

Response to Peer Review of Proposals for Endangered and Threatened Listing Action in Nebraska April 2018

North American River Otter (*Lontra canadensis*):

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 fur-bearer, 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.

Timber Rattlesnake (*Crotalus horridus*):

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.

McCown’s Longspur (*Rhynchophanes mccownii*):

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.

Proposal for four small-bodied fish species: Flathead Chub (*Platygobio gracilis*), Plains Minnow (*Hybognathus placitus*), Sicklefin Chub (*Macrhybopsis meeki*), and Western Silvery Minnow (*Hybognathus argyritis*)

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).

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

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

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

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

- Nebraska Dept. of Natural Resources and Upper Republican Natural Resources District. 2016. Integrated management plan. Nebraska.
https://dnr.nebraska.gov/sites/dnr.nebraska.gov/files/doc/water-planning/republican/upper-rep-NRD/20151210_URNRD_FinalIMP.PDF (accessed 11 Apr 2018).
- Perkin, J. S., K. B. Gido, A. R. Cooper, T. F. Turner, M. J. Osborne, E. R. Johnson, and K. B. Mayes. 2015. Fragmentation and dewatering transform Great Plains stream fish communities. *Ecological Monographs* 85:73–92.
- Perkin, J. S., K. B. Gido, J. A. Falke, K. D. Fausch, H. Crockett, E. R. Johnson, and J. Sanderson. 2017. Groundwater declines are linked to changes in Great Plains stream fish assemblages. *Proceedings of the National Academy of Sciences of the United States of America* 114(28):7373–7378.
- Rahel, F. J. and L. A. Thel. 2004. Flathead Chub (*Platygobio gracilis*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region, USA.
www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5182082.pdf
- Siebert, S., J. Burke, J. M. Faures, K. Frenken, J. Hoogeveen, P. Döll, and F. T. Portmann. 2010. Groundwater use for irrigation – a global inventory. *Hydrology and Earth System Sciences* 14:1863–1880.

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.

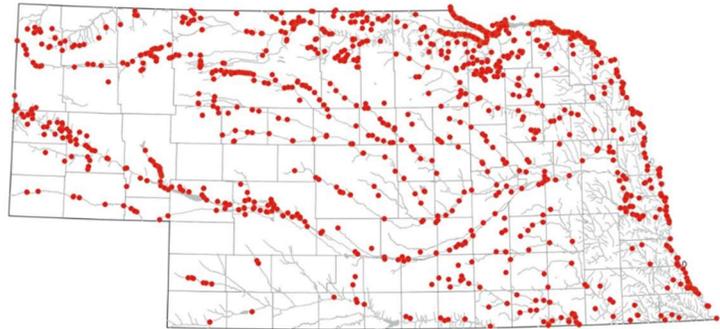
Referee 2: Move the map that shows all sites sampled from Appendix 3 to the beginning of the document.

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.

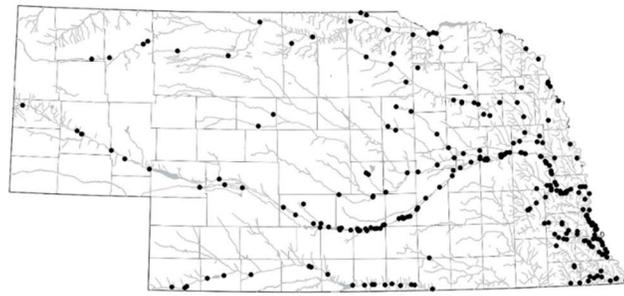
Referee 2: I recommend depicting a map for each of the fish species showing where we sampled since a chosen date vs. where it was collected, possibly with the hydrologic unit highlighted/outlined.

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.

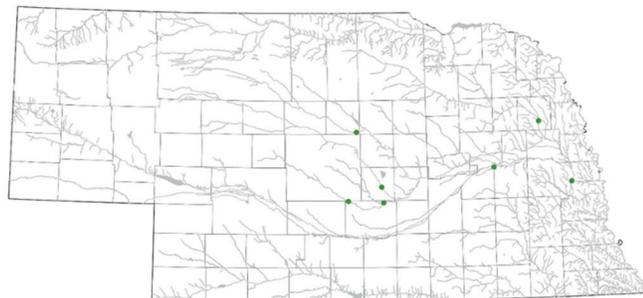
For example:



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



Western Silvery Minnow
All Collection Sites
1900 - 2004



Western Silvery Minnow
All Collection Sites
2005 - 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.