

Use of the Lower Platte River by Juvenile and Non-reproductive Adult Pallid Sturgeon Life Stages

Juvenile and non-reproductive adult life stages have been combined due to 1) the lack of a clear delineation between these life stages and 2) the lack of any information specific to the juvenile life stage.

There is strong evidence that:

- **Pallid sturgeon occur in the Lower Platte River, mostly below the Elkhorn River confluence.**
 - Hatchery-reared pallid sturgeon have been stocked into or at the mouth of the Platte River since the late 1990s. Since 2002, 5,131 pallids have been stocked at the mouth of the Platte River and 22,436 have been stocked near the mouth of the Platte.²
 - Since 2009, 152 genetically confirmed pallids have been captured downstream of the Elkhorn River confluence, and 13 genetically confirmed pallids have been captured upstream of the Elkhorn River confluence.^{3,4}
 - Most pallids captured in the Lower Platte River (80%) are hatchery-reared; 7% have been wild and 13% have been of unknown origin.^{3,4}
- **Pallids use the deepest available water habitat in the Lower Platte**
 - They use a range of habitat, but during one study, pallids were most frequently captured in the deepest and swiftest runs of the river⁶. During another, pallids were captured more often in deeper water when water temperatures were cooler and turbidity was lower.³
- **Captures of pallid sturgeon in the Lower Platte River are highest during spring and fall.**
 - Pallid sturgeon have been captured every month when sampling occurred between March and November. Approximately twice as many pallids have been captured in the spring (March-May; n=72) and fall (Sept-Nov; n=61) seasons than were captured in summer (June-Aug; n=32).^{2,3,4}
- **Pallid sturgeon in the Lower Platte are in good physical condition.**^{3,9}
- **Low summer flows in the Lower Platte increase the potential for pallid sturgeon stress and/or mortality**
 - Two pallid sturgeon mortalities were documented in 2012 downstream of the Elkhorn confluence when flow was less than 1,000 cfs and water temperature was >86°F.⁷

There is some (or conflicting) evidence that:

- Capture of pallid sturgeon in the Lower Platte varies relative to discharge and season.
 - One study⁵ indicated that probability of occurrence decreased with increasing distance from the Missouri River and increasing discharge in the spring and fall, and that probability of occurrence decreased with increasing discharge in the summer; another study found that discharge was not significant when comparing sites where pallids were captured and not captured³. Overall, there is no established relationship between discharge and flow-related variables of depth, velocity, temperature or turbidity that could be used to explain species occurrence.
- Pallid occurrence in the Lower Platte decreases with increasing within-day stage change due to hydrocycling.
 - One study⁸ indicated that probability of occurrence decreased with increasing coefficient of diel variation in discharge (CV) due to hydrocycling. However, there was no established relationship between CV and flow-related variables of depth, velocity, temperature or turbidity that could be used to explain species occurrence.

PRRIP Pallid Sturgeon State of Knowledge Summary (July 2017)

- The PPRIP Executive Director's Office conducted an internal review of the paper above and concluded the research contains a statistical error that renders the inference with regard to the relationship between the probability of pallid sturgeon occurrence and coefficient of diel variation in discharge erroneous.¹⁰

Remaining uncertainties include:

- Limitations in sampling methodologies or analyses could affect aforementioned flow/species relationship. Factors not related to flow could also affect our understanding of flow/species relationships.
- Reasons for lack of wild pallid sturgeon in the lower Platte are unknown. It has been hypothesized that the lack of deep-water habitat (>3.28 ft) may limit larger, wild adults³.
- Sturgeon captures that are not genetically identified cannot be conclusively included with pallid sturgeon counts. In addition to those identified here, 25 suspected pallid sturgeon (but not genetically identified) have been captured in the Lower Platte.

Our predictive ability would be enhanced if:

- Collaboration with pallid sturgeon experts identified key limitations in sampling methodologies or analyses, and through this collaboration, we develop a plan to address key limitations in future research/monitoring/analyses.
- We could improve our understanding of differences in pallid sturgeon flow- and temperature-related variables upstream to downstream and relate these differences to discharge.
- We could improve our understanding of flow- and temperature-related factors that affect pallid mortality, condition, capacity, and movement in the Lower Platte River.

References

1. Peters, E. J., and J. E. Parham. 2008. Ecology and management of sturgeon in the lower Platte River, Nebraska. Nebraska Game and Parks Commission, Nebraska Technical Series No. 18, Lincoln, Nebraska.
2. Huenemann, T. 2017. Central Lowlands and Interior Highlands Pallid Sturgeon Spawning and Stocking Summary (1992-2016). Prepared for the Middle Basin Pallid Sturgeon Workgroup.
3. Hamel, M.J., Pegg, M.A., Hammen, J.J. and Rugg, M.L., 2014. Population characteristics of pallid sturgeon, *Scaphirhynchus albus* (Forbes & Richardson, 1905), in the lower Platte River, Nebraska. *Journal of Applied Ichthyology*, 30(6), pp.1362-1370.
4. Hamel, M.J. 4/28/2017. Personal communication with John Shadle.
5. DeLonay, A.J., Chojnacki, K.A., Jacobson, R.B., Albers, J.L., Braaten, P.J., Bulliner, E.A., Elliott, C.M., Erwin, S.O., Fuller, D.B., Haas, J.D., Ladd, H.L.A., Mestl, G.E., Papoulias, D.M., and Wildhaber, M.L., 2016, Ecological requirements for pallid sturgeon reproduction and recruitment in the Missouri River—A synthesis of science, 2005 to 2012: U.S. . with appendixes, <http://dx.doi.org/10.3133/sir20155145>.
6. Peters, E.J., and J. E. Parham. 2004. Pallid sturgeon and sturgeon chub in the lower Platte River 2000 to 2004: Final Report to the Pallid Sturgeon / Sturgeon Chub Task Force.

PRRIP Pallid Sturgeon State of Knowledge Summary (July 2017)

7. United States Fish and Wildlife Service. 2016. Final Biological Opinion for Loup River Hydroelectric Project No.P-1256-031. Prepared for Federal Energy Regulatory Commission.
8. Hamel, M. J., Spurgeon, J. J., Pegg, M. A., Hammen, J. J. and Rugg, M. L. (2014). Hydrologic Variability Influences Local Probability of Pallid Sturgeon Occurrence in a Missouri River Tributary. *River Research and Applications*. 32(3), 320-329. DOI: 10.1002/rra.2850
9. Steffensen, K.D., and Mestl, G.E., 2016, Assessment of pallid sturgeon relative condition in the upper channelized Missouri River: *Journal of Freshwater Ecology*, p. 1-13. 10.1080/02705060.2016.1196465.
10. Executive Director's Office. 1 December 2014. Review of: Hydrological variability influences local probability of pallid sturgeon occurrence in a Missouri River tributary. Platte River Recovery Implementation Program, Kearney, NE.