Section 11: Managing for Stream Health Now and into the Future

Prairie streams across western South Dakota have experienced major changes and loss of function—and yet, they continue to hold significant potential for beneficial restoration. We hope users of this guide will begin to see the connectedness of our systems. Healing in these systems is critical for the health of our prairie, its waters, and all who depend on them into the future.

Managing for Resilience

Throughout the guide, we have discussed many of the current common management challenges and opportunities for prairie streams of western South Dakota. Increasingly, landscapes are being looked at with resilience in mind to ensure that our lands and waters continue to thrive with changing land use and climate variability. Resilience in a stream system is the ability of a site to maintain diversity, productivity, and ecological function following a disturbance event such as flooding, drought, fire, or grazing. Stream systems in the Great Plains are naturally incredibly resilient because this landscape has been shaped by drought, grazing, and fire, and are uniquely adapted to variable moisture conditions and disturbance. Both droughts and floods, along with other extreme events, are a common occurrence in the region. However, much of this natural resilience has diminished over time, and many of our stream systems are struggling to function.

Streams rely on the relationship between the plant community, channel and landform characteristics, and hydrology to maintain resilience and support life. These are interconnected components of the system, and a stream's ability to recover from disturbance depends on these relationships. Managing streams and riparian corridors for flood, drought, and fire resilience means understanding the connections between the plant community, the stream channel, and the floodplain. Disconnected floodplains, lowered water tables, and reduced water storage capacity will make a system more sensitive to disturbance.

A stream with more channel diversity and complexity, such as one with beaver dams, wood accumulation, point bars, pools, and high sinuosity, will have variety in the flow pattern, water depth, and water velocity and will be more resilient to disturbances than simplified, homogeneous channels. Channel diversity can help increase the hydrologic connectivity both to the floodplain and to up- and downstream reaches, which can lead to increases in riparian vegetation resilience. A more connected system has improved water storage capacity and lessens the reliance of vegetation on rainfall to be productive. This allows the stream, riparian area, and overall system to function and remain intact during drought periods. Overall, as riparian areas and stream systems become more diverse and healthier, the stream can reach a new balance in which its productivity fluctuates very little with changes in rainfall, demonstrating greater resiliency against the impacts of drought or flooding.

Managing for resilience in the plant community and stream channel can decrease the sensitivity of the riparian area to climate variability over time. Incorporating resilience into stream management and restoration is fundamental for creating long-term conditions that best support both human use and ecosystems. Resiliency-based management helps to develop a system that can be self-sustaining under dynamic conditions.

The starting point in managing for resilience can vary and should fit the individual ranch needs and site conditions. Changes in grazing season of use or duration may be enough to trigger woody species recruitment, which can begin to make a site more diverse and complex. Incorporating resilience into ranch planning, grazing management, and restoration planning may seem like an abstract concept, but through adaptive management, monitoring, and clear goals, it can be implemented at a meaningful scale.

Restoration Planning and Continuous Adaptive Management: "Learn by Doing"

Adaptive management is a "systematic, and rigorous approach to learning from the outcomes of management actions, accommodating change, and improving management" (Holling 1978). It is basically a strategy of "learn by doing."

This model can be especially helpful and effective when working with novel techniques, understanding new systems, and discovering efficiencies. It is a system that is particularly well suited for stream and riparian restoration. The basis for implementing an adaptive management plan is focusing and responding to on-the-ground conditions and making management decisions to benefit long-term rangeland health and ranch economics. This system requires setting clear goals, and then monitoring and continuously evaluating to see if you are moving toward or away from the goals you have set. If you are moving toward the goals, great—keep going! However, if you are moving further away from your goals, evaluate what you may need to adjust to correct your course.

One of the challenges in assessing stream systems, particularly highly degraded systems, is discriminating between the potential of the system and the realistic interim management objectives. Restoring the system's potential will most likely involve continuous adaptive management to move toward more desired conditions, based on a full picture and understanding of the site's history and restoration options.

Successful restoration and management will therefore involve continuous and repeating cycles of site monitoring and an understanding of site condition and potential. Land managers will need to evaluate possible solutions, understand potential outcomes, and make changes based on the results. Figure 100 illustrates a decision model that may assist in the planning process. When working with this planning system you may not find the perfect "recipe," but the model can be an effective tool to evaluate decisions and adjust practices. Ultimately it will help you answer the question: "Am I heading in the right direction?" When planning restoration projects, land managers should consider the local and physical context as well as identifying financial, environmental, and social goals.

Due to variations in riparian landscapes, we may not fully know what these streams looked like pre-European settlement. A true "reference" stream (or ideal condition stream) may not exist—nor do we know the full potential that these streams may hold. On the positive side, this also means that the potential for improvement of these systems to provide habitat, slow and hold water, and regain resilience could potentially go beyond any expectations we can currently set. This is why we have not set a bar for what a healthy stream should look like, but instead encourage land managers to continuously work to improve the dynamic resilience of their stream systems. When discussing goals and objectives, it's important to think about ecological function, system resiliency, and management considerations.

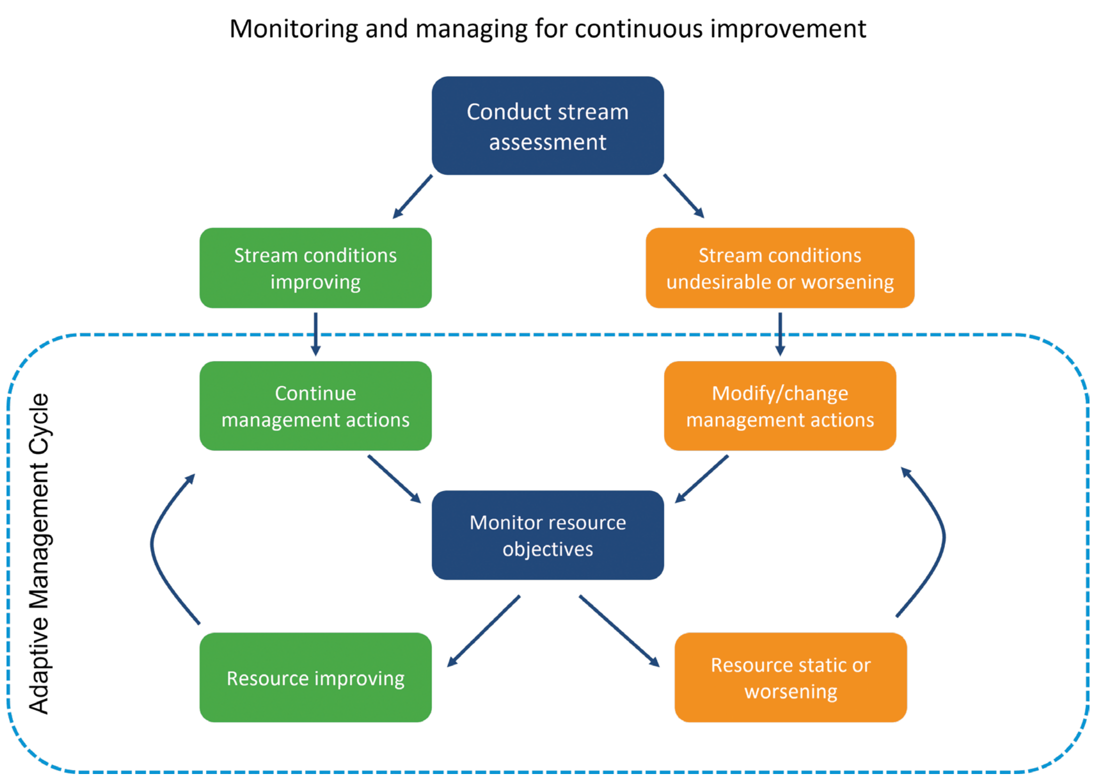

Figure 100: This monitoring and adaptive management framework shows how to work for continuous improvement. Graphic © Corissa Busse, TNC

To understand whether a grazing management system is encouraging riparian area recovery, for example, it is necessary to understand recovery rates and grazing impacts. The time scales required for recovery vary. Herbaceous and woody vegetation typically respond more quickly, whereas water quality and channel configuration may take 10–20 years to improve. Degradation rates show the same pattern: vegetation degrades first, followed by the channel and water quality.

Understanding expected recovery rates for specific riparian sites is necessary to develop achievable objectives that can be met within a designated timeframe. When you select indicators to monitor the effectiveness of management changes, keep in mind that there is often a lag between changes in management and the ecological response. Recovery of channel morphology and water quality can take time; therefore, it may be more appropriate to observe and monitor indicators based on vegetation response. Recovery times may also be highly variable due to the influences of climate, soils, available moisture, and streamflow.

Photo Point Monitoring

Photo point monitoring is an especially powerful way to track and observe changes over time. It is also quick, easy, and effective. It can be implemented to determine whether your management decisions are meeting your objectives and moving the riparian areas and/or uplands toward a desired future condition. Photo point monitoring can show trends over time by documenting effects of changes in the environment or effects of management actions. It requires no specialized expertise to take or interpret photo points, and they can stand alone as a record or be supplemented with additional data collection.

How to Conduct Photo Monitoring

As with any type of monitoring, it's important first to understand the goals or why you're beginning a monitoring program. Common goals of photo monitoring include:

- Documenting the current conditions
- Documenting change following a management practice or intervention
- Determining the effectiveness of management practices
- Documenting general change over time
- Document abnormal events like severe drought or wildfire

There is no one-size-fits-all, as monitoring is based on individual goals. It can be done once a year or throughout the year. The best method is the one that works for you. Below are some tips to help you develop an effective photo point monitoring program.

- **Equipment:** You can collect photos with digital cameras or cell phone cameras; just be sure the images are high enough resolution. Include a photo board; a sheet of paper with notes or an erasable board should appear in every picture. The photo board should include information about the date, location, or other details such as whether the photo is taken before or after grazing. A photo board will help you keep the photos organized.
- **Timing:** Take photos as close to the same time of year as possible. Usually, monitoring is done during the peak of the growing season, but this can vary depending on what you are trying to monitor.
- **Site selection:** Start by monitoring a site that is representative of the area. Don't be afraid to choose sites that are in poor condition, as these areas may end up being very responsive to management. Pick sites that are easy to get to, since you're more likely to take photos regularly if they're easily accessible. Use distinct landscape features to help you find your sites again and to help line up the photos each time they are taken. Distinct landscape features are those that are unlikely to change dramatically over time and can include rock formations, trees, and distinct topography (e.g., hills, swales, saddles). Take a minimum of two photos at each riparian site, one looking upstream and one looking downstream.

Figure 101: These photos show how repeated photo point monitoring has documented 10 years of stream recovery. The top photo is from 2008 and the bottom photo is from 2018. The photo board includes date, location, and direction. The lone trees and hillside in the background act as reference points. Photos © Al and Simone Wind

Questions and Techniques for Monitoring Stream Resilience Over Time

This following content outlines a monitoring protocol that can be used to better understand and "read" a stream, as well as to help notice trends and changes in the system over time. The monitoring questions outlined below can help indicate the current resilience of a stream reach, the processes at play, and whether there is potential for improvement.

Any stream within a given type can exhibit a wide range of conditions, from healthy and resilient to degraded and non-functioning. Since streams are dynamic, they are often actively transitioning either toward or away from a resilient state. The following monitoring tools are *not* intended to give a score to a stream nor compare its condition with that of other streams. Instead, this monitoring protocol is intended to help compare the condition of a stream to itself over time, and to notice how the stream is responding and adapting to management actions. In turn, this will help determine what management changes may be needed to help improve the stream's resilience. Management options to promote stream resilience are described in greater detail in Section 10.

Following the monitoring questions is a worksheet that you can use in the field to take notes and track your monitoring. Extra copies of the worksheet are also located in the appendices. In order to identify how a stream is changing over time—and whether it is trending toward or away from resilience—it is important to complete monitoring year after year. We also recommend monitoring at different times of the year and taking notes. A stream will change with the seasons, due to precipitation patterns, and from impacts that occur above and below your stream section. Above all, this process is primarily intended to help you get to know and listen to what the stream is telling you.

Key Monitoring Questions to Understand Stream Resilience

1. How often does the stream flow?

Why this matters: Wet meadows and streams that hold water for longer periods of time greatly benefit livestock and wildlife alike and can support more diverse vegetation and animal species. They are also more productive and likely to respond more quickly to changes in management. Determining how often your stream flows can help you understand its connection to the water table and its natural potential.

How to assess the stream flow:

The best method to determine your stream flow is to observe or monitor it multiple times throughout the year and note the differences in flow between years. If you are not familiar with the stream, it can help to ask someone who has managed the land previously or a neighbor who may know it well. If this is not possible, we recommend visiting your stream site in late summer, during a period without recent rainfall, to determine its flow. By August, most ephemeral and intermittent streams will have ceased flowing for the year.

Select the option that best describes your stream:

- ❑ **Ephemeral** (generally < 10 mi2 in drainage area): flows during < 10% of the year, for less than 30 consecutive days, and only in response to precipitation.
- ❑ **Intermittent** (generally 10–100 mi2 in drainage area): flows approximately 10–75% of the year. There is usually some connection to the groundwater table, which is generally within a few feet of the bottom of the stream bed, and there may be some permanent pools.
- ❑ **Perennial** (generally 100+ mi2 in drainage area): always flows, or flows for at least 75% of the year, even in dry years. Springs or seeps in the area often feed the stream.

Figure 102: A headwater ephemeral stream only holds water in its channel after a precipitation event. The area may still be marshy and wet if the adjacent floodplain is sub-irrigated and acting as a wet meadow. Photo © Joe Dickie, Generation Photography, Inc.

Figure 103: An intermittent stream holds water in its channel part or most of the year but goes dry seasonally, and may have disconnected pools of water, as shown in the photo above. Photo © Joe Dickie, Generation Photography, Inc.

Figure 104: A perennial stream holds water throughout the year. However, severe drought years may cause even these streams to go dry in pockets. Photo © Doug Shaw, TNC

2. Do you notice any springs or seeps feeding the stream?

Why this matters: Springs and seeps can influence the flow regime of a stream. Some small headwater streams that would otherwise be ephemeral can be perennial systems because of the presence of springs in the watershed. Springs also provide an important source of water for grazing livestock and critical habitat for aquatic life, waterfowl, frogs, and reptiles, because most streams in western South Dakota go dry for much of the year.

How to assess whether springs are present:

Look for aquatic plants or other indicators of permanent water in locations where the stream would otherwise go dry. The best time to observe is during low flow or drought periods, or in the winter when water levels are usually low. Is there water or pooling on the channel during dry periods, or does water seem to disappear and reappear in the channel? This may be an indicator of subsurface flow from springs.

Based on your assessment, are springs or seeps present along your stream?

- ❑ No
- ❑ Yes

Figure 105: Seeps and springs are visible along the margin of the hills, making this headwater stream perennial even during dry periods. The tall wetland plants along the channel indicate that it holds water year-round. Photo © Lori Brown, TNC

3. What is the stream's sinuosity?

Why this matters: A stream's **sinuosity** describes how often it bends and curves over its course. Bends and curves help to slow down the water and remove energy from its flow. A slower flowing stream with less energy can benefit the land by holding water on the landscape longer, reducing erosive force, and allowing the water to seep into the surrounding riparian area, increasing vegetation cover. Imagine the speed and force you would have if you ran straight across a football field, versus if you ran while curving back and forth every five feet.

Unlike meandering streams, straight streams often provide fewer benefits to the land and can be in poorer health, particularly if they were naturally meandering streams that were straightened by people or forced to carry increased flow. Straight streams tend to pack more force and can erode the channel faster, causing it to separate from the floodplain and riparian vegetation. Many of the steep woody draws and river breaks in western South Dakota are naturally straight due to the higher velocity and in-stream forces within their steep, straight channels. You may hear of streams with straight channels referred to as "bowling alleys" because of the force that water can generate as it flows straight through them. Headwater streams may also be straight because they lack the stream power to produce meander bends.

How to assess sinuosity: Often, the sinuosity of a stream varies. A stream may be very curvy for 50 feet, then have a straighter section for the next 100 feet. For this assessment, describe the average sinuosity that you see over the entire area you are surveying.

Figure 106: This stream is an example of a straight channel. Streams can straighten over time as they downcut and disconnect from the floodplain. Photo © Joe Dickie, Generation Photography, Inc.

Figure 107: This moderately sinuous stream channel has noticeable bends but limited movement in the floodplain. Photo © Joe Dickie, Generation Photography, Inc.

Figure 108: This highly sinuous stream channel has large horseshoe bends. Photo © Joe Dickie, Generation Photography, Inc.

Figure 109: Some streams may not have a defined channel; the water course is actually a wet meadow system. Photo © Joe Dickie, Generation Photography, Inc.

Based on your assessment, which best describes the sinuosity of your stream?

- ❑ Straight (almost no bends in the channel)
- ❑ Moderately Sinuous (identifiable bends with limited movement in the floodplain)
- ❑ Highly Sinuous (stream with very winding path)
- ❑ Wet Meadow (no defined channel, wet sponge-like meadow)

4. How is the stream channel changing or evolving?

Why this matters: Determining the stage of the channel can help you identify whether your stream is stable and connected to your floodplain (or trending in that direction), or whether your stream is actively incising, entrenching, and separating from the floodplain. A stream that is connected to its floodplain can provide greater benefits for livestock and wildlife. When floods do occur, connected floodplains help to spread out or dissipate the force of the water, slowing it down. Streams with floodplain connections can produce greater amounts of riparian vegetation and store water longer.

In contrast, a stream that has incised has less access to its floodplain and is less able to slow down high flows. These streams often have greater in-stream force and higher rates of bank erosion. The force and erosion are not necessarily "bad," as they can also help the stream break down its banks and reach a new balance and inset floodplain. However, streams in this disconnected state provide fewer benefits for livestock and wildlife. They may also cause challenges for ranchers by making pastures inaccessible due to their high or unstable banks, threatening farm buildings and/or pastures located next to streams, and reducing meadow habitat due to a possible drop in the water table. (Note: Some steep woody draws and gullies have little or no floodplain, but may provide other benefits, such as shelter from the sun and snow.) Streams are dynamic and are usually evolving between stages as they seek balance and equilibrium after large disturbance events or management changes.

How to assess the stage of the channel evolution cycle:

Depending on your type of stream and on whether active headcuts are forming, different portions of your stream may be at different stages of channel evolution. The downstream areas may have undergone channel incision and are in later stages of channel evolution as they seek equilibrium after a disturbance event. Meanwhile, areas upstream of the headcut may not have undergone incision yet. Look for evidence along your stream like active headcutting, formation of point bars, and bank failure. Using Figure 110 below, estimate which stage represents what your stream is doing.

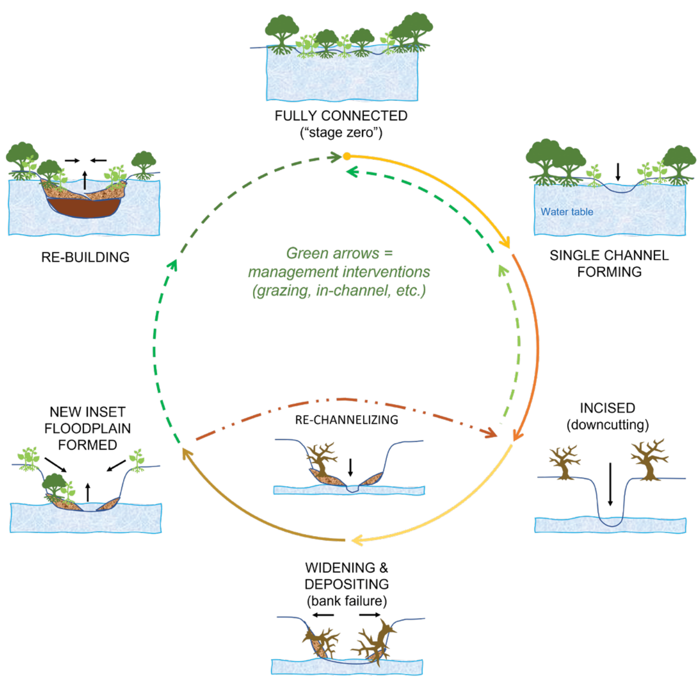

Figure 110: This figure can help to identify the stage of your stream. Streams that are highly connected to their floodplains (streams in the "stage zero," single channel, or recovery/rebuilding phases) are considered to be functioning at higher potential, or more "healthy," as they are able to accommodate and dissipate the energy of higher flows by spilling out over the floodplain. As the stream adjusts to change or disturbance by downcutting and widening, it is processing through more active erosional, unstable phases. As the stream begins to form a new inset floodplain and potentially move toward "recovery," it is attempting to reestablish equilibrium with the flow and sediment regime by rebuilding active floodplain features. Graphic © Corissa Busse, TNC

Based on your assessment, which option best describes how your stream is changing?

- ❑ **Fully Connected ("stage zero"):** For smaller stream systems, there is no visible channel, and the area usually resembles a moist or wet meadow; for larger stream systems, the channel is highly braided (multiple channels that intersect and weave together) and the stream readily overflows to its floodplain.
- ❑ **Single Channel Forming:** There is a stable single channel that is not excessively downcutting or eroding its banks, with a good connection to the floodplain and mature riparian vegetation (either trees or prairie grasses and forbs).
- ❑ **Incised (downcutting) or Rechannelizing:** The stream is eroding its bed and there are steep drops in elevation (cutting downward or headcutting); streambanks are getting steeper.
- ❑ **Widening and Depositing (bank failure):** The channel is widening and banks are slumping, and sediment is being deposited or laid down within the channel or on low benches next to the stream.
- ❑ **New Inset Floodplain Formed:** The channel has developed a new inset floodplain with benches laid down and point bars formed within the original channel boundaries.
- ❑ **Rebuilding / Recovery:** The channel is closing back in after heavy historic disturbance. The channel has rebuilt from the bottom up and potentially from the sides in and is now shallower and perhaps narrower than in the past.

5. How connected is the stream to the floodplain?

Why this matters: A stream that does not have frequent access to its floodplain fails to provide many benefits for both people and nature, such as reducing impacts of flooding and preventing erosion and damage to land alongside the stream. As flow becomes concentrated in the channel and cannot spread out onto the floodplain, its erosive force increases, leading to more channel erosion and sediment entering the stream.

How to assess your stream for floodplain connectivity:
Following periods or events of significant rainfall, visit the stream you are monitoring and note whether the flow of water has exited the stream's banks and is spilling out or flowing over and onto the adjacent floodplain. Document how often this flooding out of the streambanks occurs over time.

Based on your assessment, which of these descriptions best matches your stream's floodplain connectivity?

- ❑ Flooding out of banks occurs infrequently or never: stream channel is incised or confined within steep, narrow banks with no access to a floodplain except at the very highest, most infrequent flows (every 5–100 years at most)
- ❑ Flooding occurs occasionally: stream channel is confined or well-contained within the banks, but with access to a narrow floodplain at higher flows (may flood every 2–5 years)
- ❑ Flooding occurs frequently: stream can frequently access a wide or well-developed floodplain during typical bankfull floods occurring once or twice every couple of years

6. What is the condition of the riparian plant community area?

Why this matters: The condition of your riparian area is important for grazing animals, wildlife, and people. As mentioned in section 5, a health riparian plant community helps dissipate flood energy, stabilize soils, and improve water infiltration. Areas with low plant cover are more prone to erosion, provide less nutrition for grazing animals, and offer less habitat for fish and wildlife.

How to assess riparian condition:
There are many ways to measure riparian health, including amount and type of vegetation, distance that the greenbelt extends from the stream edge, presence of trees and woody plants, and diversity of plant species. This assessment piece is broken down into five components to generate a comprehensive picture of riparian condition.

6a. How much vegetative cover is there?

Why this matters: Plant cover prevents soil erosion, provides food for grazers, and supports wildlife.

How to assess amount of vegetative cover: You can estimate the percentage of plant cover visually. It is easiest and most accurate to focus on a small square or circle a few feet across (a square yard or meter). Compare your riparian area with the images in Figure 111.

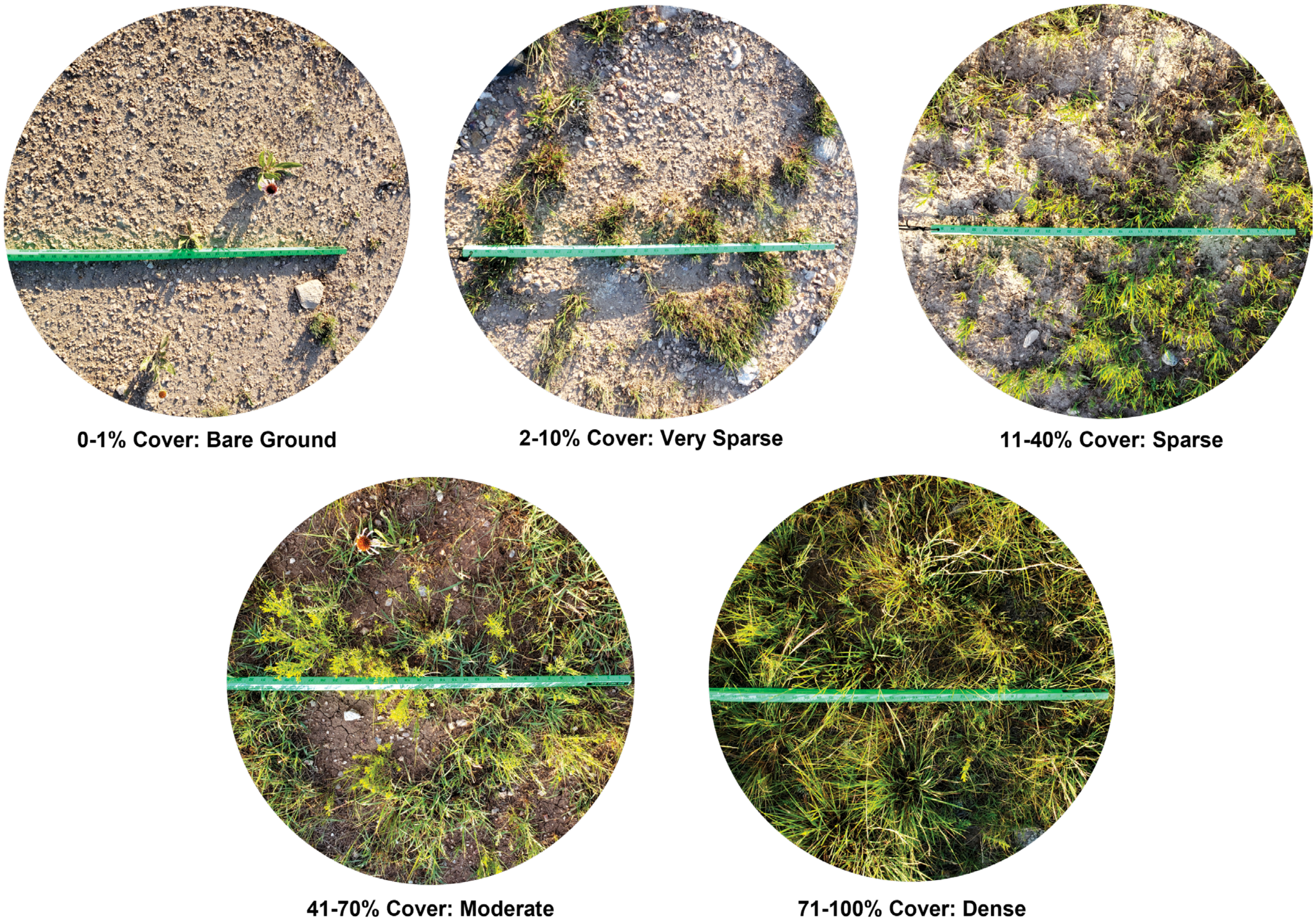

Figure 111: Different levels of plant cover, as seen from above. Photos © Julie Brazell, TNC

Based on your assessment, which option best describes the amount of vegetative cover?

- ❑ All bare ground, 0%–1% cover
- ❑ Very sparse, 2%–10% cover
- ❑ Sparse, 11%–40% cover
- ❑ Moderate, 41%–70% cover
- ❑ Dense, 71%–100% cover

6b. How far does your greenbelt extend from the stream edge?

Why this matters: The greenbelt is important for wildlife habitat, channel stability, and other stream functions. It is an indicator of subsurface moisture and can help you see how connected the stream is to the floodplain. An expansive greenbelt filling the majority of the valley bottom indicates that the site is well connected and holding water. A very narrow greenbelt that only exists along the stream channel indicates that there is little floodplain connection and water storage capacity.

Figure 112: This stream has little to no riparian vegetation. The banks are covered but are susceptible to erosion because they lack deep-rooted plants. Photo © Corissa Busse, TNC

Figure 113: This is an example of an expansive greenline along the valley bottom. The vegetation has helped to protect the channel and has minimized bank erosion. When this system floods, the stream has easy access to the floodplain and dense vegetation to dissipate energy. Photo © Chris Helzer, TNC

Figure 114: This stream has a very distinct greenline along the channel, but the adjacent areas are dominated by sagebrush, which indicates that the stream does not regularly access the valley bottom. Photo © Joe Dickie, Generation Photography, Inc.

How to assess the width of the greenbelt: Visually assess how far the greenbelt extends from your stream edge. Look for the line where denser, dark green vegetation stops and/or switches to more upland plants as the indication of the edge of the greenbelt.

Based on your assessment, which option best describes the greenbelt?

- ❑ No greenbelt present
- ❑ Greenbelt limited to the edge of the channel
- ❑ Greenbelt only occupying part of the valley bottom, limited to low-lying areas
- ❑ Valley bottom well vegetated with plants that are dependent on saturated or well-watered conditions

6c. What kind of vegetation is dominant within the greenbelt of your stream?

Why this matters: Vegetation type is important because some plants have more developed root systems, are more valuable for grazers, and can be indicators of a shallow water table, especially lush stands of native mesic grasses. Shrubs and trees typically do not provide much forage for livestock but do provide other benefits, such as shade, bank stabilization, and wildlife habitat.

How to assess the type of dominant vegetation: Walk next to your stream and through the stream valley bottom, and note the most common plant types. Are they species that typically occur in uplands or in wetlands? Note whether there are signs of wetness, such as ponded water or frequent flooding.

Figure 115: These photos show examples of dominant vegetation in a variety of western South Dakota streams. Top photos © Corissa Busse, TNC; Bottom photos © Joe Dickie, Generation Photography, Inc.

Based on your assessment, which best describes the type of vegetation?

- ❑ Mostly upland plants (sagebrush, western wheatgrass, needle-and-thread, cheatgrass)
- ❑ Mix of upland and some mesic plants (big bluestem, smooth brome, Kentucky bluegrass, snowberry, foxtail barley)
- ❑ Mostly wetland/mesic plants (prairie cordgrass, Canada wildrye, willow, rose)
- ❑ Wet meadow plants (cattails, sedges, bulrushes)

6d. Are trees and woody plants present?

Why this matters: Trees and shrubs help stabilize streambanks, provide habitat for birds, and offer shade for grazing animals. They can shelter wildlife movement along the stream corridor. (Note: Trees are not always native to a system. Russian olive and salt cedar can be particularly problematic, as they can take over stream areas and outcompete native species.)

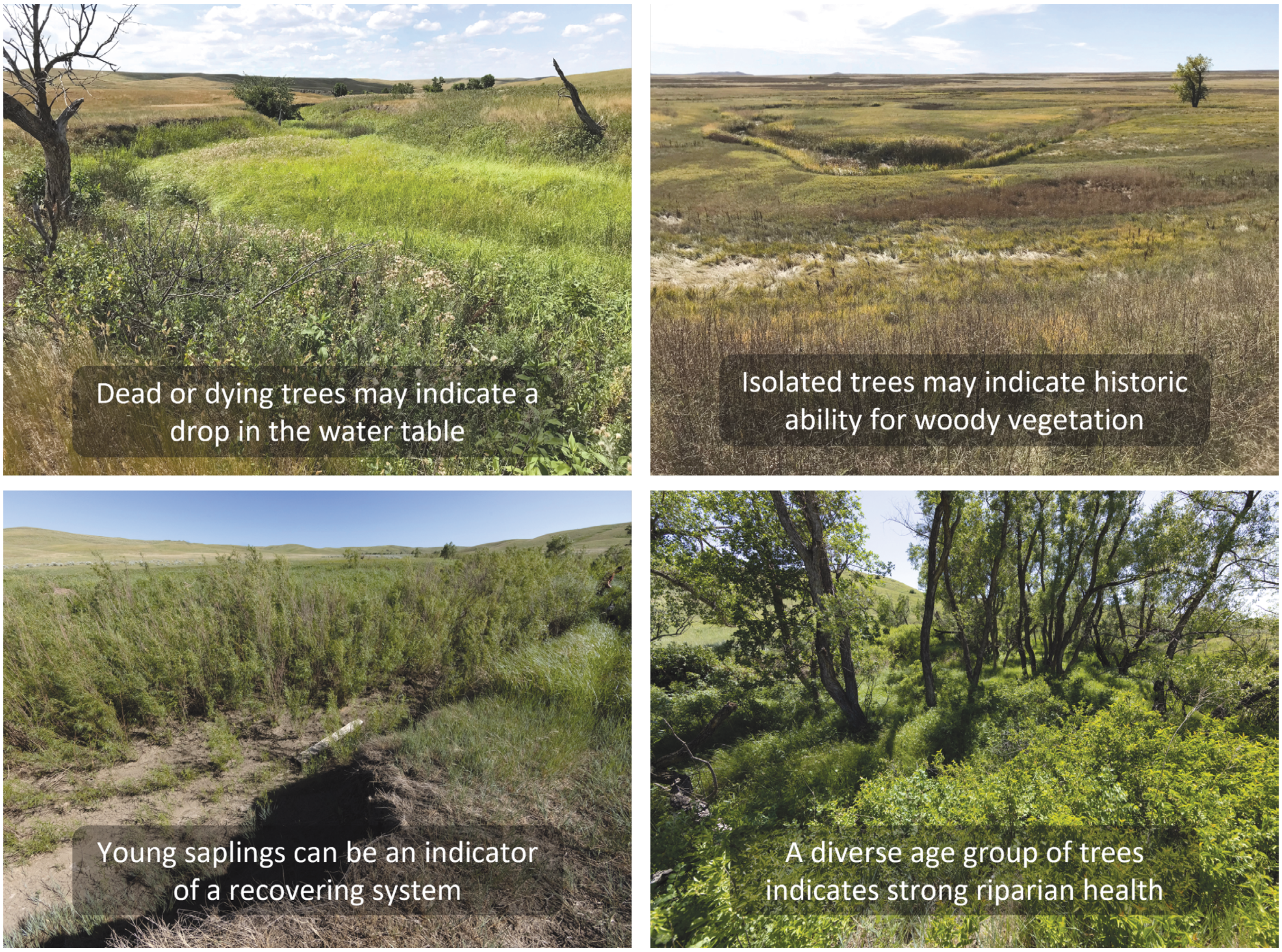

Figure 116: These images demonstrate how trees and woody vegetation can indicate stream health in some systems. Top photos © Kristen Blann and Corissa Busse, TNC; Bottom photos © Joe Dickie, Generation Photography, Inc.

How to assess the presence of trees:

Walk next to your stream and note whether trees such as cottonwood, willow, and ash are present. Remember, the trees you are looking for may be young saplings rather than fully mature trees.

Based on your assessment, which best describes the presence of trees in the portion of the stream you are monitoring?

- ❑ No trees or woody plants are present in this portion of the stream's riparian area
  OR
  Only invasive tree species and upland shrubs are present
- ❑ There are old, mature and/or dying trees high on banks away from the stream, but no new "recruits" (young trees)
- ❑ Young trees and mesic woody vegetation are beginning to re-establish in the riparian area
- ❑ There are mixed ages of trees and/or mesic woody plants and native perennial shrubs

6e. What is the diversity of plant species in your riparian zone?

Why this matters: The more diverse a plant community is, the more resilient it is to periodic disturbance. A site with high species diversity and richness will be more productive, as there are different species available to take advantage of changes in growing conditions. A variety of plants also helps support habitat for different birds, insects, and wildlife and provides forage for grazing animals throughout the year.

How to assess plant diversity:
Walk through the area next to the stream and note the number of different species you see.

Based on your assessment, which best describes the plant diversity?

- ❑ Low diversity, mostly invasive species and/or annual weedy species
- ❑ Low diversity, mostly perennial native species
- ❑ High diversity, mostly native species, and a mix of perennial grasses, forbs, and shrubs

7. Are indicators of salinity present?

Why this matters: Saline seeps prevent many plants from growing or stunt their growth. They are not as valuable for grazing and tend to support lower plant and animal diversity, though they are a natural feature on the landscape due to the parent material of our western South Dakota soils.

How to assess salinity:
Look for a white salt "pan" on the surface of the ground. You may also notice stunted growth in plants or notice that only salt-tolerant species are present (see Plant Guide for information on salt-tolerant plant species).

Figure 117: This area exhibits signs of salinity, including stunted plant growth and salt "pans" on the surface. Photo © Corissa Busse, TNC

Based on your assessment, is the presence of salts inhibiting plant growth and productivity?

- ❑ Saline conditions are affecting plant health, productivity, and vigor
- ❑ Salt indicators are visible but are not limiting plant growth
- ❑ Salts do not appear to be present