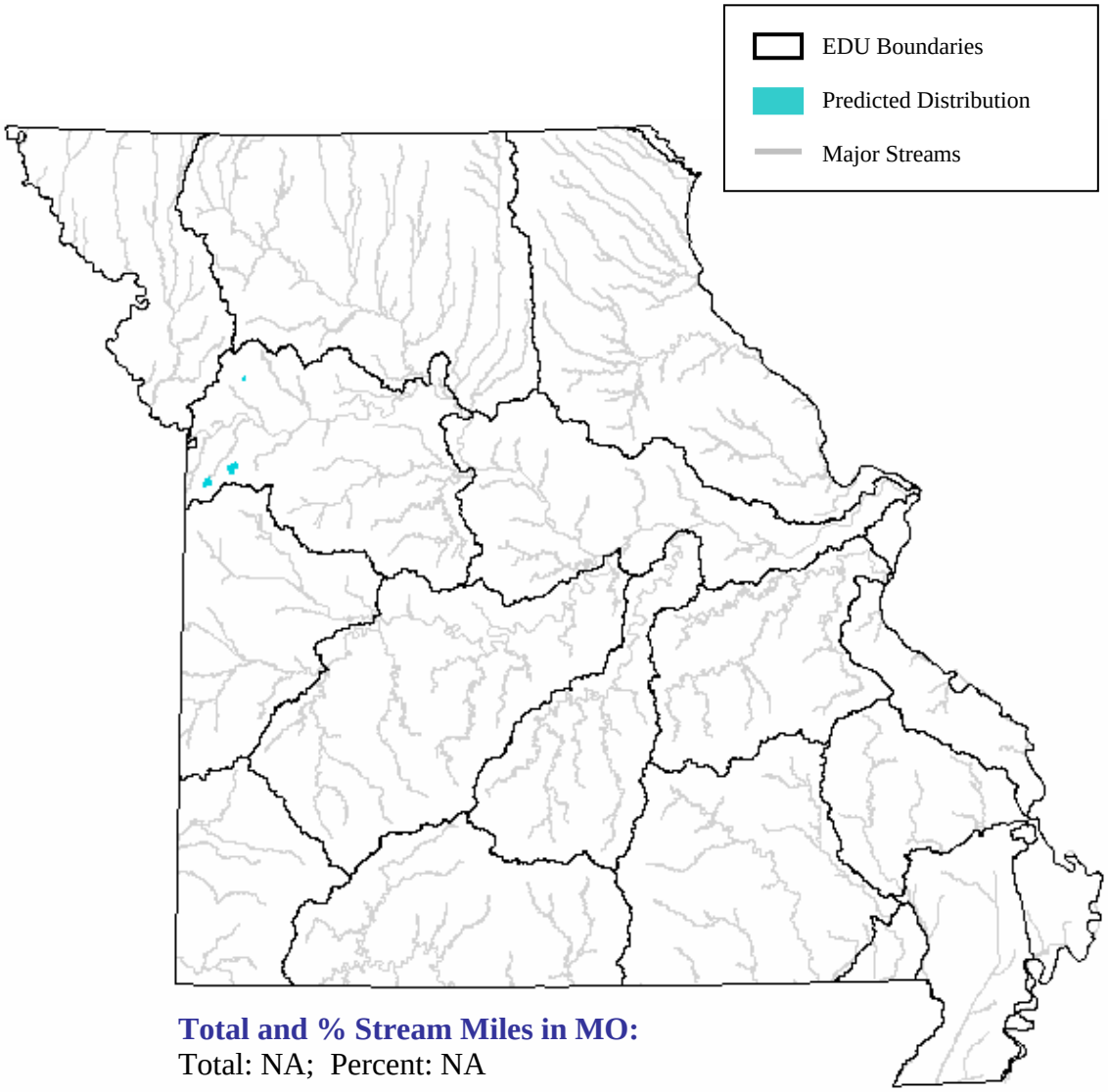
Endemism: NA

State Rank: SE

ITIS Code: 163613

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:

The rudd is native to Europe and Central Asia. It was introduced to North America as an ornamental fish in the early 1900's (Pflieger, 1997). In the early 1980's, it was widely sold as bait in Missouri and other Midwestern states. In Missouri, it has only been collected from three lakes (Watkins Mill, Longview Lake and Lake Jacomo) in the western part of the Central Plains Subregion near Kansas City (Jake Allman, pers. comm..; cited in Pflieger, 1997). There is no evidence that any of these releases have resulted in the establishment of self-sustaining populations (Pflieger, 1997).

Habitat Affinities:

The rudd inhabits still or slow backwaters and pools of sluggish streams, and the shallow edges of ponds and lakes. It is often associated with dense submergent vegetation where it deposits adhesive eggs (Pflieger, 1997; Crossman, 1992).

Predictive Model(s):

Lake Model

The distribution is in selected lakes, based upon professional review.

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Sabine Shiner

Notropis sabinae

Native: Yes

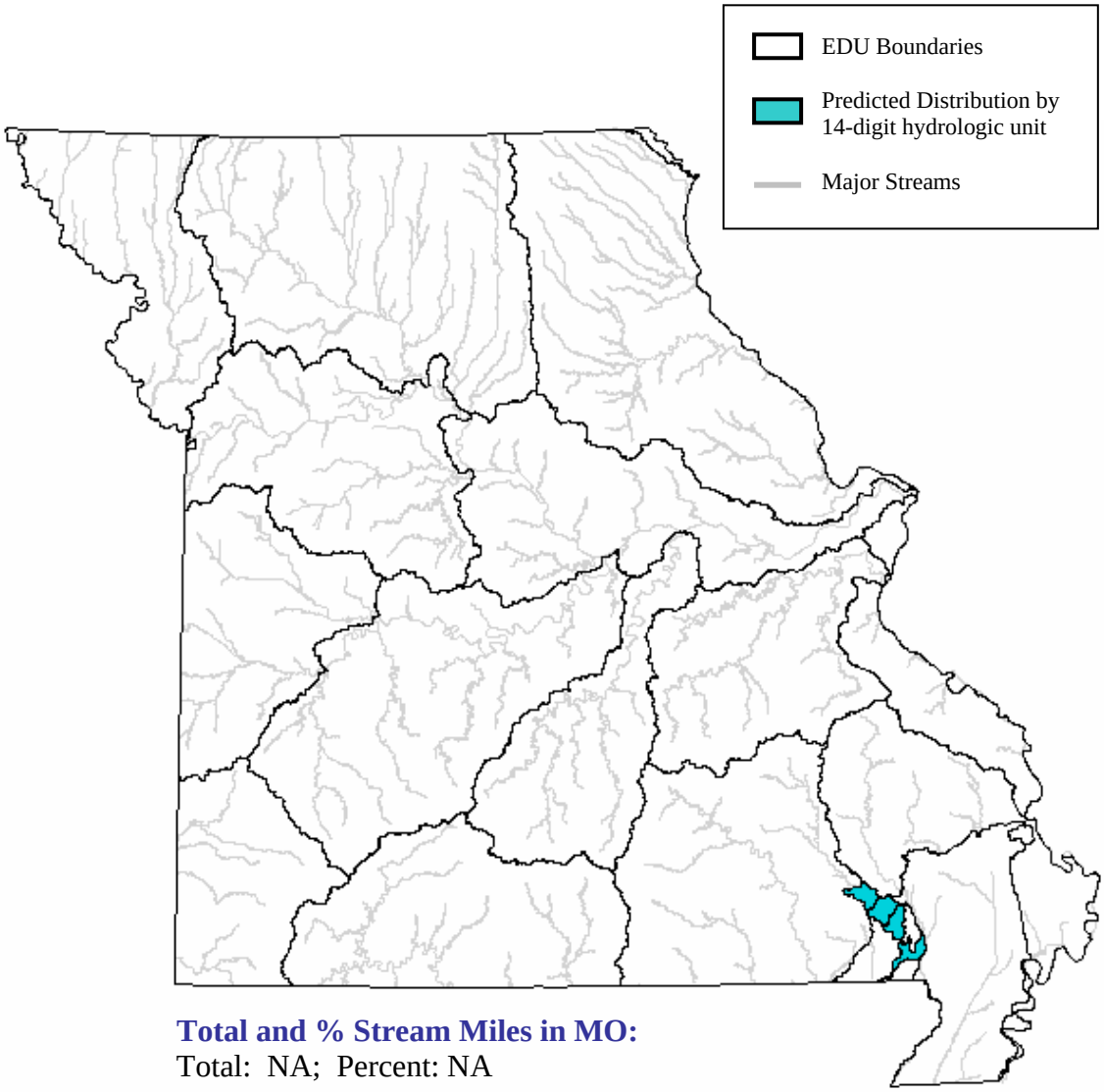
Endemism: EDU

State Rank: S1

ITIS Code: 163463

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:

The Sabine shiner has been collected only from the Black River where it flows from the Ozark Aquatic Subregion into the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The Sabine shiner is found in moderately clear, large rivers over bottoms of fine, silt-free sand and gravel bottoms. It is a bottom dweller and has been collected mostly near sand bars with some current (Pflieger 1997; Robinson and Buchanan 1988). In Missouri, the Sabine shiner inhabited the Black River, which is narrow and deep with moderately clear water and a substrate composed primarily of fine, silt-free sand or small gravel. It was collected adjacent to sand bars in slight to moderate current (Pflieger 1971; Pflieger 1997).

Predictive Model(s):

Ozark Model/ Mississippi Alluvial Basin Model
The distribution is based upon existing collection records and professional review.

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Saddleback Darter

Percina vigil

Native: Yes

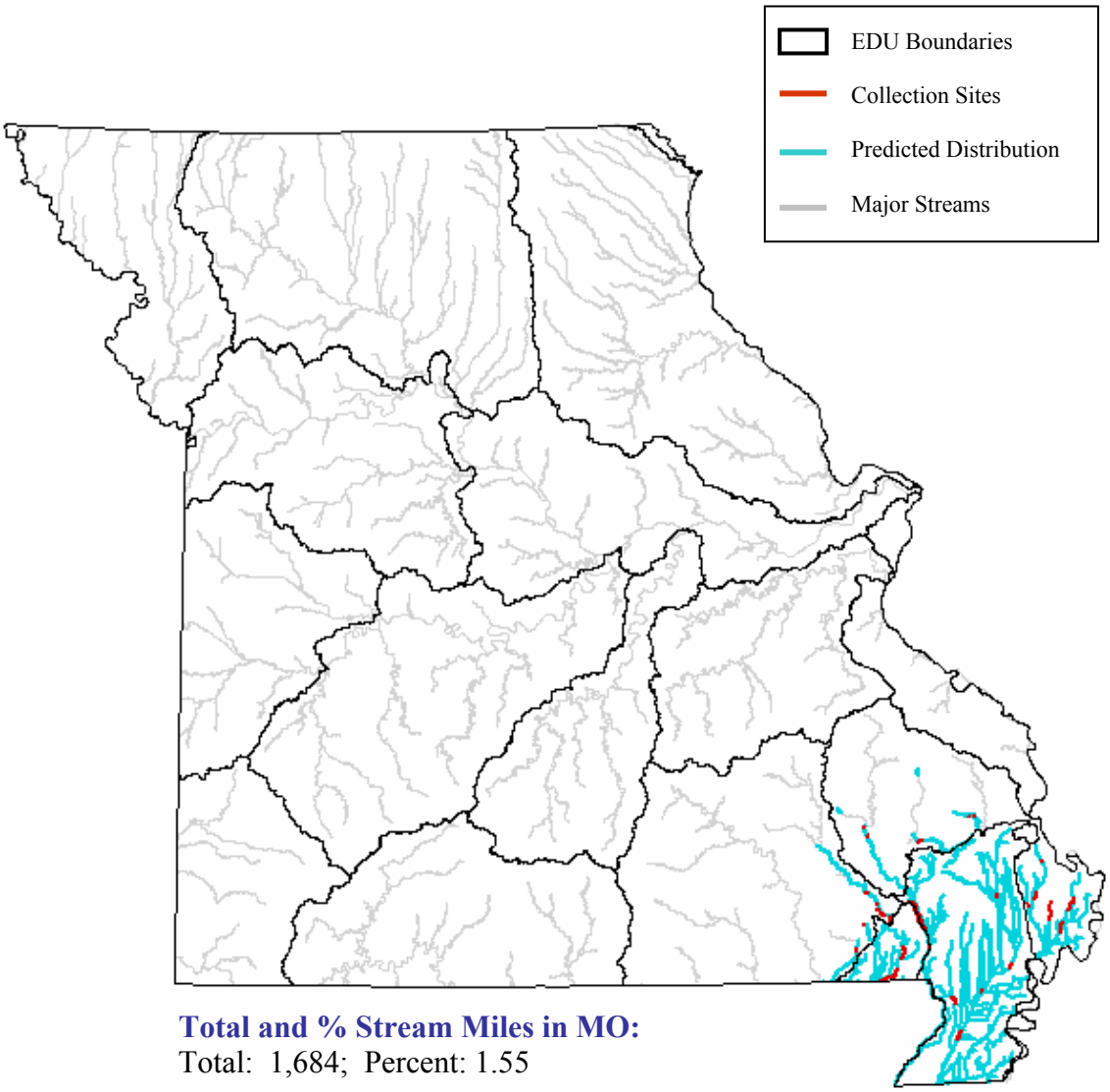
Endemism: Region

State Rank: S?

ITIS Code: 168503

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,684; Percent: 1.55

State Range:

The saddleback darter is found in the Mississippi Alluvial Basin Aquatic Subregion and adjoining portions of the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The saddleback darter is found mostly in shallow to moderately-deep riffles of large streams and rivers having sand or gravel bottoms (Pflieger, 1997; Etnier and Starnes 1993; Robinson and Buchanan 1988). In the Mississippi Alluvial Basin Aquatic Subregion, it is found in moderate-sized rivers and ditches with silt-free sand and fine gravel bottoms and moderate or low gradients. It generally inhabits shallower, slower water than its relative, the stargazing darter but requires permanent flow (Pflieger 1997). The saddleback darter cannot tolerate silt and avoids pools and sluggish waters (Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] = 5) and ([Rgrad_subr] = 1)) or (([Linkr] >= 6))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 2) and ([Ssize_code] <= 4) and ([State] = "MO")

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Sand Shiner

Notropis stramineus

Native: Yes

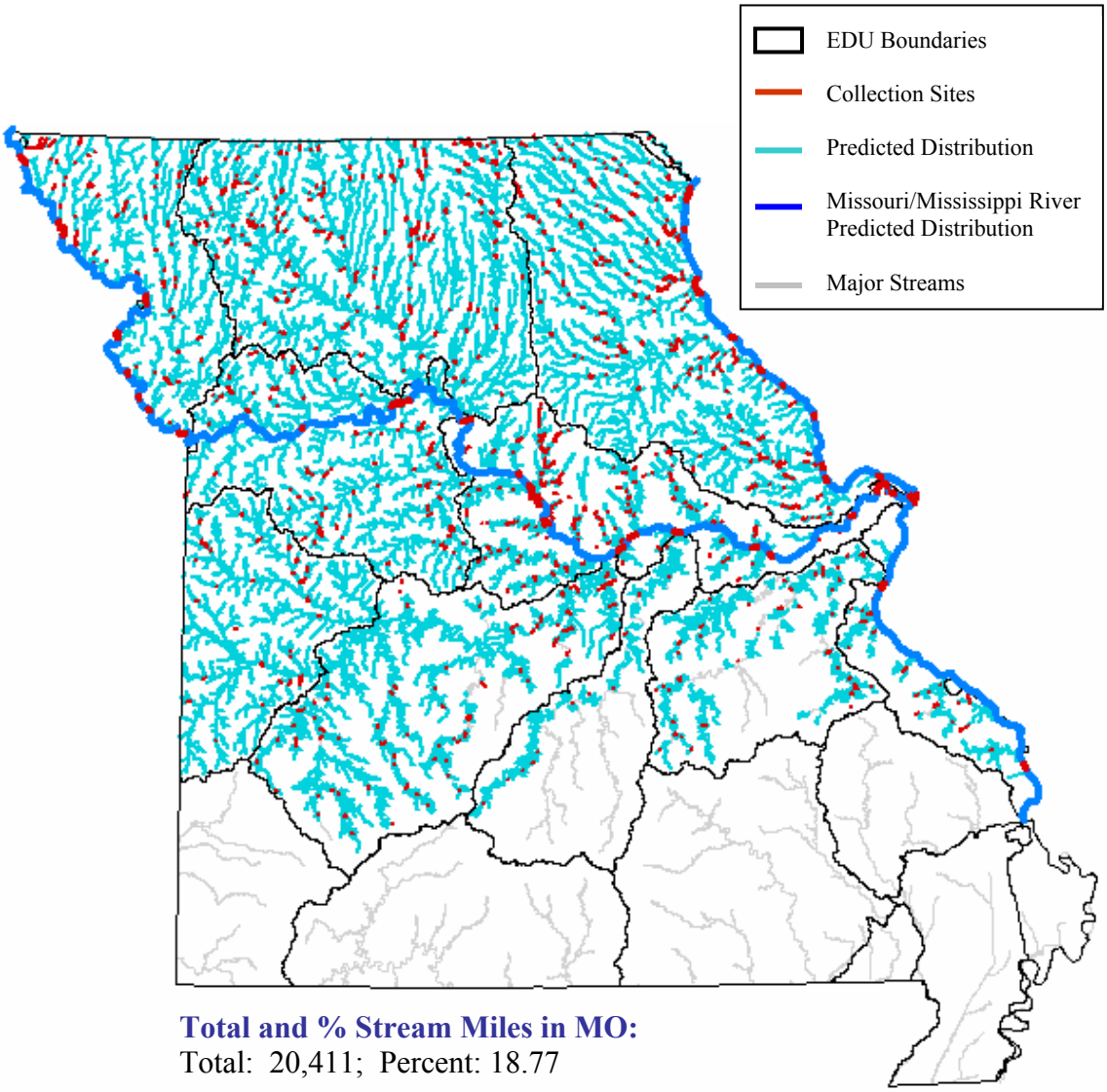
Endemism: Subzone

State Rank: S?

ITIS Code: 163419

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 20,411; Percent: 18.77

State Range:

The sand shiner is widely distributed in the Central Plains Aquatic Subregion and penetrates south into the Ozark Aquatic Subregion, but is absent from the Neosho, White, Black/Current and Upper St. Francis/Castor Ecological Drainage Units (EDU), and all of the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The sand shiner inhabits a wide variety of streams and rivers and can tolerate a wide range of turbidities, as well as some organic pollutants, provided they do not cover the bottom (Pflieger 1971; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It is invariably found over clean sand or fine gravel within quiet to flowing, shallow pools (Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988). In Missouri, it occurs in all flowing waters, excepting the largest rivers, and is most abundant in the shallow pools of permanently flowing creeks and small rivers with moderate turbidity, low to moderate gradients and sand substrates (Pflieger 1997).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 2)

Ozark Model
Query 1: ([Temp_code] = 2)
Query 2: (([Linkr] >= 1) and ([Linkr] <= 2) and ([DlinkR] >= 4)) or (([Linkr] = 3) and ([Rgrad_subr] = 1)) or (([Linkr] >= 4) and ([Linkr] <= 7) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2) and ([Flow] = 1)) or (([Linkr] >= 8))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Sauger

Stizostedion canadense

Native: Yes

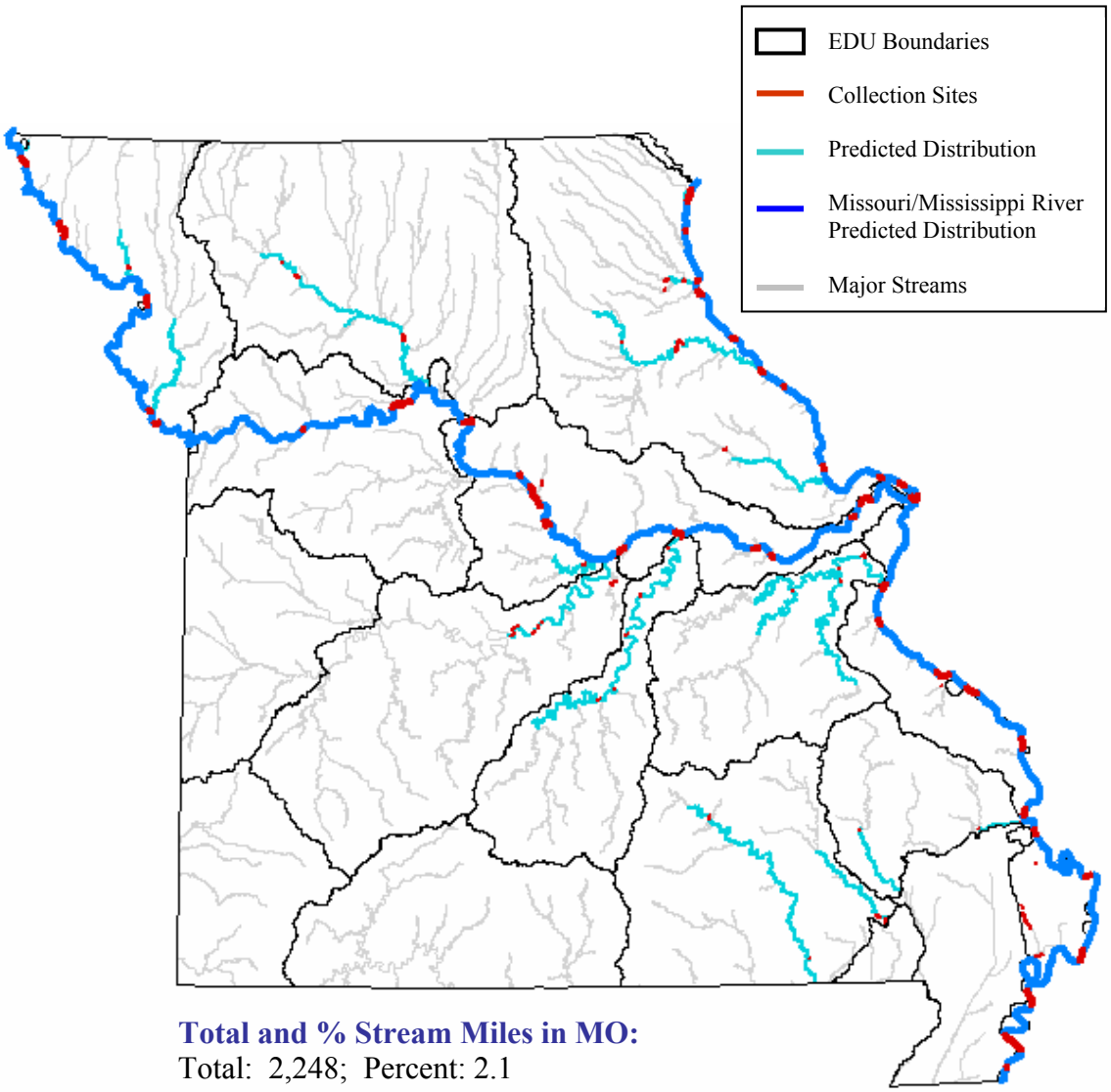
Endemism: Subzone

State Rank: S?

ITIS Code: 168509

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 2,248; Percent: 2.1

State Range:
The sauger is primarily found in the Missouri and Mississippi Rivers, but it occurs sporadically in various parts of each of the Aquatic Subregions (Pflieger 1997).

Habitat Affinities:
The sauger mainly inhabits moderate to large, turbid rivers and the shallower areas of lakes (Cross and Collins 1975; Douglas 1974; Pflieger 1997; Robinson and Buchanan 1988; Phillips et. al. 1982; Trautman 1957), but it has also been successful in impoundments and reservoirs in some parts of its range (Clay 1975; Etnier and Starnes 1993). The sauger is often found in large, free-flowing streams near the ends of rock dikes with moderate to strong current over rocky substrates, and spawns over silt-free rip-rap (Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Upper Left: Photo courtesy of the Native Fish Conservancy, http://www.nativefish.org.

Upper Right: Photo courtesy of the Missouri Department of Conservation, Missouri Fish and Wildlife Information System, http://www.conservation.state.mo.us.

Scaly Sand Darter

Ammocrypta vivax

Native: Yes

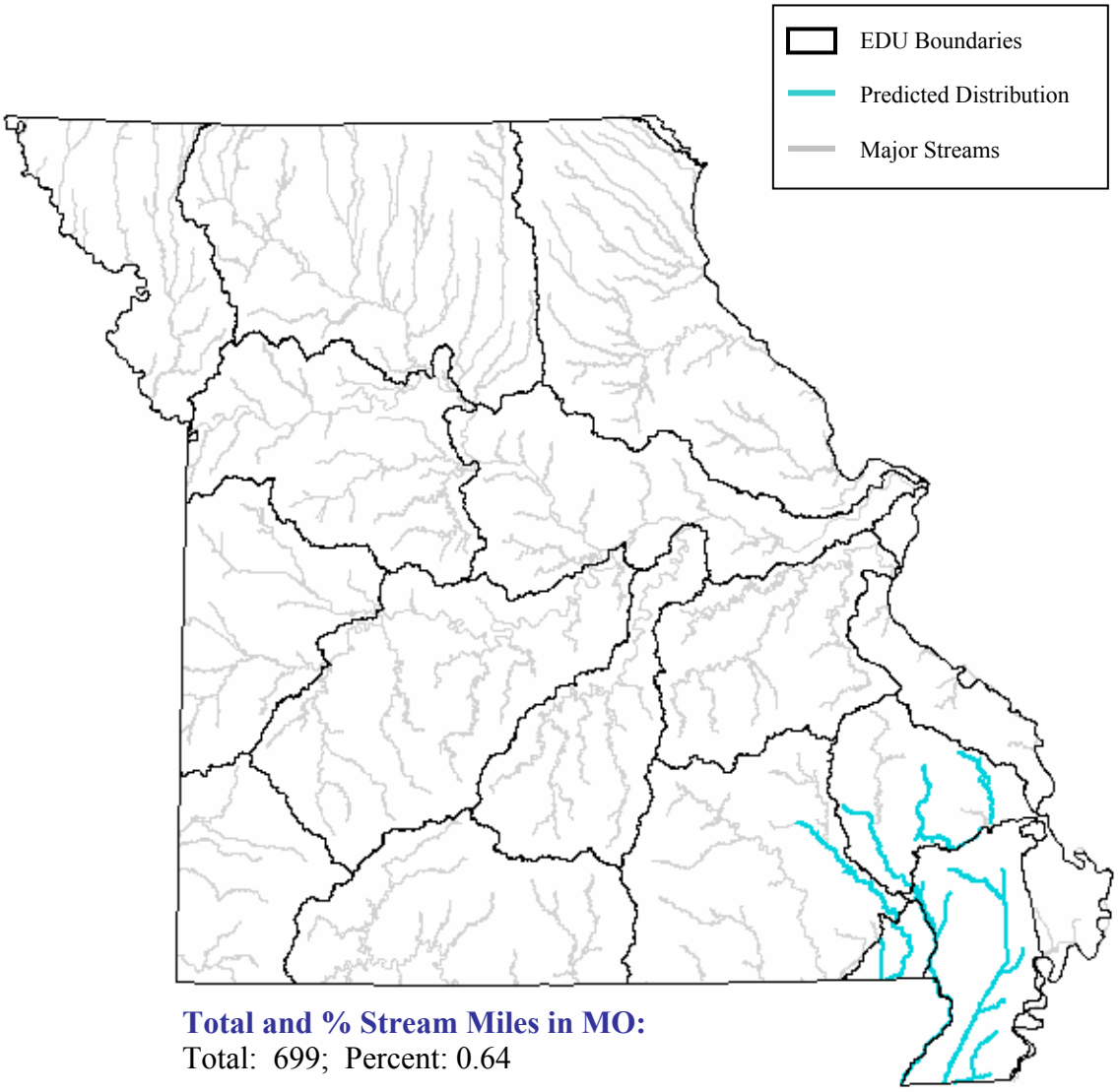
Endemism: Region

State Rank: S3

ITIS Code: 168518

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 699; Percent: 0.64

State Range:

The scaly sand darter is found in the Black, St. Francis, Headwater Diversion, and Little River drainage system of the Mississippi Alluvial Basin Aquatic Subregion and immediately adjacent sections of the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The scaly sand darter characteristically inhabits the shallow, sandy-bottomed areas of moderate-sized rivers and tributary streams of medium to large size (Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). The scaly sand darter prefers moderate current, and is occasionally found over mixed substrates of sand and fine gravel, and it can tolerate mild siltation and turbidity (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Mississippi Alluvial Basin (MAB) Aquatic Subregion, it achieves greatest abundance in large ditches with sparse vegetation, and prefers the low-gradient, downstream sections of rivers entering the MAB from Ozark Aquatic Subregion (Pflieger 1997).

Predictive Model(s):

Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] = 1) and ([DlinkR] >= 6) and ([DlinkR] <= 8)) or (([Linkr] >= 5)) DlinkR is done.

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

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Shadow Bass

Ambloplites ariommus

Native: Yes

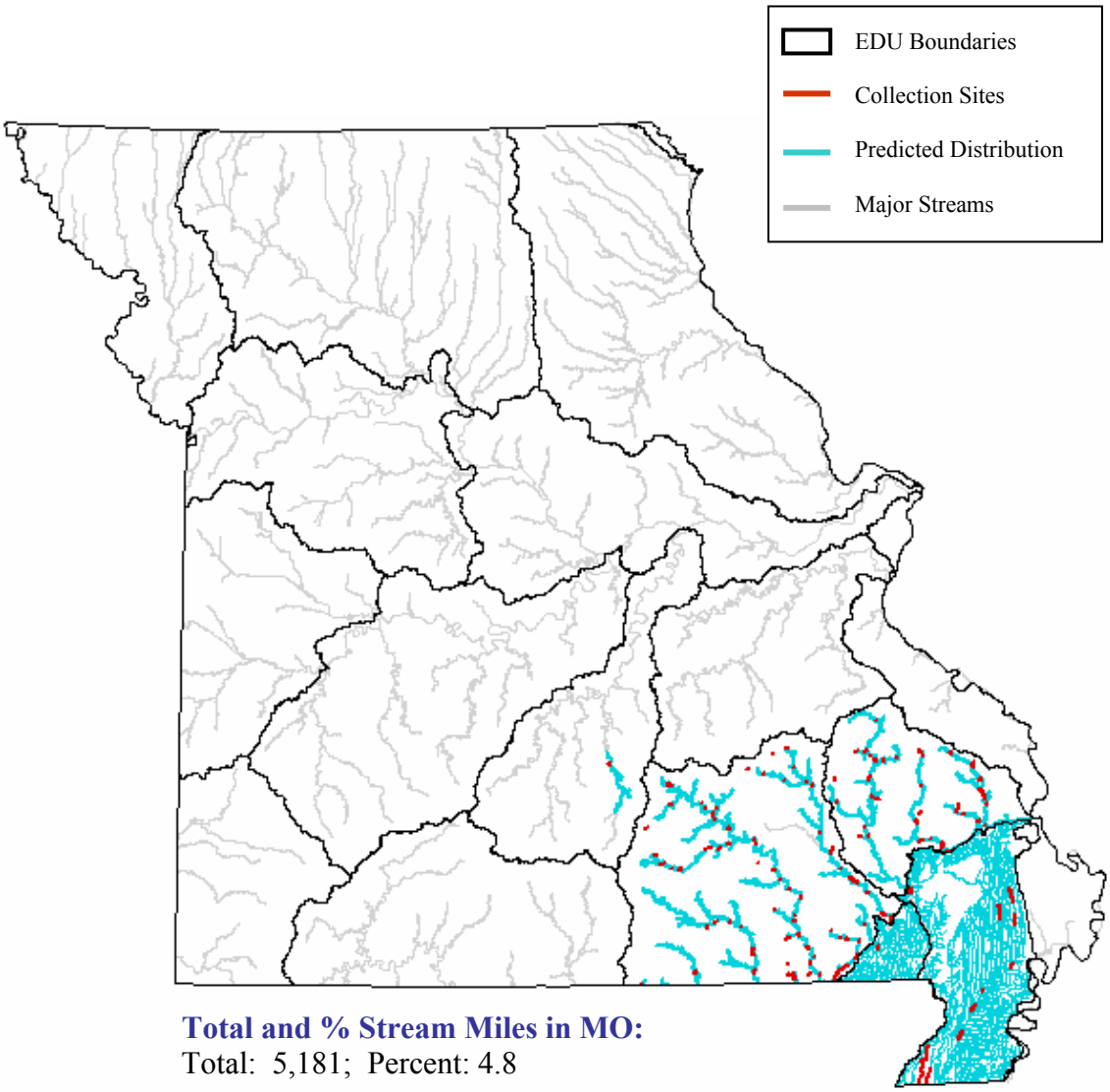
Endemism: Region

State Rank: S?

ITIS Code: 168099

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,181; Percent: 4.8

State Range:

The shadow bass primarily occurs in the Upper St. Francis/Castor and Black/Current Ecological Drainage Units (EDU) and adjacent sections of the Gasconade EDU and Mississippi Alluvial Basin (MAB) Aquatic Subregion. Small, localized populations in ditches of the central MAB Aquatic Subregion comprise a secondary area of occurrence (Pflieger 1997).

Habitat Affinities:

The shadow bass inhabits clear, moderate to high-gradient mountain streams and the clearer ditches of lowland areas (Pflieger 1997; Robinson and Buchanan 1988). In upland areas, its microhabitat is characterized by moderate to strong flowing pools with silt-free, rocky bottoms and abundant cover in the form of logs, brush, boulders or dense beds of vegetation, such as water willow (*Justicia*) (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). While in lowland areas, the shadow bass prefers areas of clear ditches with strong current and abundant aquatic vegetation (Pflieger 1997). The shadow bass does not tolerate high turbidity or siltation (Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 3) and ([GradsegR] >= 5) and ([Flow] = 1) and ([DlinkR] >= 4) and ([DlinkR] <= 7)) or (([Linkr] >= 4) and ([Linkr] <= 7))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 3) and ([State] = "MO")

References:

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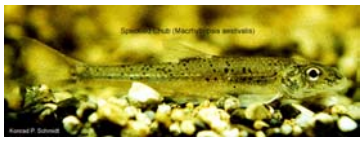


Shoal Chub

Macrhybopsis hyostoma

Native: Yes

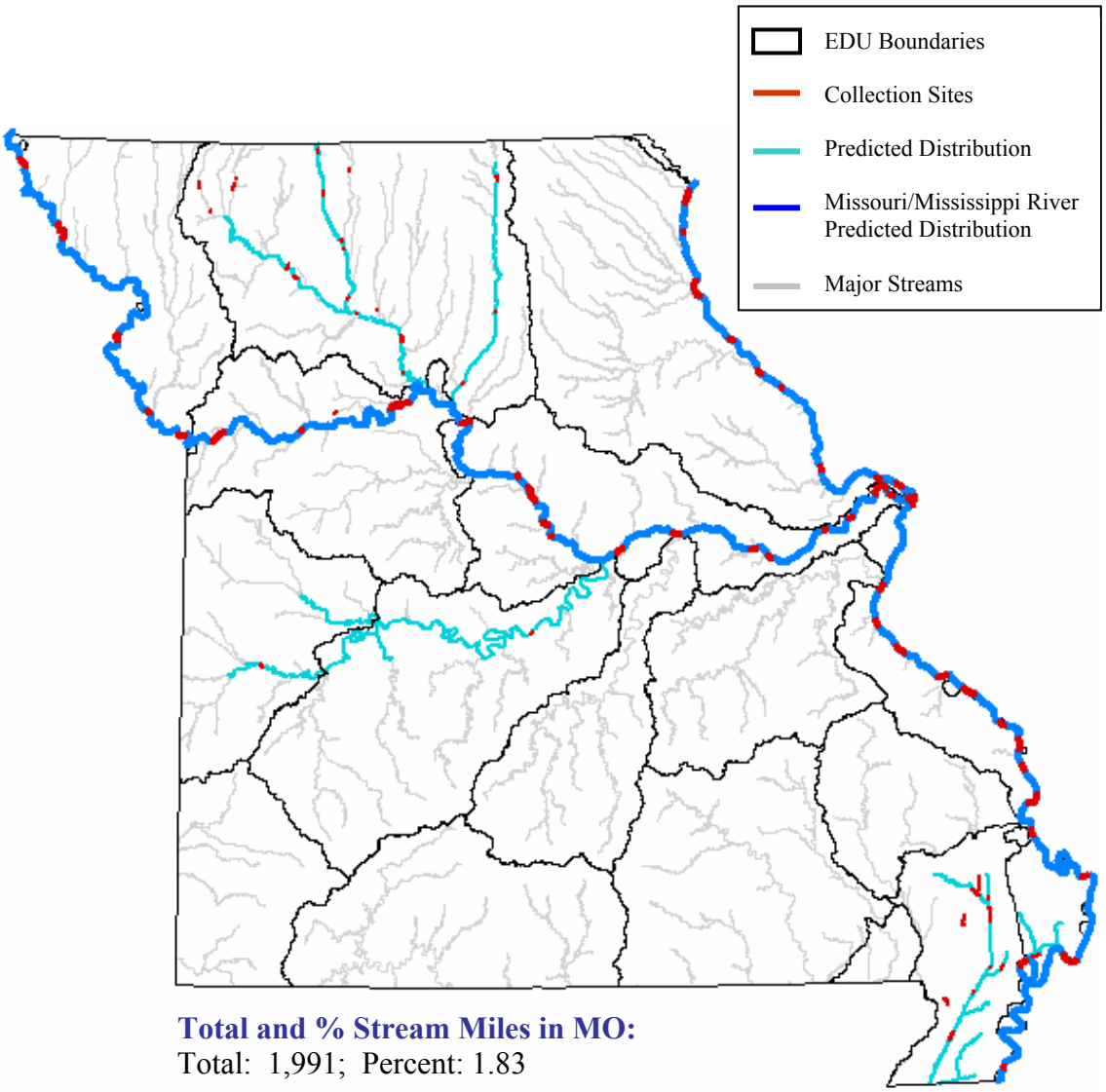
Endemism: Region

State Rank: S?

ITIS Code: 553280

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,991; Percent: 1.83

State Range:
Recent systematic revision by Eisenhour (1999) of the *M. aestivalis* complex, formerly known as the speckled chub (name used Pflieger 1997), recognizes several distinct species. *M. hyostoma* and the closely related *M. tetranema* occur in the Midwest. However, *M. hyostoma*, or the shoal chub, is the form that occurs in Missouri.
The shoal chub is a common and characteristic of the Mississippi and Missouri Rivers. It also occurs in large Plains rivers and the larger ditches of the Mississippi Alluvial Basin. While populations have increased considerably in the Missouri River from 1940 to 1980, there has been a decline in the Mississippi River (Pflieger 1997).

Habitat Affinities:
The shoal chub inhabits medium to large streams and large rivers with permanent flow and continuous high turbidity (Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982). It feeds in shallow areas at night and is usually found in open channels with moderate to swift current, primarily over clean, fine sand, but also fine gravel (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). In Missouri, it is found in the swift current of large, low-gradient streams with turbid to moderately clear water and fine sand or small gravel substrates (Pflieger 1997). Cross and Collins (1975) note that the shoal chub avoids sluggish waters and silted bottoms.

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Shorthead Redhorse

Moxostoma macrolepidotum

Native: Yes

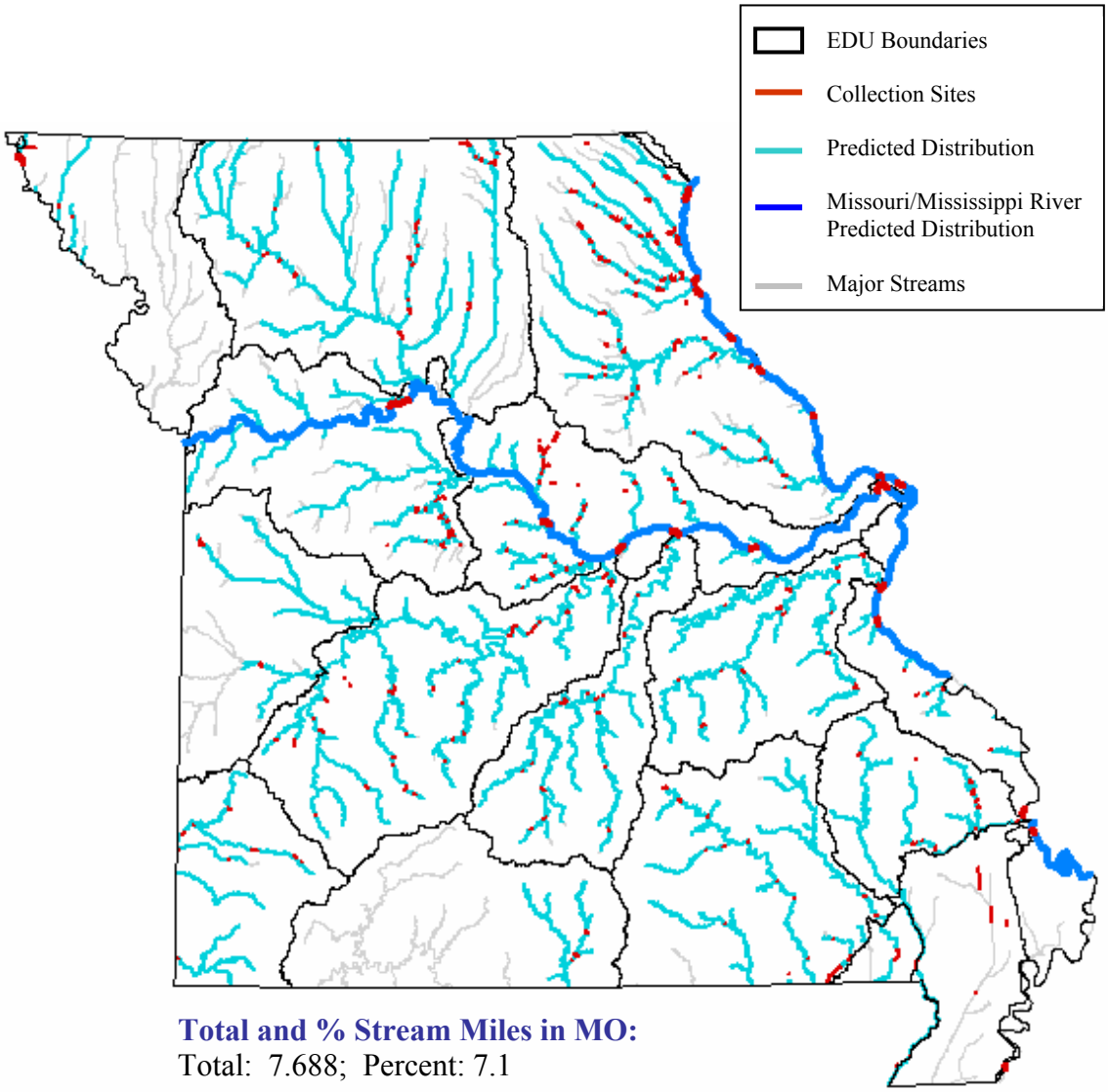
Endemism: Subzone

State Rank: S?

ITIS Code: 163928

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 7.688; Percent: 7.1

State Range:

The shorthead redhorse is found in most streams throughout the state, except within the White River drainage. In moderate-sized streams of northeast Central Plains Aquatic Subregion and downstream sections of large Ozarks Rivers, it is the most abundant redhorse (Pflieger 1997).

Habitat Affinities:

Over its entire range, the shorthead redhorse is adapted to a wide variety of habitats and is able to tolerate more turbidity than other redhorses (Phillips et. al. 1982; Robinson and Buchanan 1988), although populations tend to be smaller (Pflieger 1997; Trautman 1957). It is abundant in large streams and moderately large rivers (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988), but is also common in the clear, shallow waters of northern lakes (Phillips et. al. 1982; Trautman 1957), and occasionally inhabits the inflows of reservoirs (Etnier and Starnes 1993). The shorthead redhorse prefers moderate to swift currents, often adjacent to riffles, and silt-free substrates of gravel and rock, or mixtures of sand and gravel (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Missouri, it occurs in both larger streams with strong current, near riffles, and in the sluggish pools of smaller streams (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Linkr] >= 5)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = “MO”)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Shortnose Gar

Lepisosteus platostomus

Native: Yes

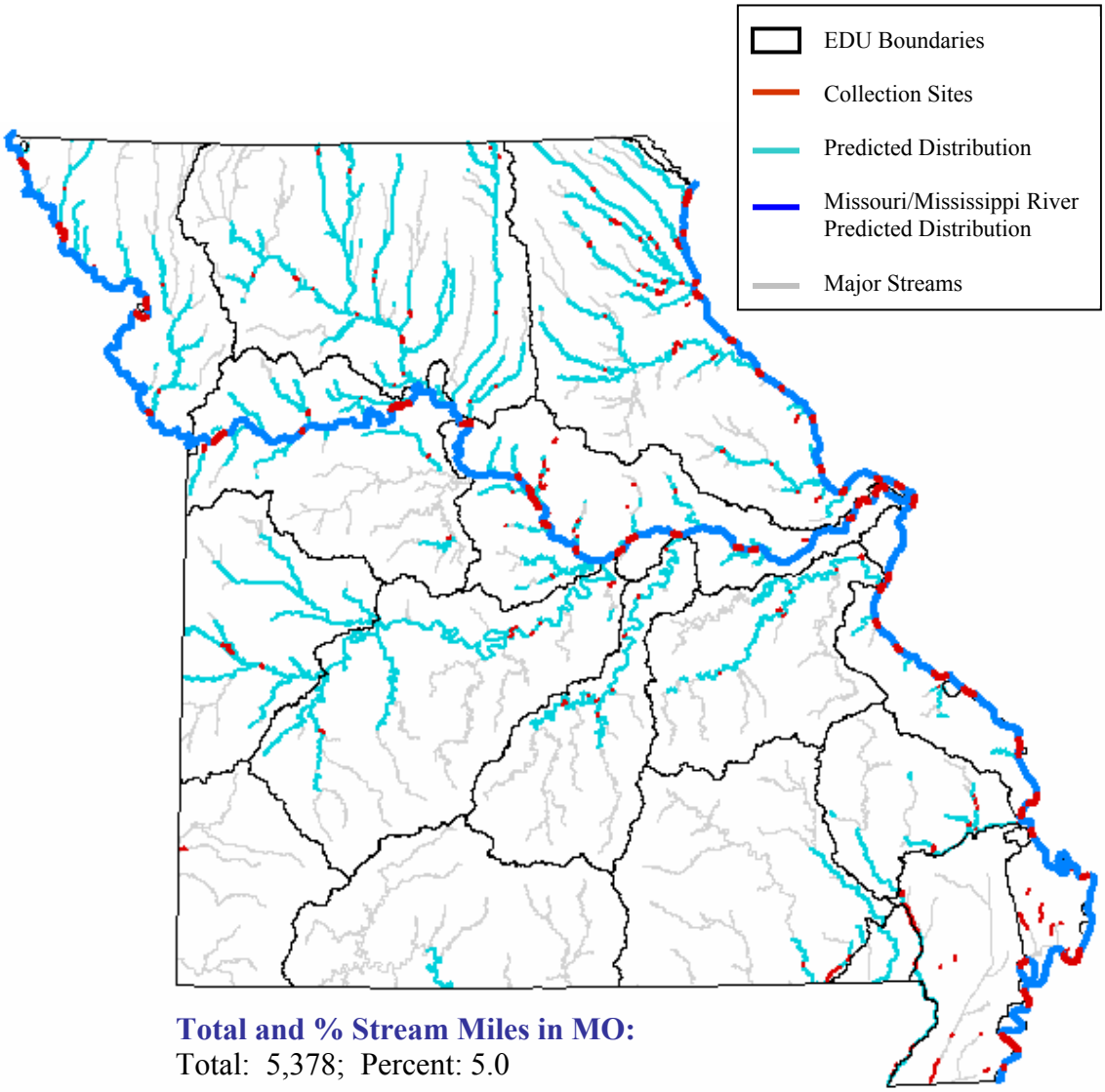
Endemism: Region

State Rank: S?

ITIS Code: 161096

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,378; Percent: 5.0

State Range:

The shortnose gar is found throughout each of the Aquatic Subregions of Missouri, avoiding only the central Ozarks (Pflieger 1997).

Habitat Affinities:

The shortnose gar is found in lowland lakes, oxbows, quiet backwaters and overflow areas along large, low gradient rivers and streams (Douglas 1974; Phillips et. al. 1982; Robinson and Buchanan 1988; Etnier and Starnes 1993; Trautman 1957). However, in Kansas, Clay (1975) reports that it avoids backwaters, oxbows, and impoundments, which are more often inhabited by the spotted and longnose gars. The shortnose gar is abundant in clear, quiet pools with sand or mud bottoms (Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). It tolerates higher siltation, turbidity and stronger current than other gars and is not as dependent on aquatic vegetation (Etnier and Starnes 1993; Pflieger 1997; Trautman 1957). In the Ozark Aquatic Subregion, the shortnose gar is common in quiet pools, backwaters and oxbow lakes, and in the Central Plains Aquatic Subregion, it inhabits large, permanent pools (Pflieger 1997).

Predictive Model(s):

Central Plains Model
Query 1: ([Temp_code] = 2)
Query 2: (([Linkr] = 4) and ([Rgrad_subr] = 1)) or (([Linkr] >= 5))

Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([LinkR] >= 5) and ([Rgrad_subr] = 1)) or ([LinkR] >= 7)

Ozark Model for Spring River
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([LinkR] >= 5) and ([Rgrad_subr] = 2))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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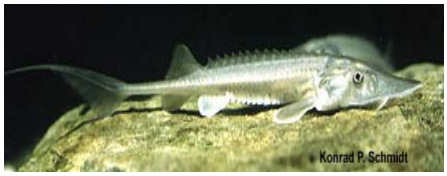
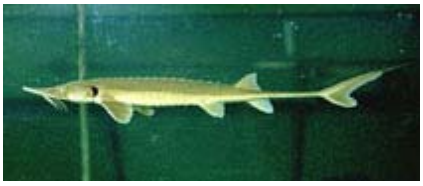


Shovelnose Sturgeon

Scaphirhynchus platorynchus



Native: Yes

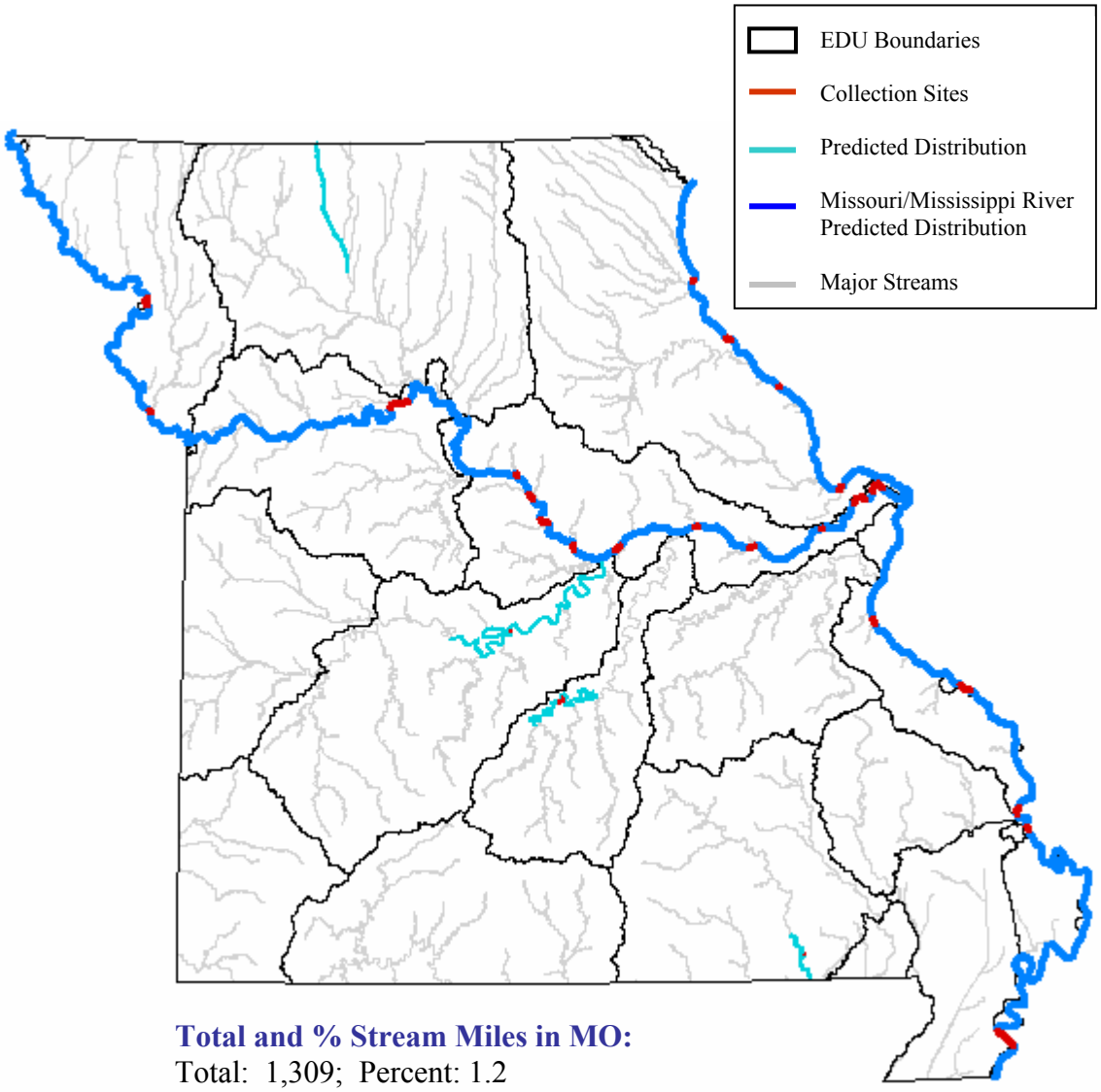
Endemism: Region

State Rank: S?

ITIS Code: 161082

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,309; Percent: 1.2

State Range:

The shovelnose sturgeon has been declining in the Mississippi and Missouri Rivers since the 1900's but it is still one of the most abundant sturgeons. Additionally, large populations in the Nianuga and Osage Rivers probably existed before dams were constructed (Pflieger 1997).

Habitat Affinities:

The shovelnose sturgeon inhabits the open flowing channels of large rivers with moderate to strong currents and clean sandy or gravelly bottoms (Douglas 1974; Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957; Pflieger 1997). It feeds over deep chutes or shallow bars and can tolerate high turbidity (Robinson and Buchanan 1988; Trautman 1957; Pflieger 1997). In Missouri, the shovelnose sturgeon is found at the bottom of open channels in large rivers with swift current and sand or gravel substrates (Pflieger 1997). Impoundments are a major threat to the shovelnose sturgeon as they block access to spawning grounds (Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Sicklefin Chub

Macrhybopsis meeki

Native: Yes

Endemism: Region

State Rank: S3

ITIS Code: 163868

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick

Total and % Stream Miles in MO:
Total: 870; Percent: 0.8

State Range:
The sicklefin chub is found throughout the Missouri River and the section of the Mississippi River below the mouth of the Missouri River (Pflieger 1997). It distribution is similar to that of the sturgeon chub (Pflieger 1971). The range of the sicklefin chub has expanded in the Missouri River as upstream reservoirs have been built, acting as sediment traps and extending the amount of firm, silt-free substrates (Pflieger and Grace 1987).

Habitat Affinities:
The sicklefin chub is found in the deep, swift waters of large, warm, turbid rivers with firm substrates of smooth sand or fine gravel (Cross and Collins 1975; Pflieger 1997; Smith 1979). In Missouri, the sicklefin chub inhabits the mainstem of large, turbid rivers in strong current (Pflieger 1997). The sicklefin chub spawns in flowing waters with rocky substrates.

Predictive Model(s):

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Silver Carp

Hypophthalmichthys molitrix

Native: No

Endemism: NA

State Rank: SE

ITIS Code: 163691

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick

Total and % Stream Miles in MO:
Total: 1,035; Percent: 0.95

State Range:
The silver carp probably occurs throughout the Missouri and Mississippi Rivers as well as the major tributaries to these rivers (Duane Chapman (USGS), personal communication).

Habitat Affinities:
The silver carp is native to the large rivers of eastern China and has adapted to lakes and reservoirs as well as large rivers and tributaries in the United States (Etnier and Starnes 1993; Freeze and Henderson 1982; Pflieger 1997). The silver carp moves about in the pelagic zone feeding on phytoplankton by filtering it through spongelike gill apparatus (Etnier and Starnes 1993; Freeze and Henderson 1982; Pflieger 1997).

Predictive Model(s):

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Silver Chub

Macrhybopsis storeriana

Native: Yes

Endemism: Region

State Rank: S3

ITIS Code: 163870

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick

Total and % Stream Miles in MO:
Total: 2,412; Percent: 2.22

State Range:

The silver chub was widely distributed and common in larger prairie streams of the Central Plains and the lower portions of some larger streams draining the northern Ozarks, but it has declined considerably in most of the state as reservoirs have been constructed and land uses have changed. Its remaining strongholds are the Missouri River and the Mississippi River below the mouth of the Ohio River (Pflieger 1997).

Habitat Affinities:

The silver chub inhabits lakes and large, low-gradient streams and rivers, where it prefers the deeper parts of the mainstem during the day, making it difficult to capture (Cross and Collins 1975; Clay 1975; Robinson and Buchanan 1988; Etnier and Starnes 1993). The silver chub is much easier to collect after dusk, as it migrates to shallow areas by the shoreline to feed on insects and other small invertebrates (Clay 1975; Robinson and Buchanan 1988). Some investigators note that this pool species is quite tolerant of silty, turbid streams and rivers (Clay 1975; Robinson and Buchanan 1988) but Trautman (1957) found that, in extremely turbid or silty areas, it resorted to riffles or clearer, high gradient tributaries. The silver chub prefers moderate to swift current and silty, sandy or gravelly substrates (Clay 1975; Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). In Missouri, the silver chub was mainly found in the quiet pools and backwaters of large streams (Pflieger 1997). In some areas, the silver chub is able to tolerate large reservoirs (Etnier and Starnes 1993; Pflieger 1997)

Predictive Model(s):

Central Plains/Ozark Model
Query 1: ([Temp_code] = 2)
Query 2: (([Linkr] = 5) and ([DlinkR] >= 6)) or (([Linkr] >= 6))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

References:

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Silver Lamprey

Ichthyomyzon unicuspis

Native: Yes

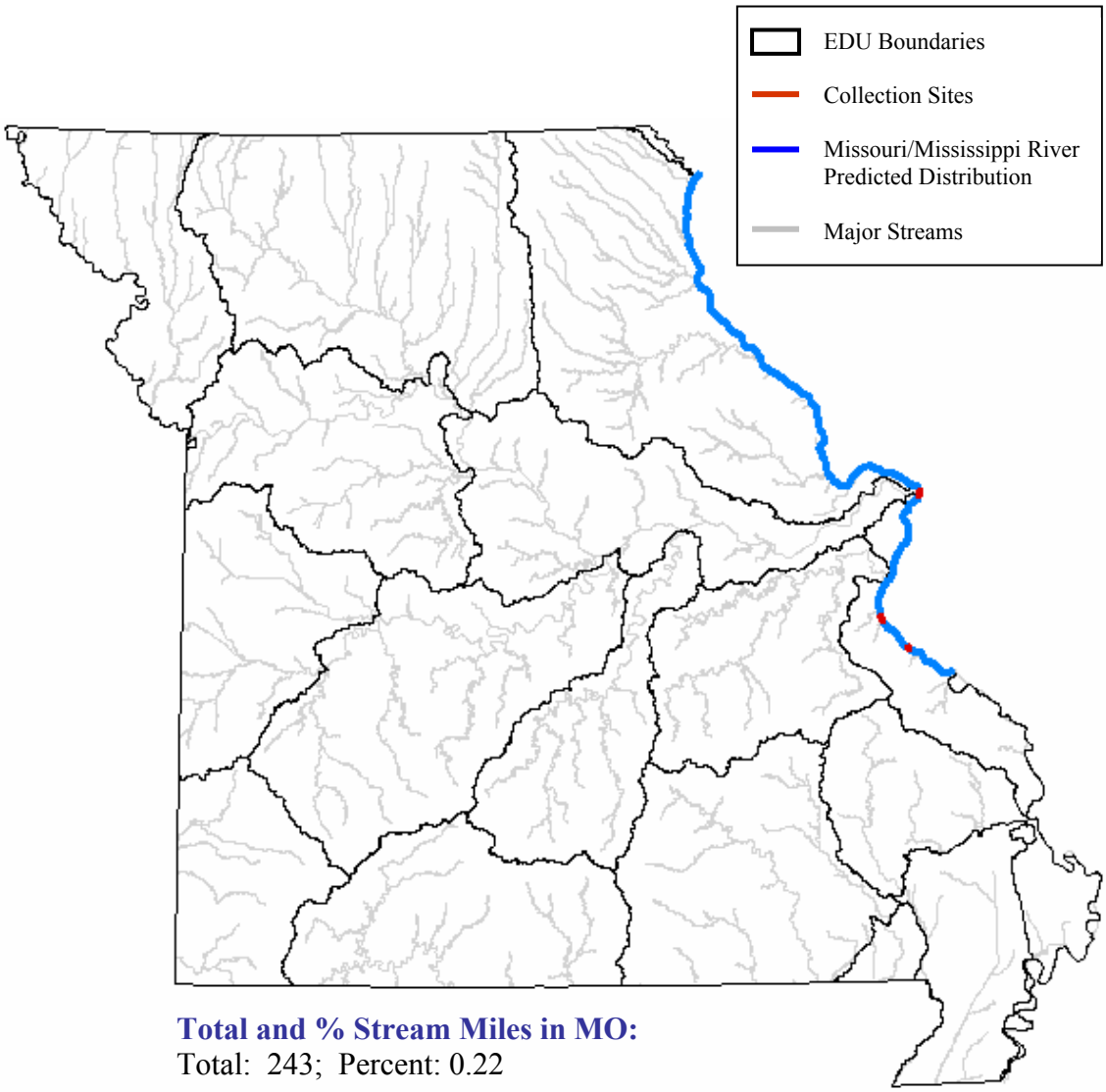
Endemism: Subzone

State Rank: S?

ITIS Code: 159730

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 243; Percent: 0.22

State Range:
The silver lamprey is not common in Missouri and has only been found in the northern parts of the Mississippi River. No larvae have been colleted from the state (Pflieger 1997).

Habitat Affinities:
The silver lamprey is mainly a northern species, inhabiting large streams, rivers and lakes (Eddy and Underhill 1974; Phillips et. al. 1982). The silver lamprey migrates into smaller streams and constructs nests in sandy and gravelly riffles to deposit larvae, which remain in these areas for early development. Adults drift into larger waters and prefer clean, clear water with bottoms of sand, gravel and organic debris, completely free of silt and pollutants (Pflieger 1997; Trautman 1957). In Missouri, the silver lamprey not common (Pflieger 1997), but it can be found in some large rivers of Tennessee and Kentucky, as well as Lake Erie in Ohio (Clay 1975; Etnier and Starnes 1993; Trautman 1957).

Predictive Model(s):

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Silver Redhorse

Moxostoma anisurum

Native: Yes

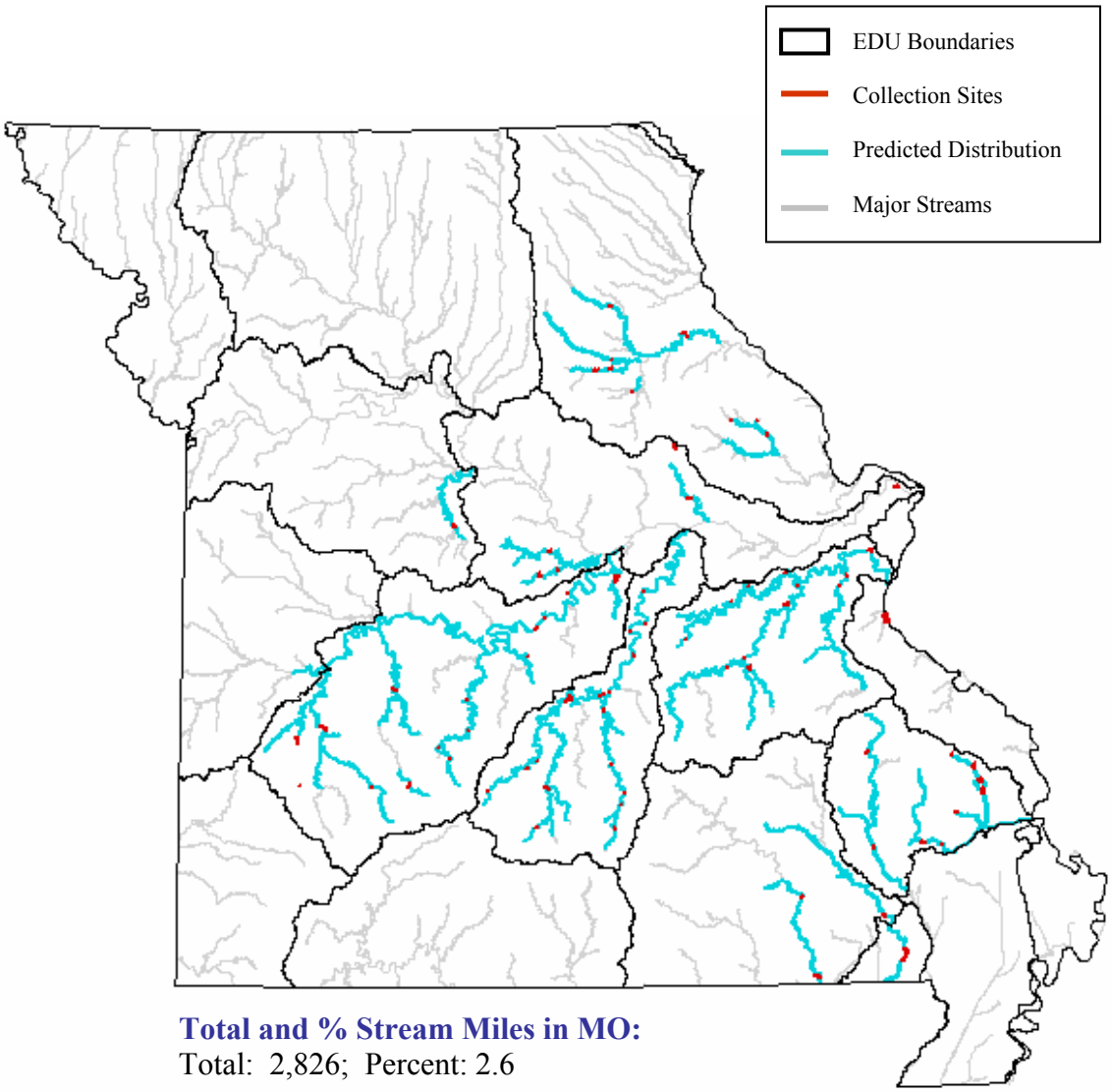
Endemism: Subzone

State Rank: S?

ITIS Code: 163933

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 2,826; Percent: 2.6

State Range:

The silver redhorse is widespread in the Ozark Aquatic Subregion but only abundant along its northern and eastern edges within the transition zone between the Plains Aquatic Subregion. Dam construction has caused the silver redhorse to decline in the Salt River system of the Plains Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The silver redhorse primarily inhabits medium to large streams with low gradients, but can also be found in moderately large rivers (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It avoids high gradients, spring-fed streams, and the largest rivers, and is especially sensitive to excessive turbidity, siltation, and industrial pollutants (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). The preferred microhabitat of the silver redhorse is long, deep pools with clear, sluggish water and rocky or gravelly bottoms (Robinson and Buchanan 1988; Trautman 1957). In Missouri, it was most often found in the deep, gravelly or rocky pools of moderate to large, permanently flowing streams with slight turbidity (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Linkr] >= 5)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = “MO”)

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Silverband Shiner

Notropis shumardi

Native: Yes

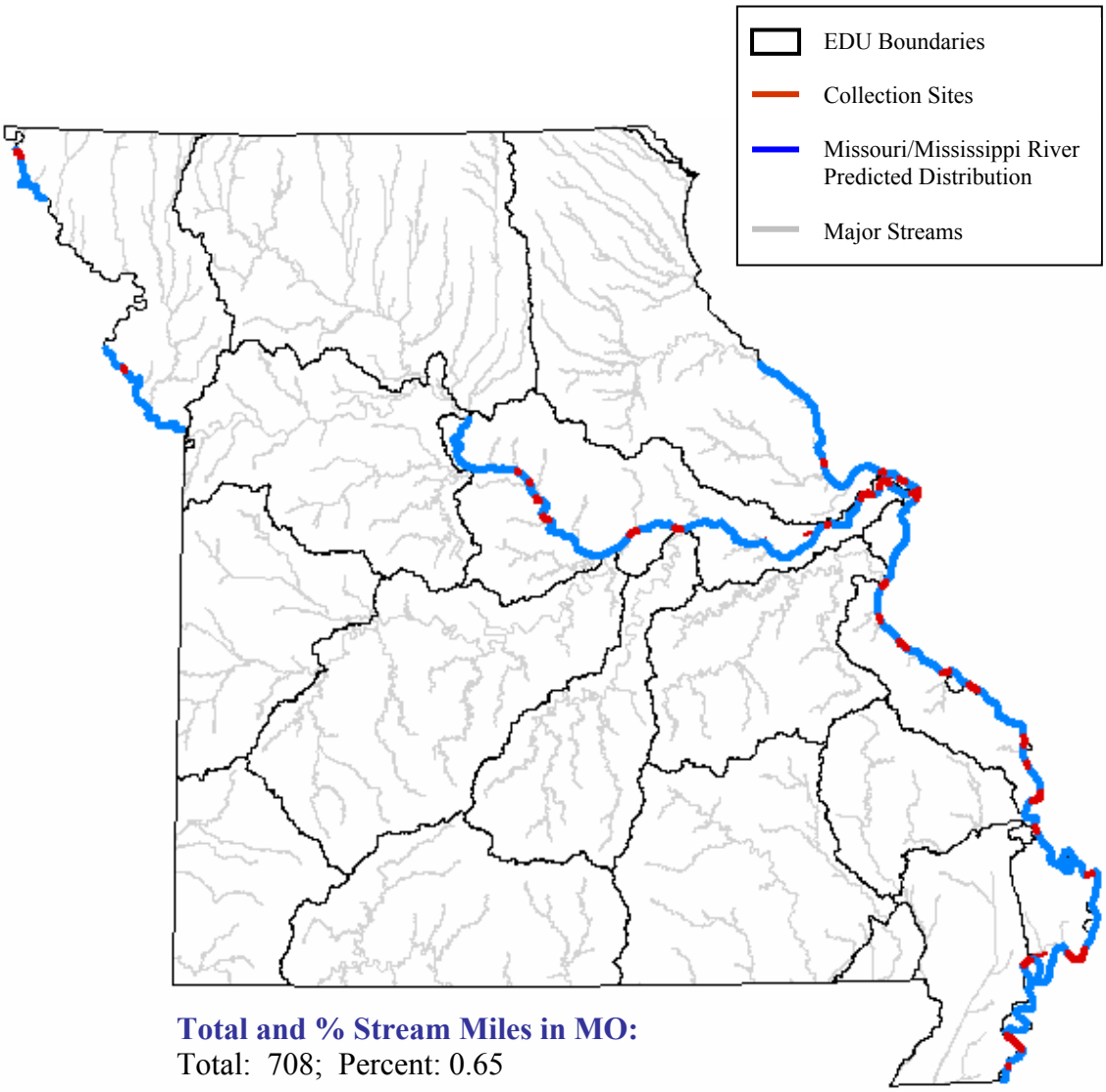
Endemism: Region

State Rank: S?

ITIS Code: 163417

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 708; Percent: 0.65

State Range:
The silverband shiner is most common in the lower Mississippi River and has a spotty distribution in the Missouri River. It rarely ventures into the lower sections of tributaries (Pflieger 1997).

Habitat Affinities:
The silverband shiner inhabits the mainstem of large, silty rivers. It can tolerate extremely turbid conditions and is usually found in moderate to swift current near sandy or gravelly bars (Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988). In the big rivers of Missouri, the silverband shiner is found in open channels with strong current and stable sand or gravel substrates (Pflieger 1997).

Predictive Model(s):

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Silverjaw Minnow

Notropis buccatus

Native: Yes

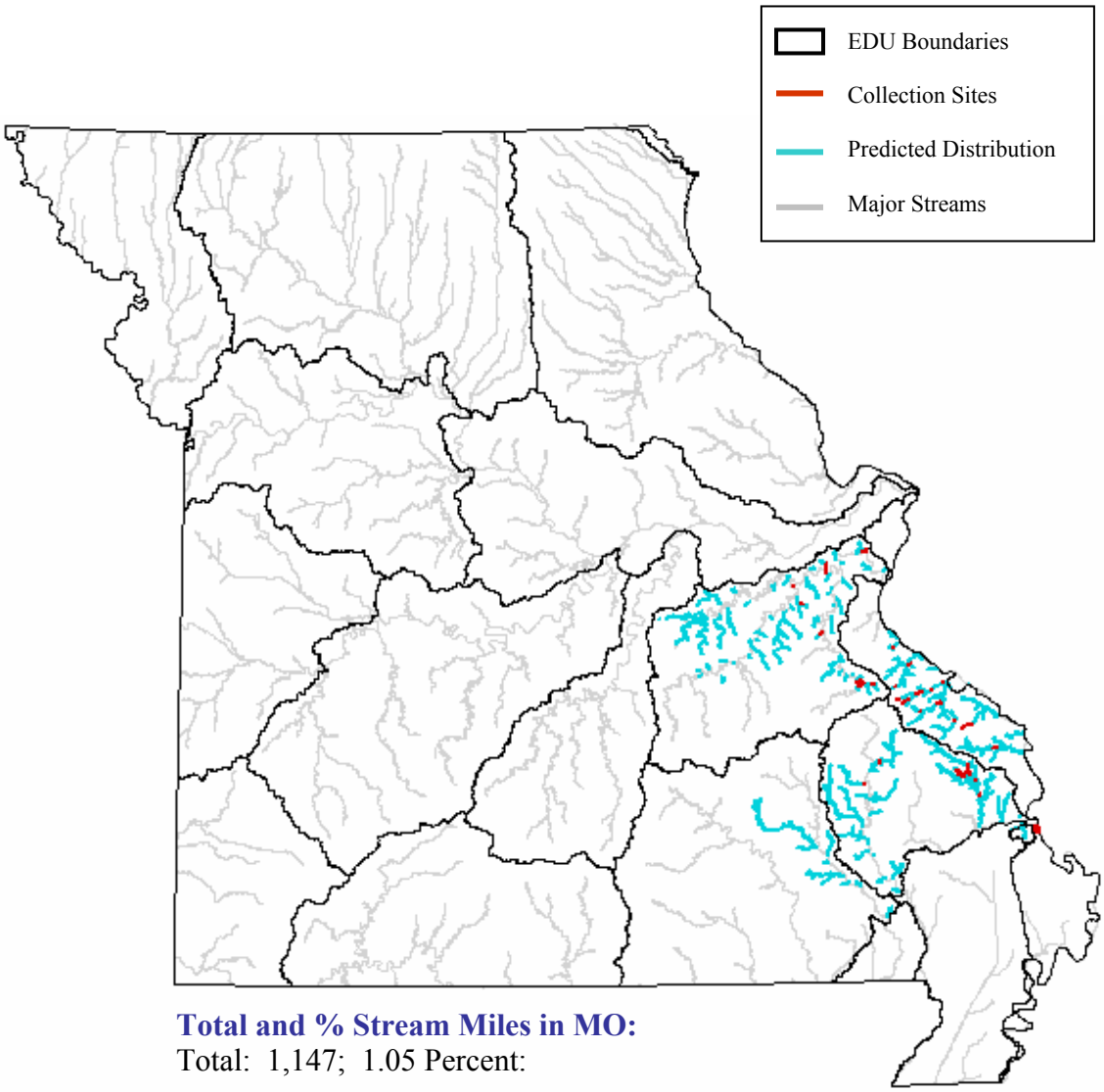
Endemism: Region

State Rank: S4

ITIS Code: 163478

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,147; 1.05 Percent:

State Range:
The silverjaw minnow is found almost exclusively in tributaries of the Mississippi River between the Missouri and Ohio Rivers. It is also found in parts of the Upper St. Francis/Castor and Meramec Ecological Drainage Units (EDU) but these are thought to be strays from Mississippi River tributaries (Pflieger 1997).

Habitat Affinities:
The silverjaw minnow inhabits brooks, small creeks, small streams, and large rivers with moderate gradient and sandy substrates (Etnier and Starnes 1993; Trautman 1957). It is found in pools, bars, and riffles, and can tolerate considerable turbidity and domestic pollutants so long as they do not cover the sand (Trautman 1957). In Missouri, the silverjaw minnow inhabits small, clear streams with permanent flow. It is found in shallow areas over long beds of sand (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and
(([Linkr] >= 3) and ([Linkr] <= 5))

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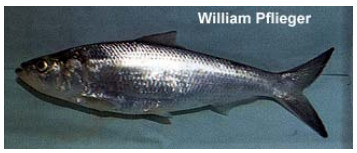


Skipjack Herring

Alosa chrysochloris

Native: Yes

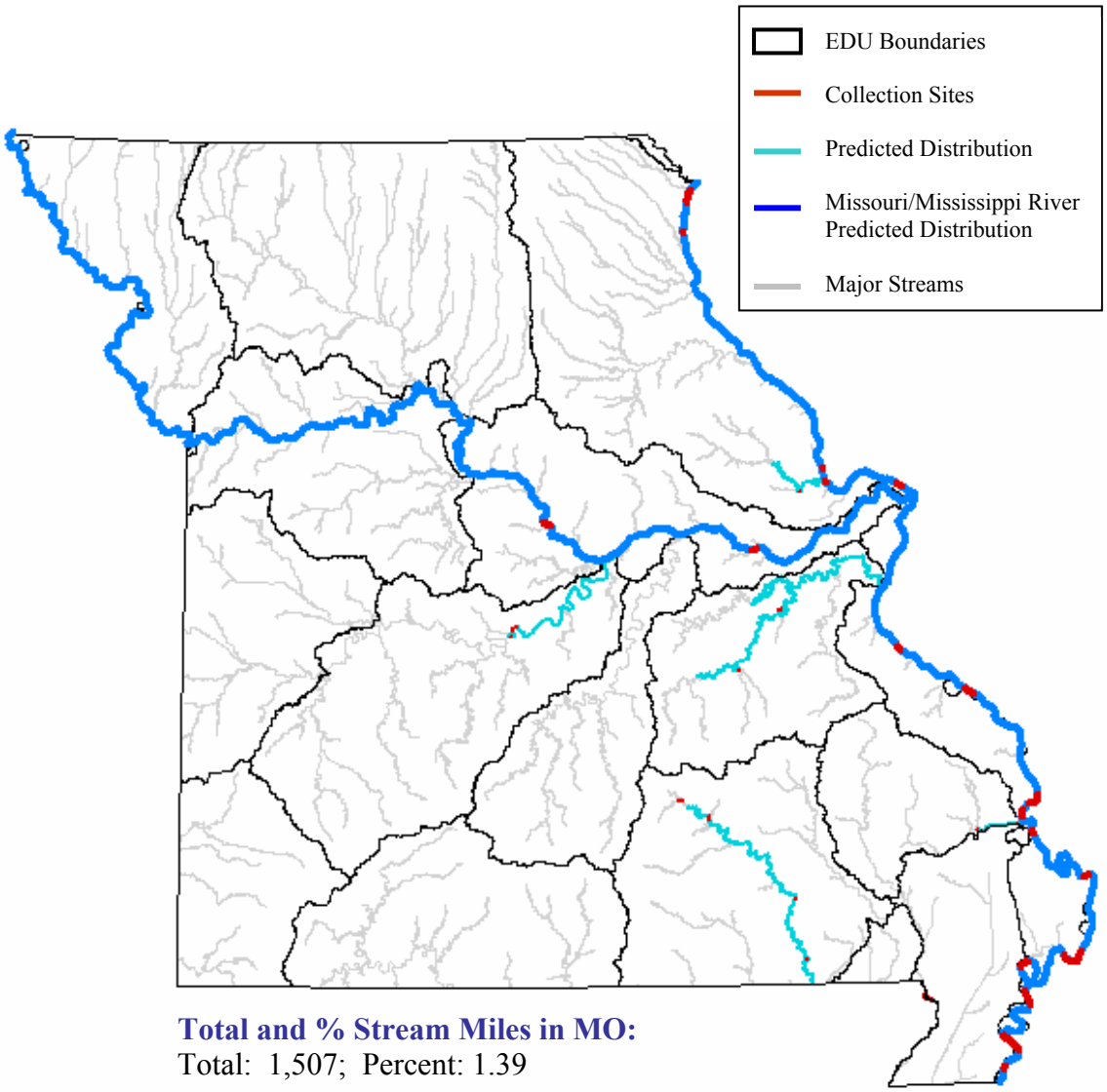
Endemism: Region

State Rank: S?

ITIS Code: 161707

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 1,507; Percent: 1.39

State Range:
The skipjack herring reaches its highest abundance in the Mississippi River south of the mouth of the Ohio River, but it probably occurs sporadically in many large rivers of the state. The biggest impediment to the distribution of the skipjack herring is dams (Pflieger 1997).

Habitat Affinities:
The skipjack herring is highly migratory and mainly inhabitants large rivers, but is also found in backwaters and main channel reservoirs (Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). The skipjack herring cannot tolerate high turbidity and where dams impede upstream migration large numbers aggregate in the swift waters below (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). In Missouri, the skipjack herring is naturally found in the open channels of large rivers. As in other states, it congregates in the swift waters below dams that are blocking movement (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Slender Madtom

Noturus exilis

Native: Yes

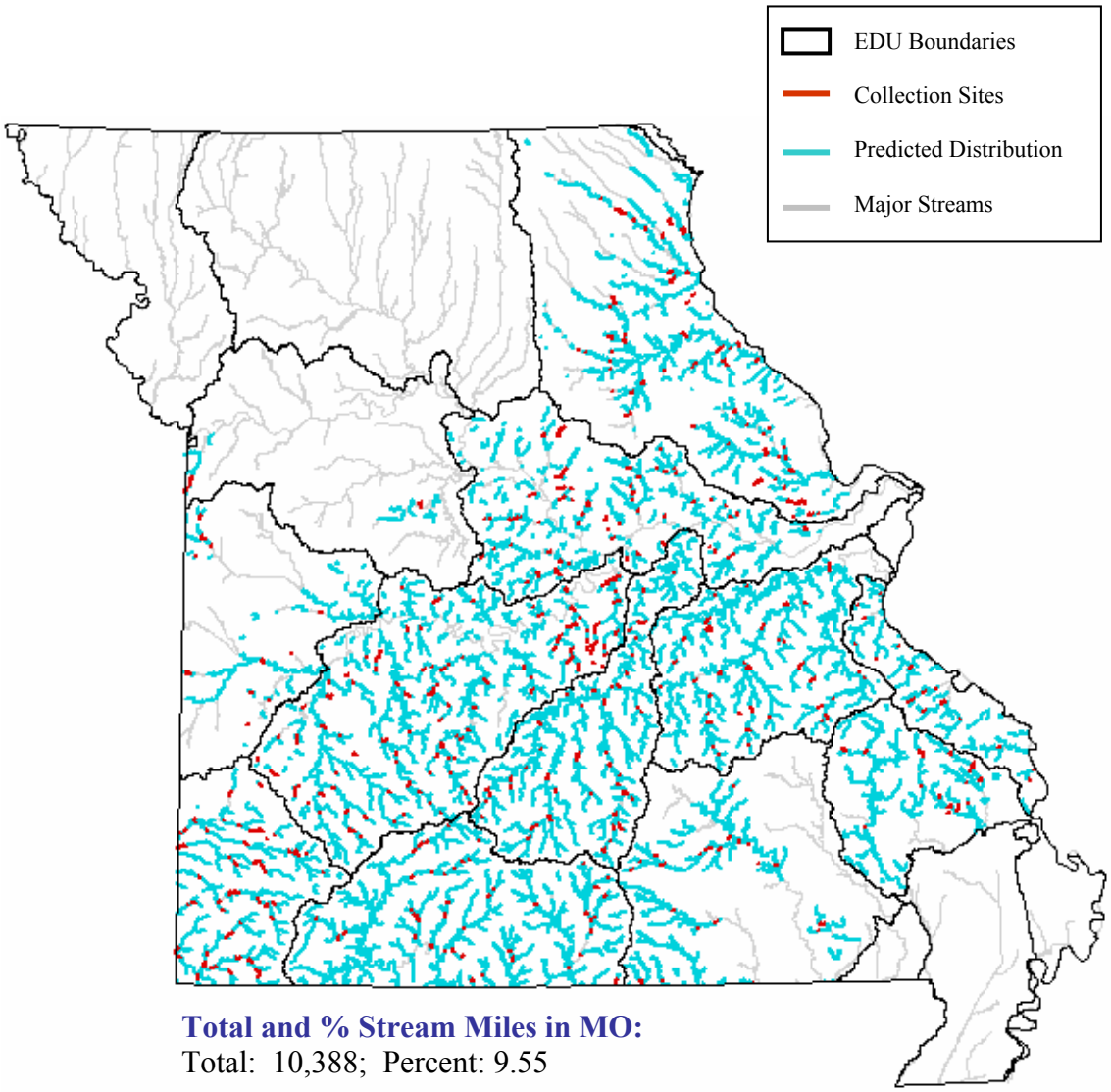
Endemism: Region

State Rank: S?

ITIS Code: 164010

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 10,388; Percent: 9.55

State Range:

The slender madtom is found throughout the Ozark Aquatic Subregion and the tributaries to the Mississippi River in the eastern Central Plains Aquatic Subregion. It is not found in the Mississippi and Missouri Rivers (Pflieger 1997).

Habitat Affinities:

The slender madtom inhabits small, permanent, spring-fed streams with cool, clear water and limestone slab, rock or gravel substrates (Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Phillips et. al. 1982; Trautman 1957). The microhabitat of the slender madtom is gentle to swift, shallow riffles or flowing pools with debris or other cover beneath which it hides during the daylight hours (Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Phillips et. al. 1982; Trautman 1957). In Missouri, the principal requirements of the slender madtom seem to be permanent base flow and clear water, but it is generally scarce in extremely clear waters. As in other areas, the slender madtom is found mainly in riffles but also in raceways or shallow pools with enough current to prevent silt accumulation (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model

(([Linkr] = 3) and ([GradsegR] >= 4) and ([GradsegR] <= 6)) or (([Linkr] >= 4) and ([Linkr] <= 5) and ([GradsegR] = 2) and ([Flow] >= 2)) or (([Linkr] = 5) and ([GradsegR] = 2) and ([Flow] = 1)) or (([Linkr] >= 4) and ([Linkr] <= 5) and ([GradsegR] >= 3) and ([Temp_code] = 1)) or (([Linkr] >= 4) and ([Linkr] <= 5) and ([GradsegR] >= 3) and ([Temp_code] = 2) and ([Flow] = 1)) or (([Linkr] >= 6) and ([Linkr] <= 7) and ([Temp_code] = 2))

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Slenderhead Darter

Percina phoxocephala

Native: Yes

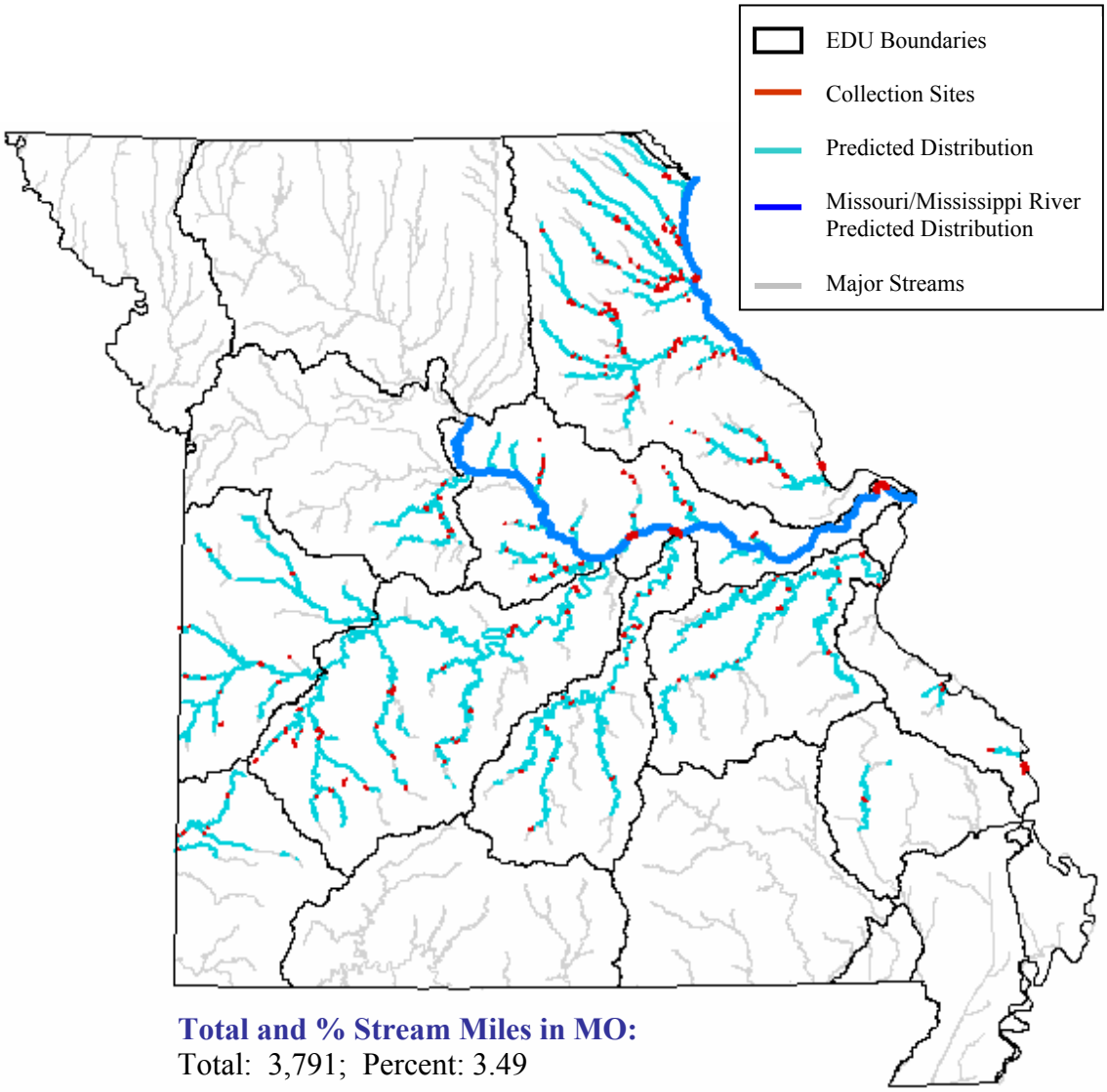
Endemism: Region

State Rank: S?

ITIS Code: 168494

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 3,791; Percent: 3.49

State Range:
The slenderhead darter is most common in border streams between the Central Plains/Osage and Central Plains/Cuivre/Salt Ecological Drainage Units (EDU). It is also found in tributaries to the Mississippi river along the Plains and Ozarks Aquatic Subregions, and within the Neosho, Meramec and Gasconade EDU's (Pflieger 1997).

Habitat Affinities:
The slender madtom inhabits large, permanent streams and creeks, or moderate-sized rivers with moderate gradient and moderate to swift current (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). Its microhabitat ranges from riffles to bars and shoals with firm, relatively silt-free bottoms of sand, small, loose gravel, or bedrock littered with loose stones (Cross and Collins 1975; Clay 1975; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). In Missouri, the slender madtom is most common in medium-sized creeks to large rivers with moderate to swift current in the transition areas between the Ozarks and Central Plains Aquatic Subregions (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] = 5) and ([GradsegR] >= 1) and ([GradsegR] <= 2)) or (([Linkr] >= 6))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Slim Minnow

Pimephales tenellus

Native: Yes

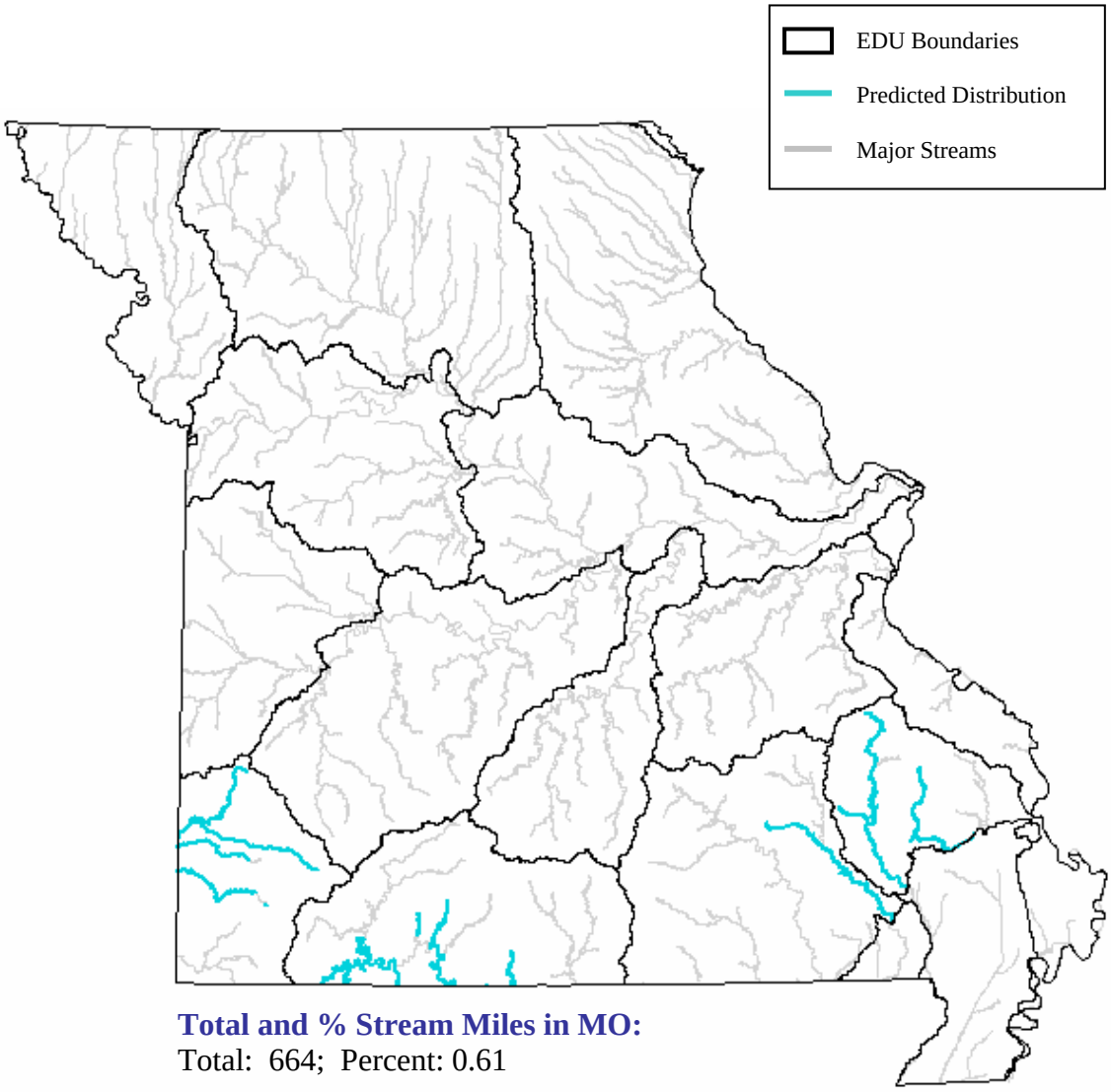
Endemism: Region

State Rank: S3

ITIS Code: 163519

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 664; Percent: 0.61

State Range:
The slim minnow is known from stream systems draining Missouri's southern Ozarks. It is common in the Neosho Ecological Drainage Unit (EDU), and rare in the Upper St. Francis-Castor EDU. It suspected that it has been eliminated from the White and St. Francis River drainages, likely due to reservoir construction (Pflieger 1997).

Habitat Affinities:
The slim minnow is a schooling species inhabiting bottom or mid-water areas of clear, quiet waters of streams with moderate to swift current and rocky or sandy bottoms that are free of silt (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). In the Neosho EDU, it avoids clear, cool spring-fed streams (Pflieger 1971). Pflieger (1997) found that the slim minnow avoids strong current, but it has been observed actively swimming in current, unlike other members of its genus (Miller and Robison 1973).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

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Slough Darter

Etheostoma gracile

Native: Yes

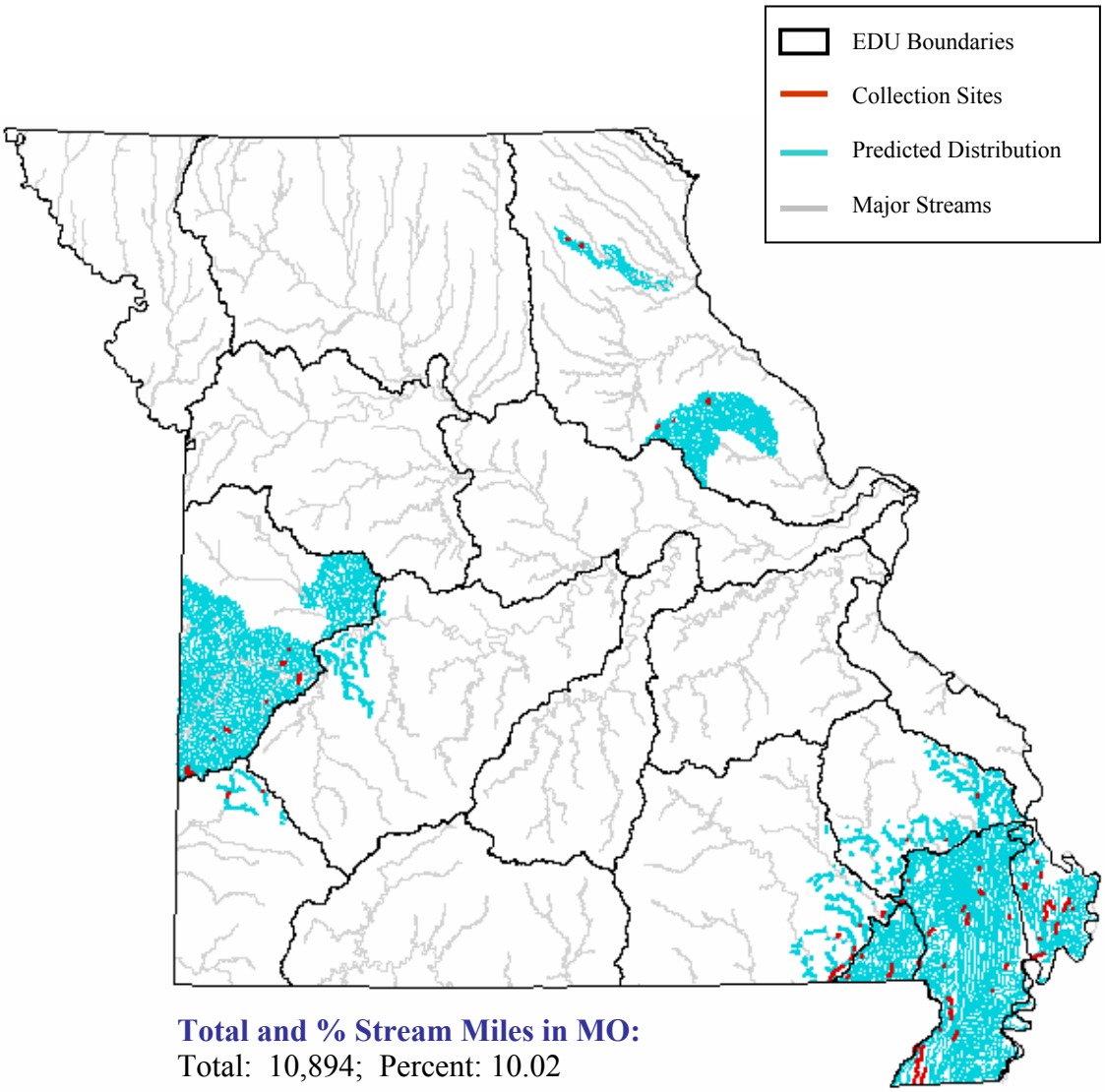
Endemism: Region

State Rank: S?

ITIS Code: 168366

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 10,894; Percent: 10.02

State Range:

The slough darter is common and widely distributed in the Mississippi Alluvial Basin (MAB)Aquatic Subregion and portions of the Ozarks that drain to the MAB. It is sporadic in the Central Plains/Osage and Central Plains/Cuivre/Salt Ecological Drainage Units (EDU) (Pflieger 1997).

Habitat Affinities:

The slough darter inhabits a wide variety of sluggish water habitats, such as swamps, low-gradient, shaded streams, backwaters, small creeks, overflow ponds, oxbow lakes, bayous, and sloughs (Clay 1975; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). Its preferred microhabitat is sluggish pools or slow-flowing riffles with substrates of soft silt, mud, organic debris, and occasionally sand and fine gravel, with sparse aquatic vegetation (Clay 1975; Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988; Pflieger 1997). The slough darter does not tolerate continuous muddy waters and there are varying reports on its tolerance for aquatic vegetation (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997). In the Mississippi Alluvial Basin Aquatic Subregion, the slough darter prefers clear, heavily vegetated ditches. In the Central Plains Aquatic Subregion, it prefers the densely vegetated pools of small creeks draining level uplands, with slack current, moderate turbidity, and warm water. Soft substrates with a covering of organic debris are a requirement in both Subregions (Pflieger 1997).

Predictive Model(s):

Central Plains Model
Query 1: ([Temp_code] = 2)
Query 2: (([Rgrad_subr] = 1) and ([Linkr] >= 1) and ([Linkr] <= 4)) or (([Rgrad_subr] >= 2))

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and
(([Linkr] >= 1) and ([Linkr] <= 5)) and ([Rgrad_subr] = 1)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

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Smallmouth Bass

Micropterus dolomieu

Native: Yes

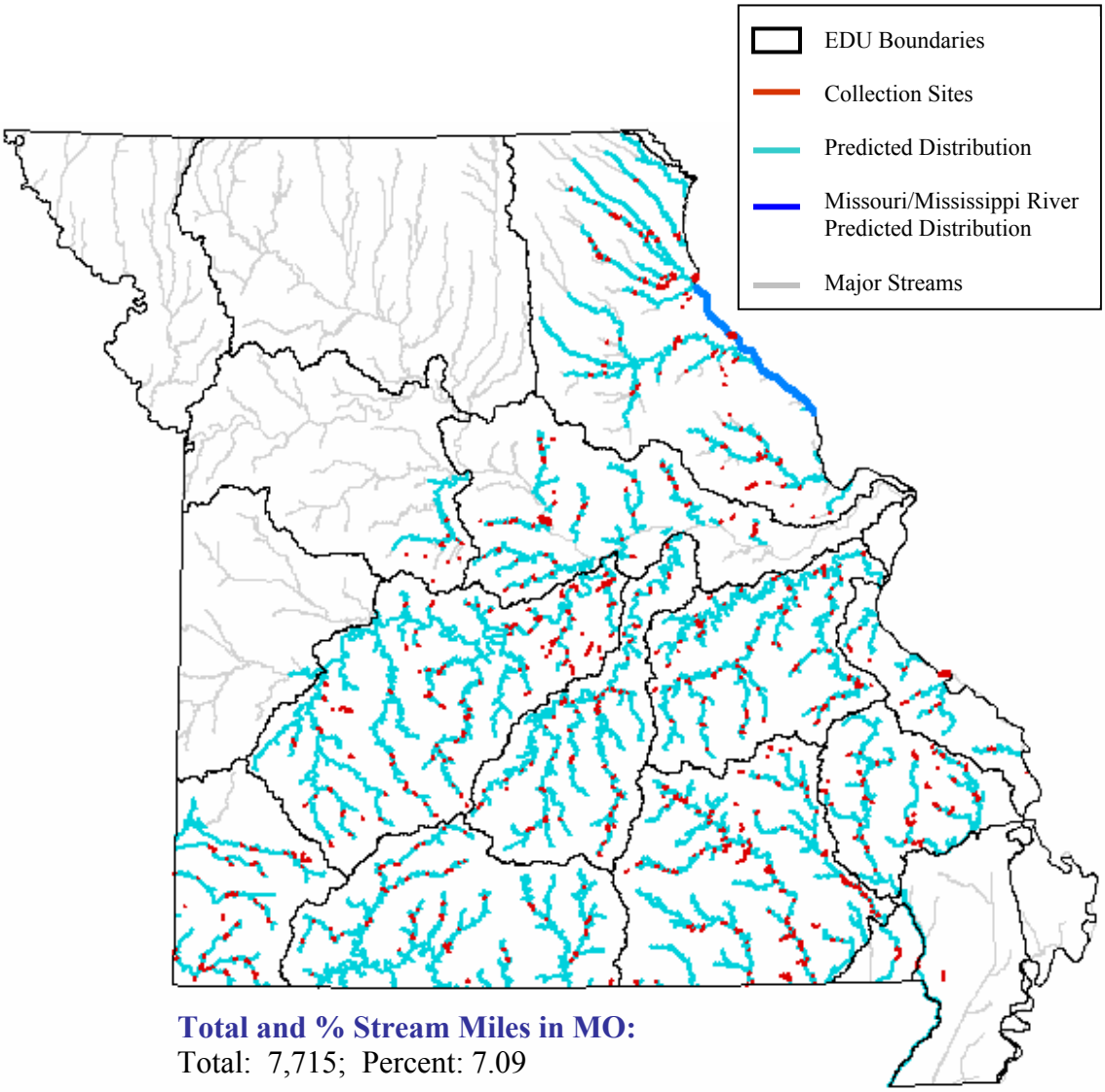
Endemism: Subzone

State Rank: S?

ITIS Code: 550562

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 7,715; Percent: 7.09

State Range:
The distribution of the smallmouth bass is well delineated by the Ozark Aquatic Subregion, with the exception of small populations in the Mississippi River and its tributaries in the northeastern Plains Aquatic Subregion. Its decline in the Mississippi River and its tributaries is due to a combination of hybridization, increased siltation, and hydrological changes causing occasional intermittent flow. Populations in select drainages of Boone, Morgan and Cooper counties are the result of introductions (Pflieger 1997).

Habitat Affinities:
The smallmouth bass inhabits clear, cool and swift flowing upland creeks, mountain streams, large rivers and medium-sized lakes with clean gravelly or rocky bottoms and permanent flow (Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). It is occasionally found in large reservoirs having clear, deep water and a well-developed, oxygenated hypolimnion (Pflieger 1997; Robinson and Buchanan 1988). The smallmouth bass is associated with pools just below riffles with various forms of cover, such as undercut banks, boulders, logs, stumps, and fallen trees (Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). In Ozark Aquatic Subregion, the smallmouth bass is most common in clear, cool, permanent flowing streams overlying silt-free gravel. It can also be found in some large Ozark reservoirs along windswept, rocky shorelines. In the Mississippi River, the smallmouth bass inhabits the rocky shoals below navigation dams, as these areas mimic stream conditions (Pflieger 1997). The smallmouth bass is intolerant of high siltation and turbidity and has been eliminated for miles below dams, as it cannot tolerate cold tailwaters (Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains Model
([Linkr] >= 5) and ([Temp_code] = 2)

Ozark Model
(([Linkr] = 3) and ([Temp_code] = 2) and ([DlinkR] >= 4) and ([DlinkR] <= 7)) or (([Linkr] >= 4))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = “MO”)

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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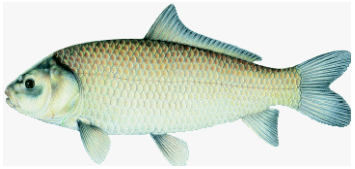
Smallmouth Buffalo

Ictiobus bubalus



Native: Yes

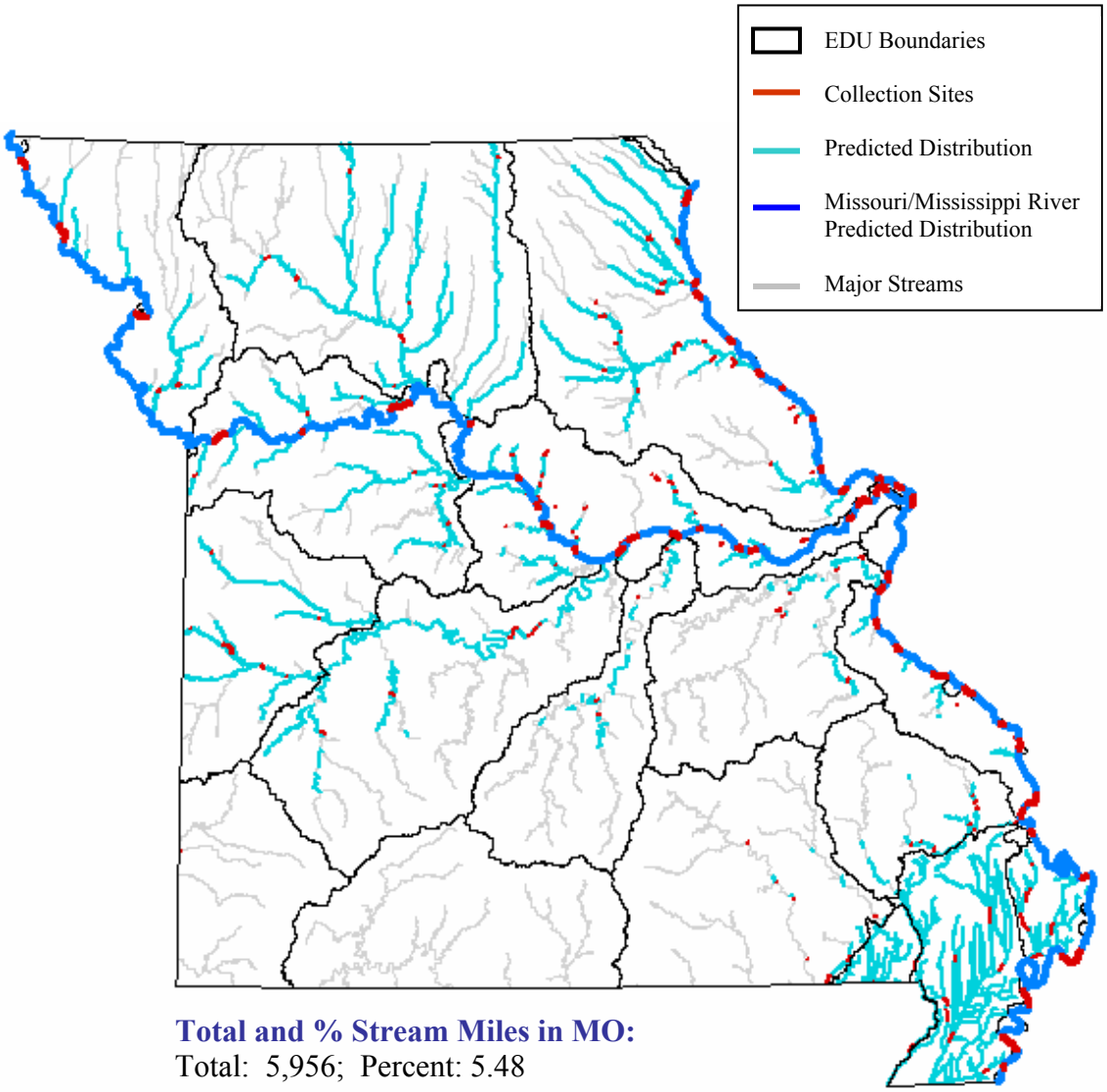
Endemism: Subzone

State Rank: S?

ITIS Code: 163955

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,956; Percent: 5.48

State Range:
The smallmouth buffalo is abundant in the Mississippi River and its larger Central Plains tributaries, the Osage River, large Ozark reservoirs, streams and ditches of the Mississippi Alluvial basin Aquatic Subregion (Pflieger 1997). It is also found in the Missouri River and sporadically in streams draining easterly off of the Ozark Aquatic Subregion.

Habitat Affinities:
The smallmouth buffalo inhabits the deep pools of streams, large rivers, backwaters in the mouths of tributaries and oxbows. It is associated with moderate current, rocky bottoms, clear water and debris, such as "deadfalls" or log drifts (Cross and Collins 1975; Robinson and Buchanan 1988; Trautman 1957). In Missouri, its habitat is similar to the other buffalofishes except that it prefers clearer water than the bigmouth buffalo and is less abundant in strong current, unlike the black buffalo (Pflieger 1997).

Predictive Model(s):

Central Plains Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and
(([Ssize_code] >= 3) and ([Ssize_code] <= 4)) and ([Rgrad_subr] = 1)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 2) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Southern Brook Lamprey

Ichthyomyzon gagei

Native: Yes

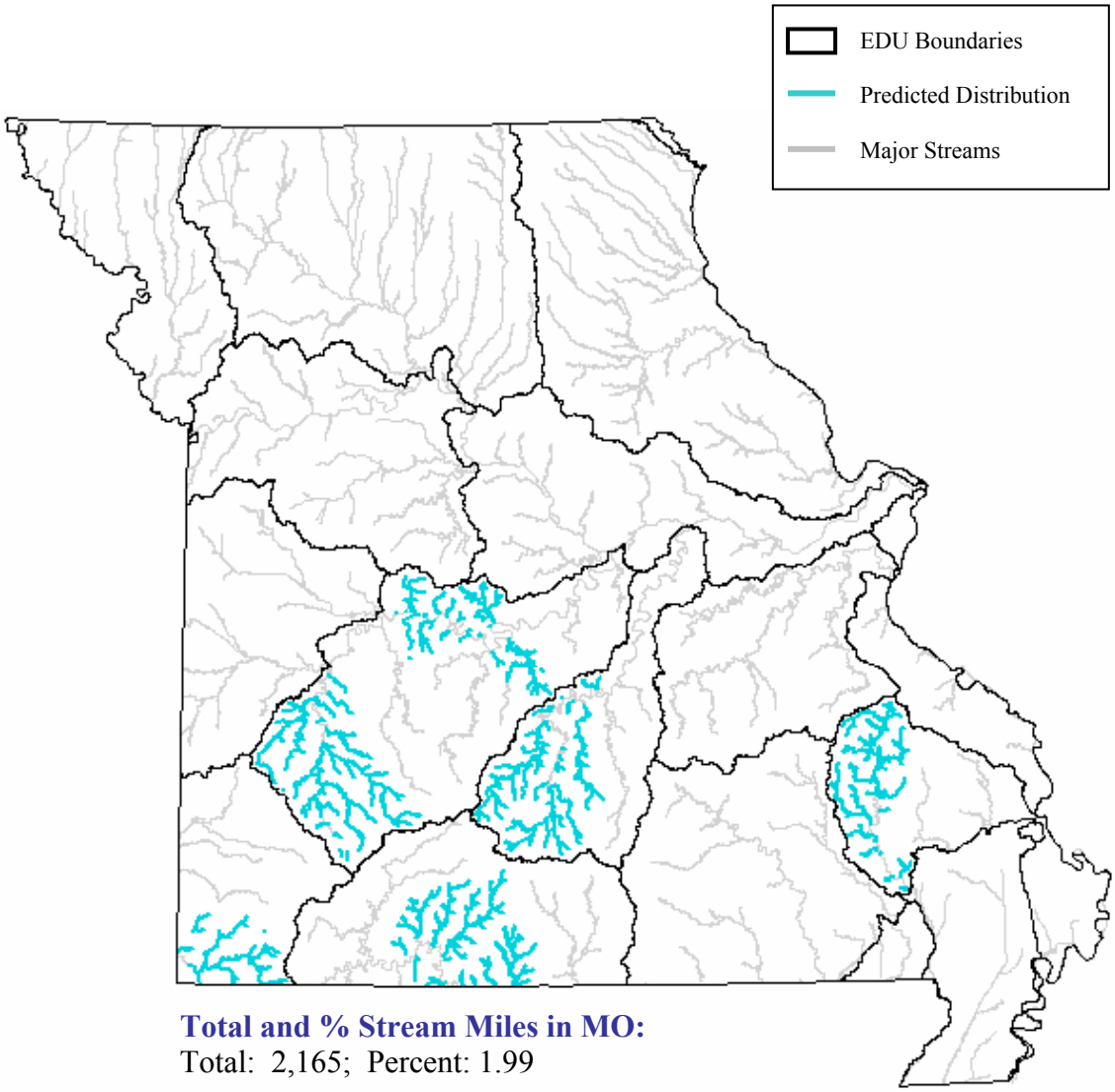
Endemism: Region

State Rank: S2S3

ITIS Code: 159727

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 2,165; Percent: 1.99

State Range:
The southern brook lamprey has a wide and spotty distribution in the Ozark Aquatic Subregion but distribution records are based on very few specimens. As with other lampreys, it is rare in the adult form and therefore hard to identify. It is likely that more populations will be discovered in the future. The distribution of the southern brook lamprey may also be limited by competition, as it has not been found in association with the northern brook lamprey, even where both species are known to occur (Pflieger 1997).

Habitat Affinities:
The southern brook lamprey inhabits creeks, small to medium-sized upland streams, and small rivers. It prefers clear, permanent-flowing waters with sand, sand-gravel, or rock substrates (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Ozark Aquatic Subregion, it prefers medium-sized to moderately large rivers and adults were found in riffles with rock and gavel bottoms (Pflieger 1997). Larvae of the southern brook lamprey seek out slack marginal waters below sand bars or obstructions in the stream (Dendy and Scott 1953). Here they burrow into accumulations of mud, leaves or other organic debris (Robinson and Buchanan 1988; Dendy and Scott 1953).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and (([Ssize_code] >= 2) and ([Ssize_code] <= 3))

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Southern Cavefish

Typhlichthys subterraneus

Native: Yes

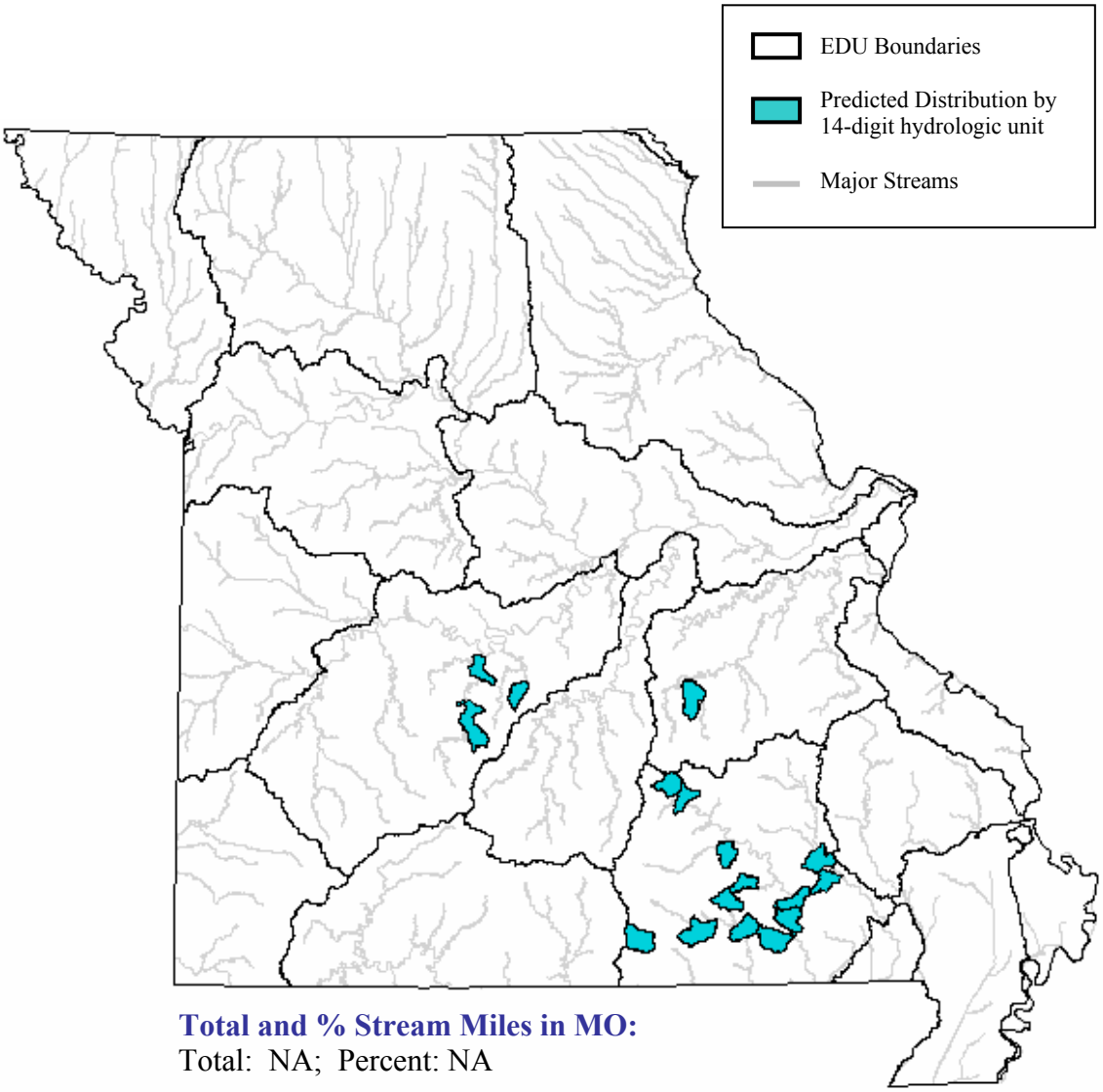
Endemism: Subzone

State Rank: S2S3

ITIS Code: 164399

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The southern cavefish is found in the Ozark Aquatic Subregion, mainly within the Black/Current Ecological Drainage Unit (EDU), but also in parts of the Osage, Gasconade, and Meramec EDU's. It is less threatened than the Ozark cavefish because it has a wider distribution, larger populations, and occurs in more protected areas (Pflieger 1997).

Habitat Affinities:
The southern cavefish exists only in subterranean environments (Etnier and Starnes 1993), usually limestone caves. It inhabits the pools of slow flowing cave streams with substrates of clay rubble (Robinson and Buchanan 1988). In Missouri, its habitat is much like that of the Ozark cavefish: the clear pools of quiet cave streams, the outlets of springs, and underground lakes with rubble bottoms (Pflieger 1997; Poulson 1963).

Predictive Model(s):

Ozark Model
The distribution is based upon habitat affinity and professional review.

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Southern Redbelly Dace

Phoxinus erythrogaster

Native: Yes

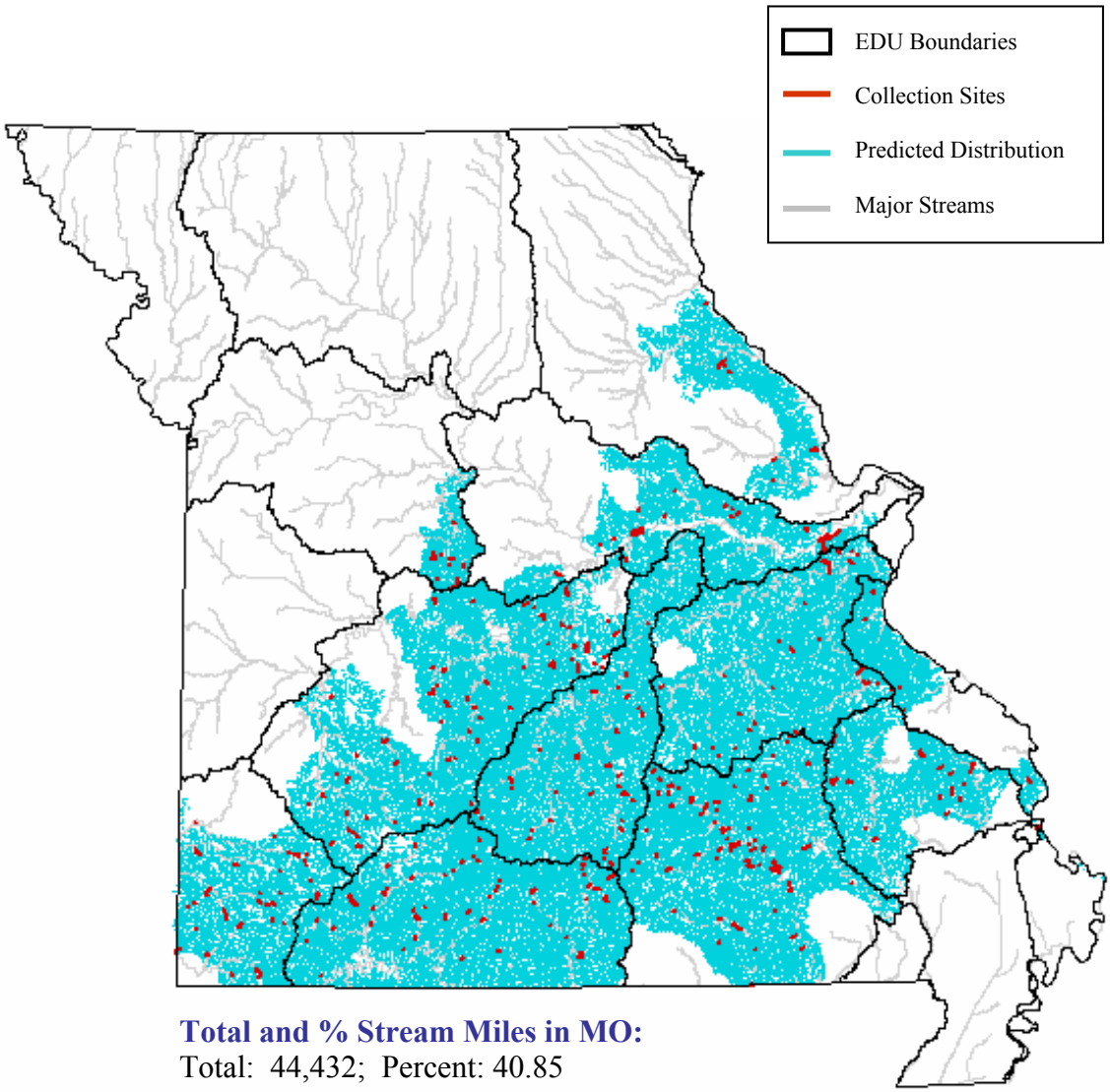
Endemism: Region

State Rank: S?

ITIS Code: 163593

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 44,432; Percent: 40.85

State Range:
The boundaries of the Ozark Aquatic Subregion describe the distribution limits of the southern redbelly dace quite well, with the exception of a few Mississippi River tributaries in the southeastern Central Plains Aquatic Subregion.

Habitat Affinities:
The southern redbelly dace is most common in permanent brooks, headwaters, and small clear streams that are fed by springs (Cross and Collins 1975; Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). The microhabitat of the southern redbelly dace is clear, cool and quiet pools with gravel substrates, or swifter areas near cut banks overhung by vegetation. It is often found in association with submerged aquatic vegetation, such as watercress (*Nasturium*), but vegetation is not essential (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). In the Ozark Aquatic Subregion, the habitat of the southern redbelly dace is characterized by permanent flowing small creeks or spring branches with clear, cool water, sandy or gravelly substrates, and dense beds of submergent vegetation (Pflieger 1997). Clay (1975) reports that the southern redbelly dace does not tolerate pollution, and in Minnesota, it was observed migrating downstream towards large streams and rivers at the onset of winter (Phillips et. al. 1982).

Predictive Model(s):

Central Plains/Ozark Model
(([GradsegR] = 3) and ([Temp_code] = 1)) or (([GradsegR] = 4)) or (([GradsegR] = 5) and ([Temp_code] = 1)) or (([GradsegR] = 5) and ([Temp_code] = 2) and ([Linkr] >= 3) and ([Linkr] <= 4)) or (([GradsegR] >= 6))

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Speckled Darter

Etheostoma stigmaeum

Native: Yes

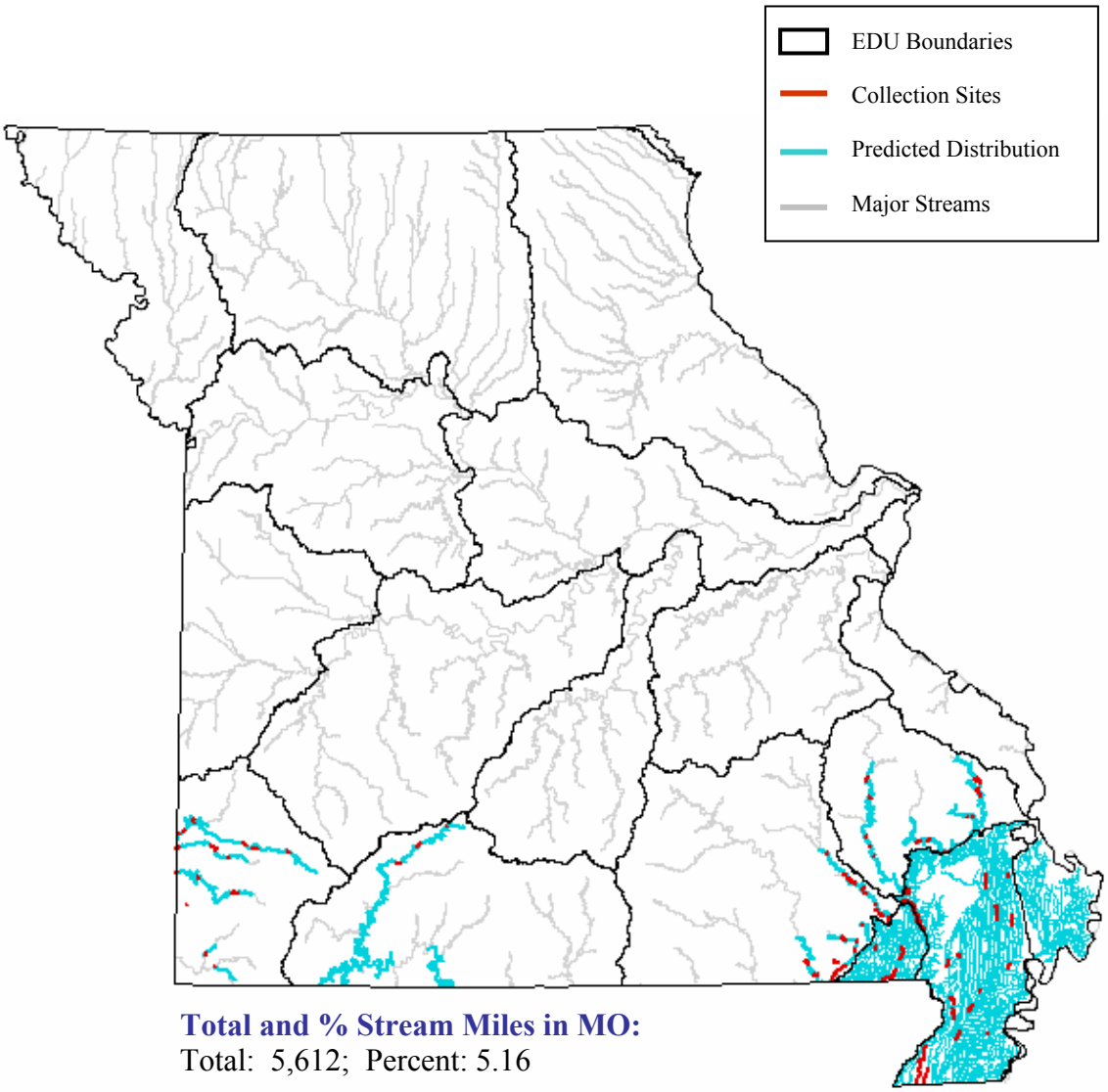
Endemism: Region

State Rank: S?

ITIS Code: 168437

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,612; Percent: 5.16

State Range:

The speckled darter has two distributional centers in the southwest and southeast corners of the state. In the southwest, it is found in the White and Neosho Ecological Drainage Units (EDU) of the Ozark Aquatic Subregion. In the southeast, it occurs throughout the Mississippi Alluvial Basin Aquatic Subregion and in adjacent sections of the Ozarks (Pflieger 1997).

Habitat Affinities:

The speckled darter is most abundant in clear, small to medium-sized streams (Cross and Collins 1975; Robinson and Buchanan 1988) but has also been found in moderate-sized rivers and upland reservoirs (Robinson and Buchanan 1988). It prefers moderate to high gradients and sluggish to swift currents (Clay 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988). The microhabitat of the speckled darter is pools with slight current and sometimes adjacent riffles with firm substrates ranging from silty sand to sand and gravel (Clay 1975; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In the Mississippi Alluvial Basin Aquatic Subregion, the speckled darter inhabits moderately large ditches with sparse vegetation. In the Ozark Aquatic Subregion, it is largely restricted to the quiet, sandy or gravelly pools and backwaters of rivers, avoiding small, intermittent creeks and headwaters (Pflieger 1997). In Tennessee, the speckled darter spawned in swifter currents over courser substrates (Etnier and Starnes 1993), while in Missouri it was found spawning in sluggish riffles (Pflieger 1997).

Predictive Model(s):

Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] >= 1) and ([Linkr] <= 4) and ([DlinkR] >= 5)) or (([Linkr] >= 5) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)) or (([Linkr] >= 6) and ([Rgrad_subr] = 3))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

References:

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Spotfin Shiner

Cyprinella spiloptera

Native: Yes

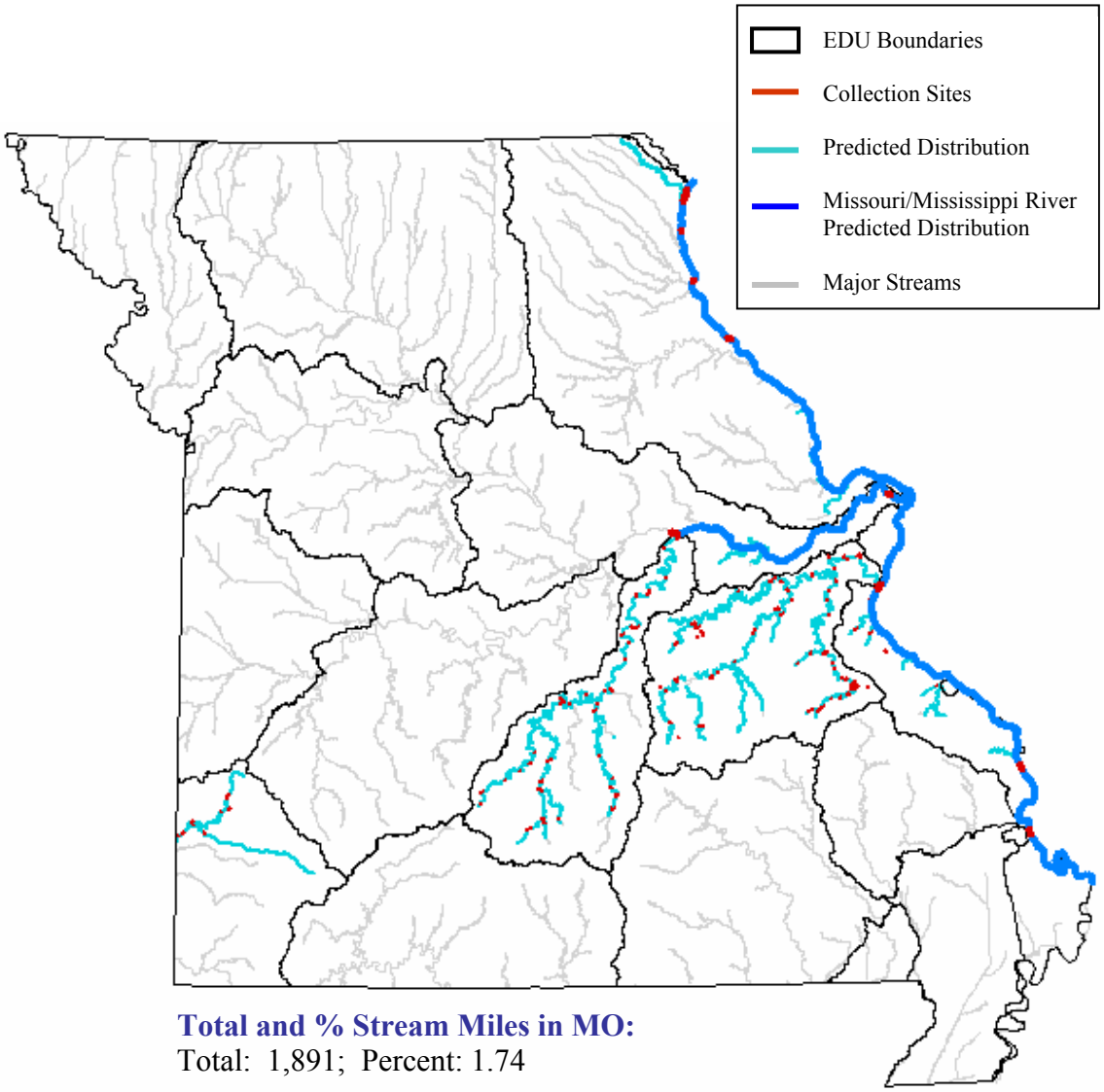
Endemism: Subzone

State Rank: S?

ITIS Code: 163803

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,891; Percent: 1.74

State Range:

The spotfin shiner is common throughout the Gasconade and Meramec Ecological Drainage Units (EDU), and occurs sparingly within the Neosho EDU. It also has a spotty distribution in the Mississippi River, the Lower Missouri River and some adjacent tributaries in the northeastern Central Plains Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The spotfin shiner inhabits an impressive range of habitats, as evidenced by the descriptions from various regions. In Ohio, it reaches greatest abundance in low gradient streams with submergent vegetation (Trautman 1957). In the Spring River drainage of Kansas, it prefers the edges of clean gravelly bars with moderate current (Cross and Collins 1975). In the northern U.S., it prefers large rivers in areas overlying sandy-silt (Eddy and Underhill 1974). In Missouri, the spotfin shiner has much the same habitat as the steelcolor shiner: large, clear upland rivers with moderate to high gradient and permanent flow. However, the spotfin shiner is more often found in large streams. Its microhabitat consists of vegetated pools with moderate current below rocky and gravelly riffles (Pflieger 1997). The spotfin shiner is able to withstand considerable turbidity, siltation, and pollution (Pflieger 1997; Trautman 1957).

Predictive Model(s):

Central Plains/Ozark Model
([Temp_code] = 2) and ([Linkr] >= 5)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Spottail Shiner

Notropis hudsonius

Native: Yes

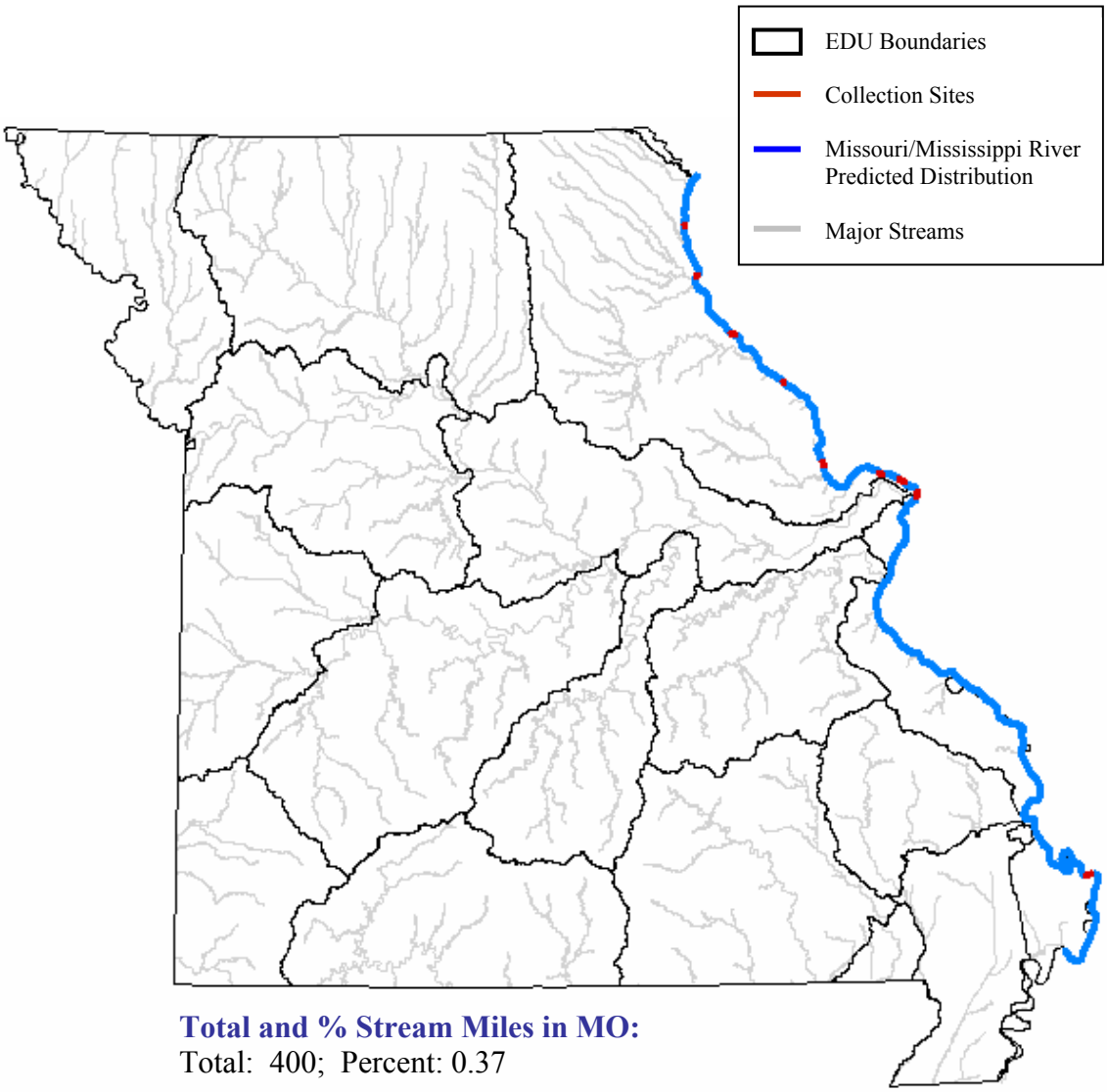
Endemism: Subzone

State Rank: S?

ITIS Code: 163404

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 400; Percent: 0.37

State Range:
The spottail shiner is not abundant in Missouri and is only found in the Mississippi River, where it is more common above the mouth of the Missouri River (Pflieger 1997).

Habitat Affinities:
The spottail shiner is most often found in northern lakes and large rivers (Eddy and Underhill 1974; Phillips et. al. 1982). It is found over substrates of sand or gravel and reaches depths of up to 60 ft in Lake Erie (Trautman 1957). In the Mississippi River of Missouri, the spottail shiner inhabits sluggish areas with firm substrates of sand, gravel or rubble and moderately clear water (Pflieger 1971; Pflieger 1997). The spottail shiner has declined in many areas from silted bottoms and excessively turbid or polluted waters from industry and agriculture (Eddy and Underhill 1974; Phillips et. al. 1982; Trautman 1957).

Modeled Affinities:

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Spotted Bass

Micropterus punctulatus

Native: Yes

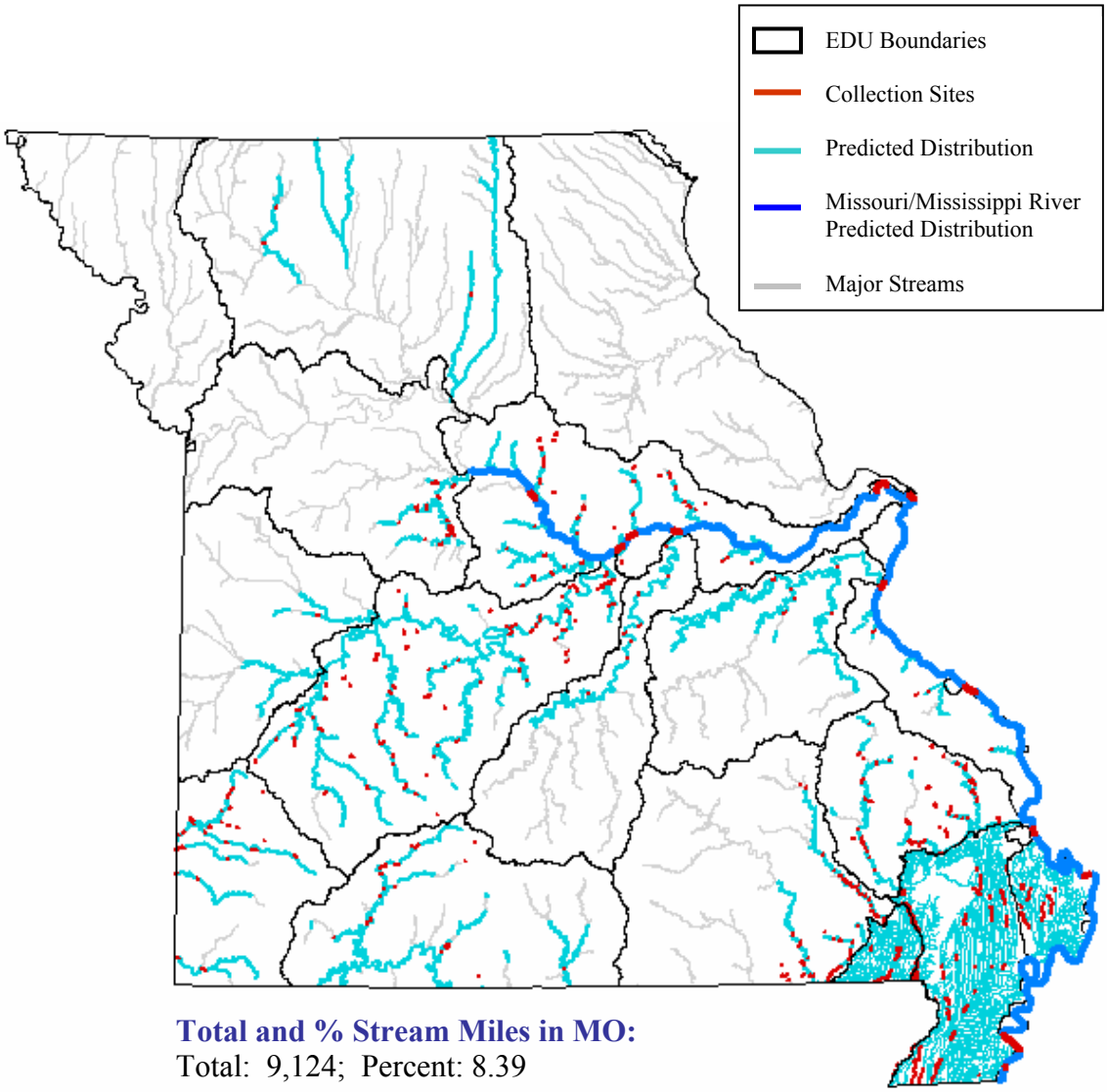
Endemism: Region

State Rank: S?

ITIS Code: 168161

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 9,124; Percent: 8.39

State Range:

The spotted bass occurs throughout the Mississippi Alluvial Basin Aquatic Subregion and in larger streams in adjacent sections of the Ozark Aquatic Subregion. The spotted bass is absent from the southern Gasconade and Meramec Ecological Drainage Units (EDU), although its range is expanding here, and the western part of the Current EDU, but it is found in the rest of the Ozark Aquatic Subregion, and some areas along its western border with the Plains Aquatic Subregion. The spotted bass occurs sporadically in the northern and eastern Plains Aquatic Subregion and occurs in the Missouri River through an introduction (Pflieger 1997).

Habitat Affinities:

The spotted bass occurs primarily in large streams and moderate to large rivers with permanent flow but it has been successful in reservoirs and manmade impoundments as well (Clay 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). The spotted bass is able to tolerate higher turbidity and warmer water than the smallmouth bass, but is replaced by it in cool, spring-fed streams (Pflieger 1997; Robinson and Buchanan 1988). The spotted bass is more tolerant of turbid water and silty bottoms than the largemouth bass (Trautman 1957), but is replaced by the largemouth bass in backwaters and floodplain lakes along streams (Pflieger 1997). The spotted bass is most often found in long, deep, clear pools with moderate current and gravel substrates (Clay 1975; Douglas 1974; Robinson and Buchanan 1988; Trautman 1957). In Missouri, the spotted bass is dominant in the main channels of large rivers and quite successful in large reservoirs of the Ozark Aquatic Subregion (Pflieger 1997). Etnier and Starnes (1993) found that the spotted bass was most near the rocky and headwater areas of reservoirs.

Predictive Model(s):

Central Plains/Ozark Model
(([Linkr] = 4) and ([DlinkR] >= 5)) or (([Linkr] = 5) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2) and ([Temp_code] = 2)) or (([Linkr] >= 6))
DlinkR is done.

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Spotted Gar

Lepisosteus oculatus

Native: Yes

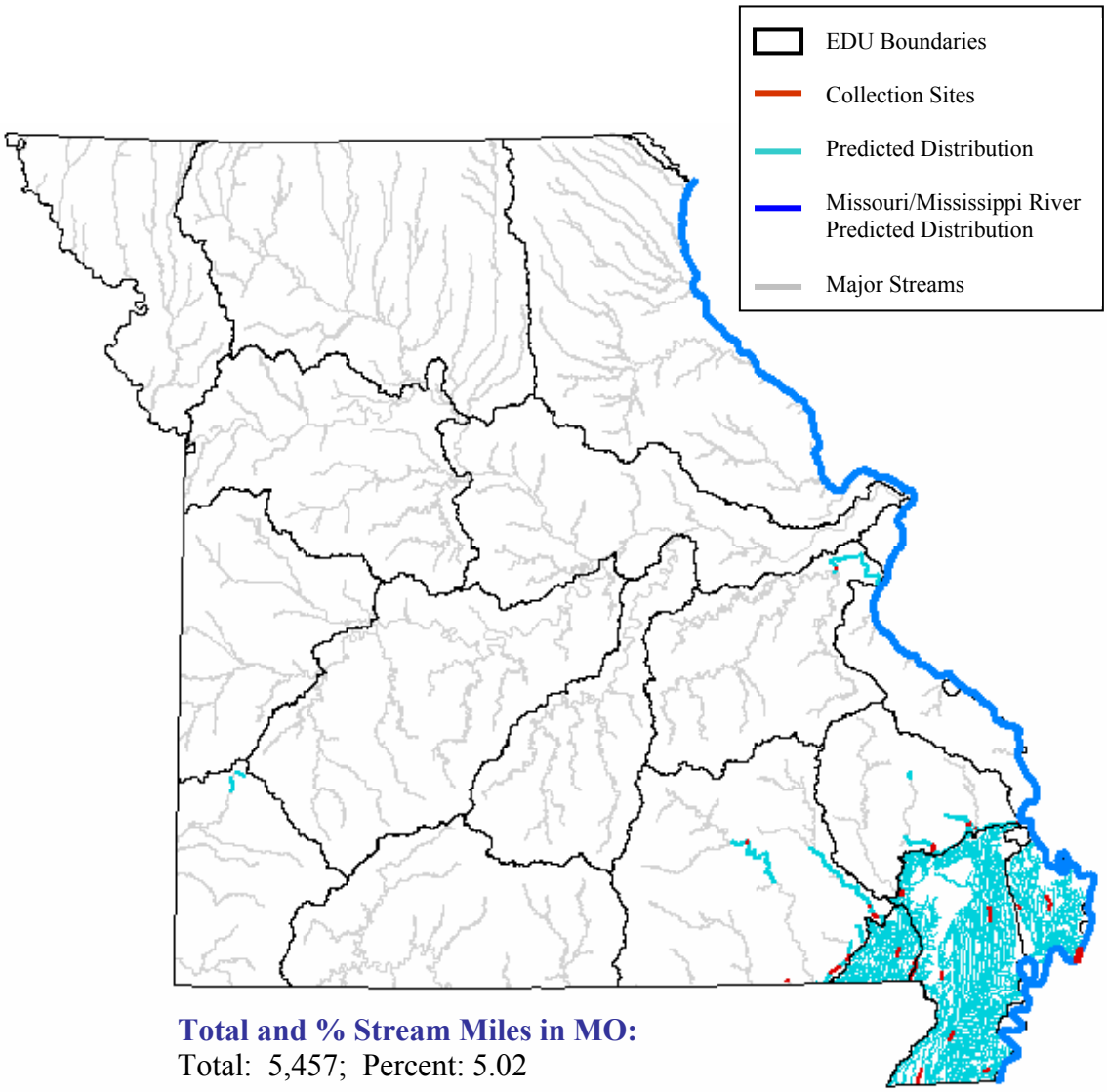
Endemism: Region

State Rank: S5

ITIS Code: 161095

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,457; Percent: 5.02

State Range:

The spotted gar occurs primarily in the Mississippi Alluvial Basin Aquatic Subregion and adjacent sections of the Ozark Aquatic Subregion, where it is common and widespread (Pflieger 1997).

Habitat Affinities:

The spotted gar can be found in oxbows, floodplain ponds, pothole and lowland lakes, reservoirs, bayous, less brackish estuaries, and the backwater pools of rivers and streams (Clay 1975; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Trautman 1957). It is strongly associated with dense aquatic vegetation (Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988; Pflieger 1997; Trautman 1957), and less tolerant than other gars of siltation and turbidity (Etnier and Starnes 1993; Robinson and Buchanan 1988). The spotted gar reaches greatest abundance in clear, warm and calm waters choked with vegetation or containing extensive standing timber (Clay 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988; Pflieger 1997; Trautman 1957).

Predictive Model(s):

Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] >= 5) and ([Rgrad_subr] = 1)) or (([Linkr] > 6))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Spotted Sucker

Minytrema melanops

Native: Yes

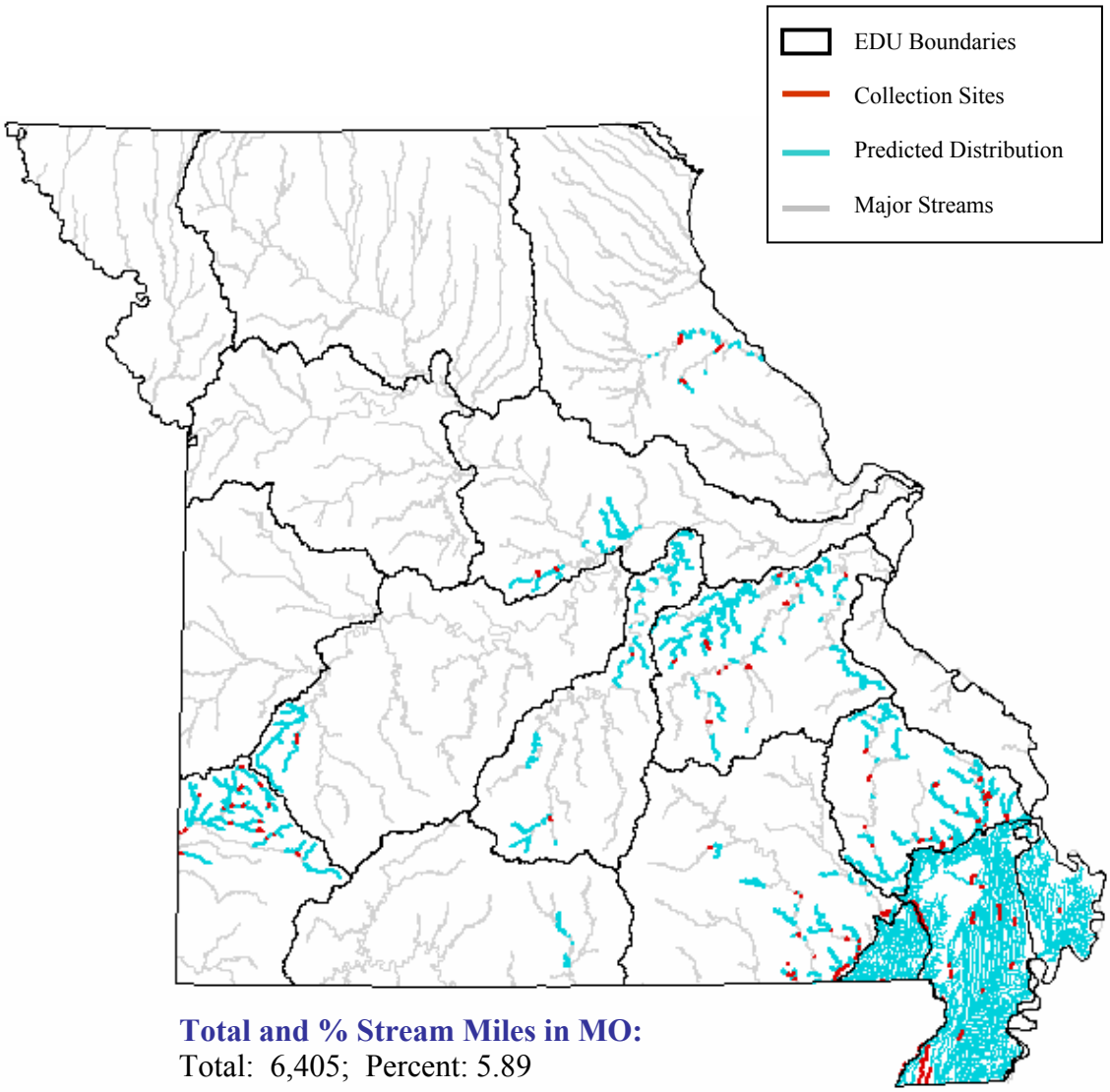
Endemism: Subzone

State Rank: S?

ITIS Code: 163959

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 6,405; Percent: 5.89

State Range:

The spotted sucker is mainly found in the Mississippi Alluvial Basin Aquatic Subregion and adjoining sections of the Ozarks Aquatic Subregion. It has a spotty distribution elsewhere in the Ozarks and the Salt River drainage of the Central Plains, but substantial populations can be found in the Ozark/Neosho Ecological Drainage Unit (EDU) (Pflieger 1997).

Habitat Affinities:

The spotted sucker inhabits low gradient streams, rivers, overflow ponds, sloughs, oxbows, turbid lowland ditches (Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957), and larger impoundments in some areas (Douglas 1974). In Kentucky, the largest spotted suckers were found in navigation lock chambers of the Ohio River (Clay 1975). It is typically found in the pools of small streams having slack current, clear to slight turbidity, relatively soft waters with submergent vegetation and considerable amounts of organic debris on which to feed (Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988; Pflieger 1997). In the Ozark Aquatic Subregion, the highest abundances of the spotted sucker are found in deep pools of small creeks that drain fairly level uplands along stream divides or in backwaters and overflow pools of larger streams (Pflieger 1997). In the Mississippi Alluvial Basin Aquatic Subregion, it preferred clear, sluggish ditches (Pflieger 1997). Trautman (1957) found that the spotted sucker is intolerant of turbidity, industrial pollutants and bottoms covered with flocculent clay silts.

Predictive Model(s):

Central Plains/Ozark Model
([Temp_code] = 2) and
([Linkr] >= 3) and ([Rgrad_subr] = 1)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

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Spring Cavefish

Forbesichthys agassizii

Native: Yes

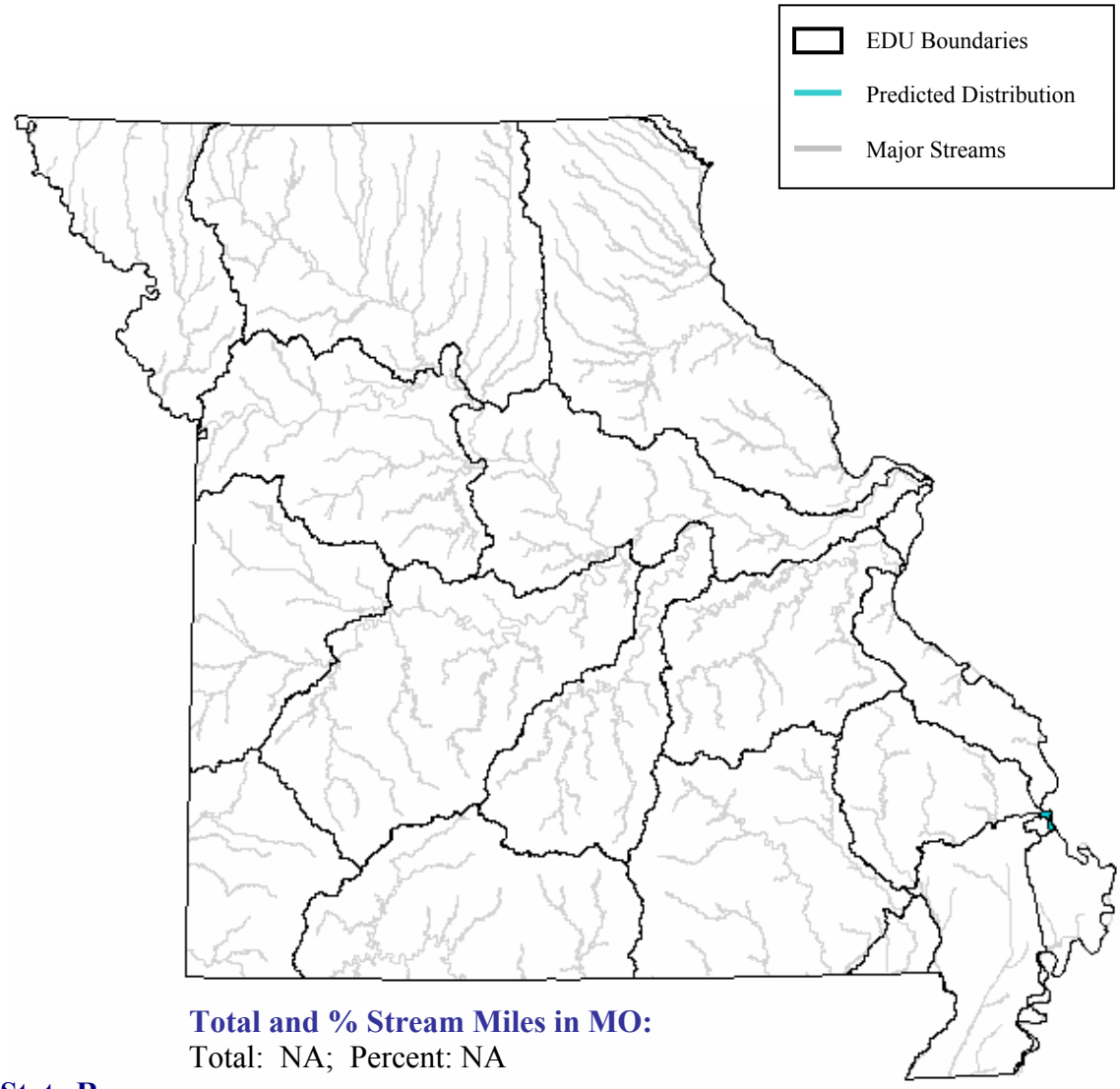
Endemism: EDU

State Rank: S1

ITIS Code: 201968

Global Rank: G4G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:

The spring cavefish is only found in a few springs along a limestone bluff adjacent to the alluvial plain of the Mississippi River in the Little Ecological Drainage Unit of the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The spring cavefish is trolophilic, meaning it is not restricted to cave habitats, but does retreat to subterranean environments for spawning (Etnier and Starnes 1993). It is found in the shallow waters of caves, springs, spring runs, spring seeps, and spring fed streams and is associated with dense vegetation in some areas (Pflieger 1997; Etnier and Starnes 1993). The small, highly localized population in Missouri is threatened by the development of a port facility nearby (Pflieger 1997).

Predictive Model(s):

Mississippi Alluvial Basin Model

The distribution is based upon habitat affinity and professional review.

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Stargazing Darter

Percina uranidea

Native: Yes

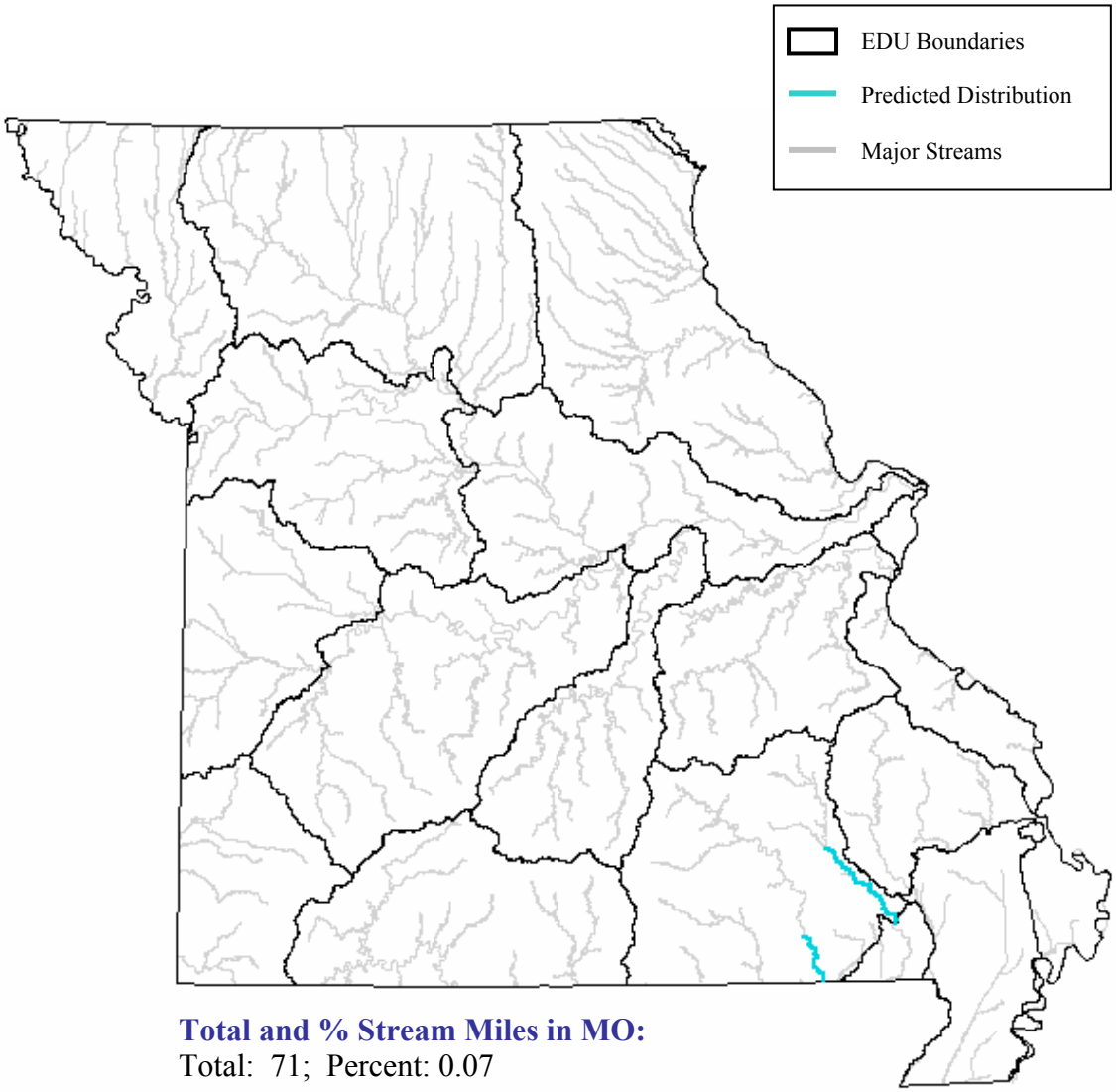
Endemism: Subregion

State Rank: S2

ITIS Code: 168500

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 71; Percent: 0.07

State Range:
The stargazing darter is one of the most rare fish Missouri, but populations do exist in the southern and southwestern streams of the Current Ecological Drainage Unit (EDU) where they descend from the uplands (Pflieger 1997).

Habitat Affinities:
The stargazing darter inhabits clear rivers of moderate size. It is found in deep, swift chutes or riffles with clean gravel bottoms (Pflieger 1997; Robinson and Buchanan 1988). In Kentucky, the stargazing darter was collected in sandy, lowland streams (Clay 1975). The stargazing darter is intolerant of silt (Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

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Starhead Topminnow

Fundulus dispar

Native: Yes

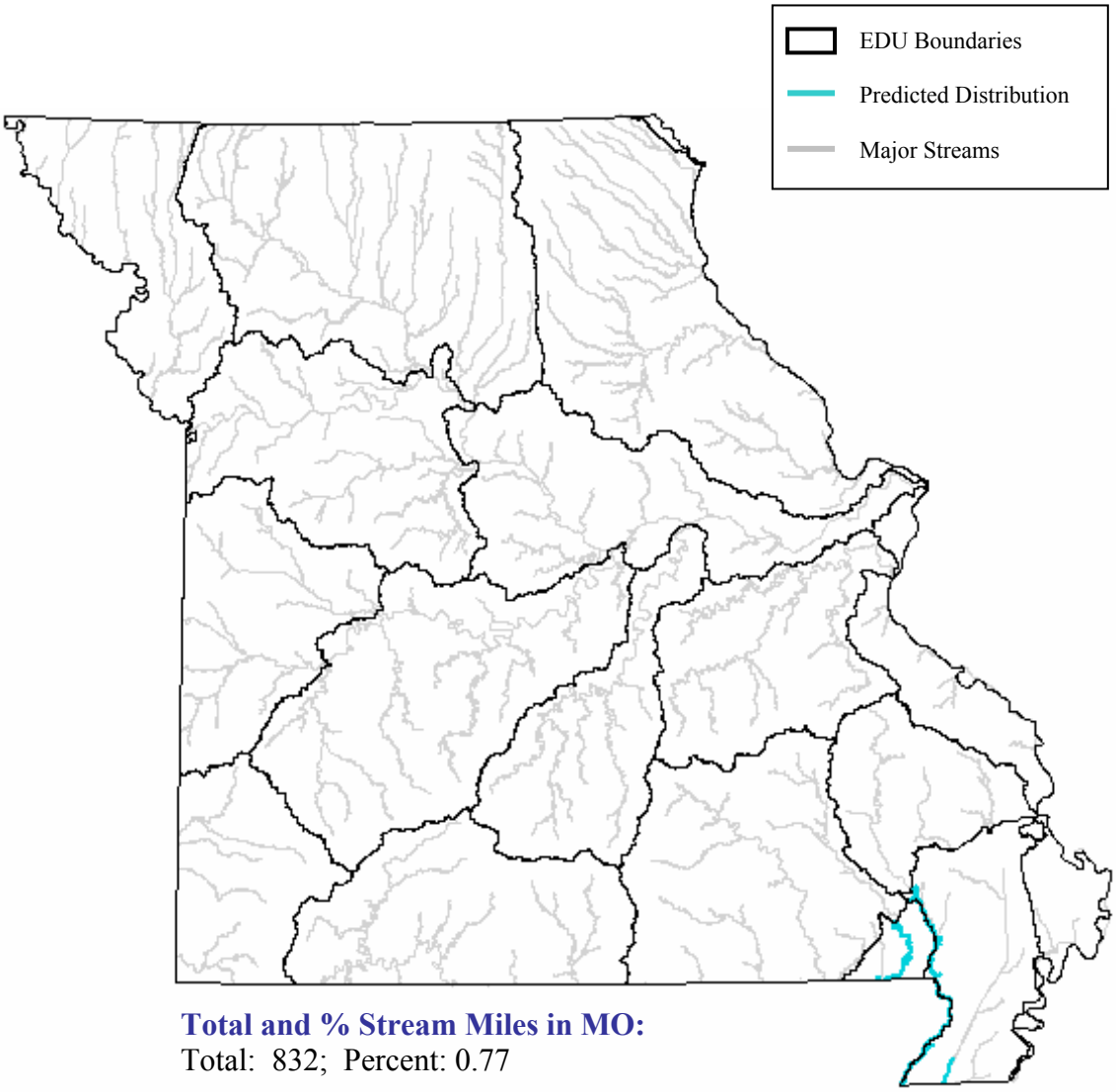
Endemism: Region

State Rank: S2

ITIS Code: 165672

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 832; Percent: 0.77

State Range:
The starhead topminnow is rare and it is suspected that the only remaining populations are in the Mingo Swamp and the Otter Slough Conservation Areas in the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The starhead topminnow is a lowland species occupying heavily vegetated swamps, creeks, oxbows, ditches, and backwater overflows of rivers (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). It can be found in shallow, non-flowing pools or along the margins of swamps and lakes with clear water and bottoms of soft mud and organic debris (Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([Dsize_code] =4) and ([State] = "MO")

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Steelcolor Shiner

Cyprinella whipplei

Native: Yes

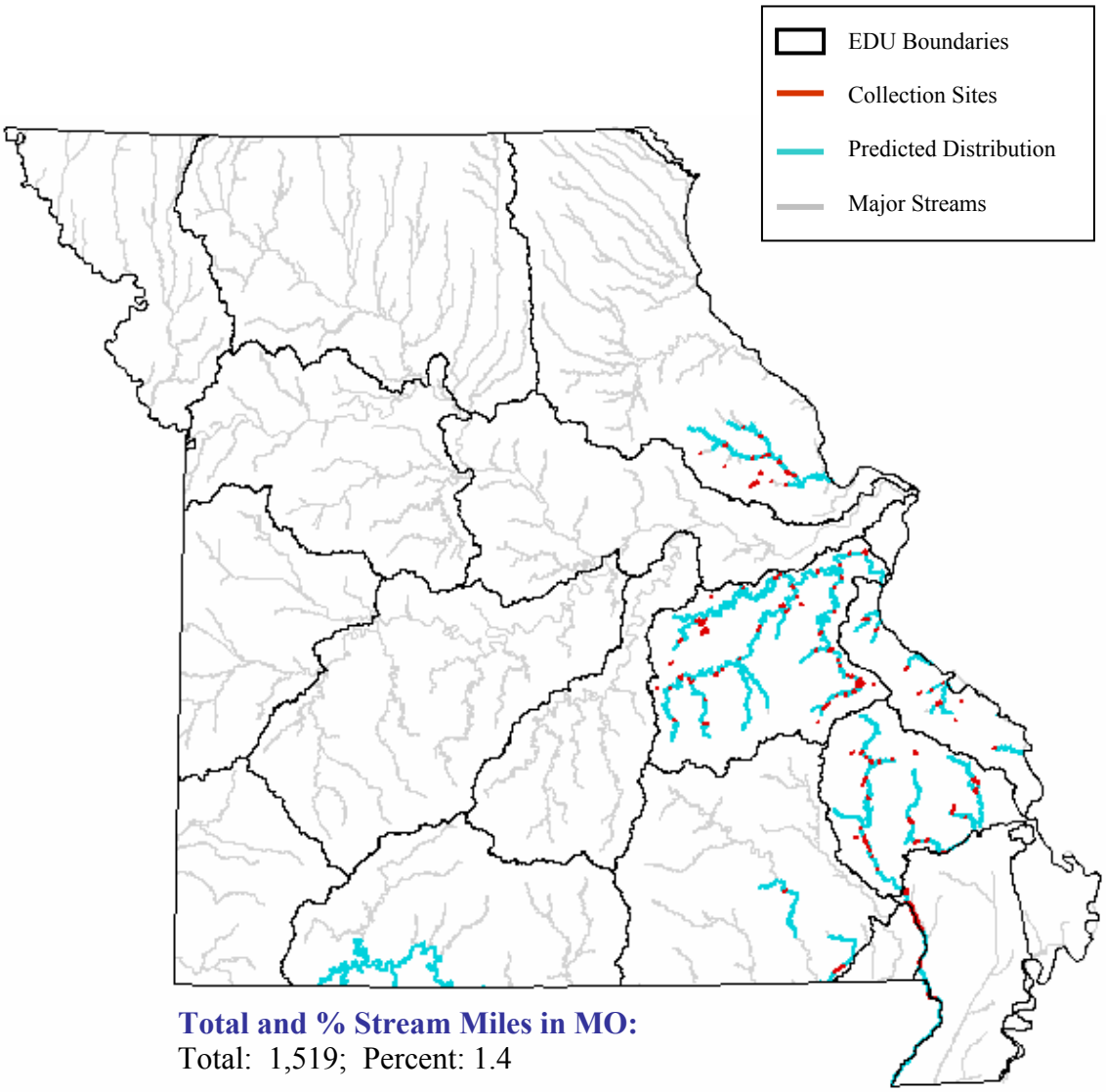
Endemism: Region

State Rank: S?

ITIS Code: 163811

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,519; Percent: 1.4

State Range:
The steelcolor shiner is suspected to have been extirpated from the White Ecological Drainage Unit (EDU) as large dams were constructed, but it is common and widely distributed in the Meramec, St. Francis, and Mississippi tributaries between the Missouri and Ohio Rivers EDU's of the Ozark Aquatic Subregion. An isolated population of the steelcolor shiner can also be found in the Cuivre River of the southeastern Central Plains Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The steelcolor shiner commonly inhabits large to medium-sized, upland streams with permanent flow, moderate to high gradient, clear water, and firm bottoms of clean gravel and boulders (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). Its microhabitat is characterized by flowing pools, often just below riffles, with dense growths of water willow (*Justicia*) along the margins (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). The steelcolor shiner avoids headwater creeks and the largest rivers, and cannot tolerate excessive turbidity and siltation (Pflieger 1997; Robinson and Buchanan 1988). In Ohio, the steelcolor shiner was abundant in waters with considerable timer and brush. The steelcolor shiner spawns in areas with brush, often below logs and timber (Trautman 1957).

Predictive Model(s):

Central Plains/Ozark Model
([Linkr] >= 5)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = "MO")

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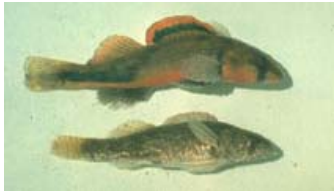
Stippled Darter

Etheostoma punctulatum



Native: Yes

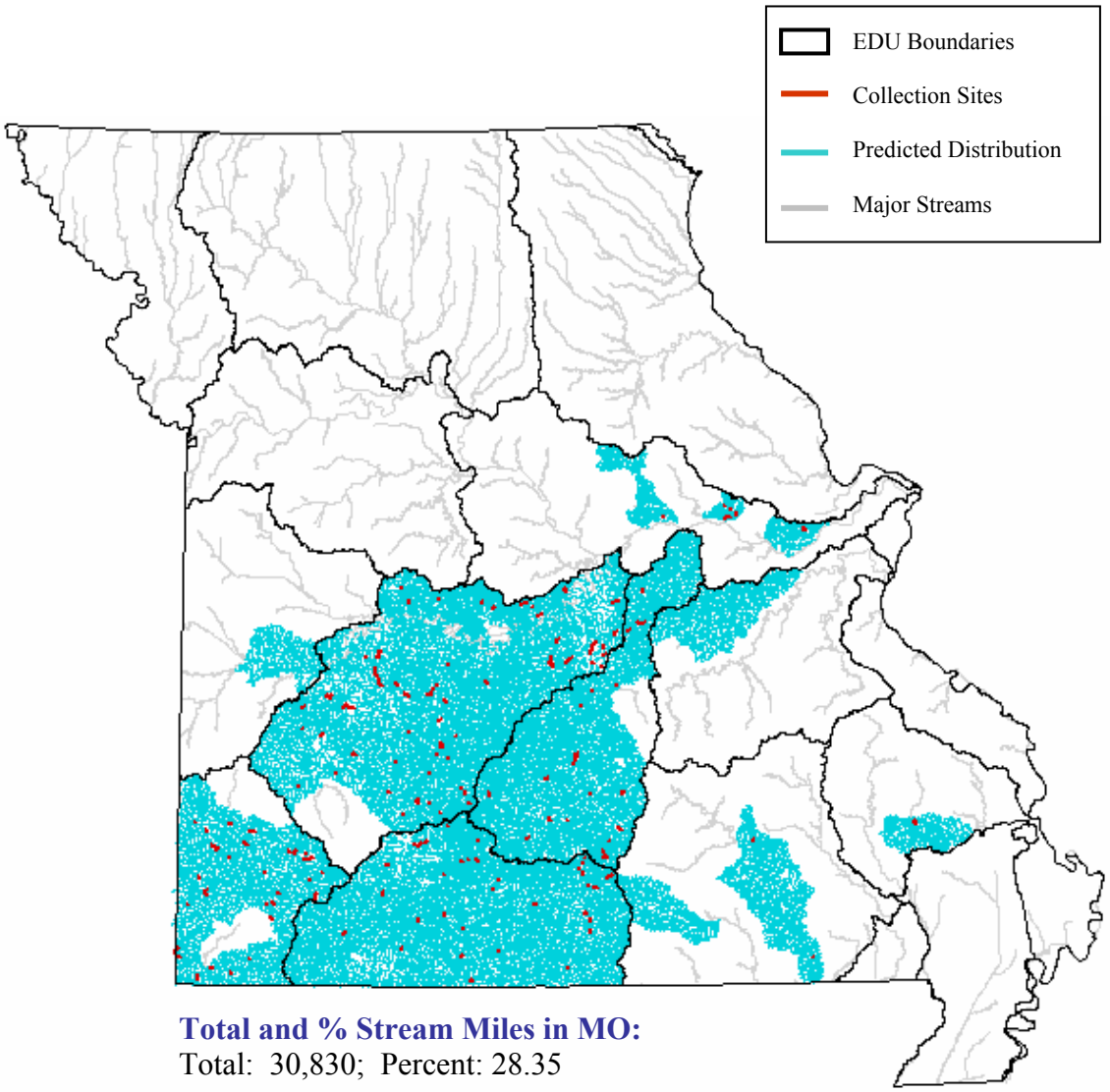
Endemism: Subregion

State Rank: S?

ITIS Code: 168425

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 30,830; Percent: 28.35

State Range:

The stippled darter is found primarily within the Neosho, Osage, White and Gasconade Ecological Drainage Units of the western Ozark Aquatic Subregion. There are scattered populations in the eastern portions of Ozark Aquatic Subregion, but these are probably remnants of a previously wider distribution (Pflieger 1997).

Habitat Affinities:

The stippled darter is characteristic of clear, permanent flowing, headwater creeks, large springs, spring runs, spring-fed brooks, and can occasionally be found in larger creeks, streams and small rivers (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). Its microhabitat is small, clear gravel or rubble bottomed pools with little current and vegetation or detritus. It often hides beneath cutbanks, rootwads, boulders, organic debris or aquatic vegetation (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). The stippled darter has also been found in shallow overflow and seepage pools fed by groundwater adjacent to large streams (Cross and Collins 1975). It spawns over gravel riffles in shallow water and moderate to swift current (Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model

The distribution is based upon existing collection records, contingency tables, habitat affinity and professional review.

([Linkr] >= 1) and ([Linkr] <= 7)

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Stonecat

Noturus flavus

Native: Yes

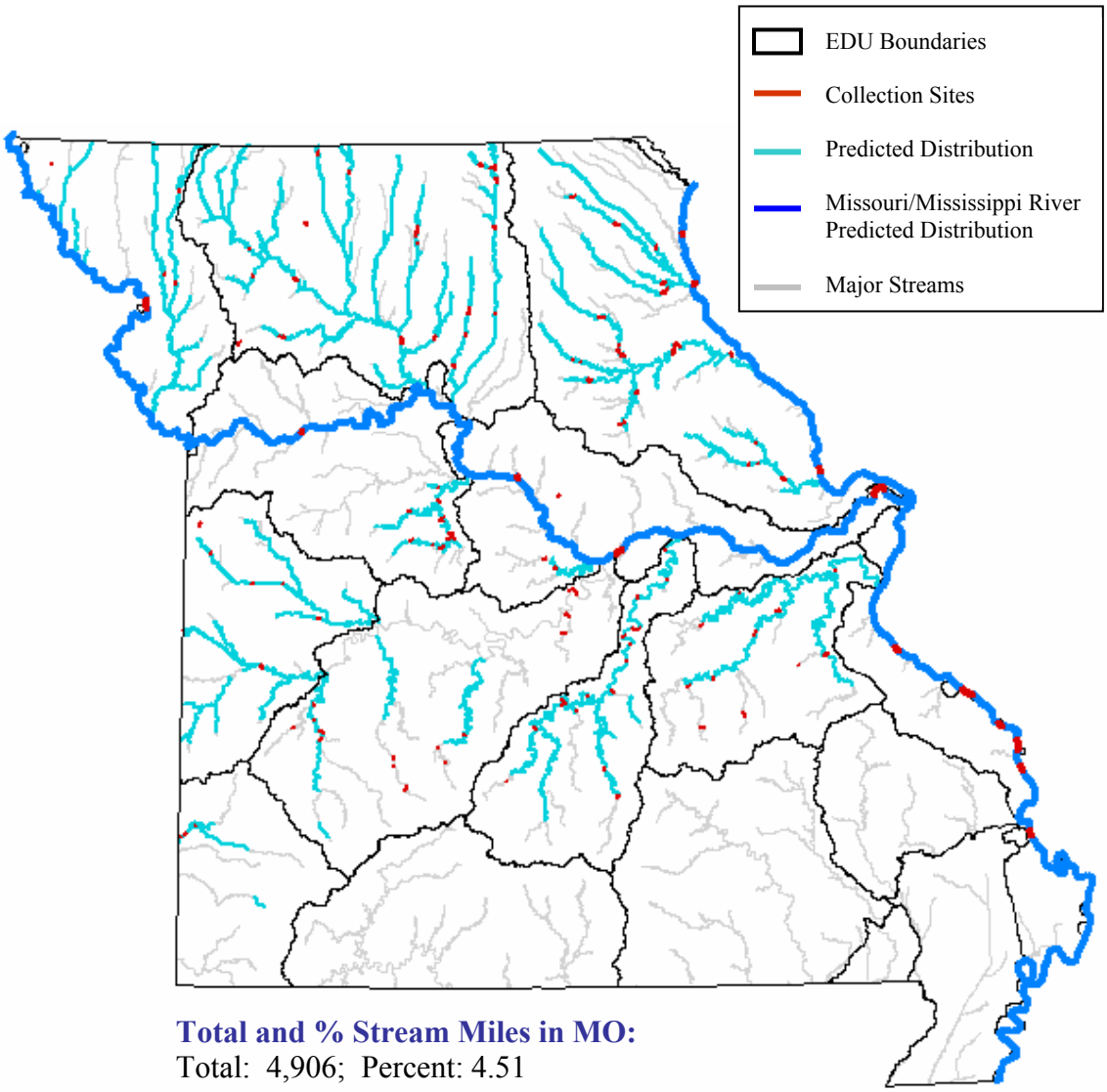
Endemism: Subzone

State Rank: S?

ITIS Code: 164013

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 4,906; Percent: 4.51

State Range:

The stonecat is the most abundant madtom, occurring in most large streams in the Ozark Aquatic Subregion, and in the Plains Aquatic Subregion. It occurs commonly in the upper Mississippi River and is rare in the lower Mississippi and Missouri Rivers. Its range includes most of the northern two-thirds of Missouri, and it is most abundant in the Ozark and Plains Aquatic Subregions (Pflieger 1997). It is absent from the White, Black/Current and Upper St. Francis Ecological Drainage Units of the Ozark Aquatic Subregion.

Habitat Affinities:

The stonecat appears in varied clearwater stream types, from moderate-sized, warm water creeks to larger streams (Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982). However, it avoids areas with extremely high gradient, as well as those with intermittent flow, and occurs only sparingly in low-gradient sluggish streams (Pflieger 1997; Trautman 1957). The stonecat is primarily found in higher gradient habitats, where it is found in riffles or runs with gravel, boulder and bedrock substrates (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). In large, low-gradient streams, it requires bottoms free of silt or other pollutants, and it can also be found along the beaches of Lake Erie, where currents mimic stream-like conditions (Trautman 1957). In the Missouri River, the stonecat inhabits swift channels with sand bottoms (Pflieger 1997). In Minnesota, stonecat are sometimes found concentrated just below dams on streams or rivers (Phillips et. al. 1982). During the daylight hours, the stonecat can be found hiding beneath slabs of shale or limestone, in rock crevices or in woody debris on the stream bottom (Cross and Collins 1975; Eddy and Underhill 1974; Phillips et. al. 1982). The insect, crayfish, and forage fish populations must be high to support the stonecat population (Pflieger 1997; Trautman 1957).

Predictive Model(s):

Central Plains Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 5)

Ozark Model
Query 1: ([Flow] = 1)
Query 2: (([Linkr] = 5) and ([Temp_code] = 1)) or (([Linkr] >= 6) and ([Linkr] <= 7))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Striped Bass

Morone saxatilis

Native: No

Endemism: NA

State Rank: SE

ITIS Code: 167680

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick

Total and % Stream Miles in MO:

Total: 384; Percent: 0.35

State Range:

The striped bass is native to the Atlantic Coast of North America but is regularly stocked in Lake of the Ozarks, and periodic escapes are caught downstream. The striped base is occasionally collected in the Missouri and Mississippi Rivers, indicating that small, self-sustaining populations might exist (Pflieger 1997).

Habitat Affinities:

The marine habitat of the striped bass includes shores, bays, and estuaries along the Atlantic and Pacific Coasts. Marine populations ascend the lower parts of rivers to spawn in strong current, sometimes reaching as far as 100 miles inland (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). Inland populations are maintained by stocking in most states (Clay 1975; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988), but self-sustaining landlocked populations were discovered in North Carolina and used in stocking operations in some areas, including Missouri (Pflieger 1997).

Predictive Model(s):

Great River Model

The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Striped Mullet

Mugil cephalus

Native: Yes

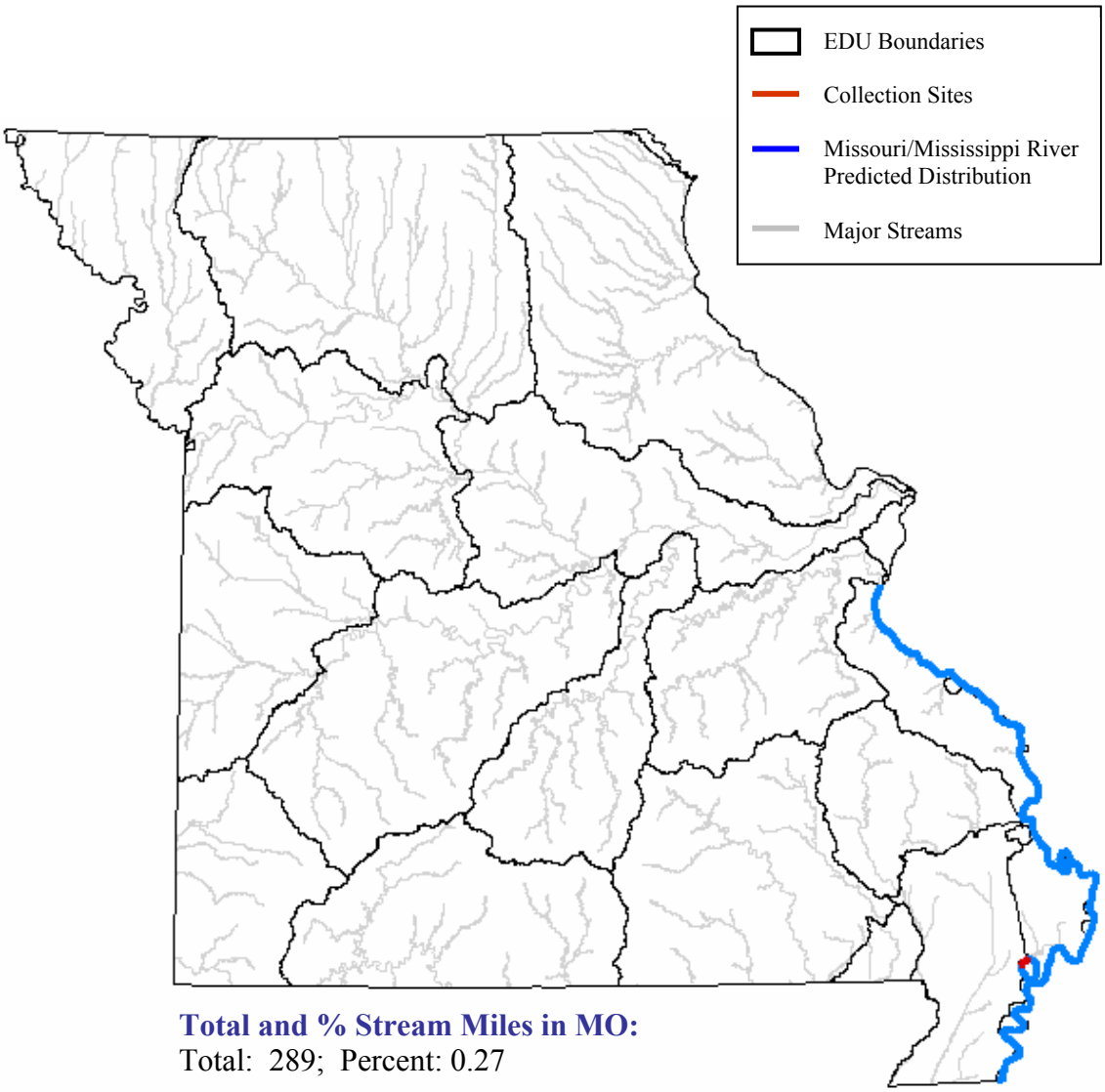
Endemism: Zone

State Rank: SA

ITIS Code: 170335

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 289; Percent: 0.27

State Range:
The striped mullet was first recorded in the lower Mississippi River in 1983 and since then, it has been collected at two other localities below the mouth of the Missouri (Pflieger 1997).

Habitat Affinities:
The striped mullet is able to move between salt and fresh water. It inhabits estuaries, salt marshes, and shorelines, and penetrates considerable distances up large rivers, usually in the spring and summer (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Striped Shiner

Luxilus chrysocephalus

Native: Yes

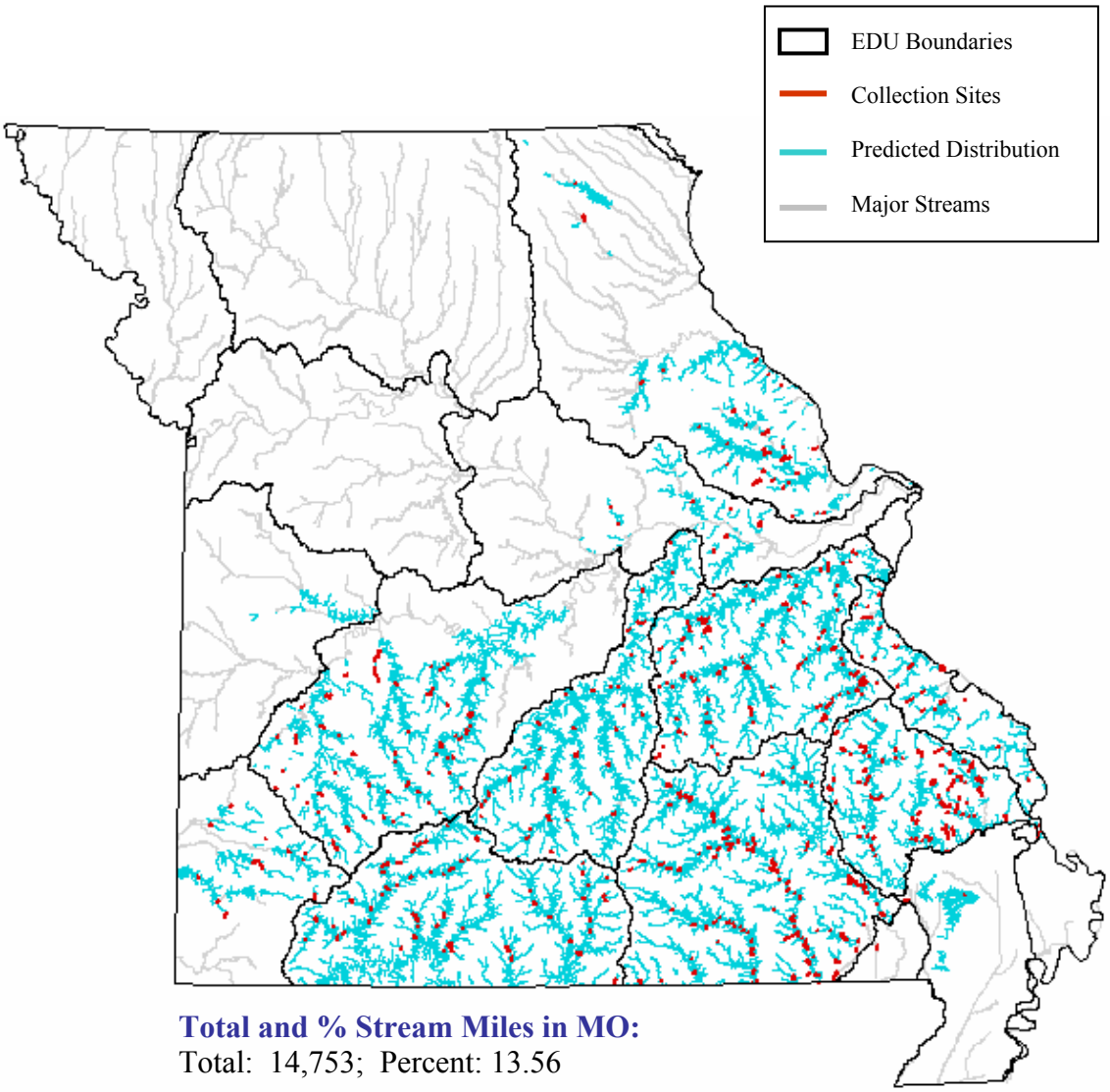
Endemism: Region

State Rank: S?

ITIS Code: 163832

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 14,753; Percent: 13.56

State Range:

The striped shiner occurs over much of the Ozark Aquatic Subregion. The striped shiner has declined considerably in the Neosho Ecological Drainage Unit (EDU) but has persisted at least into the 1990's. In the Gasconade EDU, it had nearly disappeared by the 1940's but then made a recovery by 1990 and now occurs throughout the drainage. It seems likely that undocumented reintroductions had something to do with the striped shiners reestablishment. More recently, the striped shiner has spread into the Moreau/Loutre EDU where it has apparently begun to replace its close relative the common shiner (Pflieger 1997). It is suspected to be gone from the Central Plains/Cuivre/Salt EDU (Pflieger 1997).

Habitat Affinities:

The striped shiner is found in small to medium perennial streams, but more often in smaller creeks. It prefers clear, weed-free, moderate to swiftly flowing streams having clean rock or gravel bottoms (Pflieger 1997; Etnier and Starnes 1993; Robinson and Buchanan 1988; Cross and Collins 1975). Researchers in Tennessee report that in the western portion of the state, it occurs in streams over sand; and in eastern Tennessee, in pool areas over gravel (Etnier and Starnes 1993). Commonly it is found downstream from and in the edges of riffles in slight to moderate current, and it avoids strong current and calm pools (Robinson and Buchanan 1988; Cross and Collins 1975; Pflieger 1997). This shiner is less tolerant of turbidity than the common shiner and occupies warmer and more still water than the bleeding shiner. In Missouri, the striped shiner is most abundant over rubble or clean gravel, and in the clear streams of the Ozark Uplands (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model

(([Linkr] >= 1) and ([Linkr] <= 2) and ([Dlinkr] >= 5))or (([Linkr] = 3) and ([Gradsegr] >= 4))or (([Linkr] = 4) and ([Gradsegr] >= 3)) or (([Linkr] = 5) and ([Gradsegr] >= 2) or ([Linkr] >= 6))

Mississippi Alluvial Basin Crowley's Ridge Model

([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

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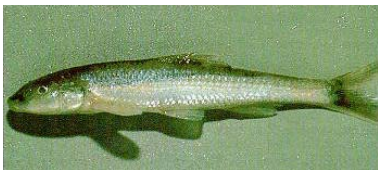

Sturgeon Chub

Macrhybopsis gelida

Native: Yes

Endemism: Region

State Rank: S3

ITIS Code: 163866

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick

Total and % Stream Miles in MO:
Total: 781; Percent: 0.72

State Range:

The sturgeon chub is found in the Missouri and Mississippi Rivers but it is less abundant in the Missouri above Kansas City and it has declined in the Mississippi River (Pflieger 1997).

Habitat Affinities:

The sturgeon chub inhabits the warm, continuously turbid waters of large perennial streams and rivers. They are found in association with moderate to strong current over sand and more often gravel substrate (Etnier and Starnes 1993; Robinson and Buchanan 1988; Pflieger 1997; Pflieger 1971). The sturgeon chub is restricted primarily to the main channels of the Missouri and Mississippi Rivers and their more sizeable tributaries. In the Missouri River, collections have been made where strong current flows over wide sand bars. The Mississippi River collections were made where steep banks were associated with fine gravel and sand patches in medium to fast current (Etnier and Starnes 1993). In Kansas populations have been found where the channel splits at the heads of islands and shallow sandy areas occur (Cross and Collins 1975). In Missouri, sturgeon chub numbers have increased in the lower Missouri river potentially due to the sediment-trapping effect of several large reservoirs upstream. As silt is flushed out of the Lower Missouri, less silt is being carried down to replace it. Subsequently, the amount of preferred gravel substrate habitat has increased, favoring the sturgeon chub (Pflieger 1997).

Predictive Model(s):

Great River Model

The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Suckermouth Minnow

Phenacobius mirabilis

Native: Yes

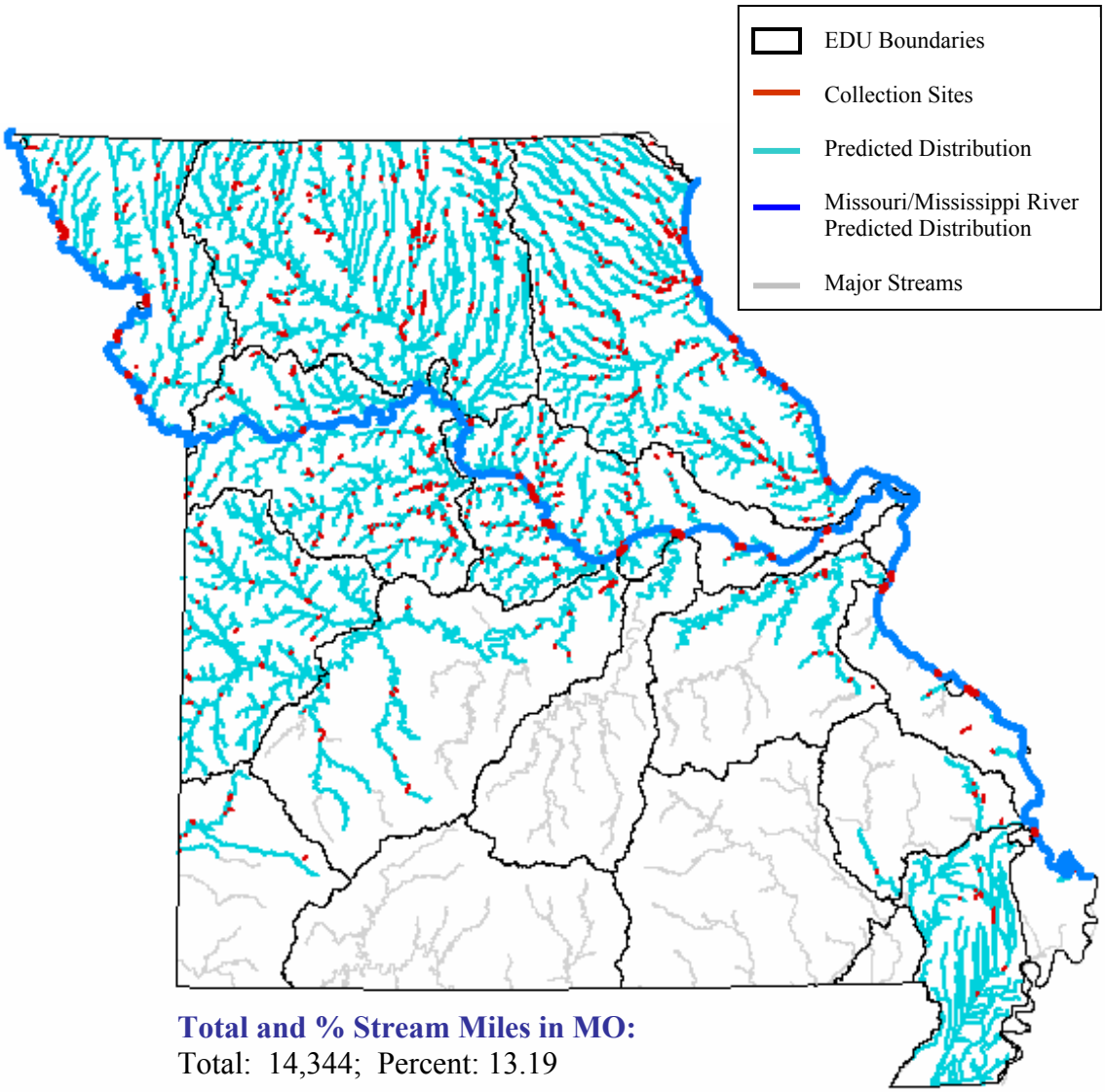
Endemism: Region

State Rank: S?

ITIS Code: 163502

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 14,344; Percent: 13.19

State Range:
The suckermouth minnow is abundant throughout the Central Plains Aquatic Subregion, the Missouri and Mississippi Rivers and some ditches and streams of the Mississippi Alluvial Basin Aquatic Subregion. It is also common in streams along the Plains-Ozarks border but does not penetrate into high-gradient streams (Pflieger 1997).

Habitat Affinities:
The suckermouth minnow is primarily a riffle fish, though not restricted to areas of swift current, inhabiting perennial streams of sufficient gradient to keep the bottoms silt-free (Pflieger 1997; Trautman 1957; Robinson and Buchanan 1988; Etnier and Starnes 1993). It occurs over substrates ranging from small rubble to sand and in streams of all sizes. While researchers agree that this minnow is tolerant of high turbidity, some find higher populations in clearer waters (Pflieger 1997; Robinson and Buchanan 1988) and others indicate low numbers or a complete absence in clear waters (Trautman 1957). It is more tolerant of changes in water level than other riffle species (Cross and Collins 1975). The suckermouth is intolerant of high gradient streams, those kept constantly cold from springs, intermittent flow, and competition from other small riffle fish (Trautman 1957; Pflieger 1997). In Missouri, the suckermouth minnow can be found occasionally in lowland ditches and in the warmer streams of the Ozark margin, and avoids the clear streams of the central Ozarks (Pflieger 1971).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2)
(([Linkr] = 3) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)) or (([Linkr] >= 4))

Ozark Model in Hydrologic Unit 10300102
([Temp_code] = 2)
(([Linkr] = 3) and ([Rgrad_subr] >= 1) and ([Rgrad_subr] <= 2)) or (([Linkr] >= 4))

Fish62 sub2 LinkR (by 11)
Ozark Model
([Temp_code] = 2)
(([Linkr] >= 3) and ([Linkr] <= 4) and ([DlinkR] >= 5))or (([Linkr] >= 5))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 2) and ([Ssize_code] <= 3) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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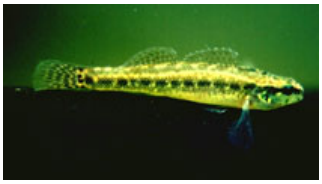


Swamp Darter

Etheostoma fusiforme

Native: Yes

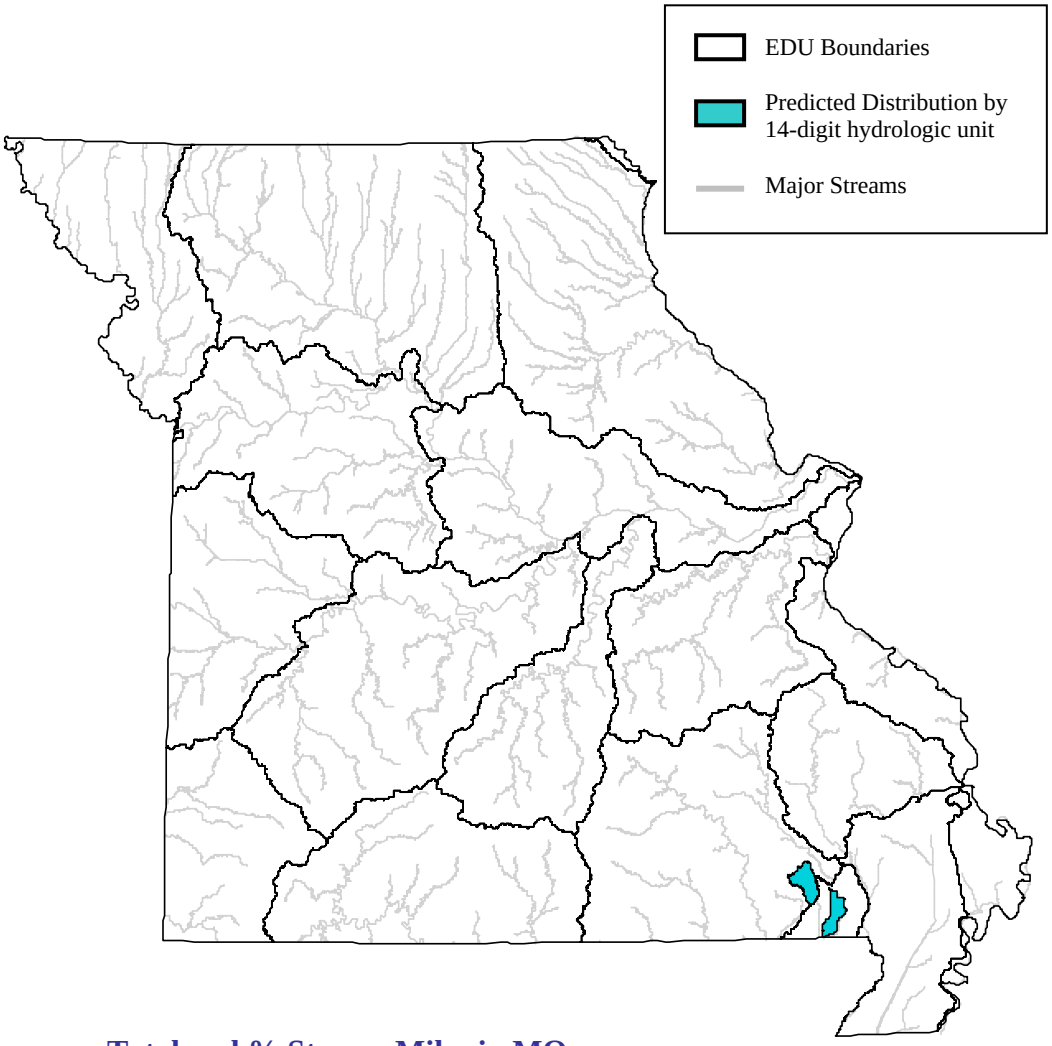
Endemism: Subzone

State Rank: S1

ITIS Code: 168358

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:

The swamp darter has only been collected from Allred Lake and a slough along Cane Creek along the southern border of the Ozark and Mississippi Alluvial Basin Aquatic Subregions. Before 1981, it was not known to exist in Missouri (Pflieger 1997).

Habitat Affinities:

The swamp darter inhabits slow moving or lentic waters of swamps, bayous, and oxbows with dense aquatic vegetation and substrates of mud and vegetative debris (Pflieger 1997; Etnier and Starnes 1993; Robinson and Buchanan 1988; Douglas 1974). It is found in waters having a range of pH, but is most common in acid waters (Robinson and Buchanan 1988). It is not a particularly common species in its range, as it requires "better-quality vegetated habitats," such as Reelfoot Lake and Isom Lakes in Tennessee, or undisturbed cypress swamps in Missouri, such as Allred Lake (Douglas 1974; Robinson and Buchanan 1988; Etnier and Starnes 1993; Pflieger 1997). In Missouri, it was also found in an abandoned stream channel in Cane Creek (Pflieger 1997).

Predictive Model(s):

Ozark Model

The distribution is based upon existing collection records and professional review.

References:

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Tadpole Madtom

Noturus gyrinus

Native: Yes

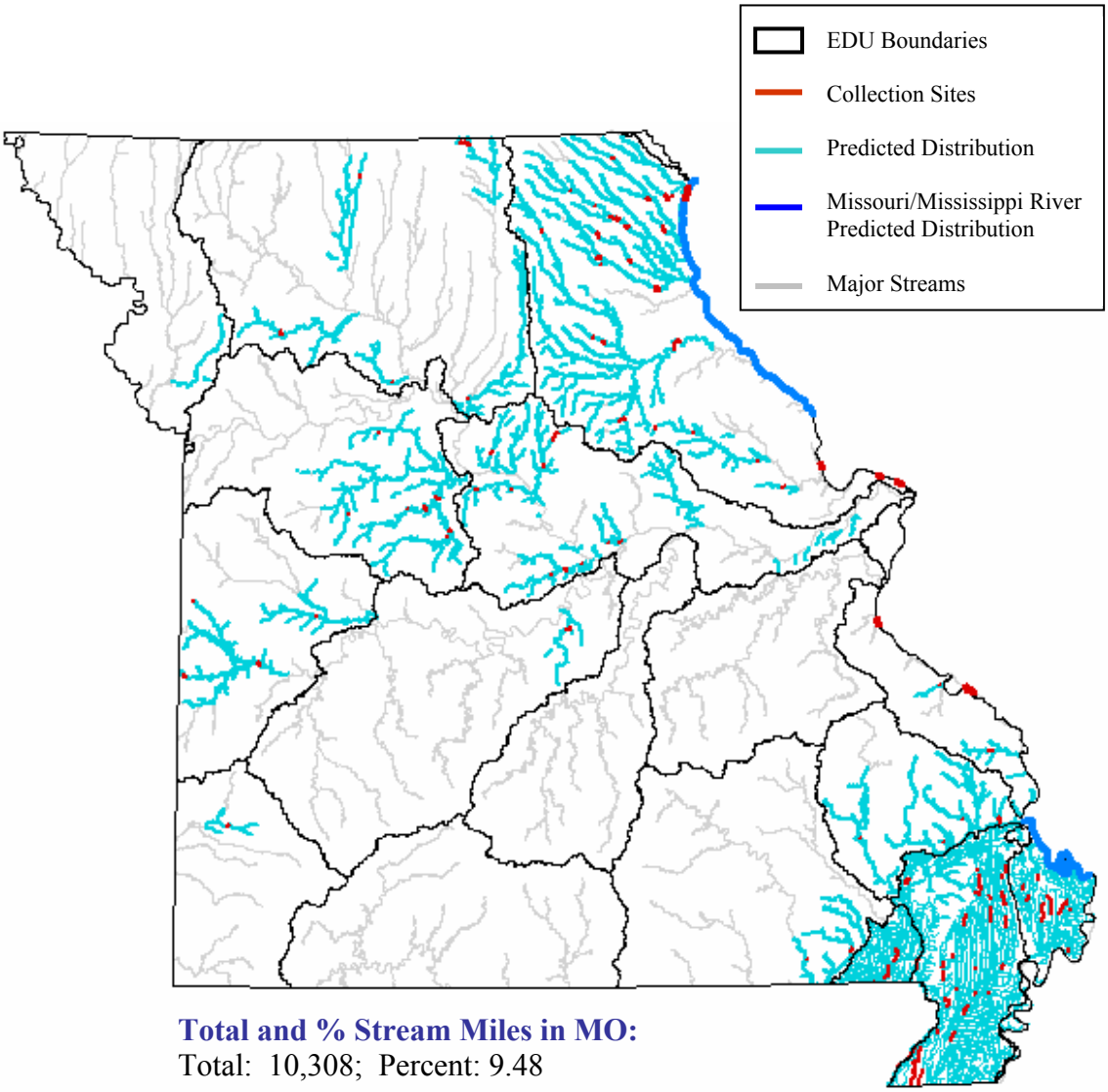
Endemism: Subzone

State Rank: S?

ITIS Code: 164003

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 10,308; Percent: 9.48

State Range: The tadpole madtom is the most common madtom in the Mississippi Alluvial Basin Aquatic Subregion. It also occurs in a broad zone from the Spring River in southwest Missouri to Mississippi River tributaries in the Central Plains/Cuivre/Salt Ecological Drainage Unit. The tadpole madtom prefers streams draining level upland areas along the Ozark Aquatic Subregion and was more abundant before settlement, particularly in the plains streams (Pflieger 1971; Pflieger 1997).

Habitat Affinities:

The tadpole madtom occurs in clear to moderately turbid water with little to no current; thick growths of submerged aquatic vegetation or accretions of organic debris are requirements. Most research indicates that the madtom prefers soft to moderately firm substrates of sand and silt (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957; Cross and Collins 1975; Phillips et. al. 1982; Eddy and Underhill 1974) but collections have been made over gravel in Kentucky (Clay 1975). The tadpole madtom is often found in the quiet waters of marshes, sloughs, and oxbows; and in impoundments and lakes in the shallow margins where cover is abundant (Cross and Collins 1975; Douglas 1974; Phillips et. al. 1982; Eddy and Underhill 1974; Trautman 1957; Robinson and Buchanan 1988; Etnier and Starnes 1993). It is the only madtom commonly found in the lakes of Minnesota (Phillips et. al. 1982; Eddy and Underhill 1974). In smaller sluggish streams, the tadpole madtom is common in quiet pools and backwaters. In swifter waters, it is found along heavily vegetated margins of drainage ditches, and in overflow areas (Etnier and Starnes 1993; Pflieger 1997). It has also been associated with streams of riffle and pool character (Clay 1975).

Predictive Model(s):

Central Plains/Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Linkr] = 3) and ([Rgrad_subr] = 1)) or (([Linkr] >= 4))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = “MO”)

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

References:

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Taillight Shiner

Notropis maculatus

Native: Yes

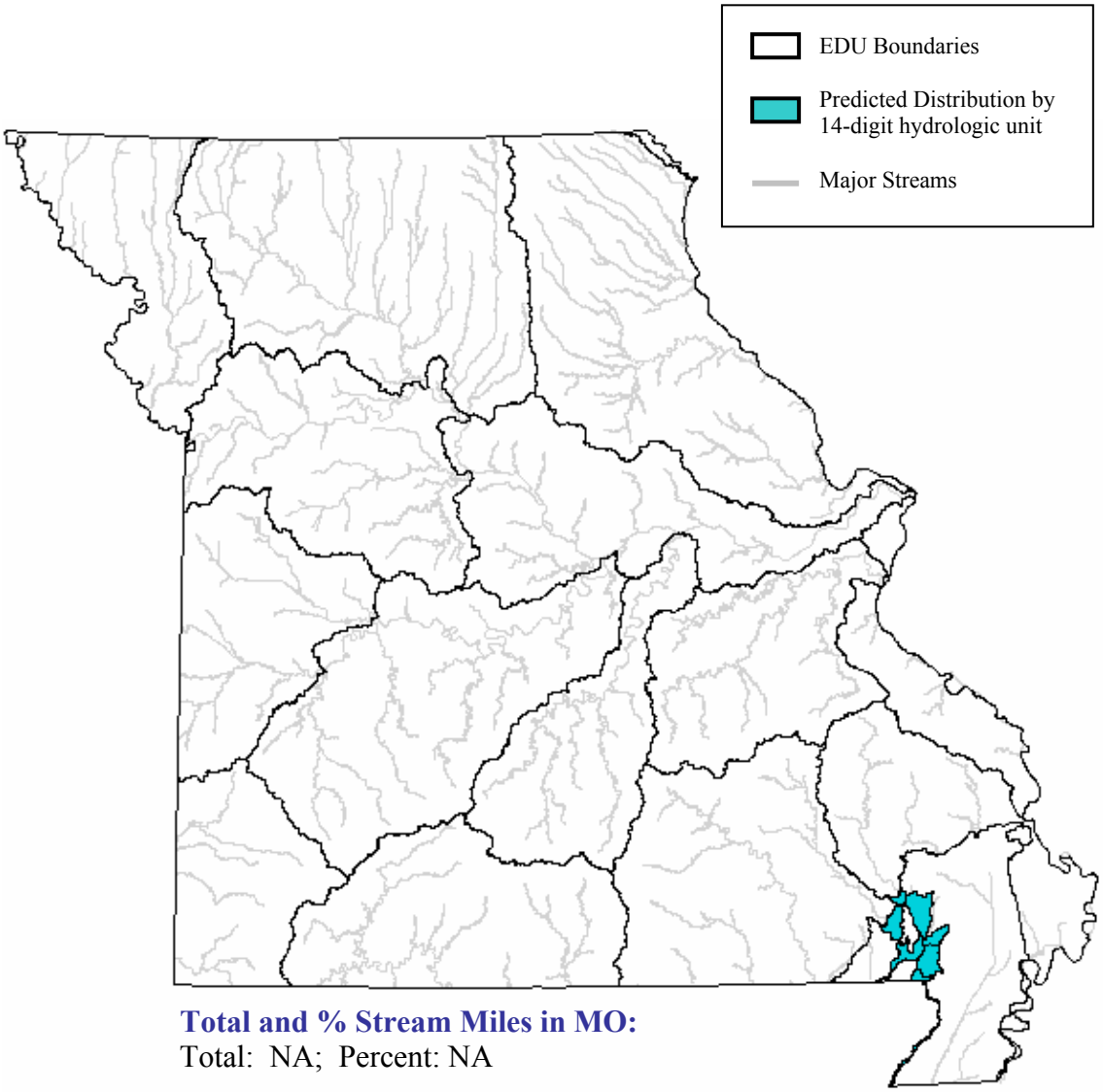
Endemism: Subzone

State Rank: S1

ITIS Code: 163454

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA; Percent: NA

State Range:
The taillight shiner is among the rarest of Missouri minnows with recent collections from only two localities; Mcpherson Slough and Allred Lake, which are within or along the western periphery of the Mississippi Alluvial Basin (MAB) Aquatic Subregion. As the ditching and draining of the MABAquatic Subregion has progressed, the taillight shiner has declined and it is now at risk of being extirpated from the state (Pflieger 1997).

Habitat Affinities:
The taillight shiner is found in low-gradient sloughs and streams; as well as the quiet waters of lakes, oxbows, bayous and swamps in lowland areas (Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988; Pflieger 1997). The taillight shiner shows an affinity for clear, tannin-stained waters with pH 6.1-6.9 and prefers substrate materials of silt, soft mud, and decomposing vegetation (Etnier and Starnes 1993; Robinson and Buchanan 1988; Pflieger 1997). It is most commonly collected in currentless shallows of backwater areas (Robinson and Buchanan 1988). Etnier and Starnes (1993) indicate an affinity for heavy vegetation. In Missouri it is found in slow moving areas of lowland creeks and rivers (Pflieger 1971).

Predictive Model(s):

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = "MO")

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Bailey, R. M., J. E. Fitch, E.S. Herald, E. A. Lachner, C. C. Lindsey, C.R. Robins, & W. B. Scott. 1970. A list of common and scientific names of fishes from the United States and Canada American Fisheries Society Special Publication No. 6. 149 pp.

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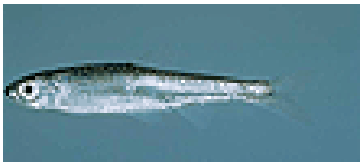
Telescope Shiner

Notropis telescopus



Native: Yes

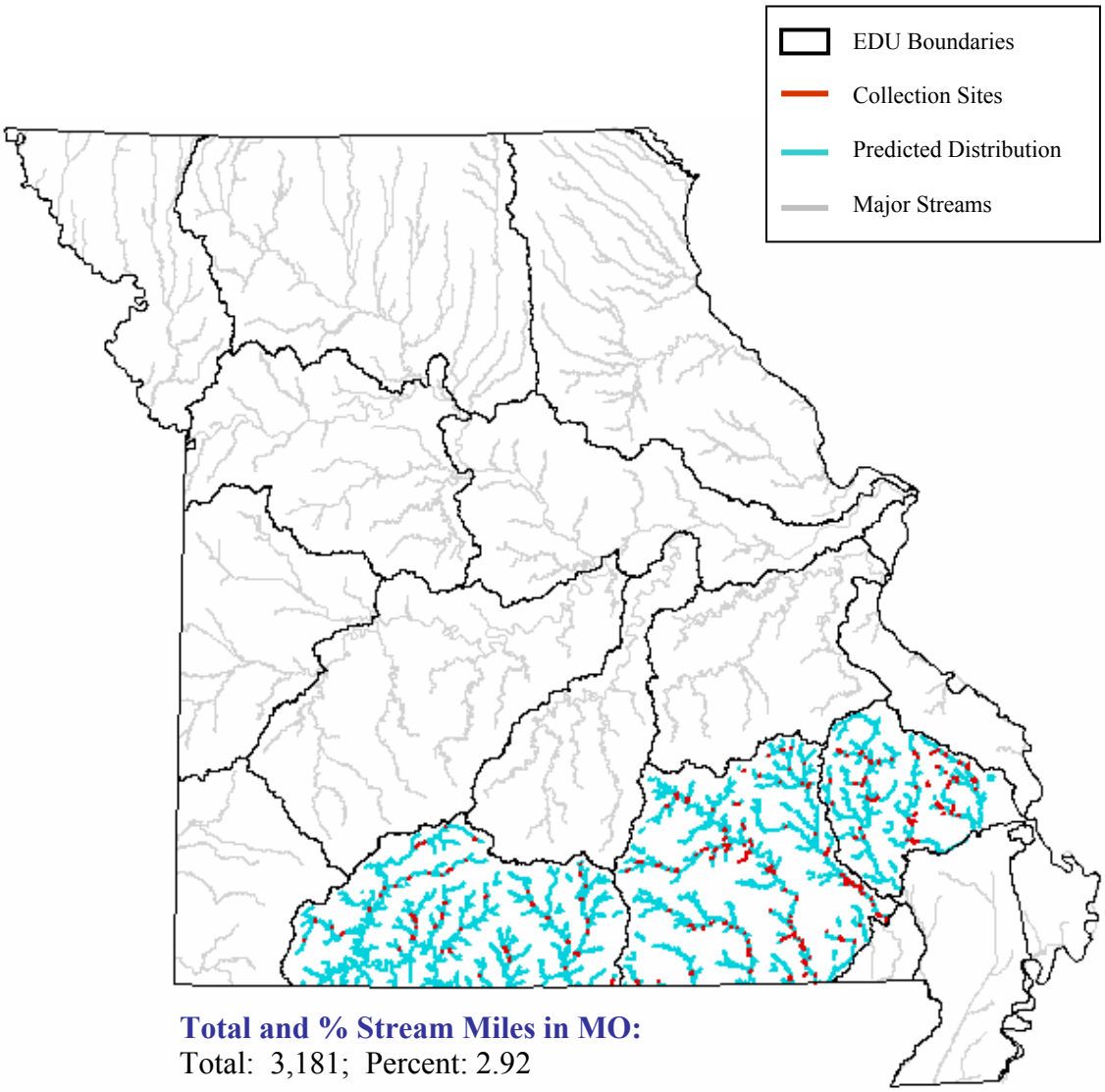
Endemism: Region

State Rank: S?

ITIS Code: 163470

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 3,181; Percent: 2.92

State Range:
The telescope shiner is found exclusively within the White, Current and Upper St. Francis/Castor Ecological Drainage Units (EDU) of the Ozark Aquatic Subregion, where it is the second most abundant shiner at many localities (Pflieger 1997).

Habitat Affinities:
The telescope shiner prefers the clear waters of high-gradient, rocky streams and rivers (Etnier and Starnes 1993; Pflieger 1997). It is typically found adjacent to riffles in moderate to swift current over substrates of silt-free, gravel or rock (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Ozark Aquatic Subregion, the telescope shiner is most abundant in medium-sized streams with strong base flow maintained by numerous springs and is often associated with beds of water willow (*Justicia*) or spatterdock (*Aeshna*). It avoids extreme headwaters and is less abundant in larger rivers (Pflieger 1997).

Predictive Model(s):

Ozark Model
(([Linkr] = 3) and ([Flow] = 1) and ([Rgrad_subr] >= 2) and ([Rgrad_subr] <= 3)) or (([Linkr] >= 4))

References:

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Threadfin Shad

Dorosoma petenense

Native: Yes

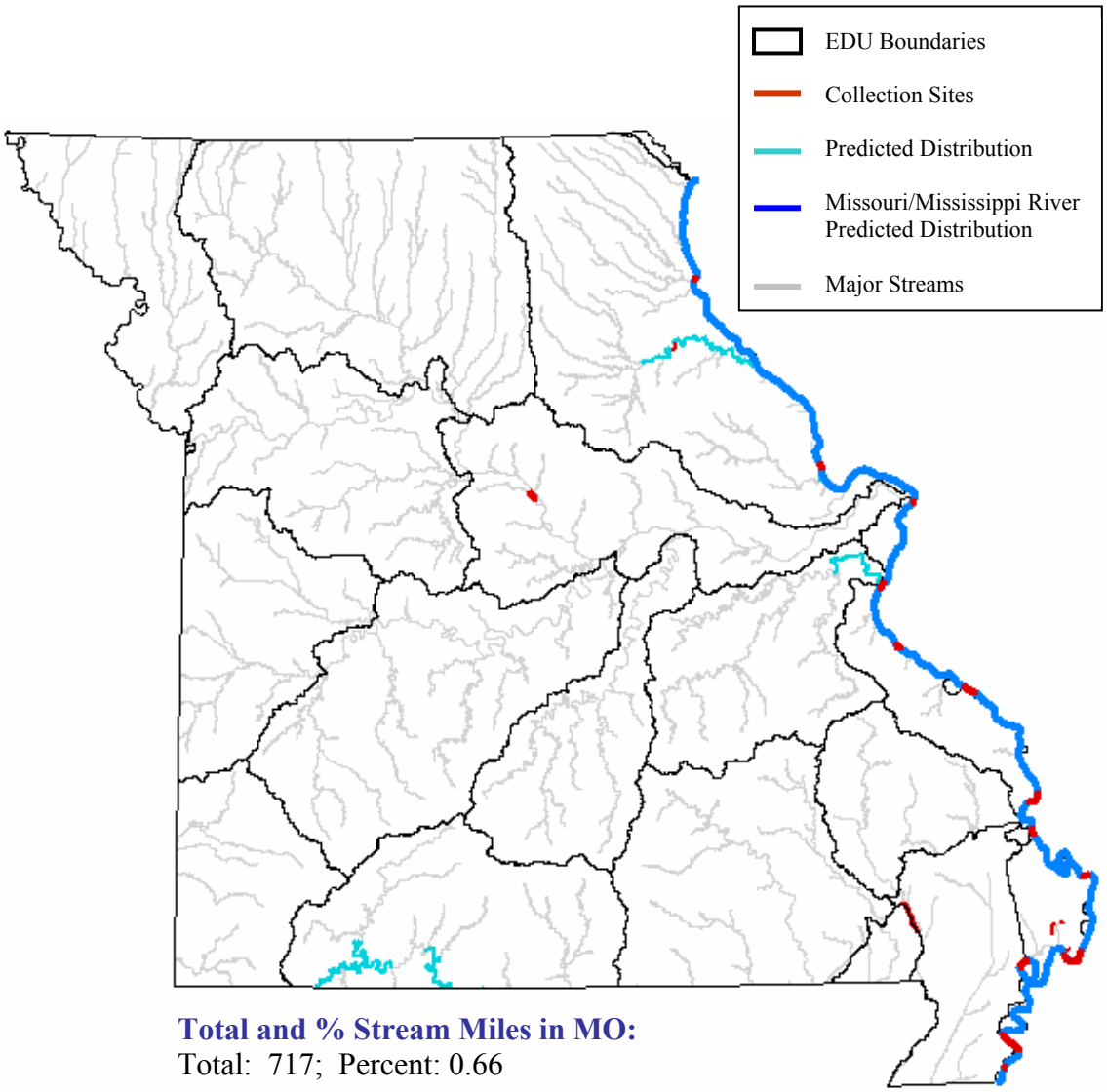
Endemism: Subzone

State Rank: S?

ITIS Code: 161738

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 717; Percent: 0.66

State Range:
The threadfin shad was probably overlooked by early collectors, as the first records of natural occurrence only appeared in 1963 when it was found in abundance in the Mississippi River below the mouth of the Missouri River. It can be found in most of the Mississippi River and some large tributaries, occasionally in the downstream sections of the Missouri River, and in mainstream reservoirs of the White River Basin, where it has been introduced (Pflieger 1997).

Habitat Affinities:
The threadfin shad is found mainly in reservoirs and moderate to large rivers (Etnier and Starnes 1993). As a subtropical and southern temperate species it prefers warm waters and mass die-offs can occur when temperatures dip below 45 degrees (Pflieger 1997; Robinson and Buchanan 1988). Compared to the gizzard shad, the threadfin shad is less tolerant of cold and more abundant in currents (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Missouri, the threadfin shad is found mainly in reservoirs but large numbers congregate below dams in spring and fall. Apparently, it has been able to survive in some reservoirs by relying on continuous warm-water discharge from steam-generating power plants (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Topeka Shiner

Notropis topeka

Native: Yes

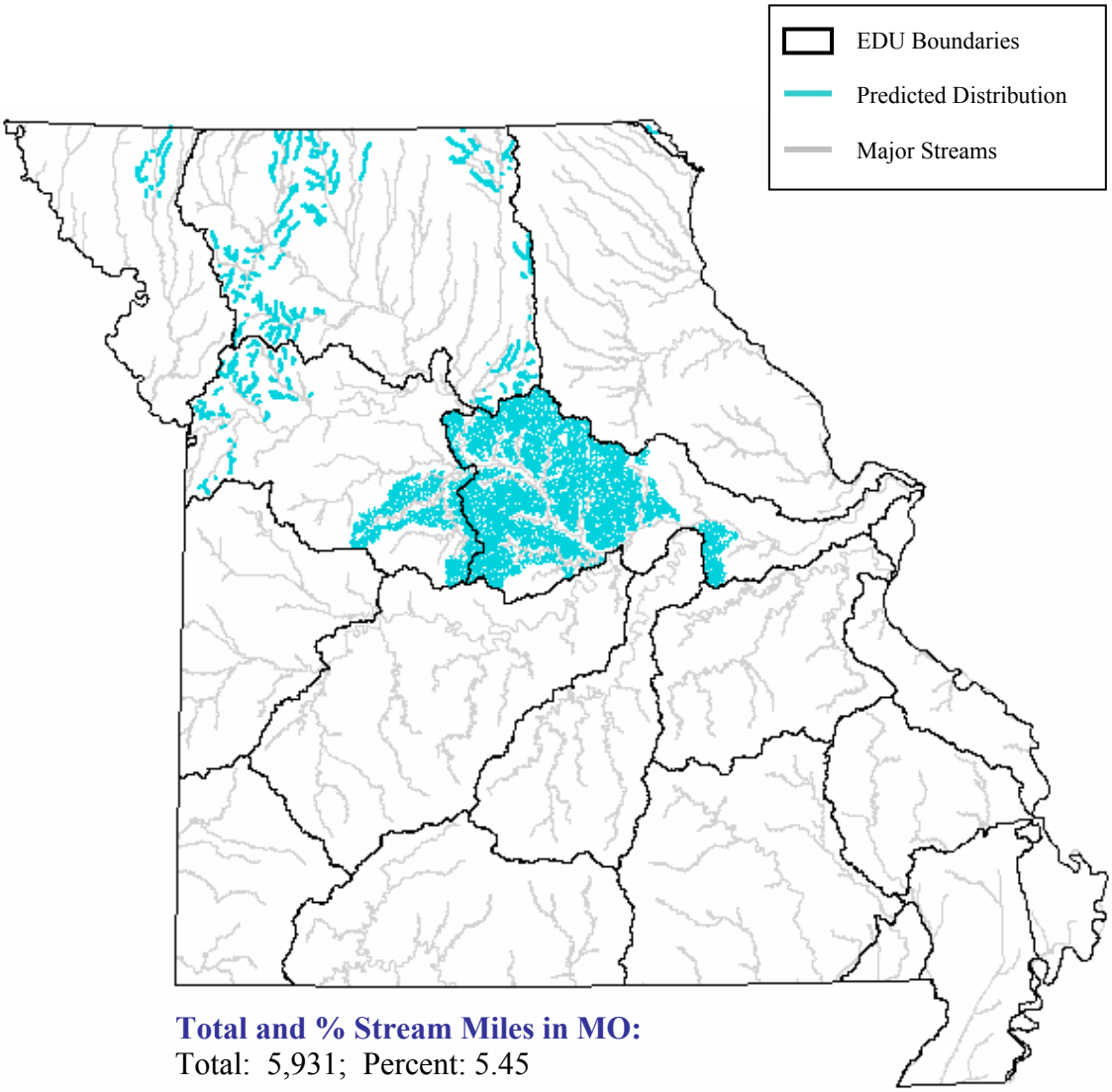
Endemism: Subregion

State Rank: S1

ITIS Code: 163471

Global Rank: G2

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 5,931; Percent: 5.45

State Range:

The Topeka shiner's range includes portions of northwest and north-central Missouri. The most substantial remaining populations of the Topeka shiner are in Bonne Femme Creek, Moniteau Creek, and Sugar Creek of the western Moreau/Loutre Ecological Drainage Unit (EDU) (Pflieger 1997).

Habitat Affinities:

The Topeka shiner inhabits large, open pools and runs of small, moderately clear headwater streams with silt-free sand, gravel, rubble, and bedrock substrates. Streams of this type tend to have low base flow and intermittent flow, so an important characteristic is groundwater percolation or occasionally small springs, which maintain the Topeka shiners pool habitat during dry periods (Cross and Collins 1975; Pflieger 1997). In Missouri, the habitat of the Topeka shiner tends to occur in belts of hilly topography adjacent to major rivers, where less-intensive agriculture results in lower rates of sedimentation and higher gradients flush silt efficiently, maintaining clean substrates in the pools the Topeka shiner inhabits (Pflieger 1997). In Minnesota, populations of the Topeka shiner have probably declined from increased agricultural development and climate change (Eddy and Underhill 1974). The Topeka shiner is severely threatened in Missouri and although the exact reason for its decline is not known, there are many likely causes. These are increased sedimentation from more intensive row-crop production, confined livestock farms that affect stream quality, the more widespread application of pesticides, increased urbanization, the construction of small flood-control impoundments, and competition pressures from introduced species, such as the western mosquitofish and blackstripe topminnow (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model plus Lamine River
([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([Sdiscr_11c] <= 1) and ([Temp_code] = 2) and ([Gradsegr] >= 3)

Central Plains Model minus Lamine River
([Flow] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([Sdiscr_11c] <= 1) and ([Temp_code] = 2) and ([Gradsegr] >= 3) and ([Gradsegr] <= 6)

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Trout-perch

Percopsis omiscomaycus

Native: Yes

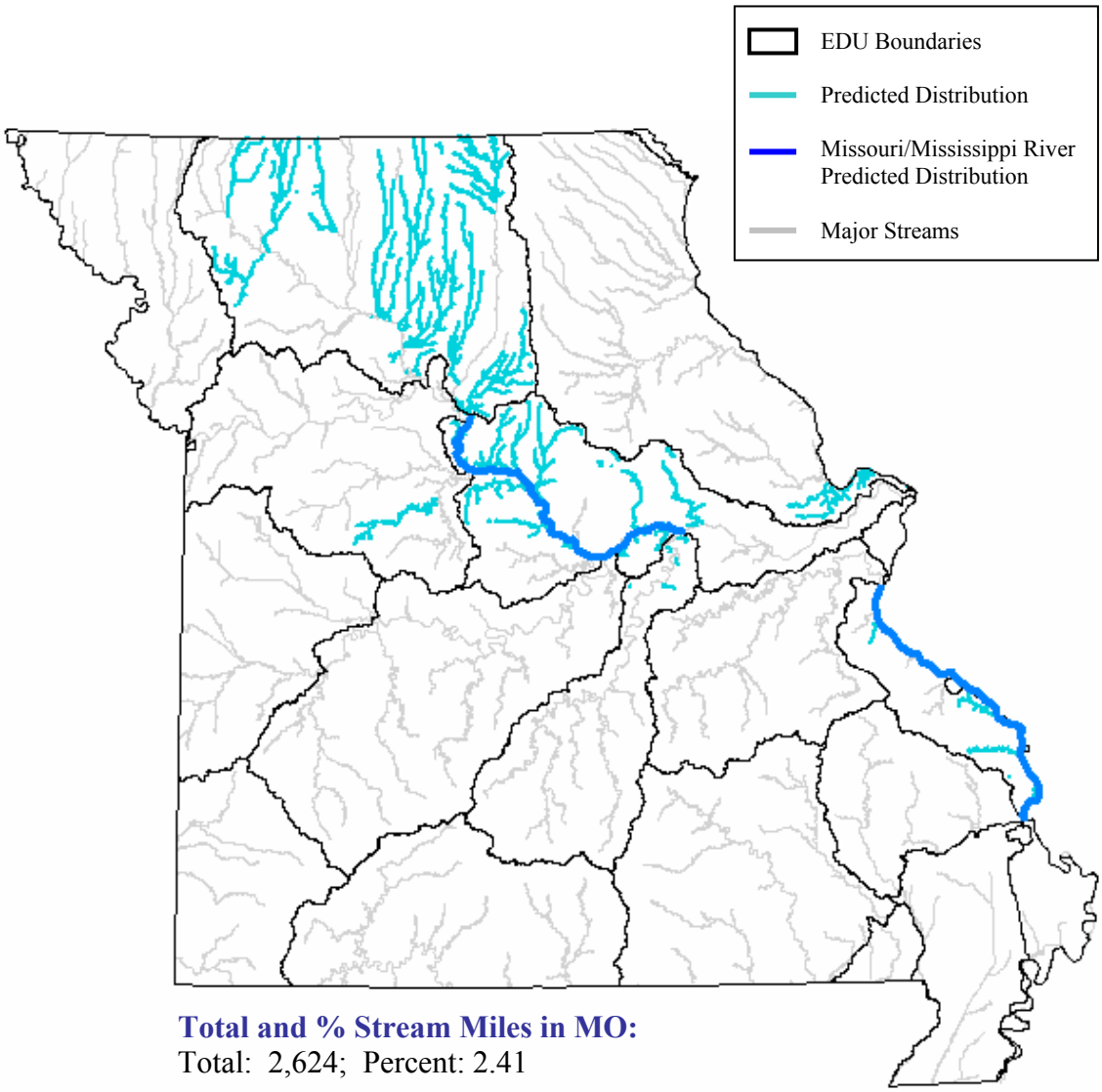
Endemism: Subzone

State Rank: S1?

ITIS Code: 164409

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 2,624; Percent: 2.41

State Range:

It is suspected that the only remaining populations of trout-perch are in the Grand/Chariton Ecological Drainage Unit (EDU) of the Central Plains Aquatic Subregion, although populations have been known from the Ozark/Moreau/Loutre EDU as well. Its range was probably more widespread before the landscape was radically altered by extensive channelization in the early part of the 20th century, resulting in the widespread destruction of pool-type habitats. More recently, the trout-perch has been threatened by pesticide-intensive agricultural practices and erosion-promoting row crops, such as soy beans, and its continued existence in Missouri is not at all certain (Pflieger 1997).

Habitat Affinities:

The trout-perch inhabits low-gradient streams as well as clear lakes with clean sand and gravel bottoms, where it can be found at depths of almost 200 ft (Clay 1975; Eddy and Underhill 1974; Phillips et. al. 1982; Trautman 1957). In streams, the trout-perch prefers long, deep pools with sand and fine gravel substrates (Clay 1975; Pflieger 1997; Trautman 1957). In the Central Plains Aquatic Subregion of Missouri, the trout-perch inhabits moderately clear streams with permanent flow with substrates composed mainly of sand and gravel (Pflieger 1997). The trout-perch is extremely intolerant of clayey silt deposition and avoids rooted aquatic vegetation (Clay 1975; Pflieger 1997; Trautman 1957). The trout-perch spawns in shallow water over sand and gravel, and adults sometimes migrate from lakes habitats to shallow tributaries for spawning (Phillips et. al. 1982).

Predictive Model(s):

Central Plains/Ozark Model
Query 1: ([Flow] = 1) and ([Temp_code] = 2)
Query 2: (([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([GradsegR] >= 1) and ([GradsegR] <= 3)) or (([Ssize_code] = 3))

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Walleye

Stizostedion vitreum

Native: Yes

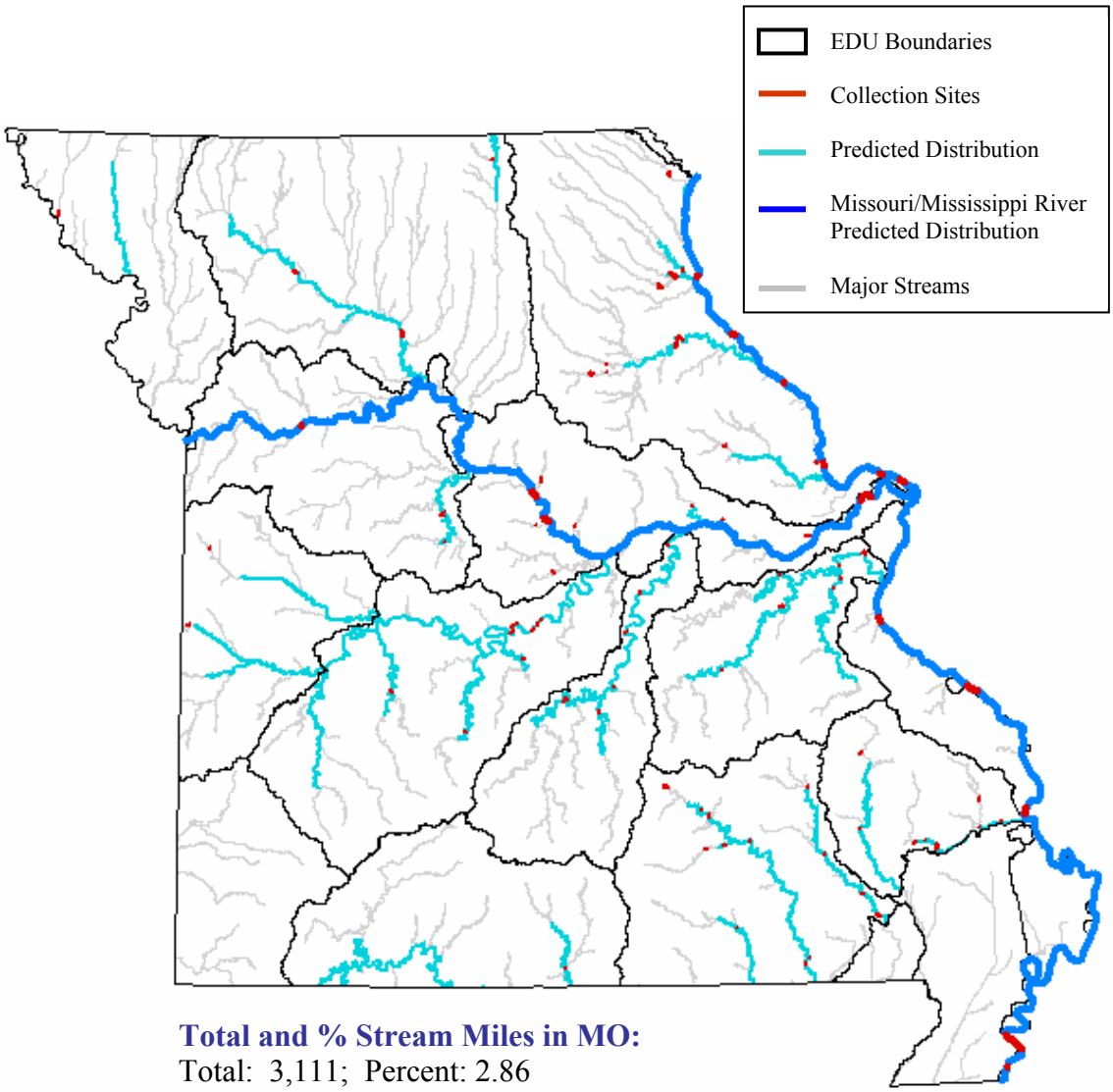
Endemism: Subzone

State Rank: S?

ITIS Code: 168506

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 3,111; Percent: 2.86

State Range:

The walleye is distributed statewide, excepting the Ozark/Neosho Ecological Drainage Unit and interior streams of the Mississippi Alluvial Basin, with the largest populations occurring in the upper Mississippi River and in large streams and reservoirs of the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:

The walleye is most abundant in large, cool, sandy-bottomed lakes, reservoirs or impoundments but also inhabits small lakes and large streams in smaller numbers (Clay 1975; Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). In Missouri rivers, the walleye is typically found at the bottom of deep pools containing large boulders or submerged logs, but migrates to shallower waters at night (Pflieger 1997). In large northern lakes, the walleye spawns over bars or shoals (Eddy and Underhill 1974).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Linkr] >= 6)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Upper Left: Photo courtesy of the Walleye Technical Committee of the North Central Division of the American Fisheries Society, http://www.ws3.coopfish.siu.edu/walleye_tech.

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Warmouth

Chaenobryttus gulosus

Native: Yes

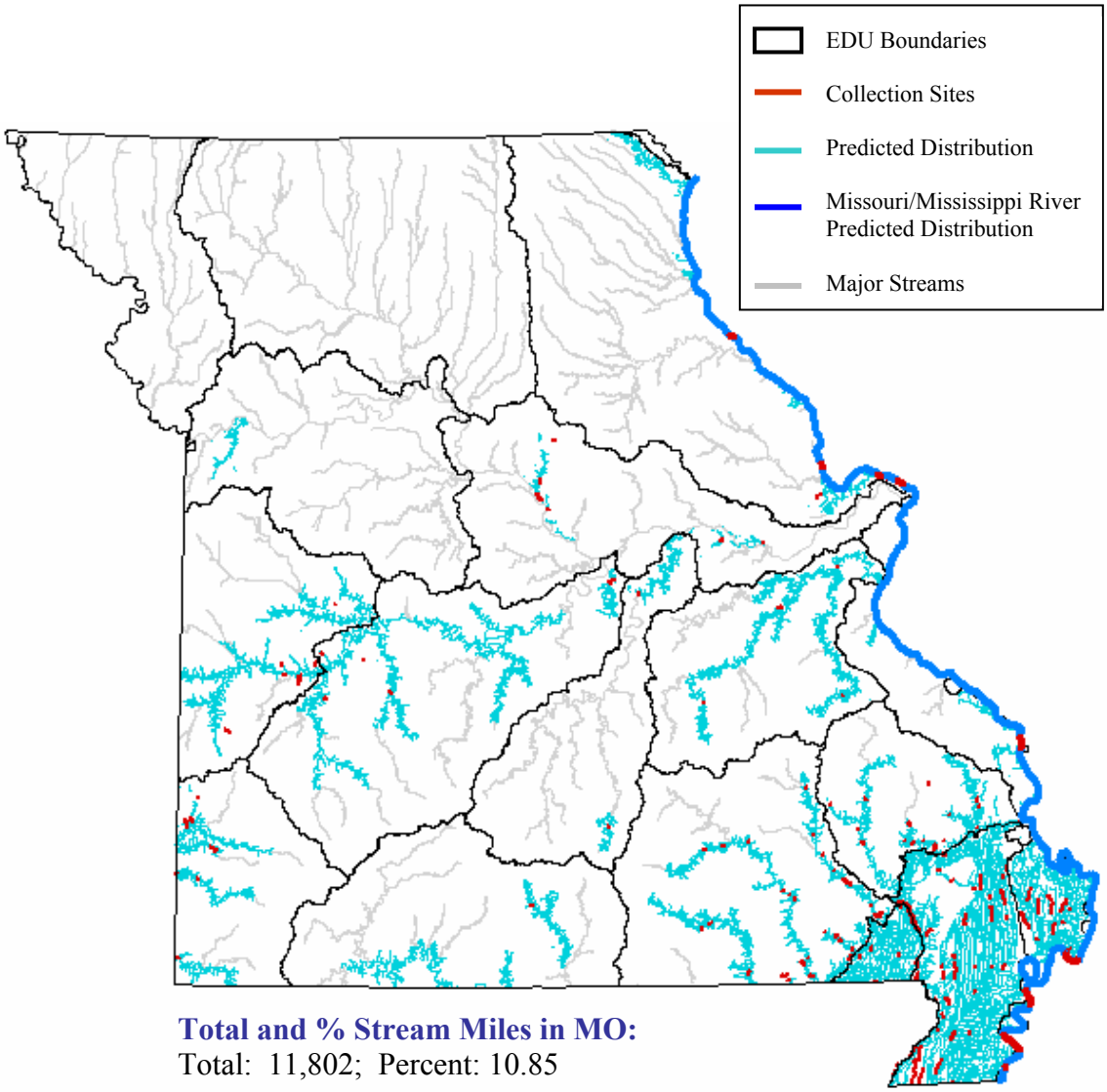
Endemism: Subzone

State Rank: S?

ITIS Code: 168139

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 11,802; Percent: 10.85

State Range:

The warmouth was initially found only in the Mississippi River and the Mississippi Alluvial Basin Aquatic Subregion and adjacent sections Ozark Aquatic Subregion. However, through undocumented and state-sponsored introductions, and subsequent habitat expansion from impoundment construction and other environmental alterations, it now occurs in reservoirs and overflow waters across the southern two-thirds of the state (Pflieger 1997).

Habitat Affinities:

The warmouth reaches abundance in a wide variety of habitats, from low-gradient streams, overflow waters, marshes, swamps, and natural lakes of lowland areas, to impoundments, reservoirs and ponds in mountainous areas, assuming its microhabitat exists. The warmouth requires ponded or slow moving, clear to moderately turbid water with dense beds of aquatic vegetation and soft bottoms of silt-free, mud and organic debris (Clay 1975; Cross and Collins 1975; Douglas 1974; Eddy and Underhill 1974; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). The warmouth is often found about cover, such as submerged stumps, logs or cypress knees (Robinson and Buchanan 1988). In the Mississippi Alluvial Basin Aquatic Subregion of Missouri, the warmouth reaches highest abundance in ditches with dense vegetation, while in other parts of the state it is overflow habitats adjacent to streams or large impoundments in uplands areas (Pflieger 1997).

Predictive Model(s):

Central Plains/Ozark Model

(([GradsegR] >= 1) and ([GradsegR] <= 2)) or (([GradsegR] = 3) and ([Linkr] >= 6)) or (([GradsegR] = 3) and ([DlinkR] >= 5)) or (([GradsegR] >= 4) and ([DlinkR] >= 5))
DlinkR is done. – Not removing anything.

Mississippi Alluvial Basin Model

([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model

The Mississippi River distribution is based upon existing collection records and professional review.

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Wedgespot Shiner

Notropis greenei

Native: Yes

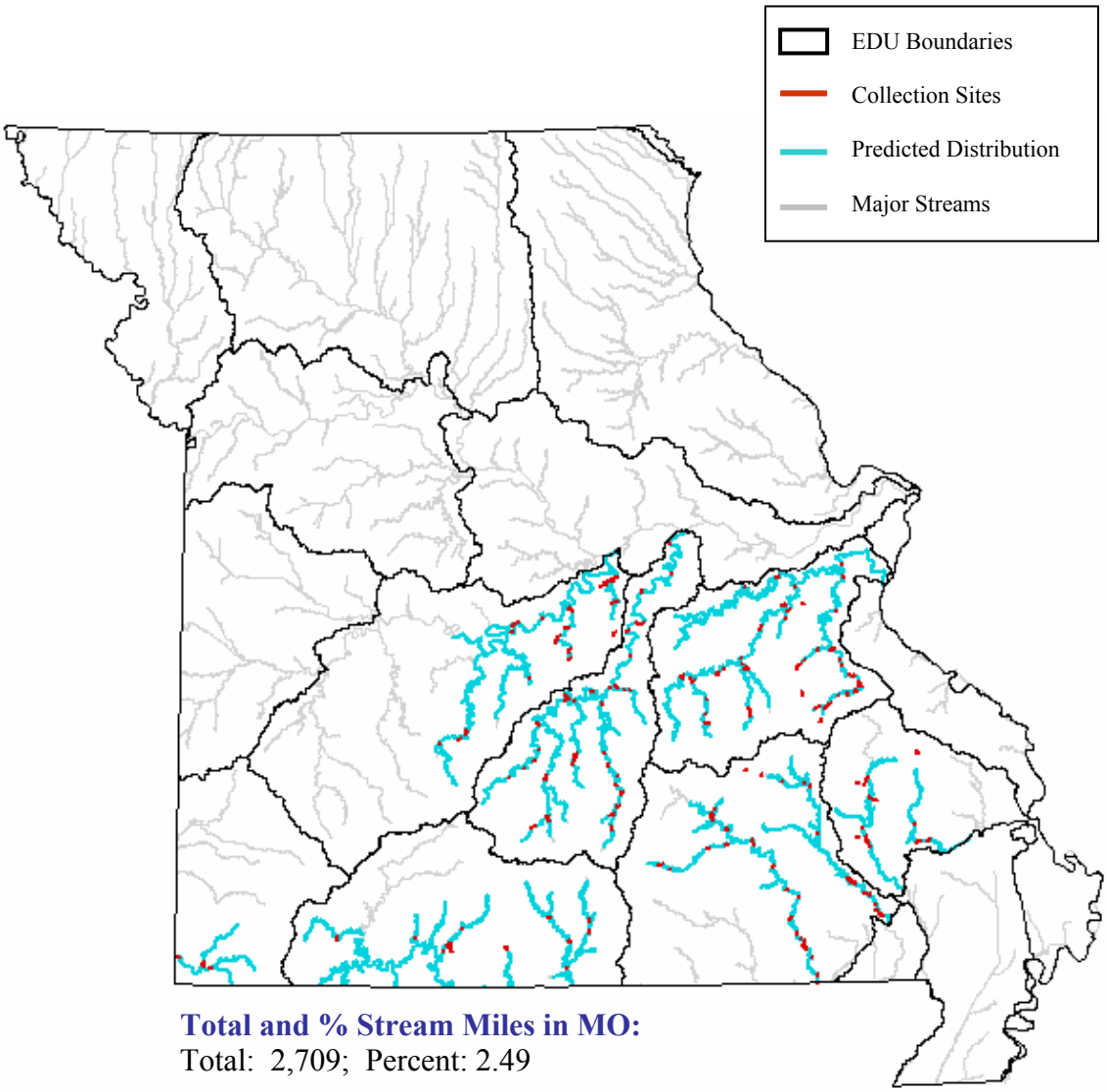
Endemism: Subregion

State Rank: S?

ITIS Code: 163443

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 2,709; Percent: 2.49

State Range:
The wedgespot shiner is found exclusively within the upland areas of the Ozark Aquatic Subregion. It suspected that it has recently disappeared from the Neosho Ecological Drainage Unit (EDU) and parts of the White EDU, and occurs only as far west as the Niangua River in the Osage EDU (Pflieger 1997).

Habitat Affinities:
The wedgespot shiner inhabits medium-sized creeks to moderately large, upland rivers with clear water and permanent flow, but avoids headwater creeks entirely (Pflieger 1997; Robinson and Buchanan 1988). It is usually found in pools with moderate current or adjacent to riffles over substrates of sand, fine gravel and rubble (Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model
([Linkr] >= 5)

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Weed Shiner

Notropis texanus

Native: Yes

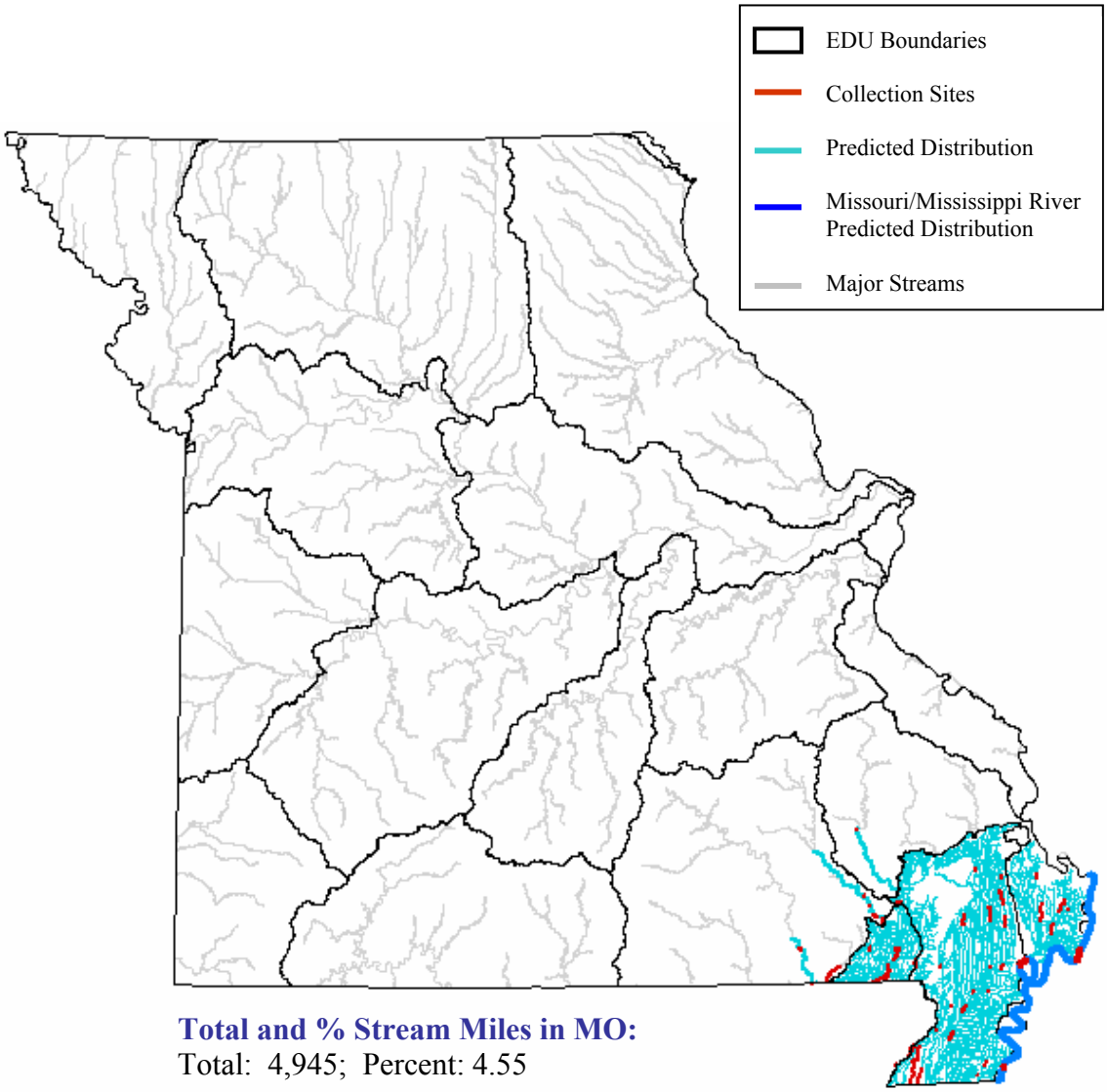
Endemism: Region

State Rank: S?

ITIS Code: 163420

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 4,945; Percent: 4.55

State Range:

The weed shiner occurs widely in the Mississippi Alluvial Basin Aquatic Subregion and adjacent sections of the Black/Current and Upper St. Francis/Castor Ecological Drainage Units (EDU). Historical records suggest that it occurred further north in eastern Missouri in the past (Pflieger 1997).

Habitat Affinities:

The weed shiner reaches highest abundance in small to moderate-sized, low-gradient streams with clear water, slight current and substrates of silt-free sand, gravel or mud (Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). Despite its name, the weed shiner is associated with little or no aquatic vegetation (Douglas 1974; Etnier and Starnes 1993; Pflieger 1997). In Missouri, lowland populations are most abundant in large ditches with sparse vegetation, while Ozark populations are found in quiet, protected areas along the margins of low gradient streams (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

References:

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Western Mosquitofish

Gambusia affinis

Native: Yes

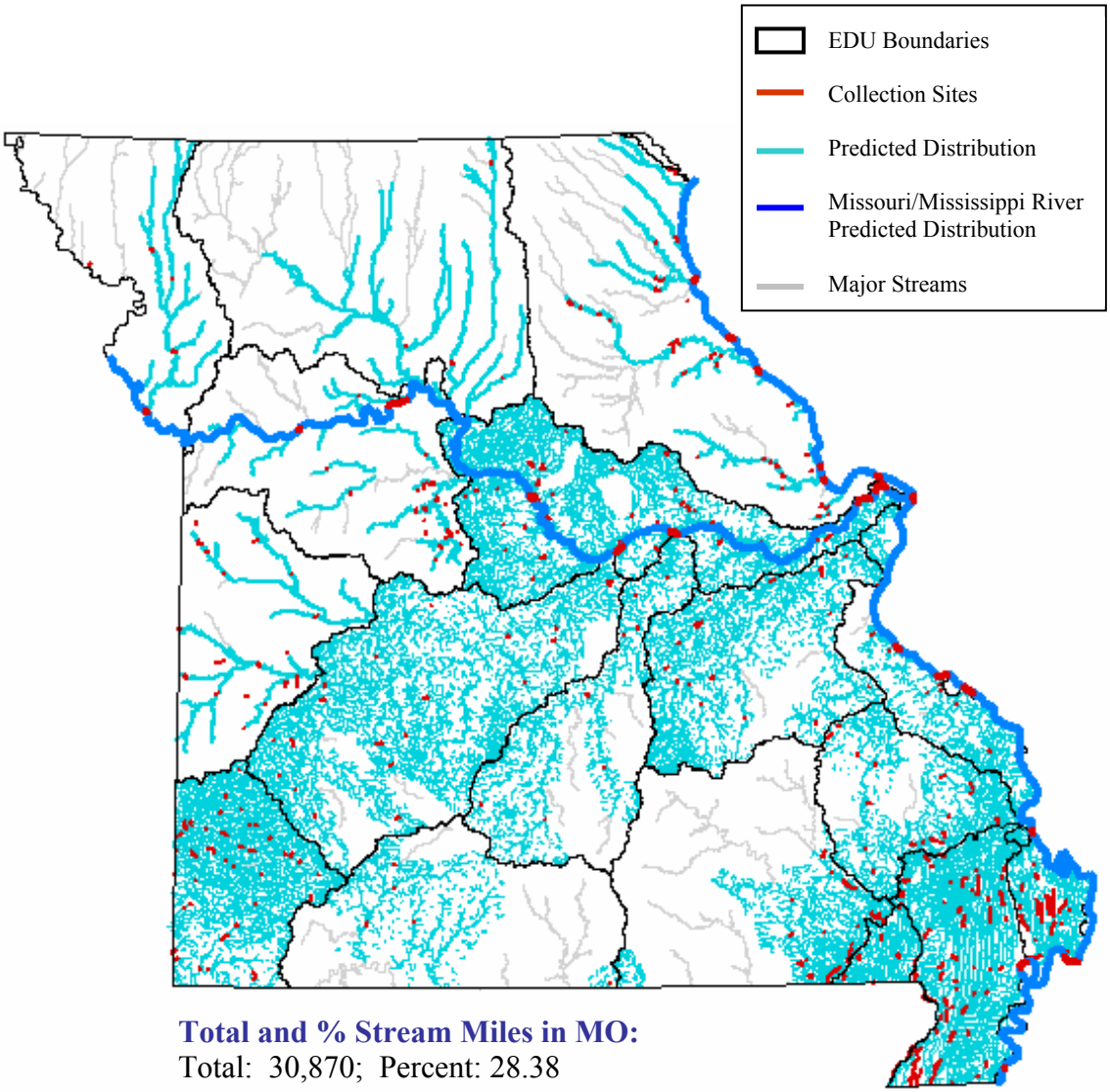
Endemism: Region

State Rank: S?

ITIS Code: 165878

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 30,870; Percent: 28.38

State Range:
The western mosquitofish has increased its distribution throughout Missouri, now occurring in each of the Aquatic Subregions of the state. Although the western mosquitofish suffers high mortality rates in winter, its short life cycle and high reproductive potential allow it to reach considerable abundance by late summer. Seasonally high population densities can be found throughout the Mississippi Alluvial Basin Aquatic Subregion, the northeastern Central Plains Aquatic Subregion, and the Neosho and Moreau/Loutre Ecological Drainage Units (EDU) of the Ozark Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The western mosquitofish can be found in a wide range of habitats, from the warm, shallow waters of swamps, ditches and impoundments to the calm backwater pools of creeks and rivers (Clay 1975; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). It moves about in groups at the surface and prefers densely vegetated shorelines with little or no current (Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Missouri, the western mosquitofish is most often found in swamps, sloughs, oxbows and warm backwater of the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997). The western mosquitofish's aggressive nature, short life cycle and broad ecological tolerances are a serious concern in some states because it has eliminated many native small fishes through intense competition and rapid range expansion (Robinson and Buchanan 1988; Trautman 1957).

Predictive Model(s):

Central Plains Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 4)

Ozark Model
([Linkr] >= 1) and ([Linkr] <= 4) and ([Rgrad_subr] = 1) or ([Linkr] >= 5)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Western Sand Darter

Ammocrypta clara

Native: Yes

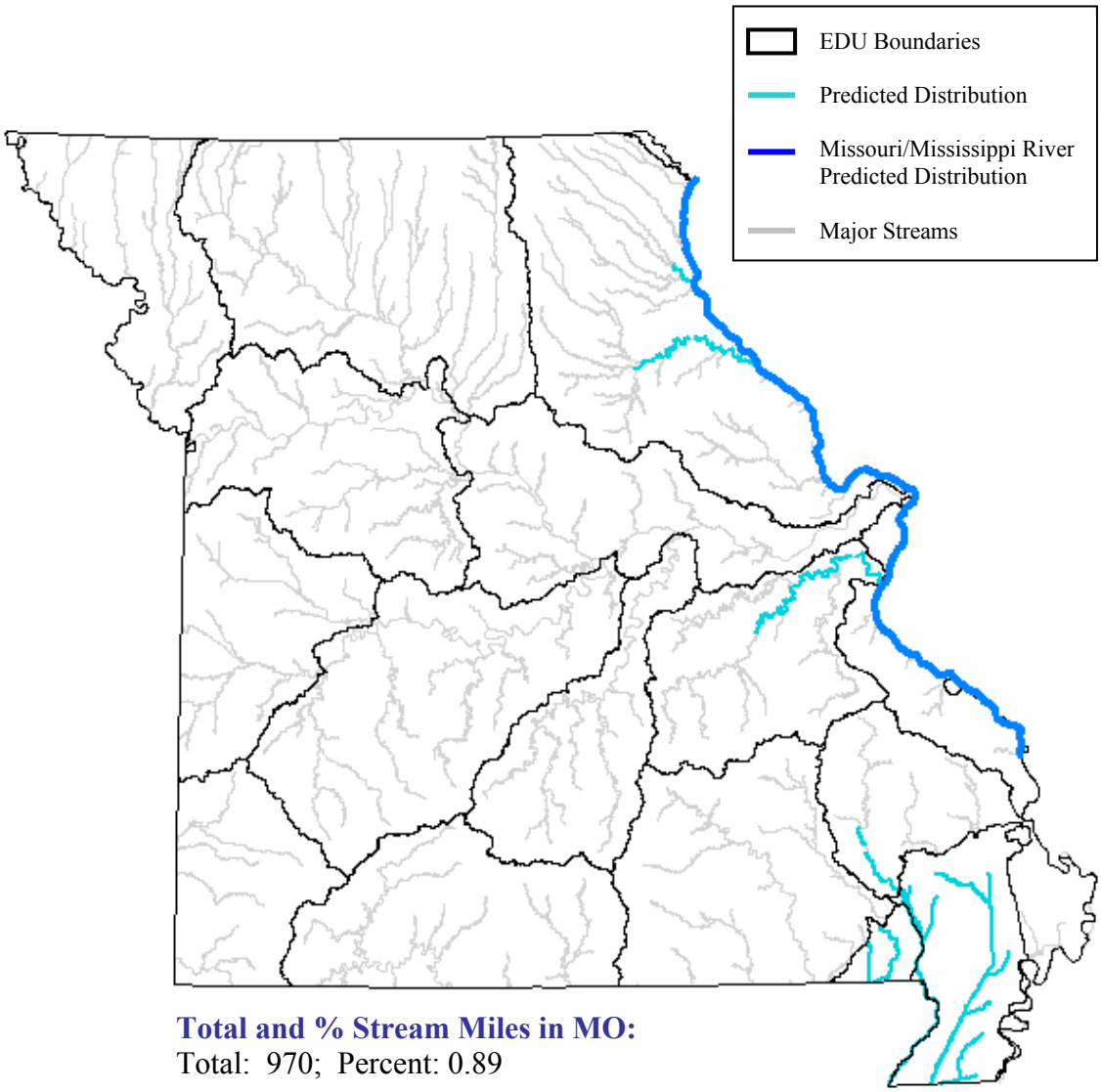
Endemism: Region

State Rank: S2S3

ITIS Code: 168515

Global Rank: G3

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 970; Percent: 0.89

State Range:

The western sand darter occurs primarily in the upper Mississippi River and in ditches of the Mississippi Alluvial Basin Aquatic Subregion. The western sand darter seems to be declining in the latter two areas and is not abundant anywhere in Missouri (Pflieger 1997).

Habitat Affinities:

The western sand darter is associated with clear to moderately turbid water, slight to moderate current, and substrates of course sand and fine gravel (Douglas 1974; Eddy and Underhill 1974; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988). In northern regions, the western sand darter is often found in the mouths of tributaries to large rivers, over bottoms of shifting sand (Eddy and Underhill 1974; Phillips et. al. 1982). Further south, it inhabits the deep, open channels of medium to large streams, moderate-sized rivers and sparsely vegetated ditches (Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). The western sand darter is endangered or declining over much of its range (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Central Plains/Ozark Model
([Linkr] = 7) and ([Gradsegr] >= 1) and ([Gradsegr] <= 2)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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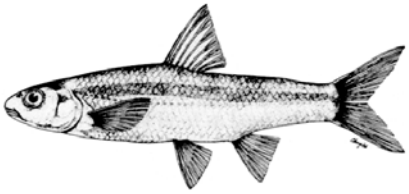
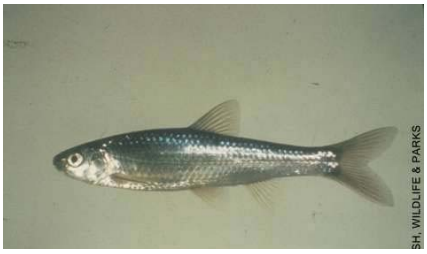


Western Silvery Minnow

Hybognathus argyritis



Native: Yes

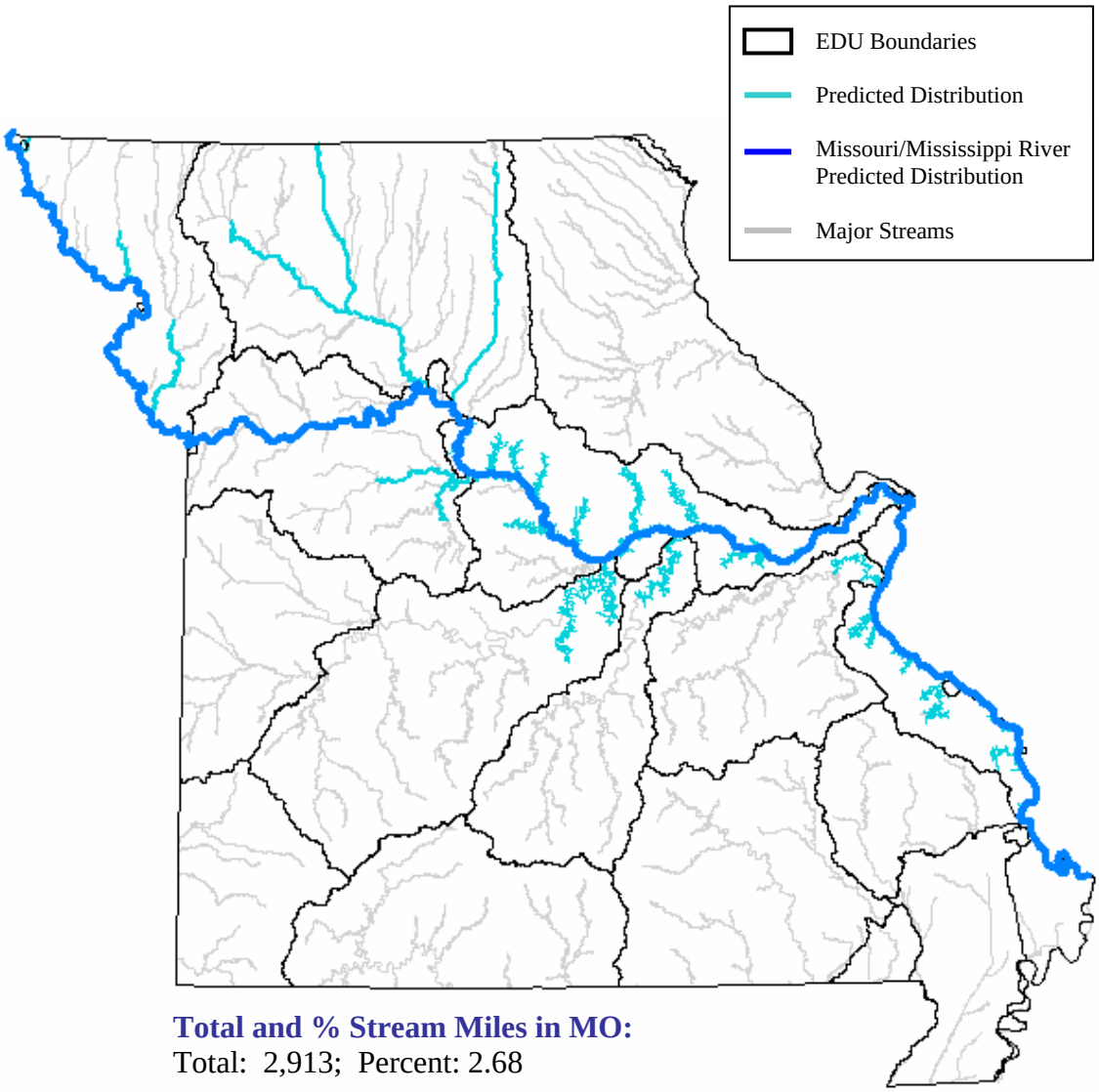
Endemism: Region

State Rank: S2

ITIS Code: 163362

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland Michael Morey, Scott Sowa, John Stanovick



Total and % Stream Miles in MO:
Total: 2,913; Percent: 2.68

State Range:

The western silvery minnow is close to being extirpated from Missouri, as it has undergone a precipitous decline throughout its range over the last few decades. Its former range included the Missouri River and its lower tributaries, the Grand and Chariton systems of the Central Plains Aquatic Subregion, and the middle Mississippi River (Pflieger 1997).

Habitat Affinities:

The western silvery minnow is common only in the Missouri River and adjacent creeks and backwaters, where it is often found behind wing dikes, revetments, and other protected shoreline habitats. The western silvery minnow prefers relatively deep, quiet waters with sluggish flow and bottoms of silt or sand (Cross and Collins 1975; Pflieger 1997). Like the Mississippi silvery minnow, the western silvery minnow avoids strong current but it is able to tolerate higher levels of turbidity (Pflieger 1997). However, in Kansas, the western silvery minnow is sometimes taken in strong currents of the mainstream (Cross and Collins 1975).

Predictive Model(s):

Central Plains Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Ozark Model
Query 1: ([Temp_code] = 2)
Query 2: ([Linkr] >= 5) or ([DlinkR] >= 5)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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White Bass

Morone chrysops

Native: Yes

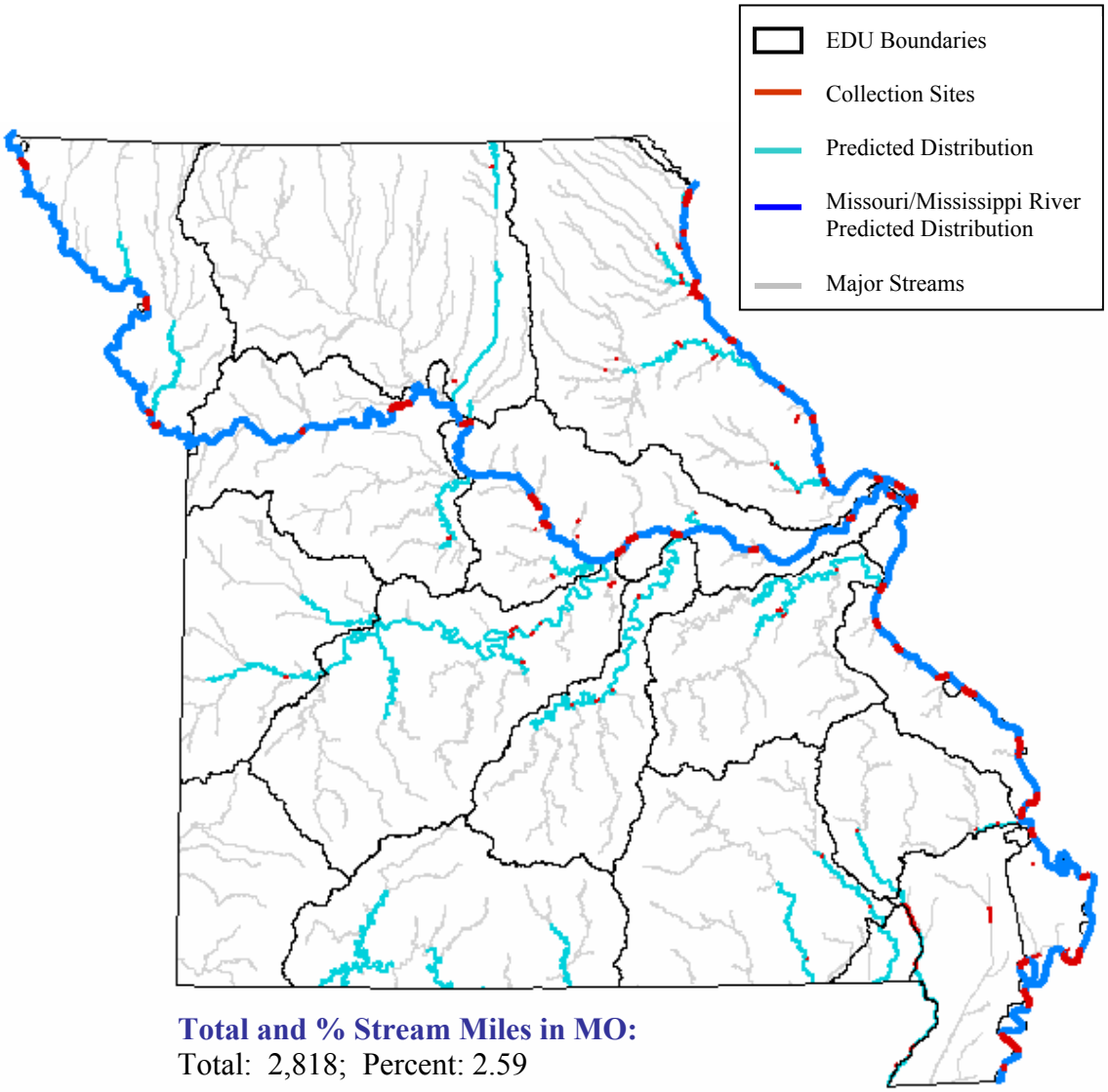
Endemism: Region

State Rank: S?

ITIS Code: 167682

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 2,818; Percent: 2.59

State Range:
The white bass is naturally found only in the Mississippi River and its principal tributaries. However, its range has expanded considerably through the construction of impoundments and is now found throughout much of Missouri. The white bass has been introduced into large reservoirs of the Ozark Aquatic Subregion and sediment-trapping impoundments along the Missouri River have reduced turbidity significantly, making it a suitable habitat as well (Pflieger 199).

Habitat Affinities:
The white bass inhabits the deeper pools of medium to large streams, moderate-sized rivers and reservoirs but reaches greatest abundance in large rivers, natural lakes, and impoundments (Clay 1975; Cross and Collins 1975; Douglas 1974; Eddy and Underhill 1974; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). The range of the white bass has been expanded considerably through introduction into impoundments and reservoirs (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). The white bass is found in both quiet backwaters and current with clear water and firm substrates of sand or rock (Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988). The white bass fuels an important seasonal fishery in Missouri, as large numbers of adults migrate from the open waters of lakes and reservoirs up tributary streams to spawn (Pflieger 1997). In Lake Erie, the white bass is found clear waters less than 30 ft deep with firm bottoms and an abundance of small fish on which to feed (Trautman 1957).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 6)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = “MO”)

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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White Catfish

Ameiurus catus

Native: No

Endemism: NA

State Rank: SE

ITIS Code: 164037

Global Rank: G5

Modeled By: NA

Total and % Stream Miles in MO:
Total: NA Percent: NA

State Range:
The white catfish is native to the Atlantic Coast but has been collected widely outside its natural range. In Missouri, it is stocked in private waters and for-profit fishing ponds. There is also a record of the white catfish from the Mississippi River along the Missouri-Illinois boundary. The white catfish probably does not reproduce in Missouri (Pflieger 1997).

Habitat Affinities:
The white catfish inhabits ponds, reservoirs lakes, large streams and medium to large rivers throughout its range (Jenkins and Burkhead 1994; Robinson and Buchanan 1988). Etnier and Starnes (1993) describe its habitat as intermediate between the sluggish water and soft substrates preferred by bullheads and the current-swept substrates preferred by the channel catfish. Robinson and Buchanan (1988) note that the white catfish avoids strong currents and abundant aquatic vegetation. In Missouri, collections of the white catfish came from large rivers and a reservoir (Pflieger 1997). Young and juvenile white catfish are commonly found in shallow riffles and raceways (Robinson and Buchanan 1988).

Predictive Model(s):

There are probably no self-sustaining populations of white catfish in Missouri.

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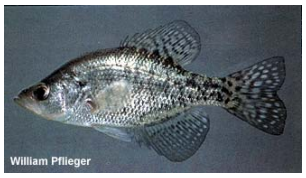


White Crappie

Pomoxis annularis

Native: Yes

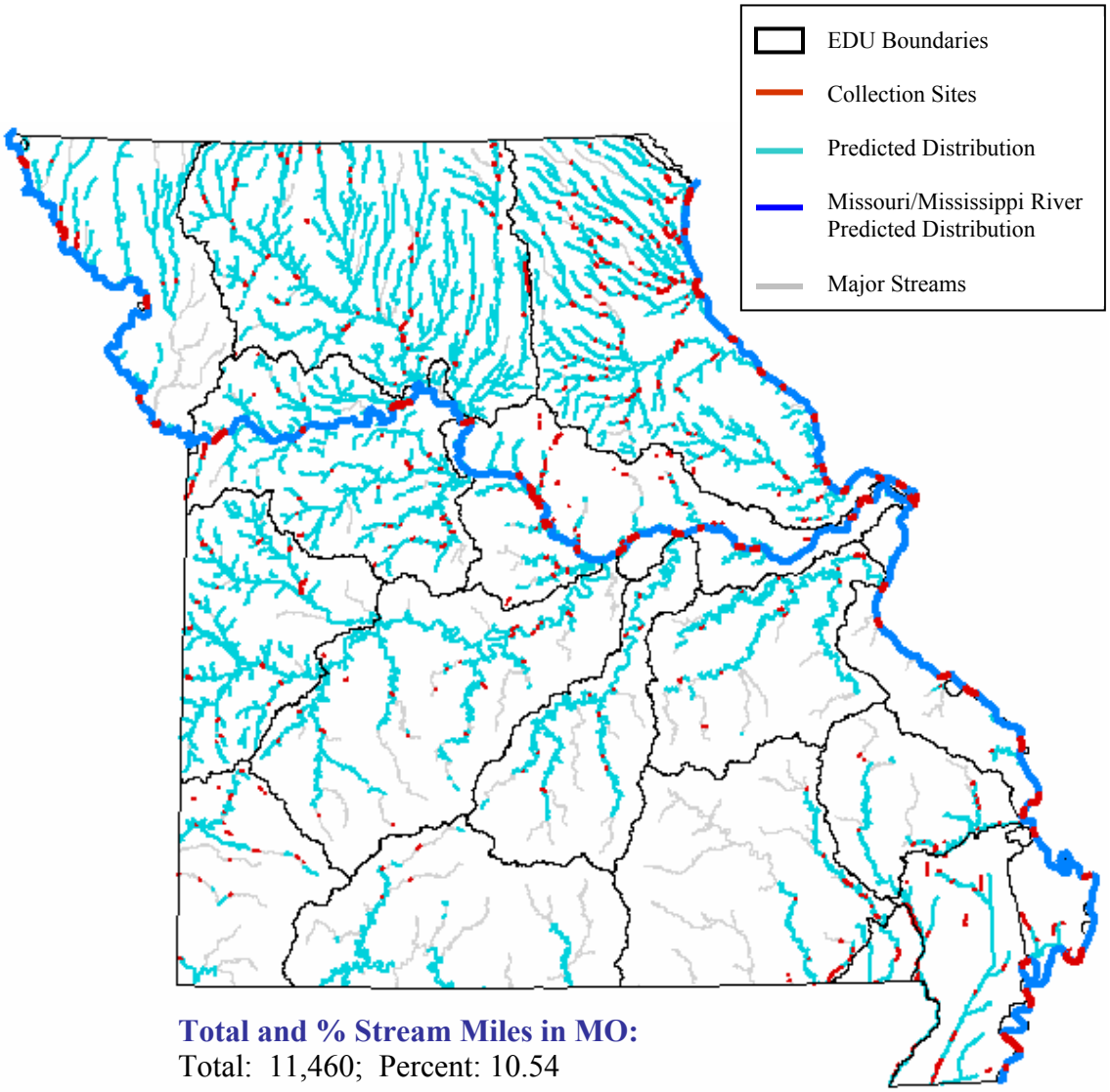
Endemism: Region

State Rank: S?

ITIS Code: 168166

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 11,460; Percent: 10.54

State Range:

The white crappie occurs over nearly the entire state, but is rare in the central Ozarks and the northwestern part of the state. It is most abundant in natural lakes of the Mississippi Alluvial Basin Aquatic Subregion, navigation pools in the upper Mississippi River, and large manmade impoundments throughout the state (Pflieger 1997).

Habitat Affinities:

The white crappie can be found in wide variety of lentic habitats ranging from ponds, oxbows, bays and marshes to large lakes, impoundments and reservoirs. It also inhabits the sluggish, protected areas of large rivers, moderate or large-sized streams (Cross and Collins 1975; Douglas 1974; Eddy and Underhill 1974; Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988), but is intolerant of high gradients and cool waters maintained by spring flow (Pflieger 1997; Trautman 1957). The white crappie prefers quiet, turbid waters with plenty of cover, such as submerged brush, standing timber, logs, tree roots, and aquatic vegetation, and a variety of hard and soft bottoms (Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). In Missouri streams, the white crappie is most abundant in deep pools adjacent to the stream channel. The white crappie inhabits reservoirs containing standing timber or other cover and migrates to shallower waters to spawn (Pflieger 1997). Trautman (1957) notes that the white crappie has increased in abundance because it is able to tolerate considerable turbidity and siltation.

Predictive Model(s):

Central Plains Model
Query 1: ([Temp_code] = 2)
Query 2: (([Linkr] = 3) and ([Rgrad_subr] = 1)) or (([Linkr] = 4) and ([Rgrad_subr] = 3)) or (([Linkr] >= 5))

Ozark Model
Query 1: ([Temp_code] = 2)
Query 2: (([Linkr] >= 2) and ([Linkr] <= 4) and ([Rgrad_subr] = 1) and ([DlinkR] >= 5) and ([DlinkR] <= 9)) or (([Linkr] = 5) and ([Rgrad_subr] = 1)) or (([Linkr] >= 6))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 3) and ([Ssize_code] <= 4) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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White Sucker

Catostomus commersoni

Native: Yes

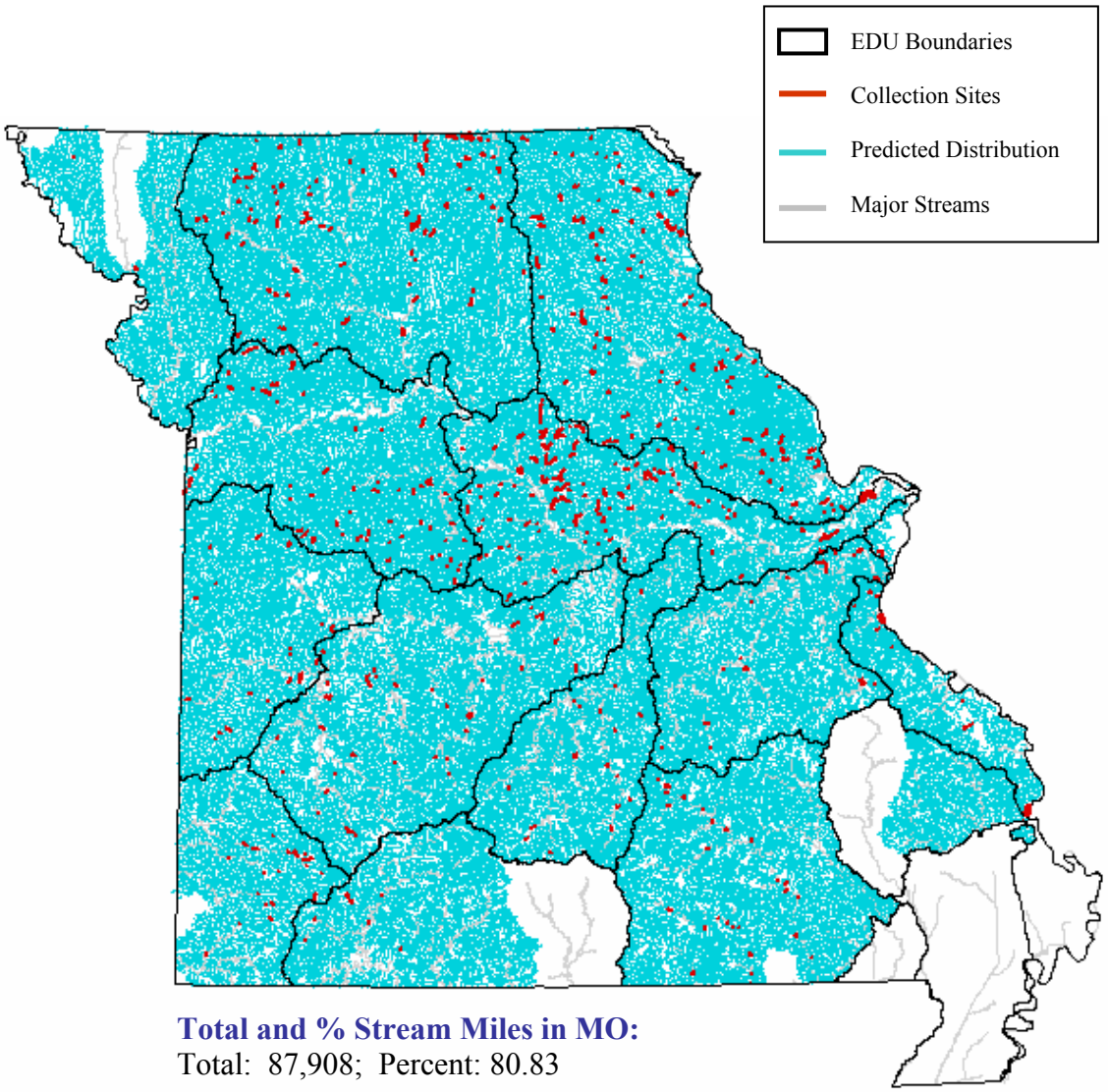
Endemism: Subzone

State Rank: S?

ITIS Code: 163895

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 87,908; Percent: 80.83

State Range:

With the exception of the Mississippi Alluvial Basin Aquatic Subregion and some adjacent sections of the Ozarks, the white sucker essentially occurs throughout the state. Its main centers of distribution are the central and northeastern Central Plains Aquatic Subregion where it is common and widespread. Elsewhere the white sucker is locally common but sporadically distributed (Pflieger 1997).

Habitat Affinities:

The white sucker inhabits small, high gradient creeks, especially spring pools along large streams and intermittent pools kept cool and clear by groundwater seepage (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes 1993; Clay 1975; Cross and Collins 1975). It occupies clear headwater creeks of the Central Plains Aquatic Subregion that contain little or no aquatic vegetation, but in the Ozark Aquatic Subregion it is found in association with heavy vegetation (Pflieger 1997; Robinson and Buchanan 1988). It prefers well-defined riffles and gravelly or rocky bottoms, and is found in greatest abundance where other suckers are absent (Pflieger 1997; Robinson and Buchanan 1988; Cross and Collins 1975). In Ohio, the white sucker exhibits distinct habitat affinities from other areas, occurring in permanent lakes, streams, and rivers, with large populations found in nutrient-rich waters. In Ohio it tolerates all gradients, turbidity, low-oxygen water, dense vegetation, and many organic and inorganic pollutants. In Kansas, it can be found in clear lakes in the limestone uplands (Cross and Collins 1975).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and
([Linkr] >= 1) and ([Linkr] <= 5)

Ozark Model
(([Linkr] >= 1) and ([Linkr] <= 2)) or (([Linkr] = 3) and ([GradsegR] >= 1) and ([GradsegR] <= 5)) or (([Linkr] >= 4) and ([Temp_code] = 1))

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Whitetail Shiner

Cyprinella galactura

Native: Yes

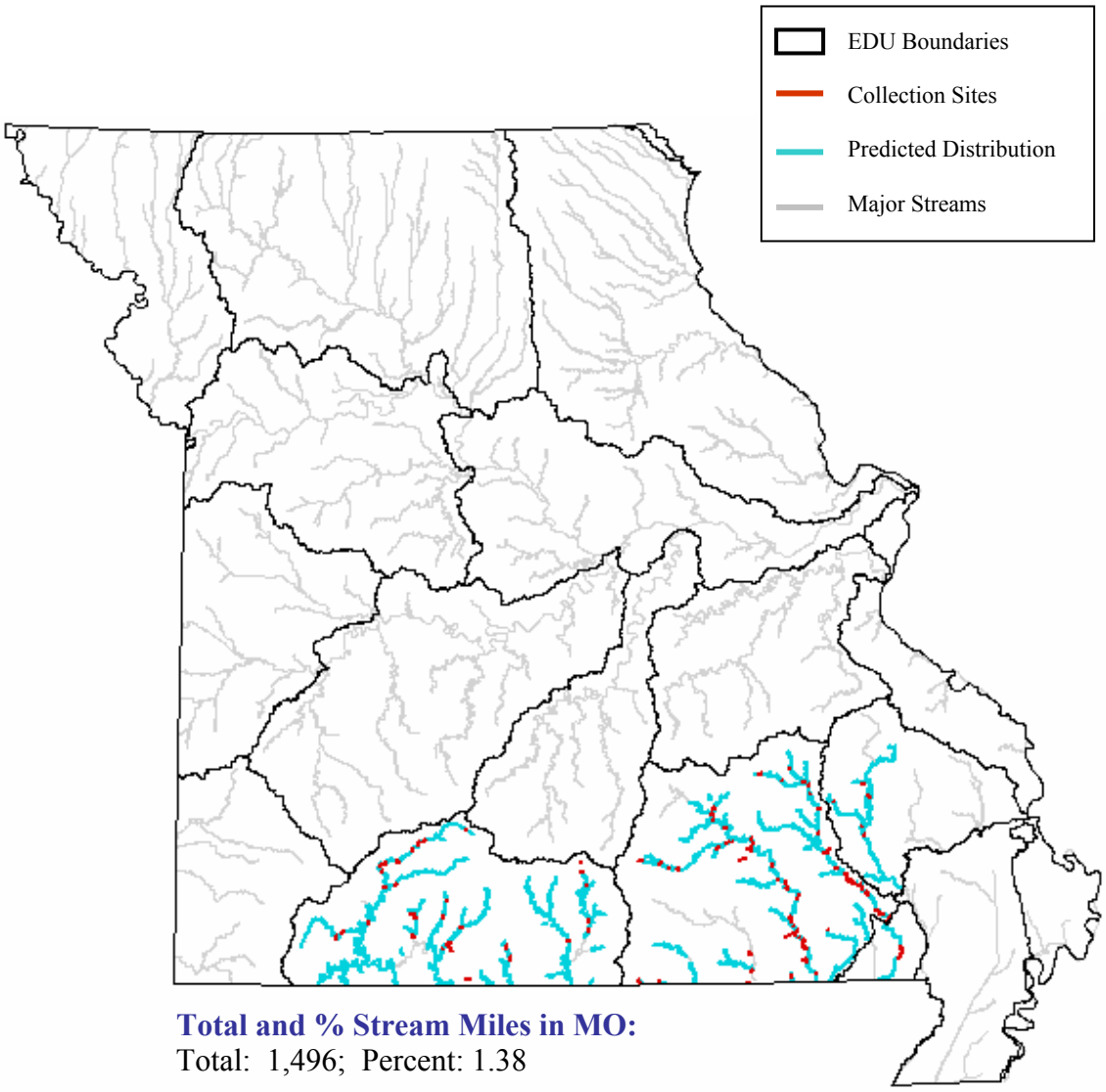
Endemism: Region

State Rank: S?

ITIS Code: 163782

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 1,496; Percent: 1.38

State Range:
The whitetail shiner occurs within the White, Black/Current and Upper St. Francis/Castor Ecological Drainage Units (EDU) of the Ozark Aquatic Subregion. It is one of the common and characteristic minnows of the White and Black/Current EDU's. The whitetail shiner also occurs less abundantly in Black/Cache EDU of the Mississippi Alluvial Basin Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The whitetail shiner is an inhabitant of clear, medium to large high-gradient streams with continuous strong flow and firm silt-free gravel or rubble substrates. The swift runs and flowing pools in which it lives are often strewn with boulders (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In the White EDU, the whitetail shiner sometimes occurs along the shorelines of large reservoirs (Pflieger 1997). It has been also found in upstream storage reservoirs of Tennessee (Etnier and Starnes 1993). The whitetail shiner avoids small headwater streams and those kept cool by large springs (Pflieger 1997).

Predictive Model(s):

Ozark Model
([Temp_code] = 2) and ([Linkr] >= 4)

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] = 4) and ([State] = "MO")

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Yellow Bass

Morone mississippiensis

Native: Yes

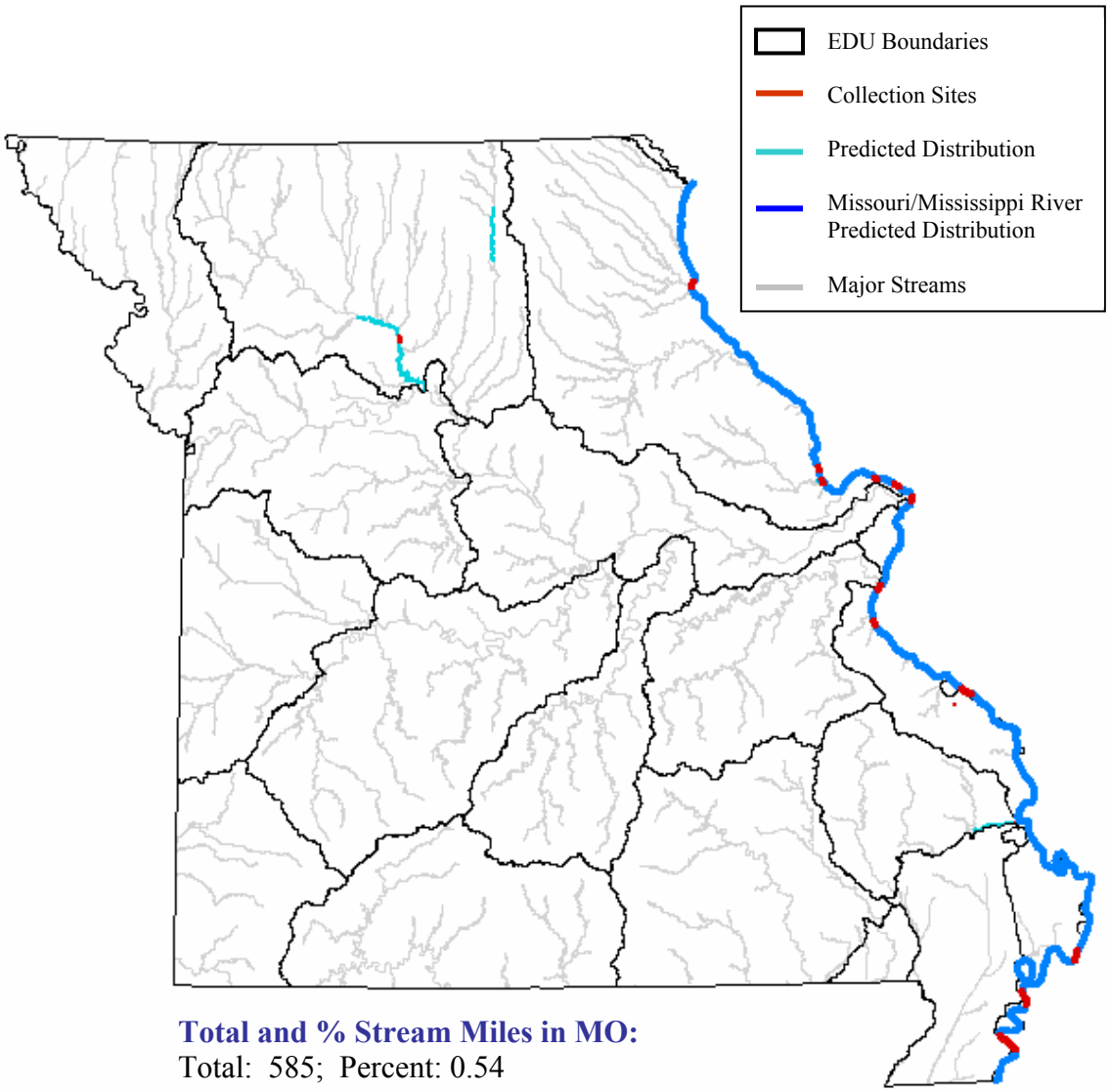
Endemism: Region

State Rank: S?

ITIS Code: 167683

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 585; Percent: 0.54

State Range:

The yellow bass is primarily distributed in the Mississippi River and its adjacent overflow waters. A few collections have also been made in the Grand/Chariton Ecological Drainage Unit. All collection records are based on few specimens and the yellow bass does not reach high abundance anywhere in the state (Pflieger 1997).

Habitat Affinities:

The yellow bass inhabits large rivers and their backwaters, lakes, and quiet pools (Pflieger 1997; Robinson and Buchanan 1988; Clay 1975; Douglas 1974; Phillips et. al. 1982; Eddy and Underhill 1974; Etnier and Starnes 1993). It is a schooling fish characteristic of sluggish waters, but may be found in rapids or gravel-bottomed open water when it spawns (Etnier and Starnes 1993; Clay 1975; Phillips et. al. 1982). It tolerates varying turbidity, but prefers clearer water with vegetation (Robinson and Buchanan 1988; Etnier and Starnes 1993).

Predictive Model(s):

Central Plains/Ozark Model
([Flow] = 1) and ([Temp_code] = 2) and ([Linkr] >= 7)

Great River Model
The Mississippi River distribution is based upon existing collection records and professional review.

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Yellow Bullhead

Ameiurus natalis

Native: Yes

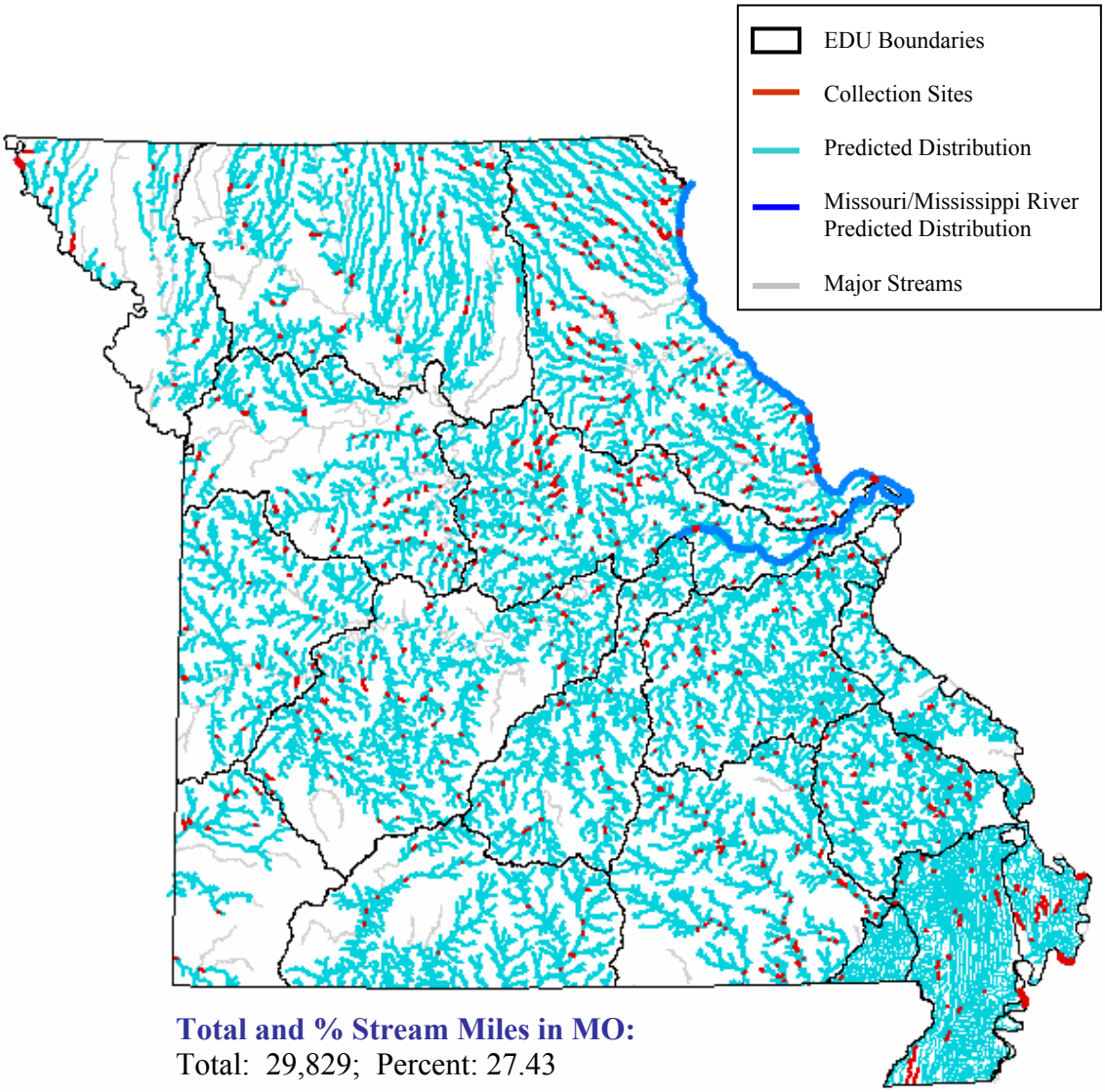
Endemism: Subzone

State Rank: S?

ITIS Code: 164041

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 29,829; Percent: 27.43

State Range:
The yellow bullhead occurs statewide and is nearly as widespread in Missouri as the black bullhead. It is the most common bullhead in the Ozark Aquatic Subregion and the Mississippi Alluvial Basin Aquatic Subregion. The yellow bullhead is nearly as common as the black bullhead in the clearer streams of central and northeastern Central Plains Aquatic Subregion (Pflieger 1997).

Habitat Affinities:
The yellow bullhead is found in clear streams, rivers, overflow pools, lakes and reservoirs. It prefers streams with permanent flow, but avoids strong currents (Pflieger 1997; Robinson and Buchanan 1988; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Phillips et. al. 1982). In Missouri, yellow bullheads in the Ozark and Mississippi Alluvial Basin Aquatic Subregions tend to inhabit quiet backwaters or ditches with heavy vegetation; yellow bullheads in the Central Plains Aquatic Subregion occupy clear streams with high gradients, often in open pools of the stream channel (Pflieger 1997). In Ohio the yellow bullhead is most common in shallow portions of lakes, ponds, or streams with low gradients, over diverse bottoms from sand to peat muck (Trautman 1957). In Arkansas and Kansas, however, it is most common over gravelly or rocky bottoms (Robinson and Buchanan 1988; Cross and Collins 1975).

Predictive Model(s):

Central Plains Model
([Temp_code] = 2) and ([Linkr] >= 2) and ([Linkr] <= 5)

Ozark Model
(([Linkr] >= 1) and ([Linkr] <= 2) and ([Flow] = 1)) or (([Linkr] >= 3) and ([Linkr] <= 7))

Mississippi Alluvial Basin Model
([Core_Crowley] = 0) and ([Ssize_code] >= 1) and ([Ssize_code] <= 4) and ([State] = "MO")

Mississippi Alluvial Basin Crowley's Ridge Model
([Core_Crowley] = 1) and ([Ssize_code] >= 1) and ([Ssize_code] <= 2) and ([State] = "MO")

Great River Model
The Missouri and Mississippi River distributions are based upon existing collection records and professional review.

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Yellow Perch

Perca flavescens

Native: Yes

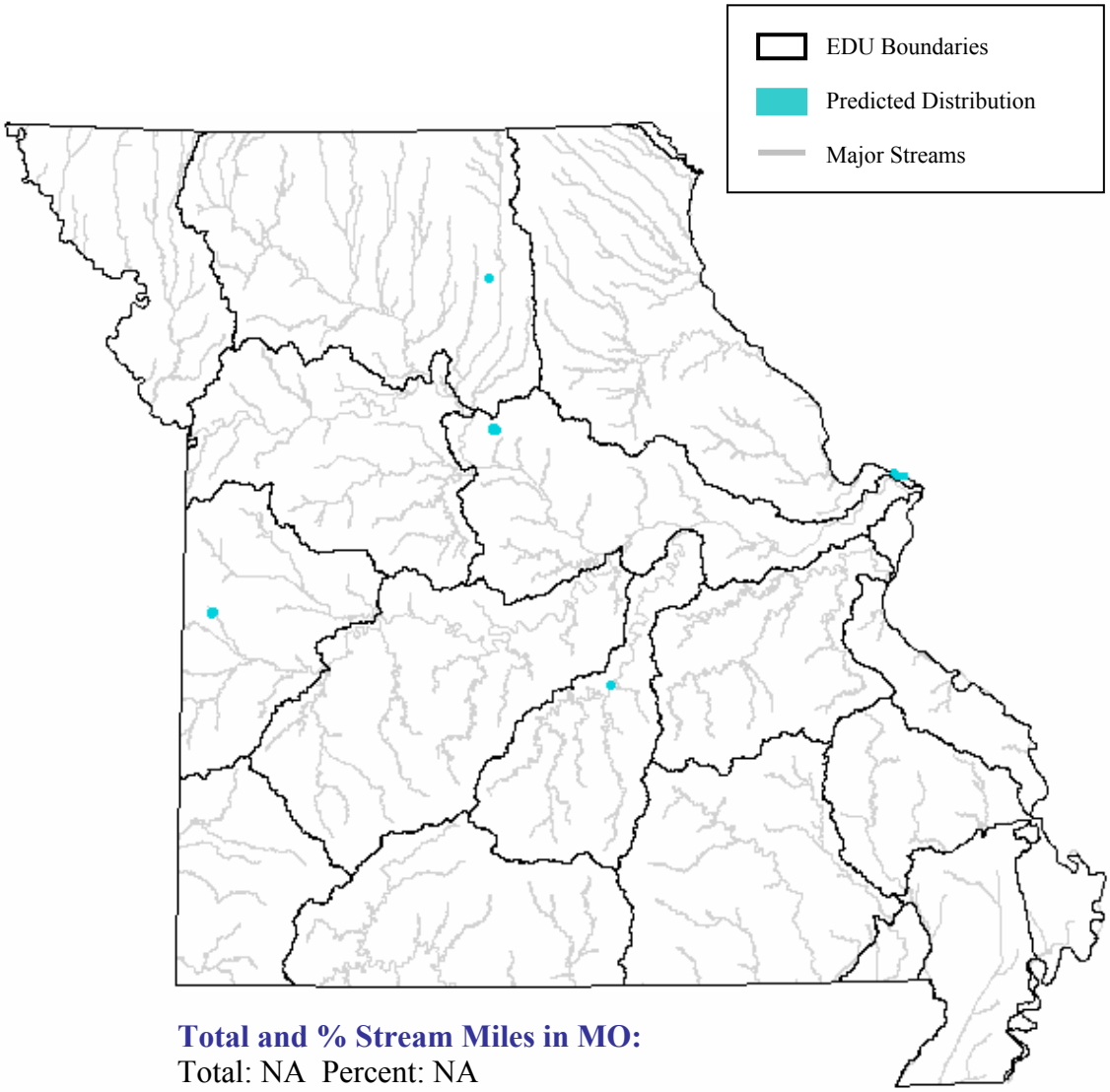
Endemism: Subzone

State Rank: S?

ITIS Code: 168469

Global Rank: G5

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: NA Percent: NA

State Range:

The yellow perch reaches the southern limit of its range in Missouri and is rare in natural waters of the state. Specimens in Missouri may be stragglers from farther north. However, there is recent evidence that a natural, self-sustaining population exists in the Brickhouse Slough, and established populations exist in several artificial lakes—Butler City Lake, Bates County; Blue Jay Lake, Pulaski County, Fayette City Lake, Howard County; and Ethel Lake, Macon County. There was an extensive stocking operation by the Missouri Fish Commission in the 1930's, as several million yellow perch were stocked in streams and lakes throughout the state (Pflieger 1997).

Habitat Affinities:

The yellow perch primarily occurs in lakes and impoundments (Pflieger 1997; Cross and Collins 1975; Phillips et. al. 1982; Etnier and Starnes 1993). It can be found in brackish water along the Atlantic seaboard (Etnier and Starnes 1993), but it generally occupies clear, quiet waters with rocky or sandy bottoms, in association with aquatic vegetation near the shore (Cross and Collins 1975; Etnier and Starnes 1993; Phillips et. al. 1982). Adults prefer deep water, and move out into open water to feed in the evening (Cross and Collins 1975; Phillips et. al. 1982).

Predictive Model(s):

Central Plains/Ozark Model

The distribution is based upon existing collection records and professional review.

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Yoke Darter

Etheostoma juliae

Native: Yes

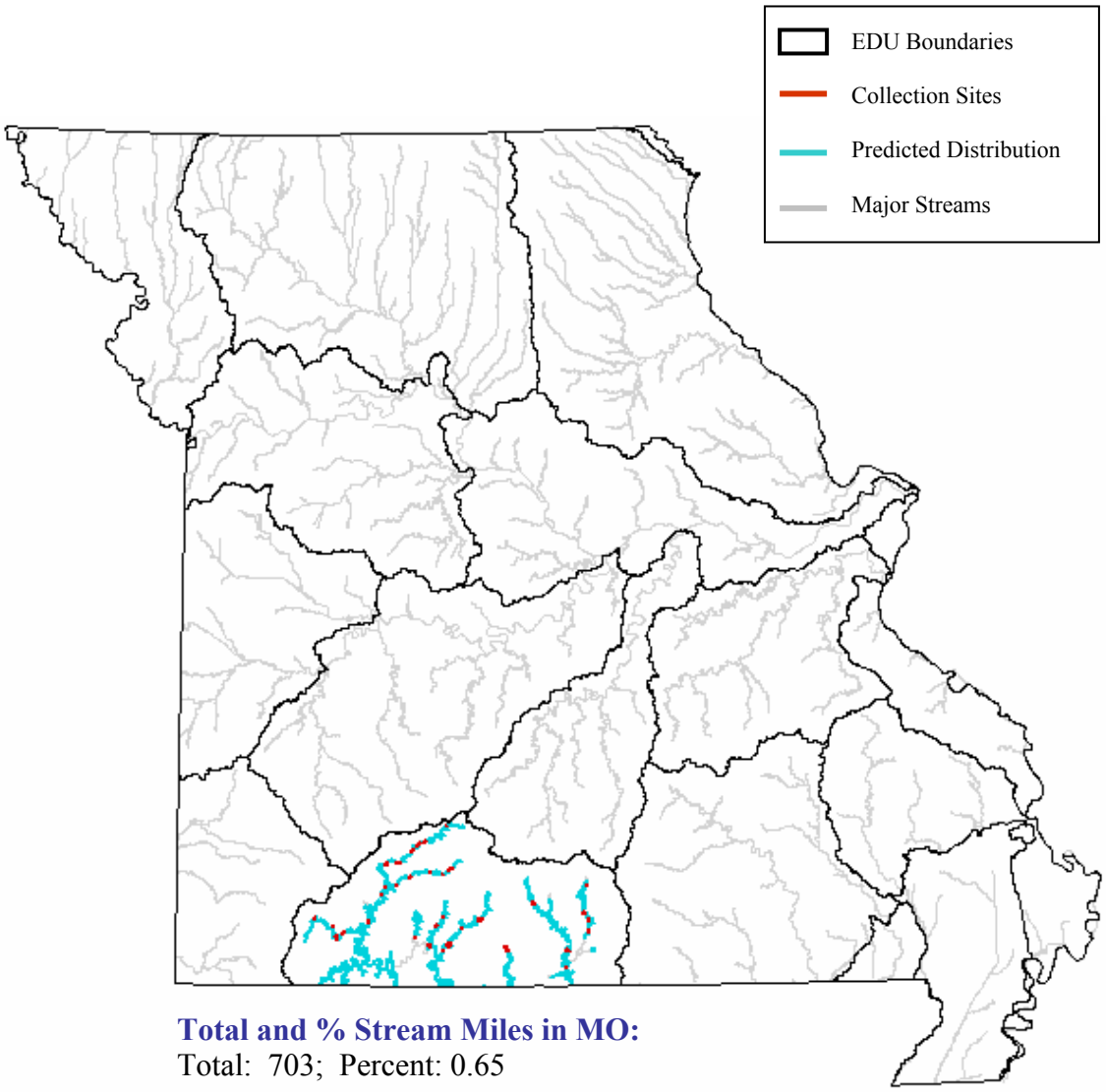
Endemism: EDU

State Rank: S4

ITIS Code: 168403

Global Rank: G4

Modeled By: Gust Annis, Pam Haverland
Michael Morey, Scott Sowa,
John Stanovick



Total and % Stream Miles in MO:
Total: 703; Percent: 0.65

State Range:
The yoke darter is endemic to the White Ecological Drainage Unit (EDU) and occurs exclusively within this EDU. Large reservoirs have destroyed much of its range but it is still one of the most common darters in unimpounded streams of the White EDU (Pflieger 1997).

Habitat Affinities:
The yoke darter occupies streams ranging in size from creeks to large rivers, but is most abundant in medium-sized rivers. It is found almost exclusively in clear, high gradient streams with continuous strong flow, occupying the deepest, swiftest riffles, over silt-free coarse gravel or boulder-strewn substrates (Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

Ozark Model
Query 1: ([Flow] = 1)
Query 2: (([Linkr] >= 1) and ([Linkr] <= 4) and ([DlinkR] >= 5))or (([Linkr] >= 5) and ([Temp_code] = 2))

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