

**Minnesota Department of Natural Resources
Division of Ecological and Water Resources
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Hello,

What follows is a brief description of the general impacts of dams on river systems and ecology and reference to the options available to address them.

Dams have numerous negative impacts on river processes, biodiversity, and overall health. Dams fragment rivers and convert free-flowing ecosystems into lake-like ecosystems. This fundamental change results in the following impacts.

- Aquatic biodiversity declines because many riverine fish & mussel species cannot endure when they cannot reach spawning grounds, feeding areas, or refuge. Fragmentation of river systems (primarily by dams) has been one of the most widely cited causes of total extinction or local extinction of native fish species. All fish species are migratory to varying extent, but the most vulnerable fish species are those that travel very long distances (100's of miles) such as lake sturgeon, channel catfish, freshwater drum, sauger and walleye. Analysis of fish catch data from 19 complete main-stem dams throughout MN revealed that an average of 41% of the fish species downstream of these dams were not present anywhere upstream of the barriers. Furthermore, the extinction of all 20 mussel species in the U.S. has been attributed to dams.
- The altered habitat is unsuitable for the native riverine community, causing the riverine food webs to change. The native community suffers and becomes vulnerable to non-native species adapted to lake-like settings. The native fishes then cannot successfully compete. Research in the Great Lakes region found that non-indigenous species were 2.4 to 300 times more likely to occur in reservoirs than in natural lakes.
- The natural movement of water and sediment is disrupted resulting in accumulation of sediment in the reservoir with channel & bank erosion below the dam. A projected 25% of U.S. reservoirs will be at least half full by 2018. Inundation, sediment deposition, and erosion bury and damage riverine habitat, which is often critical rocky, steeper gradient rapid habitat.
- Water quality is altered. Nutrients & pollution accumulate in the reservoir. Water temperatures generally increase while other parameters, like dissolved oxygen, may be reduced as a result, which stresses the aquatic community and may shift species composition.

Social issues related to dams and their removal can be significant, as you know. Safety and security of residents is often a driving concern for removal of low head dams, due to the roller hydraulics, and 'drowning machine' effect. Aesthetic and cultural values of site visitors are important considerations but can be complicated for decision-makers to ascertain fully, in the absence of the alternatives. To that point: we have been restoring

rivers and removing or modifying dams in Minnesota since the late 1990's. A common experience for these projects is for a small, vocal group to be opposed to any proposed changes. If the restoration work proceeds, it is just as common for people to be very happy with the restored river, afterwards. Examples of communities that have been through this process are: Appleton, Jackson, and Dawson, Minnesota. A report, entitled: "Reconnecting Rivers: Natural Channel Design in Dam Removals and Fish Passage" documents river restoration and reconnection projects in our state that have helped restore stream health and connectivity. It can be accessed at: http://www.dnr.state.mn.us/eco/streamhab/reconnecting_rivers.html and is full of before and after pictures for various projects, to give you an idea of the possibilities available to remove or replace the dam. Obviously scale is an issue, many of the examples are of rivers much larger than Minnehaha Creek, but the principle remains: there are sound alternatives that replace the dam, provide recreational, aesthetic, and cultural amenities and heighten the resource values.

The River Ecology Unit has been involved in numerous dam removal and modification projects across the state. We support your efforts in this regard, as at low flows the dam is clearly unpassable for fish and may be a safety hazard at high flows. Our staff has expertise that ranges from river scientists to fish and mussel specialists, with many years of experience in river restoration work, including removing and modifying dams (with installed riffles). We would be happy to provide further expertise, information, or collaboration, as needed.

Sincerely,



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