Threatened and Endangered Species Listing/Delisting Recommendations

January 2020
Listing Action Recommendations

Summary.—The Nebraska Game and Parks Commission has the statutory responsibility of administering Nebraska's Nongame and Endangered Species Conservation Act. One of the Commission’s duties under the Act is to determine which species are endangered or threatened in the state. According to Nebraska Revised Statute § 37-806, determinations regarding endangered and threatened species shall be made on the basis of the best scientific, commercial, and other data available to the Commission. Revisions to the list of endangered and threatened species were last completed in 2000, and since then much new information was gained regarding the abundance, distribution, and imperilment status of rare species.

A detailed process was followed in order to meet requirements under Nebraska law to add or remove a species from the state endangered and threatened lists by including notice to the public, state departments, Natural Resource Districts and Public Power Districts, and the Governor; allowing at least 60 days for comment; holding at least one public hearing on such proposed action in each commissioner district of the subject species' range; submitting data to scientists outside of the Commission; and developing an outline of potential impacts of listing new species. All proposals were sent to scientists outside and independent of the Commission for peer review. All substantive comments from peer reviews were addressed. The public and other interested parties also had the opportunity to submit comments to the Commission via e-mail, phone, or letter.

During this process, seven species were initially proposed for listing action. North American River Otter was proposed for delisting. McCown’s Longspur, Timber Rattlesnake, Sicklefin Chub, Flathead Chub, Western Silvery Minnow, and Plains Minnow were proposed for listing. To allow for the opportunity to collect additional information, refine species’ distribution maps, and work with interested parties to address items of concern, listing is not recommended for Flathead Chub, Western Silvery Minnow, and Plains Minnow at this time.

North American River Otter (*Lontra canadensis*) is recommended to be removed from the list of threatened species. The conservation and repatriation of the river otter to its native rivers in Nebraska has led to the species’ recovery. Data collected over recent decades clearly demonstrate a healthy, reproductively viable, and successfully expanding population of river otters in Nebraska.

McCown’s Longspur (*Rhynchophanes mccownii*) is being recommended for listing as threatened because of changes to its habitat. McCown’s Longspurs have always been part of Nebraska’s ornithological landscape with records since the time of settlement by Europeans, but based on well-documented broad, long-term declines, continued habitat loss, and exposure to multiple threats (like pesticides and predation), it is believed that the species’ continued existence in the state of Nebraska is uncertain.
Timber Rattlesnake (*Crotalus horridus*) is recommended for listing as threatened. The consensus among researchers is that the distribution of Timber Rattlesnakes is shrinking everywhere they occur. Based on population declines, habitat loss, and multiple threat factors, the species’ continued existence in the state of Nebraska is uncertain.

Sicklefin Chub (*Macrhybopsis meeki*) is recommended for listing as endangered. As the lower Missouri River remains highly altered with minimal activities to mitigate these anthropogenic modifications, the likelihood of this native fish species recovering without additional protection appears bleak. Based on its documented declines, habitat loss, and exposure to threats, the Sicklefin Chub is recommended for listing in order to avoid its extirpation from Nebraska.
Listing Proposal
for
McCown’s Longspur (Rhynchophanes mccownii)
in Nebraska

Prepared by Melissa J. Panella and Joel G. Jorgensen
Nebraska Game and Parks Commission
Lincoln, Nebraska
April 2018
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 threatened 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). Wildlife Division staff concluded McCown’s Longspur (Rhynchophanes mccownii) has experienced significant, well-documented declines in abundance in Nebraska and throughout its range and should be placed on the state list.

Species Description:

McCown’s Longspurs are medium-sized birds in the Order Passeriformes, Family Calcariidae. The average size of McCown’s Longspur is 15 cm (6 in) long with wing spans of 28 cm (11 in), and body mass of 23 g (0.8 oz). Both male and female longspurs have white outer tail feathers with dark central feathers forming an inverted T-shape. The plumage of breeding males is streaked above, with black crown, whitish face, black whisker markings below the eye, gray rump, chestnut wing bar, and black band across the upper breast. The females and winter males are duller in color and more streaked; males may maintain a vestige of the black breast band. It has a large conical bill which is stouter than other longspurs.

Habitat Requirements:

McCown’s Longspurs are a species of the western Great Plains of North America. In Nebraska, McCown’s Longspurs occur in the wide expanses of high-plains shortgrass prairie located west
of the Sandhills in the Panhandle (Sharpe et al. 2001). They are typically found in sparse shortgrass prairies, plowed and stubble agricultural fields, and other areas with little vegetative litter or bare ground (Felske 1971, Sharpe et al. 2001, Dechant et al. 2002). Breeding habitat is generally dry, shortgrass plains. Rosche (1982) reported that longspurs nest in light to moderately grazed native shortgrass prairie, frequently at prairie dog colonies. McCown’s Longspurs apparently avoided using agricultural fields until recently (DuBois 1935, Mickey 1943, Dechant et al. 2002). The first report of their nesting in agricultural fields in Nebraska was in 2007 when 21 nests were found in Kimball County (Snyder and Bly 2009). It is possible that agricultural fields were providing breeding habitat prior to 2007, but there are no known records to determine this with certainty. Change in habitat use may be the result of loss of native shortgrass prairie, agricultural conversion, and habitat fragmentation. Territory size requirements vary by region and habitat quality, with a range of 0.5–1.5 ha (Dechant et al. 2002). McCown’s Longspurs feed primarily on insects (e.g., grasshoppers, beetles, and moths) and other arthropods in the summer and seeds from grasses and forbs in fall and winter (With 2010).

Figure 1. Sparse shortgrass prairie is the nesting habitat of McCown’s Longspurs. The ecosystem supports many species of native wildlife such as this mother American badger (*Taxidea taxus*) carrying her baby. This photo was captured by JGJ during a trip to see longspurs, which he was unable to photograph that day, in the same area.
Distribution and Temporal Occurrence:

McCown’s Longspurs are migratory; the species’ breeding and wintering range is entirely within North America (Fig. 2, With 2010). The southern limit of the breeding range is in east-central Colorado (Colorado Bird Atlas Partnership 2016), and the northern limit extends into the Canadian provinces of Saskatchewan and Alberta (With 2010). McCown’s Longspurs winter in the southwestern U.S., primarily west Texas, Oklahoma, and New Mexico, and northwestern Mexico (Mickey 1943, Krause 1968), ranging into the grasslands of the Chihuahuan Desert (Partners in Flight 2016).

McCown’s Longspurs have always been part of the ornithological landscape with records since the time of settlement by Europeans. Bruner et al. (1904) considered the species to be an uncommon migrant and noted its breeding occurred in Sioux County. The McCown’s Longspur’s distribution within Nebraska is limited currently to the westernmost parts of the state (Figs. 2–3). It is a common spring and fall migrant in the western Panhandle and breeds locally within two areas, the southwestern Panhandle including most of Kimball, southern Banner, and western Cheyenne counties and the prairies of central and southern Sioux County (Rosche 1982, Sharpe et al. 2001, Johnsgard 2013). Within Nebraska, as in nearby Wyoming (Faulkner 2010), McCown’s Longspurs nest in localized areas likely because of the patchy distribution of suitable habitat (Rosche 1982, Sharpe et al. 2001). Rosche (1982) noted the eastern edge of the breeding range expands eastward during dry years and retreats westward during wet years.

Sharpe et al. (2001) reported that migrants are common in the Panhandle but casual elsewhere in Nebraska. Spring migrants arrive typically in April but sometimes as early as March (Sharpe et al. 2001). Fall departure occurs normally in late October, sometimes November (Sharpe et al. 2001). Occurrence of McCown’s Longspurs during winter in Nebraska is hypothetical; there are reports of them wintering in the state prior to 1974, but these reports are undocumented and are likely errors (Sharpe et al. 2001). There are no data on individual distances traversed during migration (With 2010).

Reproduction:

McCown’s Longspurs likely begin breeding at 1 year of age (With 2010). Breeding occurs mid-March to mid-August (With 2010), but individuals may remain on breeding grounds as late as October to November (Johnsgard 1980). Nests are most often located on top of hills and buttes where males sing and perform courtship displays (With 2010, Mollhoff 2016).

The female lays 2–5 pale green eggs with dark brown and black spots in a grass-lined hollow or scrape on open ground (With 2010). Nests are sometimes associated with dung from cattle (With and Webb 1993) or horses (DuBois 1935) but usually associated with bunch grasses, some shrubs, or cacti (With 2010). The female incubates 12 days (DuBois 1937, Mickey 1943);
she alone is responsible for all the incubation (With 2010). Both parents then tend young that leave the nest after 10 days and can fly 12 days after hatching (DuBois 1923). McCown’s Longspurs frequently produce two broods in a single nesting season, but this may be limited by the energy reserves of the female (Felske 1971, With 2010). Subsequent or replacement nests within individual territories may be located an average of 30.4 m from the first nest (With 2010). Brood parasitism by Brown-headed Cowbirds (Molothrus ater) can occur, but it is unclear if this has a significant effect on populations of McCown’s Longspurs (Friedmann 1963, Maher 1973, Dechant et al. 2002).

Pairs may nest in close proximity to each other (Mickey 1943, Felske 1971). Felske (1971) reported that territory size varied from 5,000–10,000 m², with the smallest territories located on the steepest inclines and competition occurring for the better nesting sites. Greer and Anderson (1989) suggested a small territory size when McCown’s Longspurs are in uncrowded habitat with plentiful food resources. While McCown’s Longspurs may find a patch of habitat sufficient for nesting attempts, the lower territory size limits where number of nest failures begins to increase is unknown (Dechant et al. 2002).

In Nebraska, Snyder and Bly (2009) observed nesting McCown’s Longspurs in fallow agricultural fields in Kimball County in 2007 when 21 nests were located during surveys for Mountain Plovers. These observations suggest that McCown’s Longspurs are more flexible in their habitat use than previously believed. However, it is unknown if nesting in agricultural fields occurs regularly, if the observations in 2007 are unique, or if agricultural habitats can serve as a suitable substitute to natural grassland habitats. It seems that McCown’s Longspurs are attempting to accommodate the changes in their grassland nesting habitat, which has been greatly reduced.

**Abundance and Status:**

The McCown’s Longspur is considered a species of significant conservation concern because of its relatively small range and well-documented broad, long-term population declines. The species’ breeding range has been substantially reduced (Bent 1968, Krause 1968) and numbers of individuals have declined precipitously (With 2010). It is listed as a Tier 1 at-risk species in Nebraska (Schneider et al. 2011) and as a species of greatest conservation need (SGCN) in the bordering states of Kansas (Tier 2), Colorado (Tier 2), and Wyoming (Tier 2). It is recognized as a U.S. Fish and Wildlife Service Bird of Conservation Concern and a U.S. Forest Service Sensitive Species.

According to eBird data, citizen scientists only detected McCown’s Longspurs at 46 locations in Nebraska over the last 10 Years (Sullivan et al. 2009). Under those same reports, birders usually only detected one or a few McCown’s Longspurs at a time, but a high of 65 individuals was reported just south of Kimball on 1 May 2016 (Sullivan et al. 2009).
The Nebraska Breeding Bird Atlas reported 5 confirmed, 4 probable nesting McCown’s Longspurs in 9 blocks (9 square-miles each) surveyed from 1984–1989 (Mollhoff 2001). In the Second Nebraska Breeding Bird Atlas, citizen scientists only reported 1 confirmed, 3 probable, and 3 possible nesting McCown’s Longspurs in 7 survey blocks over the data collection period (Mollhoff 2016). Reports of McCown’s Longspurs using upland shortgrass prairie exhibited a decline from 2% \( (n = 9\) reports\) to 1% \( (n = 6\) reports; Mollhoff 2016).

North American Breeding Bird Survey trend analysis for the McCown’s Longspur shows sharp annual declines of -5.9% (95% credibility intervals; -9.06, -2.83) survey-wide during the period 1966–2015 (Table 1; Sauer et al. 2017). The species is listed on the Partners in Flight Watch List with up to a 94% decline range-wide (appendix A: species assessment information; Partners in Flight 2016). Twelve percent of the entire breeding population of McCown’s Longspurs are found in Bird Conservation Region (BCR) 18 (Shortgrass Prairie; RMBO 2005) which spans the Panhandle of Nebraska. In BCR 18, McCown’s Longspurs have exhibited declines in both breeding and non-breeding numbers (RMBO 2005).

Partners in Flight estimates the global population of the McCown’s Longspur to be 950,000 individuals (Partners in Flight 2016). Nebraska’s population has been estimated to be ~5,000 individuals, although this is an estimation based on the available data (JGJ). The range of McCown’s Longspurs in Nebraska is consequential and an important component of the species’ population.
Figure 2. Range-wide distribution of the McCown’s Longspur. The portion of the species’ range within Nebraska includes migratory and breeding habitat. Map from With 2010.

Figure 3. Range of the McCown’s Longspur in Nebraska. Red shaded areas indicate breeding range and yellow shaded areas show where the species is observed during migration. Map from Silcock and Jorgensen (2018).
TABLE 1. Trend estimates (interval-specific estimates of population change) for the McCown’s Longspur from the North American Breeding Bird Survey (1966–2015). The sample size for shortgrass prairie is limited; however, the data clearly show an overall decline for the species survey-wide on a total of 117 routes (Sauer et al. 2017).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Rockies</td>
<td>20</td>
<td>-2.68</td>
<td>(-6.80, 1.65)</td>
</tr>
<tr>
<td>Prairie Potholes</td>
<td>69</td>
<td>-7.06</td>
<td>(-10.44, -3.48)</td>
</tr>
<tr>
<td>Badlands and Prairies</td>
<td>20</td>
<td>-1.00</td>
<td>(-5.43, 3.31)</td>
</tr>
<tr>
<td>Shortgrass Prairie</td>
<td>8</td>
<td>1.36</td>
<td>(-3.32, 6.26)</td>
</tr>
<tr>
<td>Alberta</td>
<td>31</td>
<td>-7.90</td>
<td>(-10.90, -5.11)</td>
</tr>
<tr>
<td>Colorado</td>
<td>8</td>
<td>1.36</td>
<td>(-3.32, 6.26)</td>
</tr>
<tr>
<td>Montana</td>
<td>24</td>
<td>-1.35</td>
<td>(-4.63, 1.78)</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>25</td>
<td>-7.99</td>
<td>(-12.05, -3.04)</td>
</tr>
<tr>
<td>Wyoming</td>
<td>29</td>
<td>-0.18</td>
<td>(-4.57, 4.38)</td>
</tr>
<tr>
<td>Central BBS Region</td>
<td>97</td>
<td>-6.11</td>
<td>(-9.32, -2.88)</td>
</tr>
<tr>
<td>Western BBS Region</td>
<td>20</td>
<td>-2.68</td>
<td>(-6.80, 1.65)</td>
</tr>
<tr>
<td>Canada</td>
<td>56</td>
<td>-8.00</td>
<td>(-11.57, -4.06)</td>
</tr>
<tr>
<td>United States</td>
<td>61</td>
<td>-0.73</td>
<td>(-3.29, 1.75)</td>
</tr>
<tr>
<td>Survey-wide</td>
<td>117</td>
<td>-5.90</td>
<td>(-9.06, -2.83)</td>
</tr>
</tbody>
</table>

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 McCown’s Longspurs are as follows:

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

Populations of McCown’s Longspurs have exhibited drastic declines in northern and migratory parts of their range (NatureServe 2016). Their breeding habitat has become fragmented as the landscape has been converted from grassland to other uses (Schneider et al. 2011). Loss of native shortgrass prairie has been detrimental to the wintering range of McCown’s Longspur as well (Sedgwick 2004). Management practices that maintain higher vegetation structure create conditions unsuitable for McCown’s Longspurs (Schneider et al. 2011). The elimination of colonies of black-tailed prairie dogs (Cynomys ludovicianus) negatively impacts habitat for McCown’s Longspurs (Schneider et al. 2011).
The infrastructure required for oil, gas, and wind developments can fragment wildlife habitat and affect many species. The Commission provides environmental review and guidance documents to reduce negative impacts on wildlife (Nebraska Game and Parks Commission 2017). Few studies have investigated potential negative effects of energy development on McCown’s Longspurs (Mahoney and Chalfoun 2016), so it is worthwhile to minimize these types of disturbances on this Tier I species (Sedgwick 2004). It is estimated that 82% of avian fatalities at wind turbines, excluding those in California, are of migratory passerines (Erickson et al. 2002). Development may also alter predator communities; for example, utility structures may provide perching sites for avian predators and lead to increased predation on McCown’s Longspurs (Committee on the Status of Endangered Wildlife in Canada 2016).

(B) **Over-utilization from commercial, sporting, educational, or other purposes.**
Not currently a threat.

(C) **Disease or predation.**

High predation rates appear to limit populations of McCown’s Longspurs (Greer and Anderson 1989). Development and fragmentation of shortgrass prairie can alter predator communities that can negatively impact McCown’s Longspurs. Their predators include thirteen-lined ground squirrels (*Spermophilus tridecemlineatus*), Short-eared Owls (*Asio flammeus*), Swainson’s Hawks (*Buteo swainsoni*), and Loggerhead Shrikes (*Lanius ludovicianus*) (Dubois 1937, With 1994, Sedgwick 2004). Other likely predator species in Nebraska include the American badger (*Taxidea taxus*), Wyoming ground squirrel (*S. elegans*), striped skunk (*Mephitis mephitis*), red fox (*Vulpes vulpes*), swift fox (*V. velox*), coyote (*Canis latrans*), long-tailed weasel (*Mustela frenata*), deer mouse (*Peromyscus maniculatus*), American Crow (*Corvus brachyrhynchos*), and snakes (Dubois 1937, Mickey 1943, Felske 1971, Greer and Anderson 1989, With 1994, Sedgwick 2004). Blancher (2013) estimates that predation from free-roaming cats is a serious threat to longspurs. Nestlings are much more susceptible to predation than adults during the breeding season (Felske 1971).

(D) **Inadequacy of existing regulatory mechanisms.**

The federal Migratory Bird Treaty Act (MBTA) of 1918 makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulation. McCown’s Longspurs and their nests are also afforded similar protections from state laws (e.g., Neb. Rev. Stat. § 37-540). However, these protections only apply to birds, nests, and their; they do not protect habitat. Habitat loss is a significant reason for the decline in populations of McCown’s Longspurs across their range. If a species is placed on Nebraska’s list, the Nongame and Endangered Species Conservation Act
would offer additional protection 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.

Ground-nesting McCown’s Longspurs may suffer from reductions in clutch size early in the breeding season (late Apr to early May) because of low temperatures and moisture levels in the environment. The ground may become saturated and egg temperatures can drop too low to maintain embryonic development (With 2010). Overuse of pesticides may increase mortality of McCown’s Longspurs through ingestion and may limit availability of insect prey such as grasshoppers (Dechant et al. 2002).

Proposal:

Based on long-term declines, continued habitat loss, and the threats described therein, we believe the species’ continued existence in the state of Nebraska is uncertain. Therefore, we recommend the McCown’s Longspur 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.

Acknowledgments

The authors of this proposal are grateful to Mary Bomberger Brown and Wayne Mollhoff for providing thorough reviews. Their comments greatly improved an earlier version of this document.
Literature Cited


Bruner, L., R. H. Wolcott, and M. H. Swenk. 1904. McCown’s Longspur. Page 85 in A preliminary review of the birds of Nebraska with synopsis. Klopp and Bartlett, Omaha, Nebraska, USA.


Felske, B. E. 1971. The population dynamics and productivity of McCown’s Longspur at Matador, Saskatchewan. Thesis. University of Saskatchewan, Saskatoon, Saskatchewan, Canada.


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.

<table>
<thead>
<tr>
<th>Committee Member</th>
<th>Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melissa Panella (Chair)</td>
<td>Wildlife</td>
</tr>
<tr>
<td>Carey Grell</td>
<td>Planning and Programming</td>
</tr>
<tr>
<td>Rick Holland</td>
<td>Fisheries</td>
</tr>
<tr>
<td>Michelle Koch</td>
<td>Planning and Programming</td>
</tr>
<tr>
<td>Rick Schneider</td>
<td>Wildlife</td>
</tr>
<tr>
<td>Kristal Stoner</td>
<td>Wildlife</td>
</tr>
</tbody>
</table>
Response to Peer Review of Proposal for
McCown’s Longspur (*Rhynchophanes mccownii*), April 2018

Both professional peer referees agree with adding the McCown’s Longspur to the list of threatened species in Nebraska.

Reviewers’ Comments:

*Referee 1:* I agree completely with listing it. I thought it was already Tier 1 before the second atlas, and it has declined even more in the 30 years since atlas 1. Just looked through my nest card file, which I've had my nose in for hours daily for the past month or two, and find about a dozen actual nest reports. Even though there were reports of breeding since 1901, the first nest was only found in 1985. The only colony I've had a chance to study, was a bit more crowded than others have reported, I'm guessing with an estimated nest per acre. It was on a windy hilltop which provided perfect wind flow for the display flights, and may have covered 4-5 acres. Bad news is, other similar sites in the area were unoccupied, maybe due to cattle grazing. Farming might be a threat, but most places I've seen them are too rocky, or rough, but that could change if crop prices go up.

*Response:* The nesting information that Referee #1 provided was added to the proposal. Conversion of grassland to other uses was identified under factors that can present a threat to McCown’s Longspurs.

*Referee 2:* You've got me convinced that they should be placed on the Nebraska list.

*Referee 2:* The summary needs to better summarize the data and arguments and end with the proposal to list.

*Response:* The authors think the reviewer’s suggestion is a better way to present the material. They rewrote the first paragraph of the document as an Introduction section. The last sentence of the introductory section states the proposal to list McCown’s Longspur. The proposal to list the species as threatened is reiterated at the end of the document.

*Referee 2:* In the Habitat Requirements section, point out that change in habitat use may be the result of loss of native short-grass prairie, agricultural conversion, and habitat fragmentation. I’d bring the 5-factor analysis material earlier in the document.

*Response:* The authors added a sentence to the Habitat Requirements section that states the stressor of habitat loss as the reviewer recommends. They see how bringing the 5-factor analysis material earlier in the document may be well suited for a journal article; however, the authors chose an order to present the material that is more consistent with the structure of current federal species status assessments. All of the other species’ listing proposals that have
been peer reviewed followed a format with the factors presented after the ecology and natural history information.

Referee 2: The Abundance and Status section should be expanded with more data.

Response: The authors included data from eBird citizen science reports of McCown’s Longspurs over the last 10 years. Breeding records from the Nebraska Breeding Bird Atlases have been included as well.

Referee 2: If Nebraska is peripheral to the range, why are we worried about them?

Response: The range of McCown’s Longspurs in Nebraska is consequential and an important component of the species’ population.

Referee 2: For Table 1, is sample size the number of surveys? Should data be arranged differently in this table? Some of the credible intervals span zero, does that mean they’re insignificant? Does this explain the 95% decline?

Response: The authors further explained sample size by adding “No. of Routes” to the corresponding column heading in Table 1. The data are given exactly as presented by BBS. The unfiltered data are unbiased and tell a more complete story. We expanded the caption to include a statement that although there have been a limited number of survey routes through the shortgrass prairie, the data clearly show an overall decline for the species survey-wide on 117 routes. The sentence about percentage decline was updated in the body of the proposal with an expanded citation to list the appendix in PIF where it originated. The authors chose not to reproduce this lengthy appendix in this proposal, but a reader can look up the source information after referring to the Literature Cited.

Referee 2: Include comparative material from Nebraska’s first Breeding Bird Atlas

Response: The authors included a reference to Mollhoff 2001 and added the BBA to the Literature Cited section.

Referee 2: I’d also provide photographs of the landscape these birds occupy in Nebraska and of the birds.

Response: The authors agree with this suggestion, but are currently lacking a picture of the McCown’s Longspur that can be used. M. Panella contacted Macaulay Library of Cornell University to request assistance in obtaining permission to use a photo from one featured on their All About Birds website. She also submitted a request to NEBRASKAland photographers to try and capture photos of McCown’s Longspurs and their habitat that may be used for future agency publications. A picture taken by J. Jorgensen has been added to the document that exhibits the sparse shortgrass nesting habitat where longspurs have been known to occur. Even
though the picture shows a mammal rather than the subject bird, it is currently the best photographic representation we have of the habitat in Nebraska.

Referee 2: The members of the listing action committee should be identified.

Response: An appendix was added to give the names of Nebraska Game and Parks Commission staff members who formed the listing action committee.

Edits: Some rewording of content was made according to Referee #2’s suggestions to better convey messaging to the reader. The authors think these suggested edits greatly enhance the document. Peer reviewers were acknowledged in the proposal.

Potential Impacts of Listing McCown’s Longspur
(Rhynchophanes mccownii)

(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.

Implications:

I. McCown’s Longspur and their nests and eggs are currently protected under the provisions of state law (e.g., Neb. Rev. Stat. § 37-540).

A. The collection of a McCown’s Longspur may be allowed with a Scientific and Education Permit issued by the Nebraska Game and Parks Commission.

II. Any project that is permitted, funded, or carried out in part or full by any state agency on public or private land requires that state agency to coordinate with the Nebraska Game and Parks Commission to prevent the “take” (take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct) of species on the Nebraska State Threatened or Endangered Species List.

A. Site Specific requirements to prevent “take” of this species will be recommended during coordination between the state agency and the Nebraska Game and Parks Commission. Such requirements will only be applicable within or near the modeled distribution of this species, and may include, but are not limited to:
i. Ground disturbance may be limited during the nesting season.
ii. Survey for nests may be required for projects that take place during the nesting season.
iii. Planting of non-native species and trees in prairies may be limited.
iv. Conversion of nesting habitat to a different land use or vegetative cover may be limited.
Listing Proposal for the Timber Rattlesnake
(*Crotalus horridus*)
in Nebraska

Prepared by:
Melissa J. Panella
Nebraska Game and Parks Commission
and
Daniel D. Fogell
Southeast Community College
Lincoln, Nebraska
April 2018

Photo by Jon Farrar; NEBRASKAland
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 and plants to determine whether any species warranted placement on the list or whether any species currently listed as threatened 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 reptiles and amphibians, Commission staff concluded the Timber Rattlesnake (*Crotalus horridus*) has experienced significant, well documented declines in abundance in Nebraska and throughout much of its range, its population faces significant threats, and it should be placed on the state list.

Species Description:

Fogell (2010) and Panella (2010) describe Timber Rattlesnakes (*Crotalus horridus*) as ranging in color from yellow-brown or gray to black, with dark crossbands, often bordered with whitish scales. They may also be yellowish-, brownish- or pinkish-gray, with tan or reddish-brown dividing crossbands, which may not always connect on the ventral side of the snake. Timber Rattlesnakes have a rusty brown dorsal stripe, a triangular head, and vertical pupils. A golden colored stripe extends along the cheeks. They have a sensory pit in front of the eye. Tail is black with a lighter colored rattle. Timber Rattlesnakes are the largest of Nebraska’s rattlesnakes and grow to an average size of 111.8–127 cm (44–50 in) long.
Distribution:

Timber Rattlesnakes have a wide distribution across most of the eastern half of the United States. NatureServe (2017) describes their range as extending south from the states of central New England to northern Florida, and west to southeastern Minnesota, southern and eastern Iowa, eastern Texas, central Oklahoma, eastern Kansas, and southeastern Nebraska. Timber Rattlesnakes have a patchy distribution on the northern and western portions of their range, and they are believed to now be extinct in the state of Maine and Ontario, Canada (NatureServe 2017; Fig. 1).

In Nebraska, Timber Rattlesnakes live in the very southeast portion of the state (Fig. 2). They are found in the Sandstone Prairies, Southeast Prairies, Missouri River, Indian Cave Bluffs, and Rulo Bluffs Biologically Unique Landscapes, although records are scarce. Nebraska’s population is at the western periphery of the species’ range.

Figure 1. Map illustrating the distributional range of the Timber Rattlesnake, *Crotalus horridus*. Map prepared by NatureServe.
Habitat Requirements:

Fogell (2010) documents Timber Rattlesnakes using deciduous and riparian woodlands in conjunction with rock outcrops or talus slopes that provide winter denning hibernacula. Woodlands that Timber Rattlesnakes inhabit often are associated with prairie uplands. Grasslands, and sometimes agricultural fields, provide the snakes with a migratory corridor between woodlots. During their migration, they are known to use houses of Eastern Woodrats (Neotoma floridana) for cover (Fogell 2010).

The foraging ecology of Timber Rattlesnakes can vary geographically, and they will hunt a variety of prey (Reinert et al. 2011). Clark (2002) synthesized the feeding ecology of Timber Rattlesnakes with published records and information about stomach contents from museum specimens. Their diet consists primarily of small mammals (>90%) such as mice, chipmunks, ground squirrels, and voles (Clark 2002). Occasionally, they will eat birds, amphibians, or reptiles (Clark 2002). Gravid females may fast or feed less, relying on their fat reserves, because they must spend more time basking and seeking warmth of rocks to support development of their young (Keenlyne 1972).

Reproduction:

Timber Rattlesnakes are a slow-growing and long-lived species. Sexual maturity is not reached until males are ~5 years old (New York State Department of Environmental Conservation 2018),
and females are 5–11 years old (i.e., most females are 7–10 years at first reproduction; Brown 1991, Martin 1993). The females ovulate 4–6 weeks after their spring emergence from their hibernacula (Martin 1993). A female may migrate ~3.2 km (2 mi) in search of a mate (Fogell 2010). Anderson (2010) and Mohr (2012) found that males traveled farther than females in search of mates. Females give birth to live young in late summer (Aug–Sept) (Martin 1993, Fogell 2010). Litter sizes range from 4–15 (ave. ~9) (Center for Reptile and Amphibian Conservation and Management 2003, New York State Department of Environmental Conservation 2018).

Lifespan is 16–22 years (max ~30 years, New York State Department of Environmental Conservation 2018). Females reproduce at 2–4-year intervals (Brown 1991, Martin 1993), so they may only produce 3-4 litters before they die. The largest females can be expected to have the greatest overall fecundity (i.e., number and size of neonates) (Martin 1993). Frequency of reproduction and litter size can vary based on environmental conditions and food availability (Martin 1993).

The young remain close to their mother for at least the first week of life (Cobb et al. 2005). Snake mortality during the first year of life is high, estimated at 75–90% because of predation on neonates, not enough small prey, lack of suitable dens (Greene 1997), and risks during dispersal (Bonnet 1999).

**Abundance and Status:**

Approximately half the states in the U.S. consider the Timber Rattlesnake to be a species of greatest conservation need (U.S. Geological Survey 2017). Of these states, Timber Rattlesnakes are listed as threatened in Texas, Minnesota, Illinois, and New York and endangered in Indiana, Ohio, New Jersey, Vermont, Massachusetts, Connecticut, and New Hampshire. Two populations remain in Vermont, but only one persists in New Hampshire. In Massachusetts, there are five known viable population clusters. In New York, 26% of known historic den sites are now extirpated, another 5% are nearly extirpated, and the state’s entire population is estimated to have declined by 50–75% since colonial settlement. Timber Rattlesnakes are considered extirpated from Maine and Rhode Island. Populations are also extinct in Canada (NatureServe 2017).

Precise data on distribution decline at the global level are not readily available; however, the consensus among researchers is that the distribution of Timber Rattlesnakes is shrinking everywhere they occur. The most notable distribution declines are in the New England states, New York, New Jersey, Minnesota, Wisconsin, and Indiana. There is no place where their distributions are increasing, though in several Appalachian states they are somewhat stable.
The only known extant occurrences of Timber Rattlesnakes in Nebraska are in southern Gage County where multiple small den sites collectively form a single population in which gene flow can regularly occur, and in northeastern Richardson County in the Barada Hills where only a single den site is known, but evidence supports at least 1–2 additional den sites that collectively compose a single, interbreeding population. Additional den sites may occur in southeastern Richardson County; however, presently there are no known sites. A specimen from Jefferson County was collected by Marvin Stover in 1992 (Catalog #15110; University of Nebraska State Museum 2018), and there is another record of one killed in Pawnee County (Fogell 2011) in 1989 (EO #6201; Nebraska Natural Heritage Program 2018), but extant populations have never been identified for those locales. Populations in Cass County were extirpated by the end of the 1970s, and it is believed that any Otoe and Nemaha county populations also perished during that time. Population studies and surveys have been ongoing in Gage County since 1997, and evidence strongly shows a decline in both number and distribution in Gage County. In Richardson County where Timber Rattlesnakes were once reported to be fairly common, <20 individuals have been sighted within the past 40 years, and seven of those were within the last 3 years as a result of intense survey efforts.

Two of the largest den site populations in Nebraska have <100 Timber Rattlesnakes each based on a long-term mark and recapture study from Gage County. Fogell (2000) estimated the population size using the Lincoln-Petersen index (Blower et al. 1981). Given that there are 10–12 known den sites in Gage County and one in Richardson County, the total number of Timber Rattlesnakes in the state is estimated to be <1,000. Declining population densities reduce the probability of encounters with other Timber Rattlesnakes, and therefore reduce the probability for mating, reproduction, and recruitment. This exacerbates the continued decline of populations.

Den site re-establishment studies at locations within the population core have all failed because of the strong, nearly 100% den site fidelity exhibited by this species. In Nebraska, den site fidelity was the norm but was not 100%, thus re-establishing den sites here could be more successful than at the core of the species’ distribution. This would require restoration of habitat around denning sites and establishing and maintaining travel corridors. However, the natural history of Timber Rattlesnakes will not afford for a successful recovery within just 10 years. Additionally, habitat connectivity in both Gage and (especially) Richardson counties is so poor that natural recolonization of extirpated den sites would take substantially >10 years.

While Nebraska’s population represents a significantly small proportion of the global population, its placement in distribution is notable and significant in terms of the species’ biogeography, global genetic diversity, and most importantly – conservation value. Several studies have shown that as species become rare and start to decline in population size and distribution, they do not collapse at the periphery of their range but rather at the center, and the peripheral populations
remain intact (Crowley 2011, Channell and Lomolino 2000). In a review of numerous studies, more than 90% of declining distributions remained intact at the western periphery of their global distribution – which is precisely where Nebraska’s Timber Rattlesnakes reside. One reason for this is the more diverse set of adaptability “tools” present within these populations. Individuals at peripheries are more prone to adapt and survive under suboptimal conditions, thus those “survival” alleles become prevalent in peripheral populations. Those at the core of the range are rarely presented with the extreme conditions present at the periphery, thus those same “survival” alleles are not nearly as prevalent (Lesica and Allendorf 1995). From a conservation genetics standpoint, Timber Rattlesnakes at their extreme periphery contain valuable genetic diversity that will allow both for survival in an already extreme environment and the potential to provide founding stock for reintroduction efforts elsewhere in the range as populations begin to collapse and become extirpated. While Nebraska’s Timber Rattlesnakes are an extreme peripheral population, the Richardson County population is also disjunct from the rest of the distribution, with the nearest known population occurring ~45 mi to the southeast near Atchison, Kansas. Populations in Gage County are somewhat continuous with populations in Kansas to the south.

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 Timber Rattlesnake are as follows:

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

While Timber Rattlesnakes have been known to use grassland and agricultural habitats during their active seasons, they are predominantly a woodland species that is adapted to forested and savanna-like environments. Woodlands are rare and scarce in Nebraska, and woodlands associated with suitable hibernation habitat are even rarer. It is doubtful that – if their habitat features in Nebraska were to become severely altered – Timber Rattlesnakes would be able to survive.

The need for rocky outcrops with very specific characteristics limits the likelihood that Timber Rattlesnakes will survive extreme winter conditions in Nebraska. While Timber Rattlesnakes in more southern regions of their range can survive by hibernating in tree root systems and mammal burrows, extended time periods with sub-freezing temperatures preclude this behavior in Nebraska.
In Nebraska, Timber Rattlesnakes once occurred from Plattsmouth to Rulo along the Missouri River’s limestone bluffs; however, channelization construction quarried these bluffs for stabilization rock, which ultimately reduced their distribution to a small part of Richardson County near the town of Barada. The distribution of Timber Rattlesnakes in Gage County has been reduced as a result of quarrying and land conversion for agriculture, but several stronghold den sites still persist.

The spread of invasive eastern redcedars (*Juniperus virginiana*) has caused significant “shading over” of den sites, which depend on solar exposure during winter months. Many of these den sites have been abandoned over the past 30-40 years (per landowner discussions).

In the species’ range, rock outcroppings in some locations are being quarried for rock. Some old quarries with denning sites are once again being mined, thus destroying denning sites.

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

Timber Rattlesnakes have been victims of illegal collecting and pet trade in some states such as Connecticut (Connecticut Department of Energy and Environmental Protection 2016), New York (New York State Department of Environmental Conservation 2018), and New Jersey (Conserve Wildlife Foundation for New Jersey 2018). It is unknown if this is a significant contributing factor to the species’ decline in Nebraska.

(C) Disease or predation.

A new and potentially devastating mortality factor is a disease known as *Ophidiomyces ophiodiicola*, also known as Snake Fungal Disease (SFD). Preliminary evidence of this disease in Nebraska’s Timber Rattlesnakes has been recorded as far back as 1998. Other than several observational notes in the past 20 years, its prevalence, mortality rate, and continued presence in Nebraska are currently unknown.

Isolated populations of Timber Rattlesnakes may be the most at risk of mortality attributable to SFD (Lorch et al. 2016). An isolated population in New Hampshire suffered high mortality (>50%) after skin infections with clinical signs consistent with SFD, but those snakes may have been unusually susceptible because of lack of genetic diversity following a population bottleneck (Clark et al. 2011). Stengle (2018) found that wild Timber Rattlesnakes in Massachusetts fared better, showing healing of lesions and recovery, than in reports of SFD mortality from other states, but she also stated that peripheral and isolated populations are more susceptible (McBride et al. 2015) and can benefit from assisted gene flow (i.e., introduction of genetically diverse individuals) to support disease resistance and population persistence. Several other states have reported occurrences of SFD – in Timber Rattlesnakes and other species – but without any observable population declines (U.S. Geological Survey 2016). Because
Nebraska’s Timber Rattlesnakes are a peripheral population, there are potential population level impacts of SFD to consider as a threat.

(D) Inadequacy of existing regulatory mechanisms.

While take of Timber Rattlesnakes is prohibited under Title 163, Chapter 4, 010.02, state laws and regulations do not protect against habitat loss and alteration that threaten Timber Rattlesnakes. The Nongame and Endangered Species Conservation Act could offer the possibility for protection of this species on state and private lands through Section 37-807 involving conservation programs and state agency consultation.

The greatest contribution to mortality of Timber Rattlesnakes in Nebraska has been the result of human interactions. In the past 20–25 years an estimated average of 6–8 large adult Timber Rattlesnakes each year have been reported by residents of Gage County to have been killed on roads – either accidentally by traffic or maliciously. Additionally in the past 5 years, a total of at least six have been killed either by car traffic or maliciously on roads in Richardson County. Additional malicious killings of Timber Rattlesnakes have also occurred at locations other than roads, such as directly on den sites or at sites where they were randomly encountered.

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

Because Timber Rattlesnakes in Nebraska also frequently occupy grasslands such as pastures and hay fields, several are killed annually during hay cutting and baling activities. With the recent conversion of railroad lines to bicycling/hiking trails along the Big Blue River in Gage County, trail users will pass directly in front of den sites where Timber Rattlesnakes hibernate communally and which were previously protected by railroad “no trespassing” regulations; therefore, interactions with Timber Rattlesnakes are likely to increase, and these almost never end well for the snakes. The small size of the remaining populations increases the possibility of loss of the remaining populations as a result of any natural catastrophic or human induced events.

Proposal:

Based on population 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 Timber Rattlesnake 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. Timber Rattlesnakes may be treated similarly in state regulations to the currently listed Massasauga (Sistrurus catenatus) as threatened.
**Acknowledgments**

The authors and listing action committee are grateful to Mike Fritz for providing information that was helpful in drafting this document. We are grateful to Colleen Rothe-Groleau for her assistance in literature review. We thank James Fawcett and Dennis Ferraro for reviewing this proposal and providing suggestions for improvement.

**Literature Cited**


Fogell, D. D. 2011. Surveys for Timber Rattlesnakes (*Crotalus horridus*) and Western Slender Glass Lizards (*Ophisaurus attenuatus*) and their habitat in Nebraska. Final Report to the Nebraska Game and Parks Commission, Lincoln, Nebraska, USA.

Fogell, D. D. 2010. Timber Rattlesnake. Pages 142–143 in *A field guide to the amphibians and reptiles of Nebraska*. Conservation and Survey Division, School of Natural Resources, Institute of Agriculture and Natural Resources, University of Nebraska, Lincoln, USA.

Fogell, D. D. 2016. Timber Rattlesnakes in the Biologically Unique Landscapes of Indian Cave State Park and the Rulo Bluffs Preserve. Richardson County, Nebraska. Final report to the Nebraska Game and Parks Commission, Omaha, Nebraska, USA.


Nebraska Natural Heritage Program. 2018.  Nebraska Natural Heritage Program, Nebraska Game and Parks Commission, Lincoln, Nebraska, USA.


University of Nebraska State Museum. 2018. Division of Zoology, University of Nebraska State Museum, Lincoln, Nebraska, USA.


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.

<table>
<thead>
<tr>
<th>Committee Member</th>
<th>Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melissa Panella (Chair)</td>
<td>Wildlife</td>
</tr>
<tr>
<td>Carey Grell</td>
<td>Planning and Programming</td>
</tr>
<tr>
<td>Rick Holland</td>
<td>Fisheries</td>
</tr>
<tr>
<td>Michelle Koch</td>
<td>Planning and Programming</td>
</tr>
<tr>
<td>Rick Schneider</td>
<td>Wildlife</td>
</tr>
<tr>
<td>Kristal Stoner</td>
<td>Wildlife</td>
</tr>
</tbody>
</table>
Response to Peer Review of Proposal for Timber Rattlesnake

*Crotalus horridus*, April 2018

Both professional peer referees agree with adding the Timber Rattlesnake to the list of threatened species in Nebraska.

**Reviewers’ Comments:**

*Referee 1:* I have read the proposal very carefully and checked on several factual details. I believe that listing the Timber Rattlesnake as Threatened and placing it on the State's Species list, is fully warranted based on the information presented.

*Referee 2:* Excellent work drafting the proposal. Very well organized. I fully support listing the species in Nebraska.

*Referee 2:* Insert dates for the specimens referenced.

*Revision:* Dates and citations for the Timber Rattlesnakes from Pawnee and Jefferson counties have been included. A specimen from Jefferson County was collected by Marvin Stover in 1992 (University of Nebraska State Museum 2018), and there is another record of one killed in Pawnee County (Fogell 2011) in 1989 (Nebraska Natural Heritage Program 2018), but extant populations have never been identified for those locales.

*Referee 2:* Indicate index used for the mark and recapture study to estimate population size in Gage Co.

*Revision:* This information has been added to the proposal and literature cited. Population size was estimated using the Lincoln-Petersen index (Blower et al. 1981).

*Referee 2:* “Populations in Massachusetts and New Hampshire have experienced high mortality rates and severe population declines directly attributable to Snake Fungal Disease.” Source(s) needed. New research indicates that wild snakes may recover from SFD if there are no other significant stressors (e.g., food shortage). SFD may be much less of a concern than other threats pressuring the species. Review and include additional literature cited.

*Revision:* The literature was further reviewed regarding SFD and sources were added to the proposal. The authors chose to keep the mention of SFD as a potential threat, because we are dealing with a peripheral population that could be vulnerable based on what is known from the literature.

Isolated populations of Timber Rattlesnakes may be the most at risk of mortality attributable to SFD (Lorch et al. 2016). An isolated population in New Hampshire suffered high mortality (>50%) after skin infections with clinical signs consistent with SFD, but those snakes may have
been unusually susceptible because of lack of genetic diversity following a population bottleneck (Clark et al. 2011). Stengle (2018) found that wild Timber Rattlesnakes in Massachusetts fared better, showing healing of lesions and recovery, than in reports of SFD mortality from other states, but she also stated that peripheral and isolated populations can benefit from assisted gene flow (i.e., introduction of genetically diverse individuals) to support disease resistance and population persistence (Stengle 2018). Several other states have reported occurrences of SFD – in Timber Rattlesnakes and other species – but without any observable population declines (U.S. Geological Survey 2016). Because Nebraska’s Timber Rattlesnakes are a peripheral population, there are potential population level impacts of SFD to consider as a threat.

*Edits:* The names of the peer reviewers were added to the Acknowledgements section of the proposal. A higher resolution current range map of Timber Rattlesnakes in Nebraska was included; the species’ distributional boundaries remained the same.

**Potential Impacts of Listing Timber Rattlesnake (Crotalus horridus)**

(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.

**Implications:**

I. Purposeful take (take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct) of Timber Rattlesnakes is prohibited under Title 163, Chapter 4, 010.02, in Nebraska Game and Parks regulations.

A. Exceptions in proposed regulations will include the take of a Timber Rattlesnake if it is done for the immediate protection of the health of humans, livestock, or pets.

B. The collection of a Timber Rattlesnake may be allowed with a Scientific and Education Permit issued by the Nebraska Game and Parks Commission.

II. Any project that is permitted, funded, or carried out in part or full by any state agency on public or private land requires that agency to coordinate with the Nebraska Game and Parks Commission to prevent the “take” (take means to harass, harm, pursue,
hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct) of species on the Nebraska State Threatened or Endangered Species List.

A. Site Specific requirements to prevent “take” of this species will be recommended during coordination between the state agency and the Nebraska Game and Parks Commission. Such requirements will only be applicable within or near the modeled distribution of this species, and may include, but are not limited to:

i. Avoiding and minimizing ground disturbance in areas with habitat for this species.

ii. Burning may be prohibited during certain times of the year when snakes are most vulnerable.

iii. Surveys for individuals or hibernating habitat may be required.

iv. Height restrictions for mowing or haying may be required.

v. Conversion of native habitats used by snakes to a different land use or vegetative cover may be prohibited.

vi. Erosion and silt control devices will need to be used and installed in a way to allow snakes to pass through areas without getting tangled, trapped or caught.
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 .................................................................................................................. 40  
Listing Proposal for the Flathead Chub (*Platygobio gracilis*) ............................. 42  
Listing Proposal for the Plains Minnow (*Hybognathus placitus*) ..................... 53  
Listing Proposal for the Sicklefin Chub (*Macrhybopsis meeki*) ....................... 60  
Listing Proposal for the Western Silvery Minnow (*Hybognathus argyritis*) .... 67  
Acknowledgments ..................................................................................................... 73  
Literature Cited .......................................................................................................... 74  
Appendix 1. ................................................................................................................ 82
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 threatened 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.
Figure 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*)

**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 Saskatchewan, 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).
Figure 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).
Figure 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.
Figure 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
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.
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).
Figure 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.
Figure 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 stream 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).

Figure 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.

Figure 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) 29–36 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 upstream 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.
Figure 10. The range of the Western Silvery Minnow, *Hybognathus argyritis*, in North America is shown. Map created by the U.S. Geological Survey (2018).
Figure 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


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.


Nebraska Dept. of Natural Resources and Upper Republican Natural Resources District. 2016. Integrated management plan. Nebraska.


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


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.

<table>
<thead>
<tr>
<th>Committee Member</th>
<th>Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melissa Panella (Chair)</td>
<td>Wildlife</td>
</tr>
<tr>
<td>Carey Grell</td>
<td>Planning and Programming</td>
</tr>
<tr>
<td>Rick Holland</td>
<td>Fisheries</td>
</tr>
<tr>
<td>Michelle Koch</td>
<td>Planning and Programming</td>
</tr>
<tr>
<td>Rick Schneider</td>
<td>Wildlife</td>
</tr>
<tr>
<td>Kristal Stoner</td>
<td>Wildlife</td>
</tr>
</tbody>
</table>
Response to Peer Review of Proposal for Flathead Chub (*Platygobio gracilis*), Plains Minnow (*Hybognathus placitus*), Sicklefin Chub (*Macrhybopsis meeki*), and Western Silvery Minnow (*Hybognathus argyritis*), April 2018

All peer reviewers are supportive of listing the fish.

**Reviewers’ Comments:**

**Referee 1:** Overall, I think the compilers of this document did a good job. The literature review seems thorough and there were two references from the literature that I had not previously seen or read. From that standpoint, this document provides a good foundation for further deliberations and for moving this proposal further up the political ladder. I support the proposed species for listing. I simply think that one species has really good data to support the listing while the other three, less so.

**Referee 2:** Listing of the fish is warranted in Nebraska, particularly because of decreasing distribution.

**Referee 3:** It seems like the data presented support such a listing.

**Referee 1:** It seems the basis for this proposal at this time is built upon data from the Missouri River program and the fairly recent statewide stream survey. The Missouri River program has a probabilistic sampling design and is robust enough to draw meaningful inferences from the data. To that extent, I think estimates of species richness, relative abundance (more on this below), and distributional patterns have a firm basis for the Missouri River only.

I have concerns for the statewide survey:

- I would like to review the study (experimental) design for the statewide survey. For example, I have no idea about the gears that were used, effort expended, sample units; just what constituted “effort?”

- Why the “patchy” distribution of sampling sites? Some areas of the state were not sampled at all, others rather sparsely. Thus, I am concerned about site stratification and potential biases interjected into the design and how that could have affected the interpretation of results relative to the status of the proposed species for listing.

**Response:** Sampling followed a standard protocol based on the U.S. EPA’s Regional Environmental Monitoring and Assessment Program (R-EMAP; U.S. EPA, 1994). This citation has been added to the text.
Surveyors attempted to collect data to revisit Johnson’s historical survey sites and cover a wide distribution of streams; however, some “patchiness” was unavoidable because of limitations gaining permission and access to sites. Researchers would have liked to conduct more thorough and frequent surveys, but there were also staffing and funding constraints.

Referee 1: There are several references to “unpublished data,” some of which if we knew more about the analyses that went into these assertions I might find them more palatable. For example, each species was given a statewide “abundance estimate.” I’ve spent much of my career designing monitoring and research studies for rivers and streams and I am confident in saying that obtaining an abundance estimate with reasonable error (within pre-established confidence limits) is a massive undertaking. Even for somewhat “easy” occupancy designs for fish communities, it takes a HUGE mark-and-recapture effort for even a small geographic area or reach of stream.

Response: The authors recognize that there are limitations to population estimates for the fishes. For conservation planning purposes, there is often a need to make an estimation based on the data, albeit imperfect. We do not wish to overstate accuracy and have changed the wording to describe these estimates based on relative abundance indices.

Referee 1: There was ample reference made to stream fragmentation (based on great work coming out of Kansas and Texas), but relatively little said about water diversion, lowering of water tables, and altered hydrographs. Nebraska has its share of stream fragmentation issues but of equal or even greater impact is dewatering. I think an analysis showing how Nebraska’s stream flows are severely altered would have great implications for success of this proposal and might open some eyes in the Unicameral. Much of that kind of analyses has been done, so I think a simple “lifting” of data and graphics from other sources would suffice (along with some interpretation of how that affects Great Plains fishes).

Response: The authors conducted additional literature review on the issue of dewatering. Findings and examples specific to Nebraska from several sources have been included in the text under the 5-factor analysis: the present or threatened destruction, modification, or curtailment of its habitat or range.

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).


Referee 1: I’m a little perplexed by this decision to develop maps showing the estimated current range of each of these species. The maps as given, for most species, shows a fairly broad range in the state. Without some information on “abundance,” how is a decision-maker going to make a decision? Again, I don’t know your process and what all is involved, but I fear that three out of four of the species are going to be looked at as, “what’s the problem?” They are in many basins of the state. There has to be a more powerful way than just an estimated current range map to show changes in distribution through time that will not become too messy or cluttered. Innovative symbology and color-coding could even add another dimension: relative abundance (like CPUE).

Response: It is customary to develop estimated current range maps for endangered and threatened species for conservation planning purposes. However, the authors agree that a current range map does not adequately demonstrate the species’ shrinking distribution and loss over time. We think that a variety of maps will best fulfill both of these needs, and we have incorporated additional maps into the proposal.

Referee 2: Move the map that shows all sites sampled from Appendix 3 to the beginning of the document.

Response: This map was relocated from Appendix 3 and placed under the Introduction of the document and relabeled as Figure 1. All other figures were relabeled accordingly and updated in the text.

Referee 2: I recommend depicting a map for each of the fish species showing where we sampled since a chosen date vs. where it was collected, possibly with the hydrologic unit highlighted/outlined.

Response: The authors decided to demonstrate the loss in distribution by showing a set of three maps: all recent survey sites, historical collections, and collections from 2005-2016 for all four of the species proposed for listing.
As part of an ongoing survey and monitoring effort, stream sites indicated in red were sampled for fish between 2005 and 2016.

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.
Referee 4: I agree that maps depicting historical range should be used as part of the data set. Just using the current distributions creates a shifting baseline that deludes the importance of historical distribution in relationship to current distribution. At least for the Flathead Chub, a large number of tributaries (particularly the lower reaches) to the highlighted rivers in your map once were occupied by this species (and some may still be). Historically, the Western Silvery Minnow would have occurred a greater distance upstream in the Loup River system. Also from a historical perspective, the Plains Minnow would have been found further west in the Niobrara River as well as the Middle Loup River.

Response: Maps have been included to demonstrate historical distribution of the fishes in the listing proposals. Also, estimated current range maps are to be included in summary handouts. Any location within the current or historical distribution of a species will be eligible for recovery efforts.

Referee 1: Species description of Flathead Chub: The creek subspecies sometimes has rounded pectoral fins (as opposed to falcate). Hrabik (1985) captured *P. gracilis gulonella* in several locations in the South Fork Little Nemaha River basin. Specimens from that study are deposited at the University of Nebraska State Museum. As mentioned above, in 2013 Lance Merry and I captured two specimens of *P. g. gulonella* from South Fork Little Nemaha River. I agree that the distribution of the subspecies in Nebraska is unknown and some ichthyologists suspect that the *gulonella* subspecies is not warranted (Bill Pflieger, for example, never captured what he believed was *gulonella* in Missouri and doubted its existence (pers. comm.).

Response: The authors greatly appreciate Referee 1 sharing this detailed species description for the creek subspecies. The text has been updated to include this additional detail.

My recommendations based on this document:

- *Macrhybopsis meeki* should be proposed as a Threatened species. The data that supports this recommendation is based on a sound and robust sampling design.

- *Hybognathus argyritis* is probably a Threatened species in Nebraska, but in my opinion some river basins appear to be under-sampled (see additional comment below).

- *Hybognathus placitus* is a species of concern. Akin to my South Fork Little Nemaha River example above, in 2015 George Cunningham and I sampled the Loup River at Columbus to obtain Plains Minnow specimens to photograph. We found the species relatively common there (I can supply the trip report if anyone wants to see it—nice easy trip!). In recent times, I have captured a few from the Elkhorn and Platte Rivers (no trip report, just fooling around—they were not common, but there). How sure are we that this species warrants Threatened designation?

- *Platygobio gracilis* is a species of concern; same thinking here as for Plains Minnow.
Final thought: statewide surveys and even better, monitoring programs like that on the Missouri River, with standardized sampling protocols, are great programs to detect long-term changes in fish communities (thus, raising warning flags that problems may be emerging). However, once a flag has been raised, then different types of surveys are needed to assess occupancy and distribution and they require a different sampling (experimental) design. Thus, I think the *H. argyritis*, *H. placitus*, and *P. gracilis* have had their flags raised and now more in-depth assessments are needed to paint a true picture of what is happening to these species statewide.

Response: The Nebraska Game and Parks Commission plans to continue to monitor these fish species, in addition to others. The authors wish to take the preponderance of the evidence showing declines in the four fish species before the public. Listings will ensure that projects with a state nexus will fall under the environmental review process and thus reduce further degradation and loss of endangered and threatened species’ habitat.

Edits: Referee 1 granted the authors permission to use photos of the species in the listing proposal materials. These pictures were included in the revised listing proposal. All peer reviewers were acknowledged in the document.

Impacts of Listing Flathead Chub (*Platygobio gracilis*), Plains Minnow (*Hybognathus placitus*), Sicklefin Chub (*Macrhybopsis meeki*), and Western Silvery Minnow (*Hybognathus argyritis*)

(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.

Implications:

I. Fisheries regulations Title 163, Chapter 2, 009 already restrict baitfish to specific species.

A. The collection of state-listed fish species may be allowed with a Scientific and Education Permit issued by the Nebraska Game and Parks Commission.
II. A prohibition already exists against seining or trapping any fish in the streams listed below to prevent take of species currently listed as endangered or threatened
   i. Brush Creek west of Brownlee in Cherry County
   ii. Cottonwood Creek in Keya Paha County
   iii. East Holt Creek in Keya Paha County
   iv. Gordon Creek west of Highway 61 in Cherry County
   v. Holt Creek in Keya Paha County
   vi. Niobrara River east of Box Butte Reservoir and west of Highway 385 in Dawes County
   vii. Taylor Creek west of Highway 81 in Madison County

III. Any project that is permitted, funded, or carried out in part or full by any state agency on public or private land requires that state agency to coordinate with the Nebraska Game and Parks Commission to prevent the “take” (take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct) of species on the Nebraska State Threatened or Endangered Species List.

   A. Site Specific requirements to prevent “take” of these fish species will be recommended during coordination between the state agency and the Nebraska Game and Parks Commission. Such requirements will only be applicable within or near the modeled distribution of these fishes, and may include, but are not limited to:

   i. New surface water rights (uses) may be limited or reduced.
   ii. Some chemicals which are approved for overwater use may not be acceptable for use in streams with these fish. Guidance documents will be made available.
   iii. Release of piscivorous fish may be prohibited in some areas.
   iv. Work or projects conducted in stream or river channels may not be allowed during the spawning periods of these fish.
   v. Bank stabilization may be limited.
   vi. Grazing (as part of a management plan developed with the assistance of a state agency) along streams where these fish occur may be limited or controlled.
   vii. Upland erosion or soil disturbances will need to be designed to avoid and minimize sedimentation of streams where these fish occur.
   viii. Certain projects (e.g., pond construction) may need to be located outside of the floodplain of streams and rivers.
   ix. Aquatic organism passage will need to be considered for in-stream structures (e.g., culverts, dams, weirs).
Delisting Proposal for
North American River Otter (*Lontra canadensis*)
in Nebraska

Prepared by:
Melissa J. Panella and Samuel P. Wilson
Nebraska Game and Parks Commission
Lincoln, Nebraska
March 2018
Introduction

The Nebraska Game and Parks Commission (hereafter, Commission) is authorized under the 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 threatened 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 mammals, Commission staff concluded the North American River Otter (Lontra canadensis) has demonstrated recovery and should be removed from the state list.

Status

The North American River Otter (hereafter, river otter) is currently listed as Threatened in the state of Nebraska. The species is not federally listed. Based on new data, expert input, and a successful recovery program, the Commission proposes to remove the river otter from the state threatened species list. The population of river otters has been growing in Nebraska’s waterways since their release back into the ecosystem in 1986. We are now in the unprecedented situation where a reintroduced and threatened species in the state is a candidate for delisting.

History

Once a common member of Nebraska’s biodiversity, river otters were extirpated from the state in the early 1900s (Bischoff 2006). River otters were state listed as Endangered in 1986. In 2000, the species was down-listed to Threatened because of substantial progress towards
recovery. Over the course of 6 years (1986–1991), river otters were live-trapped in other states with viable populations (primarily Alaska and Louisiana) and transported to Nebraska for release. These relocated otters were reintroduced at a total of seven sites: on the Platte (2 release sites), Niobrara, South Loup, Elkhorn, Calamus, and Cedar rivers (Andelt 1988, Bischoff 2006). Biologists have since been monitoring the establishment of the river otters, expansion of their distribution, and progress toward their recovery.

**Research**

Research efforts have included surveys conducted from bridges, telemetry study for home range, habitat use, and survival, DNA analysis for density estimates, and distribution modeling from presence-absence data. Researchers found that river otters’ range has been expanding beyond reintroduction rivers (Fig. 1), and their survival is high (in one study, no mortalities were detected from Oct 2006–Dec 2009 for 18 river otters tracked by telemetry on the Platte River; mean number of days that a marked river otter was known to be alive was 470.5 \( \pm 168.8 \) [Wilson 2012].

NGPC regularly receives reports of river otters from hunters, anglers, landowners, boaters, birders, and field personnel for NGPC, U.S. Fish and Wildlife Service, Natural Resource Districts, the Nebraska Public Power District, Central Nebraska Public Power District, The Nature Conservancy, the Crane Trust, and Audubon’s Rowe Sanctuary. Observational reports include pairs, adults with young, and groups of animals. Data on river otters have also come from accidentally trapped specimens, often of very good physical condition. These specimens provide data on areas of occurrence, age, sex, and reproduction.

The Commission keeps a list of Species of Greatest Conservation Need, identified as at-risk with Tier 1 or 2 status. This list is regularly reviewed and updated so that those species most at-risk in the state receive necessary attention and eligibility for additional conservation measures. The river otter will continue to be monitored and could be considered for Tier 1 or 2 status if conditions warrant in the future.

Monitoring of the river otter population after the species is delisted will include locations of observations from the public and the Commission, federal agencies, and non-governmental agencies. In addition, carcasses of incidentally trapped river otters will also still be collected. Sign surveys at bridges, trail camera based surveys, or searches by kayak/canoes will be used as needed to assess changes in distribution.

Fur-bearers may be considered for harvest seasons. Harvest seasons and limits in Nebraska are carefully considered and based on the ability of a population to withstand the pressure of losing some individuals. A criterion for holding a harvest is typically that the population is likely
resilient to the proposed harvest based on the best available science. If monitoring of the species or poor habitat conditions reveal stresses on river otters that would threaten their persistence in the state, there will likely be a recommendation of reduced or no harvest. The same balance of allowing harvest and maintaining resilient populations has allowed other harvested species like deer, elk, and turkeys to thrive over the long term in Nebraska. Decisions regarding managing for more or less individuals would depend on future management goals. It is important to note that animals managed under game law are typically abundant over the long term and none have become extirpated under modern game management that includes a harvest.

**Distribution and Abundance**

In the Midwest where river otters were absent from a number of states, they have since recovered because of reintroduction efforts, including in the bordering states of Iowa, Missouri, and Kansas. The reintroductions of 159 river otters in Nebraska from 1986–1991 have allowed the species to expand to the majority of areas in the state with appropriate habitat.

During the most recent surveys (2014–2015), multiple observers covered >1000 river miles across the state to look for signs of river otters (Bieber et al. 2018). The bulk of detections of river otters in these surveys were from the Platte, Elkhorn, and Niobrara rivers. Occupancy modeling and maximum entropy modeling, from data collected during this effort, both identified the Platte, Elkhorn, central and eastern Niobrara, and southern Loup rivers as core areas for river otters in Nebraska. Survey and monitoring data indicate that river otter populations have grown and expanded out from reintroduction sites. It is likely that the otters are also recolonizing areas of Nebraska because of immigration from neighboring states, such as Missouri and Iowa, with large populations of river otters. Evidence supports growth to a nearly statewide distribution of river otters, in major river systems in Nebraska, over the last 30 years. In fact, Bieber et al.’s (2018) data and distribution modeling results indicate a current otter distribution in the state that is quite similar to historical records.

River otters are widely distributed in North America (Fig. 2). They are identified as a species of least concern by the International Union for Conservation of Nature (Serfass et al. 2015). Estimates indicate there are ≥50,000 river otters globally and ≤5,000 in Nebraska. Less than 10% of the river otter’s global population occurs within Nebraska. Nebraska’s river otter population is largely connected and has been stable or growing. It is likely that population growth will continue at some level given that there are currently no known threats of significance or exceptional mortality factors facing river otters. The number of river otters/km in a focal area of study on the Platte River was higher than previously reported (Williams 2011), although the Platte River in the study area is a complex system of braided streams, not a single river channel.
Proposal

Data clearly demonstrate a healthy, reproductively viable, and expanding population of river otters in Nebraska. In recognition of the current status of this species, it is recommended that the North American River Otter be delisted under the Nebraska Nongame and Endangered Species Conservation Act (37-801 to 37-811). Commission biologists seek to delist the river otter, but they also support continued monitoring, management, and habitat conservation for the species to ensure that river otters remain a mainstay of Nebraska’s biodiversity.

Figure 1. The range of North American river otters in Nebraska has expanded greatly from the seven locations where biologists originally reintroduced them. Map from NEBRASKAland.
Figure 2. The North American distribution of river otters shows their wide expanse in the United States and Canada. (D. E. Wilson and S. Ruff [Editors] 1999).

**Acknowledgments**

The listing action committee and authors of this proposal are grateful to the student researchers Nathan Bieber, Amy Wilson, and research technicians who tirelessly collected and analyzed data. We thank Keith Geluso and Jeremy White for reviewing this proposal.
Supporting Literature


Wilson, S. P. 2012. River Otter (*Lontra canadensis*) home range, habitat use, overnight movement, and survival in the Platte River of Nebraska. Thesis. University of Nebraska, Lincoln, USA.
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.

<table>
<thead>
<tr>
<th>Committee Member</th>
<th>Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melissa Panella (Chair)</td>
<td>Wildlife</td>
</tr>
<tr>
<td>Carey Grell</td>
<td>Planning and Programming</td>
</tr>
<tr>
<td>Rick Holland</td>
<td>Fisheries</td>
</tr>
<tr>
<td>Michelle Koch</td>
<td>Planning and Programming</td>
</tr>
<tr>
<td>Rick Schneider</td>
<td>Wildlife</td>
</tr>
<tr>
<td>Kristal Stoner</td>
<td>Wildlife</td>
</tr>
</tbody>
</table>
Response to Peer Review of Proposal for North American River Otter

*Lontra canadensis*), April 2018

Both professional peer referees agree with removing the North American River Otter from the threatened species list in Nebraska.

Reviewers’ Comments:

*Referee 1*: With all these facts and information, I find it warranted to de-list the River Otter status in Nebraska.

*Referee 2*: It is terrific that the reintroduction of otters has been so successful in Nebraska and neighboring states—what a great thing to have a healthy population of otters back in our rivers!

*Referee 1*: If the species is de-listed, I recommend that it still remain on a watch list, as it will be a valuable indicator of ecosystem function.

*Referee 2*: Is there a planned effort to continue to monitor the population after delisting that can be briefly mentioned here?

*Response*: The Nebraska Game and Parks Commission does not keep a formal list of species (e.g., “watch list”) that may require direct conservation action in the future. They do however keep a list of Species of Greatest Conservation Need, identified as at-risk with Tier 1 or 2 status. This list is regularly reviewed and updated so that those species most at-risk in the state receive necessary attention and eligibility for additional conservation measures. The river otter will continue to be monitored and could be considered for Tier 1 or 2 status if conditions warrant in the future. Wildlife biologists will still be monitoring the river otter population after the species is delisted. Locations of observations from the public and Nebraska Game and Parks Commission, federal agencies, and non-governmental agencies will continue to be recorded. In addition, carcasses of incidentally trapped river otters will also be collected. Sign surveys at bridges, trail camera based surveys, or searches by kayak/canoes will be used as needed to assess changes in distribution.

*Referee 1*: I'm a proponent not to have them as a harvestable species in the state as a furbearer, or at least until we even have a better understanding of population abundance. Even if otters are not being actively trapped, their numbers still might decline in the future if issues arise because of water quality, habitat quality, and/or prey quality.

*Referee 2*: Are there more details that can be provided on the criteria that will be used to evaluate whether or not a harvest season will be opened?
Response: Harvest seasons and limits in Nebraska are carefully considered and based on the ability of a population to withstand the pressure of losing some individuals. A criterion for holding a harvest is typically that the population is likely resilient to the proposed harvest based on the best available science. If monitoring of the species or poor habitat conditions reveal stresses on river otters that would threaten their persistence in the state, there will likely be a recommendation of reduced or no harvest. The same balance of allowing harvest and maintaining resilient populations has allowed other harvested species like deer, elk, and turkeys to thrive over the long term in Nebraska. Decisions regarding managing for more or less individuals would depend on future management goals. It is important to note that animals managed under game law are typically abundant over the long term and none have become extirpated under modern game management that includes a harvest.

Edits: The document was updated to include our response to reviewer comments. Also, a map depicting the global distribution of river otters was included (source Smithsonian). Sam Wilson was added as a co-author of this proposal, because he has provided additional information that has enhanced this document significantly. The acknowledgments section of the document was updated.
Comments on Proposed Listing Action

In 2018 and 2019, the Commission held a public hearing in each Commissioner’s district throughout Nebraska in order to gather public testimony on the proposed listing and delisting of state endangered and threatened species:

- June 22, 2018, Ogallala (District 7)
- August 16, 2018, Valentine (District 6)
- October 26, 2018, Kearney (District 4)
- January 18, 2019, Lincoln (District 8)
- March 15, 2019, Nebraska City (District 1)
- April 24, 2019, Ponca (District 3)
- June 21, 2019, Alma (District 5)
- October 18, 2019, Omaha (District 2)

The official minutes from those public hearings are included here, along with comments and questions received regarding the proposed listing actions. The public comment period was open from May 15, 2018 - October 29, 2019. Recently updated research information further supports the listing of the Sicklefin Chub. Regulation changes for the listing and delisting of state endangered and threatened species will be brought to the Board of Commissioners on January 22, 2020 at the Commission Meeting in Lincoln. The Board may take action on the proposed regulations following a public hearing at this meeting.

MINUTES

June 22, 2018, Ogallala (District 7):
Chairman Bell opened the public hearing at 8:46 AM for Commissioner District 7 input on proposed listing and de-listing of State Threatened and Endangered Species. Biologist Melissa Panella reviewed the species being considered for listing in District 7 and possible impacts that could result in the area. She also shared the recommendation to delist the River Otter. There was no public comment; the public hearing was closed at 9:10 AM. The Commission will take action on this item once public hearings have taken place in all of the Commissioner districts.

August 16, 2018, Valentine (District 6):
Chairman Bell opened the public hearing at 8:30 AM for Commissioner District 6 input on proposed listing and de-listing of State Threatened and Endangered Species. Biologist Melissa Panella reviewed the three species of minnows being considered for listing in District 6 and possible impacts that could result in the area. She also shared the recommendation to delist the
River Otter. Jim Ducey of Valentine did not testify in support or opposition, but asked whether or not a trapping season would be considered for the otter if it was delisted and if delisting it would affect the fish species that are being considered for listing. It is possible that a regulation change could be proposed to allow trapping of the otter at some point if it is delisted. Although there is potential for the otter to eat the little fish that are being proposed for listing, otters normally pursue larger fish. There was no other public comment; the public hearing was closed at 8:45 AM. The Commission will take action on this item once public hearings have taken place in all of the Commissioner districts.

October 26, 2018, Kearney (District 4):
Chairman Bell opened the public hearing at 8:30 AM for Commissioner District 4 input on proposed listing and de-listing of State Threatened and Endangered Species. Biologist Melissa Panella reviewed the three species of minnows being considered for listing in District 4 and possible impacts that could result in the area. She also shared the recommendation to delist the River Otter. James Jenniges of Nebraska Public Power District located in Kearney did not testify in opposition or support, but advised NPPD would be submitting comments. David Zorn of the Central Nebraska Public Power and Irrigation District from Gothenburg did not testify in opposition or support, but advised CNPPID would be submitting comments. There was no other public comment; the public hearing was closed at 8:46 AM. The Commission will take action on this item once public hearings have taken place in all of the Commissioner districts.

January 18, 2019, Lincoln (District 8):
Chairman Bell opened the public hearing at 8:30 AM for Commissioner District 8 input on proposed listing and de-listing of State Threatened and Endangered Species. Biologist Melissa Panella reviewed the one species of minnow – the Flathead Chub, which is being considered for listing in District 8 and possible impacts that could result in the area. There was no public comment; the public hearing was closed at 8:40 AM. The Commission will take action on this item once public hearings have taken place in all of the Commissioner districts.

March 15, 2019, Nebraska City (District 1):
Chairman Allen opened the public hearing at 8:30 AM for Commissioner District 1 input on proposed listing and de-listing of State Threatened and Endangered Species. Biologist Melissa Panella reviewed the one species to be considered for de-listing, which is the North American River Otter. She also reviewed the species to be considered for listing in District 1. They are: the Timber Rattlesnake, the Flathead Chub, the Sicklefin Chub, Plains Minnow, and Western Silvery Minnow. She reviewed the possible impacts the listings could have in the area. Daniel Fogell, 2323 Royal Wood Drive, Omaha, NE 68144, a private citizen, was present to support the listing of the Timber Rattlesnake. He gave historical information on the species, as well as reporting on independent research he has conducted himself. With no other public comment, the public hearing was closed at 8:57 AM. The Commission will take action on this item once public hearings have taken place in all of the Commissioner districts.
April 24, 2019, Ponca (District 3):
Chairman Allen opened the public hearing at 8:43 AM for Commissioner District 3 input on proposed listing and de-listing of State Threatened and Endangered Species. Biologist Melissa Panella reviewed the one species to be considered for de-listing, which is the North American River Otter. She also reviewed the species to be considered for listing in District 3. They are the Flathead Chub, the Sicklefin Chub, Plains Minnow, and Western Silvery Minnow. She reviewed the possible impacts the listings could have in the area. There was no public comment. The public hearing was closed at 8:57 AM. The Commission will take action on this item once public hearings have taken place in all of the Commissioner districts.

June 21, 2019, Alma (District 5):
Chairman Allen opened the public hearing at 8:30 AM for Commissioner District 5 input on proposed listing and de-listing of State Threatened and Endangered Species. Biologist Melissa Panella reviewed the one species to be considered for de-listing, which is the North American River Otter. She also reviewed the one species to be considered for listing in District 5. It is the Plains Minnow. She reviewed the possible impacts the listing could have in the area. There was no public comment. The public hearing was closed at 8:50 AM. The Commission will take action on this item once public hearings have taken place in all of the Commissioner districts.

October 18, 2019, Omaha (District 2):
Chairman Allen opened the public hearing at 9:17 AM for Commissioner District 2 input on proposed listing and de-listing of State Threatened and Endangered Species. Biologist Melissa Panella reviewed the one species to be considered for de-listing, the North American River Otter. She also reviewed the Sicklefin Chub, the only species to be considered for listing in District 2. She reviewed the possible impacts the listing could have in the area. There was no public comment. The public hearing was closed at 9:41 AM. The Commission will take action on this item in future meeting as all public hearings have now taken place in all of the Commissioner districts.
**Updated Status for the Sicklefin Chub (Macrhybopsis meeki)**

23-October-2019

**SUBJECT:** The Sicklefin Chub (*Macrhybopsis meeki*) is currently being petitioned by the Nebraska Game and Parks Commission to be listed as an endangered species under the Nebraska Nongame and Endangered Species Conservation Act (NESCA; Neb. Rev. Stat. 37-801 to 37-811; Panella et al. 2018).

**HISTORICAL DISTRIBUTION & ABUNDANCE**

Historical collections of Sicklefin Chubs in Nebraska were restricted to the Missouri and Platte Rivers (Meek 1892, Johnson 1942, Morris 1960) with state-wide interior stream assessments not capturing any Sicklefin Chubs (Peters and Parham 2008, Bazata 2011). The status of the Sicklefin Chub in the Missouri River was initially assessed by Hesse (1994) and followed-up 20 years later by Steffensen et al. (2014). Hesse (1994) reported that Sicklefin Chubs were likely extirpated upstream of Lewis and Clark Lake and in very low abundance below, resulting in a recommendation to be listed as a state endangered species. Steffensen et al. (2014) used the robust data set from the U.S. Army Corps of Engineers’ Pallid Sturgeon Population Assessment Program (PSPA Program; Welker et al. 2017; Welker and Drobish 2018) to further assess the Sicklefin Chub population. Steffensen et al. (2014) also reported that Sicklefin Chubs are likely extirpated above Lewis and Clark Lake and were rarely observed in the Lower Unchannelized reach and noted the frequency of Sicklefin Chubs increase in a downstream trend. Steffensen et al. (2014) analysis included data from the PSPA Program through the 2012 sampling season. Since the Steffensen et al. (2014) status update was published, an additional six years of PSPA Program monitoring has occurred.

**STUDY AREA & METHODS**

The PSPA Program operates under a stratified random design utilizing a multi-gear approach. The strata are at the segment level, which divides the river at significant landmarks (i.e., dam or reservoir headwaters) or changes (i.e., channel modification or tributary input) and the randomization is at the river bend level where 25% of individual river bends within each segment are randomly selected annually. This has resulted in near-complete river coverage in all available habitats within the lower Missouri River. Similar to past reports, the Missouri River along Nebraska’s eastern border was divided into four riverine sampling segments:

- **Upper Unchannelized (PSPA Program Segments 5 & 6):** The Nebraska / South Dakota border (rkm 1,411.0) downstream to the headwaters of Lewis and Clark Lake (rkm 1,331.7).
• Lower Unchannelized (PSPA Program Segment 7): Gavins Point Dam (rkm 1,305.2) downstream to rkm 1,211.8 – approximately Ponca State Park where the river transitions from unchannelized to a channelized channel.

• Upper Channelized (PSPA Program Segment 8): Rkm 1,211.8 downstream to the confluence of the Platte River (rkm 957.6).

• Lower Channelized (PSPA Program Segment 9): Platte River confluence downstream to the Nebraska / Kansas state line (rkm 788.4).

This assessment used the same data as Steffensen et al. (2014) but extended the data set through the 2018 sampling season. The PSPA Program details and sampling logistics were detailed in Steffensen et al. (2014).

RESULTS & DISCUSSION

Upper Unchannelized: No Sicklefin Chubs have been collected in 16 years of sampling under the PSPA Program’s sampling efforts from the Upper Unchannelized reach (Figure 1). Sicklefin Chubs still appear to be extirpated in this reach between Fort Randall Dam and the headwaters of Lewis and Clark Lake.

Lower Unchannelized: Sicklefin Chubs occurrences are rare in the Lower Unchannelized reach of the Missouri River with only 22 fish collected during standardized sampling efforts, resulting in an overall catch rate of 0.004 fish per 100-m trawled (Figure 1). Only adult-sized Sicklefin Chubs were collected with the length distribution ranging from 96 to 122-mm (Figure 2).

Upper Channelized: Sicklefin Chubs are more frequently captured in the Upper Channelized reach compared to the Lower Unchannelized reach. However, only 74 Sicklefin Chubs have been captured during the PSPA Programs standardized otter trawl sampling in 14 years of sampling, resulting in an overall mean of 0.012 fish per 100-m trawled (Figure 1). The relative abundance varied from zero fish collected in several years to 0.068 fish per 100-m trawled in 2005. Due to the lack of Sicklefin Chubs in the Lower Unchannelized reach and the drift dynamics of larval Sicklefin Chubs, age-0 fish were rarely collected in the Upper Channelized reach (Figure 2).

Lower Channelized: Captures of Sicklefin Chubs in the Missouri River along Nebraska’s border is highest in the Lower Channelized reach but are highly variable with no discernable trend (Figure 1). Similar to the Upper Channelized reach, 2005 was the highest observed relative abundance (CPUE = 0.366 fish per 100-m trawled). Catch rates declined and remained low but slightly increased in 2017 (CPUE = 0.248). The size distribution of Sicklefin Chubs represents several age classes showing reproduction and early population recruitment on age-0 fish than an adult-sized population of mainly age-1 and likely age-2 fish (Figure 2).
As the lower Missouri River remains highly altered with minimal activities to mitigate these anthropogenic modifications, the likelihood of native fish species population recovering without additional protection appears bleak. Sicklefin Chub population, like other chub species, are generally suppressed below dams likely due to the change in water clarity and divergence from a natural hydrograph and temperature regime. This population suppression is perceived on the unchannelized reach with Sicklefin Chubs extirpated from the upper reach and infrequently observed in the upper half of the lower reach. Reduced population levels are observed in the Upper Channelized reach despite the input from several large tributaries (i.e., James River and Big Sioux River), which can cause a more natural hydrograph. The Sicklefin Chub are slightly more abundant compared to the currently State of Nebraska listed Sturgeon Chub (*Macrhybopsis hyostoma*). However, these species have both displayed negative population trends resulting from river modification and management with both *Macrhybopsis* species are currently being petitioned for Federal listing.

Prepared by:

Kirk Steffensen  
Missouri River Program  
Fisheries Division
Figure 1. Mean annual otter trawl catch per unit effort (±2SE) for Sicklefin Chubs by Missouri River reach along Nebraska’s eastern border from 2003-2018.
**Figure 2.** Sicklefin Chub length-at-capture by day-of-the-year by Missouri River reach along Nebraska’s eastern border from 2003-2018. Black lines represent approximate age class designations.
APPENDIX I.

ADJACENT STATES: Status of the Sicklefin Chub

South Dakota: Currently, the Sicklefin Chub is listed state endangered (SD Administrative Rule 41:10:02:05) and is included as a Species of Greatest Conservation Need is South Dakota Wildlife Action Plan. Main stem Missouri River impoundment and the subsequent filling on the Missouri River reservoirs, restricted Sicklefin Chubs distribution to the border waters between Nebraska and South Dakota below Gavins Point Dam (i.e., the Lower Unchannelized reach).


Iowa: Currently, the Sicklefin Chub is considered critically imperiled (S1) but does not carry a state endangered or threatened status. The Sicklefin Chub populations are restricted to the main stem Missouri River, which is the border water between Nebraska and Iowa and these abundance and distributions are listed above in under the Upper and Lower Channelized sections.


Kansas: Currently, the Sicklefin Chub is listed state endangered and protected by the Kansas Nongame and Endangered Species Conservation Act. The Sicklefin Chub distribution are restricted to main stem Missouri River with occasional observations from the lower Kansas River

https://ksoutdoors.com/content/download/7451/37213/version/2/file/sicklefin+chub%2C+sturgeon+chub%2C+Western+silvery+minnow.pdf

Missouri: Currently, the Sicklefin Chub are listed S3, meaning they are considered rare and uncommon in the state but are not considered endangered or threatened. In Missouri, the Sicklefin Chub is limited to the main stem Missouri River and the Mississippi River below the confluence of these rivers. Sampling efforts from the Pallid Sturgeon Population Assessment Project has shown that Sicklefin Chubs are most frequently captured in the Missouri reach of the lower Missouri River.

REFERENCES


Hesse LW. 1994. The status of Nebraska fish in the Missouri River, selected chubs and minnows (Cyprinidae): Sicklefin Chub (Macrhybopsis meeki), Sturgeon Chub (M. gelida), Silver Chub (M. storeriana), Speckled Chub (M. aestivalis), Flathead Chub (Platygobio gracilis), Plains Minnow (Hybognathus placitus), and Western Silvery Minnow (H. argyritis). Transaction of the Nebraska Academy of Science 21:L99-108.


Meek SE. 1892. A report upon the fishes of Iowa, based upon observations of collections made during 1889, 1890 and 1891. Bulletin of the US Fish Commission 10: 217-248


Panella MJ, SC Schainost, GE Mestl, and KD Steffensen. 2018. Listing proposal for four small-bodied fishes in Nebraska: Flathead Chub (Platygobio gracilis), Plains Minnow (Hybognathus placitus), Sicklefin Chub (Macrhybopsis meeki), Western Silvery Minnow (Hybognathus argyritis). Nebraska Game and Parks Commission, Lincoln, NE.


Steffensen KD, DA Shuman, 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. storeriana), Flathead Chub (Platygobio gracilis), Plains Minnow (Hybognathus placitus), Western Silvery Minnow (H. argyritis), and Brassy Minnow (H. hankinsoni). Transactions of the Nebraska Academy of Science 34:49-67.


June 12, 2018

Nebraska Game and Parks Commission  
Attn: James Douglas, Director  
2200 N. 33rd St.  
PO Box 30370  
Lincoln, NE 68503-0370

Dear Mr. Douglas,

Thank you for sharing the information on the process and species the state of Nebraska plans to adjust within its state species list under your Nongame and Endangered Species Conservation Act. Your collaboration with a neighboring state is greatly appreciated and solidifies the established relationship our states have when it comes to managing our natural resources.

We are supportive of the status changes you are proposing. It is also understood that the status of individual species can differ from one state to another, which is the case for a few of the species Nebraska is proposing compared to the status in South Dakota. Because those differences exist, we are providing some brief data for information sharing purposes. We are interested in learning more and sharing information with Nebraska.

Your current proposal is to categorize the Western Silvery Minnow as state endangered and the Flathead Chub and Plains Minnow as state threatened. South Dakota currently does not have these fish species listed and are defined as secure. In fact, all three species are listed as bait that can be used by anglers for noncommercial use as described in Administrative Rule 41:09:04:02.04 (Species that may be taken as bait for noncommercial use. Species that may be taken as bait by lawful anglers for noncommercial use are: flathead chub, western silvery minnow, plains minnow, fathead minnow, white sucker, creek chub, golden shiner, spottail shiner, gizzard shad, tiger salamander (all subspecies), leopard frog (all subspecies), crayfish (Cambarus diogenes, Orconectes virilis, and Orconectes causeyi), freshwater shrimp, and leeches.).

The Sicklefin Chub is also listed as a state endangered species in South Dakota, whereas the McCown’s Longspur is not a state listed species. The proposed status change to the North American River Otter seems appropriate as we are seeing similar trends in South Dakota and is likely to be removed from its state threatened status in the near future.
Thank you again for contacting the state of South Dakota. As stated earlier, the Department of Game, Fish and Parks is interested in learning more about these species and we stand ready to exchange information that will be helpful to both states in managing our natural resources.

Sincerely,

Kelly R. Hepler
Cabinet Secretary
Hi Melissa,

Could you please provide the District with photos of the species and a map of their occurrence in the District that were included in the Director’s letter to Paul Zillig? The NRD Directors would like this information.

Thanks,

Dan
Hi Melissa,

Thanks for the maps. Do you have a photo of each species? The Directors on the Recreation, Forestry & Wildlife subcommittee were interested in seeing what these species look like.

Thanks,

Dan
RE: T&E Species Revision's

Dan Schulz [dschulz@lpsnrd.org]

Sent: Monday, June 18, 2018 11:19 AM

To: Panella, Melissa

Those are great Melissa, Thanks,

Dan
Hello Melissa,

Attached you will find some comments and suggestions on the Nebraska Game and Parks Commission proposed listing of several small bodied fishes. If you have any questions please feel free to call.

We also sent hard copies to the Commissioners for Districts in which the majority of our facilities occur. We look forward to working with the NGPC on the issues outlined.

James Jenniges
Senior Environmental Specialist
Nebraska Public Power District
Office 308-236-2293
Cell 308-627-6732
jjjenni@nppd.com
March 26, 2019

Dear Madams and Sirs,

The Nebraska Public Power District, Central Nebraska Public Power and Irrigation District and Loup Power District (collectively the Districts) are respectfully providing comment and input on the proposal by the Nebraska Game and Parks Commission to list several small bodied fishes as threatened and/or endangered under the Nebraska Nongame and Endangered Species Conservation Act (NESCA; Neb. Rev. Stat. 37-801 to 37-811). These comments are provided pursuant to Neb. Rev. Stat. 37-806 Section 3(b)(iii).

Data

As part of the relicensing of the Federal Energy Regulatory Commission (FERC) Project 1835 and 1417, the Districts have sampled small bodied fishes in the central Platte River at various sites from Lexington to Philips, Nebraska at different times since 1988. Since 1999 these reports have been provided to NGPC in an annual FERC monitoring report and all fish collected have been identified and documented in our scientific collecting permit reports. All the fish species being proposed for listing have been caught and identified in those sampling efforts. Below is a summary of those data:

Flathead chub (*Platygobio gracilis*): proposed to be listed as threatened. The Districts’ last captured flathead chub was in 1990 near Philips. However, that should not be taken to mean that they do not still exist in portions of the central Platte. As management actions associated with the FERC licensing became clear, the objectives of our sampling plan changed and NPPD quit sampling sites below the Kearney Canal Diversion in the 1990s. Therefore, our data do not provide much additional information over what NGPC has considered. However, with no barrier to fish migration from the lower Platte or Loup River, it would seem likely they would be present in the same areas they were historically observed.

Plains minnow (*Hybognathus placitus*): proposed as threatened; western silvery minnow (*H. argyritis*): proposed as endangered. The objectives of the Districts’ fish sampling efforts were not to differentiate among very similar species such as the plains minnow and the western silvery minnow. Due to the growing concern over the western silvery minnow and the need to sacrifice specimens for purposes of species identification (i.e., to that from the plains minnow), the Districts’ combined the two into one category under the genus *Hybognathus* beginning in 2003. Consequently, all data presented here
represent a combination of both plains minnow and western silvery minnow. With 18 years of sampling between 1988 and 2018, the percentage of fish caught that were plains minnow/western silvery minnow ranged from 0% in 1988 and 2014, to 4.3% in 1999 (Table 1). These two species made up a small percentage of all fish communities examined and did not reflect any temporal or spatial trends of representing larger or smaller parts of these communities. During our sampling efforts, multiple replications of seine or trawl samples were taken at each site along the river reaches sampled. The vast majority of those samples did not contain either of these two species. Replicate sampling demonstrates these species are not evenly distributed, and limited sampling may yield false negative species occurrences. Therefore, care should be taken if making decisions of species listing based on limited sampling events.

**Concerns**

In addition to the actual data collected, our long-term sampling of fish in the central Platte has given us insight to issues when sampling small bodied fishes. There is a very high degree of variability in parameters and factors such as fish distribution and sampling efficiency that are affected by flow, habitat availability, weather, season, and even time of day. The sampling design we used of multi-trawls or seines from a defined length of river allows for evaluating the variation associated with the sample. What became clear early on is that the variation is so great compared to the point estimate that any estimate of abundance is statistically imprecise, very difficult to interpret, and likely does not represent a very accurate picture of actual species abundance, without multiple samples over long river reaches.

Another source of bias is observer error. Our sampling efforts have required anywhere from 4 to 11 people, and over the course of 30 years, there have been multiple personnel changes associated with our sampling plan. Most personnel had formal training in natural resource fields; however, few have a good knowledge of small fishes and their ability to differentiate among small bodied central Platte fish species is quite variable. This potential source of error needs to be recognized when comparing samples from different people, where there seems to be conflicting results.

It appears NGPC has used the best data available to them; however, it is unclear how many sampling events occurred during the 1900-2004 and 2005-2016 periods. Given species distribution and abundance variability observed in samples taken at the same site at the same time (e.g., among replicates), and at the same site at different times (i.e., both seasonally in the same year or among years), it is difficult for us to understand exactly what comparisons between those two time periods reflect. Based on the data presented, there appears to be numerous areas sampled between 2005 and 2016 where the species were absent. Without knowing sampling technique, effort, timing and capabilities of field personnel, we do not agree that the data “reflecting” species absence automatically equates to the aforementioned fish species being threatened or endangered, or potentially becoming extinct in the state of Nebraska. For example, the map depicting sampling from 2005-2016 would indicate numerous sampling events in the lower Platte River with no captures of western silvery minnow. Conversely, a recently published paper (Uerling et al. 2018) found 11% of the fish captured in a restored side channel on the lower Platte were western silvery minnows. Similarly, the map for plains
minnow shows one occurrence in the central Platte River and the western silvery minnow map shows no occurrences, yet our data indicate plains minnow/western silvery minnow were sampled in most years when replicate samples were taken. Likewise, a study of foraging ecology of least terns in the central Platte River indicated that western silvery minnow (and "Hybognathus sp.") made up 2.2% of the fish community (Sherfy et al. 2012), which was consistent with the Districts’ data.

The NGPC in response to peer review indicates that one of the main goals of the listing is to ensure that projects with a state nexus will fall under the environmental review process, and thus reduce further degradation and loss of habitat. While it is understandable why NGPC would want to have that input, it is also worrisome that every water transfer, water right, treatment of phragmites that uses state funds, etc. would need to be approved by NGPC. Even NGPC’s own actions, such as stocking predator fish species in lakes and canals that ultimately reconnect to the river systems would have to be evaluated. In our experience with the Federal Endangered Species Act, such approvals result in delays, costs and uncertainty that make project planning very difficult. Given that the four species proposed for listing would encompass every river basin except the Blue River, and NGPC indicate any location within the current or historical species distributions would be eligible for recovery, and thus need review this would be a lot of new responsibility for NGPC.

In addition to those things that have a state nexus, there are numerous other ongoing activities that could potentially “take” these fish. The NGPC correctly points out none of the species under consideration would currently be legal as bait fish. This would imply that commercial bait operations, as well as anglers capturing their own bait fish, would be required to adequately identify these fish to the species taxonomic level, and differentiate those species among legal bait fish. However, it is very unlikely the average person, or even many people trained in natural resource management, would be able to correctly identify these species when compared to other small bodied silver fishes found in the same rivers. As stated in the proposal, it is this incidental catch and take that created a prohibition on seining and trapping any fish in streams where currently listed species reside. Would listing of these species preclude seining and fish trapping in all river basins where these species have been documented?

In addition to “Implications” listed in the proposals, there are other activities which most assuredly take fish, such as drying up of irrigation canals at the end of irrigation season. How would NGPC handle such a scenario if any of the listed species were found in those canals? Historically, activities of electric companies and irrigation districts such as hydro peaking and diversion of water from the river have been blamed for fish kills. While the Districts do not necessarily agree with the logic to connect the causation of those fish kills with our activities, fish kills have occurred. Therefore, we believe NGPC needs to address how incidental take associated with otherwise lawful activities would be handled. Under existing Nebraska law there must be a net benefit to the species to issue a permit for take.

**Conclusion**

The Districts agree with the peer reviewer that NGPC has presented sufficient data to raise the question regarding current status of the species proposed for listing, but the overall existing database and
sampling effort variability do not provide reliable data necessary to make the final decision. The Districts believe there is sufficient information (i.e., peer reviewer example of easily catching plains minnow in Loup River, NPPD data; Sherfy et al. 2012; Uerling et al. 2018) to raise questions as to how well the current monitoring efforts are documenting these species of concern. The reported decline in relative abundance and distribution of these small bodied fishes is an indication that additional monitoring and sampling efforts are warranted. This additional effort would need to include multiple sampling events and replication conducted at varying habitat types along representative river reaches. More novel scientific approaches, such as environmental DNA, should be examined to supplement the existing data and be integrated if appropriate before making a final decision.

Even if this additional data support listing these fish species, the Districts disagree with the implied tone of the listing proposals, which is that the listings will have limited impacts or that the impacts are easily addressed. The Districts believe the issue of take incidental to otherwise lawful activities, such as water diversion for irrigation, hydro-electric generation or dredging of canals, needs to be addressed before any listing is finalized. The Districts would prefer to work with NGPC to address those issues in a cooperative manner, rather than through a post listing regulatory effort. In the Districts’ experience, attempting to obtain an incidental take permit after listing can result in time and expenses that far outweigh any benefit the species may receive by the final conditions of that permit. The Districts take precautionary measures to avoid incidental take of threatened or endangered species; however, listing these four species almost assuredly means incidental take could not be avoided in the form of stranding in dewatered irrigation canals, and that potentially, water diversion will be blamed for fish kills associated with low water levels and high temperatures. Therefore, the Districts would prefer to address these issues prior to listing these fish species of concern.

If you have any questions or would like to meet to discuss these comments, please contact Jim Jenniges at 308-236-2293, jjenni@npdd.com or Dave Zorn at 308-537-3582, dzorn@cnppid.com or Ron Ziola at 402-564-3171, rziola@loup.com.
Table 1. Number of total fish (i.e., all species observed in the samples) and number of plains minnow/western silver minnow (*Hybognathus* spp.) sampled from open channel areas during Districts’ fish sampling 1988 to 2018.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Fish</th>
<th><em>Hybognathus</em> spp.</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>8,578</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1990/1991</td>
<td>49,012</td>
<td>698</td>
<td>1.4</td>
</tr>
<tr>
<td>1992</td>
<td>9,172</td>
<td>116</td>
<td>0.2</td>
</tr>
<tr>
<td>1999</td>
<td>1,456</td>
<td>67</td>
<td>4.3</td>
</tr>
<tr>
<td>2003</td>
<td>7,133</td>
<td>52</td>
<td>0.7</td>
</tr>
<tr>
<td>2005</td>
<td>4,105</td>
<td>11</td>
<td>0.3</td>
</tr>
<tr>
<td>2007</td>
<td>1,246</td>
<td>18</td>
<td>1.4</td>
</tr>
<tr>
<td>2008</td>
<td>2,159</td>
<td>3</td>
<td>0.1</td>
</tr>
<tr>
<td>2009</td>
<td>2,603</td>
<td>44</td>
<td>1.7</td>
</tr>
<tr>
<td>2010</td>
<td>681</td>
<td>9</td>
<td>1.3</td>
</tr>
<tr>
<td>2011</td>
<td>735</td>
<td>3</td>
<td>0.4</td>
</tr>
<tr>
<td>2012</td>
<td>8,134</td>
<td>14</td>
<td>0.1</td>
</tr>
<tr>
<td>2013</td>
<td>3,847</td>
<td>6</td>
<td>0.2</td>
</tr>
<tr>
<td>2014</td>
<td>2,683</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2015</td>
<td>886</td>
<td>4</td>
<td>0.5</td>
</tr>
<tr>
<td>2016</td>
<td>2,038</td>
<td>9</td>
<td>0.4</td>
</tr>
<tr>
<td>2017</td>
<td>2,352</td>
<td>21</td>
<td>0.9</td>
</tr>
<tr>
<td>2018</td>
<td>980</td>
<td>21</td>
<td>2.1</td>
</tr>
</tbody>
</table>

**Literature Cited**


Cc: Jim Ernst – Commissioner District 3  
Norris Marshall – Commissioner District 4  
Robert Allen – Commissioner District 5
Good Morning Melissa,

Would August 28 work I don't think we will need more than an hour or so.
Thank You Melissa,

We do understand and agree that available evidence suggest these species are not as abundant as historical data indicates. Therefore as we indicated we would like to continue to work proactively with the NGPC to ensure their continued existence and preclude the need for future listing. We believe there is opportunity and flexibility to address the needs of the species and look forward to working with the NGPC.
The following regulations are prescribed by the Game and Parks Commission, State of Nebraska in accordance with Neb. Rev. Stat. §§ 37-301, 37-314, 37-316, 37-418, 37-540, 37-542, 37-548 through 37-549, and 37-801 through 37-811. For purposes of these regulations, unless context otherwise requires, the definitions found in Chapter 37, sections 202 through 247 of the Game Law, are used. These regulations are effective following enactment by the Commission, approval by the Attorney General and Governor, and when five days have elapsed since filing with the Secretary of State.

### 004.01 ENDANGERED SPECIES

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Location¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Whooping crane</td>
<td>Grus americana</td>
<td>Entire</td>
</tr>
<tr>
<td>*Eskimo curlew</td>
<td>Numenius borealis</td>
<td>Entire</td>
</tr>
<tr>
<td>*Interior least tern</td>
<td>Sternula antillarum athalassos</td>
<td>Entire</td>
</tr>
<tr>
<td>Mammals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Black-footed ferret</td>
<td>Mustela nigipes</td>
<td>Entire</td>
</tr>
<tr>
<td>Swift fox</td>
<td>Vulpes velox</td>
<td>Entire</td>
</tr>
<tr>
<td>Plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Blowout penstemon</td>
<td>Penstemon haydenii</td>
<td>Entire</td>
</tr>
<tr>
<td>**Colorado butterfly plant</td>
<td>Gaura neomexicana ssp. coloradensis</td>
<td>Entire</td>
</tr>
<tr>
<td>Saltwort</td>
<td>Salicornia rubra</td>
<td>Entire</td>
</tr>
<tr>
<td>Fishes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Topeka shiner</td>
<td>Notropis topeka</td>
<td>Entire</td>
</tr>
<tr>
<td>*Pallid sturgeon</td>
<td>Scaphirhynchus albus</td>
<td>Entire</td>
</tr>
<tr>
<td>Blacknose shiner</td>
<td>Notropis heterolepis</td>
<td>Entire</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Location</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Sturgeon chub</strong></td>
<td><em>Macrhybopsis gelida</em></td>
<td>Entire</td>
</tr>
<tr>
<td><strong>Sicklefin Chub</strong></td>
<td><em>Macrhybopsis meeki</em></td>
<td>Entire</td>
</tr>
<tr>
<td>Invertebrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>American burying beetle</em></td>
<td><em>Nicrophorus americanus</em></td>
<td>Entire</td>
</tr>
<tr>
<td><em>Salt Creek tiger beetle</em></td>
<td><em>Cicindela nevadica lincolniana</em></td>
<td>Entire</td>
</tr>
<tr>
<td>*Scaleshell mussel</td>
<td><em>Leptodea leptodon</em></td>
<td>Entire</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Also listed as endangered in Nebraska under the Federal Endangered Species Act.</em>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Also listed as threatened in Nebraska under the Federal Endangered Species Act.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1Portion of Nebraska where endangered or threatened.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2Last reported Nebraska sighting was made in 1926, no documented sighting anywhere since 1962. Species likely extinct.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3There are recent (not historical) records of this species in Nebraska. However, there are no known breeding populations and/or Nebraska does not provide an important stopover or migratory path for this species.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>004.02 THREATENED SPECIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Name</td>
</tr>
<tr>
<td>Birds</td>
</tr>
<tr>
<td>Mountain plover</td>
</tr>
<tr>
<td><strong>Piping plover</strong></td>
</tr>
<tr>
<td><strong>Red knot</strong></td>
</tr>
<tr>
<td><strong>McCown’s Longspur</strong></td>
</tr>
<tr>
<td>Mammals</td>
</tr>
<tr>
<td>Southern flying squirrel</td>
</tr>
<tr>
<td><strong>River otter</strong></td>
</tr>
<tr>
<td><strong>Northern long-eared bat</strong></td>
</tr>
<tr>
<td>Plants</td>
</tr>
<tr>
<td><strong>Ute ladies’-tresses orchid</strong></td>
</tr>
<tr>
<td><strong>Western prairie fringed orchid</strong></td>
</tr>
<tr>
<td>American Ginseng</td>
</tr>
<tr>
<td>Small white lady’s-slipper</td>
</tr>
</tbody>
</table>
Fishes

<table>
<thead>
<tr>
<th>Species</th>
<th>Scientific Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake sturgeon</td>
<td>Acipenser fulvescens</td>
<td>Entire</td>
</tr>
<tr>
<td>Northern redbelly dace</td>
<td>Chrosomus eos</td>
<td>Entire</td>
</tr>
<tr>
<td>Finescale dace</td>
<td>Chrosomus neogaeus</td>
<td>Entire</td>
</tr>
</tbody>
</table>

Reptiles

<table>
<thead>
<tr>
<th>Species</th>
<th>Scientific Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massasauga</td>
<td>Sistrurus catenatus</td>
<td>Entire</td>
</tr>
<tr>
<td>Timber Rattlesnake</td>
<td>Crotalus horridus</td>
<td>Entire</td>
</tr>
</tbody>
</table>

*Also listed as endangered in Nebraska under the Federal Endangered Species Act.
**Also listed as threatened in Nebraska under the Federal Endangered Species Act.
1 Portion of Nebraska where endangered or threatened.
3 There are recent (not historical) records of this species in Nebraska. However, there are no known breeding populations and/or Nebraska does not provide an important stopover or migratory path for this species.

004.03 General Regulations

It shall be unlawful to:

004.03A Take, export, possess, process, sell or offer for sale, deliver, carry, transport, or ship by any means whatsoever any threatened species, except as specifically provided by state or federal law, with the following exceptions:

004.03A1 Accidental taking of any lake sturgeon or pallid sturgeon through commercial operations or by hook and line will not be considered unlawful if returned to the water immediately.

004.03A2 Accidental taking of river otter through legal furbearer trapping activity will not be considered unlawful if released immediately (if individual is viable) or remains are delivered to the Nebraska Game and Parks Commission. Taking of massasauga or timber rattlesnake will not be considered unlawful if it is done for the immediate protection of the health of humans, livestock or pets.

004.03A3 Taking of massasauga will not be considered unlawful if it is done for the immediate protection of the health of humans, livestock or pets.

004.03A4 Possession, processing, sale or transport of cultivated (non-wild) ginseng, or wild ginseng that is legally harvested outside of Nebraska, shall not be considered unlawful.
004.03A5 004.03A4 Unintentional taking of plants resulting from normal agricultural practices shall not be considered unlawful.

004.03B Take by seine or trap any fish in any of the streams listed below:

- Brush Creek west of Brownlee in Cherry County
- Cottonwood Creek in Keya Paha County
- East Holt Creek in Keya Paha County
- Gordon Creek west of Highway 61 in Cherry County
- Holt Creek in Keya Paha County
- Niobrara River east of Box Butte Reservoir and west of Highway 385 in Dawes County
- Taylor Creek west of Highway 81 in Madison County

The Commission is authorized under state law to permit any act otherwise prohibited by these regulations for scientific purposes or to enhance the propagation or survival of the affected species.

Habitat improvement and maintenance programs administered by the Commission may be utilized to provide incentives or otherwise assist landowners in the protection of species affected by these regulations.
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.
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.

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.

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.

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.

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.