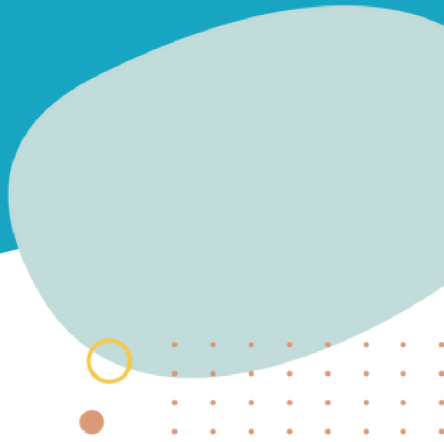


RIPARIAN BUFFER STRIPS

IMPLEMENTATION AND BENEFITS



FRIENDS OF THE BIG SIOUX RIVER

OUR MISSION

To protect and restore the Big Sioux River and its watershed, improve the water quality, and educate our community to build a conservation ethic.

OUR VISION

Our vision is to restore and ensure the health of the Big Sioux River watershed and promote the environmental, recreational, economical use, and enjoyment of the river for future generations. Community involvement is critical to achieving our vision, and FBSR seeks win-win solutions through strong partnerships and coalitions with all parts of the community, government, and stakeholders.



Friends of the Big Sioux River is a 501 (c)(3) nonprofit.

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WHAT ARE RIPARIAN BUFFER STRIPS?

Riparian buffers—also called **filter strips**—are vegetated boundaries composed of perennial grasses or woody plants that physically separate cropland from waterways. They effectively mitigate the movement of sediment, nutrients, and pesticides from waterways and farm fields. Width plays a factor when it comes to buffer strips. Narrow buffers are less effective filters than wider ones. **Fifty-foot buffers are considered good**; less than 50 feet are less than desirable. **Broad 150-foot buffers are deemed exemplary.**

Native grasslands and prairie wetlands have historically provided natural filtration and treatment before soil runoff drains into lakes, rivers, and streams. As more acres of native grasslands are plowed, or wetlands drained to make room for more planted acres, the integrity of water in lakes, rivers, and streams has become increasingly compromised by chemicals and eroding topsoil associated with ever-intensifying industrial agriculture.

PRIMARY FUNCTIONS OF BUFFER STRIPS

- **Reduce** the speed of water running off fields toward waterways
- **Trap and filter** sediment and chemicals carried by runoff
- **Prevent** pollution from reaching water resources
- **Provide** additional habitat for desirable plants and animals, such as pheasants, and promote healthy aquatic life

WHAT ARE THE BENEFITS OF BUFFER STRIPS?



Financial

There are financial incentives for installing buffers through the Riparian Buffer Initiative and the Big Sioux River Project.



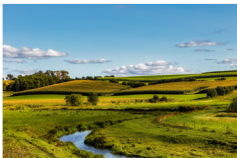
Flooding

Buffer strips improve profitability by reducing inputs on non-crop-yielding acres, particularly those that flood frequently.



Livestock

Buffer strips protect livestock from harsh weather and, under the right management system, can provide forage for livestock.



Water Quality

Buffer strips trap and filter sediment and chemicals carried by runoff, improving water quality in nearby waterbodies.



Appearance

Like the trim on a house, well-planned conservation buffers improve the appearance of a farm or ranch.



Habitat

Contiguous buffers, stretching long distances, can serve as increased habitat and safe travel corridors for wildlife.

Researchers have verified that grassy buffers most effectively trap particulate pollutants such as eroded soils. One study prepared for the U.S. Department of Agriculture identified the **sediment-trapping capabilities of buffers as ranging from 41 percent to 100 percent**, depending on the width of the buffer.¹



Buffers also decrease problems associated with soluble pollutants—ones that dissolve in water, such as nitrogen and phosphorus—moving from cropland to surface waters. Deeper-rooted buffers, such as dense perennial grasses and brushy or woody plants, can **filter pollution** moving below the surface toward a river or body of water. This type of buffer can be especially useful in removing nitrates through denitrification or plant uptake in the soil.

Not only will riparian buffers help to protect downstream waterways, but when coupled with appropriate upland treatments, including crop residue management, nutrient management, integrated pest management, winter cover crops, and similar management practices and technologies, buffer strips can assist producers in achieving a measure of **increased economic and environmental sustainability** in their operations.



SOUTH DAKOTA & THE BIGGER PICTURE

Imagine one farmer allowing their cattle access to a nearby stream, leading to stream bank erosion and excess sediment and manure in the waterbody. Or imagine one person dropping their empty soda can into a river rather than a trash can. The actions taken by these individuals may seem insignificant in the grand scheme of an entire watershed, and if only one person were completing this action, it likely would be insignificant.

However, we know that **hundreds of farmers are allowing cattle access to streams, and countless people litter in or along waterways.** When the same action is taken by multiple people, it starts to have a significant impact, whether positive or negative. In the case of the Big Sioux River, the actions taken by South Dakotans currently negatively affect those living downstream along the Missouri and Mississippi Rivers.

The Big Sioux River connects with the Missouri River near Sioux City, IA. Often known as the “Big Muddy,” the Missouri River is known to be polluted. However, as is evident in the aerial picture below, the Big Sioux is muddier than the Missouri at their confluence. This indicates that the **Big Sioux River has a high concentration of sediments and is highly impaired.**



Confluence of the Big Sioux River and Missouri River

The Missouri River flows on to meet with the Mississippi River in St. Louis, eventually emptying into the Gulf of Mexico. From the beginning of the Big Sioux River to the estuary of the Gulf of Mexico is 2,451 miles downstream.

In the Gulf of Mexico at the mouth of the Mississippi River is an area known as a “**dead zone**,” where there is not enough oxygen for fish to survive due to excess nutrients causing harmful algal blooms. The dead zone continues to grow and now covers an area the size of New Jersey.

NOAA estimates that the dead zone deprives the U.S. seafood and tourism industries of **\$82 million per year**. The Gulf of Mexico accounts for more than 40% of the nation’s seafood.²

“Most of the nitrogen and phosphorous that drives this problem comes from the upper Midwest. It’s coming from agriculture.”

-Don Scavia, former scientist at NOAA³



Dead Zone at the Gulf of Mexico (NASA)

ARE BUFFER STRIPS PROFITABLE?

Areas with already low-yielding acres are a great place to integrate buffer strips and perennial vegetation. If a landowner targets areas with low economic return but high conservation value, they can reduce input costs while gaining environmental benefits.

On average, about **20% of nitrogen fertilizer is lost through surface runoff or leaching into groundwater.**⁴ Approximately 135-150 pounds of nitrogen fertilizer are used per acre. Nitrogen fertilizer (urea and anhydrous) costs, on average, \$0.44/lb. By implementing riparian buffer strips, which reduce fertilizer loss, a farmer can potentially **save \$11.88-\$13.20/acre** on fertilizer costs.⁵ According to Iowa State University, research shows that **converting just 10% of crop-field to native perennial vegetation will reduce erosion from fields by up to 95% and reduce total phosphorous and nitrogen loss by up to 90%.**⁶

Farmers can also save money by removing cattle from streams. Cattle with unrestricted access to clean water from an alternative source, such as rural water, have been found to **gain up to 23% more weight** than those who drink from a contaminated pond or stream.⁷ Additionally, cattle with clean water spend more time grazing, have increased milk production, and decreased illness.⁸ Not only will the farmer have larger cattle to sell, but they may also see reduced vet bills.

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When erosion and nutrient loss are reduced, farmers can save money on fertilizer and other costs associated with decreased soil health. While the economic benefits of these practices may not be seen in the first few years following practice introduction, over time, these **benefits will compound and lead to increased economic and environmental health.** It is a win-win situation for all species involved.

All prices as of 2019.

IOWA CASE STUDY

Due to its similarity to Eastern South Dakota landscapes, we have included research findings from a study in Iowa looking at the cost-benefit of riparian buffers. If these practices are introduced in South Dakota, we envision South Dakota landowners seeing similar economic viability.

Strong wind and rain events carry tons of rich, fertile topsoil from farmland every year. According to one Iowa State University professor, this could potentially cut \$1 billion in yield from the state's farms. Topsoil contains the highest amount of organic matter and nutrients, meaning that its loss results in lower yields. With this loss occurring year after year, Iowa is seeing an unsustainable amount of topsoil reduction that will lead to economic impacts. These same impacts will be seen in South Dakota.⁹

One study by the Argonne National Laboratory investigated the cost-benefit of riparian buffers in the Raccoon River watershed in Iowa, specifically the use of switchgrass buffers for bioenergy feedstock. The study found that at a biomass market price of \$60-\$80 per dry ton of biomass, the use of switchgrass buffers is economically viable. For biomass less than \$60 per dry ton, the landowner must take into consideration the trade-off between water quality and profitability if they wish to install switchgrass buffers.¹⁰



DAMAGE REVERSAL & ASSOCIATED COSTS

There are several methods and practices landowners can introduce to their land to reverse the damage caused by runoff and erosion. When coupled together, these practices can increase economic and environmental sustainability. Additionally, many of these practices have cost-share opportunities available.



Land Along Skunk Creek Before and After Buffer Strip Implementation

Photos Courtesy of the Big Sioux River Project



PLANTING TREES & SHRUBS

Trees provide many benefits for streambank communities, including stabilizing the bank and providing habitat and food for wildlife. In Virginia, one landowner was able to **reduce *E. coli* levels by 30.6%** in half a mile of stream by removing cattle from the river and planting trees and shrubs. A study in Pennsylvania found that a stream flowing through forested buffers is **2-8 times more capable of processing in-stream nitrogen pollution** than a stream without buffers.¹¹

RIPARIAN BUFFER STRIP

Vegetative plantings, e.g., buffer strips, are used to **stabilize** streambanks, **reduce** sediment and nutrient loads, and **improve** habitat for aquatic and grassland species. Buffer strips are particularly cost-effective to **implement on poor-yielding acres** that are often subject to flooding and erosion. By converting these marginal acres to buffer strips, a producer can **reduce inputs and recoup money** through programs such as SRAM or CREP.¹²

Native Grass Buffer Strip: \$235 / acre
Pollinator Buffer Strip: \$1,035 / acre



COVER CROPS & NO-TILLAGE

Immediately following the harvest of a row crop, a farmer may plant a cover crop, such as a small grain, legume, or grass. When managed properly, cover crops **improve** soil health, **promote** water infiltration, **reduce** runoff and erosion, **limit** pest and disease outbreaks, and **provide** additional biomass and ground cover for fields.¹³

Reduced tillage or no-tillage practices can also be used in conjunction with cover crops to **reduce** runoff and erosion. This practice **improves** soil structure, which allows water to penetrate deeper into the soil rather than ponding and running off. When combined, these practices help keep soil and fertilizer on the land and out of rivers and streams.

Basic Cover Crop: \$30-\$40 / acre
Multiple Species Cover Crop: \$40-\$45 / acre
Over-Wintering Cover Crop: \$25-\$40 / acre

CURRENT & FUTURE PROGRAMS

South Dakota currently has the Riparian Buffer Initiative (RBI), the Big Sioux River Watershed Conservation Reserve Enhancement Program (CREP), Riparian Area Management (RAM), and Seasonal Riparian Area Management (SRAM) programs in place for landowners who voluntarily wish to introduce buffer strips on their property. First rolled out in the fall of 2021, the RBI program through SD DANR has attracted very little interest from landowners so far, despite \$3 million being set aside for the program. CREP opened enrollment on November 1, 2022, and aims to enroll up to 25,000 acres of agricultural land into the program. RAM and SRAM are run by the Big Sioux River Project, which, since 2008, has enrolled 3,574.3 acres in riparian buffer programs, protected 88.8 miles of river and stream, and prevented over 28,000,000 pounds of sediment from entering the river.¹⁴

RIPARIAN BUFFER INITIATIVE

- A program of SD DANR, the Riparian Buffer Initiative offers annual cash payments and tax breaks to incentivize the use of buffers on private lands in impaired watersheds.¹⁵
- Requirements include:
 - A buffer of at minimum 50 ft and not to exceed 120 ft.
 - Vegetation may not be harvested or mowed between May 1st and August 1st.
 - Vegetation may not be grazed between May 1st and September 30th.
 - A minimum of four inches of cover must be maintained.
 - Landowners must commit to a ten-year contract.
- Payments are based on 250% of the USDA “Pasture or Non-Irrigated Cropland Cash Rent Paid Per Acre for South Dakota” publications and will vary depending on location.

BIG SIOUX RIVER WATERSHED CREP

- Through the South Dakota Big Sioux River Watershed CREP, federal and state resources are made available to program participants to voluntarily enroll in CRP for 10-year to 15-year contracts.¹⁶ Additionally, through the program:
 - Cropland and marginal pastureland are restored to native grasses, shrubs, and wetlands.
 - Participants receive annual rental payments from both the USDA and GFP that are based on the productivity of the three predominant soils of the enrolled lands.
 - Participants also receive annual rental payments and incentive payments for installing specific conservation practices.
 - Incentive payments from GFP are added for public hunting and fishing access and watershed-specific conservation benefits.
- Requirements include:
 - The land must be located in the Big Sioux River Watershed boundary of South Dakota and have been farmed for 4 out of 6 years from 2012-2017.
 - A minimum public access area requirement of 40 acres. The minimum can be achieved with just CREP acres or a combination of CREP and GFP's Walk-In Area program.
- The goals of the BSR Watershed CREP include:
 - Establish 1,500 acres of permanent vegetative cover adjacent to rivers and streams.
 - Reduce the amount of sediment, nutrients, and nitrogen entering waterbodies.
 - Produce an additional 71,250 pheasants annually.
 - Contribute an additional 15,000 ducks annually.
 - Open 250 40-acre blocks to public hunting and fishing.
 - Create 25,000 acres of permanent vegetative cover by restoring wetlands and grasslands.

RIPARIAN AREA MANAGEMENT

- A program by the Big Sioux River Project, RAM offers a 10- or 15-year contract to landowners who meet the eligibility requirements and are willing to adopt the following practices:¹⁷
 - Pasture acres along the BSRP priority water bodies, within the 100-year floodplain
 - 30-foot buffer minimum
 - No grazing is allowed.
 - Haying is allowed once per year between June 15th and August 31st.
 - Noxious weeds and other non-desirable species must be controlled.
- Funding is available for landowners who enroll in RAM. For the most up-to-date pricing information, visit www.bigsiouxriver.com.

SEASONAL RIPARIAN AREA MANAGEMENT

- A program by the Big Sioux River Project, SRAM offers a 10- or 15-year contract to landowners who meet the eligibility requirements and are willing to adopt the following practices:¹⁷
 - Pasture acres along the BSRP priority water bodies, within the 100-year floodplain
 - 30-foot buffer minimum
 - No grazing is allowed April 1st through September 30th.
 - Haying is allowed beginning June 15th.
 - Grazing is allowed October 1st through March 31st.
 - An alternative water source shall be available.
 - Minimum vegetative stand of 4-6 inches maintained at all times.
- Funding is available for landowners who enroll in SRAM. For the most up-to-date pricing information, visit www.bigsiouxriver.com.



WHAT PROGRAMS ARE AVAILABLE IN OTHER STATES?

MINNESOTA

Minnesota passed an ambitious buffer strip law in 2015 that requires 50-foot perennial vegetation buffers along all public waters (lakes, rivers, streams, and wetlands) and 16.5-foot buffers along public drainage systems (ditches).¹⁸

NEBRASKA

The Nebraska Department of Agriculture administers a buffer strip incentive fund, using fees assessed on registered pesticides to help landowners install buffer strips on cropland adjacent to perennial and seasonal streams, ponds, and wetlands.¹⁹

KANSAS

Kansas has the Kansas Water Quality Buffer Initiative, which is a voluntary incentive program for landowners and operators who enroll in, or are eligible to enroll in, the federal Continuous Conservation Reserve Program. The Initiative provides state payments in addition to the CCRP annual payments for establishing either grass filter strips or riparian buffers in High Priority TMDL Watersheds.²⁰

NATIONAL PROGRAMS

- Conservation Reserve Program (CRP)
- Environmental Quality Incentives Program (EQIP)
- Agriculture Management Assistance

POTENTIAL NEXT STEPS



Expand Farm Bill Programs

- Increase funding for the Conservation Reserve Program (CRP) to make it cost-effective for farmers to implement high-value practices like buffer strips that protect streams and wetlands from runoff. CRP pays farmers to take marginal cropland out of production and plant grasses or trees.
- Increase funding for the Agricultural Conservation Easement Program (ACEP). This program funds conservation easements, which protect wetlands and native prairies from development.



Reform and improve the current buffer strip program in South Dakota

- Work with elected officials to write potential ordinances and legislation to promote buffer strips and appropriate management.
- Work with county conservation districts and other appropriate governmental offices to better track buffer strips and tile drainage.
- Develop partnerships with landowners and other conservation organizations to implement buffer strip implementation programs.



Work with partners to implement best management practices relating to buffer strips

- Partner with Northern Prairies Land Trust to purchase conservation easements.
- Work with conservation districts, Ducks Unlimited, South Dakota State University Extension, and Natural Resources Conservation Service to provide technical resources.
- Work with the Big Sioux River Project to provide cost-share funding to landowners to help pay for buffer strip infrastructure.

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