

Restoring Aquatic Connectivity to a Historic Reach of the Pomme de Terre River and the Rapid Colonization of Freshwater Mussels and Fish

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One of the goals of the Marsh Lake Ecosystem Restoration Project was to restore the historic lower Pomme de Terre River reach to a similar dimension, planform and profile of an upstream reference reach and likely to its previous condition. Stream restoration in various forms is an important way to improve ecosystem function and biological diversity. A potential benefit of restoration is the capacity for freshwater mussels to colonize formerly degraded or unavailable habitats via dispersal by their obligate host fish. The composition of colonizing mussel assemblages depends, in part, on the composition, proximity, and connectivity of source populations. Colonization rates in these habitats are poorly known. We studied mussel colonization rates, community structure, and fish use of the restored reach of the Pomme de Terre River, a tributary of the Minnesota River in west central Minnesota.

The Pomme de Terre was diverted to a constructed adjacent channel in 1939, abandoning 2.2 km of the lowermost channel to stagnate and fill with sediment. Mainstem flow was reconnected to the abandoned channel in October 2018, 79 years later, restoring aquatic connectivity to the Minnesota River. Fish surveys were conducted during 2021, 3 years after flow was reconnected to the channel. We surveyed the restored channel for mussels in August 2022 during a 19-hour timed search. General observations suggest that up to 6 vertical feet of accumulated sediment was flushed from the channel with portions of the historic riverbed exposed revealing consolidated sand substrate with a small number of relic mussel shells present. We collected mussels at multiple sites totaling 163 individuals of 9 species, representing 60% of potential species from the source assemblages downstream in the Minnesota River and upstream in the Pomme de Terre River. Age estimates from external annuli counts averaged 1.9 years and included all age classes 0 to 5 years. Species with opportunistic and periodic life history strategies made up 98% of colonists, whereas equilibrium and periodic species were most abundant (70%) in the potential source assemblages. Our results showed that colonization by mussels occurred soon after flow was restored, likely by host fish, thus providing measurable benefits in a short time.

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