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Riparian Ecosystems of North Dakota

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More than 20 riverine systems occur in North Dakota, with four major rivers (Figure 1). These rivers are the Missouri, James, Souris and Red rivers. The Sheyenne River is the longest tributary of the Red River of the North, and the Little Missouri is the longest tributary of the Missouri River. These tributaries and associated riparian ecosystems play an important role in the maintenance of water quality within the primary basin.

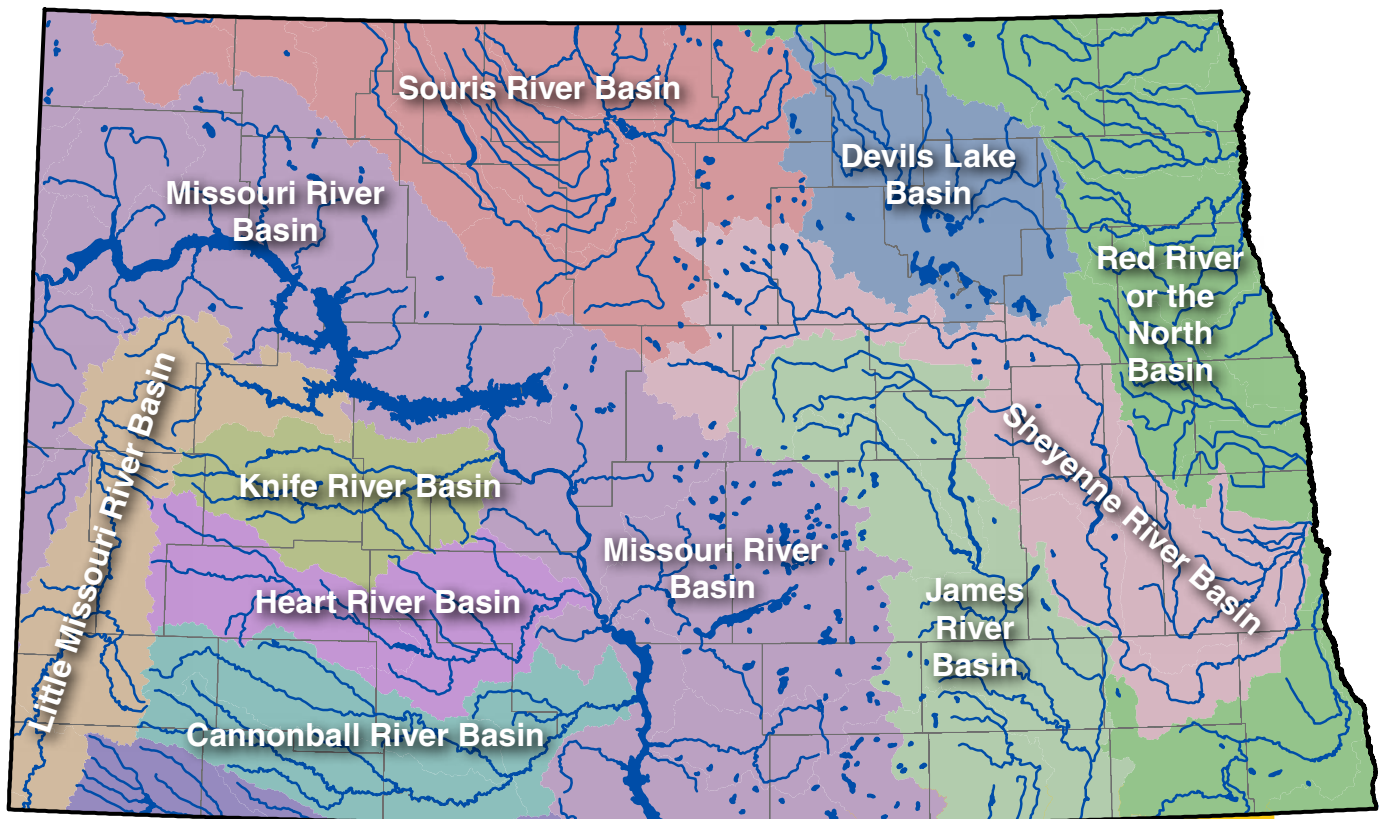


Figure 1. Map depicting major North Dakota river systems.

What are Riparian Ecosystems?

Riparian ecosystems are transitional areas between uplands, where water is generally not present, and streams, rivers or lakes, where water is present under normal conditions. Riparian ecosystems consist of the stream channel and flood plain of the stream, where vegetation is influenced by the water table, flooding and water-holding capacity of the soil.

Riparian ecosystems possess unique ecological processes and a diverse assemblage of plant communities, in comparison with the upland plant communities. The composition of riparian plant communities can vary greatly depending on streamflow, which influences water available for plant establishment and growth. Five primary communities can be associated with riparian ecosystems: 1) the greenline, which is the line of vegetation on or at the water's edge, 2) shrublands, 3) woodlands, 4) grasslands and 5) wetlands (Figure 2).

Riparian health is directly influenced by the composition of its riparian plant community. In a healthy riparian system, sedges and other deep-rooted species dominate the greenline. These species have many growing points, enabling them to produce many stems and roots. Streams need deep-rooted vegetation in order to hold their banks together and catch the sediment that allows a stream to build its floodplain (Figure 3). Additionally, these deep roots keep vegetation anchored in periods of high water flow and allow greater access to water in dry conditions. In the northern Great Plains, invasive perennial grasses such as smooth brome, Kentucky bluegrass and reed canarygrass are increasing within riparian areas. These invasive species can have shallow root systems compared to native riparian species, causing degradation of riparian areas due to bank erosion.

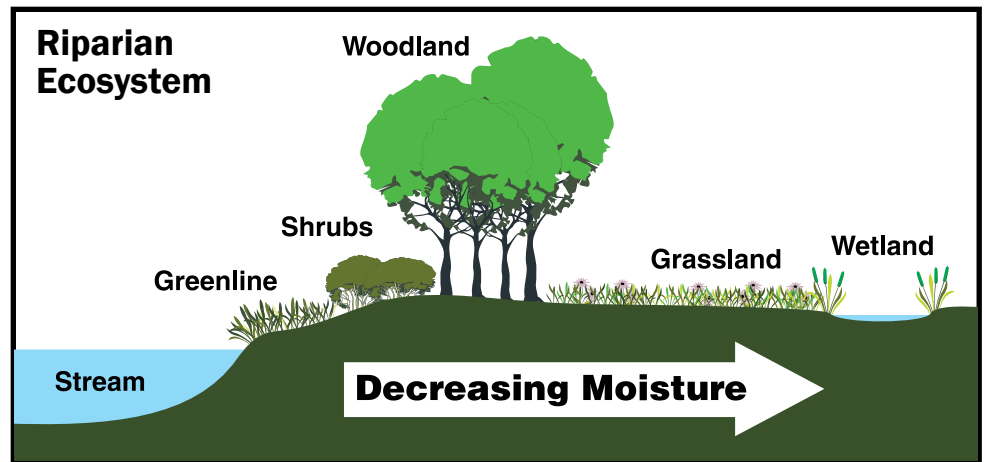


Figure 2. Illustration of the moisture gradient in a typical riparian ecosystem of the northern Great Plains.

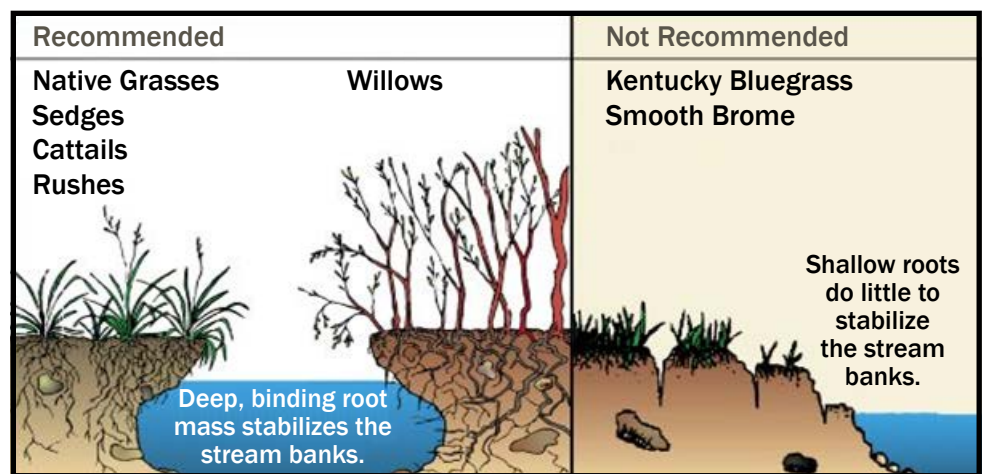


Figure 3. Illustrations of desirable and undesirable riparian vegetation and stream bank function. (Courtesy of Cows and Fish: Alberta Riparian Habitat Management Society)

Riparian Ecosystems and Water Quality

Healthy riparian ecosystems function to improve and maintain water quality and regulate seasonal flow patterns within a watershed. Riparian vegetation filters water before it reaches streams, lakes or wetlands. Healthy riparian ecosystems have the potential to reduce nonpoint source pollution that might otherwise contaminate streams and rivers in watersheds. These plant communities also catch and remove sediment, which, in excess, can pollute water, and allow the stream to better connect to its floodplain.

Riparian zones act as buffers or filters for contaminants from uplands that may be altered by urban development,

crop production and/or livestock production, making maintenance of a proper functioning riparian zone critical. This is especially vital to a riparian ecosystem such as the middle Sheyenne River, where uplands are managed for crop production and other agricultural uses.

Healthy, properly functioning riparian ecosystems store water, enhance groundwater recharge and reduce the impacts of spring flooding. When water is stored in the groundwater system during peak spring flows, it can be released back to the stream as groundwater recharge, minimizing fluctuations in stream flow.

Riparian Ecosystems and Wildlife

Even though riparian ecosystems make up a small portion of the landscape – about 2% of the land area in North Dakota – they are a valuable source of habitat for wildlife. The large proportion of the edge of riparian ecosystems associated with the assemblage of plant communities helps make these ecosystems desirable habitat for a variety of wildlife species. Riparian ecosystems are an especially critical source of habitat in North Dakota because more than half of the state’s woodlands are part of a riparian ecosystem. North Dakota’s game species benefit greatly from these areas. Fish, turkeys, pheasants and waterfowl all rely heavily on these riparian ecosystems. If available, several species of fish will use streams to spawn, and a healthy riparian system provides them with the necessary cover to spawn. Grasslands and shrublands provide key nesting cover for North Dakota’s game bird species. Additionally, riparian communities provide foraging opportunities and act as movement corridors for many species of wildlife. Thus, riparian ecosystems are a critical source of cover and biotic diversity.

Riparian Ecosystems and Livestock

Livestock often are attracted to riparian systems due to the availability of forage, water, shade and smooth terrain. Riparian ecosystems are extremely productive, producing a high volume of forage in proportion to their size. Grazing riparian areas is often viewed negatively because improper grazing can lead to changes in riparian vegetation, resulting in increased erosion, loss of biotic diversity, degradation of wildlife habitat, reduced water quality and alterations in stream hydrology. However, research indicates that managed grazing can be used to enhance riparian health. Grazing can help maintain invasive perennial grasses, which are desirable forage species. Proper grazing management allows the riparian vegetation time to rest and recover prior to high flow events that occur in the fall and early spring in the region (Figure 4). Research being conducted at North Dakota State University has found that grazing has the potential to restore riparian ecosystems by increasing floodplain access and extent with no negative impacts on the composition and extent of riparian plant communities. Implementation of proper grazing management practices are critical to prevent degradation by livestock and improve riparian health and proper function.



Figure 4. a) Riparian area on May 22, 2022, at the end of the spring grazing period, and b) The same riparian area on July 6, 2022. Early removal of grazing livestock allowed vegetation to regrow and provide protection during fall and early spring flood events.



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