Steelcolor Shiner (*Cyprinella whipplei*)
Ecological Risk Screening Summary

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1 Native Range and Status in the United States

Native Range

From Nico et al. (2016):

"Mississippi River basin, from Ohio and West Virginia to Illinois, Missouri, and eastern Oklahoma, and south to Northern Alabama and northern Louisiana; Black Warrior River system (Mobile Bay drainage), Alabama. Native to Monongahela, Little Kanawha, and Kanawha below the falls, Guyandotte, Big Sandy, small Ohio River tributaries in West Virginia, and the main

channel of the Ohio River (Stauffer 2007). Mostly absent from Coastal Plain (Page and Burr 1991)."

From Muzzall and Whelan (2011):

"Cudmore-Vokey and Crossman (2000) listed 107 fish species that are established in Lake Erie. However, the number of fish species examined and not examined for parasites from this lake exceed 107 because several fish species examined for parasites were not listed as established species by Cudmore-Vokey and Crossman (*Anguilla rostrata*, *Cyprinella whipplei*, *Notropis anogenus*, *N. heterodon*, *Opsopoeodus emiliae*, *Moxostoma aureolum*, *Salvelinus fontinalis*, *Cottus cognatus*, *Sander canadensis*, and *S. glaucum*), plus the one remaining discrepancy may be due to the use of synonyms for the scientific name of a fish species."

Status in the United States

Native range is contained within the United States (Nico et al. 2016).

From Nico et al. (2016):

"A survey conducted by Fisher et al. (1998) in 1994 found that the historically uncommon *Cyprinella whipplei* had expanded its range in Tippecanoe County, Indiana since the mid-1970's. The 1978 survey collected 2 specimens of *Cyprinella whipplei*, and the 1994 survey collected 16 specimens; however, the authors note that the historically low abundance of *Cyprinella whipplei* could be attributed to misidentification of this species during the 1978 survey. Although historically present in Indiana, *Cyprinella whipplei* was first recorded in the Kankakee River drainage in 1990 (Simon 1992). *Cyprinella whipplei* was found in fish surveys conducted in 2008 in Killbuck Creek and Pipe Creek, but were absent in 1978 (Doll 2010). There are sporadic records of this species from western parts of Oklahoma that likely represent introductions (Miller and Robison 1973)."

"Smith-Vaniz (1968) reported that a few collections were known from the upper Black Warrior River system (Mobile Bay drainage) of Alabama, and attributed its occurrence to introductions by anglers. However, Barclay and Howell (1973) argued that stream capture rather than bait bucket introductions may have been the source of invasion. Page and Burr (1991) apparently considered the Black Warrior River system to be part of the species' native range."

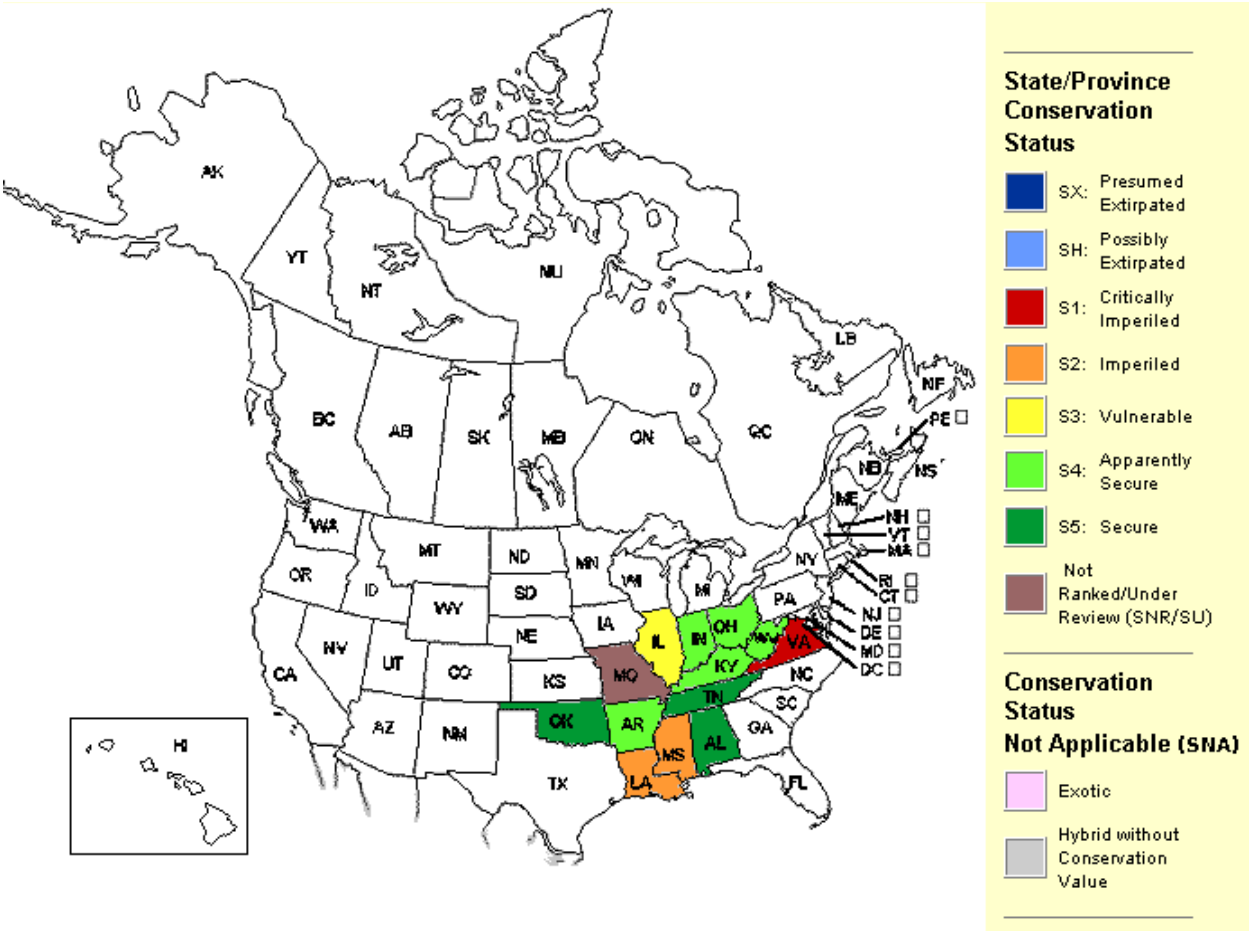

Figure 1. Status of *Cyprinella whipplei* in each state of its native range. Map from NatureServe (2015).

Means of Introductions in the United States

From Nico et al. (2016):

"Likely bait bucket release (Miller and Robison 1973)."

Remarks

No additional remarks.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Eschmeyer et al. (2017):

"***whipplii, Cyprinella*** Girard [C. F.] 1856:198 [34] [Proceedings of the Academy of Natural Sciences of Philadelphia v. 8] Sugarloaf Creek, tributary of Poteau River, about 20-25 miles south of Fort Smith, Arkansas, vicinity of Poteau, Oklahoma, U.S.A. Lectotype: USNM 137

(plus 1 pharyngeal arch as #2716). Paralectotypes: lost or none collected. Type catalog: Gilbert 1998:164-165. On p. 34 of separate. Originally as *whipplii*, presumably named for Lt. A. W. Whipple by authors; but the spelling *whipplii* is correctly formed, but the spelling *whipplei* probably can be retained on the basis of Art. 33.2.3.1 of the Code. Lectotype selected by Gibbs 1963:513 but other syntypes unknown. •Valid as *Notropis whipplei* (Girard 1856) -- (Gibbs 1963:511, Gilbert 1978:88, Lee et al. 1980:324, Robison & Buchanan 1988:241). •Valid as *Cyprinella whipplei* Girard 1856 -- (Mayden 1989:71, Burkhead & Jenkins 1991:348, Page & Burr 1991:120, Boschung 1992:47, Etnier & Starnes 1993:159, Jenkins & Burkhead 1994:359, Stauffer et al. 1995:73, Mettee et al. 1996:177, Gilbert 1998:165, Fuller et al. 1999:67, Ross et al. 2001:150, Nelson et al. 2004:69, Miller & Robison 2004:98, Boschung & Mayden 2004:175, Scharpf 2005:14, Page & Burr 2011:236, Page et al. 2013:70). **Current status:** Valid as *Cyprinella whipplei* Girard 1856. Cyprinidae: Leuciscinae."

From ITIS (2016):

"Taxonomic Status: Current Standing: valid

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Ostariophysi
Order Cypriniformes
Superfamily Cyprinoidea
Family Cyprinidae
Genus *Cyprinella*
Species *Cyprinella whipplei* Girard, 1856"

From NatureServe (2015):

"Removed from genus *Notropis* and placed in genus (formerly subgenus) *Cyprinella* by Mayden (1989); this change was adopted in the 1991 AFS checklist (Robins et al. 1991). Included in *Notropis* (*Cyprinella*) *spilopterus* until 1943. Although the original spelling ends with *-ii*, the spelling *-ei* is in prevailing usage and deemed to be a justified emendation following Article 33.2.3.1 of the Code (Nelson et al. 2004)."

Size, Weight, and Age Range

From Nico et al. (2016):

"Size: 16 cm."

From Froese and Pauly (2016):

"Max length: 16.0 cm TL male/unsexed; [Page and Burr 1991]; common length: 8.8 cm TL male/unsexed; [Hugg 1996]; max. reported age: 3 years [Hugg 1996]"

From NatureServe (2015):

"[…] lives up to 3-4 years."

Environment

From Nico et al. (2016):

"*Cyprinella whipplei* inhabits low-to-moderate gradient streams that have permanent flow (Ross 2001) as well as medium to large sized streams (Miller and Robison 2004). It occurs in streams with sand or gravel substrates, such as riffle or pool segments (Ross 2001)."

"This species has been recorded in streams with temperatures as low as -0.5°C (Felley and Hill 1983) and as high as 25.0°C (Risch 2004)."

From Froese and Pauly (2016):

"Freshwater; benthopelagic."

Climate/Range

From Froese and Pauly (2016):

"Temperate; 41°N - 33°N"

Distribution Outside the United States

Native

The native range of *Cyprinella whipplei* is entirely contained within the United States (Froese and Pauly 2016; Nico et al. 2016). See Section 1 for detailed description.

Introduced

No records of introductions of *Cyprinella whipplei* outside the United States were found.

Means of Introduction Outside the United States

No records of introductions of *Cyprinella whipplei* outside the United States were found.

Short Description

From Nico et al. (2016):

"*Cyprinella whipplei* is a shiner fish with a laterally compressed body and a small subconical head (Ross 2001). The mouth is oblique and terminal to subterminal. The pharyngeal teeth are

hooked, with narrow serrated surfaces. The eyes are small. The back and sides are blue to olive green, and the flanks are silvery. The breast and belly are completely scaled. The lateral line is decurved and completely pored. The dorsal and lateral scales are strongly outlined with melanophores, creating a cross-hatched pattern. The dorsal and ventral profiles of the body are similarly curved. The greatest body depth is in front of the dorsal fin origin. The dorsal fin origin is above or slightly posterior to the pelvic fin origin. There are nine anal rays. It can be distinguished from other members of the *Cyprinella* genus by the base of its caudal fin, which is not milky white."

From Gibbs (1961):

"*N*[*otropis*]. *whipplei* has: (1) usually 37 or 38 lateral-line scales, (2) usually 14-16 pectoral rays, (3) body depth 24-28% of standard length, (4) caudal peduncle depth 10-12% of standard length, (5) no pigment along anal base or midventral caudal peduncle, (6) pigment in all dorsal membranes, thus not differing from *N. galacturus*, and (7) no depigmented basicaudal patches."

From Ohio DNR (2012):

"Steelcolor shiners are silver-blue in color with a darker back and lighter cream colored belly. They are laterally compressed (flat side to side) and have a distinctive diamond shaped crosshatching pattern on the sides formed by dark scale edges. They have a dusky blotch on the webbing of the dorsal fin between the 3 rear fin rays. Additionally they have many small speckles of dark pigment in front of this blotch on the webbing of the dorsal fin which has a rounded rear edge on larger individuals. They have 9 anal fin rays and have a relatively deep body. Breeding male steelcolor shiners have intensely steel blue colored sides, a red tip to the end of the snout, and fins flushed with yellow. The closely related spotfin shiner differs by having a straight rear edge to the dorsal fin, no dark speckles of pigment in the front half of the dorsal fin, only 8 anal fin rays, and not as deep of a body. Additionally breeding male spotfin shiners lack the red tip to their snout and Ohio specimens (this is not true for their entire range) have fins flushed with white rather than yellow. Breeding males of both species have white tips to the fins which are often visible to an observer above the waters surface."

Biology

From Nico et al. (2016):

"*Cyprinella whipplei* generally feeds on insects in the water column, and changes its diet seasonally (Ross 2001). They feed on terrestrial insects that fall into the stream in the summer and fall. *Cyprinella whipplei* shifts to feeding on benthic invertebrates during colder weather. During the winter and spring, they also feed on organic detritus. It preys on small crustaceans, mites, and earthworms (Stauffer 2007). Piscivorous animals such as gar, bass, sunfish, sturgeon, large chubs, kingfisher, heron, and turtles are known to feed on shiners (Mayden pers. comm. 2013). Spawning occurs between June and August. Most *Cyprinella whipplei* reaches sexual maturity after their second summer, but most do not spawn until after their third summer. They spawn in the crevices in logs and roots. Females who are ready to spawn move to a spawning log and may be approached by several males. Males compete with each other for the spawning female. Usually one male is successful in driving the other males away. The successful male

mates with the female by pressing her against the spawning log. Males are territorial and defend their nest from other males. They display threats to males swimming near their nest by raising their dorsal fins and parallel swimming, or hitting the other male with their snouts. It is able to hybridize with *Cyprinella camura* in Greenleaf Creek. *Cyprinella whipplei* possesses alarm substances in their epidermal cells that are released when damaged, which chemically alert conspecifics to perform a fright reaction that may increase their chances of survival in the face of predators (Smith and Smith 1983). These alarm substance cells are lost during the spawning season. It has been suggested spawning may cause epidermal damage, and the absence of these alarm cells prevents the release of alarm substances during spawning, a situation where a fright reaction is not necessary for conspecifics."

From NatureServe (2015):

"Has species-specific vocalization that may function in spawning or species recognition."

"Habitat includes runs, pools, and backwaters of warm, moderate- to somewhat low-gradient, large creeks and medium-sized to large rivers that typically are clear; this shiner also tolerates streams that generally are turbid (Burkhead and Jenkins 1991). In Illinois, habitat includes clear, gravelly, large creeks and small rivers but generally not small creeks or large rivers; most often it occurs over gravel in large riffles and pools just below them or eddies beside raceways, especially in relatively unmodified, tree-margined streams (Smith 1979)."

From NatureServe (2013):

"Schools form near the top or middle of the water column. Spawning occurs around logs, brush, and other obstructions, usually near riffles. Eggs are attached to the undersides of obstructions or placed above the bottom under loose bark, in crevices or furrows on logs, or among tree roots. Males maintain territories around spawning surfaces."

Human Uses

No information on human uses of *Cyprinella whipplei* was found.

Diseases

No records of OIE reportable diseases were found.

From McAllister et al. (2014):

"Two immature cestodes, *Proteocephalus* sp. were found in the small intestine of three (47, 49, 52 mm TL) *C. whipplei*."

From Muzzall and Whelan (2011):

"*Cyprinella whipplei* (steelcolor shiner)
Adult Digenea: *Plagioporus cooperi*, (Bangham and Hunter 1939; Hunter and Bangham 1932)
Larval/Immature Digenea: *Neascus* sp., (Bangham and Hunter 1939)

Larval/Immature Cestoda: *Ligula intestinalis*, (Bangham and Hunter 1939)
Adult Nematoda: *Camallanus oxycephalus*, (Bangham and Hunter 1939); *Rhabdochona cascadilla*, (Bangham and Hunter 1939; Gustafson 1949)
Larval/Immature Nematoda: *Agamonema* sp., (Bangham and Hunter 1939)
Hirudinea: *Piscicola punctata*, (Bangham and Hunter 1939)"

Threat to Humans

From Froese and Pauly (2016):

"Harmless"

3 Impacts of Introductions

From Nico et al. (2016):

"Unknown"

4 Global Distribution

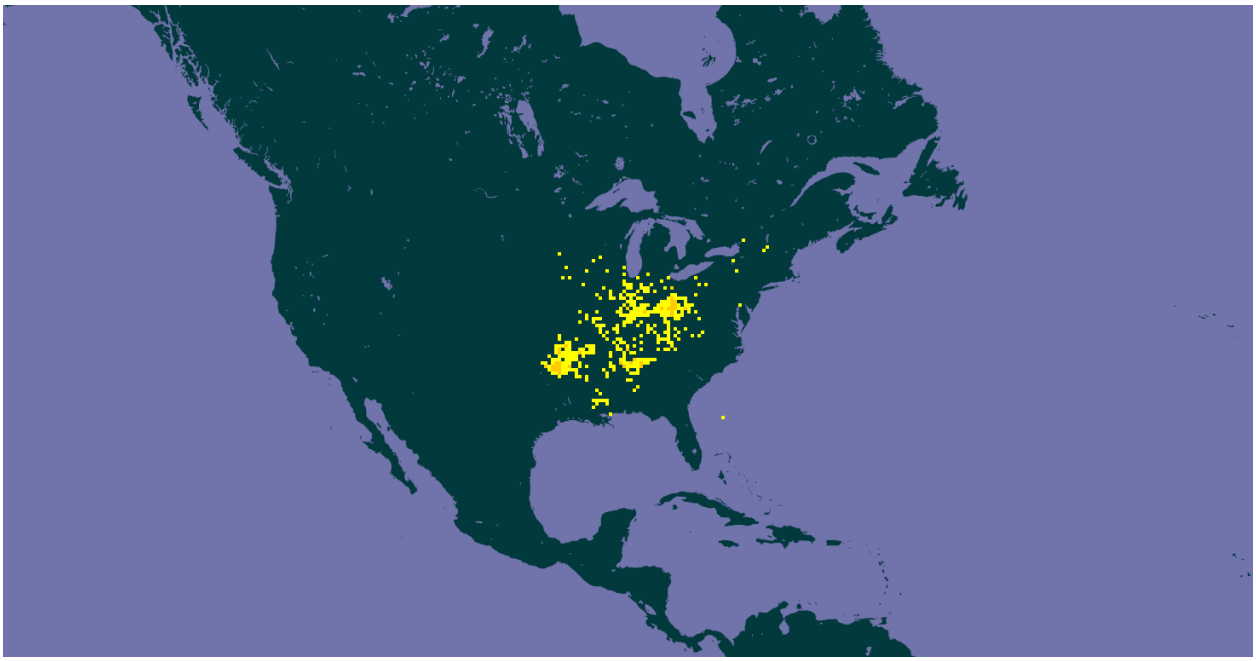

Figure 2. Known global distribution of *Cyprinella whipplei*. Map from GBIF (2013).

The locations off the east coast of Florida were not used as source points in the climate match. The specimens were collected from a river in Texas and not off the coast of Florida as indicated by the map (Royal Ontario Museum 2016).

5 Distribution Within the United States

Figure 3. Known distribution of *Cyprinella whipplei* in the United States. The brown region indicates the native range of the species. Map from Nico et al. (2016).

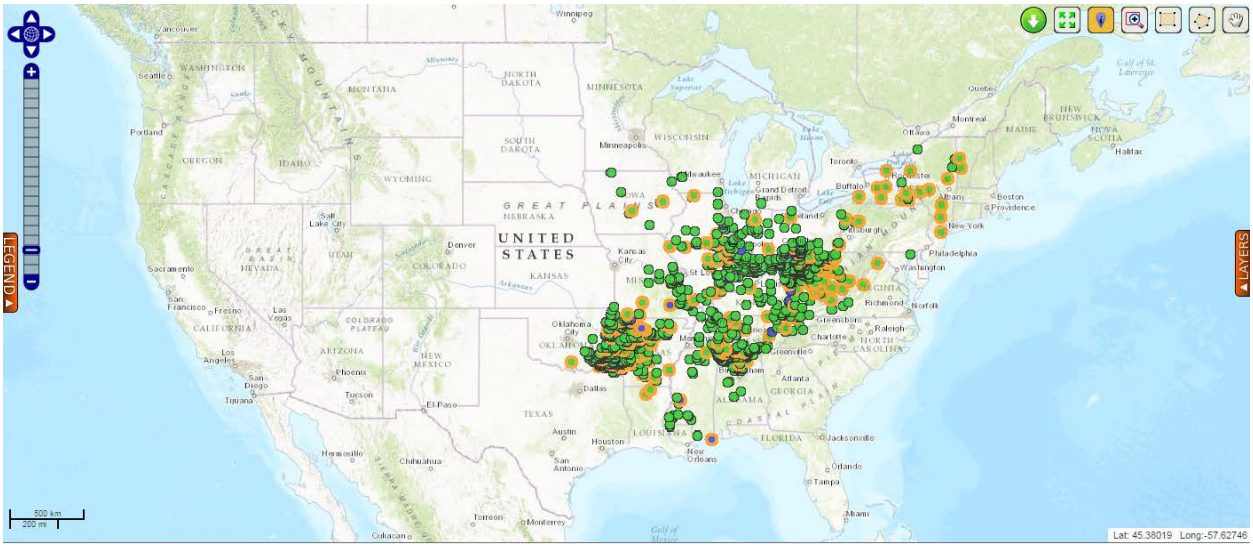

Figure 4. Known distribution of *Cyprinella whipplei* in the United States. Map created with data from BISON (2017).

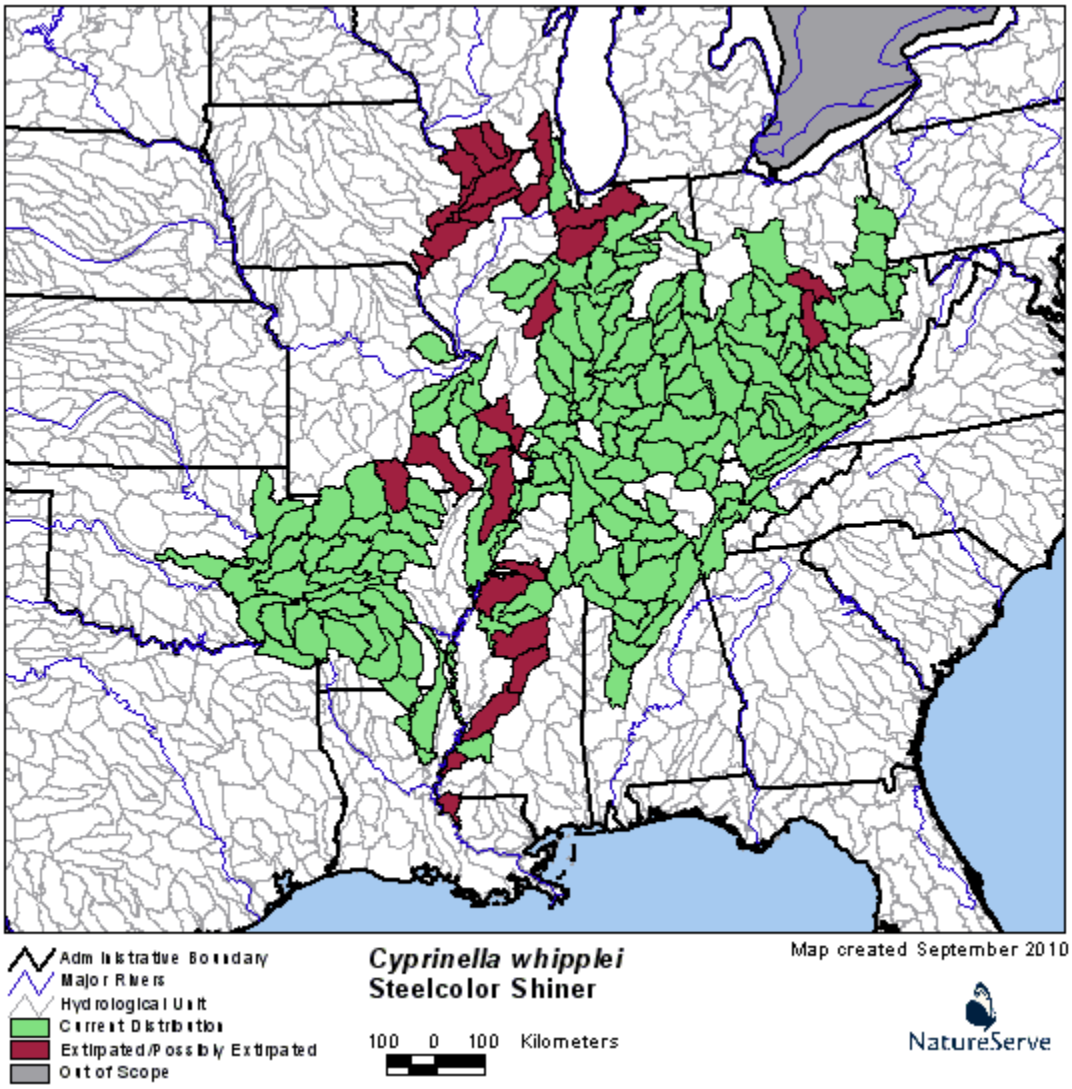

Figure 5. Distribution of *Cyprinella whipplei* by watershed. Map from NatureServe (2015).

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Cyprinella whipplei* was high in the eastern half of the country; this area represents the native range of the species. The climate match was medium in areas near the native range and moving to low in areas farthest from the native range. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the Continental U.S. was 0.599, high, and high in Colorado, Connecticut, Delaware, Florida, Georgia, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Vermont, Washington D.C., Wisconsin, and Wyoming. The following states also had a high climate match but are part of the species' native range: Alabama, Arkansas, Illinois, Indiana, Kentucky, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Tennessee, Virginia, and West Virginia.

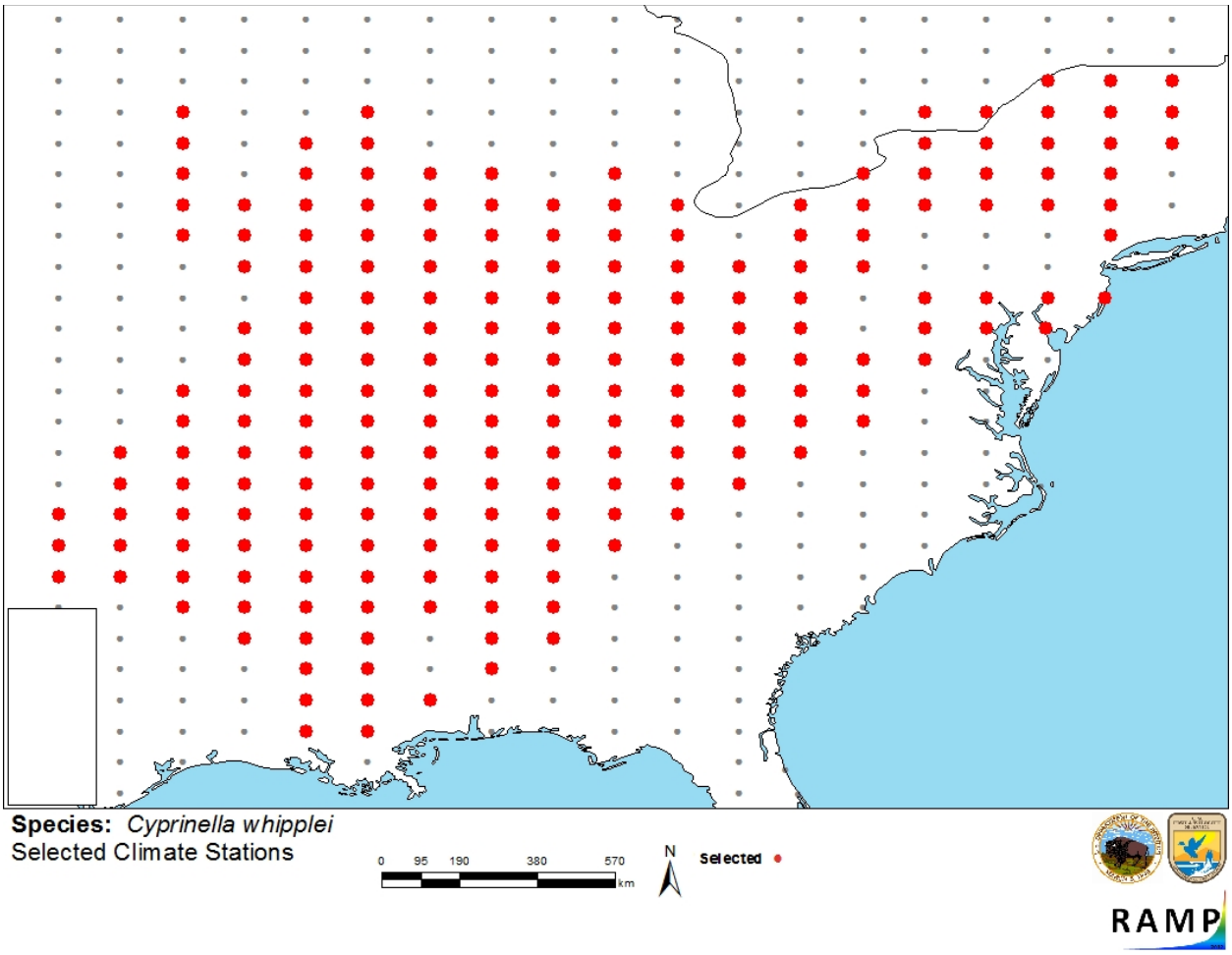

Figure 6. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (grey) for *Cyprinella whipplei* climate matching. Source locations from GBIF (2013), and BISON (2017).

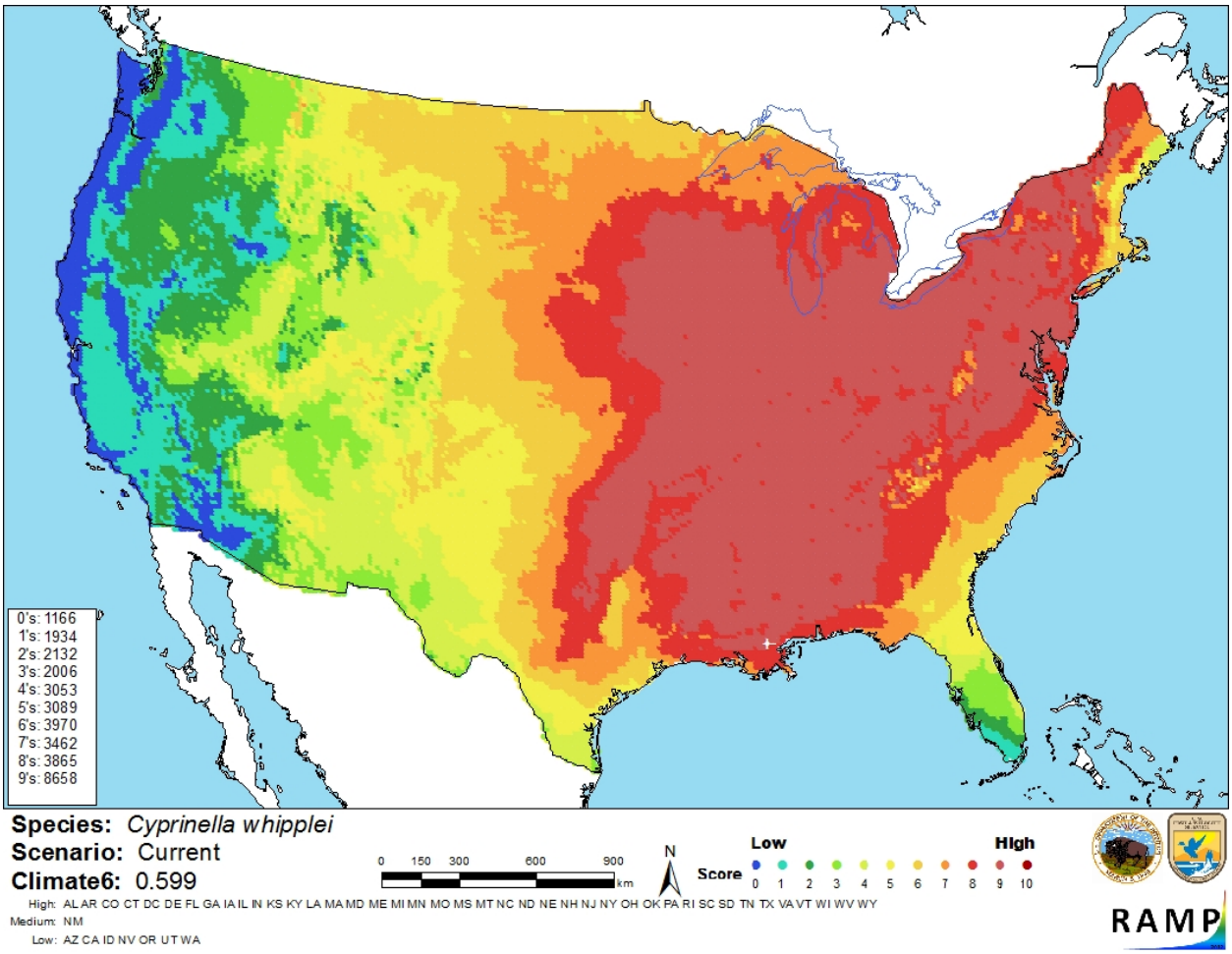

Figure 7. Map of RAMP (Sanders et al. 2014) climate matches for *Cyprinella whipplei* in the continental United States based on source locations reported by GBIF (2013), and BISON (2017). 0 = Lowest match, 10 = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

The certainty of assessment for *Cyprinella whipplei* is medium. There was adequate quality information on the ecology and biology of the species; however the information on the native range and possible introductions of the species did not seem to be complete. GBIF (2013) listed occurrences outside the otherwise stated native range (Nico et al. 2016). There were no discrepancies in the records of those occurrences to indicate that they should be discarded. The

records are also older (1800s, Royal Ontario Museum) and would potentially indicate the existing native range of the species and not additional instances of introduction. While there was one instance of a possible introduction, there was no detailed information available.

8 Risk Assessment

Summary of Risk to the Contiguous United States

The history of invasiveness for *Cyprinella whipplei* is uncertain. There was one mention of a possible introduction of the species but no detailed information. An incomplete understanding of the native range of the species may hinder determination of introduced populations. The climate match was high. This was mostly due to the large area of the native range in the eastern half of the country. Areas outside the native range had medium to low matches. The certainty of assessment is medium. The overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Medium**
- **Remarks/Important additional information No additional remarks.**
- **Overall Risk Assessment Category: Uncertain**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

BISON. 2017. Biodiversity Information Serving Our Nation (BISON). United States Geological Survey. Available: https://bison.usgs.gov. (March 2017).

Eschmeyer, W. N. and R. Fricke, and R. van der Laan, editors. 2017. Catalog of fishes: genera, species, references. Available: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. (May 2016).

Froese, R., and D. Pauly, editors. 2016. *Cyprinella whipplei* Girard, 1856. FishBase. Available: http://www.fishbase.se/summary/Cyprinella-whipplei.html. (May 2016).

GBIF (The Global Biodiversity Information Facility). 2013. GBIF backbone taxonomy. Available: http://www.gbif.org/species/5207654. (May 2016).

Gibbs, R. H. 1961. Cyprinid fishes of the subgenus *Cyprinella* of *Notropis*. IV the *Notropis galacturus-camurus* complex. The American Midland Naturalist 66(2):337-354.

ITIS (Integrated Taxonomic Information System). 2016. Cyprinella whipplei Girard, 1856. Available: http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=163811. (May 2016).

McAllister, C. T., W. F. Font, T. J. Fayton, and H. W. Robinson. 2014. Helminth parasites of select Cyprinid fishes of the Red River drainage of southeastern Oklahoma. Proceedings of the Oklahoma Academy of Science 94:81-86.

Muzzall, P. M., and G. Whelan. 2011. Parasites of fish from the Great Lakes: a synopsis and review of the literature, 1871-2010. Great Lakes Fish Commission, Miscellaneous Publication 2011-01.

NatureServe. 2013. *Cyprinella whipplei*. The IUCN Red List of Threatened Species 2013. Available: http://www.iucnredlist.org/details/full/202088/0. (March 2017).

NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available: http://explorer.natureserve.org. (May 2016).

Nico, L., P. Fuller, and J. Li. 2016. *Cyprinella whipplei*. USGS Nonindigenous Aquatic Species Database, Gainesville, Florida. Available: http://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=523. (May 2016).

Ohio Department of Natural Resources (Ohio DNR). 2012. Steelcolor shiner – *Cyprinella whipplei*. ODNR Division of Wildlife. Available: http://wildlife.ohiodnr.gov/species-and-habitats/species-guide-index/fish/steelcolor-shiner. (May 2016).

Royal Ontario Museum. 2016. Ichthyology Collection – Royal Ontario Museum. Available: http://www.gbif.org/occurrence/891272661. (May 2016).

Sanders, S., C. Castiglione, and M. Hoff. 2014. Risk assessment mapping program: RAMP. U.S. Fish and Wildlife Service.

10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

Bangham, R. V., and G. W. Hunter, III. 1939. Studies on fish parasites of Lake Erie. Distribution studies. Zoologica 24:385-448.

Barclay and Howell. 1973. [Source material did not give full citation for this reference.]

Boschung, H. T. 1992. Catalogue of freshwater and marine fishes of Alabama. Alabama Museum of Natural History Bulletin 14:1-266.

Boschung, H. T., and R. L. Mayden. 2004. Fishes of Alabama. Smithsonian Institution, Washington D.C.

Burkhead, N. M., and R. E. Jenkins. 1991. Fishes. Pages 321-409 *in* K. Terwilliger, coordinator. Virginia's endangered species: proceedings of a symposium. McDonald and Woodward Publishing Company, Blacksburg, Virginia.

Cudmore-Vokey, B., and E. J. Crossman. 2000. Checklists of the fish fauna of the Laurentian Great Lakes and their connecting channels. Canadian Manuscript Report of Fisheries and Aquatic Sciences 2550.

Doll, J. C. 2010. Changes in fish assemblages of Killbuck Creek and Pipe Creek, Delaware County, Indiana. Proceedings of the Indiana Academy of Science 119(1):52-63.

Etnier, D. A., and W. C. Starnes. 1994. The fishes of Tennessee. University of Tennessee Press, Knoxville.

Felley, J. D., and L. G. Hill. 1983. Multivariate assessment of environmental preferences of Cyprinid fishes of the Illinois River, Oklahoma. American Midland Naturalist 109(2):209-221.

Fisher, B. E., S. P. Wente, T. P. Simon, and A. Spacie. 1998. The fishes of Tippecanoe County, Indiana.

Fuller, P. L., L. G. Nico, and J. D. Williams. 1999. Nonindigenous fishes introduced into inland waters of the United States. American Fisheries Society, Special Publication 27.

Gibbs, R. H., Jr. 1963. Cyprinid fishes of the subgenus *Cyprinella* of *Notropis*. The *Notropis whipplei-analostanus-chloristius* complex. Copeia 1963(3):511-528.

Gilbert, C. R. 1978. Type catalogue of the North American cyprinid fish genus *Notropis*. Bulletin of the Florida State Museum, Biological Sciences 23(1):1-104.

Gilbert, C. R. 1998. Type catalog of recent and fossil North American freshwater fishes: families Cyprinidae, Catostomidae, Ictaluridae, Centrarchidae and Elassomatidae. Florida Museum of Natural History, Special Publication 1.

Girard, C. F. 1856. Researches upon the cyprinoid fishes inhabiting the fresh waters of the United States, west of the Mississippi Valley, from specimens in the museum of the Smithsonian Institution. Proceedings of the Academy of Natural Sciences of Philadelphia 8:165-213.

Gustafson, P. V. 1949. Description of some species of *Rhabdochona* (Nematoda: Thelaziidae). Journal of Parasitology 35:534-540.

Hugg, D. O. 1996. MAPFISH georeferenced mapping database. Freshwater and estuarine fishes of North America. Life Science Software. Dennis O. and Steven Hugg, 1278 Turkey Point Road, Edgewater, Maryland, USA.

Hunter, III, G. W., and R. V. Bangham. 1932. Studies on fish parasites of Lake Erie. I. New trematodes (Allocreadiidae). Transactions of the American Microscopical Society 51:137-152.

Jenkins, R. E., and N. M. Burkhead. 1994. Freshwater fishes of Virginia. American Fisheries Society, Bethesda, Maryland.

Lee, D. S., C. R. Gilbert, C. H. Hocutt, R. E. Jenkins, D. E. McAllister, and J. R., Stauffer, Jr. 1980. Atlas of North American freshwater fishes. Publication of the North Carolina Biological Survey 1980-12.

Mayden, R. L. 1989. Phylogenetic studies of North American minnows, with emphasis on the genus *Cyprinella* (Teleostei: Cypriniformes). University of Kansas Museum of Natural History Miscellaneous Publication 80.

Mettee, et al. 1996. [Source material did not give full citation for this reference.]

Miller, R. J., and H. W. Robison. 1973. The fishes of Oklahoma. Oklahoma State University Press, Stillwater.

Miller, R. J., and H. W. Robison. 2004. Fishes of Oklahoma. University of Oklahoma Press, Norman.

Nelson, J. S., E. J. Crossman, H. Espinosa-Perez, L. T. Findley, C. R. Gilbert, R. N. Lea, and J. D. Williams. 2004. Common and scientific names of fishes from the United States, Canada, and Mexico. American Fisheries Society, Special Publication 29, Bethesda, Maryland.

Page, L. M., and B. M. Burr. 1991. A field guide to freshwater fishes of North America north of Mexico. Houghton Mifflin Company, Boston.

Page, L. M., and B. M. Burr. 2011. Peterson Field Guide to Freshwater Fishes of North America North of Mexico (Second Edition). Freshwater Fishes of North America.

Page, L. M., H. Espinosa-Pérez, L. D. Findley, C. R. Gilbert, R. N. Lea, N. E. Mandrak, R. L. Mayden, and J. S. Nelson. 2013. Common and scientific names of fishes from the United States, Canada, and Mexico. Seventh Edition. American Fisheries Society, Special Publication 34, Bethesda, Maryland.

Risch, M. 2004. Chemical and biological quality of surface water at the U.S. Army Attenbury Reserve Forces Training Area near Edinburgh, Indiana, September 2000 through July 2001. DIANE Publishing.

Robins, C. R., R. M. Bailey, C. E. Bond, J. R. Brooker, E. A. Lachner, R. N. Lea, and W. B. Scott. 1991. Common and scientific names of fishes from the United States and Canada. American Fisheries Society, Special Publication 20, Bethesda, Maryland.

Robison, H. W., and T. M. Buchanan. 1988. Fishes of Arkansas. The University of Arkansas Press.

Ross, S. T. 2001. The inland fishes of Mississippi. University Press of Mississippi.

Ross, S. T., W. M. Brenneman, W. T. Slack, M. T. O'Connell, and T. L. Peterson. 2001. The inland fishes of Mississippi. Mississippi Department of Wildlife, Fisheries and Parks.

Scharpf, C. 2005. Annotated checklist of North American freshwater fishes, including subspecies and undescribed forms. Part I: Petromyzontidae ... [through] Cyprinidae. American Currents 31(4):1-44.

Simon, T. P. 1992. New ichthyofaunal records for the Calumet, Kankakee, and Iroquois drainages of Indiana. Proceedings of the Indiana Academy of Science 101:279-291.

Smith, P. W. 1979. The fishes of Illinois. University of Illinois Press, Urbana.

Smith, R. J. F., and J. D. Smith. 1983. Seasonal loss of alarm substance cells in Chrosomus neogaeus, Notropis venustus, and N. whipplei. Copeia 1983(3):822-826.

Smith-Vaniz. 1968. [Source material did not give full citation for this reference.]

Stauffer, J. 2007. Fishes of West Virginia. Academy of Natural Sciences.

Stauffer, J. R., Jr., J. M. Boltz, and L. R. White. 1995. The fishes of West Virginia. Proceedings of the Academy of Natural Sciences of Philadelphia 146:1-389.