# PROJECT SUMMARY SHEET

PROJECT TITLE: Little Missouri River Tributaries Implementation

PROJECT SPONSOR:
Bowman-Slope Soil Conservation District
PO Box 920
111 2nd Ave NW
Bowman, ND 58623

STATE CONTACT PERSON: Greg Sandness, ND Department of Health
PHONE 701-328-5232 FAX 701-328-5200 E-MAIL gsandes@nd.gov
STATE North Dakota WATERSHED Little Missouri River Tributaries
HYDROLOGIC UNIT CODE 10110201
HIGH PRIORITY WATERSHED (yes/no) yes
TMDL Development and/or Implementation (Check any that apply)
PROJECT TYPES: Watershed WATERBODY TYPES: Streams
NPS CATEGORY: Agriculture

SUMMARIZATION OF MAJOR GOALS: To restore the riparian health of the Spring, Skull, Horse, Fivemile and Sevenmile Watersheds, reduce non-point source pollutants entering the Little Missouri River's Tributaries.

**PROJECT DESCRIPTION:**
This Watershed Project is a conservation project that will strive to reduce non-point source pollution (soil erosion, E.coli bacteria, sedimentation, and nutrient loading) and through management education, the implementation of Best Management Practices, and monitoring project activities.

The educational and cooperative activities, such as interactive conservation tours and forums, and a multi-media source distribution of educational information, will educate watershed producers and the community on the impacts of non-point source pollution and riparian health and the importance of improving soil health.

The implementation of the Best Management Practices will be used to improve soil health and rangeland health, which will improve the health of the riparian reach through improved hydrological functioning (improved infiltration/reduced runoff) and stream bank stability. Implementation of practices will improve watershed function and trend, reducing non-point source pollutants entering the Little Missouri River through sedimentation and runoff.

**FY 2017**
**Total 319 Funds Requested: $225,538**
**Local Match Total: $239,255**
**Other Federal Funds: $450,000**
**Total Budget: $914,793.00**

## 2.0 STATEMENT OF NEED

**2.1**

The Little Missouri River from its confluence with Little Beaver Creek downstream to its confluence with Deep Creek is listed on the 2014 303(d) list, or 'TMDL List", as fully supporting recreation but threatened due to total E.coli bacteria. During major runoff events, it is likely the Spring, Skull, Horse, Fivemile and Sevenmile Creek Watersheds, which are tributaries to the Little Missouri River are contributing to the high fecal coliform bacteria counts in the Little Missouri River, thus contributing to the TMDL listing status of the Little Missouri River. Given this connection to recreational use impairments in the Little Missouri River, this project will focus on the contributions of several tributaries to the Little Missouri River by implementing the appropriate management practices to improve watershed function and trend, reducing non-point source pollutants entering the Little Missouri River through sedimentation and runoff. See Appendix 6 for a map of the project area.

Spring, Skull, Horse, Fivemile and Sevenmile Creeks are a sub-watershed of the Little Missouri watershed located in southwest North Dakota. Headwaters of these watersheds begin south and west of Rhame, ND in Bowman County and flow south west where it confluences with the Little Missouri River south of Marmarth, ND in Bowman County.

The assessment of these watersheds, conclusions, and management suggestions were completed and prepared by Miranda Meehan, Ph.D. Livestock Environmental Stewardship Specialist with North Dakota State University and Garrett Hecker, Graduate Research Assistant at North Dakota State University. The Bowman-Slope SCD is very satisfied and pleased with this type of assessment method which has resulted in a very good "picture" of these watersheds and their function. Their conclusions have assisted in the planning of this project by suggesting specific focus areas and management strategies to address in priority areas.

The NDSU Assessment Report (due to the size and number of pages the full assessment reports are available from the ND Department of Health and/or the Bowman-Slope Soil Conservation District) explains that it is widely recognized that riparian health is inherently linked to watershed condition and the health of the adjacent upland plant communities (Debano and Schmidt 1989; Martin et al. 2012). Healthy soils and plant communities in the uplands have been shown to increase infiltration and decrease overland flow. High overland flow results in more water traveling through the stream channel and higher velocities, which often leads to channel entrenchment and widening. As a result some agencies are utilizing a watershed-scale assessment in the planning process. However, to date there has been no work published directly linking the state of upland ecological sites to riparian ecological sites. This project assessed the link between riparian and rangeland health. On each tributary, the assessment included: Rosgen's classification of natural streams to identify the current state of the stream and vegetation associated with each reach, which was used to determine the current state of the riparian ecosystem, whether it is stable, unstable or at risk. The assessment of the upland adjacent to the assessed stream reaches utilized the Rangeland Health and Soil Health protocols used to evaluate stability, hydrologic function and biotic integrity of the ecological sites within the uplands. The major goal of this assessment method was to improve and strengthen the ability of resource managers and landowners to restore and/or properly manage riparian ecosystems through improved understanding of the relationships between 1) riparian and rangeland health, and 2) ecosystem health and land management.

Increased knowledge of these relationships led to the development of best management practices for riparian ecosystems, specifically grazing management strategies that will enhance stability and resilience within a particular riparian system.

In addition to the watershed health assessment, the Bowman/Slope SCD conducted various other needs assessment methods to fully research the need for this project. Needs assessment methods used include:

- Key informant interviews
- Questionnaire and survey

In key informant interviews conducted by the watershed coordinator, producers in these watersheds expressed a high level of interest in the water quality. The SCD board held multiple meetings discussing and prioritizing the conservation issues producers in the watershed are dealing with. A survey was mailed to all producers in these watersheds asking what BMP's and educational needs (related to water quality) are in the watershed. The survey was a successful tool in the planning process for this project.
The results from the surveys returned are listed below:

- 100% of the returned survey's supported the need for the project and listed BMP's they see a need for on their operation
- A strong interest in BMP's on rangeland were expressed with the need to improve and facilitate grazing systems and improve soil health.
- Producers also requested BMP's to reduce livestock's time in the riparian areas (portable windbreaks, alternative water sources)
- Specific requests were made for assistance with learning more about cover crops and improving soil health
  ***(Actual Producer Survey Results)***

This survey, in addition to the watershed assessments, were the basis for the estimated BMP's (see a copy of this survey in Appendix 4). Through this survey producers requested the following BMP's: cross fencing, water developments to improve grazing distribution, pasture/hayland plantings, invasive species control, waste management systems, cover crops, and windbreak establishment. Educational needs expressed through this survey were; soil health, rangeland/grazing management, cover crops, and Holistic Resource Management.

There are also a number of operations in this watershed that winter their cow herd near natural protection that is also located near the creek and riparian areas. Therefore an important option for these producers will be a partial manure management system; winter grazing system; and/or portable windbreaks to be able to move winter feeding areas away from riparian areas.

To limit impacts of livestock, wildlife and equipment a recommendation is to install stream hardened crossings to encourage one "main" stream crossing instead of multiple sites being used causing stream bank erosion, sedimentation and streambank degradation. Including this practice in the BMP's available to producers and land owners will be a unique conservation opportunity available to this project area and may offer a "great" conservation return for a low-cost investment. See attachment 9 for crossing specifications and additional information.

**2.2**
Spring, Skull, Horse, Sevenmile and Fivemile Creeks are located in Bowman County, and in North Dakota in hydrologic unit code 10110201. All of these listed creeks are intermittent tributaries of the Little Missouri River.

Spring Creek is approximately 19 miles in length and drainage area of approximately 20,432 acres. The Spring Creek Watershed is located within 2 Major land Resource Areas (MLRA), the eastern portion of the watershed is located within MLRA 54, the Rolling Soft Shale Plain, and the western portion is located within MLRA 58C, the Northern Rolling High Plains, Northwestern Part.

Skull Creek is approximately 20.6 miles in length with drainage area of approximately 20,658 acres. The Skull Creek Watershed is located within MLRA 58D, the Northern Rolling High Plains, Eastern Part.

Horse Creek is approximately 17 miles in length with a draining area of approximately 17,267 acres. Sevenmile is approximately 22 miles in length with a drainage area of approximately 17,570 acres. Fivemile Creek is approximately 18 miles in length with a drainage area of approximately 20,586 acres. All of these watersheds are a landscape of MLRA 58D.

Landscape in these watersheds is a diverse accumulation of rangeland, cropland, nearly barren and barren buttes and bluffs which make up the Badlands of southwestern North Dakota. Farming and ranching is the heart of the area's economy and land within the watershed is managed for this purpose.

The Watershed Assessment for Spring and Skull Creek Watersheds was completed by Miranda Meehan, Carlson McCain in 2014. The Watershed Assessment for Horse, Sevenmile and Fivemile Creeks were completed by Miranda Meehan, and Garret Hecker, NDSU in 2015. Methodology is explained in the Watershed Assessment Reports, available upon request to the Bowman-Slope SCD and/or ND Department of Health.

**2.3** See Appendix 6 for maps.

**2.4**
The total acreage in this project area is approximately 96,513 acres and approximately 97 miles of streams length.

Spring Creek Watershed drains approximately 20,432 acres in Bowman County. The topography of the watershed varies from nearly level cropland to the steep and complex badlands. Agriculture is the predominant land use in the watershed. Grassland occupies the greatest area of the watershed at 64.3%, cropland accounting for 15%, hayland 1.5%, pastureland 1.6%, shrubland 9.4%, riparian/wetland 2% and other land uses such as roads, water, and farmsteads cover the balance.

Skull Creek Watershed drains approximately 20,658 acres in Bowman County. The landscape is characterized by level plains with occasional flat-topped, steep sided buttes rising out of the plains. The dominant native vegetation within MLRA 58D is mixed prairie. Agriculture is the predominant land use in the watershed. Grassland occupies the greatest area of the watershed at 67%, cropland accounting for 8.5%, hayland .9%,

pastureland 1%, shrubland 16%, riparian/wetland 2.4% and other land uses such as roads, water, and farmsteads cover the balance.

Horse Creek Watershed drains approximately 17,267 acres and the Sevenmile Creek Watershed drains 17,570 acres all in Bowman County. The landscape is consistent with the MLRA 58D being characterized by mostly gentle slopes with steep slopes being common. The flat lands are dominated by native vegetation with mixed grass prairie. Agriculture is the predominant land use in the watershed. Grassland occupies the greatest area of the watershed at 67%, cropland accounting for 3.22%, hayland/pasture .01%, shrubland 18.09%, riparian/wetland 2.62%, badlands and barren lands 6.02% and other land uses such as roads, water, and farmsteads cover the balance

Fivemile Creek Watershed drains approximately 20,568 acres in Bowman County. The landscape is characterized by gentle to steep slopes, and contains some areas that are relatively flat where steep –sided buttes occur. The dominant native vegetation within MLRA 58D is mixed grass prairie. Agriculture is the predominant land use in the watershed. Grassland occupies the greatest area of the watershed at 64%, cropland accounting for 8%, shrubland 16%, riparian/wetland 3% and other land uses such as roads, water, and farmsteads cover the balance.

The predominant enterprises in these watersheds are cow/calf and small grain operations with forage crops, back-grounding, and sheep operations also present. There are a small number of producers that irrigate out of the Little Missouri River in these watersheds. The Energy and Gas Industry is very active in these watersheds also.

These watersheds are in a brittle type ecosystem, soils are generally very shallow, droughty and highly erodible. The ability for agriculture practices to improve infiltration rates and reduce run-off is crucial to the health of the watershed and production agriculture in this area.

The North Dakota State Land Department ( acres)and Bureau of Land Management (4,060 acres) are also landowners in this watershed.

**2.5**

The Watershed Assessments concluded:

Spring and Skull Creek Watersheds: Six of the nineteen riparian reaches evaluated were determined to have a downward trend, showing bank destabilization, channel down cutting and channel widening. The replacement of deep rooted native riparian species within the greenline plant community by shallow rooted upland and/or introduced species cause bank to become less stable resulting in the transition into state two.

Horse and Sevenmile Creek Watersheds: Of the twelve riparian reaches evaluated, six were determined to have a downward trend. Sites that were classified as having a downward trend had introduced species within their greenline communities and idle land management.

Fivemile Creek Watershed: Of the eleven riparian reaches evaluated, five were determined to be unstable/less stable condition. Sites that were classified as having a downward trend had bank destabilization, channel down cutting, high amount of upland species cover within greenline area, and channel widening.

Management suggestions to improve these downward trending sites included healthy grazing management which promotes and facilitates a healthy functioning native plant system, with deep roots to promote bank stabilization and improve infiltration rates. Grazing can include grazing riparian areas when plants are dormant to avoid plant damage, grazing systems to improve idle land and control Brome Grass invasions and promote healthy native and manage introduced grass species (Kentucky Bluegrass).

To limit the impacts of both livestock and equipment it is recommended that the number of stream crossing utilized be limited. If needed, the old crossing sites and/or eroded stream banks will be restored with installation of the new/improved crossing site. Due to the large about of acres associated with the pastures/locations of these crossing, there will be limited opportunity to fence out riparian areas and would also be cost prohibitive due to length of fence that would be needed. Condensing stream crossings can reduce sedimentation and erosion, increasing water quality.

Water samples were not collected in these creeks due to lack of flow, geographical barriers, and access issues. The lack of flow in the upper portion of this watershed made relying strictly on rain events difficult to capture water quality samples. And the lower portion of the watershed is in the Badlands landscape and physically getting to the flow sites after a rain event is almost impossible. As an alternative, the Bowman-Slope SCD coordinated with Miranda Meehan Ph.D., Livestock Environmental Stewardship Specialist at NDSU. Rather than collecting water quality samples, her work focused on collecting physical data to determine the current state and trends of the stream channels. Stressors impacting the function of the streams were also identified.

## 3.0 PROJECT DESCRIPTION

### 3.1 GOAL

To reduce the potential for the Spring, Skull, Horse, Sevenmile and Fivemile Creek Watersheds, to contribute to downstream recreational use impairments to the Little Missouri River. The implementation of the Best Management Practices will be used to improve soil health and rangeland health, which will improve the health of the riparian reach through improved hydrological functioning (improved infiltration/reduced runoff) and stream bank stability.

### 3.2 OBJECTIVES, TASKS, PRODUCTS, AND COST

**Objective 1:** Sponsor and conduct multiple conservation and water quality educational activities for the public to bring interactive and innovative educational opportunities to our community. .

**Task 1:** Employ one part-time support staff to implement all project tasks. *See a description of staff duties in appendix 6.*

**Products:** Administration, educational and informational activities, conservation plans, BMP Monitoring, producer survey.

Cost: $145,633 ($82,880 319 Funds, $62,753 Local Cash & In-Kind Match)

**Task 2:** Conduct tours, meetings, presentations, and lyceums for producers, school systems, and the general public.

**Products:** Conservation tours/meetings educating participants on: Rangeland health, Prescribed Grazing Techniques, Water Quality Indicators, Riparian heath, Soil Health, Watershed Function and Conservation Impacts, Nutrient

Management Planning, Cropping Rotations (2 per year, 10 total during the project period).
**Cost**:$27,000 ($5,000 319 Funds, $22,000 In-Kind and Cash Match)

**Task 3**: Implement a conservation and water quality information campaign using multi-media sources to distribute education.
**Products:** Educational articles (2 per year), Radio spots (6 monthly spots per year), Educational booth at the local county fairs (2 per year)
**Cost:** $15,000 In-Kind and Cash Match)

**Task 4:** Coordinate with other state, federal and/or local organization's resource management activities in the watershed to ensure water quality issues are being addressed and avoid duplications of efforts.
**Product:** Increased communication and coordination regarding water quality issues in the watershed.
**Cost:** $0- included in staff budget

**Objective 2:** Restore the function and reverse the downward trend on 20% of the stream reaches of the tributaries to the Little Missouri River by improving soil health and land management along the creeks.

**Task 5:** Assist producers with the planning and implementation of BMP's that will improve management on approximately 20,000 acres of land adjacent to the creeks to restore and protect the vegetative communities in the riparian corridor and improve plant diversity, soil health and infiltration rates on lands adjacent to the riparian corridor.
**Products:** See BMP Table in Appendix 3 for specific practices.
**Cost:** $262,160 ($137,658 319 Funds, $94,502 Producer Cash Match, $30,000 Prescribed Grazing In-Kind Match, $5,000 In-kind match for SCD vehicle use & the balance of cost are included in Task 1 Personnel/Support.)

**Objective 3:** Coordinate with the NDDoH and the North Dakota State University to monitor and document riparian improvements and estimate benefits of applied BMP's in the Spring, Skull, Horse, Sevenmile and Fivemile Creeks Watersheds.

**Task 6:** Conduct follow-up evaluations to document post-project riparian conditions and watershed function trend in the watershed. This will be completed by SCD Staff under the direction and recommendation of Miranda Meehan, Ph.D. on
**Products:** End-of-project riparian rankings defining conditions
**Cost:** Included in staff budget

**Task 7:** Track the location of applied BMP and document the benefits of select BMP using photo-monitoring sites.

**Products:** Photo documentation of riparian improvements related to applied BMP; Estimated nitrogen and phosphorus load reductions associated with full containments and partial manure management systems: and a map of BMP locations. See Appendix 8 for photo-monitoring methods to be used.
**Costs:** Included in staff budget

**Task 8:** Follow-up survey with producers in the watershed to measure the improved knowledge they gain from the project.

**Product:** Survey data and summary report to measure the impact the educational activities have.
**Cost:** Included in staff budget

**3.3 Milestone Table** – See Appendix 1

**3.4**
The appropriate environmental permits that may potentially apply to this project are:

- NDDoH Approval to Operate Permit for Animal Feeding Operations
- Cultural Resource inventories and regulations
- US Corps of Engineer 404 Permits

**3.5**
The Bowman/Slope SCD has over twenty-six years of proven effective experience with watershed and EPA-319 projects. The SCD has demonstrated leadership in progressive conservation in the local communities, district, region, and state. The SCD has sufficient resources to implement all aspects of this watershed project including: personnel with experience in federal programs, equipment, vehicles, and an established reputation with the agriculture community.

**3.6**
The project sponsor will be responsible for insuring the proper Operations and Maintenance (O&M) of 319 funded BMP's. Project staff will monitor and inspect installed BMP's as needed. BMP's standards will follow the NRCS Technical Guide. Project staff will inform the cost-share recipients of the O&M conditions during the planning process, the recipient will sign *Section 319 Cost Share Agreement Provisions*, which will be included with *Conservation Plan of Operations*.

## 4.0 COORDINATION PLAN

**4.1**
**(1) The Bowman/Slope Soil Conservation District** will be the lead project sponsor for the Little Missouri River Tributaries Project. The SCD will be responsible for the implementation of all the goals, objectives, tasks, and products presented in this proposal. The SCD will provide all personnel, administration, equipment, and financial support required to successfully implement the project.

**(2) USDA Natural Resources Conservation Service (NRCS)** will provide technical assistance, engineering services, technology/equipment, and participate in the educational activities and project promotion. The implementation of NRCS conservation programs (EQIP, WHIP, CSP, etc.) during this project period will correlate with and support the goals and objectives of this project.

**(4) North Dakota State University Extension Service** will provide the project with technical and educational assistance for tours, demonstrations, lyceums, newsletters, project promotion, and training. The SCD personnel will work closely with the Bowman County Extension Service to develop an effective education and outreach program. The NDSU Extension Service will provide in-kind match towards the project.

**(5) North Dakota Department of Health (NDDoH)** will be the EPA-319 funding administrator for the project. NDDoH will provide continued technical assistance and training to SCD staff for the implementation.

**(6) Local Community Partners** multiple local businesses and organizations will provide technical and financial assistance for the implementation of the project's educational activities. (i.e., Farm Credit Services and Dakota Western Bank will sponsor a meal and refreshments for a tour.)

**4.2**

Throughout the assessment phase of the Little Missouri River Tributaries Watershed Project, the Bowman-Slope SCD and cooperators have created public awareness of the need for the project through newsletter articles and one-on-one conservation planning with producers.

The SCD mailed a survey to these watershed producers to research the general support for the project and specific BMP and educational needs in the watershed. This proved to be a very beneficial tool for the planning of the implementation of this project. 100% of the surveys returned supported the need for this project. See a copy of this survey in Appendix 4.

Letters of support and commitment for the project are included in Appendix 8.

**4.3**

Coordination with existing projects and organizations is a strong point in this project. The proposed educational activities and BMP's in the Little Missouri River Tributaries (LMRT) Watershed project complement many existing projects and conservation activities throughout the Little Missouri River Watershed.

The SCD will coordinate this watershed project with all applicable programs available in the most efficient method to achieve the goals and objectives of the project. USDA Conservation Programs available in the watershed are the Environmental Quality Incentives Program (EQIP), Conservation Reserve Program (CRP), and Conservation Stewardship Program (CSP). NRCS currently has an active Special Sage Grouse Initiative within this watershed area that is implementing many BMP's with a common conservation goal as this EPA-319 Project. There continues to be conservation practices planned through NRCS in this special Sage Grouse Initiative to improve grazing systems and soil health. Through the LMRT Project, producers will be able to receive education and technical assistance to implement new grazing management strategies to complement the practices planned in their NRCS contracts. BMP's through this EPA-319 Project will also be used to complement and/or build upon a producers existing USDA plan.

**4.4**

The Little Missouri River Watersheds are located in Greater Sage-Grouse Habitat. In 2010 the US Fish & Wildlife Service placed the Sage Grouse on the list of species that are candidates for the Endangered Species Act Protection and in 2016 did not list the species on the Endangered Species List. Therefore there is and has been a strong effort by the USDA, US Fish & Wildlife Service and ND Game & Fish and Bowman-Slope SCD to improve habitat for the Sage Grouse. Generally, improving rangeland and soil health improves Sage Grouse Habitat; therefore, the BMP's installed through the Little

Missouri River Tributaries Project and potential findings in the other watershed assessments will complement the existing efforts in Sage Grouse Habitat areas.

## 5.0 EVALUATION AND MONITORING PLAN

**5.1-5.5**
The Little Missouri River Tributaries Project will be evaluated through:

- Photo-monitoring
- Riparian cross sections be sampled using the same protocol as done in the assessment
- Line-point intercept (LPI) of the greenline communities

Other methods of evaluation will be a project effectiveness evaluation by the SCD board and a follow-up survey to watershed producers. In addition, project staff will document participants attendance at activities completed in Tasks 1-4 to measure if project goal and objectives are achieved.

**Tracking BMP Implementation**
BMP Implementation
The ND NPS Program BMP Tracker database will be used to store information on all BMPs applied during the project. The database will be updated and maintained regularly throughout the project to track the costs, type, location and amounts of specific BMP's implemented in the watershed. Information (e.g., location, type, & amount) from the database will be used to associate the applied BMP with data from the riparian assessment sites to document the environmental benefits resulting from the BMP. The BMP data will also be used to document and map the extent of land use improvement in the watershed.

## 6.0 Budget

**6.1 See Appendix 2 for budget tables**

## 7.0 Public Involvement

The Little Missouri Tributaries Watershed Project will ensure public involvement through an extensive information and education campaign to increase the awareness of the project and resource concerns in the watershed. The planned "hands- on" educational activities will allow producers to learn how to address their individual resource concerns and ensure involvement from all participants.

The assessment survey completed by the producers in the watershed gave the producers "ownership" and individual involvement in the planning of this project. With the implementation of this project, producers will have the opportunity to complete BMP's and participate in the educational activities that they expressed a need for.

The SCD board represents the constituents of the watershed. They uphold the responsibility to address the needs of their constituents and ensure their involvement in the project.

Appendix

# Final Milestone Table for Liittle Missouri River Trib Watershed Implementation Project

| TASK/RESPONSIBLE ORGANIZATIONS | Output | Goal | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|---|
| | | | 07/17-6/18 | 07/18-6/19 | 07/19-6/20 | 07/20-06/21 | 07/21-12/21 |
| **Objective 1**: Educational Activities | | | | | | | |
| Task 1 - Employ part-time staff to implement tasks | conservation plans, assessments, educational activities | 1 part time staff employed | | | | | |
| Task 2 - Conduct tours, meetings, presentations | tours, educational | | | | | | |
| Group 1, 2, 3 | events, | 10 | | | | | |
| Task 3 - Conservation Information Campaign | | | | | | | |
| | Articles | 10 | | | | | |
| | Radio Ad | 30 | | | | | |
| | Fair Booths | 10 | | | | | |
| Group 1,2,3 | | | | | | | |
| Task 4 - Coordination with other organizations on water quality issues. | Communication/ Coordination | | | | | | |
| Group 1, 2, 3 | | 1 | | | | | |
| **Objective 2**: Restore the downward trend on stream reaches | | | | | | | |
| Task 5 - Improve riparian area status, Conservation Planning, Implement BMP's | Acreage in Conservation Plans | | | | | | |
| Group 1, 2 | *See BMP Table | 20,000 | | | | | |
| **Objective 3**: Monitor and Evaluate Project | | | | | | | |
| Task 6- Follow up evaluation of BMP's | Collect data for | | | | | | |
| Group 1, 2, 3, | Final Report | 1 | | | | | |
| Task 7 - Photo- Monitoring | Data Collection | 8 | | | | | |
| Task 8 - Follow-up Survey with Producers | Collect data for | | | | | | |
| Group 1, 2, 3 | Final Report | 1 | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

*Group 1: SCD Group 2: NRCS Group 3: NDSU Extension Group 4: NDDoH*

**Appendix 2**

## Little Missouri Tributaries BUDGET TABLE

| PART 1: Funding Sources | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 | TOTAL |
|---|---|---|---|---|---|---|
| | | | | | | |
| **EPA Section 319 Funds** | | | | | | |
| 1) FY 17 Funds (FA) | $47,948 | $50,977 | $52,675 | $47,948 | $25,990 | $225,538 |
| Subtotals | $43,616 | $46,646 | $48,343 | $43,616 | $43,317 | $225,538 |
| | | | | | | |
| **Other Federal Funds** | | | | | | |
| 1) NRCS- EQIP, WHIP, CSP (FA) | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $250,000 |
| NRCS (TA) | $40,000 | $40,000 | $45,000 | $45,000 | $30,000 | $200,000 |
| Subtotals | $90,000 | $68,000 | $85,000 | $85,000 | $58,000 | $450,000 |
| | | | | | | |
| **State/Local Match** | | | | | | |
| 1) Bowman/Slope SCD (FA, TA) | $17,095 | $17,094 | $17,094 | $17,097 | $17,099 | $84,235 |
| 2) Watershed Producers (FA) | $24,900 | $24,900 | $24,900 | $24,900 | $24,900 | $124,500 |
| 3) NDSU Extension Service (TA) | $4,000 | $4,000 | $4,000 | $4,000 | $4,000 | $20,000 |
| 4) Local Sponsors (FA)* | $2,104 | $2,104 | $2,104 | $2,104 | $2,104 | $10,520 |
| Subtotals | $48,099 | $48,098 | $48,098 | $48,101 | $48,103 | $239,255 |
| | | | | | | |
| **TOTAL BUDGET FUNDS** | **$181,715** | **$162,744** | **$181,441** | **$176,717** | **$149,420** | **$914,793** |

FA: Financial Assistance
TA: Technical Assistance
NRCS: Natural Resource Conservation Service
SCD: Soil Conservation District
* Local sponsors: Local Business and organizations providing assistance for the educational activities (i.e. meal/refreshments sponsor)

# Little Missouri River Tributaries Implementation Project Budget

**PART 2: Funding**

| | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 | Total Costs | Cash Match | In-Kind Match | 319 Funds |
|---|---|---|---|---|---|---|---|---|---|
| **PERSONNEL/SUPPORT** | | | | | | | | | |
| 1) Salary- Part-time Project Coordinator | $16,056 | $26,056 | $26,605 | $27,403 | $14,113 | $110,233 | $44,093 | | $66,140 |
| 2) Benifits - Project Coordinator | $3,400 | $5,500 | $5,500 | $5,500 | $5,500 | $25,400 | $10,160 | | $15,240 |
| 3) Office Equipment | $0 | $0 | $0 | $0 | $0 | $0 | | | $0 |
| 4) Travel | $500 | $500 | $500 | $500 | $500 | $2,500 | $1,000 | | $1,500 |
| 5) Supplies | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $5,000 | $5,000 | | |
| 6) Postage | $500 | $500 | $500 | $500 | $500 | $2,500 | $2,500 | | $0 |
| Subtotals | $21,456 | $33,556 | $34,105 | $34,903 | $21,613 | $145,633 | $62,753 | $0 | $82,880 |
| OBJECTIVE 1: EDUCATIONAL ACTIVITIES | | | | | | | | | |
| Task 1: Project Staff | Included in Personnel/Support | | | | | | | | |
| Task 2: Tours | $5,400 | $5,400 | $5,400 | $5,400 | $5,400 | $27,000 | $11,000 | $11,000 | $5,000 |
| Task 3: Information Campaign | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 | $15,000 | $10,000 | $5,000 | |
| Task 4: Muli-organiztion Coordination | Included in Personnel/Support | | | | | | | | |
| Subtotals | $8,400 | $8,400 | $8,400 | $8,400 | $8,400 | $42,000 | $21,000 | $16,000 | $5,000 |
| OBJECTIVE 2: | | | | | | | | | |
| Task 5: Planning & BMP's | $46,320 | $53,960 | $53,960 | $53,960 | $53,960 | $262,160 | $94,502 | $30,000 | $137,658 |
| | | | | | | | | | |
| Subtotals | $46,320 | $53,960 | $53,960 | $53,960 | $53,960 | $262,160 | $94,502 | $30,000 | $137,658 |
| OBJECTIVE 3: MONITOR AND EVALUATE | | | | | | | | | |
| Task 7: Monitor Riparian health | Included in Personnel/Support | | | | | | | | |
| Task 8:Photo Monitoring | Included in Personnel/Support | | | | | | | | |
| Task 9: Follow-up Survey | Included in Personnel/Support | | | | | | | | |
| Subtotals | | | | | | $0 | $0 | $0 | $0 |
| **Administration and Accounting** | | | | | | | | | |
| SCD Management | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 | $15,000 | $0 | $15,000 | $0 |
| **TOTAL PROJECT BUDGET** | **$79,176** | **$98,916** | **$99,465** | **$100,263** | **$86,973** | **$464,793** | **$178,255** | **$61,000** | **$225,538** |

***All Personnel/Support costs are separate and not included in the total cost of each Task Total.***

** Conservation Planning: In-kind value for SCD vehicle use*

** BMP In-Kind: based on 10,000 acres of Prescribed Grazing @ $3/ac.

Refer to BMP Table (Appendix 3) for more detailed BMP costs.

| Little Missouri River Tributaries Watersheds Implementation | | | | | Appendix 3 |
|---|---|---|---|---|---|
| | BEST MANAGEMENT PRACTICE TABLE | | | | |
| PRACTICE CODE | PRACTICE DESCRIPTION | COST PER UNIT | QUANTITY | TOTAL | 319 FUNDS |
| 382 | Fencing | $1.80/ft | 3,750 ft | $6,750.00 | $5,467.50 |
| 512 | Pasture/Hayland Planting | $35/ac | 250 ac | $8,750.00 | $5,250.00 |
| 516 | Pipelines | $3.00/ft | 10,000 ft | $30,000.00 | $18,000.00 |
| 550 | Range Planting | $40/ac | 50 ac | $2,000.00 | $1,200.00 |
| 614 | Trough and Tank | $1,500/each | 10/ each | $15,000.00 | $9,000.00 |
| 633 | Waste Utilization | $2/ton | 100/ton | $200.00 | $120.00 |
| 642 | Well (livestock only) | $8100/each | 3 each | $24,300.00 | $14,580.00 |
| 351 | Well Decommissioning | $900/each | 3 each | $2,700.00 | $1,620.00 |
| 380 | Windbreak/Shelterbelt Establishmer | $30/hlf | 5,000 ft | $1,500.00 | $900.00 |
| 312 | Waste Management System | $40,000 | 1 | $36,220.00 | $36,220.50 |
| 340 | Cover Crops | $20/ac | 250 ac | $5,000.00 | $3,000.00 |
| 528A | Prescribed Grazing (In-Kind) | *$5/ac* | *10,000 ac* | *$30,000.00* | |
| | Portable Windbreaks | $27.00 | 500 ft | $13,500.00 | $8,100.00 |
| | Solar System | $6,000 | 2 each | $12,000.00 | $7,200.00 |
| | Harden Water Crossing | $9,000 each | 4 each | $45,000.00 | $27,000.00 |
| | | | **TOTAL** | **$232,920.00** | **$137,658.00** |
| * *Standard Cost Share Ratio: 60% Federal / 40% Local Funds* | | | | | |

**Appendix 4**

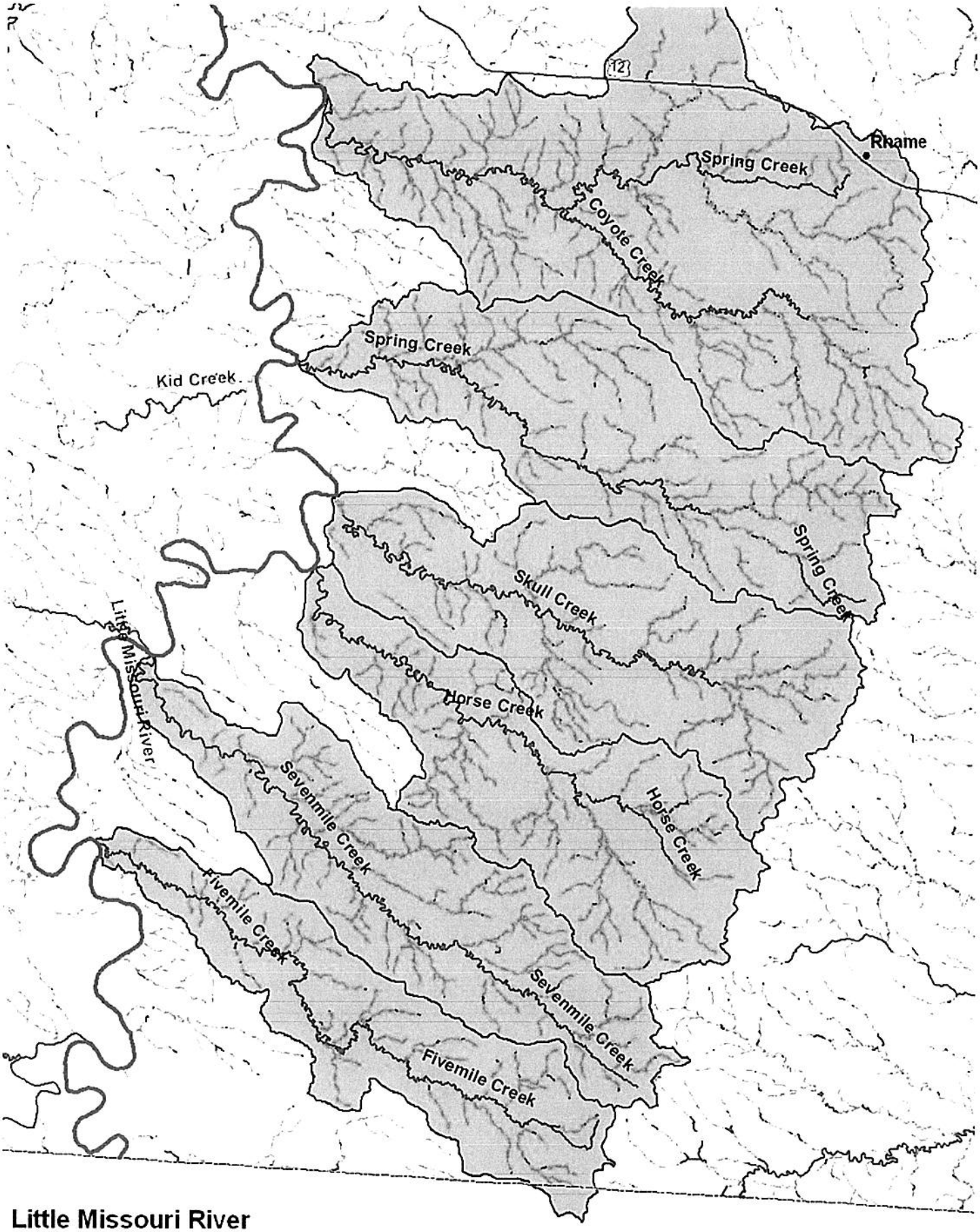
**Little Missouri River Tributaries Watershed Project**
**Producer Input Survey Results**

- 38% of the surveys mailed out were returned
    - 2- ranches/families combined their answers
- BMP requests
    - 28% Fencing
    - 57% Pipelines & tanks
    - 42% Livestock wells
    - 1 solar system
    - 100% grass seeding (tame and/or native seeding)
    - 42% Cover crop systems/acres
    - 3 hardened water crossings
    - 2 Nutrient Management and/or Animal Feeding Systems or Partial Systems
    - 3 Producers interested in Portable Windbreak for winter feeding distribution and to lesson concentration areas.
- Demonstration Project & Education Topic Ideas:
    - Re-establishing Native Range
    - Intensive cover crop grazing systems

- As project sponsors, we appreciate the "ground-level" input from producers in the project area through this survey. It gives producers input into the planning process and also gives us, as project sponsors, valuable data to use in planning BMP's and educational goals for this project.

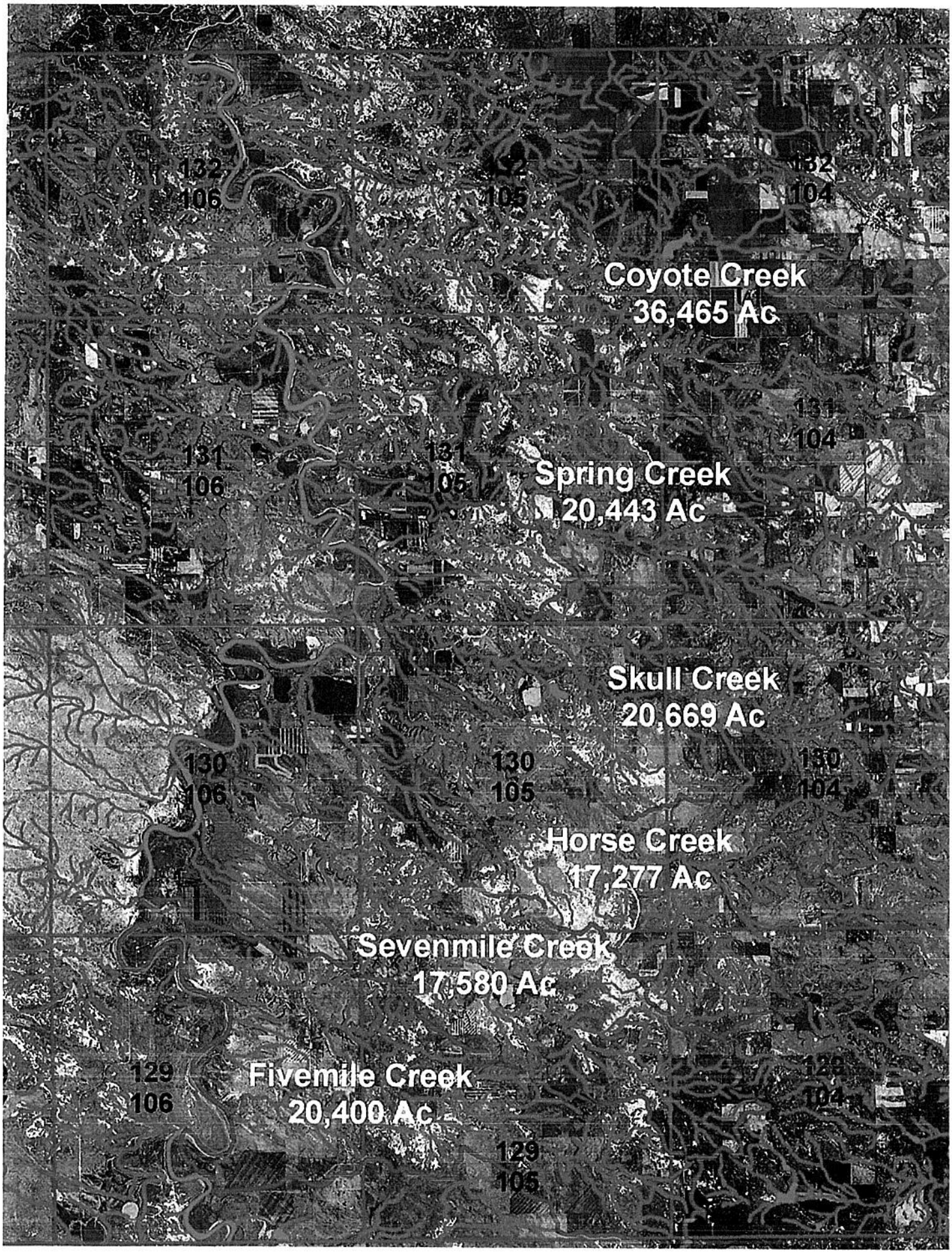
Appendix 5

# Project Area Maps




**Little Missouri River**
**Tributaries Assessment**

**Legend**


132
106
132
105
132
104
Coyote Creek
36,465 Ac
131
104
131
106
131
105
Spring Creek
20,443 Ac
Skull Creek
20,669 Ac
130
106
130
105
130
104
Horse Creek
17,277 Ac
Sevenmile Creek
17,580 Ac
129
106
Fivemile Creek
20,400 Ac
129
104
129
105

# Staff Job Descriptions

Appendix 6

**Watershed Coordinator Job Description**

The Bowman-Slope SCD watershed coordinator will be responsible for promoting, implementing, and completing all aspects of the watershed BMP practices and overall project management. The SCD Board of Supervisors will serve as the supervisor and management for this position.

Specifically the coordinator will:

- Promote conservation practices through producer contacts
- Develop conservation plans, gather data, complete/assist with field work
- Plan, organize, and conduct educational activities
- Assist the SCD Board in a coordinated effort with other agencies/organizations to improve the natural resources of the watershed
- Complete all necessary reports, record keeping, database management, and administrative needs of the watershed
- Collect water samples and field data need for project monitoring and for the assessment of additional watersheds
- Complete the administrative aspects of the project (financial records, bookkeeping, reimbursement reports, newsletters, ect.)
- Other duties as established by the SCD Board and/or required to implement the project

# Photo Monitoring Protocol

## Appendix V Photo Monitoring Protocol

# Monitoring Riparian Areas With a Camera

By Michael DeLasaux[1], Holly George[2], and Philip Mauryama[3]

Riparian areas are next to streams, springs, rivers, ponds and lakes. Physical characteristics that influence riparian areas vary considerably and include slope, aspect, topography, soil type of streambed material, water quality, elevation, size, and adjacent plant community as seen in Figure 1.

**Figure 1**
Riparian zones are identified by the presence of vegetation that requires large amounts of free or subsoil water.

Source: BLM Colorado State Office, 1990

You probably have overall management goals that include livestock production objectives. What about your riparian areas? **Management objectives for a healthy riparian area may include:**

- High water table and maintenance of water storage capacity.
- High forage production.
- Shade for cool water.
- Habitat for desirable fish.
- Wildlife habitat diversity.
- Presence of vegetation and roots to protect and stabilize banks.

[1] County Director and Natural Resources Advisor, Plumas-Sierra Counties, UCCE, 208 Fairgrounds Rd, Quincy, CA 95971
[2] Natural Resources and Livestock Farm Advisor, Plumas-Sierra Counties, UCCE, 208 Fairgrounds Rd, Quincy, CA 95971
[3] Natural Resources Farm Advisor Intern, Plumas-Sierra Counties, UCCE, 208 Fairgrounds Rd, Quincy, CA 95971

- Late summer stream flows.

Management objectives can help you define what to monitor. For example, by recording amount of bare soil along a stream bank each season, you may determine the trend of the b towards stability or degradation. If the amount of bare banks is increasing, then y management practices should be changed to fulfill the objective of protected banks and sta banks.

### Riparian Area Inventory

The first step in monitoring riparian areas is to determine the location, amount and the type riparian areas in your management area. Riparian inventory is important when determining wh to monitor. For an example of a riparian inventory short form see *Appendix III*.

### Where to Monitor

Select areas that represent the different riparian areas on your property. These areas should useful for demonstrating trends. Include riparian areas where management is having an imp either positive or negative. You should also include riparian areas that are in some way degra or highly susceptible to degradation. These areas may have little bank vegetation, resulting bank instability, little shade, warmer water, lower water table, poor fish habitat, etc. At least monitoring site should be established for each different riparian area. The transect for collection is linear or parallel to the stream course.

### Riparian Photo Monitoring Components

Riparian monitoring has two components:

1) Landscape photo

2) Site description with data collection.

Photo points are used to record change over time. The pictures on the following page are examples of the power of photographs to illustrate change over time. They also indicate the direction that change is occurring.

(see following page)

Photo Pt. 2 Fitzhugh Creek:
Summer 1976

Photo Pt. 2 Fitzugh Creek:
Summer 1987

The second riparian monitoring component describes the site and its physical and biological characteristics, such as vegetative cover and bank condition.

Ideally, photographic monitoring is used together with site description and data collection. Monitoring that is based solely on photography might not provide sufficient information to evaluate objectives.

**Photo Monitoring**

It is convenient to use the same riparian monitoring areas for photographic monitoring and for collecting information on physical and biological characteristics. However, photographs should be taken before the sampling so the vegetation is not trampled. Also, photos should be taken at approximately the same time of year for comparison. Each monitoring area should have a number and location description unique to the management area. (See *Appendix IV* - Photo Monitoring Site Record).

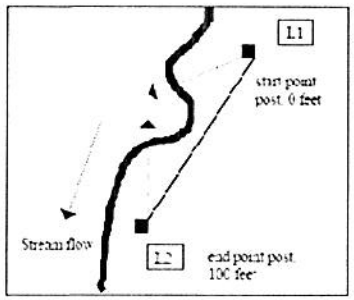
**Monitoring Area Location and Size**

The monitoring area (distance along stream course) should be long enough to give a representative view of the area. For example, a narrow creek that is only ten feet wide with dense vegetation may only need a monitoring area that is 50 feet long, while a one-hundred-foot-wide stream in an open meadow may need a 400-foot monitoring area to better represent the section. As a rule of thumb, your monitoring area length should be about four times the width of the channel at the banks' edges.

Two permanent markers (post, tree, etc.) are used to delineate the monitoring area, one at the beginning and one at the end on the same side of the stream (see Figure 2). These two markers are the principal photo points. One of the monitoring area markers should be referenced with a compass bearing and distance to a witness point such as a nearby large tree or utility pole to aid in future location of the monitoring area or if the marker post is removed. The compass bearing and distance between the two permanent landmarks should also be noted. The referenced landmark should be noted on a map or aerial photos as shown in Figure 2. This information should be included on the Photo Monitoring Site Record.

**Figure 2**

A stream channel that is only 10 feet wide may require as few as two photographs to adequately cover the area.




A diagram similar to Figure 2 should be drawn with a sketch of the stream channel, the photo points, the direction of stream flow, a reference or witness point, and any extra comments that would be helpful in locating the monitoring area.

# Project Letters of Support

USDA

United States Department of Agriculture

September 20, 2016

Mr. Greg Sandness
North Dakota Department of Health
918 East Divide Ave, 4th Floor
Bismarck, ND 58501-1947

Dear Mr. Greg Sandness:

The purpose of this letter is to document the Natural Resources Conservation Service (NRCS) supports the Little Missouri River Tributaries Implementation Project.

NRCS is always thankful to have additional partners to network with when trying to address resource concerns on land. The area within the proposed project is of high concern to all conservation partners as it provides North Dakota's only habitat for the Sage Grouse. The funding of the proposed Bowman-Slope SCD project would allow all planners to have an additional "tool in the conservation toolbox" whether designing a grazing plan for water quality improvement or Sage Grouse habitat.

The Bowman NRCS Field Office will serve as a cooperator for the Little Missouri River Tributaries Implementation Project. We will provide technical assistance through conservation planning; practice designs and engineering services; and practice implementation and certification. In addition, we will partner with the project sponsors and other cooperators to promote the project through educational activities and public outreach opportunities.

I look forward to partnering with you and the project sponsors to improve the water quality of the Little Missouri River through the promotion of conservation practices and educational activities.

Sincerely,

Wendy F. Bartholomay

Wendy F. Bartholomay
District Conservationist

Appendix 9

## Harden Stream Crossings

Attached is the USDA, Natural Resources Conservation Service's Conservation Practice Standard for the conservation practices Stream Crossing, code 578. This Standard and Specification will be followed for the installation of the Harden Stream Crossings in the Little Missouri River Tributaries Project.

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

# STREAM CROSSING

(Number)

CODE 578

## DEFINITION

A stabilized area or structure constructed across a stream to provide a travel way for people, livestock, equipment, or vehicles.

## PURPOSES

- Improve water quality by reducing sediment, nutrient, organic, and inorganic loading of the stream.
- Reduce streambank and streambed erosion.
- Provide crossing for access to another land unit.

## CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where an intermittent or perennial watercourse exists and a ford, bridge, or culvert type crossing is desired for livestock, people, and /or equipment.

## CRITERIA

**Location.** Stream crossings shall be located in areas where the streambed is stable or where grade control can be provided to create a stable condition. Avoid sites where channel grade or alignment changes abruptly, excessive seepage or instability is evident, overfalls exist, or large tributaries enter the stream. Wetland areas shall be avoided if at all possible.

Locate crossings, where possible, out of shady riparian areas to discourage cattle loafing time in the stream.

Stream crossings shall provide a way for normal passage of water, fish and other aquatic animals within the channel during all seasons of the year.

**Access Roads.** Where high rates of erosion of the adjacent roadways that slope towards the crossing threaten to deliver an excessive amount of sediment to the drainage, install measures to minimize erosion of the roadside ditch, road surface, and/or cut slopes. Where the stream crossing is installed as part of a roadway, the crossing shall be in accordance with NRCS Conservation Practice Standard, 560, Access Road.

**Width.** The stream crossing shall provide an adequate travel-way width for the intended use. A multi-use stream crossing shall have a travel-way no less than 10 feet wide. "Livestock only" crossings shall be no less than 6 feet wide. Width shall be measured from the upstream end to the downstream end of the stream crossing and shall not include the side slopes.

**Side Slopes.** All cuts and fills for the stream crossing shall have side slopes that are stable for the soil involved. Side slopes of earth cuts or fills shall be no steeper than 2 horizontal to 1 vertical. Rock cuts or fills shall be no steeper than 1.5 horizontal to 1 vertical.

**Stream Approaches.** Approaches to the stream crossing shall blend with existing site conditions where possible, and shall not be steeper than 4 horizontal to 1 vertical. Unless the foundation geology is otherwise acceptable, the approaches shall be stable, have a gradual ascent or descent grade, and be underlain with suitable material, as necessary, to withstand repeated and long term use. The minimum width of the approaches shall be equal to the width of the crossing surface.

Surface runoff shall be diverted around the approaches to prevent erosion of the

units shall comply with ACI 525 or 533, or as otherwise acceptable for local conditions.

When heavy equipment loads are anticipated, the concrete slab shall be designed using an appropriate procedure as described in American Concrete Institute, ACI 360, Design of Slabs on Grade.

**Geocell and/or Rock Ford Crossings**

Rock ford crossings with geotextile shall be used when the site has a soft or unstable subgrade. Ford crossings made of stabilizing material such as rock riprap are often used in steep areas subject to flash flooding, where normal flow is shallow or intermittent.

The bed of the channel shall be excavated to the necessary depth and width and covered with geotextile material. The geotextile material shall be installed on the excavated surface of the ford and shall extend across the bottom of the stream and at least up to the 10-year, 24-hour peak discharge elevation.

The geotextile material shall be covered with at least 6 inches of crushed rock. If using geocells, the cells shall be at least 6 inches deep. All geosynthetic material shall be suitably durable and shall be installed in accordance with the manufacturer's recommendations, including the use of staples, clips and anchor pins.

At minimum, all rock ford stream crossings shall be designed to remain stable during the 10-year, 24-hour peak discharge.

## CONSIDERATIONS

Avoid or minimize stream crossings, when possible, through evaluation of alternative trail or travel-way locations.

Ford crossings have the least detrimental impact on water quality when crossing is infrequent. Ford crossings are adapted for crossing wide, shallow watercourses with firm streambeds.

Stream crossings should be located where adverse environmental impacts will be minimized and considering the following:

- Effects on up-stream and down-stream flow conditions that could result in increases in erosion, deposition, or flooding.
- Short term and construction-related effects on water quality.
- Effects on fish passage and wildlife habitats.
- Effects on cultural resources.
- Overall effect on erosion and sedimentation that will be caused by the installation of the crossing and any necessary stream diversion.

Where stream crossings are used, evaluate the need for safety measures such as guardrails at culvert or bridge crossing, or water depth signage at ford crossings.

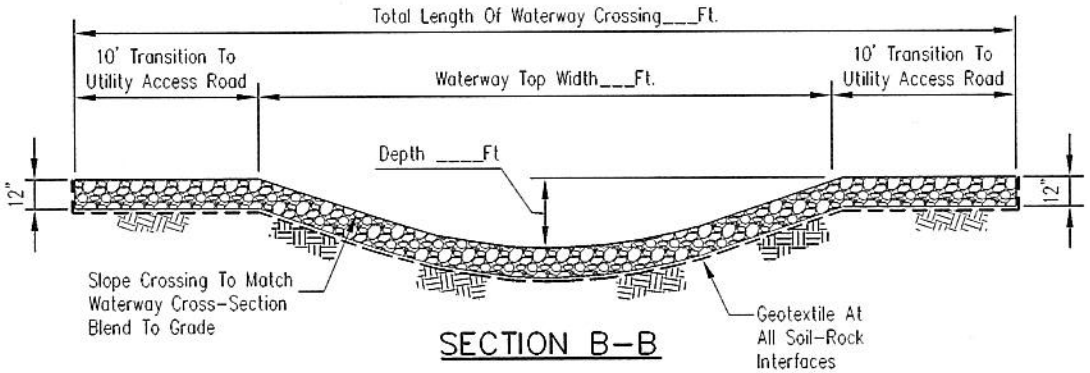
## PLANS AND SPECIFICATIONS

Plans and specifications for stream crossings shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

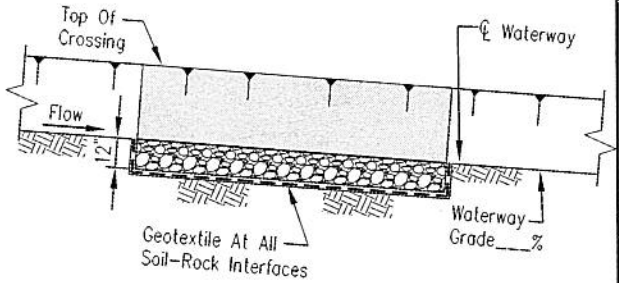
## OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed and implemented for the life of the practice.

The stream crossing, appurtenances, and associated fence should be inspected after each major storm event, with repairs made as needed.

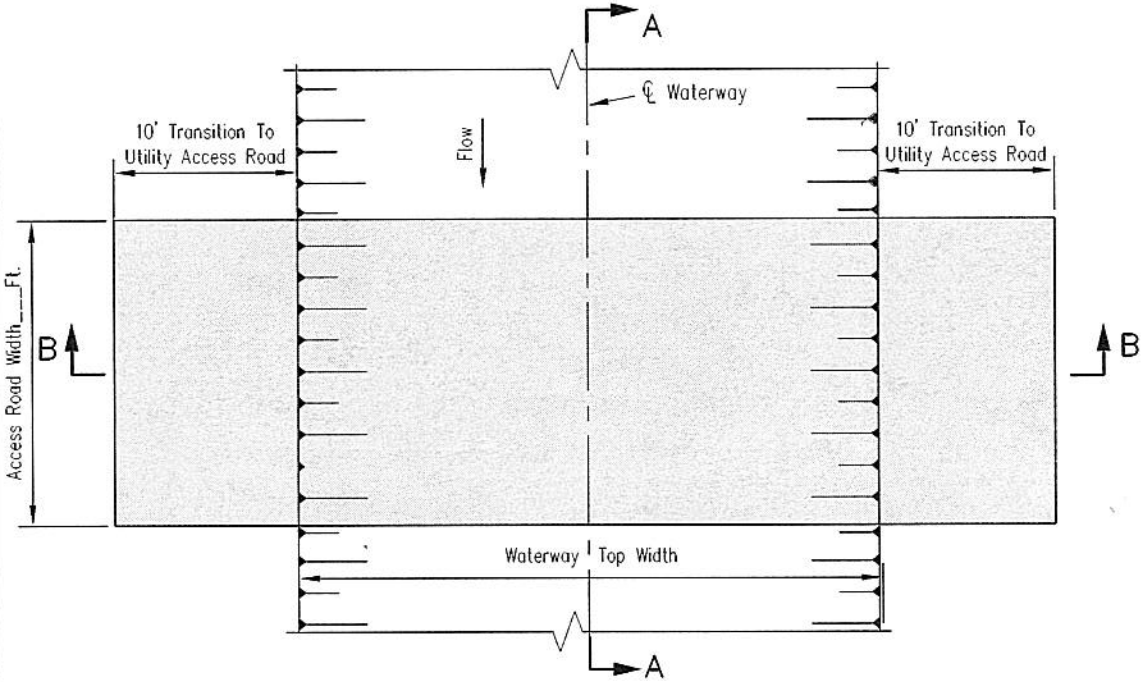



SECTION B–B




SECTION A–A

At Centerline Of Waterway




PLAN VIEW

Notes:

1. Geotextile (non-woven, needle punched) min. criteria:
   Grab Tensile strength (lb) ASTM D 4632_____202
   Elongation at failure (%) ASTM D 4632_____≥50
   Trapezoidal tear strength (lb) ASTM D 4533_____79
   Puncture strength (lb) ASTM D 6241 _____433
   Ultraviolet light (% retained strength) ASTM D 4355__
   ____min 50
   Apparent opening size (AOS) ASTM D 4751____
   max 0.22 mm (US sieve size 70)
   Permittivity $sec^{-1}$/ ASTM D 4491_____min 0.70
2. Any geotextile splices shall overlap a minimum of 18 inches, with upstream or upslope geotextile overlapping the abutting downslope geotextile.
3. The rock surface shall be compacted with the track or tire of the equipment used for construction over the entire surface and shall not leave any large depressions or irregularities that would not drain.

IDOT = Illinois Department Of Transportation

| BILL OF MATERIAL | | |
|---|---|---|
| Surface Material IDOT GRAD. CA 2 Quality Designation A | Tons | |
| Geotextile | Sq.Yd. | |

Date
Designed — — —
Drawn — N. GIBBONES — 10/1/13
Checked — — —
Approved — — —

# ROCK CROSSING FOR WATERWAY

NRCS
Natural Resources Conservation Service
United States Department of Agriculture

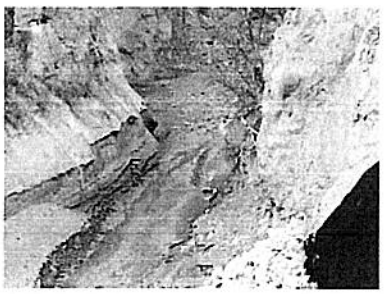
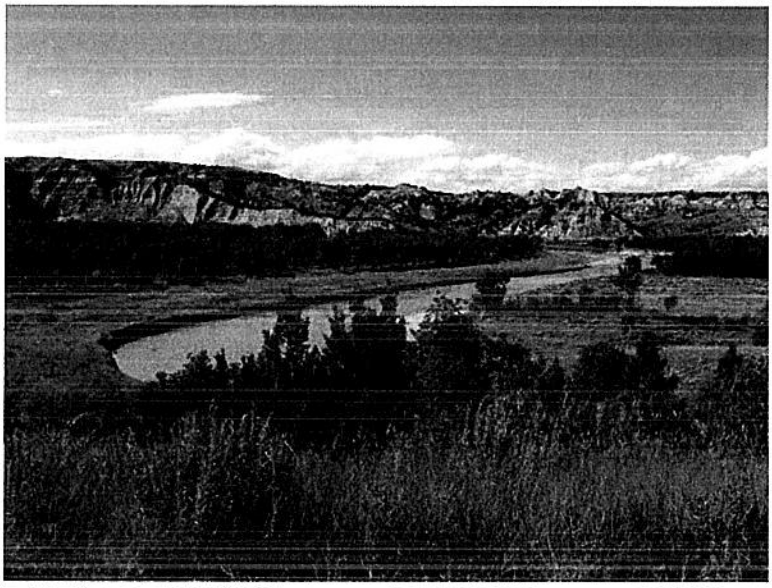
File No.
IL-ENG-80
Drawing No.
Page 1 of 1
Sheet of

# Riparian Complex Ecological Sites of ND
# A Pictorial Guide of Riparian Complex Ecological Sites Common in North Dakota.

# Pictorial Used to Assess the watersheds and Follow-Up Assess Sites at the end of the implementation of the watershed project.

R1791



# Riparian Complex Ecological Sites of North Dakota

A Pictorial Guide of Riparian Complex Ecological Sites Common in North Dakota









**Miranda A. Meehan,** Extension Livestock Environmental Stewardship Specialist, North Dakota State University, Fargo

**Kevin K. Sedivec,** Extension Rangeland Management Specialist, North Dakota State University, Fargo

**Garret A. Hecker,** Research Assistant, North Dakota State University, Fargo

**Jeffrey L. Printz** (retired), Rangeland Management Specialist, U.S. Department of Agriculture, Natural Resources Conservation Service, Bismarck, N.D.



USDA NDSU EXTENSION SERVICE

North Dakota State University, Fargo, North Dakota

May 2016

Appendix 11

North Dakota Animal Feedlot Runoff Risk Index Workshop form.

This index will be used to assess and prioritize existing animal feeding operations in the project area and the potential nutrient loading associated with the operation before and after a Waste Management System is installed.

# *North Dakota Animal Feedlot Runoff Risk Index Worksheet

| | | | |
|---|---|---|---|
| **Landowner:** | | **Weather Station:** | |
| **Location:** | | **HUC:** | |
| **Planner:** | | **Precipitation:** | #N/A |
| **Date:** | January 30, 2017 | | |

| **Lot Description:** | | | | |
|---|---|---|---|---|
| **Planning Scenario:** | **Before** | **After** | **Before** | **After** |
| **Lot Size (Sq. Ft.):** | 1858100 | 4791600 | | |
| **Surface Type:** | Dirt | Dirt | | |
| **Animal Type:** | Beef (Cow) | Beef (Cow) | | |
| **No. of Animals:** | 300 | 300 | | |
| **Avg. Weight:** | 1200 | 1200 | | |
| **Days Confined:** | 150 | 90 | | |
| **Sq.Ft./Animal:** | 6193.7 | 15972.0 | | |
| **Feedlot Features** | | | | |
| **Runoff Containment** | 20 | 20 | | |
| **Distance to Water** | 8 | 2 | | |
| **% Slope** | 6 | 1.5 | | |
| **Vegetation** | 4 | 4 | | |
| **Clean $H_20$ Diversion** | 4 | 4 | | |
| **Index and Risk Level** | | | | |
| **Index:** | 42.0 | 31.5 | | |
| **Risk Level:** | Medium | Low | | |
| **Manure Management and Conservation Practices** | | | | |
| **Haul/Scrape Frequency** | Annually | Annually | | |
| **Practices to be implemented** | | | | |
| **Loading Calculations** | | | | |
| **Fresh Manure (tons)** | 1,707 | 1,024 | | |
| **Total N Available (lbs)** | 9,801 | 5,881 | | |
| **Total P Available (lbs)** | 4,779 | 2,867 | | |
| **Total $BOD_5$ Available (lbs)** | 35,640 | 21,384 | | |
| **Precipitation Factor** | #N/A | #N/A | | |
| **Lot Surface Factor** | 0.90 | 0.90 | | |
| **Risk Factor** | 0.40 | 0.10 | | |
| **Total N Loading (lbs)** | #N/A | #N/A | | |
| **Total P Loading (lbs)** | #N/A | #N/A | | |
| **Total $BOD_5$ Loading (lbs)** | #N/A | #N/A | | |

*Modified from Utah to fit North Dakota. Individual high risk features should be evaluated and conservation practices applied where possible. All runoff from a 25-year, 24-hour storm event must be contained on the lot.

**Practices that might be implemented:**

| | | |
|---|---|---|
| Move Lot | Install Dike | Install Filter Strip |
| Regrade Lot | Install Diversion | Roof Runoff System |
| Build Storage | Increase Sq.Ft./Animal | Change Hauling Frequency |
| Increase Storage | | |