

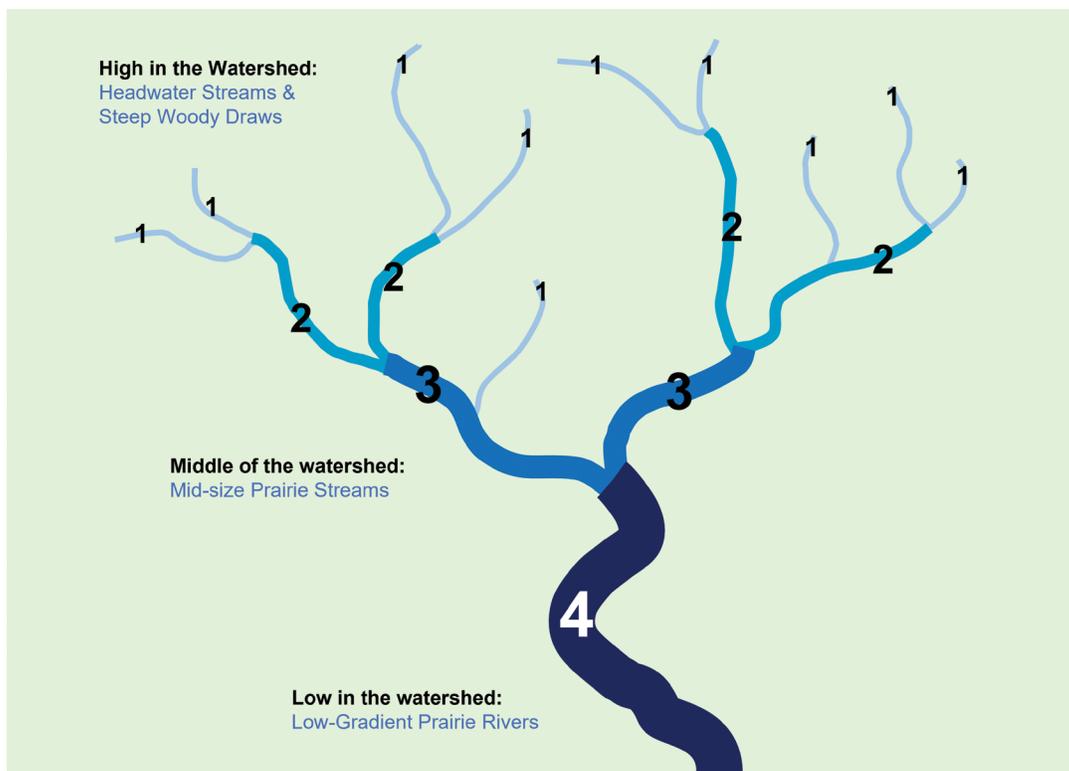
## Section 7: Determining Your Stream Type

There are four main categories or types of streams in western South Dakota: headwater streams and wet meadows, steep woody draws, mid-size prairie streams, and low-gradient prairie rivers. These four types are discussed in greater detail in section 8, along with general trends and characteristics that are common to each type. Most rivers exhibit all or most of these types somewhere along their course as they make their way to the Missouri River. The following questions will help you narrow down the likely stream type that you are working with at the given reach (or portion of stream) by helping you to “read the landscape.”

### Where Is Your Stream Located in its Watershed?

**Why this matters:** Streams high in the watershed are generally smaller and have less permanent flow. They generally serve as a source of sediment, which is eroded and carried downstream, depositing in depressions and floodplains along the way. In comparison, streams that are lower in the watershed receive more water from above them, as well as sediment, which results in more permanent flow and deposition.

The following graphic describes the concept of a stream order. High in the watershed, a first-order stream begins. Small, low-flowing, first-order streams come together to form larger second-order streams (where two streams come together). These second-order streams have more water volume, but still are not high-flowing. Third-order streams and above are where multiple second-order streams, and all of the waters above them, continue to converge and form much larger systems with more water flow. As streams continue to converge and drain larger areas of the watershed, the stream order number becomes larger, as shown in Figure 43.



**Figure 43:** Stream order affects stream type. Streams labeled “1” are in the headwaters and are commonly referred to as first-order streams. They are dominated by overland flow of water and have no upstream concentrated flow. When two or more first-order streams merge, they form a second-order stream. Lower in the watershed, these second-order streams come together to form third-order streams, and so on. The larger the stream order number, the larger the area it drains. Graphic © Corissa Busse, TNC

**How to assess the landscape position:** Think about what streams flow into your stream before it arrives at your location, or what your stream flows into after it leaves your location. Are there multiple streams and drainages or draws that flow into your channel upstream from where you are assessing?

**Based on your assessment, which option best describes your watershed position?**

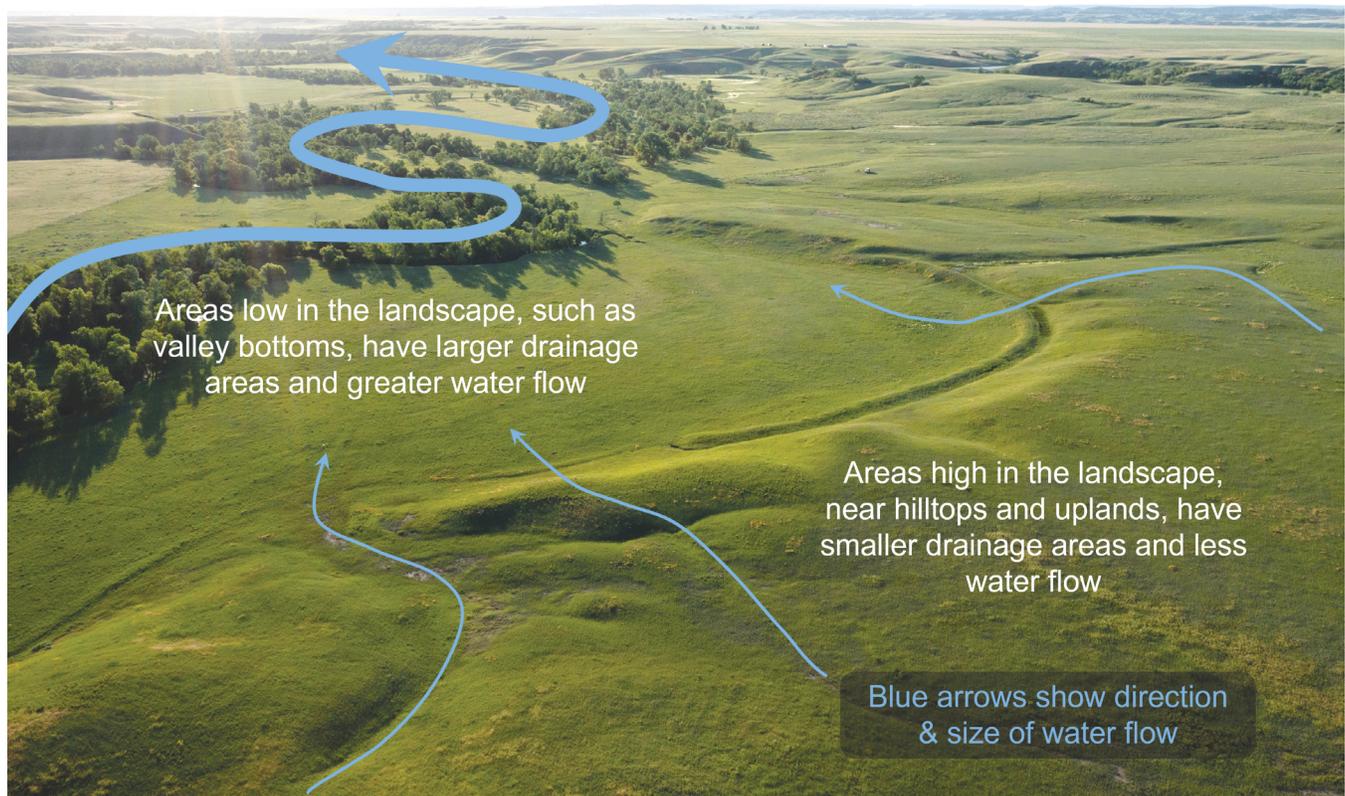
- High in the watershed: There are few draws and no streams upstream from your location.
- Middle of the watershed: Several small streams, drainages, and/or draws come together upstream from your location, adding flow.
- Low in the watershed: Many larger streams flow together upstream from your location.

**What is the Drainage Area of the Stream Reach You Are Assessing?**

**Why this matters:** A primary factor in stream type is the amount of water that feeds into it. This is determined in part by the size of your drainage area. The amount of water that the stream manages also dictates the amount of force that water can exhibit; more water typically has more force or energy. This will impact how the stream functions and often affects its condition and potential.

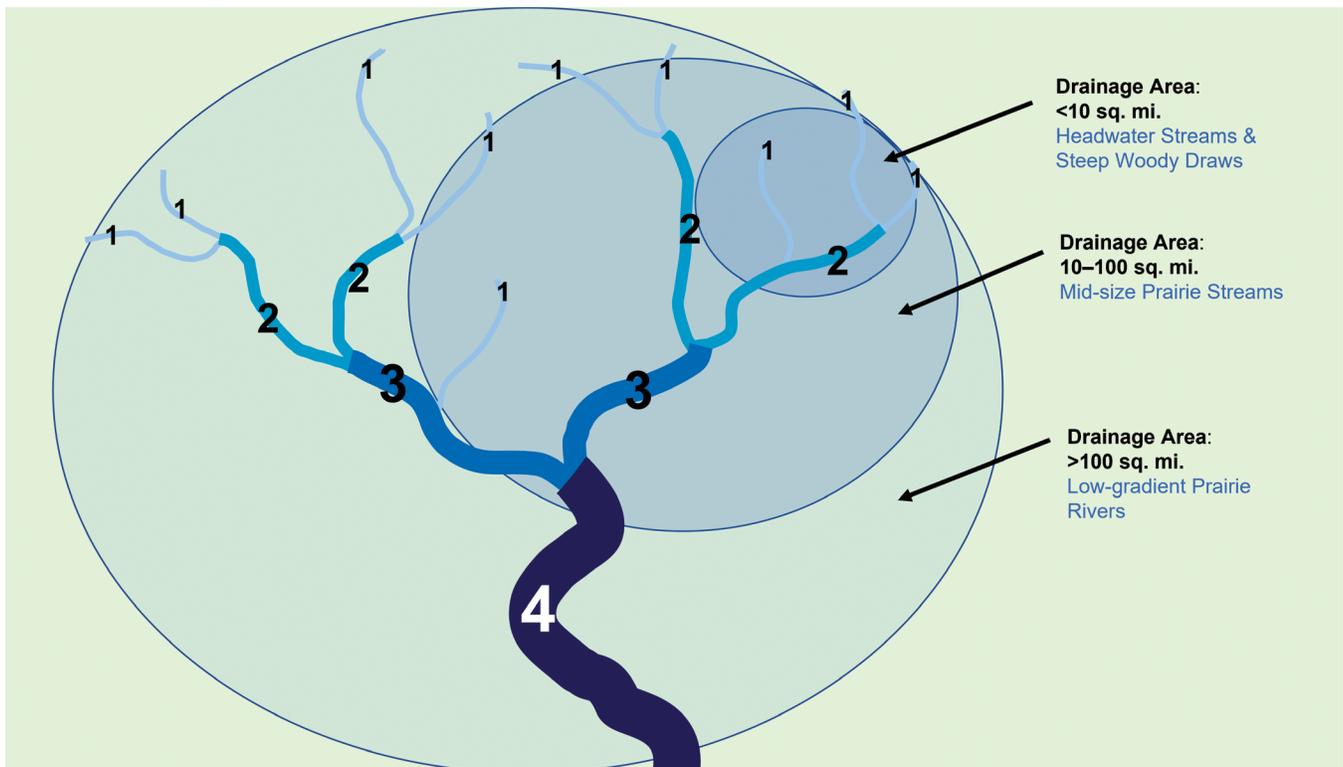
**How to assess the drainage area:**

**Method 1:** An accurate means for determining your drainage area is to use the USGS Stream Stats tool: [streamstats.usgs.gov/ss/](https://streamstats.usgs.gov/ss/). This tool uses satellite data to identify your location, the surrounding topography, and the size of your drainage area. Staff at many NRCS or SWCD offices can help you complete this assessment if requested.



**Figure 44:** Areas higher in the landscape have smaller drainage areas and less flow. Valley bottoms and lowlands collect water from these surrounding uplands over larger drainage areas and have more water flow. Photo © Joe Dickie, Generation Photography, Inc.

**Method 2:** Previously, you assessed your landscape position. What are the landscape features where the stream is located? Are you located at the top of the slope, or in a valley bottom or lowland? A high landscape position is associated with a smaller drainage area. Low areas such as valley bottoms will have larger drainage areas, as shown in Figure 44. Stream order and drainage area are also closely related, as shown in Figure 45.



**Figure 45:** Stream order and drainage area are closely related. The larger the stream order number, the more area it will drain in the landscape. Graphic © Corissa Busse, TNC

**Drainage area less than 10 square miles:**

- Typically, at or near the start of the stream (the headwaters)
- No or very few streams and drainages flow into the stream prior to your location
- May be near the top of a landscape feature, such as a hill or butte

**Drainage area of 10–100 square miles:**

- Often a few miles from the start or headwaters of the stream
- A few small streams or drainages flow into the stream prior to your location
- Typically located in a valley or other lowland

**Drainage area greater than 100 square miles:**

- Located many miles from the headwaters of the stream
- Several streams and drainages flow into the stream prior to your location
- Located in a valley bottom, river bottom, or lowland

**Based on your assessment, which option best describes the size of your drainage area?**

- Less than 10 square miles (less than 6,400 acres)
- 10–100 square miles (6,400–64,000 acres)
- Greater than 100 square miles (greater than 64,000 acres)

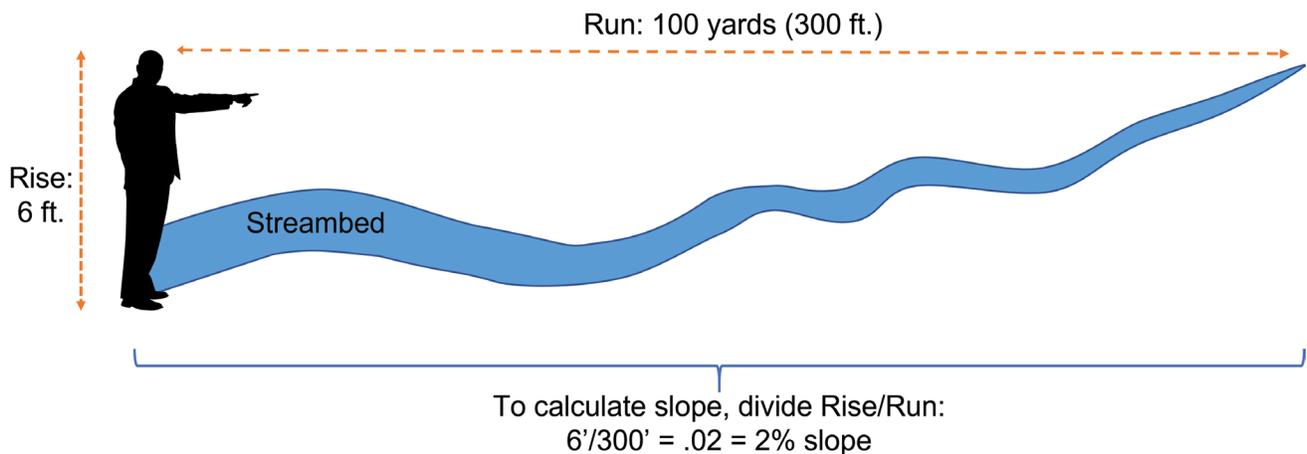
## What Is the Slope within Your Channel at This Reach?

Why this matters: The slope will partially determine how quickly water flows through the stream. Water runs downhill, and as a hill gets steeper, the water has the potential to run faster and pack more force. The slope of the channel will also help determine whether you are in a woody draw or river break stream type, both of which tend to have slopes greater than 2%. Slopes range from about 0.1% to 10% in western South Dakota prairie streams; most streams have a slope of less than 0.5%.

### How to assess the slope:

**Method 1:** Use the USGS Stream Stats: [streamstats.usgs.gov/ss/](http://streamstats.usgs.gov/ss/). This site provides you with average slope for your watershed, drainage area, and average flow discharge in cubic feet per second (cfs). It is important to note that the slope measurement on this website may be misleading because it is an average for the entire upstream watershed and is not specific for your site, but it will give you a general idea.

**Method 2:** You can do a visual guesstimate of the slope of your stream channel. A 2% slope would be the equivalent of your stream dropping roughly 6 feet (about the height of a tall person) over the course of 100 yards (or the length of a football field). Standing from a good vantage point, guesstimate whether the slope of your stream drops by more or less than 6 feet across a 100-yard distance (following the meanders of the stream). (Note: Most western South Dakota prairie streams have stream bed slopes well below 1%.)



**Figure 46:** Calculate stream bed slope by estimating how far the stream bed drops over a span of 100 yards. Graphic © Corissa Busse, TNC

**Method 3:** Look at the channel form. The shape of the stream and its bed may serve as a rough indicator of slope. Streams with very little slope (< 0.2%) tend to meander a lot. More moderately sloping streams typically have a flat bed without steep drops. Very steep channels (> 3% slope) often have steps and pools with drops of several feet occurring between flatter parts of the channel. In western South Dakota, streams with slopes > 3% are very uncommon outside the Black Hills, and most stream reaches in this region have < 0.5% slope.



**Figure 47:** This flat stream system has < 0.2% slope. Photo © Joe Dickie, Generation Photography, Inc.



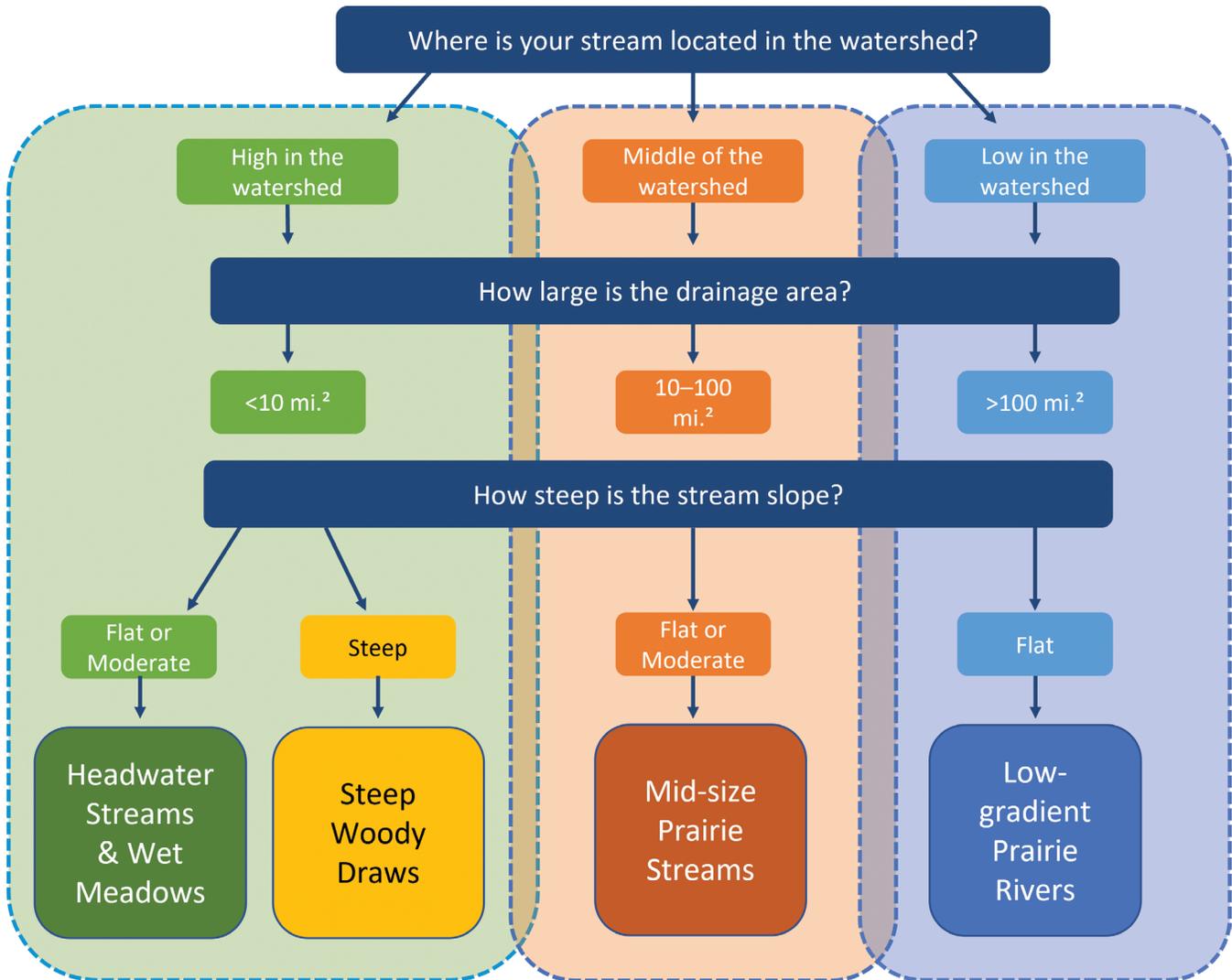
**Figure 48:** Steep woody draws coming off a butte will have slopes of 3% or greater. Photo © Joe Dickie, Generation Photography, Inc.

**Based on your assessment, which option best describes the slope of your stream?**

- Less than 0.2% (flat)
- 0.2 to 3% slope (moderate)
- Greater than 3% (steep)

## Determining Your Stream Type

Using your answers to the questions outlined in this section, follow the charts shown in Figure 49 to determine your stream type.



**Figure 49:** This flowchart will help you identify the type of stream you are assessing. Note that there is overlap between the stream types, and that some streams may exhibit characters crossing these boundaries. Graphic: Corissa Busse, TNC

**Table 1:** Summary of Stream Types

Description	Stream Type
High in the watershed, drainage area less than 10 square miles, slope flat or moderate	<b>Headwater streams and wet meadows</b>
High in the watershed, drainage area less than 10 square miles, slope steep	<b>Steep woody draws</b>
Middle location in the watershed, drainage area between 10 and 100 square miles, slope flat or moderate	<b>Mid-size prairie streams</b>
Low in the watershed, drainage area greater than 100 square miles, slope flat	<b>Low-gradient prairie rivers</b>