Listing Proposal
for Four Small-bodied Fishes in Nebraska: Flathead Chub (*Platygobio gracilis*), Plains Minnow (*Hybognathus placitus*), Sicklefin Chub (*Macrhybopsis meeki*), and Western Silvery Minnow (*Hybognathus argyritis*)

Prepared by
Melissa J. Panella, Steven C. Schainost, Gerald E. Mestl, and Kirk D. Steffensen
Nebraska Game and Parks Commission
Lincoln, Nebraska
April 2018

Contents

Introduction

The Nebraska Game and Parks Commission (hereafter, Commission) is authorized under the Nebraska Nongame and Endangered Species Conservation Act (NESCA; Neb. Rev. Stat. § 37-801 to 37-811) to determine what species should be placed on the list of threatened or endangered species maintained under the act. Species that are listed as threatened or endangered federally are automatically placed on the state's list of threatened or endangered species; however, there are additional unlisted species whose continued existence within our state is at-risk and who are candidates for state listing. The Commission is obligated to conduct a review of species when monitoring data or emerging issues indicate concern. In 2017, Commission staff undertook a review of the state's wildlife, including plants, to determine whether any species warranted placement on the list or whether any species currently listed as threated or endangered should be removed from the list. The last full review and revision of the list occurred in 2000. The purpose of the current statewide review is to maintain an accurate list of threatened and endangered species, based on the best information available, to help the Commission complete its mission of effectively conserving the wildlife resources of Nebraska. Over the last several months, Wildlife Division staff received input from species' experts, conducted extensive literature reviews, and coordinated with the Commission's Fisheries and Planning and Programming divisions to develop a list of species to consider for listing action. An in-house committee (Appendix 1) further refined the list based on multiple criteria of relevance, including but not limited to those described in Nebraska statute 37-806 (process and legal requirements; see Appendix 2). Of Nebraska's fish species, Commission staff concluded that there are four that warrant listing: Flathead Chub (*Platygobio gracilis*), Plains Minnow (*Hybognathus placitus*), Sicklefin Chub (*Macrhybopsis meeki*), and Western Silvery Minnow (*Hybognathus argyritis*). These fish species have experienced well-documented population declines in Nebraska and elsewhere, and they are subject to multiple threat factors.

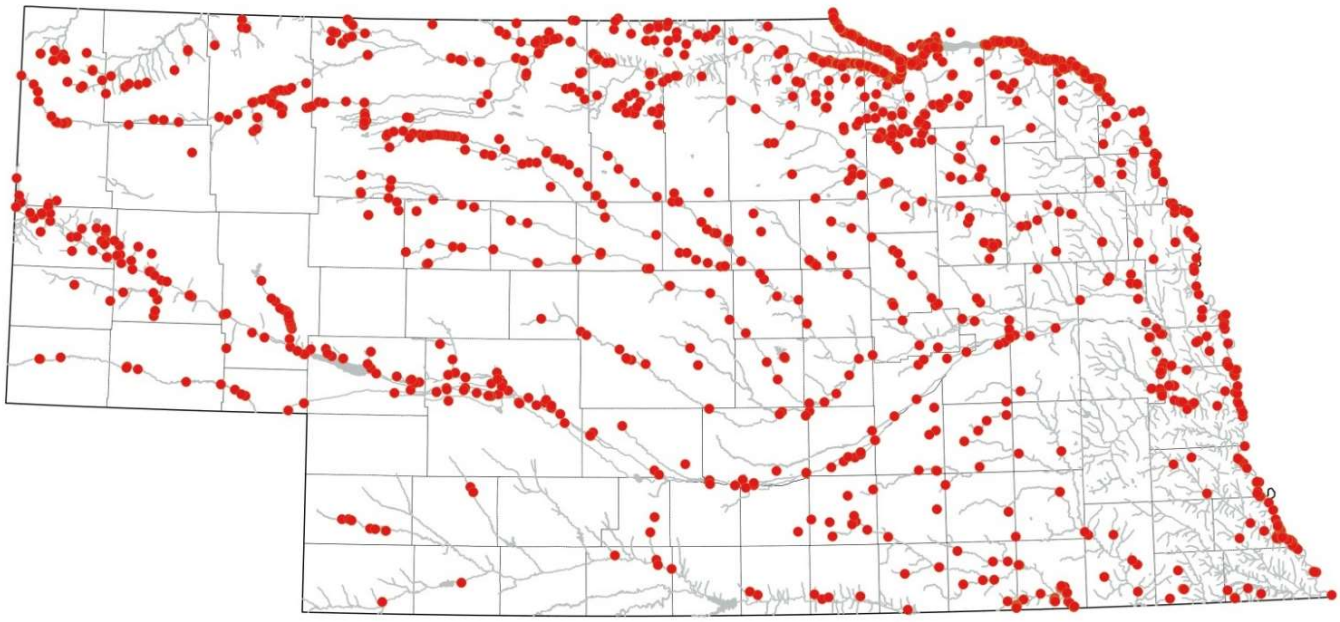


FIG. 1. As part of an ongoing survey and monitoring effort, the indicated stream sites were sampled for fish between 2005 and 2016.

Listing Proposal for the Flathead Chub (*Platygobio gracilis*)

Use authorized by Robert A. Hrabik; Copyright Missouri Dept. of Conservation & Lance Merry

Species Description:

The Flathead Chub is named for its broad, flat (wedge-shaped) snout which extends beyond the upper lip. Moore 1950, Olund and Cross 1961, Pflieger 1997, and Hrabik et al. 2015a describe the fish. The eyes are small. The mouth is large, slightly oblique with a small, distinctive barbel in the corner. It has a long, streamlined body, and they can be quite large (>25 cm/10 in.). Its sides are silvery; the belly is white and the dorsal surface is dusky brown. The dorsal and pectoral fins are sickle shaped, but the creek subspecies (*Platygobio gracilis gulonella*) sometimes has rounded pectoral fins (as opposed to falcate). Breeding males may have red on their fins. Taste buds are present on the membranes between the rays of the fins but are well-developed on the pectoral fins. It is also reported that taste buds are present over most of the body including the head, snout, lips, barbels, opercles, and brachial membranes.

Two subspecies of the Flathead Chub have been recognized. *Platygobio gracilis gracilis* is more commonly found in large rivers and cooler waters, whereas *P. g. gulonella* is found in small rivers and creeks that have warmer water. R. A. Hrabik reported that he and Lance Merry captured *P. g. gulonella* in several locations in the South Fork Little Nemaha River basin and deposited specimens from that study at the University of Nebraska State Museum (R. A. Hrabik, pers. comm.). Olund and Cross (1961) indicated that populations in Nebraska are a mix of *P. g. gracilis* and intergrades between the two. Johnson (1942) collected *P. g. communis (gracilis)* (which he termed the "plains flathead chub) from most of the large rivers of the state. He found *P. g. gulonella* (which he termed the "creek flathead chub") from upper Logan Creek in Dixon County in 1939. In the lower portions of Logan Creek as well as in the North Platte River, he found intergrades. Returning to Logan Creek in 1941, Johnson found only intergrades. Some ichthyologists suspect that the *gulonella* subspecies is not warranted; Bill Pflieger never captured

P. g. gulonella in Missouri and doubted its existence (R. A. Hrabik, pers. comm.). For the purposes of this evaluation, we consider *P. g. gracilis* and *P. g. gulonella* to be a single species because we have no information on the status of the two subspecies in the state.

Distribution:

The range of the Flathead Chub is native to four major drainage basins: the MacKenzie, the Saskatchwan, the Missouri/Mississippi, and the Rio Grande (Fig. 2). The species' range extends from the eastern Yukon and Northwest Territories southeast to Louisiana (Hrabik et al. 2015a). East of the Rocky Mountains, it is found in the Missouri and lower Mississippi river systems (Hrabik et al. 2015a). Nebraska is the center of the southern portion of the Flathead Chub's range. In Nebraska, Flathead Chub are native to all of the state's large rivers except the Blue River system (Johnson 1942, Jones 1963, Hrabik et al. 2015a). While the species is native to the Platte River system, there are few historical records from the South Platte drainage (Olund and Cross 1961).

The Flathead Chub's distribution is decreasing throughout its range and in Nebraska by at least 25–50% (Smith et al. 2014; unpubl. data, D. A. Schumann, GEM; Fig. 3). The map given in Fig. 1 is included to show that the contracted distribution is not a result of a lack of sampling effort. Flathead Chub were found at a smaller percentage of sites in Nebraska than during historical surveys (Fischer and Paukert 2008). Johnson (1942) collected 962 Flathead Chub from 52 sites in the first statewide stream fishery survey. The survey was redone in 2003–2005 following a standard protocol based on the U.S. EPA's Regional Environmental Monitoring and Assessment Program (R-EMAP; U.S. EPA, 1994), and 217 Flathead Chub were collected from 28 sites to reveal a decline of 77% (numbers) and 46% (sites). Smith et al. (2014) stated that the statewide decline was 45%. Although this species can become abundant locally, it is protected in much of its nearby range (e.g., Colorado, Missouri, Kansas).

Flathead Chub have completely disappeared from the Republican River basin of Nebraska (SCS). Since 1941, several dams built in the basin along with extensive irrigation development have cut the river into short segments, reduced flows, and changed the timing of flows to where this species could no longer survive. Some comments in Johnson's (1942) field notes are telling.

> Site 258, Muddy Creek, 17 July 1940: *Platygobio gracilis* – Great numbers of young; Site 254, Republican River, 16 July 1940: *Platygobio gracilis* – Very abundant in stream, hugging bottom in current; Site 261, Red Willow Creek, 18 July 1940: *Platygobio gracilis* – Very abundant, especially in narrow eroded channels in the stream bottom where current is swift.

In 1945 on the Missouri River near Peru, Nebraska, the Flathead Chub comprised 23% of the fish sampled in small-mesh seines and was the third most abundant species sampled (Fisher 1945). It was the most common small fish in the middle Mississippi River at 29.2% (Pflieger

1997). By the 1960s, it had declined to 8.1% in the Missouri and 3.8% in the middle Mississippi. The decline continued through the 1980s where numbers had dropped to 1.1% and 0.1%, respectively. In a 1994 survey of 13 Missouri River sites, only one Flathead Chub was seen. The species had not been seen in the smaller tributaries in over 30 years. Hesse (1994) reported the relative abundance of Flathead Chub had declined by 98% in the channelized section of the Missouri River (Ponca to the NE/KS state line), and they may be extirpated upstream of Gavins Point Dam. Extensive sampling of the small-bodied fish community by the Pallid Sturgeon Population Assessment crew from 2003–2012, resulted in only two Flathead Chub captured above Gavins Point Dam. A remnant population still exists in the upper unchannelized reach of the Missouri River but is likely unsustainable. Below Gavins Point Dam, Flathead Chub are also rarely collected with only six observations, all occurring below the Platte River confluence (Steffensen et al. 2014).

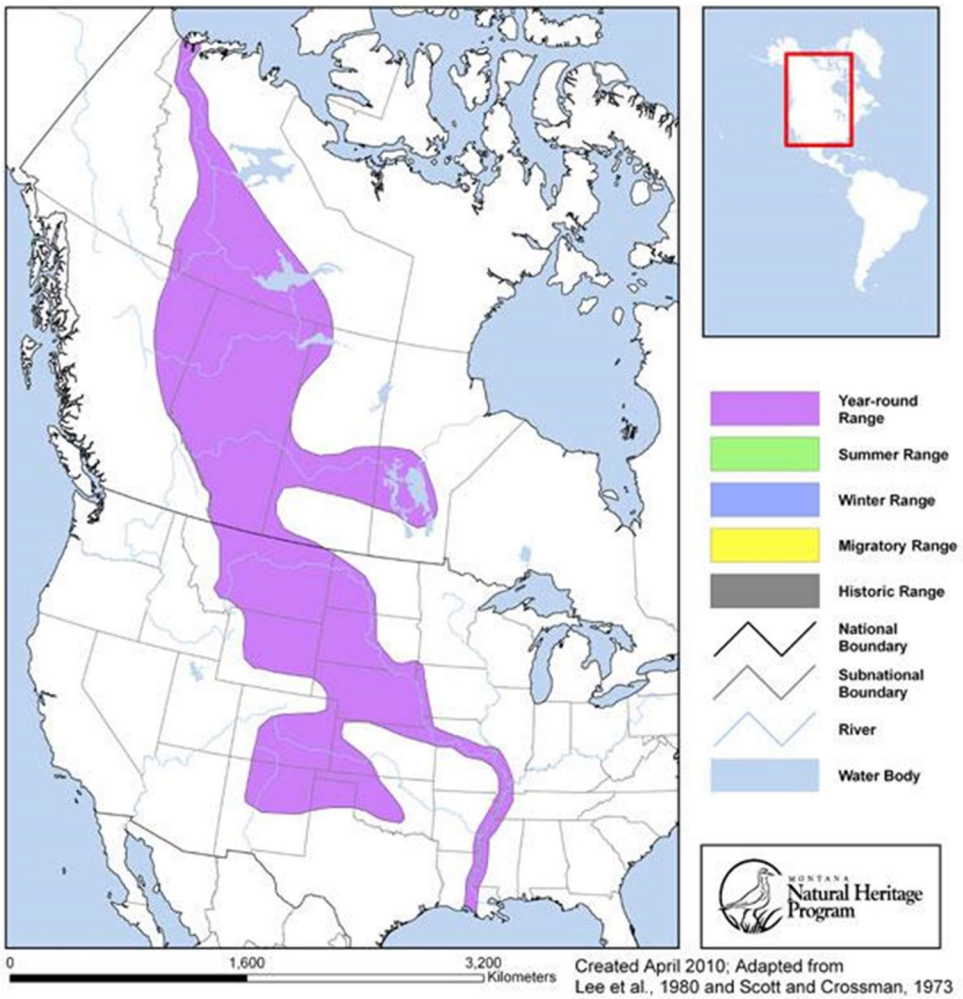
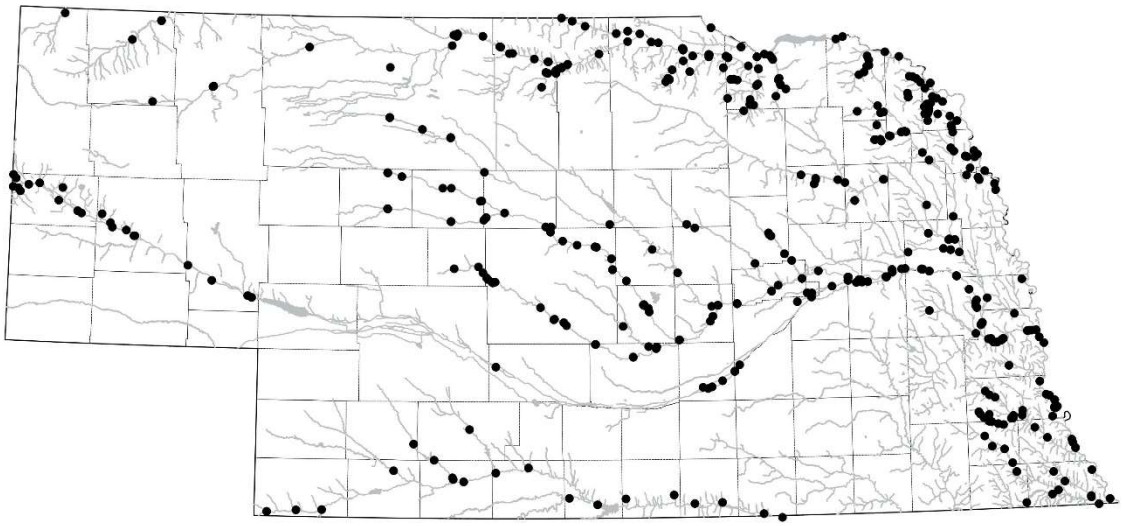


FIG. 2. Map illustrating the North American distributional range of the Flathead Chub, *Platygobio gracilis*, (Montana Natural Heritage Program and Montana Fish, Wildlife and Parks 2018).



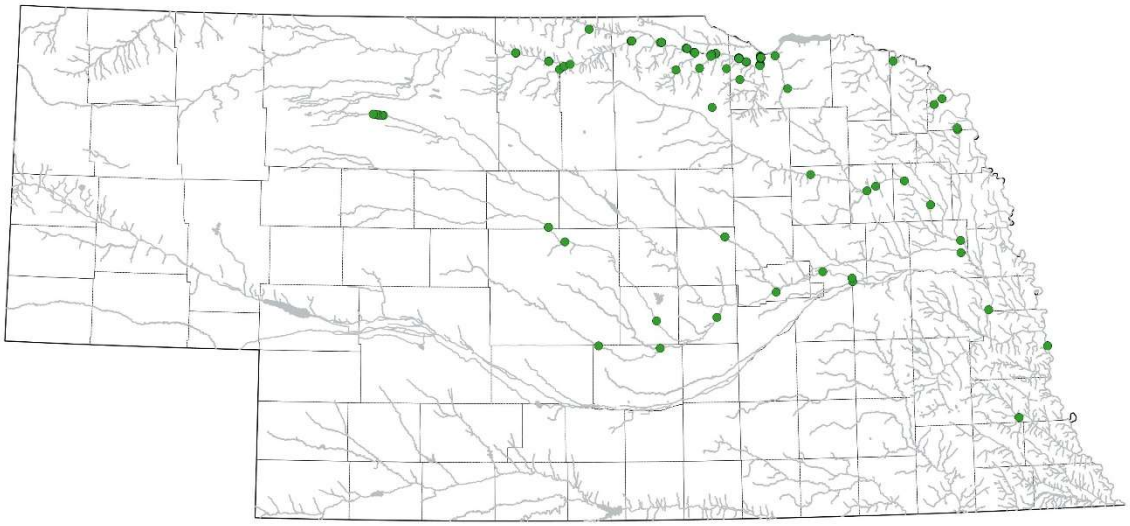


FIG. 3. Recent collections of Flathead Chub (2005–2016) demonstrate that their range in Nebraska has decreased considerably in comparison to where they were found from 1900–2004, even though sampling protocol was similar and locations overlapped with historical occurrences.

Habitat Requirements:

Flathead Chub prefer large, turbid rivers with relatively fast currents over gravel or sand substrates (Hrabik et al. 2015a). Flathead Chub have moderate to high resource specificity and relatively low adaptability and utilize the widest range of habitat conditions of any known Nebraska fish species throughout their lifetime (unpubl. data, GEM). Age-0 Flathead Chub are only found in very slow (mean velocity 0.1 m/sec) and shallow (mean depth 0.4 m) habitats in the Missouri River (Fig. 4), As they grow, they utilize faster and deeper water until as adults they are found in fairly fast (mean velocity 0.8 m/sec) and moderately deep water (mean depth 1.8 m).

Bonner and Wilde (2002) noted that Great Plains streams were, historically, quite turbid. They found that historically abundant species like the Flathead Chub were able to feed successfully at these high turbidities. Young Flathead Chub feed mainly on crustaceans (ostracods and cladocerans, Hubbs 1927). Hrabik and others (2015a) noted that Flathead Chub feed on invertebrates but are also opportunistic feeders. Since Great Plains streams have become clearer after flow alterations, sight feeding species like the Emerald Shiner (*Notropis atherinoides*), Sand Shiner (*N. stramineus*) and Red Shiner (*Cyprinella lutrensis*) have come to dominate in these streams.

Walters et al. (2014), in a mark-recapture study on Fountain Creek, Colorado, found that Flathead Chub did migrate upstream during the spawning season. They moved up to 33 km (20 mi) from the point of capture during the spring. Perkin and Gido (2011) estimated a minimum unimpounded stream length of 183 km (114 mi) was necessary to ensure the persistence of populations of Flathead Chub.

Support for the hypothesis that a long, relatively natural reach of river is necessary to support viable populations of Flathead Chub is provided in two published surveys. Hampton and Berry (1997) sampled nine sites on the 306 km (190 mi) reach of the Cheyenne River (South Dakota) between the mouth and Angostura Dam. Flathead Chub were collected at all nine sites and were the most abundant fish found both in total catch and catch per seine haul. Scarnecchia et al. (2000) stated that the collection of "all sizes and ages in the turbid, unimpounded Yellowstone River contrasts sharply with declines or disappearance of the species at other Missouri River localities." The Yellowstone River is 1114 km (692 mi) in length and is called the longest, unimpounded river in the coterminous U.S.

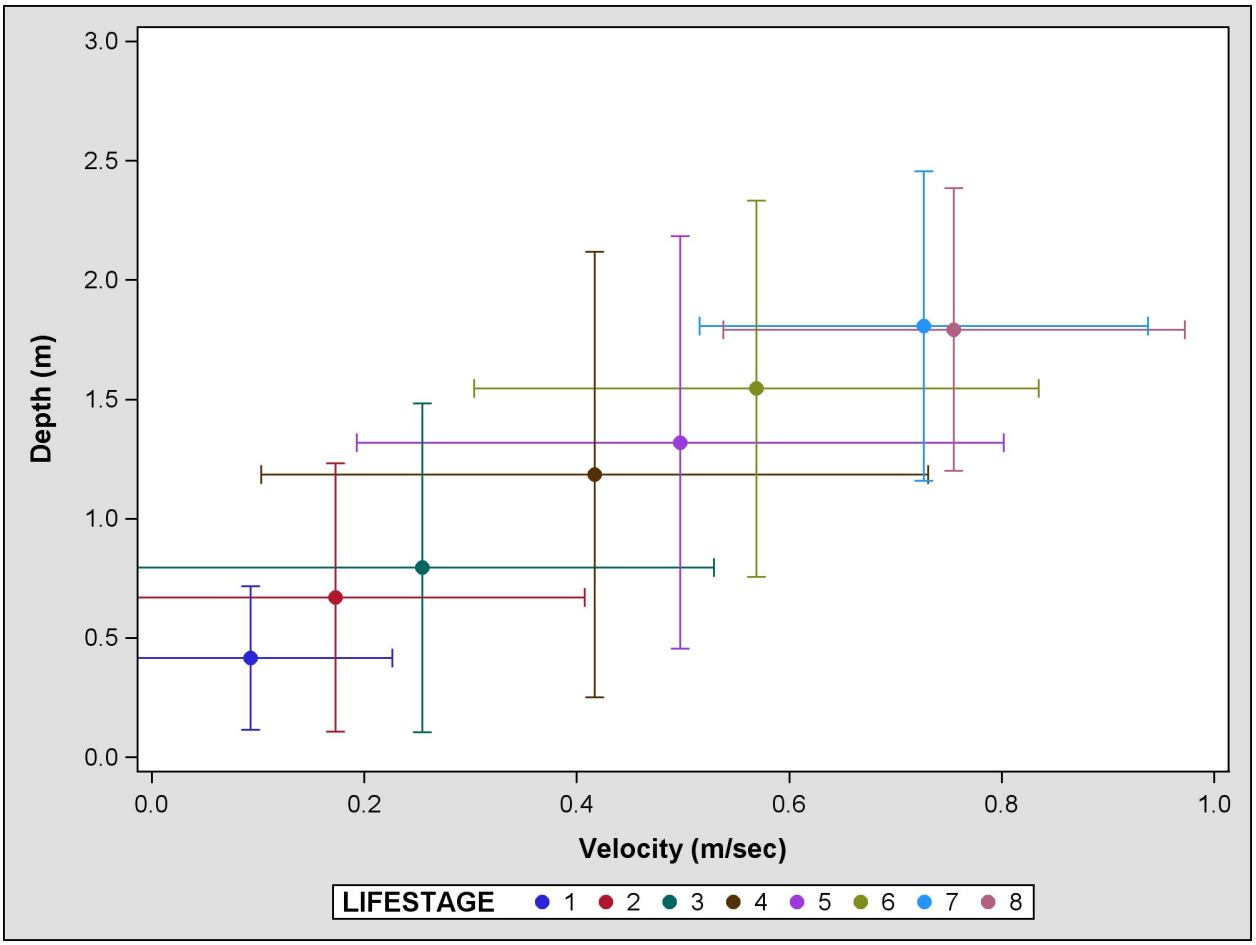


FIG. 4. Flathead Chub, *Platygobio gracilis*, of seven life stages in the Missouri River use mean depths and velocities with a standard deviation. Life stages are 1) 20–49 mm, 2) 50–73 mm, 3) 74–89 mm, 4) 90–107 mm, 5) 108–134 mm, 6) 135–173 mm, 7) 174–231 mm, and 8) 232–295 mm.

Reproduction:

Bestgen et al. (2016) described the eggs and mode of reproduction of the Flathead Chub. Flathead Chub were found to produce a non-adhesive egg that was semi-buoyant. These eggs were easily collected in large numbers with drift nets to show that they float downstream 6–7 days (at 20–22 °C) until they hatch. The larvae continue to float until they are strong enough to swim towards protected areas, which took 3–4 days (Haworth 2015). While the Flathead Chub is a pelagic spawner, this term usually refers to fishes that spawn in the open ocean. Bestgen et al. (2016) used the term potamopelagic to describe fish that spawn in flowing streams.

Researchers indicate that the peak spawning period for Flathead Chub occurs in deep, main channels (Fisher et al. 2002) between early to late summer from May to August (McPhail and Lindsey 1970, Martyn and Schmulbach 1978, Gould 1985, Smith and Hubert 1989) in response to increased stream flows (Rahel and Thel 2004). The stronger currents help to keep the

non-adhesive, semi-buoyant eggs afloat until hatchlings emerge (Rahel and Thel 2004). Flathead Chub may also move into riffle habitats to release eggs (Hrabik et al. 2015a). Water temperature during spawning ranges from ~18–25 °C (64–77 °F, Martyn and Schmulbach 1978, Gould 1985).

This species is more long-lived than many other cyprinids, so adults may remain in areas for some time after reproduction and the recruitment of young individuals has ceased. In a Montana study, mature females ranged in age from 5–7 years though some as young as age 2 were found, and no males over age 5 were found (Scarnecchia et al. 2000). Mean number of eggs per female (mean length 186 mm) was 6,981, and the total number of eggs per fish peaked in late June. The eggs were found to be of two or more distinctly different sizes indicating the ability to spawn multiple times during the year.

Durham and Wilde (2006) found that Flathead Chub in the Canadian River (Oklahoma) spawned from April through early July and spawned multiple times. There was an increase in successful reproduction during a moderate increase in discharge in late May. Those fish that spawned early in the season had the greatest incidence of successful reproduction.

Haworth (2015) studied reproduction of Flathead Chub in Fountain Creek, Colorado (Arkansas River). Collection of eggs and larvae showed that spawning began in mid-May when water temperatures reached 15 °C and continued through August with temperatures as high as 23 °C. Peak spawning and hatching was in late May through June. Larvae are able to swim 3–4 days after hatching at a size of 7 mm. Fish that hatched early in the summer had a higher probability of survival. Spates and very low flows were detrimental to spawning and larvae survival. Flows that were moderate and steady were ideal.

Abundance and Status:

The overall size of the Nebraska's population is highly uncertain, but based on relative abundance indices, it is likely between 10,000–20,000 individuals with few of these found in the Missouri River where it historically was one of the most abundant species present (D. A. Schumann, pers. comm.; unpubl. data, GEM). Nebraska is comprised of up to a quarter of the species' total population. Population decline is likely >50% in Nebraska (unpubl. data, GEM).

The Flathead Chub is currently recognized as a Tier 2 at-risk species in Nebraska, but an advisory committee of experts has recommended a revision to recognize it as Tier 1 (i.e., more at-risk of extinction). It is recognized as a species of greatest conservation need (SGCN) in all states bordering Nebraska (Wyoming [Tier 3], Colorado [Tier 1, special concern], Kansas [Tier 1, state threatened], Missouri [state endangered], and Iowa), excluding South Dakota (U.S. Geological Survey 2017). The Flathead Chub is a U.S. Fish and Wildlife Service Species of Concern and a U.S. Forest Service Sensitive Species.

Factors Affecting the Species:

Section 37-806 (2) of the Nongame and Endangered Species Conservation Act states that the Nebraska Game and Parks Commission shall determine whether any species of wildlife or

wild plants normally occurring within this state is an endangered or threatened species as a result of any of the five factors described therein. These factors and their application to the Flathead Chub are as follows:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range.

Flathead Chub are vulnerable to the fragmentation of stream and river systems, because they require large unimpounded reaches to successfully reproduce. This species is generally unable to successfully reproduce in river fragments <183 rkm (Perkin and Gido 2011). Large and small dams have fragmented river systems and resulted in the decline of this and other pelagic-spawning fishes in prairie streams (Rahel and Thel 2004, D. A. Schumann, pers, comm.). Substantial declines and calls for protection are reported in the Missouri River in Nebraska. The Missouri River in Nebraska has been fragmented by Gavins Point Dam and further impacted by Fort Randall Dam, which have isolated populations, created river reaches that are not of sufficient length to allow drifting eggs to mature, altered hydrology of the river to impact habitat formation and drift rates, and eliminated much of the sediment load to result in much less turbidity (D. A. Schumann, pers. comm.; unpubl. data, GEM).

Channelization downstream of Ponca State Park has eliminated much of the habitat, especially the very slow and shallow areas, used typically by the youngest life stages of Flathead Chub. The high velocities intentionally created during the channelization project to transport sand and maintain a 2.7 m (9 ft) channel may limit the ability of drifting larval Flathead Chub to exit the drift and settle into suitable habitats. Bestgen et al. (2016) and Haworth (2015) indicate that eggs and larvae are free-floating and may need 9–11 days of moderate currents in an unimpounded stream for successful reproduction. Hypothetically, using a velocity of 0.3 m/sec (1 ft/sec), that would mean eggs/larvae could float 26.4 km/day (16.4 mi/day) and, in total, would need 237–290 km (147–180 miles) of unimpounded river to sustain populations. The upstream migration of mature fish may be evidence of either of two strategies. One is to repopulate upstream habitats. The other is to ensure that the eggs and larvae of a pelagic spawning species have enough flowing stream that they can complete their development (Durham and Wilde 2008).

Globally, 90% of consumptive water use by humans is for irrigation (Siebert et al. 2010). In Nebraska, 1,360 million gallons of water are withdrawn each day for irrigation with a total of 3,320 million gal. per day for all consumptive uses (Maupin et al. 2010). For example, mean annual depletions to stream flow in the Republican River range from ~25% in the lower reach and as much as 44% in the upper reach (NE Dept. of Natural Resources and Upper Republican NRD 2016). Hoagstrom et al. (2011) found a decline in endemic fishes because of dewatering, habitat fragmentation, and habitat degradation, often with all stressors present together. Perkin et al. (2015, 2017) describe how overexploitation of freshwater can cause declines in Great Plains fish communities, particularly in fragmented systems. Dudley and Platania (2007) expressed concern regarding the drifting of riverine fish eggs and larvae into unsuitable downstream locations such as reservoirs or irrigation networks. Downstream

reaches are susceptible to drying during low flow conditions. Groundwater removal can lower the water table and lead to dry conditions (Rahel and Thel 2004). If fish become isolated in shallow pools for an extended period of time, increased temperatures and associated stressors such as reduced oxygen levels may cause direct mortality, and there are documented cases of dead or moribund fish collected even in flowing streams because of elevated temperatures (e.g., 38 ◦C [~100 ◦F] in KS; Durham et al. 2006). Regional water resource planning in the plains of North America should take into account water scarcity issues (Hoagstrom et al. 2011).

(B) Over-utilization from commercial, sporting, educational, or other purposes.

This is not currently considered to be an impact.

(C) Disease or predation.

Predators of Flathead Chub include fish species such as Walleye (*Sander vitreus*), Sauger (*Sander canadensis*), Northern Pike (*Esox lucius*) and Channel Catfish (*Ictalurus punctatus*) (Rahel and Thel 2004). Quist et al. (2004) found that the abundance of turbid-river cyprinids like the Flathead Chub was related positively to the percent of fine substrates and was related negatively to the percent of coarse (gravel/rocky) substrates and the abundance of exotic piscivores such as Brown Trout (*Salmo trutta*), Walleye, and Smallmouth Bass (*Micropterus dolomieu*). The composition of substrates and the abundance of piscivores was correlated with the presence and proximity of reservoirs. Stream reaches without reservoirs had high percentages of fine substrates, high catches of native turbid-river cyprinids, low abundances of exotic piscivores, and little gravel or rocky substrate. Stream reaches with a downstream reservoir (<200 km) had fewer turbid-river cyprinids and high numbers of exotic piscivores. Stream reaches with an upstream reservoir had coarse substrates, high numbers of exotic piscivores, and few turbid-river cyprinids. They concluded that conservation of populations of native turbid-river cyprinids depended on maintaining the natural hydrograph and sediment transport of the streams while minimizing sources of exotic piscivores (i.e., reservoirs). Essentially the same dynamic was observed on the Laramie River, Wyoming (Patton and Hubert 1993).

(D) Inadequacy of existing regulatory mechanisms.

The Nongame and Endangered Species Conservation Act can offer additional protection of this species on state and private lands through Section 37-807 involving conservation programs and state agency consultation.

(E) Other natural or human-induced factors affecting its continued existence.

Sportfish are often introduced into reservoirs. Reservoirs, being less turbid than streams, allow these fish predators to hunt more effectively. The reduced turbidity in reservoirs also favors fish competitors that forage by using their sight (Rahel and Thel 2004). Reservoirs

provide a source of exotic piscivores that can move upstream and downstream where they reduce or eliminate populations of turbid-river cyprinids (Quist et al. 2004)

In parts of their range, Flathead Chub are impacted by coalbed methane mining. The methane extraction process can lead to increased flows and toxins in the water (Rahel and Thel 2004).

Overgrazing of riparian areas can alter stream conditions and pollute water, leaving it unsuitable for Flathead Chub (Rahel and Thel 2004).

Proposal:

Based on long-term declines, habitat loss, and the threats described therein, we believe the species' continued existence in the state of Nebraska is uncertain. Therefore, we recommend the Flathead Chub for listing as Threatened under the Nebraska Nongame and Endangered Species Conservation Act (37-801 to 37-811) and will follow all legal requirements (Appendix 2) in pursuit of this status change for the species.

Listing Proposal for the Plains Minnow (*Hybognathus placitus*)

Use authorized by Robert A. Hrabik; Copyright Missouri Dept. of Conservation & Lance Merry

Species Description:

Hrabik et al. (2015b) describe the Plains Minnow. It can grow up to 125 mm (5 in). Its body is moderately compressed, widest just before the dorsal fin. Its sides are silver-colored. It has a thin dark line running the length of its tan back. Belly is somewhat transparent and may show the dark coils of its intestines. The eye of the Plains Minnow is ~1/5 of its head length. The thin-lipped ventral mouth is shaped like a shallow crescent and has no barbels. The ventral

mouth and the long, coiled gut suggest that they feed on the diatoms and algae found in the silty backwaters they favor. They are very similar to the Western Silvery Minnow (*Hybognathus argyritus*) and can only be differentiated by observing the shape of the bassioccipital process and, even then, can be misidentified, especially since hybrids are known.

Distribution:

Plains Minnows are found throughout streams in the Great Plains east to Missouri (Fig. 5). They are native to the western Missouri Basin and have historically been most abundant in the upper Missouri River watershed (NatureServe 2015) and Red and Arkansas rivers. The Plains Minnow is one of a group of fishes that was once common in the shallow, braided rivers in these areas (Gilbert 1980). In Nebraska, they are native to most major river systems, other than the Blue River (Fig. 6., Johnson 1942, Jones 1963, Hrabik et al. 2015b).

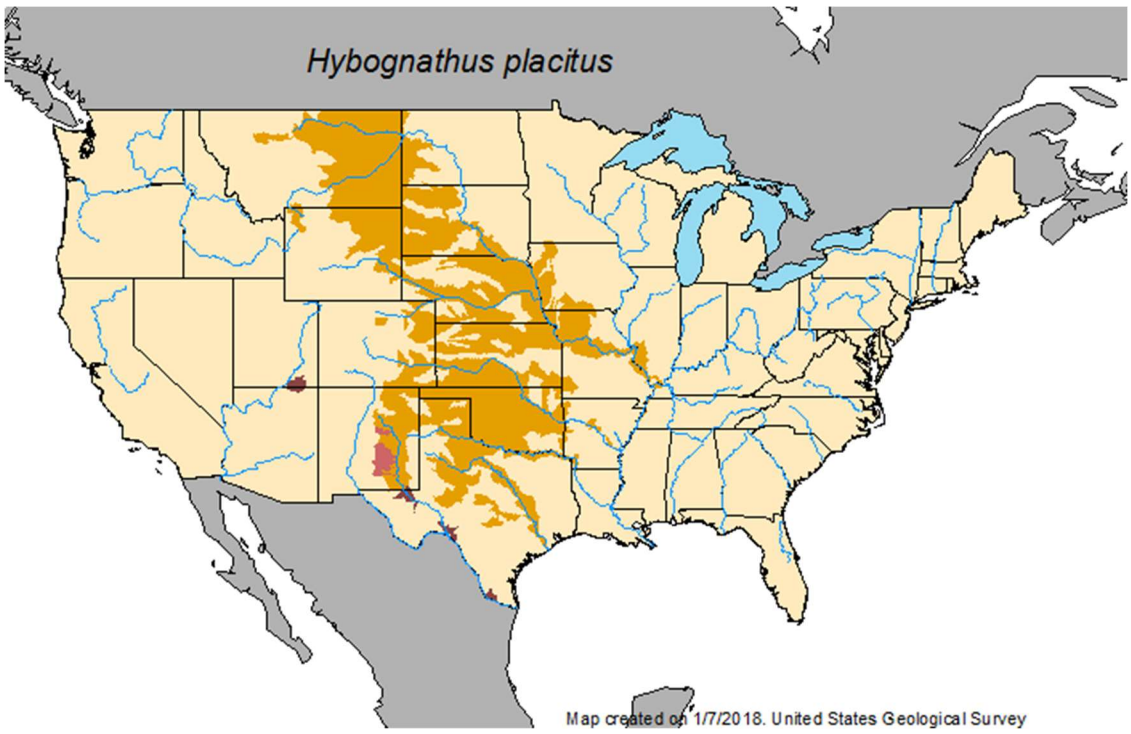
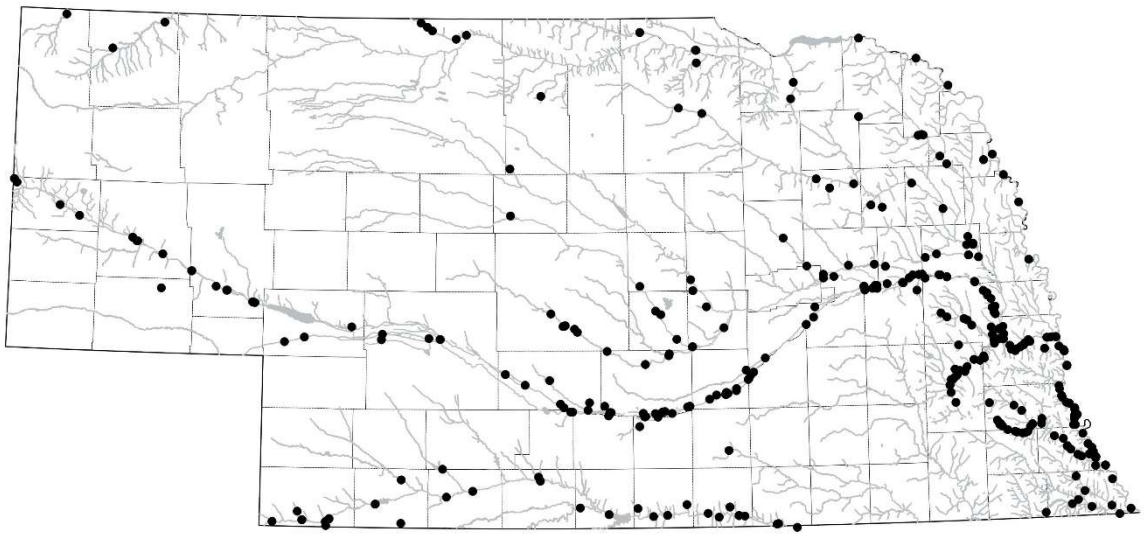


FIG. 5. The distribution of Plains Minnows, *Hypognathus placitus*, includes streams of the U.S. Great Plains. The species' distribution extends into Canada (not depicted). Map created by Fuller and Nielson (2018) for the U.S. Geological Survey.



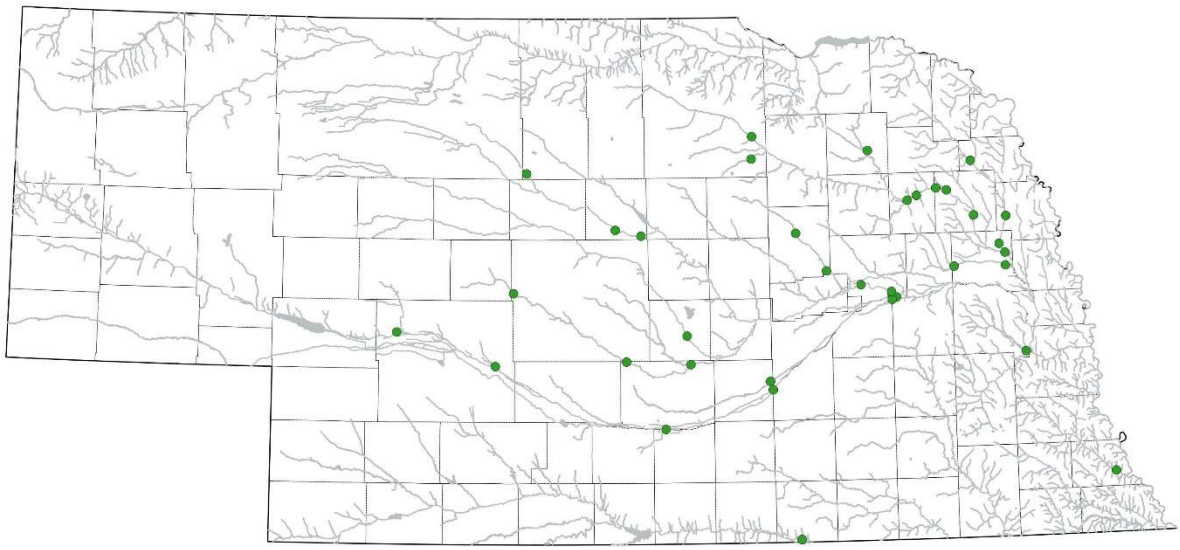


FIG. 6. Recent collections of Plains Minnows (2005–2016) demonstrate that their range in Nebraska has decreased considerably in comparison to where they were found from 1900–2004, even though sampling protocol was similar and locations overlapped with historical occurrences.

Habitat Requirements:

Plains Minnows inhabit permanent streams and backwaters with sandy substrate and moderate current (Missouri Department of Conservation 2017). In the Missouri River, they utilized very slow (mean velocity 0.11 m/sec) and shallow (mean depth 0.5 m) habitats (unpubl. data, GEM). They will use deep silty pools (Hrabik et al. 2015b), but they can be found also in shallow waters (Missouri Department of Conservation 2017). They may use undercut banks for cover (Cross et al. 1985). Plains Minnows normally travel in schools and are believed to feed on microalgae, small aquatic organisms, and invertebrates (Hrabik et al. 2015b). Cross and Moss (1987) listed the Plains Minnow as being one of the species that was diagnostic of "channels of fluctuating, shallow streams with shifting sand beds."

There must be sufficient unimpounded stream length to allow Plains Minnows to successfully reproduce, because they have an upstream migratory phase in which they repopulate upstream habitats. Urbanczyk (2012) observed that they are capable of swimming upstream a distance of 80 km (50 mi) in 55 days. Given this, maintenance of sustaining populations depends on having adequate steam length and flows. Therefore, it is not unlikely that large river pelagic spawners like the Plains Minnow may need 218 km (135 mi) of river.

In laboratory tests, Ostrand and Wilde (2001) found the critical thermal maximum tolerated by the Plains Minnow to be 39.7 °C (>102 °F). They were also tolerant of high salinity (16 ppt) and low dissolved oxygen (2.08 ppm). These factors can become important in Great Plains streams that are sometimes intermittent. Fish trapped in isolated pools can be subjected to harsh conditions including high temperatures, high salinity, and low dissolved oxygen. The ability to survive these conditions for extended periods becomes important. Pools that were isolated for long periods experienced decreasing volume (drying) and increasing specific conductance (salinity) with the result that the numbers of surviving Plains Minnows decreased steadily (Ostrand and Wilde 2004).

Taylor et al. (1996) observed that in February, large numbers of Plains Minnows had aggregated in a deep pool (1.2m). During the spring and summer, aggregations like this were not found.

Reproduction:

A rapid rise in stream flows following snow melt or spring rains induces spawning in Plains Minnows (Hrabik et al. 2015b). Receding flows may also trigger spawning (Taylor and Miller 1990). Spawning extends from spring to late summer (Taylor and Miller 1990, Hrabik et al. 2015b). Spawning may be fractional (Taylor and Miller 1990). Non-adhesive, semi-buoyant eggs drift until hatching typically within 2–6 days (Hrabik et al. 2015b). Water temperature can influence hatch rate (Hrabik et al. 2015b). Fecundity increases after 1 year of age (Taylor and Miller 1990). Lifespan is 2 years (Taylor and Miller 1990, Hrabik et al. 2015b).

Plains Minnows have an extended spawning season that begins in early April and extends into late September (Lehtinen and Layzer 1988, Urbanczyk 2012). Examination of their egg development (histological analysis) also showed that they are multiple spawners. This further

showed that Plains Minnows spawned whenever there was an increase in discharge; even small increases commenced spawning (Urbanczyk 2012).

Durham and Wilde (2006) observed that successful reproduction of Plains Minnows in the Canadian River occurred early in the season (Apr–early Jul). There was no success in later summer when the river was reduced to isolated pools. There was a "distinct increase in successful reproduction" when there was a moderate increase in streamflow. Juveniles that hatched early in the year had faster growth rates than those that hatched in late summer which increased their chances of survival (Durham and Wilde 2005).

Abundance and Status:

Historically, the Plains Minnow had been one of the most abundant fishes of the turbid rivers of the Great Plains (Hrabik et al. 2015b). In 1945, Fisher (1945) found that they were the most abundant fish in seine samples from the Missouri River near Peru, Nebraska to make up 58% of over 4,000 fish sampled. Steffensen et al. (2014) reported increases in the abundance of Plains Minnows in a downstream trend on the Missouri River in Nebraska with only a few (n = 6) individuals collected in the unchannelized reaches above and below Gavins Point Dam. Catch rates for Plains Minnows may be higher in the channelized reaches but continue to decline with near zero catch rates occurring since 2008 (Steffensen et al. 2014).

The Plains Minnow has undergone significant recent declines in Nebraska and in other parts of its range. It is currently recognized as a Tier 2 at-risk species in Nebraska, but an advisory committee of experts has recommended a revision to recognize it as Tier 1 (i.e., more at-risk of extinction). It is recognized as a species of greatest conservation need (SGCN) in all states bordering Nebraska (Wyoming [Tier 2], Colorado [Tier 1, state endangered], Kansas [Tier 1, state threatened], Missouri, and Iowa), excluding South Dakota (U.S. Geological Survey 2017). The Plains Minnow is a U.S. Forest Service Sensitive Species.

Factors Affecting the Species:

Section 37-806 (2) of the Nongame and Endangered Species Conservation Act states that the Nebraska Game and Parks Commission shall determine whether any species of wildlife or wild plants normally occurring within this state is an endangered or threatened species as a result of any of the five factors described therein. These factors and their application to the Plains Minnow are as follows:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range.

Declines may result from water diversions for irrigation and flow-regulations for reservoirs (Cross et al. 1985). Elimination of highly variable water levels, unstable streambeds, and fluctuating water temperatures are among the reasons for the observed decline (Cross et al. 1985). In the central Platte River system, trees and other undesirable woody vegetation have taken over the wide, shallow, sandy channels (K. F. Dinan, pers. comm.).

Historically, the Platte River had a wide, shallow, braided channel. High spring flows from Rocky Mountain snowmelt scoured the channel, removed vegetation, and shifted large volumes of sand and sediment to maintain the wide, shallow channel. Reservoirs and water extractions have reduced flows and eliminated the spring scour so that now, the central Platte River is a single, deep meandering channel winding its way through dense woodlands.

Dams and their reservoirs trap sediment and reduce the turbidity of outflowing water resulting in a competitive disadvantage for fishes like the Plains Minnow that are adapted to turbid rivers. In the Missouri River, they utilize very slow and shallow habitats, once common, but now nearly absent because of channelization and ongoing loss of fine sediments. Sport fishes stocked into impoundments move up and downstream where they prey on the native cyprinids.

Changes including conversion of grassland to rowcrop agriculture, construction of dams fragmenting watersheds, and extensive groundwater pumping causing stream dewatering have all caused steady declines in the status of the Plains Minnow among other fishes (Gido et al. 2010). The Plains Minnow was one of four species that declined or disappeared from upstream sites on the North Fork Red River (Oklahoma) after construction of a dam (Winston and Taylor 1991). Gido and others (2010) postulated four reasons for the disappearances: 1) the stream began to dry in late summer forcing fish to move down to the reservoir where they were vulnerable to predators, 2) predatory fish moved up into the stream, 3) the Plains Minnow is a pelagic spawner, and the length of flowing stream was too short and their eggs/young entered the reservoir where they could not survive, and 4) the drought at that time caused successive spawning failures which, for a short-lived species resulted in its extirpation.

Bonner and Wilde (2000) looked at the fish assemblages in the Canadian River (Oklahoma) below two reservoirs. One of these (Lake Meredith) reduced annual streamflows by 76% and completely eliminated high discharge years. The Plains Minnow, whose successful reproduction depends on long reaches with good flows accompanied by periodic rises, was almost completely eliminated from the river below this dam. A second dam (Ute Reservoir) significantly reduced, but did not eliminate high flows. Here, the Plains Minnow declined in abundance but did not disappear.

(B) Over-utilization from commercial, sporting, educational, or other purposes.

This is not currently considered to be an impact.

(C) Disease or predation.

Because Plains Minnows are adapted to large river systems with sediments, similarly to Western Silvery Minnows, flow regulations that could increase water clarity may lead to increased competition or predation by sight-dependent fish (COSEWIC 2007). Flow changes could also impact downstream drift of eggs and young to decrease their viability or increase predation (COSEWIC 2007).

(D) Inadequacy of existing regulatory mechanisms.

Plains Minnows have no protection in Nebraska despite their rarity (Steffensen et al. 2014). The Nebraska Nongame and Endangered Species Conservation Act can offer protection of this species on state and private lands through Section 37-807 involving conservation programs and state agency consultation.

(E) Other natural or human-induced factors affecting its continued existence.

Drought, extreme temperatures, agricultural runoff, and invasive species (e.g., Common Carp) can negatively impact Plains Minnows (COSEWIC 2018).

Proposal:

Based on recent declines, habitat loss, and the threats described therein, we believe the species' continued existence in the state of Nebraska is uncertain. Therefore, we recommend the Plains Minnow for listing as Threatened under the Nebraska Nongame and Endangered Species Conservation Act (37-801 to 37-811) and will follow all legal requirements (Appendix 2) in pursuit of this status change for the species.

Listing Proposal for the Sicklefin Chub (*Macrhybopsis meeki*)

Species Description:

Adult Sicklefin Chub are well suited for swift, turbid environments with large rounded snout, streamlined body covered with taste buds, small eyes, prominent mouth barbels, and large falcate (sickle-shaped) fins (Pflieger 1997, Kansas Fishes Committee 2014, Hrabik et al. 2015c). The taste buds allow them to locate small insects in murky waters (Hrabik et al. 2015c). Body coloration consists of silvery sides with no or very few dark speckles and tan along the dorsal surface (Hrabik et al. 2015c). The fins are unpigmented except for the lower lobe of the caudal fin being slate-colored with a white edge (Kansas Fishes Committee 2014). Rarely, does this species attain lengths >130 mm (Nebraska Game and Parks Commission – Missouri River database).

Distribution:

This species is found only in the main-stem Missouri River from Montana to the confluence with the Mississippi River and the portion of the Mississippi between the Missouri and Ohio Rivers, including the lower most reaches of the major tributaries (i.e., Yellowstone River, Platte River, Kansas River; Fig. 6). In Nebraska, Sicklefin Chub are restricted to the main-

stem of the Missouri River downstream of Gavins Point Dam and in the lower Platte River, where they are collected only rarely (Fig. 8; Pierce et al. 2017, Hrabik et al. 2015c).

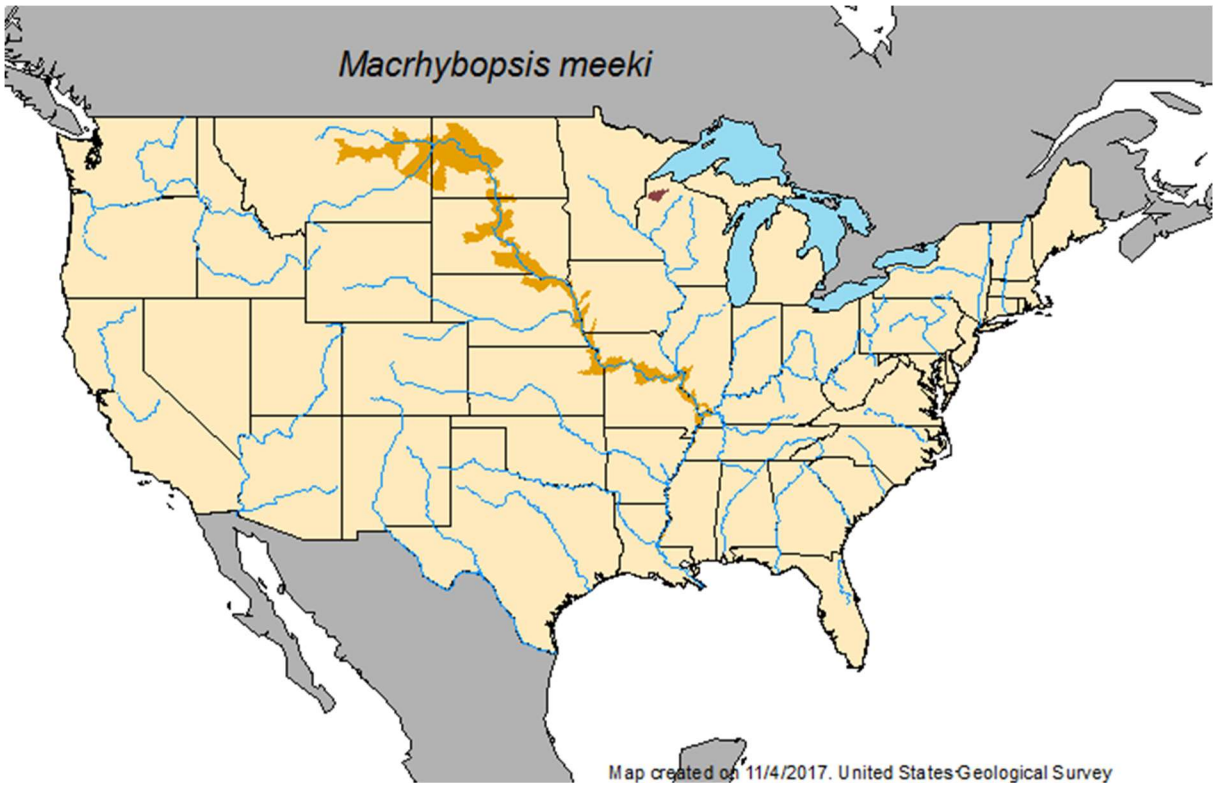


FIG. 7. North American distribution of the Sicklefin Chub, *Macrhybopsis meeki.* Map created by Sheehy (2018) for the U.S. Geological Survey.

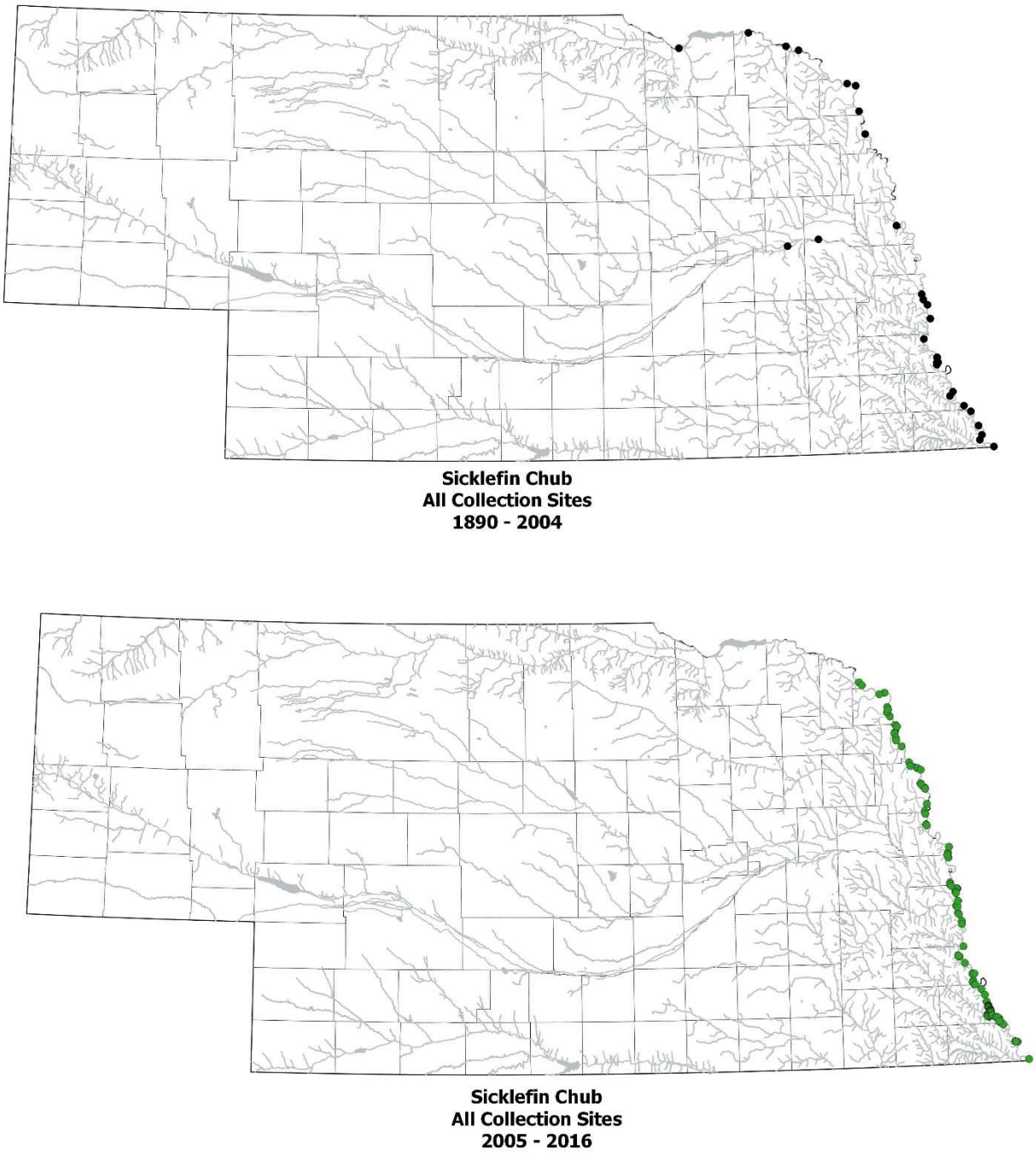


FIG. 8. Recent surveys for fish could not detect Sicklefin Chub in the lower Platte River and they were only rarely collected in the Missouri River from 2005–2016, even though sampling protocol was similar and locations overlapped with historical occurrences.

Habitat Requirements:

Sicklefin Chub depend on deep areas of large, turbid rivers with fast currents. In the upper Missouri and Yellowstone rivers, Sicklefin Chub were most abundant in areas with deeper water, low velocities, and high turbidity (Everett et al. 2004). In Nebraska, they inhabit the bottom of the Missouri River where the substrate is firm sand or gravel (Hrabik et al. 2015c). Specifically, Age-0 Sicklefin Chub use habitats that are relatively slow (mean 0.30 m/sec) and moderately shallow (mean 2.1 m) (GEM, unpubl. data; Fig. 9). Habitat use changes throughout their life and they gradually move into faster and deeper water. As adults, Sicklefin Chub are found in habitats with much higher velocities (mean 0.93 m/sec) and moderate depths (mean 3.1 m). In the channelized Missouri River in Nebraska, the availability of the habitats utilized by the early life stages is limited to a narrow band along each bankline. Much more habitat was available prior to channelization.

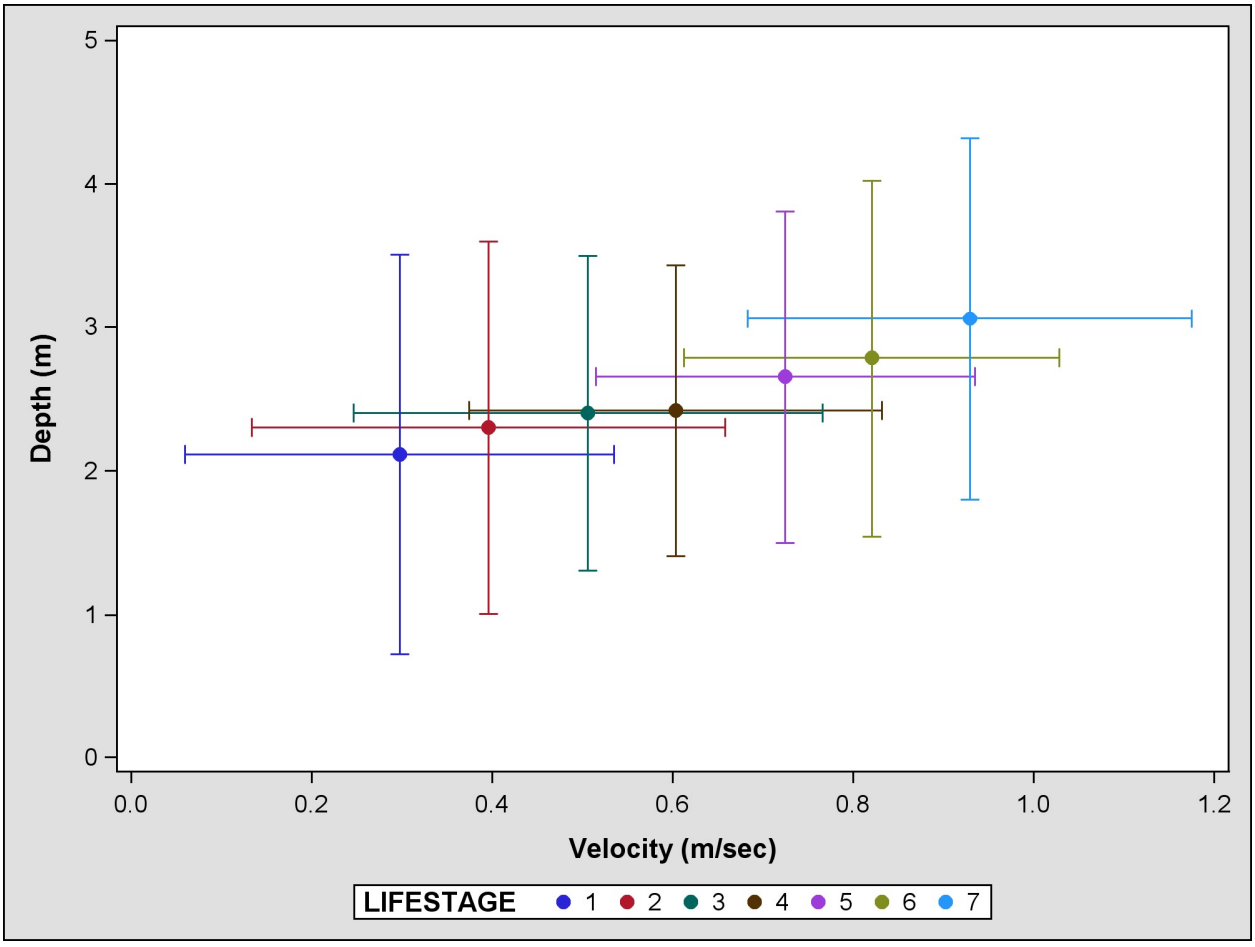


FIG. 9. Sicklefin Chub, *Macrhybopsis meeki*, of seven life stages in the Missouri River use mean depths and velocities with a standard deviation. Life stages are 1) 20–28 mm, 2) 290–36 mm, 3) 37–46 mm, 4) 47–61 mm, 5) 62–79 mm, 6) 80–97 mm, and 7) 98–120 mm.

Reproduction:

Sicklefin Chub can breed at 1 year of age and spawn annually (Lopinot and Smith 1973), but Dieterman et al. (2006) suggest most of the Sicklefin Chub in the Missouri River mature at age 3 and there could potentially be significant post-spawn mortality. Dieterman et al. (2006) and Starks et al. (2016) found that Sicklefin Chub have a protracted spawn that begins in mid-June and peaks in mid-July in the Lower Missouri River when water temperatures are around 21°C. Eggs are semi-buoyant and non-adhesive indicating that the chub are pelagic spawners and have an obligate drift phase during which eggs complete development (Albers and Wildhaber 2017).

Researchers using the developmental time of eggs in the laboratory and average Missouri River current speed have estimated that Sicklefin Chub larvae would need 468–592 km (291–368 mi) of drift distance before they could exit the drift (Albers and Wildhaber 2017). The farthest up-stream an age-0 Sicklefin Chub (<60 mm) has been collected as part of standard sampling by the Commission, was at Gibson Bend (RKM 986.2, Huenemann and Steffensen 2017). More realistically, the farthest upstream that small (<60 mm total length) age-0 Sicklefin Chub have been sampled consistently is Hamburg Bend (River Kilometer 892, 2003–06, 2008–09, 2014–2017; Hall et al. 2017; Steffensen and Huenemann 2017). Several of these specimens were sent for verification and vouchering to Robert (Bob) A. Hrabik (Missouri Department of Conservation – retired ichthyologist; Hall et al. 2017). In addition, extensive sampling by South Dakota Game, Fish, and Parks in the unchannelized Missouri River from Gavins Point Dam to Ponca State Park (RKM 1,207) has yielded few Sicklefin Chub that could serve as a breeding population (Loecker and Kral 2017). If we assume that the farthest upstream that breeding is likely occurring is Ponca State Park (RKM 1.207), the farthest upstream that adult Sicklefin Chub are collected consistently, it appears that a more realistic minimum drift distance is ~315 km.

Abundance and Status:

Based on relative abundance estimates, Nebraska contributes 10–25% of the total population of Sicklefin Chub (D. A. Schumann, pers. comm.; GEM, unpubl. data). Descriptions of population size are very limited because the species' preferred habitat is difficult to sample.

In the last 20 years, the developments of new trawls and trawling techniques have given biologists a standardized gear to more thoroughly sample small bodied benthic fishes, including Sicklefin Chub. Extensive sampling since 2003 indicates that Sicklefin Chub are likely extirpated from that portion of the Missouri River between Lewis and Clark Lake (~RKM 1,344) and Ft. Randall Dam (RKM 1,416; Pierce et al. 2017). In the ~95 km (59 mile) unchannelized reach downstream of Gavins Point Dam (RKM 1,305.1), Sicklefin Chub are captured occasionally but remain rare (Loecker and Kral 2017). Sicklefin Chub are most frequently collected in the channelized reaches along Nebraska's eastern border (Steffensen et al. 2014). Generally, their abundance increases in a downstream order; however, the relative abundance of Sicklefin Chub has continued to decline in the channelized reaches of the Nebraska's Missouri River since 2006. In 1994, Hesse (1994) reported that there had been large declines in the

abundance of all the chub species in the Missouri River over the last 50 years. In Nebraska, Sicklefin Chub have likely declined as much as 50–90% (D. A. Schumann, GEM, unpubl. data).

The Sicklefin Chub is currently recognized as a Tier 1 at-risk species in Nebraska. It is considered to be a species of greatest conservation need (SGCN) in Kansas (Tier 1, state endangered), South Dakota (state endangered), Iowa, and Missouri (U.S. Geological Survey 2017). Kansas has a recovery plan for Sicklefin Chub and two other minnows (Layher 2003). The Sicklefin Chub was petitioned for federal listing under the Endangered Species Act in August 2016.

Factors Affecting the Species:

Section 37-806 (2) of the Nebraska Nongame and Endangered Species Conservation Act states that the Nebraska Game and Parks Commission shall determine whether any species of wildlife or wild plants normally occurring within this state is an endangered or threatened species as a result of any of the five factors described therein. These factors and their application to the Sicklefin Chub are as follows:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range.

Perkin et al. (2015) noted a series of mechanisms that are contributing to the decline of pelagophilic fishes (species that broadcast eggs in the water column) a guild that includes the Sicklefin Chub. These included: disrupted spawning cues (altered stream hydrology), reduced survival of drifting eggs/larvae (fragmented streams), and insufficient habitat complexity (channelization eliminating needed habitats). Multiple authors have noted the negative impacts from channelization and mainstem reservoirs on Sicklefin Chub (Layher 2003, Hrabik et al. 2015c). Fragmentation and altered hydrology has been noted as an important negative impact on pelagic-spawning fishes (Gido et al. 2010, Perkin et al. 2014). The Missouri River in Nebraska has been fragmented by Gavins Point Dam and further impacted by Fort Randall Dam which has isolated populations, created river reaches that are not of sufficient length to allow drifting eggs to mature, and has altered the hydrology of the river impacting habitat formation and drift rates (D. A. Schumann, pers. comm.; GEM, unpubl. data). Channelization downstream of Ponca State Park has eliminated much of the habitat utilized by Sicklefin Chub, especially the slower habitats used by the younger life stages. The high velocities intentionally created during the channelization project to transport sand and maintain a 2.7 m (9 ft) channel may limit the ability of drifting larval Sicklefin Chub to exit the drift and settle into suitable habitats. While currently limited in Nebraska, sand dredging can have a negative impact on habitat for Sicklefin Chub (Collins et al. 1995).

(B) Over-utilization from commercial, sporting, educational, or other purposes.

This is not currently considered to be an impact.

(C) Disease or predation.

Lacustrine species can contribute to high mortality rates of eggs and larvae of Sicklefin Chub (Perkin and Gido 2011).

(D) Inadequacy of existing regulatory mechanisms.

Sicklefin Chub do not currently receive any special protection despite their rarity (Steffensen et al. 2014). The Nebraska Nongame and Endangered Species Conservation Act can offer protection of this species on state and private lands through Section 37-807 involving conservation programs and state agency consultation.

(E) Other natural or human-induced factors affecting its continued existence.

Sicklefin Chub are susceptible to pollution (Collins et al. 1995).

Proposal:

Based on documented declines, habitat loss, and the threats described therein, we believe the species' continued existence in the state of Nebraska is uncertain. Therefore, we recommend the Sicklefin Chub for listing as Endangered under the Nebraska Nongame and Endangered Species Conservation Act (37-801 to 37-811) and will follow all legal requirements (Appendix 2) in pursuit of this status change for the species.

Listing Proposal for the Western Silvery Minnow (*Hybognathus argyritis*)

Species Description:

The Western Silvery Minnow's body is slightly compressed and widest just in front of the dorsal fin (Layher 2003, Hrabik et al. 2015d). Its sides are silvery-colored or yellowish-white and opaque (Cross and Collins 1995). Its lateral line scales are completely pored (Hrabik et al. 2015d). Its thin-lipped mouth is positioned sub-terminally and lacks barbels (Layher 2003, Hrabik et al. 2015d). It is quite similar in appearance to the Plains Minnow (*Hybognathus placitus*) but has slightly larger eyes and a flattened, blade-like bony process at the back of its head (Hrabik et al. 2015d). The intestine is long and coiled (Layher 2003, Hrabik et al. 2015d). It may grow >15 cm long (Hrabik et al. 2015d). Individuals with overlapping characteristics of both the Western Silvery Minnow and the Plains Minnow have been collected (Layher 2003).

Habitat Requirements:

Western Silvery Minnows are known to inhabit backwaters, pools, and slow-moving waters in medium to large rivers (Hrabik et al. 2015d). In the Missouri River, they utilize very slow (mean velocity 0.1 m/sec) and shallow (mean depth 0.5 m) water (GEM, unpubl. data). In Canada, they are reported to prefer shallow waters (<1m) with slower velocities (<0.22 m/s, 0.72 ft/s) (COSEWIC 2008). Rivers they inhabit have fine sandy or silty substrates (Hrabik et al. 2015d). Western Silvery Minnows may school with Plains Minnows (Gould 1985, Hrabik et al. 2015d), Silver Chub (*Macrhybopsis storeriana*), and Flathead Chub (*Platygobio gracilis*) (Layher 2003). In Wyoming, Western Silvery Minnows were only collected from river reaches without impoundments (Quist et al. 2004). Quist et al. 2004 also noted that river reaches without impoundments had significantly higher amounts of fine substrate.

Peters et al. (1989) found that the Western Silvery Minnow had the highest preference for water depths <20 cm and velocities <10 cm/s. However, their largest single collection of the species was in water that was 21 cm deep and had a velocity of 50 cm/s. There was no really strong preference for substrate, with gravel being only slightly higher than silt.

Feeding takes place primarily in calm, shallow backwaters (Cross and Collins 1995). The diet of Western Silvery Minnows consists of plants, detritus, diatoms, fungi, and small invertebrates (Whitaker 1977, Hesse 1994, Hrabik et al. 2015d).

Distribution:

NatureServe (2017) describes the range of the Western Silvery Minnow as including the Missouri River basin, from southern Alberta (Houston 1998) and Montana to Missouri; Mississippi River basin from mouth of Missouri River to mouth of Ohio River; South Saskatchewan River (Hudson Bay basin); and extreme southern Alberta (Page and Burr 2011). They are found most frequently in the Missouri River and large tributaries of the plains (Pflieger 1997) (Fig. 10). In Nebraska, Western Silvery Minnows historically inhabited all of the major river systems in the state except the Blue (Johnson 1942, Jones 1963) (Fig. 11), but today they are most closely associated with the Missouri River system (Hrabik et al. 2015d). Quist et al. (2004) placed the Western Silvery Minnow in the turbid-river guild of fishes.

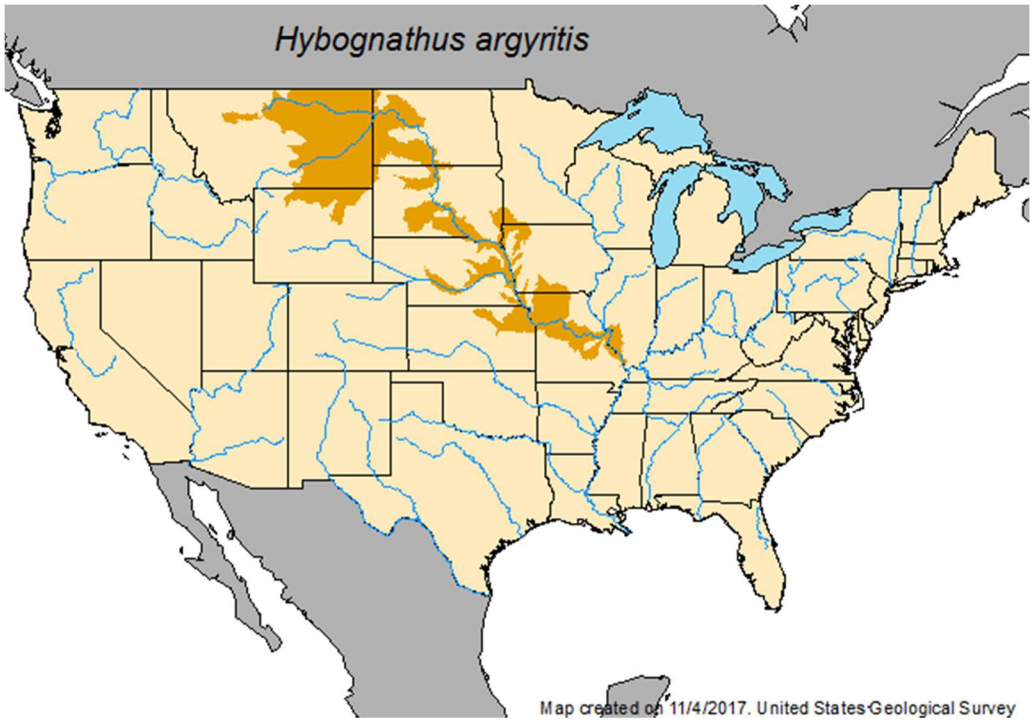
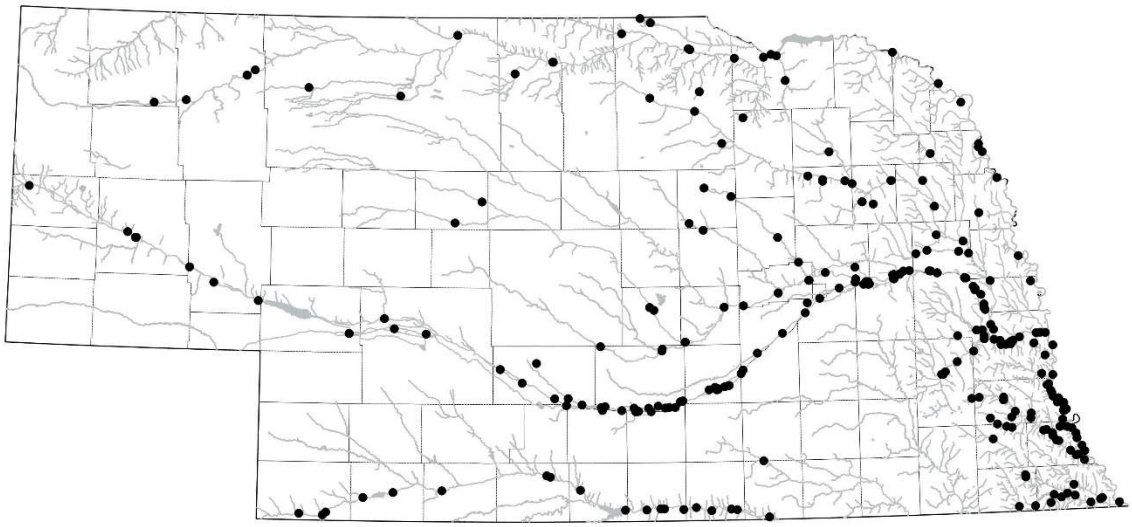


FIG. 10. The range of the Western Silvery Minnow, *Hybognathus argyritis*, in North America is shown. Map created by the U.S. Geological Survey (2018).



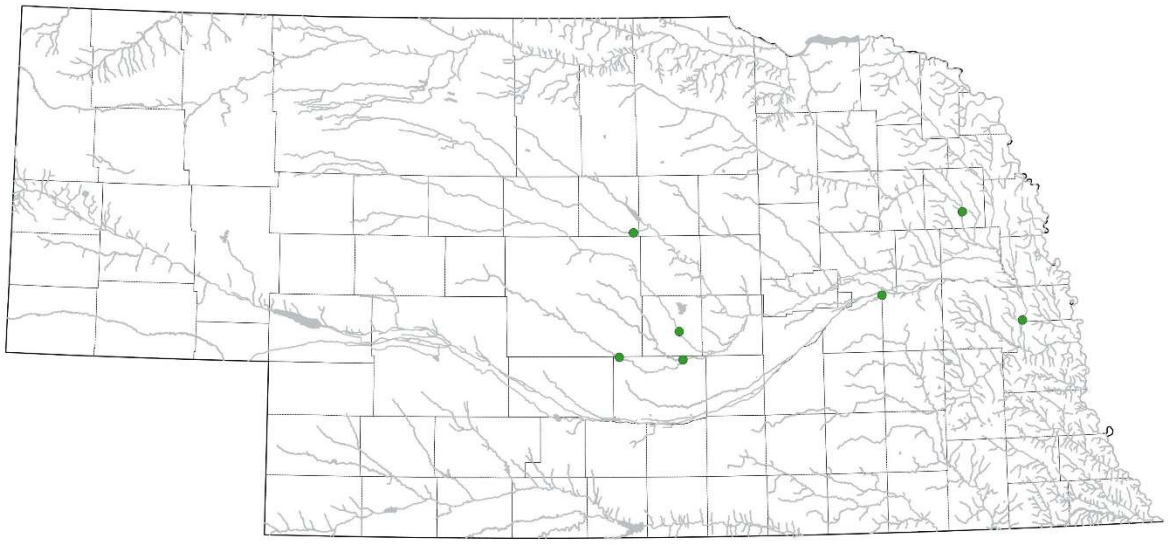


FIG. 11. Recent collections of Western Silvery Minnows (2005–2016) demonstrate that their range in Nebraska has decreased considerably in comparison to where they were found from 1900–2004, even though sampling protocol was similar and locations overlapped with historical occurrences.

Reproduction:

Western Silvery Minnows are sexually mature at 1–2 years of age (Hrabik et al. 2015d). Spawning occurs when water levels rise in the spring and summer (Hrabik et al. 2015d). Females release their non-adhesive eggs where currents are sluggish and the substrate is characterized by silt (Hrabik et al. 2015d). Individuals live ~3 years (Hrabik et al. 2015d). Although the exact nature of the spawning of the Western Silvery Minnow has not been studied, examination of the available literature suggested that the species is probably a pelagic broadcast spawner that produces semibouyant eggs (COSEWIC 2008). If so, Western Silvery Minnows would need long reaches of free-flowing river for their eggs and larvae to develop completely.

Abundance and Status:

Once a common fish of the Missouri River, several authors reported that they were increasing in abundance from 1890–1940 (as reviewed in Hesse 1994). Johnson (1942) found Western Silvery Minnows to be among the most common small-bodied fish species of the stretch of the Missouri River through Nebraska. In 1945, Fisher (1945) reported that they were the third most common species caught in the Missouri River near Peru, Nebraska, making up 16% of the catch. Pflieger and Grace (1987) documented population declines in Western Silvery Minnows of the lower Missouri River after 1940. In the 80s, Western Silvery Minnows represented <1% of the catch during surveys in upper and lower unchannelized reaches of the Missouri River (Hesse 1994). Western Silvery Minnows represented a small portion of the catch during surveys in the lower Platte River (3%, Peters et al. 1989; 0.3% Bazata 1991). Hesse (1994) reported 98% loss in the Missouri River and the species has undergone long-term population and range declines in Nebraska and globally (Hesse 1994). Records show that the population has been declining in most of Nebraska's rivers for >20 years (Hrabik et al. 2015d) and while they were once one of the more abundant species in the Missouri River, only five individuals have been collected from 2003 to 2012 (Fisher 1945, Steffensen et al. 2014).

The global population of Western Silvery Minnows is likely >100,000 (NatureServe 2017). However, based on relative abundance estimates, there are estimated to be <5,000 individuals in Nebraska (unpubl. data, GEM). The Western Silvery Minnow is currently listed as a Tier 2 at-risk species in Nebraska (Schneider et al. 2011) but has been recommended as Tier 1 (i.e., more at-risk of extinction) during a recent expert workshop to address fish species in the state. It is a species of greatest conservation need (SGCN) in the bordering states of Iowa, Missouri, Kansas (Tier 1, state-threatened), and Wyoming (Tier 2) (USGS 2017). In Canada, the Western Silvery Minnow has been listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2007) and is protected under the federal Species at Risk Act (SARA; Species at Risk Public Registry 2016).

Factors Affecting the Species:

Section 37-806 (2) of the Nongame and Endangered Species Conservation Act states that the Nebraska Game and Parks Commission shall determine whether any species of wildlife or

wild plants normally occurring within this state is an endangered or threatened species as a result of any of the five factors described therein. These factors and their application to the Western Silvery Minnow are as follows:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range.

Western Silvery Minnows have undergone drastic declines that can be associated positively with anthropogenic river and stream channel modifications (Hesse et al. 1993, Hesse 1994, Everett et al. 2004, Steffensen et al. 2014). These modifications include fragmentation and channelization that have altered stream temperatures and the natural hydrograph (Steffensen et al. 2014). Loss of dynamic habitat conditions negatively impacted aquatic plants and animals (Hesse et al. 1993, Steffensen et al. 2014). Additionally, stream modifications dislocated the connection of the Missouri River to its historic floodplain, thus disrupting ecological processes of the river (Steffensen et al. 2014).

Western Silvery Minnows have high resource specificity and low adaptability to change (GEM, unpubl. data). In the Missouri River, they are found in very slow and shallow habitats, once common but now nearly absent because of channelization and ongoing loss of fine sediments. They exhibit low demographic and behavioral resilience, and if they undergo local extinction, they likely have <20% probability of recovery through dispersal, re-colonization, and population growth under existing distribution, habitat connectivity, and growth potential.

In Wyoming's tributaries to the Missouri River, Western Silvery Minnows were not found in river reaches with impoundments. Quist et al. (2004) stated that impoundments alter the downstream sediments, reducing fine content and armoring the river bed, and that exotic piscivores introduced into the impoundments enter the river and consume the native cyprinids. Another possibility is that, if the Western Silvery Minnow is a pelagic broadcaster with semi-bouyant eggs, the impoundments break the stream segments too short to support successful reproduction.

(B) Over-utilization from commercial, sporting, educational, or other purposes.

This is not considered to be a significant factor at this time.

(C) Disease or predation.

Because Western Silvery Minnows are adapted to large river systems with sediments, flow regulations that could increase water clarity may lead to increased competition or predation by sight-dependent fish (COSEWIC 2007). Quist et al. (2004) propose that exotic piscivores introduced into the impoundments enter the river and consume the native cyprinids. Flow changes could also impact downstream drift of eggs and young to decrease their viability or increase predation (COSEWIC 2007).

(D) Inadequacy of existing regulatory mechanisms.

Western Silvery Minnows have no protection in Nebraska despite being extremely rare (Steffensen et al. 2014). The Nongame and Endangered Species Conservation Act could offer protection of this species on state and private lands through Section 37-807 involving conservation programs and state agency consultation.

(E) Other natural or human-induced factors affecting its continued existence.

Livestock use of the floodplain can degrade shorelines and negatively impact habitat and water quality for Western Silvery Minnows (COSEWIC 2007). Impoundments and water extractions could have a negative impact as well (COSEWIC 2007).

Proposal:

Based on long-term declines, habitat loss, and the threats described therein, we believe the species' continued existence in the state of Nebraska is uncertain. Therefore, we recommend the Western Silvery Minnow for listing as Endangered under the Nebraska Nongame and Endangered Species Conservation Act (37-801 to 37-811) and will follow all legal requirements (Appendix 2) in pursuit of this status change for the species.

Acknowledgments

The Commission's listing action committee and authors of this proposal would like to thank David Schumann, Postdoctoral Research Associate at Mississippi State University, for his expertise in helping to advise the conservation of the state's fishes. We are grateful to Fisheries Biologists Jerrod Hall and Thad Huenemann for collection of data and providing helpful comments on an earlier version of this manuscript. We thank the biologists and technicians who have contributed data on the status of Nebraska's fishes over the years. We thank George Cunningham for providing comments on mapping efforts. We are grateful to Robert Hrabik, Matthew Wagner, and Mark Pegg for reviewing this proposal.

Literature Cited

Albers, J. L. and M. L. Wildhaber. 2017. Reproductive strategy, spawning induction, spawning temperatures and early life history of captive Sicklefin Chub *Macrhybopsis meeki*. Journal of Fish Biology 91:58–79.

Bazata, K. 1991. Nebraska stream classification study. Nebraska Department of Environmental Quality, Lincoln, Nebraska, USA.

Bestgen, K. R., Crockett, H. J., Haworth M. R., Fitzpatrick, R. M. 2016. Production of nonadhesive eggs by Flathead Chub and implications for downstream transport and conservation. Journal of Fish and Wildlife Management 7:434–443.

Bonner, T. H. and G. R. Wilde. 2000. Changes in the Canadian River fish assemblage associated with reservoir construction. Journal of Freshwater Ecology 15:189–198.

Bonner, T. H. and G. R. Wilde. 2002. Effects of turbidity on prey consumption of prairie stream fishes. Transactions of the American Fisheries Society 131:1203–1208.

Collins, J. T., S. L. Collins, J. Horak, and C. C. Freeman. 1995. An illustrated guide to endangered or threatened species in Kansas. University Press of Kansas, Lawrence, USA.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2008. COSEWIC assessment and update status report on the Western Silvery Minnow *Hybognathus argyritis* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Canada. www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr_western_silvery_minnow_0808_e.pdf (accessed 17 Jan 2018).

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2018. Plains Minnow (*Hybognathus placitus*). Species at Risk Public Registry, Canada. www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1179 (accessed 16 Jan 2018).

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2007. Recovery strategy for the Western Silvery Minnow (*Hypognathus argyritis*) in Canada (proposed). www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=08ABB2C7-1&offset=1&toc=show (accessed 5 Jan 2018).

Cross, F. B. and J. T. Collins. 1995. Fishes in Kansas. Second Edition. University Press of Kansas, Lawrence, Kansas, USA.

Cross, F. B. and R. E. Moss. 1987. Historic changes in fish communities and aquatic habitats in plains streams of Kansas. Pages 155–165 *in* Community and evolutionary ecology of North American stream fishes (W. J. Matthews and D. C. Heins, Editors). University of Oklahoma Press, Norman, Oklahoma, USA.

Cross, E. B., R. E. Moss, and J. T Collins. 1985. Assessment of dewatering impacts on the stream fisheries in the Arkansas and Cimarron rivers. Museum of Natural History, University of Kansas, Lawrence, Kansas, USA. www.nativefishlab.net/library/textpdf/18043.pdf (accessed 19 Dec 2017).

Dieterman, D. J., E. Roberts, P. J. Braaten, and D. L. Galat. 2006. Reproductive development in the Sicklefin Chub, *Macrhybopsis meeki*, in the Missouri River and Yellowstone River USA. Prairie Naturalist 38:113–130.

Dudley, R. K. and S. P. Platania. 2007. Flow regulation and fragmentation imperil pelagic-spawning riverine fishes. Ecological Applications 17:2074–2086.

Durham, B. W. and G. R. Wilde. 2006. Influence of stream discharge on reproductive success of a prairie stream fish assemblage. Transactions of the American Fisheries Society 135:1644–1653.

Durham, B. W. and G. R. Wilde. 2008. Composition and abundance of drifting fish larvae in the Canadian River, Texas. Journal of Freshwater Ecology 23:273–279.

Durham, B. W., G. R. Wilde, and K. L. Pope. 2006. Temperature-caused fish kill in a flowing Great Plains River. Southwestern Naturalist 51:397–401.

Everett, S. R., D. L. Scarnecchia, and L.F. Ryckman. 2004. Distribution and habitat use of Sturgeon Chubs (*Macrhybopsis gelida*) and Sicklefin Chubs (*Macrhybopsis meeki*) in the Missouri and Yellowstone Rivers, North Dakota. Hydrobiologia 527(1):183–193.

Fischer, J. R. and C. P. Paukert. 2008. Historical and current environmental influences on an endemic Great Plains fish. American Midland Naturalist 159:364–377.

Fisher, H. J. 1945. Report on the fisheries survey of the Lower Missouri River, for the period April 8, 1945 to October 31, 1945. Conservation Commission, Division of Fish, Game, and Forests, Fisheries Section, State of Missouri, Jefferson City, USA.

Fisher, S. J., D. W. Willis, M. M. Olson, and S. C. Krentz. 2002. Flathead Chubs, *Platygobio gracilis*, in the upper Missouri River: the biology of a species at risk in an endangered habitat. Canadian Field-Naturalist 116:26–41.

Fuller, P. and M. Neilson. 2018. *Hybognathus placitus* Girard, 1856: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, Florida, USA. https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=545 (access date 12 Jan 2018).

Gido, K. B., W. K. Dodds, and M. E. Eberle. 2010. Retrospective analysis of fish community change during a half-century of landuse and streamflow changes. Journal of the North American Benthological Society 29:970–987.

Gilbert, C. R. 1980. *Hybognathus placitus* Girard, Plains Minnow. Page 178 *in* Atlas of North American freshwater fishes (D. S. Lee, S. P. Platania, G. H. Burgess, Editors). North Carolina State Museum of Natural History, Raleigh, North Carolina, USA.

Gould, W. 1985. Aspects of the biology of the Flathead Chub (*Hybopsis gracilis*) in Montana. Great Basin Naturalist 45:332–336.

Hall, J., D. Pauley, and G. Mestl. 2017. 2016 Annual report, habitat assessment and monitoring program, evaluation of potential interception and rearing habitats for age-0 *Scaphirhynchus* in the main channel of the Missouri River between river miles 691–520. Nebraska Game and Parks Commission, Lincoln, Nebraska, USA.

Hampton, D. R. and C. R. Berry, Jr. 1997. Fishes of the mainstem Cheyenne River in South Dakota. Proceedings of the South Dakota Academy of Science 76:11–25.

Haworth, M. R. 2015. Reproduction and recruitment dynamics of Flathead Chub *Platygobio gracilis* relative to flow and temperature regimes in Fountain Creek, Colorado. Thesis, Colorado State University, Fort Collins, USA.

Hesse, L. W. 1994. The status of Nebraska fishes in the Missouri River, selected chubs and minnows (Cyprinidae): Sicklefin Chub (*M. meeki*), Sturgeon Chub (*M. gelida*), Silver Chub (*M. storeiana*), Speckled Chub (*M. aestivalis*), Flathead Chub (*Platygobio gracilis*), Plains Minnow (*Hybognathus placitus*), amd Western Silver Minnow (*H. argyritis*). Transactions of the Nebraska Academy of Sciences 21:99–108.

Hesse, L. W, G. E. Mestl, and J. W. Robinson. 1993. Status of selected fishes in the Missouri River in Nebraska with recommendations for their recovery *in* Restoration planning for the river of the Mississippi River ecosystem (L. W. Heese et al., Editors). National Biological Survey, Biological Report 19. Washington, D.C., USA.

Hoagstrom, C. W., J. E. Brooks, and S. R. Davenport. 2011. A large-scale conservation perspective considering endemic fishes of the North American plains. Biological Conservation 144:21–34.

Houston, J. 1998. Status of the Western Silvery Minnow, *Hybognathus argyritis*, in Canada. Canadian Field-Naturalist 112:147–153.

Hrabik, R. A., S. C. Schainost, R. H. Stasiak, and E. J. Peters. 2015a. Flathead chub (*Platygobio gracilis*). Pages 251–252 *in* The fishes of Nebraska. Mennonite Press, Inc., Newton, Kansas, USA.

Hrabik, R. A., S. C. Schainost, R. H. Stasiak, and E. J. Peters. 2015b. Plains Minnow (*Hybognathus placitus*). Pages 206–207 *in* The fishes of Nebraska. Mennonite Press, Inc., Newton, Kansas, USA.

Hrabik, R. A., S. C. Schainost, R. H. Stasiak, and E. J. Peters. 2015c. Sicklefin Chub (*Macrhybopsis meeki*). Pages 216–217 *in* The fishes of Nebraska. Mennonite Press, Inc., Newton, Kansas, USA.

Hrabik, R. A., S. C. Schainost, R. H. Stasiak, and E. J. Peters. 2015d. Western Silvery Minnow (*Hybognathus argyritis*). Pages 202–203 *in* The fishes of Nebraska. Mennonite Press, Inc., Newton, Kansas, USA.

Hubbs, C. L. 1927. The related effects of a parasite on a fish. Journal of Parasitology 14(2):75–84.

Huenemann T. W. and K. D. Steffensen. 2017. 2016 annual report Pallid Sturgeon population assessment project and associated fish community monitoring for the Missouri River Segment 8. South Dakota Game, Fish and Parks, Yankton, South Dakota, USA.

Johnson, R. E. 1942. The distribution of Nebraska fishes. Thesis. University of Michigan, Ann Arbor, USA.

Jones, D. J. 1963. A history of Nebraska's fisheries resources. Nebraska Game and Parks Commission Publications 31, Nebraska Game and Parks Commission, Lincoln, Nebraska, USA.

Kansas Fishes Committee. 2014. Kansas Fishes. University Press of Kansas, Lawrence, Kansas, USA.

Layher, W. G. 2003. Kansas recovery plan for three big river fish species: Sicklefin Chub (*Macrhybopsis meeki*), Sturgeon Chub (*Macrhybopsis gelida*), and Western Silvery Minnow (*Hybognathus argyritis*). Prepared for Kansas Department of Wildlife and Parks by Layher BioLogics RTEC, Inc.

Lehtinen, S. F. and J. B. Layzer. 1988. Reproductive cycle of the Plains Minnow, *Hybognathus placitus* (Cyprinidae), in the Cimarron River, Oklahoma. Southwestern Naturalist 33:27–33.

Loecker N. and J. Kral. 2017. 2016 annual report Pallid Sturgeon population assessment project and associated fish community monitoring for the Missouri River Segment 7. South Dakota Game, Fish and Parks, Yankton, South Dakota, USA.

Lopinot, A. C. and P. W. Smith. 1973. Rare and endangered fish of Illinois. Illinois Department of Conservation, Springfield, Illinois, USA.

Martyn, H. A. and J. C. Schmulbach. 1978. Bionomics of the Flathead Chub, *Hybopsis gracilis* (Richardson). Proceedings of the Iowa Academy of Sciences 85:62–65.

Maupin, M. A., J. F. Kenny, S. S. Hutson, J. K. Lovelace, N. L. Barber, and K. S. Linsey. 2010. Estimated Use of Water in the United States in 2010. U.S. Department of the Interior, U.S. Geological Survey, Reston, Virginia, USA.

McPhail, J. D. and C. D. Lindsey. 1970. Freshwater fishes of northwestern Canada and Alaska. Fisheries Research Board of Canada, Bulletin 173. Ottawa, Ontario, Canada.

Missouri Department of Conservation. 2017. Summary information for Minnow, Plains. Missouri Fish and Wildlife Information System. http://mdc7.mdc.mo.gov/applications/mofwis/Mofwis_Summary.aspx?id=0100110 (accessed 18 Dec 2017).

Montana Natural Heritage Program and Montana Fish, Wildlife and Parks. 2018. Flathead Chub - *Platygobio gracilis* in Montana Field Guides. http://fieldguide.mt.gov/speciesDetail.aspx?elcode=AFCJB57010 (accessed 10 Jan 2018).

Moore, G. A. 1950. The cutaneous sense organs of barbeled minnows adapted to life in muddy waters of the Great Plains region. Transactions of the American Microscopical Society 69:69–95.

NatureServe. 2015. *Hybognathus placitus*. The IUCN Red List of Threatened Species 2015: e.T202114A76578578. http://dx.doi.org/10.2305/IUCN.UK.2015-1.RLTS.T202114A76578578.en **(**accessed 12 Jan 2018).

NatureServe. 2017. Western Silvery Minnow (*Hybognathus argyritis*). An online encyclopedia of life (Version 7.1). www.natureserve.org/explorer/index.htm (accessed 3 Jan 2018).

Nebraska Dept. of Natural Resources and Upper Republican Natural Resources District. 2016. Integrated management plan. Nebraska. https://dnr.nebraska.gov/sites/dnr.nebraska.gov/files/doc/water-planning/republican/upper-rep-NRD/20151210_URNRD_FinalIMP.PDF (accessed 11 Apr 2018).

Olund, L. J. and F. B. Cross. 1961. Geographic variation in the North American cyprinid fish, *Hybopsis gracilis*. University of Kansas Publications, Museum of Natural History 13(7): 323–348.

Ostrand, K. G. and G. R. Wilde. 2004. Changes in prairie stream fish assemblages restricted to isolated streambed pools. Transactions of the American Fisheries Society 133:1329–1338.

Ostrand, K. G. and G. R. Wilde. 2001. Temperature, dissolved oxygen and salinity tolerances of five prairie stream fishes and their role in explaining fish assemblage patterns. Transactions of the American Fisheries Society 130:742–749.

Page, L. M. and B. M. Burr. 2011. Peterson field guide to freshwater fishes of North America north of Mexico. Second Edition. Houghton Mifflin Harcourt Publishing, Boston, Massachusetts, USA.

Patton, T. M. and W. A. Hubert. 1993. Reservoirs on a Great Plains stream affect downstream habitat and fish assemblages. Journal of Freshwater Ecology 8:279–286.

Perkin, J. S. and K. B. Gido. 2011. Stream fragmentation thresholds for a reproductive guild of Great Plains fishes. Fisheries 36(8):371–383.

Perkin J. S., K. B. Gido, A. R. Cooper, T. F. Turner, M. J. Osborne, E. R. Johnson, and K. B. Mayes. 2015. Fragmentation and dewatering transform Great Plains stream fish communities. Ecological Monographs 85:73–92.

Perkin, J. S., K. B. Gido, K. H. Costigan, M. D. Daniels, and E. R. Johnson. 2014. Fragmentation and drying ratchet down Great Plains fish diversity. Aquatic Conservation: Marine and Freshwater Ecosystems DOI : 10.1001/aqc.2501

Perkin, J. S., K. B. Gido, J. A. Falke, K. D. Fausch, H. Crockett, E. R. Johnson, and J. Sanderson. 2017. Groundwater declines are linked to changes in Great Plains stream fish assemblages. Proceedings of the National Academy of Sciences of the United States of America 114(28):7373–7378.

Peters, E. J., R. S. Holland, M. A. Callam, and D. L. Bunnell. 1989. Platte River suitability criteria – habitat utilization, preference and suitability index criteria for fish and aquatic invertebrates in the lower Platte River. Nebraska Technical Series, No. 17. Nebraska Game and Parks Commission, Lincoln, Nebraska, USA.

Pflieger, W. L. 1997. The fishes of Missouri. Missouri Department of Conservation, Jefferson City, Missouri, USA.

Pflieger, W. L. and T. B. Grace. 1987. Changes in fish fauna of the lower Missouri River, 1940–1983. Pages 166–181 *in* Community and evolutionary ecology of North American stream fishes (W. J. Matthews and D. C. Heins, Editors). University of Oklahoma Press, Norman, Oklahoma, USA.

Pierce, L. L., D. A. Shuman, D. A. James, and W. L. Stacy. 2017. 2016 annual report Pallid Sturgeon population assessment project and associated fish community monitoring for the Missouri River Segments 5 and 6. U.S. Fish and Wildlife Service, Pierre, South Dakota, USA.

Quist, M. C., W. A. Hubert, and F. J. Rahel. 2004. Relations among habitat characteristics, exotic species and turbid-river cyprinids in the Missouri River drainage of Wyoming. Transactions of the American Fisheries Society 133:727–742.

Rahel, F. J. and L. A. Thel. 2004. Flathead Chub (*Platygobio gracilis*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region, USA. www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5182082.pdf (accessed 14 Dec 2017).

Scarnecchia, D. L., K. Grabestein, and S. Hiebert. 2000. Biology of the Flathead Chub in the lower Yellowstone River, Montana. Intermountain Journal of Science 6:10–17.

Schneider, R., K. Stoner, G. Steinauer, M. Panella, and M. Humpert. 2011. The Nebraska Natural Legacy Project: State Wildlife Action Plan. Second Edition. Nebraska Game and Parks Commission, Lincoln, Nebraska, USA.

Sheehy, G. E. 2018. *Macrhybopsis meeki* (Jordan and Evermann, 1896): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, Florida, USA. https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=2350, (accessed 16 Jan 2018).

Siebert, S., J. Burke, J. M. Faures, K. Frenken, J. Hoogeveen, P. Döll, and F. T. Portmann. 2010. Groundwater use for irrigation – a global inventory. Hydrology and Earth System Sciences 14:1863–1880.

Smith, C. D., J. R. Fischer, and M. C. Quist. 2014. Historical changes in Nebraska's lotic fish assemblages: implications of anthropogenic alterations. American Midland Naturalist 172:160–184.

Smith, J. B. and W. A. Hubert. 1989. Use of a tributary by fishes in a Great Plains river system. Prairie Naturalist 21:27–38.

Species at Risk Public Registry. 2016. Species profile: Western Silvery Minnow. Species at Risk Public Registry Office, Government of Canada, Gatineau, Quebec, Canada. www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=317 (accessed 21 Dec 2017).

Starks, T. A., M. L. Miller, and J. M. Long. 2016. Early life history of three pelagic-spawning minnows *Macrhybopsis* spp. in the lower Missouri River. Journal of Fish Biology 88: 1335–1349.

Steffensen, K. D. and T. W. Huenemann. 2017. 2016 annual report Pallid Sturgeon population assessment project and associated fish community monitoring for the Missouri River Segment 7. South Dakota Game, Fish and Parks, Yankton, South Dakota, USA.

Steffensen, K. D., D. A. Shuman, and S. Stukel. 2014. The status of fishes in the Missouri River, Nebraska: Shoal Chub (*Macrhybopsis hyostoma*), Sturgeon Chub (*M. gelida*), Sicklefin Chub (*M. meeki*), Silver Chub (*M. storeiana*), Flathead Chub (*Platygobio gracilis*), Plains

Minnow (*Hybognathus placitus*), Western Silver Minnow (*H. argyritis*), and Brassy Minnow (*H. hankinsoni*). Transactions of the Nebraska Academy of Sciences 34:49–67.

Taylor, C. M. and R. J. Miller. 1990. Reproductive ecology and population structure of the Plains Minnow, *Hybognathus placitus* (Pisces: Cyprinidae), in Central Oklahoma. American Midland Naturalist 123:32–39.

Taylor, C. M., M. R. Winston, and W. J. Matthews. 1996. Temporal variation in tributary and mainstem fish assemblages in a Great Plains stream system. Copeia 1996:280–289.

Urbanczyk, A. C. 2012. Reproductive ecology of the Plains Minnow *Hybognathus placitus* in the Brazos River, Texas. Thesis. Texas Tech University, Lubbock, Texas, USA.

U.S. Environmental Protection Agency (U.S. EPA). 1994. Quality assurance project plan for measuring the health of the fisheries in EPA Region VII, Region VII R-EMAP study. U.S. Environmental Protection Agency, Region VII. Kansas City, Kansas.

U. S. Geological Survey (USGS). 2017. A national look at species of greatest conservation need as reported in state wildlife action plans. USGS, Core Science Analytics, Synthesis, and Libraries. www1.usgs.gov/csas/swap/ (accessed 21 Dec 2017).

U.S. Geological Survey (USGS). 2018. *Hybognathus argyritis* (Girard, 1856): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, Florida, USA. https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=3199 (accessed 17 Jan 2018).

Walters, D. M., R. E. Zuellig, H. J. Crockett, J. F. Bruce, P. M. Lukacs, and R. M. Fitzpatrick. 2014. Barriers impede upstream spawning migration of Flathead Chub. Transactions of the American Fisheries Society 143:17–25.

Whitaker, J. O. 1977. Seasonal changes in food habits of some cyprinid fishes from the White River at Petersburg, Indiana. American Midland Naturalist 90:411–418.

Winston, M. R. and C. M. Taylor. 1991. Upstream extirpation of four minnow species due to damming of a prairie stream. Transactions of the American Fisheries Society 120:98–105.

APPENDIX 1.

Nebraska Game and Parks Commission staff members formed the Listing Action Committee to evaluate information for all species being considered for listing action during this review.

Committee Member	Division
Melissa Panella (Chair)	Wildlife
Carey Grell	Planning and Programming
Rick Holland	Fisheries
Michelle Koch	Planning and Programming
Rick Schneider	Wildlife
Kristal Stoner	Wildlife

APPENDIX 2.

Nebraska Statute 37-806 outlines the legal requirements of endangered or threatened listing action.

37-806. Endangered or threatened species; how determined; commission; powers and duties; unlawful acts; exceptions; local law, regulation, or ordinance; effect.

(1) Any species of wildlife or wild plants determined to be an endangered species pursuant to the Endangered Species Act shall be an endangered species under the Nongame and Endangered Species Conservation Act, and any species of wildlife or wild plants determined to be a threatened species pursuant to the Endangered Species Act shall be a threatened species under the Nongame and Endangered Species Conservation Act. The commission may determine that any such threatened species is an endangered species throughout all or any portion of the range of such species within this state.

(2) In addition to the species determined to be endangered or threatened pursuant to the Endangered Species Act, the commission shall by regulation determine whether any species of wildlife or wild plants normally occurring within this state is an endangered or threatened species as a result of any of the following factors:

(a) The present or threatened destruction, modification, or curtailment of its habitat or range;

(b) Overutilization for commercial, sporting, scientific, educational, or other purposes;

(c) Disease or predation;

(d) The inadequacy of existing regulatory mechanisms; or

(e) Other natural or manmade factors affecting its continued existence within this state.

(3)(a) The commission shall make determinations required by subsection (2) of this section on the basis of the best scientific, commercial, and other data available to the commission.

(b) Except with respect to species of wildlife or wild plants determined to be endangered or threatened species under subsection (1) of this section, the commission may not add a species to nor remove a species from any list published pursuant to subsection (5) of this section unless the commission has first:

(i) Provided public notice of such proposed action by publication in a newspaper of general circulation in each county in that portion of the subject species' range in which it is endangered or threatened or, if the subject species' range extends over more than five counties, in a newspaper of statewide circulation distributed in the county;

(ii) Provided notice of such proposed action to and allowed comment from the Department of Agriculture, the Department of Environmental Quality, and the Department of Natural Resources;

(iii) Provided notice of such proposed action to and allowed comment from each natural resources district and public power district located in that portion of the subject species' range in which it is endangered or threatened;

(iv) Notified the Governor of any state sharing a common border with this state, in which the subject species is known to occur, that such action is being proposed;

(v) Allowed at least sixty days following publication for comment from the public and other interested parties;

(vi) Held at least one public hearing on such proposed action in each game and parks commissioner district of the subject species' range in which it is endangered or threatened;

(vii) Submitted the scientific, commercial, and other data which is the basis of the proposed action to scientists or experts outside and independent of the commission for peer review of the data and conclusions. If the commission submits the data to a state or federal fish and wildlife agency for peer review, the commission shall also submit the data to scientists or experts not affiliated with such an agency for review. For purposes of this section, state fish and wildlife agency does not include a postsecondary educational institution; and

(viii) For species proposed to be added under this subsection but not for species proposed to be removed under this subsection, developed an outline of the potential impacts, requirements, or regulations that may be placed on private landowners, or other persons who hold state-recognized property rights on behalf of themselves or others, as a result of the listing of the species or the development of a proposed program for the conservation of the species as required in subsection (1) of section 37-807.

The inadvertent failure to provide notice as required by subdivision (3)(b) of this section shall not prohibit the listing of a species and shall not be deemed to be a violation of the Administrative Procedure Act or the Nongame and Endangered Species Conservation Act.

(c) When the commission is proposing to add or remove a species under this subsection, public notice under subdivision (3)(b)(i) of this section shall include, but not be limited to, (i) the species proposed to be listed and a description of that portion of its range in which the species is endangered or threatened, (ii) a declaration that the commission submitted the data which is the basis for the listing for peer review and developed an outline if required

under subdivision (b)(viii) of this subsection, and (iii) a declaration of the availability of the peer review, including an explanation of any changes or modifications the commission has made to its proposal as a result of the peer review, and the outline required under subdivision (b)(viii) of this subsection, if applicable, for public examination.

(d) In cases when the commission determines that an emergency situation exists involving the continued existence of such species as a viable component of the wild fauna or flora of the state, the commission may add species to such lists after having first published a public notice that such an emergency situation exists together with a summary of facts which support such determination.

(4) In determining whether any species of wildlife or wild plants is an endangered or threatened species, the commission shall take into consideration those actions being carried out by the federal government, by other states, by other agencies of this state or political subdivisions thereof, or by any other person which may affect the species under consideration.

(5) The commission shall issue regulations containing a list of all species of wildlife and wild plants normally occurring within this state which it determines, in accordance with subsections (1) through (4) of this section, to be endangered or threatened species and a list of all such species. Each list shall refer to the species contained therein by scientific and common name or names, if any, and shall specify with respect to each such species over what portion of its range it is endangered or threatened.

(6) Except with respect to species of wildlife or wild plants determined to be endangered or threatened pursuant to the Endangered Species Act, the commission shall, upon the petition of an interested person, conduct a review of any listed or unlisted species proposed to be removed from or added to the lists published pursuant to subsection (5) of this section, but only if the commission publishes a public notice that such person has presented substantial evidence which warrants such a review.

(7) Whenever any species of wildlife or wild plants is listed as a threatened species pursuant to subsection (5) of this section, the commission shall issue such regulations as are necessary to provide for the conservation of such species. The commission may prohibit, with respect to any threatened species of wildlife or wild plants, any act prohibited under subsection (8) or (9) of this section.

(8) With respect to any endangered species of wildlife, it shall be unlawful, except as provided in subsection (7) of this section, for any person subject to the jurisdiction of this state to:

(a) Export any such species from this state;

(b) Take any such species within this state;

(c) Possess, process, sell or offer for sale, deliver, carry, transport, or ship, by any means whatsoever except as a common or contract motor carrier under the jurisdiction of the Public Service Commission or the Interstate Commerce Commission, any such species; or

(d) Violate any regulation pertaining to the conservation of such species or to any threatened species of wildlife listed pursuant to this section and promulgated by the commission pursuant to the Nongame and Endangered Species Conservation Act.

(9) With respect to any endangered species of wild plants, it shall be unlawful, except as provided in subsection (7) of this section, for any person subject to the jurisdiction of this state to:

(a) Export any such species from this state;

(b) Possess, process, sell or offer for sale, deliver, carry, transport, or ship, by any means whatsoever, any such species; or

(c) Violate any regulation pertaining to such species or to any threatened species of wild plants listed pursuant to this section and promulgated by the commission pursuant to the act.

(10) Any endangered species of wildlife or wild plants which enters this state from another state or from a point outside the territorial limits of the United States and which is being transported to a point within or beyond this state may be so entered and transported without restriction in accordance with the terms of any federal permit or permit issued under the laws or regulations of another state.

(11) The commission may permit any act otherwise prohibited by subsection (8) of this section for scientific purposes or to enhance the propagation or survival of the affected species.

(12) Any law, regulation, or ordinance of any political subdivision of this state which applies with respect to the taking, importation, exportation, possession, sale or offer for sale, processing, delivery, carrying, transportation other than under the jurisdiction of the Public Service Commission, or shipment of species determined to be endangered or threatened species pursuant to the Nongame and Endangered Species Conservation Act shall be void to the extent that it may effectively (a) permit that which is prohibited by the act or by any regulation which implements the act or (b) prohibit that which is authorized pursuant to an exemption or permit provided for in the act or in any regulation which implements the act. The Nongame and Endangered Species Conservation Act shall not otherwise be construed to void any law, regulation, or ordinance of any political subdivision of this state which is intended to conserve wildlife or wild plants.

Source:Laws 1975, LB 145, § 5; R.S.1943, (1993), § 37-434; Laws 1998, LB 922, § 356; Laws 2002, LB 1003, § 33.

Cross References Administrative Procedure Act, see section 84-920.