

# Antelope Creek Watershed Project Implementation Plan



Grant County Soil Conservation District 103 Dakota  
Street  
P.O. Box 259 Carson,  
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## Project Summary Sheet

### Grant County Soil Conservation District Antelope Creek Watershed Implement Project

**SPONSOR:** Grant County Soil Conservation District  
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**STATE:** North Dakota

**WATERSHEDS:** Antelope Creek

**HYDROLOGIC UNIT CODE:** ND-10130203-006-S\_00 & ND-10130203-055-S-00  
ND-10030206-027-S-00 and ND- 10130206-007-S\_00

TMDL Status; a TMDL has been developed for the areas being addressed

#### PROJECT TYPES

STAFFING/SUPPORT  
 WATERSHED  
 GROUNDWATER  
 INFORMATION/EDUCATION

#### WATERBODY TYPES

GROUNDWATER  
 LAKES/RESERVOIRS  
 RIVERS  
 STREAMS  
 WETLANDS  
 OTHER

#### NPS CATEGORY

AGRICULTURE  
 URBAN RUNOFF  
 SILVER CULTURE  
 CONSTRUCTION  
 RESOURCE  
EXTRACTION  
 STOWAGE/LAND  
DISPOSAL

**PROJECT LOCATION:** Grant County, North Dakota

**MAJOR GOAL:** The Grant County Antelope Creek Watershed Project is designed to provide technical, financial, and educational assistance to agricultural producers and landowners within the watershed. The goal of this project is to improve water quality to enhance the recreational activities available on the Antelope Creek and restore riparian habitat by implementing Best Management Practices (BMPs).

**PROJECT DESCRIPTION:** The project sponsors intend to prioritize technical and financial assistance to lands that have the most impact on water quality, track water quality trends over the life of the project, develop educational programs to heighten public awareness of nonpoint source pollution concerns and solutions and develop working partnerships in the local community to benefit natural resources.

FY 2017 319 Funds requested \$382,644.00

Match \$330,096.00 (Cash costs plus In-Kind)

Other Federal Funds \$57,500.00

Total Project Cost \$770,240.00

319 Funded Full Time Personnel 1

319 Funded Part Time Personnel 2

## 1.0 Overview and Monitoring Goals

Antelope Creek, a tributary to the Heart River, is located within the Lower Heart River watershed. The Antelope Creek watershed extends from the eastern portion of Hettinger County to three miles west of Carson in Grant County, North Dakota. The contributing sub watersheds vary from 16,216 to 33,063 acres in size with a total watershed size of approximately 153,612 acres.

Identifying potential water quality impacts to aquatic life and recreation uses of Antelope Creek was the primary focus of this assessment. Chemical, biological and physical data was collected from sampling sites in the watersheds to: 1) determine current water quality conditions in Antelope Creek; and 2) assess potential effects on beneficial uses resulting from pollutant loadings, stressors and sources indicated by the data. Currently, Antelope Creek is identified on the "North Dakota 2014 Section 303(d) List of Impaired Waters" as not supporting recreational uses due to *Escherichia coli*.

In the state's water quality standards, attainment of recreational uses is defined using *E. coli* bacteria as the indicator organism. This criterion is only valid during the recreation period of May 1 through September 30. Two separate *E. coli* bacteria criteria are used to determine if the waterbody is classified as fully supporting, fully supporting, but threatened or not supporting for recreational uses. The first criterion is that the geometric mean of the samples should not exceed 126 colony forming units (CFU) per 100 milliliters (mL). The second criterion is that not more than 10 percent of the samples should exceed 409 CFU per 100 mL. The waterbody is classified as fully supporting if both criteria are met, fully supporting but threatened if only the first criteria is met, and not supporting if neither of the criteria are met by the waterbody (NDDH, 2014).

Four sampling locations were selected on Antelope Creek for collection of various chemical and physical data. Descriptions and locations of sites and parameters sampled are illustrated in Table 1 and Figure 1. Sampling frequency for each site was scheduled to occur five times per month (a minimum of once per week). Samples were only collected when flow was present.

**Table 1. Water Quality Monitoring Stations in the Antelope Creek Watershed.**

Storet ID	Site Description	Data to be Collected	Collection Year
385582	7 miles north of Carson, ND	Water Quality	2013, 2014
380064	5 miles north of Carson, ND	Water Quality	2013, 2014
385583	6 miles west of Carson, ND	Water Quality	2013, 2014
385584	6 miles north of Elgin, ND	Water Quality	2013, 2014

## 2.0 Assessment Data

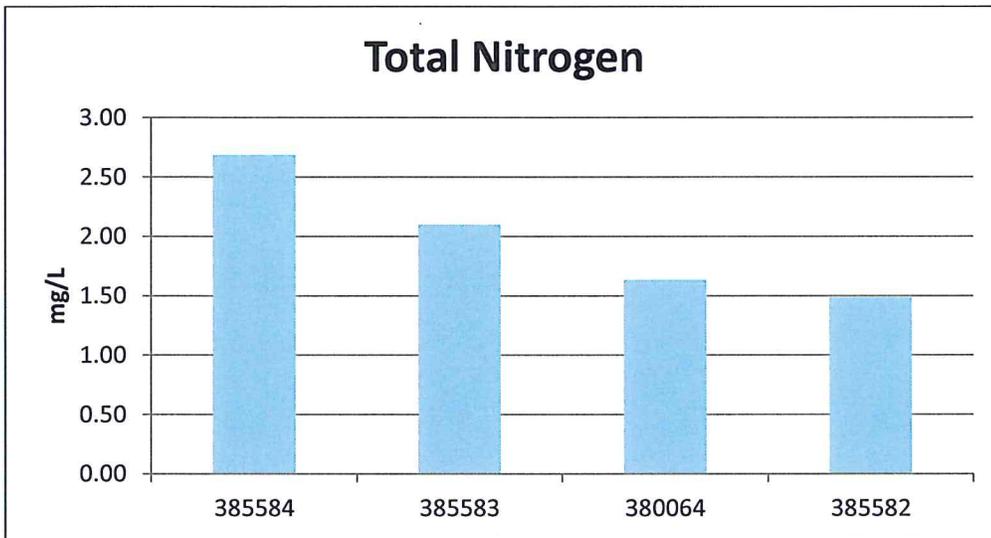
### 2.1 Total Nitrogen, Total Phosphorus, and Total Suspended Solids

Table 2 summarizes the total nitrogen (TN), total phosphorus (TP) and total suspended solids (TSS) data collected during the Antelope Creek Watershed Assessment. Figures 2 through 4 summarize TN, TP and TSS trends at each of the sites over the course of the sampling season. Descriptive statistics show that TN, TP and TSS concentrations varied widely during the course of seasonal monitoring, as well as between sites.

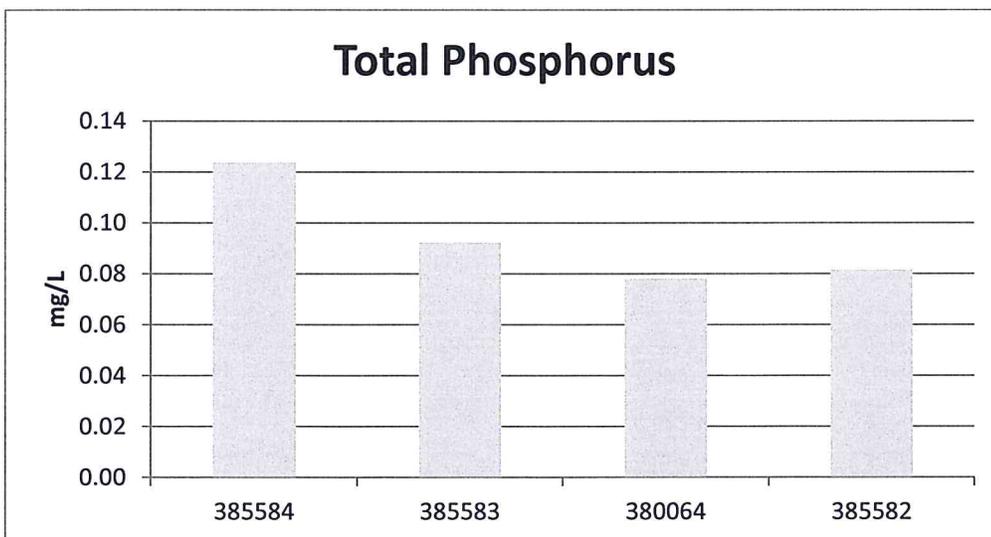
**Table 2. Summary of Descriptive Statistics for Nutrients Calculated at Each Site.**

2013-2014				
	385584	385583	380064	385582
#Samples	75	75	75	75
<b>Total Nitrogen (mg/L)</b>				
Mean	2.68	2.10	1.63	1.48
Maximum	11.10	10.10	6.64	6.50
Median	2.30	1.57	1.29	1.18
<b>Total Phosphorus (mg/L)</b>				
Mean	0.12	0.09	0.08	0.08
Maximum	0.42	0.27	0.26	0.37
Median	0.08	0.07	0.06	0.05
<b>Total Suspended Solids (mg/L)</b>				
Mean	35.04	26.71	20.55	43.42
Maximum	189.00	157.00	149.00	374.00
Median	28.00	19.50	9.00	15.00

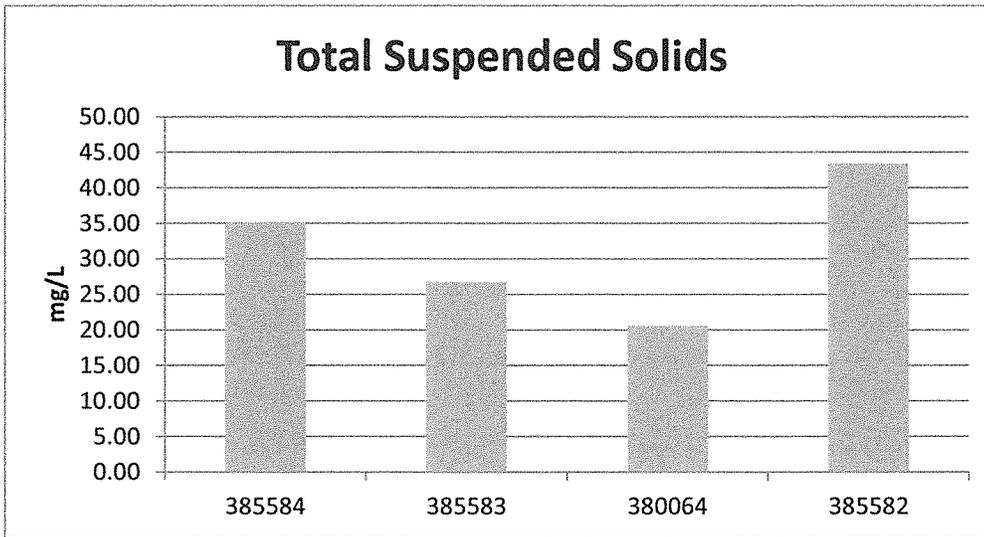
TN data for sites 385584, 385583, 380064 and 385582 was compiled for years 2013-2014 in Figure 2. Average annual concentrations for TN ranged from a low of 0.09 mg/L at site 385584 in 2013 to a high of 11.10 mg/L at site 385584 in 2014. It should be noted that a TN concentration of 11.10 mg/L exceeds the state drinking water standard of 10 mg/L. TP data for monitoring sites 385584, 385583, 380064 and 385582 was compiled for years 2013-2014 in Figure 3. Average annual TP concentrations showed very little temporal variation at most sites, however there appeared to be elevated levels of TP in mid to late summer of 2013 and 2014 at all sites which is probably associated with rain events. Analysis of the data shows concentrations of TP are steady throughout Antelope Creek where TN concentrations are highest at the furthest site upstream. Total suspended solid concentrations increase from upstream to downstream (Figure 4). Site 385582 had the highest average concentration at 374.00 mg/L. The highest concentrations of TN, TP and TSS were correlated with peak flows and runoff events.



**Figure 2. Annual Mean Total Nitrogen Concentrations for Antelope Creek**



**Figure 3. Annual Mean Total Phosphorus Concentrations for Antelope Creek**



**Figure 4. Annual Mean Total Suspended Solid Concentrations for Antelope Creek**

2.1 Antelope Creek, (Assessment Unit ID: ND-10130203-006-S\_00 & ND-10130203-055-S-00), which is a tributary to the Heart River, will be the primary focus for the project. The Antelope Creek Watershed is 153,524 acres in size and is listed in the 2014 Integrated Report as not supporting recreational uses due to E. coli bacteria impairments. Primary sources of E. coli bacteria in the watershed include concentrated livestock feeding areas and riparian pastures. Approximately 20 concentrated livestock feeding operations are in the watershed. The average number of animals is 100-150 head/system. Of the livestock feeding operations in the watershed, 10 are considered high priorities due to the close proximity to the creek and feeding area size. All the riparian pastures identified on the AnnAGNPS maps in Appendix 2 are considered high priority areas. The amount of pollutants delivered from either of these sources is dependent on existing management practices, precipitation amounts, intensities and frequencies as well as the number of livestock and duration they are in the priority areas. All of these factors are extremely variable, which makes it very difficult to assign a specific annual contribution value to either source. As such, the contributions from the feeding areas versus the riparian pastures will be considered approximately equal for the purposes of delivering technical and financial assistance.

The city of Elgin and Carson are the only point sources located in the watershed. The city of Carson has not reported any discharges in recent years and Elgin typically only discharges once per year. Given the limited discharge volume and location, neither city is considered a significant source for E. coli bacteria being delivered to Antelope Creek.

**2.2 (See Appendix 2 for map)**

This project will address water quality on stream segments ND-10030206-027-S-00 and ND-10130206-007-S\_00 and their accompanying watersheds. These stream segments are physically located in or directly adjacent to Grant County.

**2.2 E. coli Bacteria**

Table 3 summarizes the E. coli bacteria data collected during the Antelope Creek Watershed Assessment.

**Table 3. Summary of E. coli Bacteria Data Calculated at Each Site.**

385584										
	May		June		July		August		September	
	5/1/2013	40	6/3/2013	420	7/1/2013	180	8/5/2013	370	9/3/2013	200
	5/7/2013	20	6/5/2013	220	7/8/2013	280	8/7/2013	110	9/9/2013	680
	5/15/2013	140	6/10/2013	310	7/10/2013	130	8/12/2013	300	9/11/2013	290
	5/20/2013	50	6/17/2013	50	7/15/2013	10	8/14/2013	230	9/16/2013	90
	5/22/2013	4200	6/19/2013	310	7/22/2013	60	8/20/2013	420	9/24/2013	90
	5/29/2013	10	6/25/2013	400	7/29/2013	180	8/26/2013	240	9/30/2013	110
	5/5/2014	10	6/2/2014	900	7/7/2014	520	8/5/2014	160	9/3/2014	150
	5/7/2014	10	6/9/2014	550	7/9/2014	430	8/11/2014	120	9/8/2014	60
	5/12/2014	10	6/16/2014	430	7/14/2014	340	8/13/2014	90	9/15/2014	20
	5/19/2014	10	6/23/2014	220	7/16/2014	1000	8/18/2014	200	9/17/2014	30
	5/21/2014	100	6/25/2014	200	7/21/2014	5000	8/25/2014	8000	9/22/2014	10
	5/27/2014	1200	6/30/2014	900	7/28/2014	60			9/24/2014	40
# Samples	11		12		12		11		12	
Geo Mean	38		327		224		279		81	
% Greater 409	9%		42%		33%		18%		8%	
Status	FS		NS		NS		NS		FS	

385583										
	May		June		July		August		September	
	5/1/2013	10	6/3/2013	260	7/1/2013	120	8/5/2013	180	9/3/2013	10
	5/7/2013	10	6/5/2013	40	7/8/2013	140	8/7/2013	40	9/9/2013	90
	5/15/2013	10	6/17/2013	20	7/10/2013	180	8/12/2013	40	9/11/2013	50
	5/20/2013	280	6/19/2013	600	7/15/2013	100	8/14/2013	30	9/16/2013	30
	5/22/2013	4200	6/25/2013	500	7/22/2013	70	8/20/2013	30	9/24/2013	10
	5/29/2013	60	6/2/2014	250	7/29/2013	60	8/26/2013	70	9/30/2013	90
	5/5/2014	10	6/9/2014	50	7/7/2014	130	8/5/2014	110	9/3/2014	170
	5/7/2014	10	6/16/2014	60	7/9/2014	110	8/11/2014	170	9/8/2014	140
	5/12/2014	10	6/23/2014	90	7/14/2014	140	8/13/2014	160	9/15/2014	20
	5/19/2014	10	6/25/2014	80	7/16/2014	70	8/18/2014	320	9/17/2014	10
	5/21/2014	10	6/30/2014	100	7/21/2014	190	8/25/2014	4300	9/22/2014	10

	5/27/2014 60		7/28/2014 210		9/24/2014 20
# Samples	12	11	12	11	12
Geo Mean	29	112	118	120	32
% Greater 409	8%	18%	0%	9%	0%
Status	FS	FST	FS	FS	FS

**Table 3. Summary of E. coli Bacteria Data Calculated at Each Site (cont.)**

380064					
	May	June	July	August	September
	5/1/2013 10	6/3/2013 300	7/1/2013 140	8/5/2013 110	9/3/2013 110
	5/7/2013 10	6/5/2013 110	7/8/2013 150	8/7/2013 70	9/9/2013 560
	5/15/2013 100	6/10/2013 100	7/10/2013 120	8/12/2013 100	9/11/2013 260
	5/20/2013 680	6/17/2013 180	7/15/2013 380	8/14/2013 40	9/16/2013 140
	5/22/2013 1000	6/19/2013 1900	7/22/2013 160	8/20/2013 130	9/24/2013 330
	5/29/2013 30	6/25/2013 540	7/29/2013 90	8/26/2013 180	9/30/2013 2100
	5/5/2014 10	6/2/2014 210	7/7/2014 190	8/5/2014 110	9/3/2014 160
	5/7/2014 10	6/9/2014 120	7/9/2014 100	8/11/2014 70	9/8/2014 80
	5/12/2014 20	6/16/2014 400	7/14/2014 120	8/13/2014 70	9/15/2014 160
	5/19/2014 10	6/23/2014 100	7/16/2014 90	8/18/2014 680	9/17/2014 370
	5/21/2014 10	6/25/2014 160	7/21/2014 160	8/25/2014 1200	9/22/2014 200
	5/27/2014 80	6/30/2014 600	7/28/2014 60		9/24/2014 480
Geo Mean	35	250	132	137	264
% Greater 409	17%	25%	0%	18%	25%
Status	FST	NS	NS	NS	NS

385582					
	May	June	July	August	September
	5/1/2013 130	6/3/2013 280	7/1/2013 210	8/5/2013 630	9/3/2013 200
	5/7/2013 30	6/5/2013 300	7/8/2013 110	8/7/2013 420	9/9/2013 1200
	5/15/2013 40	6/10/2013 40	7/10/2013 690	8/12/2013 230	9/11/2013 430
	5/20/2013 720	6/17/2013 60	7/15/2013 270	8/14/2013 220	9/16/2013 230
	5/22/2013 330	6/19/2013 60	7/22/2013 2100	8/20/2013 270	9/24/2013 360

	5/29/2013	40	6/25/2013	770	7/29/2013	480	8/26/2013	110	9/30/2013	280
	5/5/2014	70	6/2/2014	220	7/7/2014	310	8/5/2014	340	9/3/2014	330
	5/7/2014	20	6/9/2014	260	7/9/2014	100	8/11/2014	740	9/8/2014	330
	5/12/2014	90	6/16/2014	250	7/14/2014	30	8/13/2014	350	9/15/2014	90
	5/19/2014	140	6/23/2014	150	7/16/2014	100	8/18/2014	130	9/17/2014	90
	5/21/2014	230	6/25/2014	220	7/21/2014	170	8/25/2014	8000	9/22/2014	60
	5/27/2014	400	6/30/2014	1200	7/28/2014	80			9/24/2014	60
Geo Mean	108		204		205		395		211	
% Greater 409	8%		17%		25%		36%		17%	
Status	FS		NS		NS		NS		NS	

<sup>1</sup>FS=Fully Supporting, <sup>2</sup>FST=Fully Supporting, but Threatened, <sup>3</sup>NS=Nonsupporting.

Levels of bacteria varied throughout the watershed. All sites experienced geometric mean concentrations of *E. coli* bacteria in excess of state water quality guidelines with the exception of site 385583. Also, all four sites exceeded the state guidelines where more than 10% of the samples exceeded 409 CFU/100 mL for *E. coli* bacteria. It should be noted site 385583 only exceeded the 10% guideline for the month of June. There were large peaks in bacteria concentrations at all sites in midsummer which can be attributed to riparian grazing and feedlot runoff. Excluding these concentration peaks, there were no significant trends identified that could be attributed to an explanatory variable. It should be noted that some of the samples returned results of "too numerous to count" and a value of 8,000 CFU/100 mL was used in these situations. Hence, the geometric mean concentrations may be underestimated in some situations.

### 2.3 Rapid Geomorphic Assessment

To evaluate channel-stability conditions and stage of channel evolution of Antelope Creek a Rapid Geomorphic Assessment (RGA) was completed using the Channel-Stability Ranking Scheme. RGA's utilize diagnostic criteria of channel form to infer dominant channel processes and the magnitude of channel instabilities through a series of nine criteria. Evaluations of this sort do not include an evaluation of watershed or upland conditions; however, stream channels act as conduits for energy, flow and materials as they move through the watershed and will reflect a balance or imbalance in the delivery of sediment. RGA's provide a rapid characterization of stream stability conditions.

The RGA procedure consisted of four steps completed on site:

1. Determine the 'reach'. The 'reach' is described as the length of channel covering 6-20 channel widths, thus is scale dependent and covers at least two pool-riffle sequences.
2. Take photographs looking upstream, downstream and across the reach; for quality assurance and quality control purposes. Photographs are used with RGA forms to review the field evaluation.
3. Make observations of channel conditions and diagnostic criteria listed on the channel-stability ranking scheme.
4. Sample bed material.

A field form containing nine criteria was used to record observations of field conditions during RGA's. Each criterion was ranked from zero to four and all values summed to provide an index of relative channel stability. The higher the number the greater the instability. Sites with values greater than 20 exhibit considerable instability, while stable sites generally rank 10 or less. Intermediate values denote reaches of moderate instability. Rankings are not weighted, thus a site ranked 20 is not twice as unstable as a site ranked 10. The process of filling out the form enables the final decision of "Stage of Channel Evolution". For purposes of the Antelope Creek assessment, sites with total scores of 0 to 10 are considered as stable and sites with scores of 20 to 30 as unstable, recognizing that scores which fall in the range of 10 to 20 have moderate instability and will rely on specific assessment values to determine the trend toward improvement or greater instability.

Thirty sites were randomly selected on Antelope Creek plus four macroinvertebrate sites. At each site numeric values were assigned to each of the nine RGA criteria and then summed to calculate an overall RGA score for each site. By analyzing the scores for the 34 randomly selected sites, an overall assessment of stream stability can be made for Antelope Creek.

The average score for Antelope Creek was 17 which is considered moderately unstable. Of the 34 sites sampled, four (12 percent) were assessed as stable, 24 (70 percent) were in the moderately unstable range and six (18 percent) sites were assessed as unstable (Table 4). The most unstable sites had cattle present or bank scarring from previous flood events.

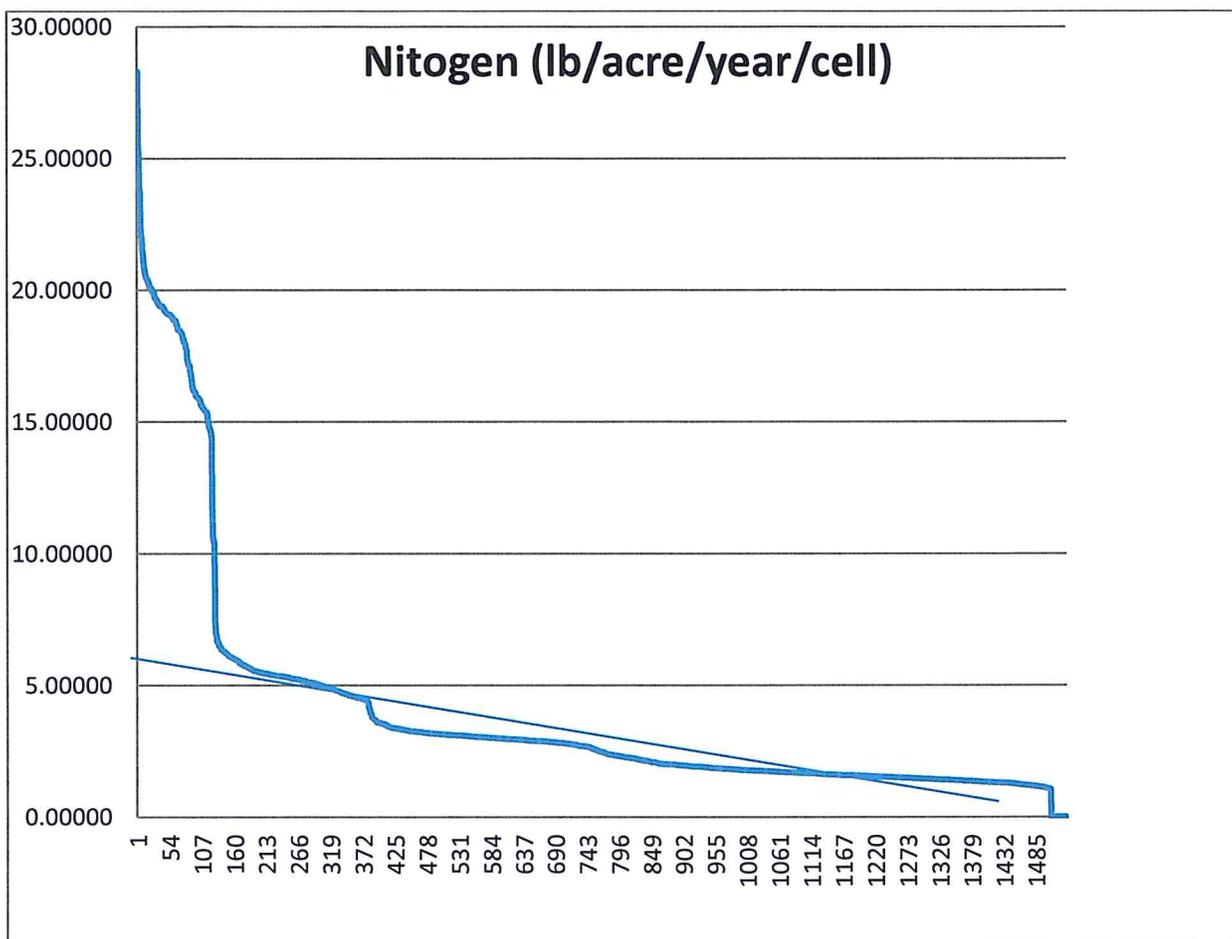
Table 4. RGA Scoring Ranges and Percentages of Antelope Creek.

RGA Scoring Range	0 – 10	10 – 20	20 – 30
Classification	Stable	Moderate Instability	Unstable
Percentage of Stream Sites	12%	70%	18%

## 2.4 Biological Assessment

In September of 2013, macroinvertebrates were sampled from four sites (553192, 553236, 553237 and 553238) on Antelope Creek. The macroinvertebrate Index of Biotic Integrity (IBI) score for sites 553236 and 553238 were fair with scores of 34 and 25, respectively. Sites 553192 and 553237 had scores of 52 and 42, respectively, indicating the conditions at those sites are good (Table 5).

2.5 Water quality issues as documented by the North Dakota Department of Health.



**Figure 1:** AnnAGNPS cell rankings for nitrogen yields. The cells nearest the y-axis are the highest priority cells. Similar charts have been developed for phosphorus and sediment yields.

The high priority AnnAGNPS cells will be focused on to coordinate with producers to evaluate needs and implement BMP that reduce/prevent the delivery of E. coli bacteria to Antelope Creek. Given the sources of the E. coli bacteria, particular emphasis will be placed on delivering assistance to producers managing land within the AnnAGNPS non-cropland priority areas, unless cover crops are being used to expand forage options and improve grazing management. Under such scenarios, cropland acres would also be included in the grazing and/or manure management plans. If the project enters into a second phase, the AnnAGNPS model will be re-run to establish new high priority areas. **Appendix 2** includes the AnnAGNPS priority maps as well as other maps of the watershed, sampling site locations, etc.

Table 5. IBI Scoring and Condition Class for Antelope Creek.

Station ID	Date	IBI Score	Condition Class
553192	04-Sep-13	52	Good
553236	04-Sep-13	34	Fair
553237	04-Sep-13	42	Good
553238	04-Sep-13	25	Fair

### 3.0 Beneficial Use Assessment

#### 3.1 Aquatic Life Use

##### Nutrients

Eutrophication is defined as the increase in primary productivity resulting from excessive nutrient inputs into rivers. The negative impacts from eutrophication may include the reduction of dissolved oxygen due to algal growth and subsequent decomposition by microbial activity and also alteration of the algal community. The alteration of the algal community can lead to a decrease in food resource quality for aquatic insects and fish and an alteration of the aquatic insect and fish communities to include less intolerant species (e.g., stonecats, mayflies, stoneflies). Concentrations of TN or TP at which rivers are considered eutrophic can be influenced by spatial and temporal variations in a variety of factors and is still an area of significant research. Based on nutrient concentrations, aquatic life uses could be impacted due to runoff of manure from pasture and animal feeding areas, runoff from riparian grazing by livestock or direct deposit of manure into Antelope Creek.

##### Total Suspended Solids

In addition to nutrients, TSS concentrations can have an impact on aquatic life use in streams. TSS is the amount of both mineral and organic solids suspended in water, and is often used as a surrogate measure for suspended sediments. North Dakota, along with most other states, does not have TSS criteria designed to protect aquatic life use. The development of criteria is a complex process influenced by numerous spatial and methodological variations and is the subject of current research. The negative effects of TSS on aquatic life are dependent on the concentration and the duration of the exposure. Long durations of high concentrations of TSS can negatively impact the reproduction, feeding, and movement of fish and aquatic insect communities. One study proposed that the level of risk to the fish community from suspended sediment concentration be based on a level above the background concentration. A level less than 25 mg/L above the background level would represent a very low risk, 25-100 mg/L above the background would represent low risk, 100-200 mg/L above the background would represent a moderate risk, 200-400 mg/L above background would represent a high risk, and greater than 400 mg/L above the background would represent an unacceptable risk (DFO, 2000). Using existing literature, the European Inland Fisheries Advisory Commission developed the following criteria: (1) less than 25 mg/L of suspended solids had no harmful effect on fisheries, (2) 25-80 mg/L could maintain moderate fisheries, (3) 80-400 mg/L was unlikely to support good freshwater fisheries, and (4) greater than 400 mg/L was likely to support only poor fisheries (DFO, 2000). South Dakota has set a standard for TSS at a 30-day average of 90 mg/L and a daily maximum of 158 mg/L for permanent warm-water fisheries. In addition, suspended solids can eventually settle and cause sedimentation problems like the filling of interstitial space and the smothering of benthic organisms. The South Dakota TSS standard will be used as a reference for this report.

Sampling site 385582, the furthest downstream site, demonstrated consistent exposure to TSS concentrations above 30 mg/L, which may negatively affect aquatic life (Figure 4). Approximately 26 percent of the samples collected at site 385582 had TSS concentrations above 30 mg/L. Based on South Dakota's criteria, there were six exceedances of the 158 mg/L daily maximum standard at site 385582. The results of this assessment show that our most impaired reach for TSS was 385582. All other locations generally had acceptable levels of TSS except 385584 (Figure 4). Site 385584 also saw concentrations of TSS above 30 mg/L.

##### 3.1 Goal

The goal of this project is to reduce *E. coli* bacteria in the Antelope Creek to achieve "fully supporting" status to enhance the recreational use on the Antelope Creek.

Objective 1:

By the end of the project period, the quality of water from stations 385584, 585583, 585582 and 380064 on the Antelope Creek will meet the North Dakota E. coli bacteria standard of a geometric mean of 126 CFU/100 ml with less than 10 percent of samples exceeding 409/CFU/100 ml.

Task 1

Employ personnel needed to provide technical and administrative assistance to producers in the watershed area.

Planned Product: Employ a full-time watershed coordinator, an individual to take water samples, and an administrative assistant.

Cost: \$9,120.00 for administrative assistant

\$13,440.00 for the individual to take water samples.

\$186,680.00 for the full-time watershed coordinator.

Task 2

Provide assistance to producers to execute Best Management Practices (BMPs) that reduce E. coli loads in the watershed by improving grazing management. Priority will be giving to grazing practices that focus on improving the riparian areas of the Antelope Creek and its tributaries.

Planned Product: Conservation planning on 3,000 acres in 2017, 5,000 acres in 2018, 7,000 acres in 2019, 10,000 acres in 2020 and 15,000 acres in 2021. Planning and practices will be a joint venture between watershed and NRCS at an estimated 75/25 split between the two entities.

Cost: \$356,000.00

Task 3

Install partial manure management systems throughout the watershed. Priority will be given to those AFOs that consistently use the Antelope Creek as a winter feeding area. Practices may include wells, pipelines, insulated water tanks and/or windbreak panels.

Planned Product: 5 partial manure management systems.

Cost: \$25,000.00

Task 4

Promotion of cover crops to increase diversity in crop rotation and extend the grazing season with aftermath grazing, relieving pressure on range and pasture land.

Planned Product: Cover crop mixes planted on 160 acres of cropland in 2017, 160 acres in 2018, 240 acres in 2019, 240 acres in 2020 and 320 acres in 2021.

Cost: \$22,400.00

#### Task 5

Conduct follow-up contacts to assist with conservation plan updates and monitor operation and maintenance of Section 319 cost shared products during the watershed project.

Planned Product: Database of applied BMPs with yearly status reviews throughout the watershed project.

Cost: Cost included with Task 1

#### Task 6

Coordinate with the entities involved in the EQIP locally led work group process to maximize the amount of EQIP funding available to improve water quality. This will include both technical and financial assistance needed to implement current and future projects on the Antelope Creek to address water quality issues.

Planned Product: Target EQIP funding to improve riparian areas through grazing practices and improved land management through this project and in future years.

Cost: Cost included with Task 1

### Objective 2

Increase the producers' understanding of the impacts and solutions to improve water quality.

#### Task 7

Organize and conduct scheduled information and educational programs focusing on grazing and land management within agricultural areas and coordinate them with ongoing state/federal sponsored information and education programs. Examples would be range, cover crop, soil health, and Grazing Land Coalition tours.

Planned Product: Four workshops, four tours/demonstrations and five informational meetings conducted throughout the project period.

Cost: \$5,250.00

#### Task 8

Prepare newsletter articles and direct mailings to local land users, general public and media to promote the project and disseminate information on improving water quality through better land management. Topics will include nutrient management, rotational grazing, benefits of cover crops, and other pertinent information on water quality.

Planned Product: Minimum of 10 newsletters and 5 direct mailings.

Cost: \$1,000.00 (equipment/supplies)      \$350.00 (postage)

#### Task 9

Promote watershed activities and water quality practices at district sponsored events. Targeted audience would be all encompassing to include agricultural producers, urban and country dwellers and school aged children. Examples are Eco-Ed, Grant County Ag Day, County Producer meetings.

Planned Product: Minimum of 6 events throughout the watershed project.

Cost: \$0      Cost will be incurred by district

## **See attached Milestone Table (Appendix 3)**

All necessary permits will be acquired as needed. These may include Clean Water Act (CWA) Section 404 permits and cultural resource reviews through the State Historical Preservation office, when needed.

### **3.2 Recreational Use**

To determine if Antelope Creek supports recreational uses the data collected at each site during the recreation season (May 1 through September 30) was compared to the North Dakota water quality criteria for the pathogen indicator, E. coli bacteria. From the assessment data, all sites on Antelope Creek were not supporting recreational uses due to elevated E. coli bacteria levels except site 385583 (Table 3). The cause of this contamination is varied. Riparian grazing and feedlot runoff are all possible causes of the elevated E. coli bacteria levels at these sites.

## **4.0 Coordination Plan**

### **4.1 Cooperating Agencies**

The Grant County Soil Conservation District (GCSCD) is the appropriate entity to coordinate and implement this project. The SCD is a locally elected volunteer conservation organization that serves all the people in the county. The GCSCD has legal authorization to employ personnel and receive and expend funds. The GCSCD has sponsored four other 319 projects.

The local NDSU Extension agent will assist with topics of discussion and educational and informational meetings. She is also a regular attendee of the Grant County Soil Conservation District monthly meetings. Assisting with and bringing up new ideas to generate interest among local producers to actively engage in conservation practices.

NRCS Carson Field office shares a building and works alongside Grant County Soil Conservation District in preparing and managing its' yearly plan. NRCS also has various conservation programs that are being run in the same geographical location as the proposed watershed. This cooperation is assured through a Memorandum of Understanding as well as a Contribution Agreement between the State Office of NRCS and Grant County Soil Conservation District.

### **4.2 Coordination Program**

While there are several organizations that operate or conduct conservation activities located within the boundaries of the proposed watershed, they tend to lend a hand in specific conservation methods. These methods do not normally maintain water quality as a top priority, but also do not risk contamination of water ways located in the vicinity of their own conservation efforts.

## **5.0 Evaluation and Monitoring Plan**

### **5.1**

The evaluation and monitoring program will be directed by the State NPS office and will be carried out efficiently by the sponsor, Grant County Soil Conservation District. This entails continuation of water quality monitoring, assessment of BMP implementation and effectiveness and a QAPP guideline.

### **5.2**

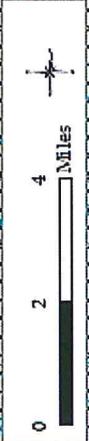
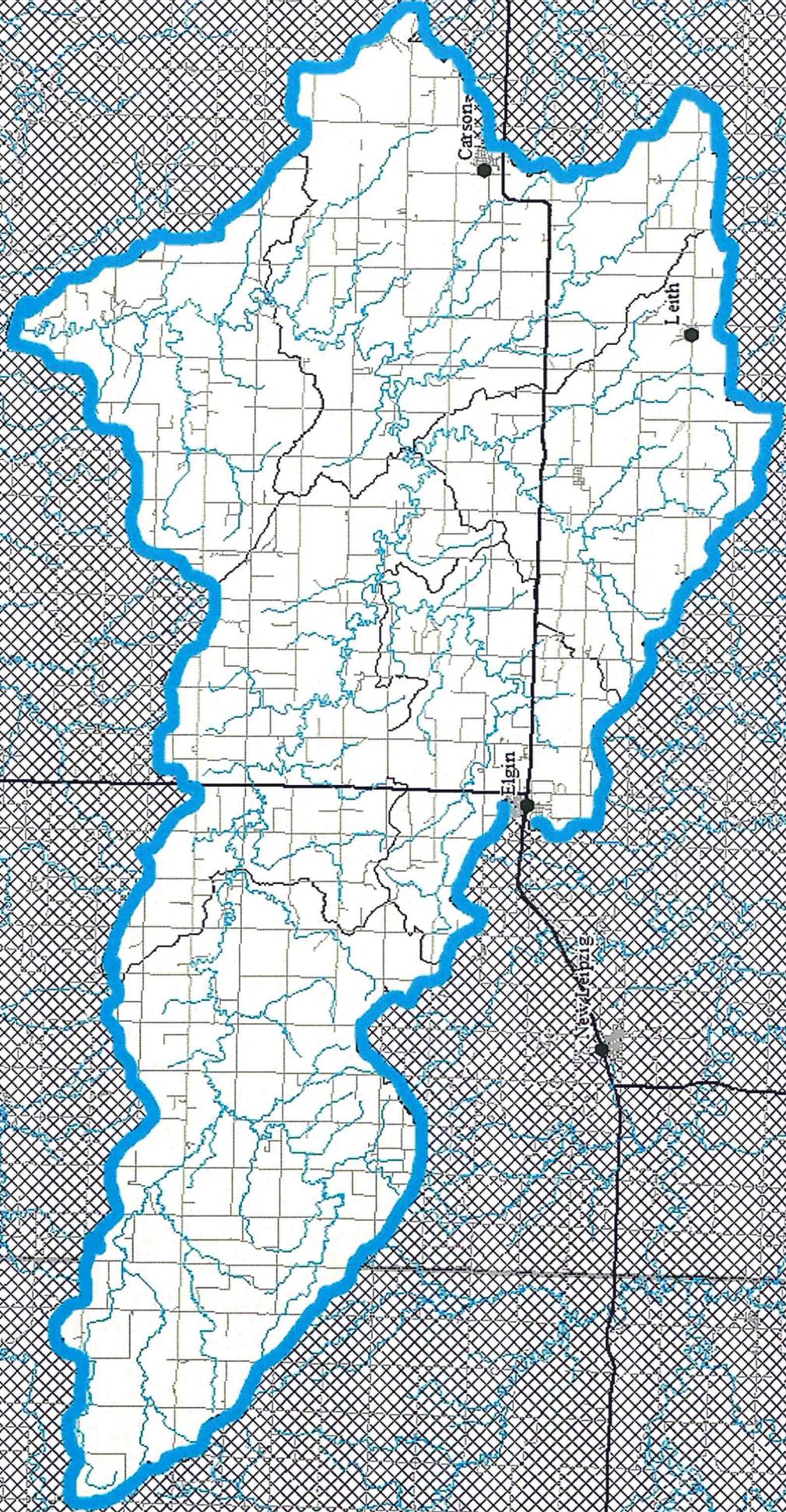
The sponsoring organization will conduct the water quality sampling as well as maintain an accurate database of BMP location and implementation dates along with financial accountability utilizing the BMP Tracker.

The Grant County Soil Conservation District will be responsible for auditing Operations & Maintenance Agreements (O&M) on BMP's after completion of the project and yearly status reviews of EPA-319 contracts. The lifespan of each BMP will be listed in the individual contracts to ensure longevity of the practices

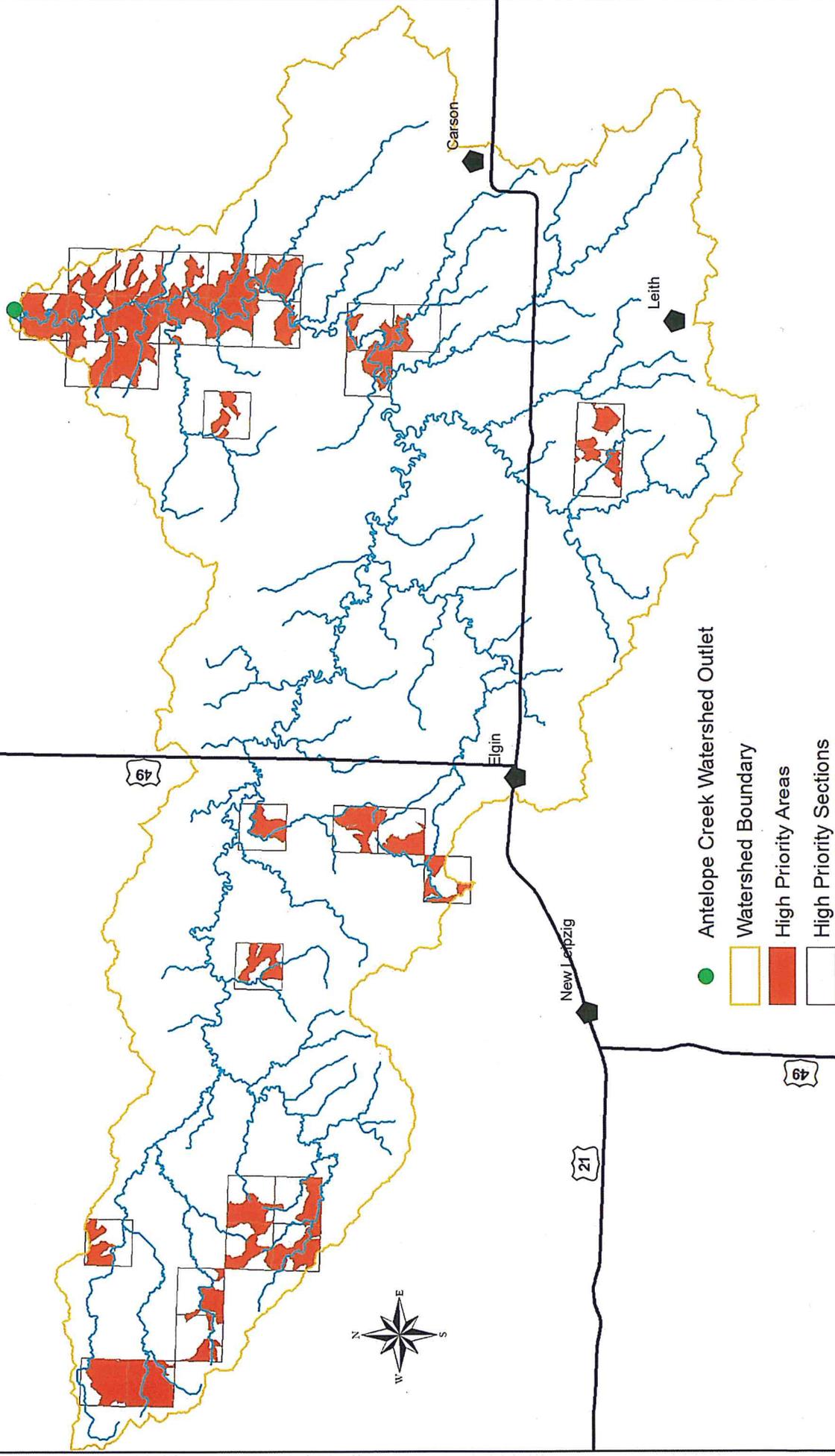
## Appendix 2

### Maps of Project Area

# Antelope Creek Watershed

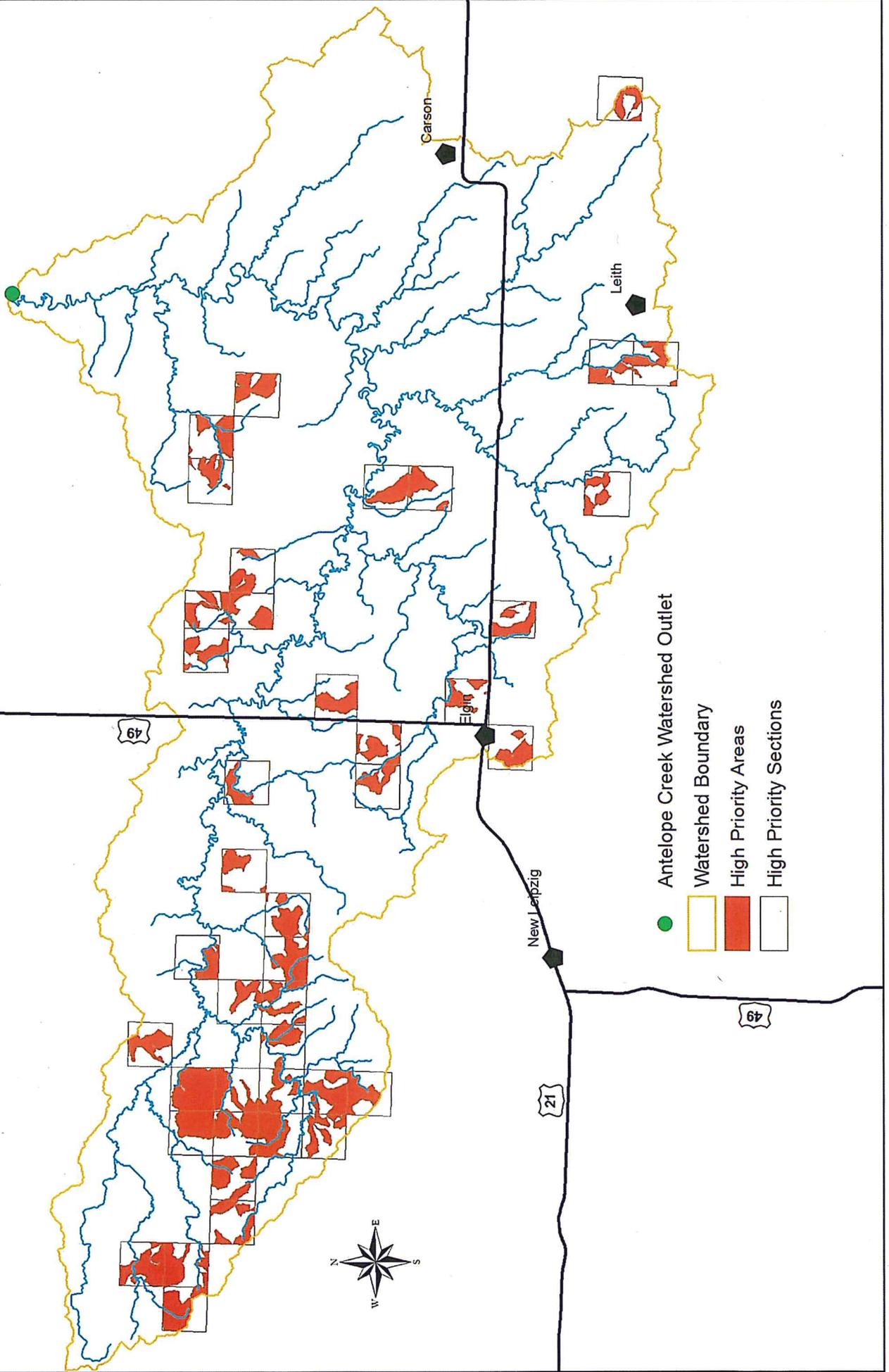


# Antelope Creek Watershed AnnAGNPS Grassland/Hayland High Priority Areas

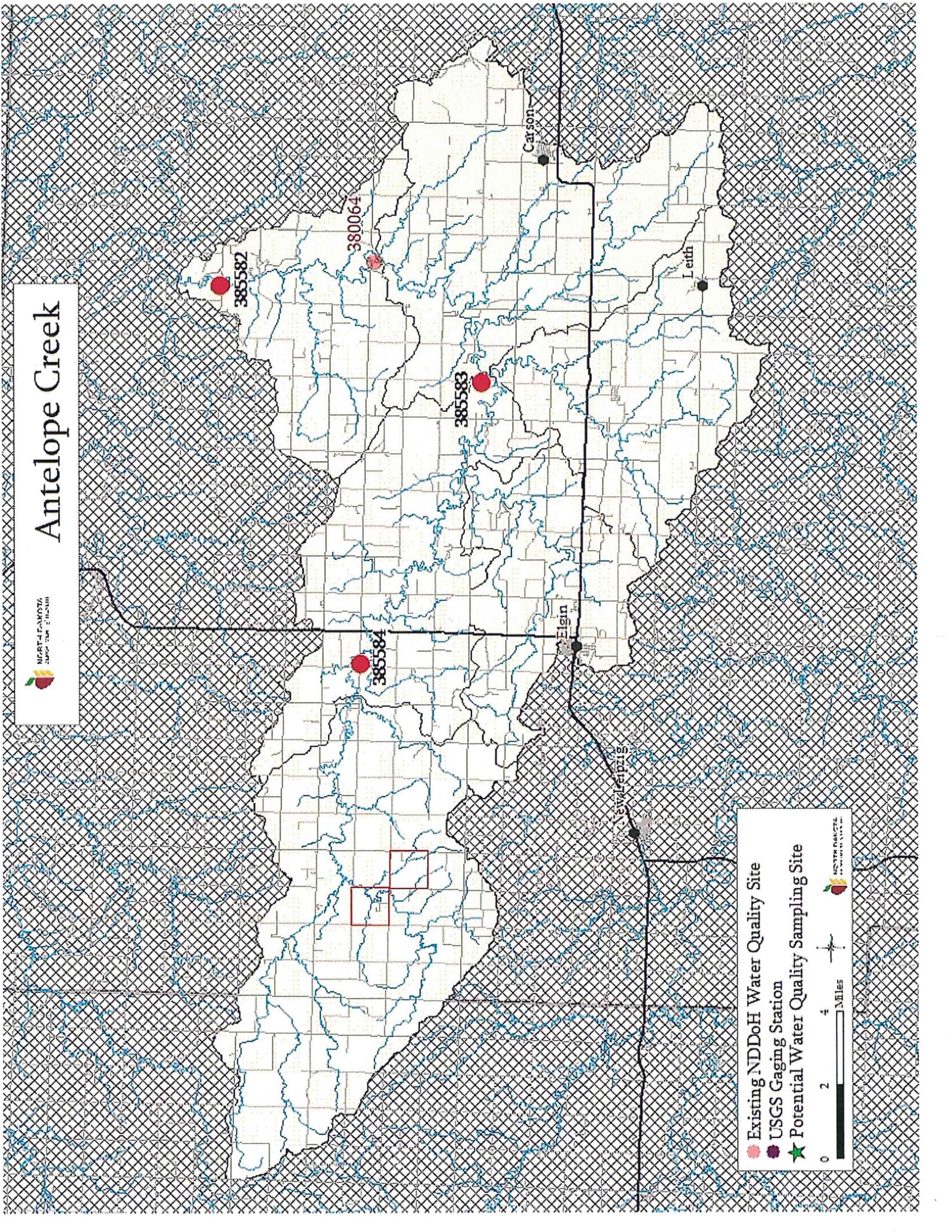
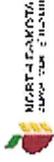


- Antelope Creek Watershed Outlet
- Watershed Boundary
- High Priority Areas
- High Priority Sections

# Antelope Creek Watershed AnnAGNPS Cropland High Priority Areas



# Antelope Creek



Existing NDDoH Water Quality Site  
USGS Gaging Station  
Potential Water Quality Sampling Site

0 2 4 Miles

## Appendix 3

### Milestone Table

Task	Output	Quantity	2017	2018	2019	2020	2021
Task 1: Employ personnel to provide technical and administrative assistance to producers in the watershed area.	Watershed Coordinator, Water sampling individual, Administrative assistant	3					
Task 2: Provide assistance to producers to execute BMP's that reduce E. coli loads within the watershed.	Conservation Planning	40,000 acres	3,000 acres	5,000 acres	7,000 acres	10,000 acres	15,000 acres
Task 3: Install Partial Manure Management systems throughout the watershed.	Partial Manure Management Systems	5	1	1	1	1	1
Task 4: Promotion of cover crops to increase diversity in crop rotations and extend the grazing season. Which will reduce pressure on rangeland and pasture land.	Cover Crop Usage	1120 acres	160 acres	160 acres	240 acres	240 acres	320 acres
Task 5 : Conduct follow up contacts to assist with conservation plan updates and monitor operation and maintenance of Section 319 cost shared products throughout the watershed project.	Database of applied BMP's with yearly status reviews throughout the watershed.	1					
Task 6: Coordinate with entities involved in the EQIP locally led work group to maximize the amount of EQIP funding available to improve water quality.	Expertise and financial resources to producers in watershed area installing grazing practices through EQIP.	1					

Task 7: Organize and conduct scheduled information and educational programs focused on grazing and land management within agricultural areas and coordinate with ongoing sponsored information.	workshops/tours/demonstrations/and informational meetings	13	2 information meeting	1 information meeting 1 workshop 1 tour	1 information meeting 1 workshop 1 tour	1 information meeting 1 workshop 1 tour	1 workshop 1 tour
Task 8: Prepare newsletter articles and direct mailings to local land users, general public and media to promote the project.	newsletters direct mailings	10 news letters 5 direct mails	2 letters 1 mailing	2 letters 1 mailing	2 letters 1 mailing	2 letters 1 mailing	2 letters 1 mailing
Task 9: Promote water quality activities and water quality practices at district sponsored events. Examples: Eco-Ed, County Ag Day, county producer meetings.	District sponsored events	6	1	2	2	1	0

## Appendix 4

### Letters of Support

# Appendix 5

## TMDL

Can be found on NDDoH

[www.ndhealth.gov/WQ](http://www.ndhealth.gov/WQ)

# Appendix 6

## Budget Tables

**ANTELOPE CREEK TMDL IMPLEMENTATION PROJECT**

**BUDGET TABLE**

<b>PART 1: FUNDING SOURCES</b>		<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>TOTAL</b>
<b>EPA SECTION 319 FUNDS</b>							
1) FY17 319 Funds (FA)		\$ 76,448	\$ 76,549	\$ 76,549	\$ 76,549	\$ 76,549	\$ 382,644
<i>Subtotals</i>		\$ 76,448	\$ 76,549	\$ 76,549	\$ 76,549	\$ 76,549	\$ 382,644
<b>OTHER FEDERAL FUNDS</b>							
1) NRCS (TA)		\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 20,000
2) NRCS (FA)		\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 37,500
<i>Subtotals</i>		\$ 11,500	\$ 11,500	\$ 11,500	\$ 11,500	\$ 11,500	\$ 57,500
<b>STATE/LOCAL MATCH</b>							
1) Local SCD (FA)		\$ 9,164	\$ 9,164	\$ 9,164	\$ 9,164	\$ 9,163	\$ 45,818
2) Local SCD (TA)		\$ 9,434	\$ 9,434	\$ 9,434	\$ 9,434	\$ 9,434	\$ 47,168
3) Cooperative Extension (TA)		\$ 150	\$ 150	\$ 150	\$ 150	\$ 150	\$ 750
6) Grant County Participating Producers (FA)		\$ 32,272	\$ 32,272	\$ 32,272	\$ 32,272	\$ 32,272	\$ 161,360
7) BMP (In-Kind match) Prescribed Grazing		\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 75,000
<i>Subtotals</i>		\$ 66,019	\$ 66,019	\$ 66,020	\$ 66,020	\$ 66,019	\$ 330,096
<i>Total 319 &amp; State/Local match</i>		\$ 142,467	\$ 142,568	\$ 142,569	\$ 142,569	\$ 142,568	\$ 712,740
<b>TOTAL BUDGET including Federal Funds</b>		\$ 153,967	\$ 154,068	\$ 154,069	\$ 154,069	\$ 154,068	\$ 770,240

FA = Financial Assistance  
 TA = Technical Assistance

NRCS = Natural Resource Conservation Service  
 SCD = Soil Conservation District

ANTELOPE CREEK TMDL IMPLEMENTATION PROJECT

BUDGET TABLE

PART 2: Section 319 / Federal Budget Funds	Non-	2017	2018	2019	2020	2021	TOTAL	FUNDING		
								Cash Costs	In-Kind Match*	319 Match
1) Salary/Fringe - Watershed Coordinator (full-time : 2080 hrs.)		\$ 35,880	\$ 36,920	\$ 37,440	\$ 37,960	\$ 38,480	\$ 186,680	\$ 37,336	\$ 37,336	\$ 112,008
2) Salary/Fringe - Admin. Assistant (part-time : 96 hrs./yr.)		\$ 1,776	\$ 1,800	\$ 1,824	\$ 1,848	\$ 1,872	\$ 9,120	\$ 1,824	\$ 1,824	\$ 5,472
3) Salary/Fringe - Water sampler (part-time : 168 hrs./yr.)		\$ 2,604	\$ 2,646	\$ 2,688	\$ 2,730	\$ 2,772	\$ 13,440	\$ 2,688	\$ 2,688	\$ 8,064
4) Travel (3,500 miles/per year at \$.54/mile) water sampler and coordinator		\$ 1,890	\$ 1,890	\$ 1,890	\$ 1,890	\$ 1,890	\$ 9,450	\$ 1,890	\$ 1,890	\$ 5,670
5) Equipment/Supplies (\$30/mo.) see also Task 8		\$ 360	\$ 360	\$ 360	\$ 360	\$ 360	\$ 1,800	\$ 360	\$ 360	\$ 1,080
6) Training (2 training sessions/yr.)		\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 2,600	\$ 520	\$ 520	\$ 1,560
7) Telephone/Postage (8/mo @ \$150/mo.) see also Task 8		\$ 1,200	\$ 1,200	\$ 1,200	\$ 1,200	\$ 1,200	\$ 6,000	\$ 1,200	\$ 1,200	\$ 3,600
<b>Subtotals</b>		\$ 44,310	\$ 45,416	\$ 46,002	\$ 46,388	\$ 46,974	\$ 229,090	\$ 45,818	\$ 45,818	\$ 137,454
<b>OBJECTIVES 1: Maintain the geometric mean concentrations for fecal coli form bacteria below 160 colonies/100mL and reduce the occurrence of single samples exceeding 409 colonies/100 mL to represent less than 10% of samples.</b>										
1) Implement BMP Practices (Task 2)		\$ 71,200	\$ 71,200	\$ 71,200	\$ 71,200	\$ 71,200	\$ 356,000	\$ 142,400	\$ -	\$ 213,600
2) Partial Manure Management (Task 3)		\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 25,000	\$ 10,000	\$ -	\$ 15,000
3) Cover Crops (Task 4)		\$ 3,200	\$ 3,200	\$ 4,800	\$ 4,800	\$ 6,400	\$ 22,400	\$ 8,960	\$ -	\$ 13,440
4) Prescribed Grazing		\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 75,000	\$ -	\$ 75,000	\$ -
<b>Subtotals</b>		\$ 94,400	\$ 94,400	\$ 96,000	\$ 96,000	\$ 97,600	\$ 478,400	\$ 161,360	\$ 75,000	\$ 242,040
<b>OBJECTIVE 2: Increase livestock producers' awareness and understanding of various management options that will reduce or prevent the delivery of livestock manure to nearby water bodies.</b>										
1) Educational workshops (4)		\$ 500	\$ 500	\$ 500	\$ 500	\$ 500	\$ 2,000	\$ 400	\$ 400	\$ 1,200
2) Field Tours and demonstrations (4)		\$ 500	\$ 500	\$ 500	\$ 500	\$ 500	\$ 2,000	\$ 400	\$ 400	\$ 1,200
3) Information/Education Meetings (5 mtgs.)		\$ 250	\$ 250	\$ 250	\$ 250	\$ 250	\$ 1,250	\$ 250	\$ 250	\$ 750
<b>Subtotals</b>		\$ 250	\$ 1,250	\$ 1,250	\$ 1,250	\$ 1,250	\$ 5,250	\$ 1,050	\$ 1,050	\$ 3,150
<b>TOTAL 319/NON-FEDERAL BUDGET</b>		\$ 138,960	\$ 141,066	\$ 143,252	\$ 143,638	\$ 145,824	\$ 712,740	\$ 208,228	\$ 121,868	\$ 382,644

**ANTELOPE CREEK TMDL IMPLEMENTATION PROJECT**

**PART 3: Selected Best Management Practices (BMPs)**

Land Use Code	NRCS Code	Practice	No.	Acres	Linear Feet (LF)	Rate	TOTAL	FUNDING		
								Cost-share Rate	Cash Costs	319 Match
2, 3, 4	382	Fencing			32,000	\$ 1.80	\$ 57,600	60%	\$ 23,040	\$ 34,560
2, 3, 4	56	Alternative Power	1			\$ 5,000.00	\$ 5,000	60%	\$ 2,000	\$ 3,000
2, 3, 4	4	Solar Power	6			\$ 8,000.00	\$ 48,000	60%	\$ 19,200	\$ 28,800
2, 3, 4	516	Pipelines			32,000	\$ 4.00	\$ 128,000	60%	\$ 51,200	\$ 76,800
3	528	Prescribe Grazing		15,000		\$ 5.00	\$ 75,000	60%	\$ -	
1	590	Nutrient Management		7,680		\$ 5.00	\$ 38,400	60%	\$ 15,360	\$ 23,040
2, 3	614	Trough & Tank	32			\$ 1,250.00	\$ 40,000	60%	\$ 16,000	\$ 24,000
2, 3, 4	642	Well (livestock only)	5			\$ 7,800.00	\$ 39,000	60%	\$ 15,600	\$ 23,400
1,	340	Cover Crops		1,120		\$ 20.00	\$ 22,400	60%	\$ 8,960	\$ 13,440
4,	0	Partial Manure Management	5			\$ 5,000.00	\$ 25,000	60%	\$ 10,000	\$ 15,000
		<b>SUBTOTALS</b>	<b>49</b>	<b>23,800</b>	<b>64,000</b>		<b>\$ 478,400</b>		<b>\$ 161,360</b>	<b>\$ 242,040</b>

Land Use Codes: 1 = Cropland 2 = Pasture Hayland 3 = Rangeland 4 = Farmstead/Misc