Section 6: Understanding Western South Dakota Stream Types and Why We Classify Streams

Streams are dynamic and complex. They don't fit nicely into perfect boxes and are prone to change. So why put them into categories or types at all? This section describes why we classify (or identify and group) streams into types.

Classification is a process of putting similar items into groups or classes based on shared qualities and characteristics. As noted, streams are complex, with many factors influencing their health and behavior. Stream classification helps to organize these complex ecosystems into a reduced number of types. By simplifying streams into categories or types, we can then help to define reference (or healthy) conditions, understand similarities and differences in stream response or behavior, and help landowners and managers make management decisions that are based on feasible, appropriate, and achievable goals. Classification can help identify and draw out these shared challenges, strengths, and responses between different stream sites and help us further learn from the way that streams respond to different management scenarios.

There are many ways to classify streams. Classifications are typically based on physical and ecological characteristics, such as hydrology and flow, drainage area, **stream order** (a measure of the relative position of a stream in a watershed; the smallest tributaries are referred to as first-order streams), flow regime, and geomorphology (interaction of landscape, landform, and flow regime to shape the channel, channel size and/or channel materials, soil type, or geologic traits). Ecological classifications attempt to integrate many of these concepts to describe plant or animal communities in relation to their underlying hydrogeomorphology.

Ecological Site Descriptions (ESDs)

Ecological Site Descriptions are a tool that the USDA NRCS uses to describe and understand the potential of a site based on its soil type, topography, and plant communities. These descriptions can help a land manager understand how a site responds to a variety of disturbances over time; this process of change is also described in "state and transition models." ESDs can be very helpful during site assessment because they show how a site compares with others that have similar characteristics or are within the same landscape.

ESDs and their previous iteration, range sites, have provided ecological perspectives and guided rangeland management for more than 60 years (NRCS National Instructions 2015). Recent guidance recognizes that riparian ecological sites require a slightly different approach than upland or wetland ESDs. Site characteristics such as climate, landscape position, and soil features in the latter remain relatively stable over time. In contrast, water continually reshapes the landscape in riparian systems (Stringham and Repp 2010).

The following are the most common ESDs used to describe riparian areas in western South Dakota and beyond.

- *Wet lands* and *wet meadows*: These sites have poor water drainage with accumulated clay and silt and long periods of flooding or ponding. The increase in surface and groundwater makes these sites resistant to drought and critical for watershed function. The soil remains very moist throughout most of the growing season, resulting in distinct wetland plant communities. These sites are dynamic but often very stable and can recover quickly under favorable management.
- *Sub-irrigated* and *overflow sites*, also referred to as mesic areas: These sites range from poorly drained to moderately well drained and typically have adequate soil moisture to meet plant needs during the growing season. However, they can dry out during periods of extended drought. They can be very sensitive yet resilient features on the landscape, and under appropriate management are very stable. Degraded plant communities often become invaded with exotic cool-season grasses, such as Kentucky bluegrass and/or smooth bromegrass, which reduce biotic integrity.

Riverine Sites and Western South Dakota Wetlands

Another method used to classify western South Dakota streams and their adjacent habitat is called wetland delineation.

For centuries, wetlands have been a poorly understood and undervalued resource on the landscape. As a result, many have been drained, degraded, or lost over time. In the 1960s, Western science realized this loss and began working to better understand and protect these features. There was an effort to delineate (or define) wetland types (Cowardin et al. 1979). However, wetland sites are inherently complex and tricky to define. There are many types of wetlands in all types of landscapes.

East River and West River South Dakota each have unique wetland features. As noted earlier in this guide, in eastern South Dakota, glaciation smoothed the landscape and left pockets for prairie potholes and ponds to form as the dominant wetlands. In comparison, West River was not glaciated during the last ice age and has a very different and more rugged topography, with a network of streams and creeks. The vast majority of hydrogeomorphic wetland types found in western South Dakota are therefore associated with these streams or rivers (even ephemeral and intermittent systems) and are known as riverine sites.

Riverine sites are the technical term used to define western South Dakota wetlands and refer to all areas potentially impacted by stream flow. They include the active stream channel and the adjacent floodplain accessed when the stream overflows its banks. They also include areas impacted by water flowing below the ground's surface and shallow groundwater associated with the stream. Sources of water in riverine sites include runoff and subsurface flow from adjacent uplands, **tributary inflow**, and precipitation. (See Figure 10 in the previous section for examples of how water flows in a landscape.)

At the headwaters of the streams, the landscape may transition to **slope** or **depressional wetlands** where the channel morphology may disappear, and the land may become poorly drained flats or uplands that can hold water for periods of time. Depressional wetlands that hold water for longer periods are not common but do occur in West River.

Western South Dakota Stream Types Used in This Guide

In this guide, we break down western South Dakota streams into four broad categories:

1. Headwater streams and wet meadows
2. Steep woody draws
3. Mid-size prairie streams
4. Low-gradient prairie rivers

These types are based on three primary factors that are unlikely to alter or change within the next several generations:

- Watershed position of the stream
- Size of drainage area
- Slope of the channel

The following sections of this guide describe these stream types in more detail. Section 7 describes how to identify your stream type using a series of "reading the landscape" questions. Section 8 describes each stream type and its common characteristics and challenges. Later sections of the guide discuss ways to manage toward stream health.

It is important to remember that all streams are capable of enormous change and potential, and we are still learning much about what western South Dakota streams could or "should" look like in their healthiest states. Due to hundreds of years of alteration, reference (or ideal) conditions are unknown for most prairie streams. Instead of looking to restore an unknown historic potential, or to manage toward a limited potential we might anticipate from current stream conditions, we strongly recommend managing for continuous improvement. Western South Dakota streams might surprise us in the future as we continue to heal them and learn more from what they have to show us.