

Habitat use and population dynamics of benthic fishes along the Missouri River

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Iowa Department of Natural Resources

Goals and Objectives:

The goal of this study has been to evaluate habitat use and population dynamics of benthic fishes along the entire length of the mainstem Missouri River, exclusive of reservoirs. The project was conducted by a consortium of Cooperative Research Units in Idaho, Montana, South Dakota, Iowa, Kansas, and Missouri. The Iowa Cooperative Research Unit was responsible for the river reach between Sioux City, Iowa and Rulo, Nebraska. The Iowa-Nebraska section of river was divided into four segments. Within each segment, six macrohabitats were identified from preliminary literature reviews and visual inspection of the river. Within each segment, data from five replicate, randomly selected samples of each macrohabitat were collected where available. Specific objectives were to:

- Assess the species composition, population age structure, recruitment, growth, condition and macrohabitat use of benthic fishes.
 - Characterize the magnitude, variability and predictability of flows and thermal regimes in different sections of the river, and in relation to human alterations.
 - Develop empirical models of the influence of hydrological and thermal regimes on the species composition, population age structure, recruitment, growth, condition and macrohabitat use of benthic fishes.
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Progress:

Several articles have been prepared for publication in peer-reviewed journals, and citations are reported at the end of this report.

Pegg, M. A., C. L. Pierce, and A. Roy. Effects of channelization and impoundment on flow in the Missouri River: a time-series analysis of daily mean flow. In revision for Aquatic Sciences. Human alteration of large rivers is commonplace, often resulting in significant changes in flow characteristics. We used a time series approach to examine daily mean flow data from locations throughout the mainstem Missouri River and tested for differences associated with human alteration. Data from a pre-alteration period (1925-1948) were compared with a post-alteration period (1967-1996), and separate analyses were conducted using either data from the entire year or restricted to the spring fish spawning period (1 April - 30 June). Daily mean flow over the entire year was significantly higher during the post-alteration period at all locations, largely reflecting long-term differences in precipitation. Daily mean flow during the spring was significantly lower during the post-alteration period at the most highly altered locations in the middle portion of the river, but unchanged at the least altered locations in the upper and lower portions. A natural flow regime during spring is widely viewed as beneficial to fish populations and river-floodplain ecosystems. Our results suggest that human alterations on the Missouri River, particularly in the middle portion most strongly affected by impoundments and channelization, have resulted in changes to the natural spring flow regime.

Future Plans:

In addition to the articles listed above, a multi-volume final report is being prepared. The final report will consist of six volumes reporting on components of the overall study, and six volumes reporting on individual Ph.D. dissertations. Two of the overall study volumes is currently complete, and five of the dissertation volumes are complete.