

Agriculture is Life!

Bacterial Monitoring for the Buck Creek Watershed

**Funding provided through a
Clean Water Act §319(h) Nonpoint Source Grant from the
Texas State Soil and Water Conservation Board and the
U.S. Environmental Protection Agency
TSSWCB Project 03-07
Partners
Texas AgriLife Research
Texas Water Resources Institute
Texas AgriLife Extension Service**

August 2008



Bacterial Monitoring for the Buck Creek Watershed

Final Report

Bacterial Monitoring for the Buck Creek Watershed

Final Report

Funding provided through a
Clean Water Act §319(h) Nonpoint Source Grant from the
Texas State Soil and Water Conservation Board and the
U.S. Environmental Protection Agency

TSSWCB Project 03-07

Partners

Texas AgriLife Research
Texas Water Resources Institute
Texas AgriLife Extension Service



This page has been left blank intentionally.

EXECUTIVE SUMMARY

The “Bacterial Monitoring for the Buck Creek Watershed” project was developed in response to the creek’s listing on the *Texas Water Quality Inventory and 303(d) List* due to a bacterial impairment and subsequent total maximum daily load (TMDL) development. Due to limited data, local soil and water conservation districts (SWCD) led the effort to have this TMDL process suspended to allow for further data collection and analysis. The Texas State Soil and Water Conservation Board (TSSWCB) was contacted to seek their assistance in developing and funding a project that would substantially increase the amount of monitoring conducted on the creek.

The Texas Water Resources Institute (TWRI) was contracted to develop the project and to coordinate the needed personnel to conduct this study. With the help and cooperation of the Texas AgriLife Research and Extension Center at Vernon, a work plan was developed to collect water samples and conduct water quality monitoring every other week at 13 different sites along the creek. The proposed work plan was then submitted to TSSWCB for funding through the U.S. Environmental Protection Agency’s (EPA) 319 (h) program which focuses on funding activities that address nonpoint source (NPS) pollution. The proposal was approved by EPA and project activities began in October 2003.

Sampling began in May 2004 and continued through May 2007 yielding a total of 78 sampling trips. During these trips, a 100 mL water sample was collected and returned to the laboratory for *E. coli* analysis. Additional water quality parameters including dissolved oxygen (DO), potential hydrogen (pH), salinity, specific conductance, temperature, and water depth were taken. Other information about the current conditions was recorded on field data sheets and included air temperature, when the most recent rain event was, flow and weather conditions. Water samples and their corresponding water quality data were not collected during all sampling trips due to impassable roads, no water present at the site, standing water or flow too low to collect a sample or adverse weather conditions.

Data review showed that Buck Creek exhibited elevated bacteria levels at several locations and in some cases, enough to exceed the state’s bacteria standards. State water quality standards dictate that the geometric mean of at least 10 samples collected within a 5-yr time frame must be ≤ 126 colony forming units (cfu) / 100 mL of water and no more than 25 percent of the individual samples collected can exceed 394 cfu / 100 mL. Several individual sites did not meet these criteria and several others were close to exceeding those limits.

Results from this study indicate that elevated *E. coli* levels periodically exist in Buck Creek. Implementing proper management measures in the watershed will aid in decreasing the impacts of *E. coli* on the creek. Additional information about the sources of bacteria in Buck Creek is needed before sound management measures can be recommended, developed and implemented into a feasible plan of action. A project to collect the needed information and to develop a watershed protection plan (WPP) for Buck Creek has been funded and initiated. Stakeholder support and involvement have grown over the course of the bacterial monitoring project and the continued support and participation of those involved will be vital to successfully improving the creek’s water quality.

ACKNOWLEDGEMENTS

TWRI and AgriLife Research – Vernon prepared the following report. Lucas Gregory, Phyllis Dyer, and Kevin Wagner served as principle authors. Dr. John Sij was the principle investigator for this project. Other TWRI and AgriLife Research personnel contributing to this project included Dr. George Di Giovanni, Dr. Bill Harris, and Clint Wolfe.

We would like to extend a special thanks to members of the Hall-Childress Soil and Water Conservation District (SWCD) #109, Salt Fork SWCD #133, Donley County SWCD #127 and the Red River Authority of Texas. Without their help, this project would not have been possible. The assistance of Catrina Moody with the Salt Fork Soil and Water Conservation District in arranging meeting locations and providing event information to local newspapers is greatly appreciated.

Texas AgriLife Extension Service County agents Josh Brooks of Hall County, Andy Hefley of Collingsworth County, and Lonnie Jenschke of Childress County were instrumental in disseminating information to the stakeholders; their assistance was greatly appreciated.

Thanks to Buck Creek landowners Kirk Skipper, Jerry Hicks, and Curtis and Ruth Ann Scrivner for allowing access to their property on Buck Creek for monitoring purposes. Their interest in this study and assistance with sampling efforts, wildlife counts, and seasonal creek information were important to the final assessment of the creek.

Collingsworth County Agent Keith Martin with USDA Farm Service Agency shared important agricultural and census data vital to this report.

We also thank TJ Helton, Mitch Conine and Aaron Wendt from the TSSWCB Nonpoint Source Team for their help, oversight and management of the project.

Funding for this project was provided through a Clean Water Act §319(h) Nonpoint Source Grant from the Texas State Soil and Water Conservation Board and the U.S. Environmental Protection Agency.



TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	iii
ACKNOWLEDGEMENTS	iv
LIST OF FIGURES	vii
LIST OF TABLES	viii
LIST OF ABBREVIATIONS	ix
INTRODUCTION.....	1
BACTERIAL MONITORING FOR THE BUCK CREEK WATERSHED.....	3
Waterbody Identification and Description.....	3
Ecologic and Geological Description of the Watershed.....	4
Climate.....	4
Ecoregions.....	4
Wildlife and Wildlife Habitat	5
Soils.....	5
Groundwater	7
Public Access.....	9
Size and Economic Structure of Population Using Waterbody	9
Historical Uses of Waterbody and Trends in Use.....	10
User Population Impacted by Waterbody Degradation	11
Inventory of Point Source Pollutant Discharges.....	11
Potential Non-Point Sources In or Near the Watershed.....	11
City of Wellington	11
City of Hedley.....	11
Wellington Livestock Commission Company	11
Concentrated Animal Feeding Operations.....	12
Grazing Livestock.....	12
Feral Hogs.....	13
Wildlife	13
Failing Septic Systems.....	13
Other Sources.....	13
Watershed Land Use and Agricultural Production	14
Hydrological Characteristics of the Waterbody.....	16
Base Flow Characteristics.....	16
Runoff Characteristics	16
Texas Surface Water Quality Standards for Buck Creek.....	17

Thermal Structure	17
Dissolved Oxygen.....	17
pH and Specific Conductance	17
Bacteria	17
Nutrients.....	18
Investigative Approach.....	18
Sampling Site Locations	19
Waterbody Sampling Procedures.....	21
Experimental Procedures	22
Waterbody and Tributary Water Quality	22
Thermal Structure	22
Dissolved Oxygen.....	23
pH and Conductance (TDS).....	23
Bacteria	23
Flow Volume	25
Summary of Public Participation and Coordination Activities.....	26
Project Meetings	26
Quarterly Reports.....	26
Educational Programs	27
Project Website	27
Conclusions.....	27
WATERSHED PROTECTION PLAN DEVELOPMENT FOR	
BUCK CREEK	29
Need for Further Study	29
Identification and Discussion of Phase II Goals and Expected Outcomes	29
Detailed Project Description.....	29
Work Schedule.....	30
LITERATURE CITED	31
APPENDICES.....	32
Appendix A: Buck Creek Water Quality Data	33
Appendix B: Buck Creek Sampling Site Report.....	68
Appendix C: Field Data Report	69

LIST OF FIGURES

Figure		Page
1.	Buck Creek watershed in Texas.....	3
2.	Soils map of the Buck Creek watershed	6
3.	Potential bacteria contributors in the Buck Creek watershed.....	14
4.	Buck Creek watershed land use and land cover map developed by TCEQ in 2002.....	15
5.	Approximate locations of sampling sites in the Buck Creek watershed.....	20

LIST OF TABLES

Table		Page
1.	Public road crossings on Buck Creek	9
2.	USDA NASS statistics for Buck Creek watershed counties, 2005	16
3.	Nutrient screening levels for freshwater streams as established by TCEQ	18
4.	Sampling site information recorded by the Vernon AgriLife Research technician. GPS coordinates: minutes ' seconds "	19
5.	Summary of <i>E. coli</i> and fecal coliform data for each sampling site	24
6.	Summary of <i>E. coli</i> results grouped by TCEQ designated Assessment Units (AUs)	25
7.	Buck Creek flow volumes in cubic feet per second	26
8.	Meetings where project information was presented	27

LIST OF ABBREVIATIONS

ac-ft	Acre-Feet
AU	Assessment Units
BMP	Best Management Practice
BST	Bacterial Source Tracking
CAFO	Concentrated Animal Feeding Operation
cfs	Cubic Feet per Second
cfu	Colony Forming Units of Bacteria
CR	County Road
CRP	Conservation Reserve Program
DO	Dissolved Oxygen
<i>E. coli</i>	<i>Escherichia coli</i>
EPA	U.S. Environmental Protection Agency
FM	Farm to Market Road
gpm	Gallons per Minute
mg/L	Milligrams per Liter
mL	Milliliters
NASS	USDA National Agricultural Statistics Service
NPS	Nonpoint Source
OSSF	on-site septic facility
pH	Potential Hydrogen
QAPP	Quality Assurance Project Plan
RRA	Red River Authority of Texas
SH	State Highway
SWCD	Soil and Water Conservation District
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids (Specific Conductance)
TMDL	Total Maximum Daily Load
TSSWCB	Texas State Soil and Water Conservation Board
TSWQS	Texas Surface Water Quality Standards
TWDB	Texas Water Development Board
TWRI	Texas Water Resources Institute
USDA	United States Department of Agriculture
WPP	Watershed Protection Plan

INTRODUCTION

The Red River Basin includes 30 classified segments and 11 major reservoirs which cover approximately 145,169 acres. Buck Creek (Segment 0207A) is a small tributary in the Red River basin. Buck Creek joins the Lower Prairie Dog Town Fork of the Red River (Segment 0207) to form the Red River above Pease River (Segment 0206). The creek originates close to Hedley, Texas in Donley County and flows 68 miles in an east-southeast direction across the Oklahoma border to its confluence with the Red River. According to TCEQ's 2004 Texas Water Quality Inventory and 303(d) List, Buck Creek is classified as a perennial stream; however, observations made during this study indicate that the creek is actually an intermittent stream that typically ceases to flow in places during the summer months. Several pools and portions of the stream maintain water year round and can support the stream's designated uses.

Designated uses of Buck Creek include aquatic life, contact recreation, and fish consumption. For assessment purposes, TCEQ splits Buck Creek into two assessment units (AU), 0207A_01 and 0207A_02. AU 0207A_01 extends from the Oklahoma state line to Buck Creek's confluence with House Log Creek (25 miles) while AU 0207A_02 stretches from the House Log Creek confluence to the upper end of the segment (43 miles). In 2000, AU 0207A_01 was determined to be non-supporting of contact recreation use due to bacteria levels exceeding Texas Surface Water Quality Standards (TSWQS). This assessment was based on data collected above the US 83 bridge crossing. The aquatic life use was found to be fully supported and fish consumption was not assessed. Due to this failure to meet water quality standards for the stream's designated use, it was added to the *2000 303(d) List*. In 2002, Buck Creek was re-assessed and remained on the *303(d) List* due to the bacterial impairment. The segment was classified as a category "5a" stream meaning that a TMDL was underway, scheduled, or will be scheduled; but was given a low priority for initiating the TMDL process. Stakeholders (SWCDs) across the watershed disliked the suggested TMDL approach to reducing the bacterial impairment and sought to have the stream re-classified. As a result, the creek remained on the impaired list after the 2004 evaluation but was re-categorized as 5c meaning that more data and information will be collected before a TMDL is scheduled. This project was developed as a result of these concerns and has focused on collecting additional data that regarding the quality of water in Buck Creek.

Bacteria levels in Texas fresh waterbodies are currently evaluated using the number of *E. coli* colony forming units (cfu) per 100 mL of water. *E. coli* is used as a bacterial indicator for the possible presence of pathogenic microorganisms in the water due to fecal contamination. In order to meet TSWQS for contact recreation, single samples should not exceed 394 cfu/100 mL more than 25 percent of the time and the geometric mean of all samples should not exceed 126 cfu/100 mL. Fecal coliform may be used as a bacterial indicator when sufficient *E. coli* data are not available. To meet the contact recreation criteria using fecal coliform, single samples should not exceed 400 cfu/100 mL more than 25 percent of the time and the geometric mean of all samples should not exceed 200 cfu/100 mL.

Through the Texas Clean Rivers Program, the Red River Authority of Texas routinely collects quarterly samples at the US 83 crossing of Buck Creek, approximately 19 miles north of Childress in Childress County. In 2006 TCEQ evaluated the samples collected over the previous 5 years and found that Buck Creek continued to not support contact recreation based on exceedances in the geometric means of *E. coli* and fecal coliform and the percentage of *E. coli* samples exceeding the established single sample limit. The geometric mean of 18 *E. coli* samples was found to be 309 cfu/100 mL and 7 of the 18 *E. coli* samples collected exceeded the single sample limit of 394 cfu/100 mL while the geometric mean of 15 fecal coliform samples was 346 cfu/100mL.

During periods of rainfall, bacteria originating from birds and mammals (livestock, wildlife, etc.), inadequately treated sewage, and/or failing septic systems may be washed into the stream and have the potential to impair recreational use of the waterbody. Indicator bacteria, such as *E. coli*, are normally found in the fecal matter of warm-blooded animals and are generally not harmful to human health, but may indicate the presence of pathogens that can cause disease. This study was designed to develop a better understanding of where and when bacteria levels exceed TSWQS in Buck Creek and to determine areas where management of contributing sources of bacteria may be needed.

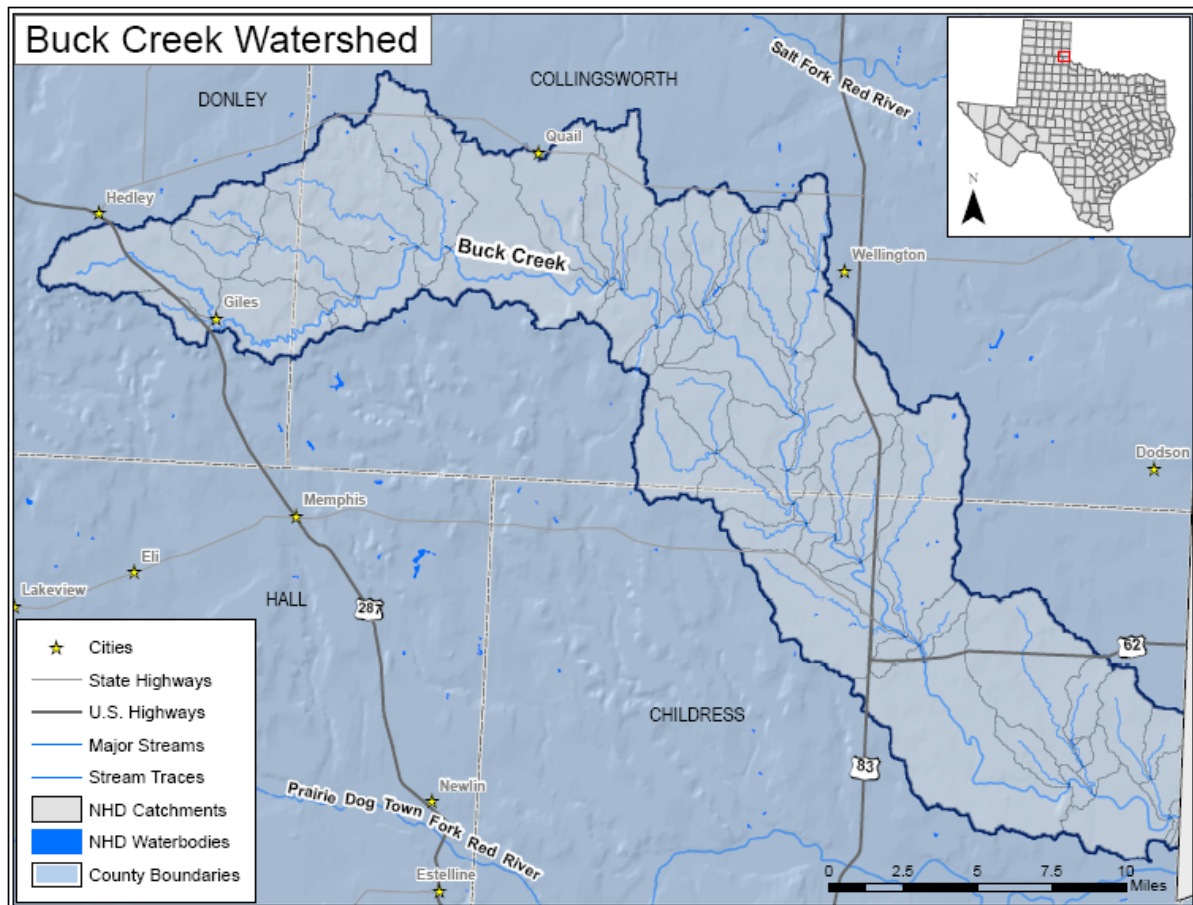
Bacterial Monitoring for the Buck Creek Watershed

Waterbody Identification and Description

Buck Creek is an unclassified freshwater stream that originates in Donley County near Hedley, Texas (Figure 1). The creek runs east-southeast through Collingsworth and Childress Counties before entering the southwestern corner of Harmon County, Oklahoma where it empties into the Red River, approximately 0.4 kilometer (¼ mile) west of Oklahoma Ranch Road 1660 and Texas State Highway (SH) 680 in Hardeman County.

The Buck Creek watershed in Texas encompasses roughly 74,850 hectares (289 square miles). In Texas, approximately 56 percent of the watershed is located in Collingsworth County, 33 percent in Childress County, and about 11 percent in Donley County. Elevation in the watershed ranges from approximately 750 meters above mean sea level in the upper portions of the watershed in Donley County to 503 meters above mean sea level at its confluence with the Red River in Oklahoma.

Figure 1: Buck Creek watershed in Texas



The Buck Creek watershed is a subwatershed of the Red River. Buck Creek is an unclassified segment numbered 0207A. Numerous tributaries flow into Buck Creek including Squaw Creek, Dry Hollow Creek, Doe Creek, Long Creek, Settlers Creek, and House Log Creek, as well as many that are unnamed.

Buck Creek is considered to be a perennial stream in TCEQ's 2004 assessment of the waterbody; however, observations made during this study indicate that the creek is an intermittent stream with portions of the creek not flowing during the summer months. Sparse rainfall and shallow aquifer drawdown from vegetation and irrigation often reduce stream flow; however, several large pools and stretches of the stream retain water throughout the year, except during extreme drought. Base flow in the stream is typically sustained by small springs while surface runoff is mainly associated with rainfall events. A 1960 account of the relief and drainage in Childress County states that "except in extremely dry years, the Red River and Buck Creek have water most of the year. During the driest periods; however, they cease flowing in places. The normal streams are generally only a few feet wide and a few inches deep. As a result of contamination from salt springs, most water is very salty" (USDA 1963).

Ecological and Geological Description of the Watershed

Climate

The Buck Creek watershed falls within the Continental Steppe sub-climate in Donley and west Collingsworth Counties, while the eastern portion of Collingsworth County and all of Childress County have a subtropical, sub-humid climate. Both sub-climates are characterized by hot, low humidity summers that moderate high daytime temperatures and allow for cool evenings. Winter months are subject to rapid temperature drops from cold fronts moving in from the Rocky Mountains and High Plains to the north and west. These fronts have been known to produce temperature changes of 50 to 60 degrees (°F) within several hours and up to 40-degree differentials in a matter of minutes. The mean annual temperature in the watershed is about 62°F, with average lows and highs of (29°F and 93°F respectively) (<http://www.srh.noaa.gov/lub/>). The prevailing wind is south-southwest in summer and is frequented by northwesterly winds moving in from the Rocky Mountains and the High Plains in the late fall to early spring months. The majority of rainfall occurs between April and September, mostly in the form of locally intense thunderstorms. Winter months are typically dry but have been known to produce snowfalls of up to 25 centimeters (10 inches). Total annual precipitation averaged 53 centimeters (21 inches) over the past 65 years. Annual pan evaporation for the watershed averaged about 166 centimeters (65.5 inches) over the past 50 years (<http://hyper20.twdb.state.tx.us/Evaporation/evap.html>).

Ecoregions

The Buck Creek watershed is located in Level III Ecoregions 26 and 27, the Southwestern Tablelands and Central Great Plains. Level IV Ecoregions have been developed to provide more detail about the respective area than the Level III descriptions. In the Buck Creek watershed, Level IV Ecoregions 26b, 26c and 27h are defined. Ecoregion 26b is described as the "Flat Tablelands and Valleys" and consists of level land between prominent buttes, badlands and escarpments of the tablelands. Soils in Ecoregion 26b are typically fine sandy loams or silt loams that have been tilled to produce cotton, sorghum and wheat. Fragments of

remaining native prairie exist within these areas and usually consist of mixed mid-grasses if they have not been subjected to heavy grazing pressure. Areas of native prairie that have seen intensive grazing are generally dominated by shorter grasses, cacti and shrubs. Ecoregion 26c is named the “Caprock Canyons, Badlands and Breaks” and encompasses the broken edges of the eastern edges of the High Plains. Numerous geological layers are exposed in this region and can be easily distinguished by the stark differences in red and white colors. Brush is the dominant vegetation throughout the region. Ecoregion 27h, the “Red Prairie” consists of gently rolling prairies that support grasslands and cultivated agriculture. This region typically receives more precipitation than the High Plains and support midgrass or shortgrass prairies depending on precipitation, soils and grazing pressure; typical grasses include little bluestem, Texas wintergrass, white tridens, Texas cupgrass, sideoats grama and curlymesquite (http://www.epa.gov/wed/pages/ecoregions/tx_eco.htm).

Wildlife and Wildlife Habitat



Site 10B, SH 256 May 2006

The Buck Creek watershed has a variety of habitats that support numerous wildlife species. The watershed contains suitable habitat for open land, rangeland, and riparian wildlife. These areas consist of cropland, pastures, meadows, brush and riparian corridors that provide cover and forage for quail, doves, badger, rabbits, pronghorn antelope, mule and whitetail deer, lesser prairie chicken, wild turkey, coyotes, red fox, coyotes, bobcats, prairie dogs, skunks, opossums, raccoons, songbirds, ducks, geese, crows, hawks and owls (USDA, 1963, 1973, 1980). Wild or feral hogs have established a significant population in the watershed although the exact number of hogs is not known. The damage caused to range and cropland has made their presence well known throughout the watershed and the state. They generally inhabit whitetail deer ranges and have very few natural predators. Feral hogs prefer bottomlands when available but also do well in drought prone areas (Taylor, 2003).

Soils

The predominate soil types in the watershed are loams, silt loams, and sandy soils. In total, the watershed includes 104 individual soil types. Six of these major soil types make up approximately 64 percent of the soils present in the watershed. Miles soils dominate the largest portion of the watershed with almost 27 percent. Within this grouping are 15 individual soils that are fine sandy loams, loams and loamy fine sands. These soils typically have slopes less than 8 percent, are deep and are located in upland areas suitable for cultivation or grazing. Woodward and Quinlan soils are often grouped together as a soil unit, and collectively they account for 14.5 percent of the soils present in the Buck Creek watershed. They are typically dominated by loamy soils over weakly cemented sandstone that range from shallow to moderately deep. These soils occupy large areas of dissected

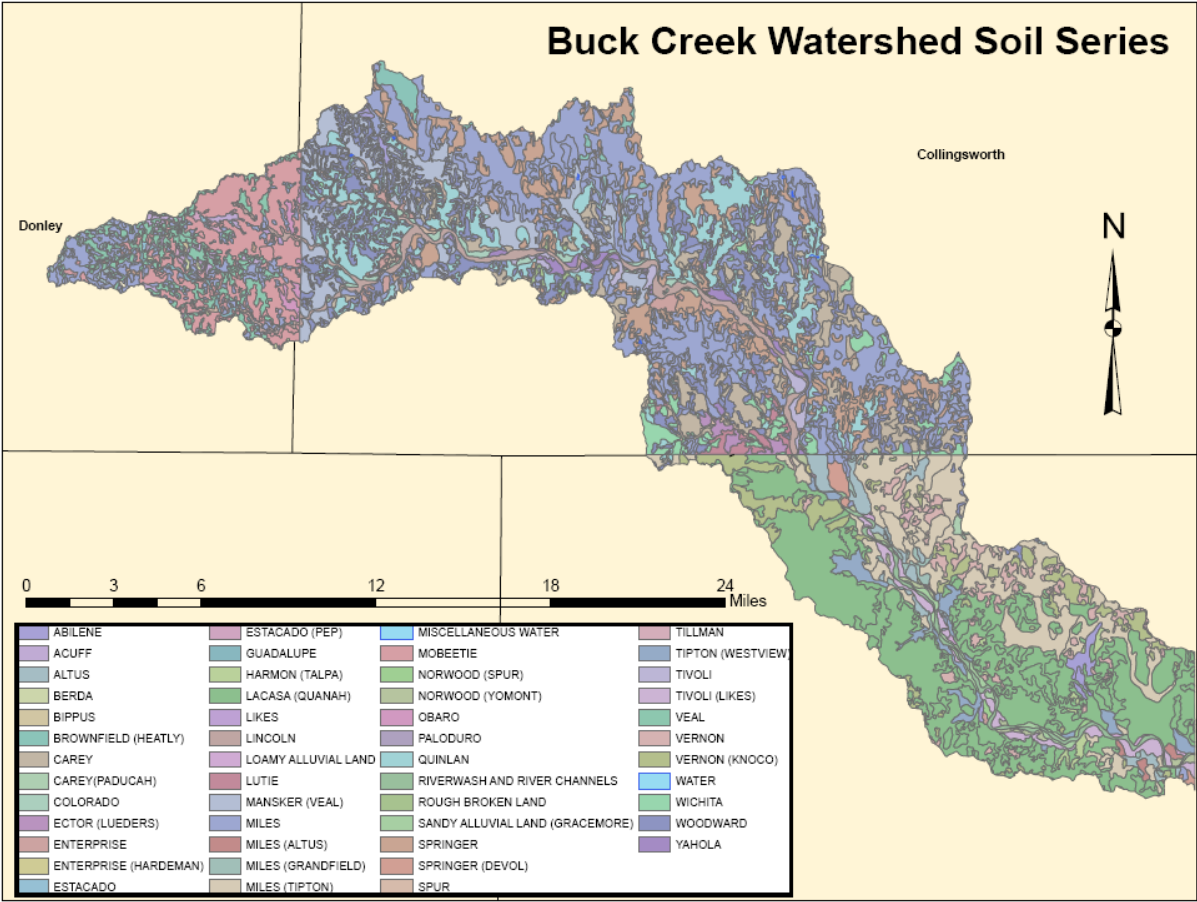
gently sloping to steep uplands and are associated with rangeland and are typically very susceptible to erosion.

The La Casa-Harmon association is the third most common soil group in the area and covers about 11.5 percent of the watershed. These soils are characterized by broad, gently sloping areas of La Casa soils and frequent outcrops of Harmon soils. La Casa soils are deep, silty soils that occupy gently sloping areas while Harmon soils are very shallow and occur as limestone outcrops and ridges. The majority of these soils are associated with rangeland, but the La Casa soils are suitable for crop production (USDA, 1963). Springer soils are also common throughout the watershed and occupy almost 7 percent of the watershed. They are deep soils that are typically under cultivation, but can be hampered by severe erosion if not properly managed. The Mobeetie-Veal-Potter association covers about 4.5 percent of the watershed and has slopes ranging from 1 to 45 percent. Soils are generally loamy and range from deep to very shallow and are typically found in upland areas. These soils are usually associated with rangeland due to their low potential for cultivated crop growth caused by the steep slopes, shallow soils and high erosion potential (USDA, 1980).



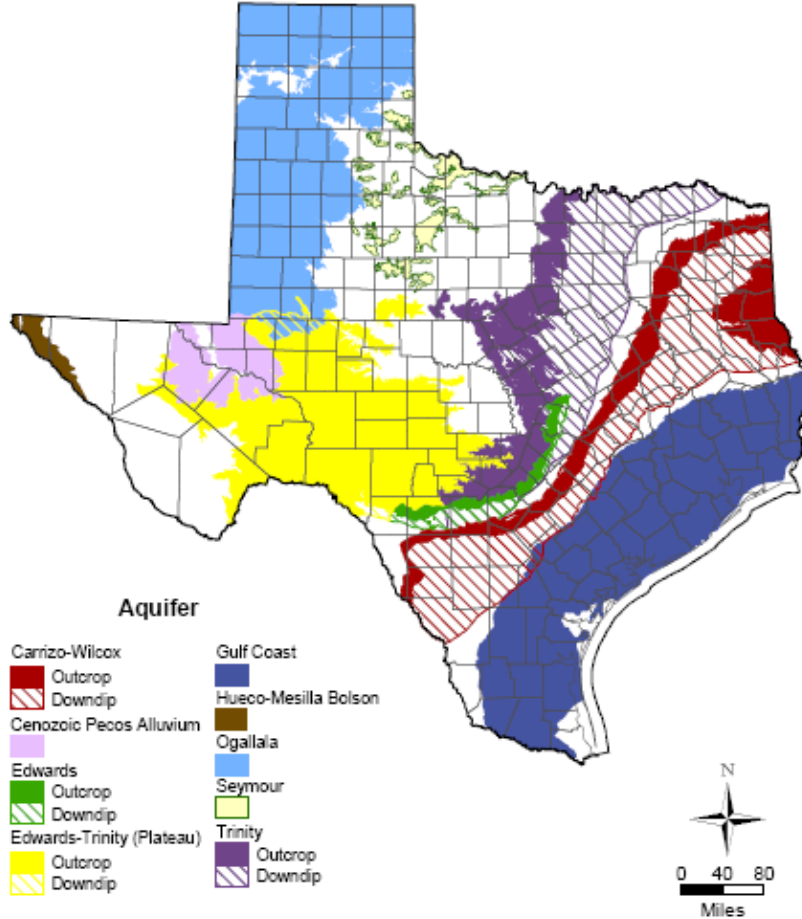
Creek bank showing soil profile and erosion near site 10B. June 2006

Figure 2: Soils map of the Buck Creek watershed



Groundwater

Two aquifers, the Seymour and Blaine, underlie the Buck Creek watershed and supply the bulk of available groundwater. The Seymour is a major aquifer located primarily in north central Texas and a few Panhandle counties. The aquifer is fresh to slightly saline and typically less than 31 meters (100 ft) thick, although a few isolated locations in



Collingsworth County may exceed 100 meters (300 ft). This aquifer is primarily under water-table conditions but artesian conditions may occur where the water-bearing zone is overlain by clay. Approximately 3.7 billion m³ (3 million ac-ft) of water are available based on 75 percent of the total storage with annual effective recharge to the aquifer is approximately 265,200 m³ (215,000 ac-ft) or 5 percent of the average annual precipitation that falls on the aquifer outcrop. No significant long-term water-level declines have occurred in irrigated areas supplied by groundwater from the Seymour Aquifer. The lower, more permeable

Major aquifers in Texas (Source: Texas Water Development Board)

part of the aquifer produces the greatest amount of water with well capacities in the area averaging about 1,130 liters per minute or 300 gallons per minute (gpm). Yields typically range from less than 380 liters per minute (100 gpm) to as much as 4,900 liters per minute (1,300 gpm). Salinity has increased in many heavily pumped areas and the aquifer's water is now unsuitable for domestic uses in some cases. Brine pollution from oil-field activities has resulted in localized contamination of formerly fresh ground and surface water supplies and has further increased salinity problems in the area. Nitrate

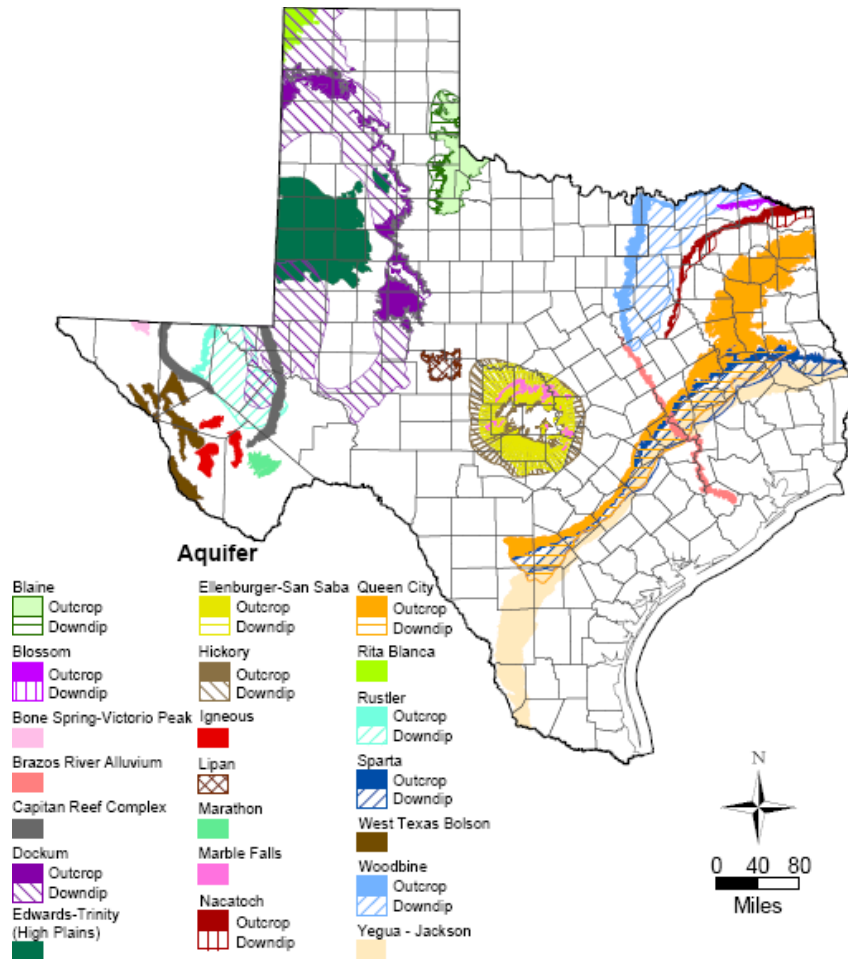


Peanut Field between sites 7 and 8. September 2006

concentrations in the aquifer are the primary concern for many people. Nitrates in excess of primary drinking-water standard of 10 mg/L are widespread in Seymour groundwater (TWDB, 1995).

The Blaine is a minor aquifer located in portions of Wheeler, Collingsworth, and Childress Counties and extends into western Oklahoma. The aquifer varies from approximately 3 to 100 m (10 to 300 ft) thick and is typically poor in quality. Concentration of dissolved solids increases with depth and in natural discharge areas at the surface, but contains water with total dissolved solids (TDS) of less than 10,000 mg/L. The primary uses are for watering livestock and irrigation of highly salt-tolerant crops with yields varying from a few liters per minute to more than 5,680 liters per minute (1,500 gpm) (TWDB, 1995). Salt-tolerant crops include Bermudagrass, wheat, cotton and some types of peanuts (Martin, 1976). The Blaine Aquifer is also known to have nitrate levels that commonly exceed the drinking water standard of 10 mg/L.

Numerous shallow groundwater tables also exist within the Buck Creek watershed. Field observations indicate that these water tables are highly connected with the creek and are influenced by irrigation wells located near the creek. Several springs have been observed discharging water into the creek channel during wet periods, but typically cease in dry periods. Water flowing in the creek has also been observed disappearing underground as it moves down the stream channel. In the spring, when irrigation begins, groundwater flow into the creek largely ceases and the stream starts to lose water to the depleted water tables. Once irrigation stops, spring flow slowly returns to the stream.



Minor aquifers of Texas (Source: Texas Water Development Board)

Management of groundwater resources in Texas is typically performed by Groundwater Conservation Districts (GCDs). The watershed includes parts of two GCDs, the Panhandle

and Mesquite GCDs. These and all other GCDs in the state have been set up to “manage groundwater resources by providing for the conservation, preservation, protection, recharging, and prevention of waste of the groundwater resources within their jurisdictions.” The establishment of GCDs can be done by: 1), the Legislature, 2) landowner petition and TCEQ review of the proposed district, 3) TCEQ in designated Priority Groundwater Management Areas where landowners do not take action, and 4) by adding additional territory to an existing GCD. In general,

Public Access

Private property upstream and downstream of all road crossings limits public access to Buck Creek to very small areas underneath bridges or in low-water-crossing areas. There are no paid public access areas to the creek that allow swimming, wading, or fishing in the creek. Leased land adjacent to the creek is the only paid access to the creek, and limited to recreational hunters and their families.

Table 1. Public road crossings on Buck Creek

Site	County	Road Name	Access	Potential Use	Water Presence
BC-01	Donley	CR 28	Limited	none	No water present during study
BC-02	Donley	CR Z and CR 29	Limited	wading	seasonal and during runoff event
BC-03	Collingsworth	CR 40	Limited	wading, fishing	constantly
BC-04	Collingsworth	SH 1547	Limited	wading, fishing	seasonal and during runoff event
BC-05	Collingsworth	SH 1056	Limited	wading, fishing	seasonal and during runoff event
BC-06	Collingsworth	CR 110	Limited	wading, fishing	seasonal and during runoff event
BC-07	Collingsworth	SH 338	Limited	wading, fishing	seasonal and during runoff event
BC-08	Collingsworth	CR SA	Limited	wading, fishing	seasonal and during runoff event
BC-09	Collingsworth	CR SA	Limited	none	No water present during study
BC-11	Childress	US 83	Limited	wading, fishing	seasonal and during runoff event
BC-12	Childress	US 62	Limited	wading, fishing	seasonal and during runoff event
BC-13	Childress	CR 19	Limited	wading, fishing	seasonal and during runoff event

Size and Economic Structure of Population Using the Waterbody

Buck Creek is used by rural residents and absentee landowners in Donley, Collingsworth and Childress counties for watering livestock purposes. According to the 2000 U.S. Census, these three counties have a combined population of approximately 14,722 citizens. Approximately 52.3 percent of the residents are considered to be in the labor force. The median family income is about \$35,400 and an estimated 17.4 percent of the population lives beneath the poverty level. Between 1990 and 2000, Collingsworth County experienced a population decline of 10.3 percent while Donley and Childress County populations increased by 3.6 percent and 29.1 percent, respectively. The large influx of people moving to Childress County can be attributed to people moving to the city of Childress which is outside of the watershed. Through the regional water planning process, the Panhandle Regional Water Planning Group (Region A) in 2006 predicted that the combined population in these counties will decline to about 14,138 residents by 2050.



Beaver Pond above site 3, June 2006



Pond below site 3, June 2006

Historical Uses of Waterbody and Trends in Use

The designated uses of Buck Creek include aquatic life use, contact recreation use and fish consumption use. Landowners with property contiguous with Buck Creek are allowed to use water for domestic and livestock needs; this is known as an exempt use that does not require a permit from TCEQ. Domestic and livestock uses encompass watering range livestock, meeting household needs, or irrigating a lawn or household garden. Construction of stock tanks for private use is also allowed, provided that they do not store more than 246,700 m³ (200 ac-ft) of water. The amount of land in the USDA Conservation Reserve Program (CRP) has increased significantly in recent years. This has given rise to some non-owner (leases) permitted hunting along the creek and throughout the watershed. Using water for wildlife watering needs is also exempt from obtaining a permit from TCEQ. Water for wildlife use can be impounded in a structure that stores less than 246,700 m³ (200 ac-ft) of water and must be in “qualified open-space land” as defined in the Texas Tax Code. Depending on the site that the reservoir is constructed on, a permit may be required from the U.S. Army Corps of Engineers.

One permitted surface water right does exist on Buck Creek in Childress County. It grants the annual use of 47,500 m³ (38.5 ac-ft) and was established with a priority date of April 5, 1954. The water right was originally used to irrigate 16 hectares (40 acres) of farmland. The water right was re-issued September 25, 1987 but has since been inactive; however, the right still exists and its owner is entitled to remove this permitted allotment of water from the creek (http://www.tceq.state.tx.us/permitting/water_supply/water_rights/wr_databases.html).

User Population Impacted by Waterbody Degradation

Water degradation in Buck Creek has the greatest impact on the rural residents of Collingsworth and Childress counties. Portions of the creek in these counties generally have areas of water that can support wading, swimming, fishing or serve as a source of water for

livestock year round. Water quality degradation due to bacterial contamination could increase the risk of developing an ailment for recreational users who ingest water from the creek. Buck Creek in Donley County rarely has water flowing in the creek channel and would most likely have little impact on users in this area. The Buck Creek watershed is sparsely populated with few people residing near the creek. Recreational hunters lease land adjacent to the creek and may periodically come into contact with the creek.

Inventory of Point Source Pollutant Discharges

There are no permitted point source discharges in the Buck Creek watershed. Hedley and Wellington, the only incorporated cities in the watershed, are permitted to apply wastewater to irrigated agricultural land and are therefore considered to be nonpoint sources.

Potential Nonpoint Sources In or Near the Watershed

City of Wellington

The City of Wellington is the only permitted municipality allowed to dispose treated effluent into the Buck Creek watershed. The water quality permit (WQ0010328001) authorizes the City to dispose of no more than 300,000 gallons of treated effluent per day via surface irrigation on specified 120 acres of non-public access agricultural lands. The treatment facility and the waste application fields are located in the sub-watershed of House Log Creek, a tributary of Buck Creek about 1.6 km (1.0 mi) southwest of the intersection of SH 338 and FM 1035 (Haskell St.) in Collingsworth County. Although this permit does not allow discharge into waters of the State, the application fields are located within the watershed of Buck Creek and may be considered a nonpoint source of pollution. This land area repeatedly receives the treated effluent and may have nutrients and/or bacteria build-up that could enter Buck Creek during runoff events or system malfunctions (http://www4.tceq.state.tx.us/cid/ccd/index.cfm?fuseaction=main.PublicNoticeDescResults&CHK_ITEM_ID=491394022006171).

City of Hedley

The City of Hedley has the same type of permit for disposal of its treated wastewater. Their water quality permit (WQ0010709001) authorizes the disposal of treated domestic wastewater at a daily average flow not to exceed 50,000 gallons per day via surface irrigation of 20 acres of non-public access grassland; the permit further states that it does not authorize the discharge of pollutants into waters in the state of Texas. The City's treatment facility and disposal site are located 1.9 km (1.2 mi) north and 1.3 km (0.8 mi) east of the US Hwy 287 and SH 203 intersection. This site is located in the drainage basin of the Salt Fork of the Red River (Segment 0222) and does not drain into the Buck Creek watershed.

Wellington Livestock Commission Company

A cattle auction facility is located west of Wellington near the city's wastewater treatment facility and could be a potential nonpoint source of pollution from runoff during high rainfall events. Weekly sales average about 900 head as reported in the *Mesquite Country Bargains*, a free classified ads newspaper.

Concentrated Animal Feeding Operations

Concentrated animal feeding operations (CAFOs) and their byproducts (animal waste) are another potential non-point source of pollution in the watershed. Only one CAFO is located in the watershed southeast of Hedley and another is located northwest of Hedley but is outside of the watershed. The Hedley Feed Lot is located southeast of town and directly north of the rest area on US Hwy 287. The Crow Hollow Feedlot is located west of Hedley on the south side of US Hwy 287 and is not in the watershed. TCEQ regulates all CAFOs in Texas and categorizes CAFOs as livestock feeding operations that: (1) feed stabled or confined animals for a total of 45 days or more in any 12-month period and the confinement area does not sustain crops, vegetation, forage growth or post-harvest residues in the normal growing season; and (2) meet certain animal number thresholds, such as maintaining more than 1,000 head of beef cattle or more than 700 head of dairy cattle.

In Texas, CAFOs are authorized to operate under a General Permit that includes extensive details on the design, construction, operation and maintenance of the facility. In general, CAFOs are not allowed to discharge manure or wastewater into waters of the State unless catastrophic or chronic rainfall occurs at the facility. To meet this requirement, these facilities are equipped with a retention control structure which is designed to capture the waste stream from the CAFO. Once the waste makes it to the structure, it is treated using microbes before it is disposed of, typically as irrigation water. These Retention Control Structures must be certified by a licensed professional engineer to document that the structures meet specific permeability and capacity requirements. The required design capacity is the volume of runoff resulting from a 25-year, 24-hour rainfall event.

Manure and wastewater generated at the CAFO must be used in an appropriate and beneficial manner as detailed in the General Permit. In general, CAFOs in the Buck Creek watershed utilize wastewater for irrigation of crops adjacent to and in close proximity to the CAFO facility. Manure is typically sold to farmers in the area either as a direct collection from the pens or as compost (TCFA, personal communication). Manure has primary and secondary crop nutrients, enhances soil water holding capacity, reduces erosion on sandy soils and increases soil organic matter. No record of acreage within the Buck Creek watershed receiving manure from either of these facilities is available.

Grazing Livestock

Free ranging livestock in the watershed serve as a source of nonpoint source pollution as well. These animals are not confined to any one small area, but instead are allowed to range over large tracts of land where they deposit their waste. Available water supplies are one of many factors that influence how livestock (and all animals) will utilize their respective habitats and where their waste is deposited. Buck Creek does serve as a source of water for many livestock (and other animals) in the watershed and will cause the animals to spend most if not all of their time within a close proximity to the creek. Animals that do use the creek as drinking water likely deposit some of their fecal material directly into the creek, but the majority of their waste is excreted throughout the watershed. Fecal matter deposited throughout the watershed is likely transported to the creek during runoff events and contributes to the total bacteria load in the creek.

Feral Hogs

Feral hogs are not considered a wildlife species by the Texas Parks and Wildlife Department and are therefore not included in the wildlife section. This non-native species is rapidly expanding in Texas and typically inhabits similar areas as white-tailed deer. Feral hogs are especially fond of areas where food and dense cover are readily available and are commonly known to wallow in available water. Obviously, riparian areas are prime habitat for feral hogs and many other species (Taylor 2003). Reclusive by nature, feral hogs are somewhat of a nocturnal species and typically remain in thick cover during the day and venture away from this cover at night.

Wildlife

Another source of bacterial contamination in the watershed may originate from wildlife. Many factors influence wildlife behaviors and the areas of the watershed that they utilize. Water, food and cover are critical factors that dictate where wildlife can be found in the watershed. These three critical factors are most commonly found in riparian areas and as a result, they serve as a critical habitat for wildlife. In many cases, riparian areas are the only reliable source of water for wildlife over a great distance and as a result, wildlife congregates in the riparian corridor thus increasing the likelihood for fecal deposition near the creek.

Wildlife also utilizes upland areas of the watershed as well and randomly deposits fecal material throughout their habitat. Runoff then carries this material to the creek further increasing the bacterial loading to the creek.

Failing Septic Systems

Numerous houses are located close to the creek and have their own septic systems. Improperly functioning septic systems can be a source of bacteria and nutrients entering Buck Creek. Failures can occur via drain field failures, broken pipes, or overloading of the drain field resulting in surfacing effluent. Information collected during the 1990 census indicates that a total of 7,302 housing units were present in Childress, Collingsworth and Donley Counties and that 31 percent of those units were equipped with an on-site septic facility (OSSF) (<http://factfinder.census.gov/>). The Buck Creek watershed is predominantly rural and only includes a portion of Wellington within the watershed boundaries; therefore, OSSFs are the dominant type of septic disposal system used in the watershed.

Other Sources

A rest area located on US Hwy 287 south of Hedley has a retention pond for runoff and is a potential source of pollution during high rainfall events. The location the retention pond is less than 0.8 km (0.5 mi) above sampling location #1 on Buck Creek. Another possible source of bacteria coming from the rest area is pet waste.

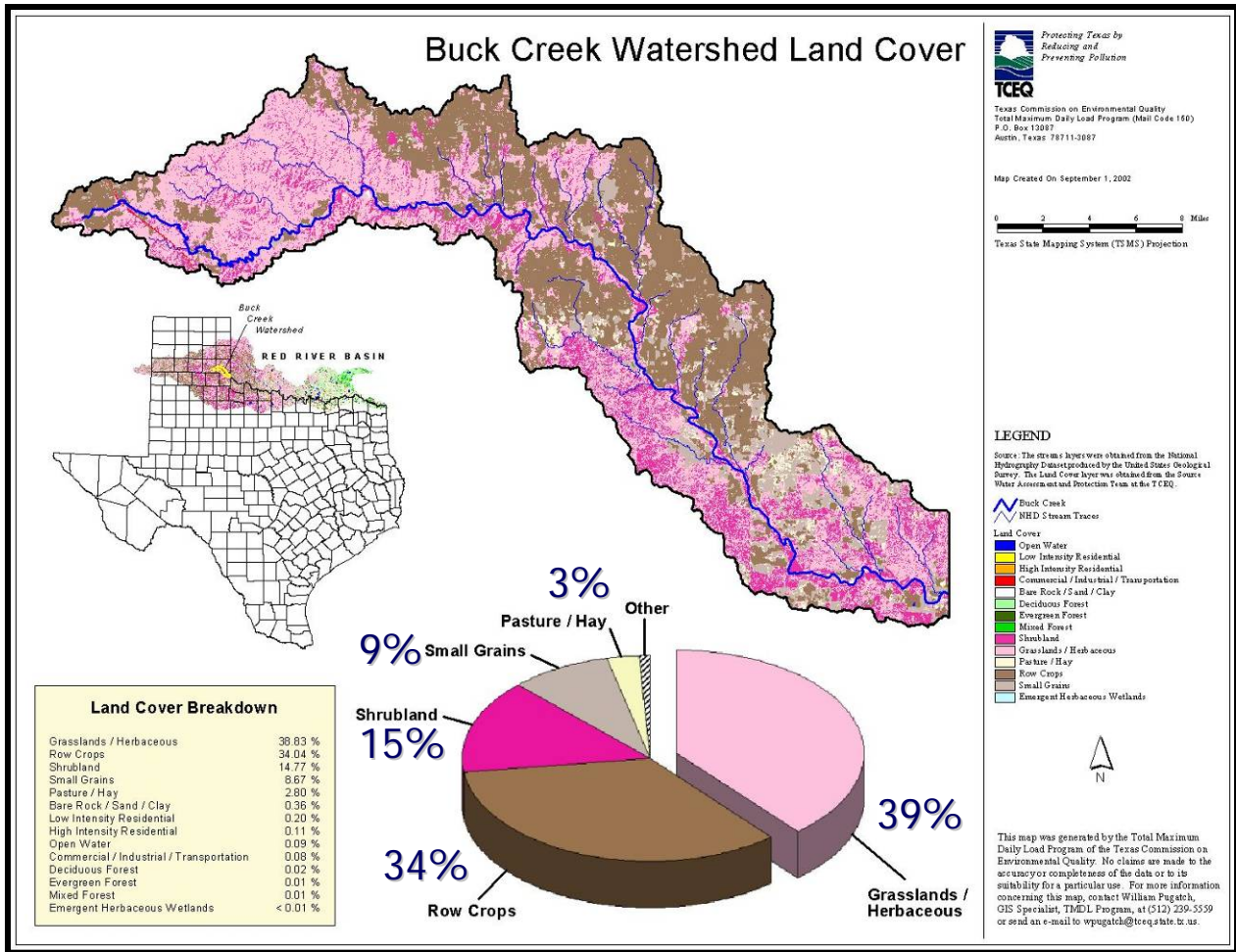
Figure 3. Potential bacteria contributors in the Buck Creek watershed



Watershed Land Use and Agriculture Production

Land resources in the watershed are primarily used for crop and cattle production although an increasing amount of land is being dedicated as wildlife habitat. A land cover map generated by TCEQ in 2002 shows that row crops and small grains account for about 43 percent of the watershed while the remaining 57 percent is considered grassland, shrubland, or pasture (Figure 3). An updated land use and land cover map is currently being developed and will be available for inclusion into the Buck Creek Watershed Protection Plan.

Figure 4. Buck Creek watershed land use and land cover map developed by TCEQ in 2002.



A recent trend has been to commit large tracts of land that have been historically farmed or grazed into the Conservation Reserve Program. The FSA keeps data on reported acres in the Conservation Reserve Program; however, these data are not specific to the watershed. Essentially, these lands are allowed to return to a more natural state and may be used for recreational hunting. Hunting has become a major revenue source for rural communities and landowners in the watershed through the purchase or leasing of hunting land and expenditures on food, lodging, and retail items.

Major agricultural commodities in the watershed include cattle, cotton, peanuts and wheat. Cattle operations in the watershed include one CAFO and numerous cow/calf operations. The USDA NASS details agricultural production for the three counties that encompass the watershed. Crop acreage and cattle numbers (including cattle in feedlots) in 2005 for Childress, Collingsworth, and Donley counties are listed in Table 2. Total acres planted for each county are shown in Table 2, and Figure 3 shows the distribution of cropland within the watershed. A significant portion of cropland in the watershed is pivot or furrow irrigated

utilizing groundwater. Irrigated production of cotton, peanuts and wheat increased 56 percent from 1995 to 2005 in Childress, Collingsworth and Donley Counties (USDA, NASS).

Table 2. USDA NASS statistics for Buck Creek watershed counties, 2005.[†]

	County		
	Childress*	Collingsworth*	Donley*
Cattle	-----No. head-----		
Beef cattle	10,000	14,000	15,000
Cattle & calves	20,000	33,000	64,000
Crop	-----No. acres-----		
Cotton	47,600	52,600	12,400
Peanuts	1,700	26,100	6,300
Wheat	39,200	40,800	15,100

*The reported number of cattle and acres of crop production included the entire county listed; actual numbers for the Buck Creek watershed will be a portion of each county's total

[†]Source: www.nass.usda.gov/Data_and_Statistics/Quick_Stats/

Hydrological Characteristics of the Waterbody

In their 2004 determination, TCEQ classified Buck Creek as a perennial stream. Throughout the course of this study, it was found that Buck Creek is actually an intermittent stream, meaning that it dries up for parts of the year. No USGS or other stream gaging station is located on Buck Creek to verify this; however, data sets presented in Appendix A commonly record 'dry' conditions at 10 of the sampling sites.

Base Flow Characteristics

The Seymour and Blaine Aquifers underlie the Buck Creek watershed and contribute base flow to the creek from numerous springs along the length of the stream. In times of normal rainfall, these aquifers remain at a level that supports return flow into the creek but during periods of drought, spring flow ceases in many locations. Irrigation in the spring and summer months also influence groundwater flow into the creek. Field observations have noted that the stream flow gradually diminishes and in many places dries up following the onset of irrigation and the development of vegetative growth in the riparian corridor. Once irrigation is terminated in the fall and vegetation along the creek becomes dormant, stream flow typically returns within 1 or 2 months.

Runoff Characteristics

Intense spring and summer thunderstorms that typically occur from April to September provide the majority of runoff for Buck Creek. Runoff from these events produces a rapid rise and subsequent fall in stream levels and rarely results in long-term flooding. Winter storms are generally lower intensity, longer duration storms that do not produce significant runoff and do not cause major fluctuations in stream flow.

Texas Surface Water Quality Standards for Buck Creek

TCEQ has determined that Buck Creek must meet surface water quality standards suitable for aquatic life uses, contact recreation, and fish consumption. Standards have not been set specifically for Buck Creek (Segment 0207A) because it is considered an unclassified segment. Specific standards have been set for the Lower Prairie Dog Town Fork of the Red River and many may be applicable to Buck Creek.

Thermal Structure

Buck Creek does not have its own temperature standard like most classified segments. The closest stream with a designated temperature criteria is the Lower Prairie Dog Town Fork of the Red River, segment 0207 and has a temperature maximum of 93°F or 33.9°C [TSWQS §307.10(A)]. This measurement is to be taken at approximately 30 cm (1 ft) below the surface of the water body [TSWQS §307.9(c)]. In addition, water temperatures are supposed to be maintained so as to not interfere with reasonable uses of the waters [TAC §307)].

Dissolved Oxygen (DO)

Buck Creek is considered by TCEQ to be an unclassified, perennial stream (TCEQ 2002). In accordance with the TCEQ's *2004 Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data*, all perennial unclassified streams are presumed to have high aquatic life use and are required to maintain corresponding DO levels. The main factor in determining aquatic life use is the DO level and the waterbody's ability to support existing, designated and attainable aquatic life uses. In order to support high aquatic life use, DO should maintain a 24-hour average of 5.0 mg/L with a minimum of 3.0 mg/L. When evaluating DO levels in a water body, TCEQ considers an index period and a critical period. The index period represents the warm-weather season of the year and spans from March 15th to October 15th. The critical period of the year is July 1st to September 30th and is the portion of the year when minimum stream flow, maximum temperatures and minimum DO levels occur across Texas. At least half of the samples used to assess a stream's DO levels should be collected during the critical period with the remainder of the samples used coming from the index period. DO measurements collected during the cold months of the year are not considered because flow and DO levels are typically highest during the winter months. Moreover, average and minimum DO levels should be at least 5.5 and 4.5 mg/L, respectively, to support fish reproduction during the spring months [TAC §307].

pH and Specific Conductance (TDS)

pH and specific conductance standards have not been set for Buck Creek. These standards have been set for the Lower Prairie Dog Town Fork of the Red River, segment 0207, which lies directly to the south of Buck Creek. For segment 0207, pH criteria fall within the 6.5 to 9.0 range [TAC §307]. If one sample falls outside the acceptable range, the stream then becomes non-supporting of the set criteria. Specific conductance (TDS) is based on an average of measurements taken over at least a 1 year period. Segment 0207 is mandated to maintain its yearly TDS average below 46,200 mg/L.

Bacteria

Bacteria standards set for contact recreation are applied to all freshwater bodies in the state unless otherwise designated in the TSWQS. As a result, a geometric mean of 126 cfu/100 mL

must be maintained and a single sample of *E. coli* should not exceed 394 cfu/100 mL [TAC §307]. In order for these standards to apply, a minimum of 10 samples collected within a 5 year period are required. Once 10 samples have been collected, those and all other samples collected within the most recent 5 year time-frame must remain at or below the geometric mean to support contact recreation. The single sample standard is structured so that no more than 25 percent of the individual samples collected may be higher than 394 cfu/100 mL. Presently the creek is on the states impaired waters list because it did not meet the geometric mean standard.

Nutrients

Nutrient levels are also monitored by TCEQ as an indicator of water quality. At this point, no specific standards are applied to Buck Creek. It is instead evaluated based on screening levels that have been established by TCEQ. These screening levels were developed by averaging all data collected from a respective type of water body in Texas and using the 85th percentile as the ‘screening level.’ Buck Creek fits into the ‘freshwater stream’ category and is evaluated based on recorded levels compared to the state-wide average. According to the TCEQ’s 2004 water quality inventory, 5 samples were analyzed for ammonia, nitrate and orthophosphorous with 3 of the samples exceeding the nitrate screening level of 1.95 mg/L.

Table 3. Nutrient screening levels for freshwater streams as established by TCEQ	
<i>Nutrient</i>	<i>Screening Level</i>
NH3-N (Ammonia)	0.33 mg/L
NO3-N (Nitrate)	1.95 mg/L
OP (Orthophosphorous)	0.37 mg/L
TP (Total Phosphorous)	0.69 mg/L
Chl a (Chlorophyll a)	14.1 µg/L

Investigative Approach

Sampling by TCEQ and Red River Authority from March 1, 1996 to February 28, 2001 indicated that Buck Creek was impaired due to elevated bacteria levels. During this 5-year period, only 14 *E. coli* and 20 fecal coliform samples were collected at one location on Buck Creek (US Hwy 83). Due to the limited number of samples, it was determined that additional data were needed to better understand spatial and seasonal bacteria loadings to the creek.

The main objective of this project was to obtain a sufficient amount of data from multiple locations in order to make a scientifically sound decision about the bacterial impairment of the waterbody. To accomplish this, a routine, bi-weekly sampling schedule was implemented to collect samples over a three year period. This time frame generated representative data during wet and dry conditions and across all seasons. Samples were taken at all sites with flowing water and field observations were recorded to document the status of the creek and other environmental conditions.

A secondary project objective was to develop community awareness, participation, and a feeling of stewardship for landowners in the Buck Creek watershed. This objective was accomplished by conducting stakeholder meetings and other educational meetings. The focus of these meetings was to inform the public about the project, its goals and objectives, how project activities would be carried out, and who was involved. In addition, project personnel wanted to improve stakeholder knowledge of the watershed and educate them on possible alternatives in managing their land to improve stream health.

Sampling Site Locations

Originally, 13 sites were chosen and located at public creek crossings and on private land (Table 3 and Figure 4). During the course of the study, it was decided that an additional two sites should be selected to gain additional knowledge about the waterbody. The first two sampling sites are located in the headwaters of the watershed in Donley County and rarely had water present. Sites 3 through 9 are located in Collingsworth County, and 3 of the 7 sites typically had flowing water present. Sites 10A through 13 are located in Childress County and usually had flowing water in them except during prolonged periods of drought. Table 3 and Fig. 4 present detailed information on each site and show site locations along Buck Creek. Site 10 was split into 3 sampling locations in order to gain additional information and understand why bacteria levels varied so drastically between sites 9 and 11. Site 11 has been historically, and is currently monitored by the RRA and TCEQ through the Clean Rivers Program and is the site where bacteria levels were originally deemed too high to meet the stream's designated uses. During the project, samples were collected above and below the bridge at site 11 in an effort to illustrate the influence of any fecal material coming from the bridge. These data are listed as sites 11A (above the bridge) and 11B (below the bride) in appendix A. Throughout the course of the project, flowing water was never recorded at sites 1 and 9; therefore, no samples were collected at these sites.

TCEQ evaluates Buck Creek as two separate units and uses the confluence of House Log Creek as the dividing line. The portion of the creek below House Log Creek to the Oklahoma state line is referred to as Assessment Unit (AU) 0207A_01 and the portion of the creek above House Log Creek is AU 0207A_02. Since TECQ assesses the creek by these units, we joined the data collected from each individual site to represent the appropriate AU. Sites 1 thru 7 were lumped together to form the dataset for AU 0207A_02 and data from sites 8 thru 13 was grouped together as AU 0207A_01. Results from the evaluation of data in these AUs are presented in Table 5 later in the document.

Table 4. Sampling site information recorded by the Vernon AgriLife Research technician. GPS coordinates: minutes' seconds".

Site No:	Road Access:	County:	Latitude 34°:	Longitude 100°:	Elevation: m (ft)	
BC-01	CR 28	Donley	N 50'07.71"	W 36'38.67"	746	(2447)
BC-02	CR 29, CR Z	Donley	N 48'54.43"	W 35'01.58"	720	(2362)
BC-03	CR 40	Collingsworth	N 51'25.47"	W 28'00.93"	646	(2119)
BC-04	FM 1547	Collingsworth	N 50'47.33"	W 23'57.71"	620	(2034)
BC-05	FM 1056	Collingsworth	N 51'50.0"	W 22'48.1"	617	(2024)
BC-06	CR 110	Collingsworth	N 50'33.04"	W 20'46.7"	598	(1961)
BC-07	FM 338	Collingsworth	N 49'08.32"	W 16'39.24"	578	(1896)
BC-08	CR SA	Collingsworth	N 47'27.4"	W 14'44.6"	589	(1932)
BC-09	CR SA	Collingsworth	N 47'26.8"	W 14'21.0"	570	(1870)
BC-10A	SH 256, Private	Childress	N 43'46.4"	W 13'41.0"	540	(1771)
BC-10B	SH 256, Private	Childress	N 43'46.4"	W 13'40.9"	539	(1768)
BC-10C	SH 256, Private	Childress	N 43'07.8"	W 12'27.2"	540	(1771)
BC-11A, B	US 83	Childress	N 42'08.6"	W 11'19.5"	529	(1735)
BC-12	US 62	Childress	N 40'09.6"	W 9'25.1"	519	(1702)
BC-13	CR 19	Childress	N 36'39.9"	W 6'39.4"	497	(1630)

Waterbody Sampling Procedures

Extensive sampling was conducted every two weeks from May 2004 to May 2007. Each site was visited to determine if enough flowing water was present to collect a sample or take water quality measurements. A field data report (Appendix C) was generated for each site even if a water sample was not collected. These reports recorded the sampling site, time, date, sample ID number, the chain of custody number, the collector's name and the collecting agency. The field data report also contains information on stream flow, the number of days since the last significant rainfall event, current weather conditions, and a back up recording of measured water quality parameters. In addition, air temperature, the appearance of the water, presence of any odor, and biological activity were noted.

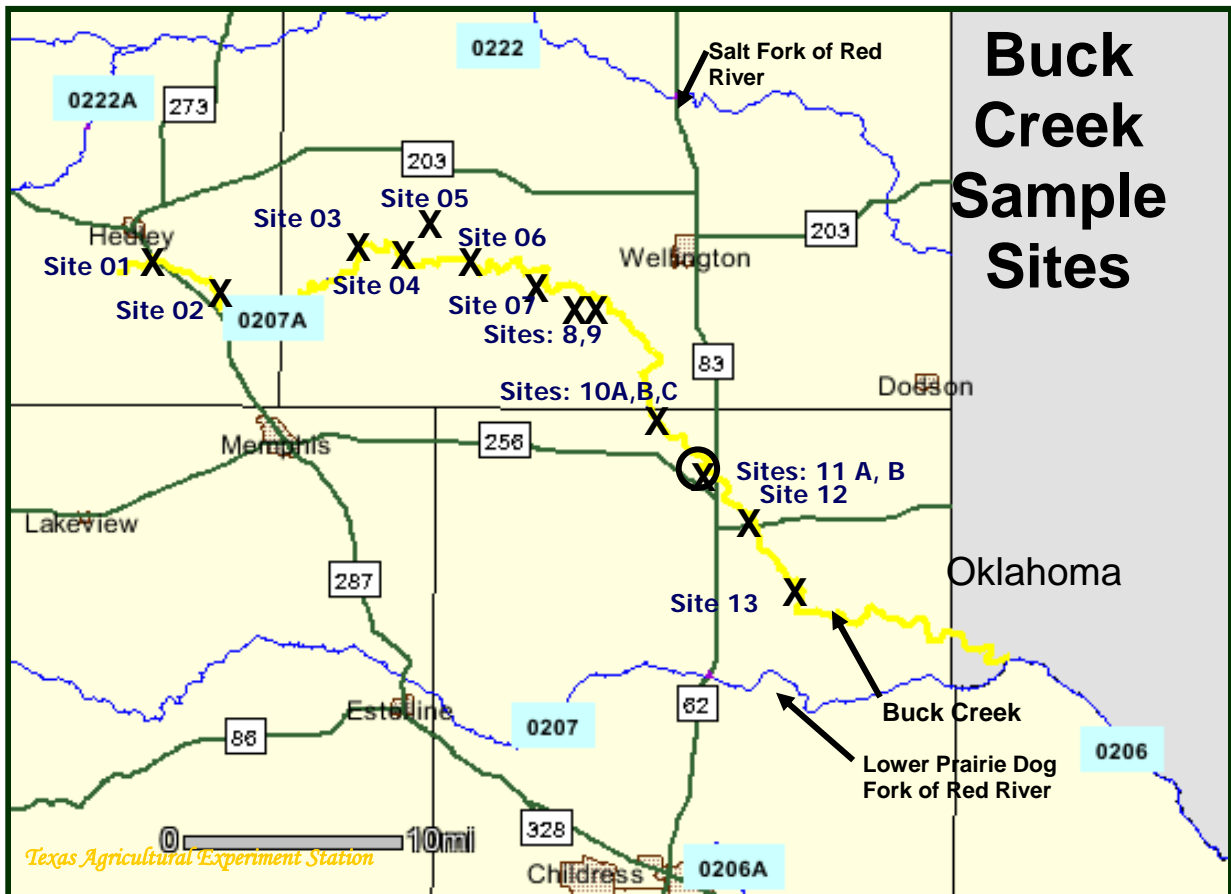


Figure 5: Approximate locations of sampling sites in the Buck Creek watershed

Samples were taken at each site if flowing water was present. In the event that no sample was taken, a note was made on the field report and recorded in the site's data file. A typical sample was collected directly from the center of the stream between 15 and 30 cm (6 to 12 in) below the water surface using a sterile, 125 mL wide-mouthed bag. All samples were labeled with the collection date and time, sampling location, and the sampler's initials. The surface layer of water, known as the micro layer, was avoided for sampling purposes because it could possibly be enriched with bacteria and thus not representative of the entire water column. Care was also taken not to disturb the sediment at the bottom of the creek bed because it too may contain higher *E. coli* numbers.

Safety of the technicians was a major concern for the project. Lightning, flooding, and impassable roads were primary concerns. When technicians felt that it was unsafe to sample at a location, observations were made about the site and a sample was not taken unless it could be taken from a bridge. In some cases, sampling from a bridge using a bucket tied to a rope was performed. A clean bucket was used and lowered from the bridge to the stream to collect water. This water was poured into sample bottles or bags and labeled accordingly. Once samples were taken, they were placed on ice to lower their temperature to 4°C before being taken to the lab.

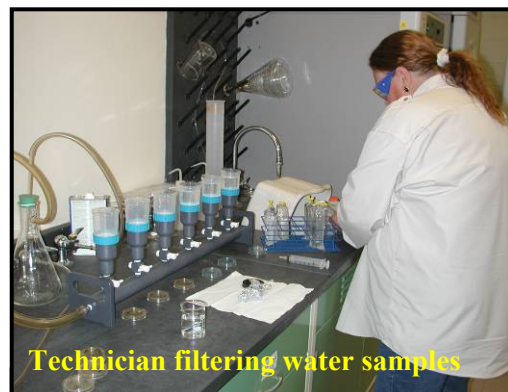
In addition to sample collection, field measurements (stream flow severity, water depth, water temperature, pH, specific conductivity, and dissolved oxygen) were recorded. Water depth was measured using a meter stick and flow severity was determined through field observation. A YSI multi-probe (YSI Environmental, Yellow Springs, Ohio, <http://www.ysi.com>) was used to measure dissolved oxygen, pH, specific conductance, salinity, and water temperature in accordance with the TSSWCB and EPA approved Quality Assurance Project Plan (QAPP).

Experimental Procedures

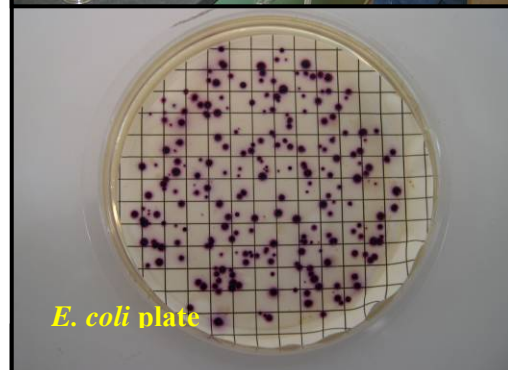
Once samples were returned to the Vernon AgriLife Research and Extension Center lab, 100 mL of the water sample (or a diluted portion of the sample) was filtered for the presence of *E. coli* and fecal coliforms. *E. coli* were isolated using a vacuum powered filtering apparatus that passes the collected water sample through a funnel with a sterile filter membrane that traps bacteria.

The membrane is subsequently placed on prepared modified mTEC (selective for *E. coli*) agar petri dishes and incubated at 35.1° C for two hours to resuscitate the bacteria. The petri dishes are then moved to a water jacketed incubator and kept at 44.5°C for 20 to 22 hours allowing sufficient time for bacterial colonies to develop. *E. coli* colonies are recognized by their magenta color.

Fecal coliform samples are treated similarly, but a different culture medium (m-FC) is used for colony development. This media is selective for fecal coliform and is recognized by its blue color. Fecal coliform testing was performed only at site 11. Water samples were taken above and below the bridge (sites 11A&B) to compare water quality as it passed under a large colony of cliff swallows nesting on the downstream side of the bridge.



Technician filtering water samples

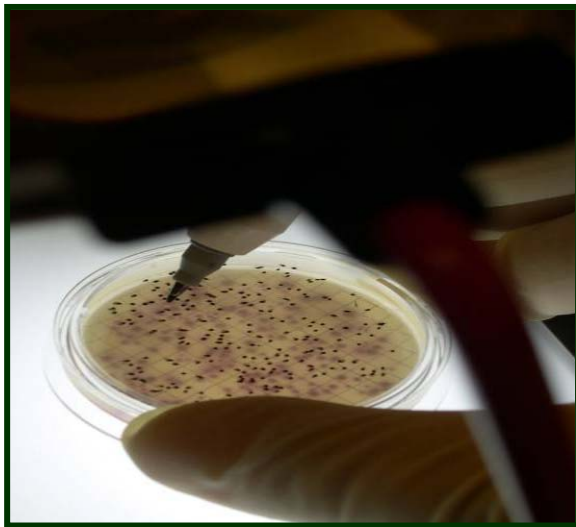


E. coli plate



Fecal coliform plate

Field blanks and laboratory blanks were also tested using the same sampling and sterilization techniques to insure that materials and methods used were effective and not contaminated by other sources of bacteria. A lab positive using live *E. coli* bacteria was also plated with each set of samples to confirm that the medium used would support bacteria growth. Following the incubation period, colonies were counted using a mini light box, magnifier, and a counting pen. Colony counts were recorded based on 100 mL of the original water sample. In some cases, colonies were too numerous to count using this method. If this was the case, an aliquot or dilution was done to yield a number of colonies that could easily be counted. Typically, 10 mL rather than 100 mL of the original sample was filtered on the plates and allowed to form colonies. These colonies were then counted and multiplied by 10 to account for the lesser volume of water being used in the sample.



Colony counter leaves a permanent dot



Counting colonies

Waterbody and Tributary Water Quality

Water quality in Buck Creek was monitored from May 2004 through May 2007 through this project. This involved grab sampling at 15 locations every two weeks. Sites 1 and 9 never had water present during the course of this monitoring project and were not sampled. Several sampling trips were also taken shortly after high rainfall events in an effort to collect grab samples of storm event influenced flows. All water quality monitoring data are included in Appendix A. TSSWCB will submit all data collected during this project to TCEQ for 305(b) and 303(d) assessment purposes.

Thermal Structure

Water temperatures were recorded at each sampling location when flowing water was present. Readings were recorded in °C using a multi-function YSI water quality meter. The maximum water temperature recorded along the creek was 34.7°C on June 16, 2005 and exceeded the temperature criteria by 0.8°C. Only one other water temperature was recorded above the maximum temperature standard of 33.9°C. The lowest water temperature recorded during the two years of sampling was 1.79°C on January 19, 2005; however, ice prevented temperature measurements from being collected during several sampling trips.

Dissolved Oxygen (DO)

DO grab samples were recorded using the YSI water quality meter at 13 of the 15 sites sampled. The remaining 2 sites never had enough water present to take readings. DO levels in Buck Creek are supposed to maintain a 24 hour average of 5.0 mg/L or greater and remain above an absolute minimum of 3.0 mg/L. No 24 hour sampling profiles were conducted during this study. Throughout the course of monitoring, DO levels ranged between 7.8 to 14.7 mg/L, and were well above the 5.0 mg/L standard. Out of 416 measurements recorded, only 10 individual readings were below the 3.0 mg/L minimum standard. These low readings were all taken during the summer months in the upper portions of the stream where flow was minimal. DO measurements are supposed to be taken during the index and critical periods as described in the Texas Surface Water Quality Standards section on p. 17; however, DO readings were taken whenever a sample was collected and approximately 100 of the readings taken were outside of the index/critical period. At least half of the collected samples are also supposed to be within the critical period and that level was not achieved during this study. The average springtime standard is 5.5 mg/L with a minimum DO level of 4.5 mg/L; these standards were met at all locations where readings were taken. DO

pH and Specific Conductance (TDS)

Specific conductance (TDS) and pH standards have not been set for Buck Creek, but will be compared to standards set for stream segment 0207. The listed criteria state that pH should remain at or above 6.5 and not exceed 9.0, and TDS should not exceed 46,200 mg/L. pH readings taken along the creek ranged from a minimum of 4.8 to a maximum of 9.0 and averaged 7.9 between all sites. This violates the minimum standard set by TCEQ. Recorded maximum values for TDS ranged from a minimum of 43 mg/L to a maximum of 5,118 mg/L and were well within the limit of 46,200 mg/L TDS.

Bacteria

Water samples were collected and analyzed for *E. coli* at all sites except sites 1 and 9; these sites did not have flowing water present that allowed for a suitable sample to be collected at any point during the project. All other sites had adequate water present to collect samples that could be analyzed. Results showed a wide range of bacteria present in the stream at different times, locations and under varying conditions. The lowest number of bacteria colonies present in water samples was 0 and occurred at multiple sites at multiple times. For geometric mean calculating purposes, these 0s were recorded as 0.5 in the data spreadsheets. The reasoning behind this is that a 0 in the geometric mean calculation causes an error because a number cannot be divided by 0. TSWQS assessment methodologies state that if a water sample does not contain any *E. coli*, then it will be recorded as containing 0.5 cfu/100 mL. This addition of 0.5 in place of 0 does not increase the geometric mean average of a site or influence the total number of recorded cfu in a negative way. The maximum number of bacteria collected in any one water sample was found to be 8,100 cfu/100 mL and was collected at site 5 on June 5, 2006. In general, most sampling sites maintained bacteria levels within the required water quality standards. Sites 7 and 10C did not meet the required geometric mean or single sample standards and sites 2, 5, 8 and 12 also showed concern for elevated geometric mean values. Table 4 presents information from each sampling site and indicates whether or not that specific site meets the state's water quality standards; however, TCEQ does not assess Buck Creek on an individual sampling site basis. Instead, TCEQ

evaluates the creek in two AUs, one above and one below the confluence of House Log Creek and Buck Creek. Table 4 shows the number of samples collected, both the geometric mean and the percentage of samples that exceeded the single sample bacteria limit of all samples collected at each site and if that site met bacterial water quality standards while table 5 lumps the data together by the TCEQ designated AUs and indicates what the overall quality of the creek was during the study. In analyzing data this way, data from sites 2 thru 7 were grouped together in AU 0207A_02 and data from sites 8 thru 13 were grouped in AU 0207A_01. Grouping these data together by assessment unit showed that Buck Creek was not impaired. The geometric mean of all samples collected in AU 0207A_02 (the upper portion of the creek) was 50 cfu/100 mL and only 16.7 percent of the samples collected exceeded the single sample limit. In AU 0207A_01, the geometric mean was calculated as 91 cfu/100 mL and the single sample limit was only exceeded 19.2 percent of the time. Complete bacterial data sets for each sampling site are available in Appendix A.

Table 5. Summary of *E. coli* and fecal coliform data for each sampling site

Site #	Number of Samples	----- <i>E. coli</i> -----					
		Geometric means ¹			Single sample exceedances ²		
		Number of colonies	Pass	Fail	Percent exceeded	Pass	Fail
01	0	no sample	---	---	---	---	---
02	7	258		Concern	14.3		
03	66	11	√		10.6	√	
04	66	55	√		18.2	√	
05	55	109	√	Concern	20	√	
06	29	17	√		6.9	√	
07	14	192		√	42.8		√
08	5	168		Concern	20		
09	0	no sample	---	---	---	---	---
10A	71	202		√	36.6		√
10B	35	92	√		8.6	√	
10C	38	67	√		15.8	√	
11 above	55	23	√		10.9	√	
11 below	33	81	√		15.2	√	
12	20	115	√	Concern	15	√	
13	22	78	√		18.2	√	
		-----fecal coliform-----					
11 above	47	63	√		23.4	√	Concern

¹ Geometric mean of at least 10 samples must not exceed 126 for *E. coli* and 200 cfu/100 mL for fecal coliform

² Samples must not exceed 394 cfu /100 mL for *E. coli* and 400 cfu/100 mL for fecal coliform no more than 25% of the total number of samples taken should exceed single colony limits

Rows with **BOLD** text do not have at least 10 collected samples and could not be correctly assessed

Rows **highlighted in Orange** indicate that the site did not meet water quality standards.

When water quality monitoring was initiated on Buck Creek, fecal coliform was used as the bacterial indicator. TCEQ now uses *E. coli* as the standardized bacterial indicator for fecal pathogens in water. Sample analysis at site 11 above the bridge revealed that fecal coliform levels were within the designated water quality standard; however, 23.4 percent of the samples taken did exceed the single sample limit and were close to the 25 percent limit considering only 47 samples had been taken. One more sample over the single sample limit would have caused the site to not meet water quality standards.

Table 6: Summary of *E. coli* results grouped by TCEQ designated Assessment Units (AUs)

Assessment Units	Number of Samples	Geometric Mean			Single sample exceedances		
		Number of colonies	Pass	Fail	Percent exceeded	Pass	Fail
0207A_01 : House Log Creek to Oklahoma state line	281	91	√		19.2	√	
0207A_02 : Buck Creek above House Log Creek	239	50	√		16.7	√	

¹ Geometric mean of at least 10 samples must not exceed 126 cfu / 100 mL for *E. coli*

² *E. coli* samples should not exceed 394 cfu /100 mL and no more than 25% of the total number of samples taken should exceed single colony limits

Flow Volume

Beginning on February 12, 2007, measurements to determine the velocity of water flowing in the creek were taken. These measurements were then used to calculate the volume of water flowing at each sampling site at the time of sampling. This information will be critical in developing an understanding of the bacterial load that is present in the creek at a given point and time. These measurements were made on 7 sampling trips at sites where water was present and resulted in a total of 58 individual flow readings. The minimum flow recorded was 0 cubic feet per second (cfs) and the maximum was measured at 158.16 cfs (Table 6). Velocity data were collected using an electromagnetic Marsh-McBirney Flo-Mate flow meter at multiple points across the stream channel and were multiplied by the width and depth of the channel to obtain an instantaneous flow volume.



Evidence of high flow in Buck Creek

Table 7. Buck Creek flow volume in cubic feet per second

Site	2/12/2007	3/6/2007	3/27/2007	4/11/2007	4/24/2007	5/7/2007	5/14/2007
01	---	---	---	---	---	---	---
02	---	---	0.25	0.33	0.29	---	0.23
03	16.57	3.76	9.09	17.40	6.11	---	6.64
04	5.22	15.58	14.09	9.46	8.32	---	17.04
05	2.88	1.30	0.56	2.08	0.51	---	0.36
06	19.49	3.70	7.38	2.56	8.54	9.07	19.46
07	---	---	7.46	6.69	---	36.54	15.30
08	---	---	2.51	0.20	---	158.16	12.86
09	---	---	---	---	---	---	---
10A	---	1.23	---	0.95	---	2.31	3.65
10B	---	3.60	---	---	---	7.12	5.63
10C	4.42	1.23	---	4.34	---	2.31	9.84
11A	---	---	---	---	---	---	10.68
11B	3.18	0.83	1.63	1.95	---	0.30	7.83
12	---	---	---	---	---	---	10.48
13	---	---	---	---	---	---	6.73

--- = No data available due to low flow

Summary of Public Participation and Coordination Activities

Project Meetings

Meetings were scheduled quarterly as deemed appropriate to discuss water quality monitoring activities, the project schedule, lines of responsibility, communication needs, and other requirements with project participants, landowners, and various interested parties. The general purpose of these meetings was to keep stakeholders informed of ongoing project activities and to get feedback from meeting participants. Project personnel attended meetings throughout the watershed giving project updates and presentations. Table 7 contains a listing of project meetings that were held throughout the course of the project, the date of the meeting, who the meeting was with and an approximate number of people in attendance.

Quarterly Reports

Brief reports were drafted each quarter and submitted to funding and cooperating agencies providing updates on activities that were conducted during the previous three months. These reports were also posted on the project website (<http://twri.tamu.edu/buckcreek>). Content contained in these reports included meetings held related to the project, educational activities and progress made on project deliverables. Quarterly reports also gave updates on sampling activities performed. Lastly, quarterly reports highlighted other related issues or problems associated with the project and provided projections on what would be accomplished during the upcoming quarter.

Educational Programs

Numerous presentations were given in an effort to educate and inform the public and stakeholders about the project, what the project was trying to accomplish, why the project was needed and who the various personnel involved with the project were. Educational information about the project is posted on the website and can be viewed at any time. Table 7 contains a listing of educational meetings that were held throughout the course of the project, the date of the meeting, who the meeting was with and an approximate number of people in attendance.

Table 8. Meetings where project information was presented

Meeting Type	Date	Meeting conducted with:	# in Attendance
Project	3/30/2004	Red River Authority	10
Project	7/13/2004	Hall-Childress SWCD	9
Project	10/28/2004	Red River Authority	10
Educational	2/8/2005	Hall Co. Farm & Ranch Meeting	80
Project	3/30/2005	Red River Authority	15
Educational	5/5/2005	Watershed Stakeholders Meeting	18
Project	3/14/2006	Red River Authority	25
Educational	5/9/2006	Watershed Stakeholders Meeting	22
Educational	9/27/2006	Texas A&M University Soil & Crop Science Department	12
Project	10/10/2006	Hall-Childress SWCD	8
Project	3/15/2007	Red River Authority	23
Educational	5/6/2007	Quail Appreciation Day	40
Educational	6/12/2007	Watershed Stakeholders Meeting	40

Website

TWRI designed and maintains a website dedicated to disseminating all information related to the Buck Creek bacterial monitoring project. The website provides an introduction to the Buck Creek study by showing a map of the creek, describing its location, highlighting its characteristics, and describing the watershed, land use and land cover and the climate of the watershed. This website also describes the impairment in the stream segment, how this impairment is quantified and what standards Buck Creek is supposed to meet. The website goes on to describe the project and the need for the project, goals and how they will be accomplished, deliverables, and agencies involved. Links to quarterly reports, presentations and participating agency websites are all included in the Buck Creek website.

Conclusions

Three years of data collected on Buck Creek have shown that elevated *E. coli* levels did exist during some of the sampling trips; but the majority of the time *E. coli* levels were within the state's standards. When data were analyzed as individual sites, several of the locations exceeded allowable geometric mean and single sample *E. coli* levels; however, when the analysis was conducted by grouping sampling sites together by the assessment units that TCEQ utilizes, neither standard was exceeded.

Specific sites that showed levels of bacteria higher than those permitted by TCEQ were sites 2, 7, 8 and 10A. Sites 7 and 10A both exceeded the geometric mean and single sample standard while sites 2 and 8 only exceeded the geometric mean standard. While these sites do exceed *E. coli* standards established for the state, they are not considered impaired because the creek is not assessed at each site, it is instead assessed by the designated AUs. These sites should still be considered areas of concern that exhibit an elevated number of *E. coli* present.

The original monitoring site on US Hwy 83 (site 11A) that has been and continues to be tested by TCEQ and RRA for *E. coli* was also tested for fecal coliform throughout this study. Neither *E. coli* nor fecal coliform colony counts exceeded their respective geometric means or single sample exceedance limits at this site. Despite the fact that this specific site initially caused Buck Creek to be listed on the state's impaired waters list and it now meets water quality standards, the creek continues to be on the state's list of impaired waters. Data that were collected through this project are in the process of being submitted to TCEQ for use in the next assessment and will likely result in Buck Creek being removed from the 303(d) List. Until the creek is removed from this list, bacteria will be considered a primary concern that needs to be properly managed in Buck Creek.

Watershed Protection Plan Development for Buck Creek

Need for Further Study

Results of the “Bacteria Monitoring for the Buck Creek Watershed” project have shown that bacteria can pose a significant water quality concern and should be properly managed to limit potential negative impacts of elevated bacteria levels in the creek. This study did leave several questions that must be answered before appropriate management measures can be recommended to reduce the amount of bacteria entering the creek. Specifically, the sources of bacteria in the stream need to be identified and the amount of bacteria in the stream from each source also needs to be quantified. TSSWCB and EPA have provided additional grant funding to proceed with the next project, “Watershed Protection Plan Development for Buck Creek.” It will answer these questions and provide the information needed to develop sound management measures that will reduce the amount of bacteria entering the creek.

Identification and Discussion of Phase II Goals and Expected Outcomes

The “Watershed Protection Plan Development for Buck Creek” project is a multi-faceted project that aims to accomplish three main goals: (1) identify the specific sources of bacteria present in Buck Creek; (2) evaluate potential management alternatives for restoring the waterbody and educating landowners about these best management practices (BMPs); and (3) develop a working WPP to restore and maintain the waterbody at or below existing water quality standards through a stakeholder driven process.

Detailed Description

The first priority of the project will be the identification of specific sources of bacteria in the watershed. AgriLife Research personnel in Vernon will collect fecal samples from known sources (i.e. septic systems, cattle, horses, raccoons, deer, wild hogs, turkey, etc.). AgriLife Research personnel in Vernon will also be responsible for streaking fecal material onto specialized media, culturing colonies, preparing isolates from purified colonies, and quick freezing them in liquid nitrogen for storage and shipment to AgriLife Research in El Paso for DNA analysis and inclusion into the Texas Known Source Library. Water samples will be collected and prepared as in the first project. Several colonies will be isolated and streaked multiple times to increase purity. DNA from the Buck Creek *E. coli* isolates will be compared with known *E. coli* DNA at the AgriLife Research and Extension Center in El Paso to determine the source of bacteria.

This process will be divided into two phases. The first phase will analyze monthly grab samples from high risk creek segments as identified in 03-07. Samples will be tested to determine if the bacteria originate from humans or animals using library-independent BST methodologies. In addition, approximately 50 of these isolates from 50 different water samples will be analyzed using library-dependent methods to determine if the Texas Known Source Library is sufficient to determine bacteria sources or if an *E. coli* source library specific to Buck Creek needs to be established. If a larger Buck Creek library is needed, more

samples from known sources will be analyzed. If the Texas Known Source Library appears suitable for identifying water isolates, more water samples and fewer known source samples may be analyzed. This approach should optimize BST results within budget limitations.

The second goal of the project is to evaluate potential BMPs, using a stakeholder driven process, which will aid in reducing the bacterial load. The approach and types of BMPs evaluated will depend on information provided by the BST study. If the human contribution is significant, then septic systems will be targeted for repair or upgrading. If livestock or other domesticated animals are identified as a significant source of fecal bacteria, then the project team will develop integrated watering, grazing, shade development, feeding, loafing area and prescribed burning strategies to decrease the frequency and amount of time livestock spend in the riparian zone. If other sources are found problematic, appropriate BMP strategies will be implemented.

Developing a WPP is the last goal of the Buck Creek Phase II study. This plan will outline:

- The causes and sources or groups of similar sources that will need to be managed to achieve the load reductions targeted.
- An estimate of the load reductions expected for the management measures described.
- A description of management measures that need to be implemented to achieve the load reductions estimated.
- An estimate of the level of technical and financial assistance needed, associated costs, equipment, etc., to implement the plan and potential sources of these funds.
- An information/education component to enhance public understanding.
- A schedule for implementing management measures identified in this plan.
- A description of interim, measurable milestones to determine whether management measures or other control actions are effective.
- A set of criteria that can be used to determine whether loading reductions are being achieved over time.
- A monitoring component to evaluate the effectiveness of the implementation efforts over time.

Formation of a stakeholder group to guide the development of this plan will be crucial to the success of the project and its implementation. Great care will be taken to include stakeholders in all portions of this project and to educate them about the issues being addressed in the planning process. A WPP engages stakeholders and develops their ideas about what is causing the problem and how to manage the problem into a voluntary management plan that can effectively reduce the impacts of pollution in the watershed. A positive aspect of a WPP is that it is made up from ideas and approaches that stakeholders indicate that they want in the WPP and is also a 100 percent voluntary effort. WPPs are not forcefully implemented; however, in order for them to achieve water quality goals established within the plan, the stakeholders must participate in WPP activities and implement the management practices recommended by the plan.

Work Schedule

The end-product of this project is the development of a WPP for the Buck Creek watershed. It is anticipated that the project and the WPP will be completed by August 31, 2009.

LITERATURE CITED

Martin, J. H., W.H. Leonard, D.L. Stamp. 1976. *Principles of Field Crop Production*. Third Edition. Macmillan Publishing Co. Inc., New York.

Taylor, R. 2003. *The Feral Hog in Texas*. Texas Parks and Wildlife Department. PWD BK W7000-195.

TAC §307. *Texas Administrative Code: Chapter 307-Texas Surface Water Quality Standards*. July 23, 2007
<http://info.sos.state.tx.us/pls/pub/readtacSext.ViewTAC?tac_view=4&ti=30&pt=1&ch=307&rl=Y>

TCEQ. 2002. *2002 Water Quality Inventory Stream Flow Types and Information used to Determine the Dissolved Oxygen Criteria (October 1, 2002)*. August 6, 2007
<http://www.tceq.state.tx.us/assets/public/compliance/monops/water/02twqmar/02do_crit.pdf>

TCEQ. 2004. *Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data, 2004*. August 8, 2007
<http://www.tceq.state.tx.us/assets/public/compliance/monops/water/04twqi/04_guidance.pdf>

TCFA. 2006. Personal communication. E-mail contact. November 2006.

Texas Water Development Board. 1995. *Volumetric Survey of Lake Meredith*. Austin, Texas. September 1995.

US Census. 2000. *U.S. Census Bureau State and County QuickFacts*. July 18, 2007
<<http://quickfacts.census.gov/qfd/states/48000.html>>

USDA. 1963. *Soil Survey of Childress County, Texas*. US Government Printing Office. Washington, D.C.

USDA. 1973. *Soil Survey of Collingsworth County, Texas*. US Government Printing Office. Washington, D.C.

USDA. 1980. *Soil Survey of Donley County, Texas*. US Government Printing Office. Washington, D.C.

USDA. National Agricultural Statistics Service. July 20, 2007 <<http://www.nass.usda.gov>>

APPENDICES

APPENDIX A: Buck Creek Water Quality Data

APPENDIX B: Buck Creek Sampling Site Report

APPENDIX C: Field Data Report

APPENDIX A: Buck Creek Water Quality Data

Buck Creek Project Site 01 Field Report CR 28, Donley County																	
Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Dup. Count:	Field Comments:
10-May-04	9:30	76		DRY	14		00		None noted	NSC							
24-May-04	9:32	76		DRY	28		00		None noted	NSC							Rest Area .2 miles A with lagoon
5-Jun-04	11:54	75	Yes	DRY	1		00		None noted	NSC							
8-Jun-04	9:50	74		DRY	5		03		None noted	NSC							Feedlot A at mouth S. Fork BC*
20-Jun-04	15:00	73	Yes	DRY	1		00		None noted	NSC							
27-Jun-04	15:00	78	Yes	DRY	1		10,43		None noted	NSC							
7-Jul-04	10:30	80		DRY	5		00,03		None noted	NSC							
19-Jul-04	10:15	82		DRY	24		00		None noted	NSC							
28-Jul-04	10:00	82	Yes	CRS ²	0		10,30,41,80		None noted	NSC							Got stuck in road ~200' in
11-Aug-04	9:20	89		DRY	14		00,03		None noted	NSC							
24-Aug-04	12:00	82		DRY	10		03		None noted	NSC							
9-Sep-04	9:30	84		DRY	27		00		None noted	NSC							
22-Sep-04	10:15	70		DRY	0		21,03		None noted	NSC							
6-Oct-04	10:28	67	Yes	DRY	1		03		None noted	NSC							Intermittent puddles, no flow
18-Oct-04	11:25	74		DRY	12		00		None noted	NSC							GPS data
4-Nov-04	11:20	58		DRY	1		00		None noted	NSC							
16-Nov-04	Skip	59	Yes	CRS	1		10			NSC							
1-Dec-04	11:50	48		DRY	5		00		None noted	NSC							
8-Dec-04	11:25	48		DRY	2		00,01		None noted	NSC							
20-Dec-04	10:40	61		DRY	14		00		None noted	NSC							
3-Jan-05	11:28	49		DRY	1		20,03		None noted	NSC							
19-Jan-05	11:12	39		DRY	15		00		None noted	NSC							
3-Feb-05	11:40	51		DRY	6		00		None noted	NSC							
17-Feb-05	10:40	40		DRY	11		02		None noted	NSC							Cow walking down road
28-Feb-05	11:15	52		DRY	1		00		None noted	NSC							
16-Mar-05	12:15	37	Yes	DRY	1		00		None noted	NSC							Snow on ground about 1"
29-Mar-05	10:35	64		DRY	14		01		None noted	NSC							Recent flush, dry now
21-Apr-05	10:40	66	Yes	DRY	1		00		None noted	NSC							
4-May-05	11:25	48	Yes	CRS	0		80			NSC							
17-May-05	11:09	72		DRY	15		00		None noted	NSC							
26-May-05	10:30	64	Yes	DRY	0		12,80		None noted	NSC							
9-Jun-05	11:30	82		DRY	6		03		None noted	NSC							
21-Jun-05	10:30	84		DRY	18		00		None noted	NSC							
12-Jul-05	9:50	82		DRY	1		00,03		None noted	NSC							
26-Jul-05	9:30	78		DRY	9		03		None noted	NSC							
9-Aug-05	Skip			DRY	2		00			NSC							
18-Aug-05	14:00	94	Yes	DRY	2		00,03		None noted	NSC							Recent flush
26-Aug-05	Skip			DRY	2		00			NSC							
10-Sep-05	Skip			DRY	16		00			NSC							

Site 01	Air °F	Rainfall	Flow	Last	Water	Weather	Sample	Biological	Salinity	Specific	Temp	E. coli	Dup.	Field			
Date:	Time:	Temp:	Event:	Rate:	Rain:	Appear:	Code:	Depth:	Activity:	DO:	pH:	PPT:	Cond:	° C:	Count:	Count:	Comments:
24-Sep-05	Skip			DRY	7		00		NSC								
14-Oct-05	Skip			DRY	3		00		NSC								
25-Oct-05	Skip			DRY	15		00		NSC								
5-Nov-05	Skip			DRY	25		00		NSC								
14-Dec-05	11:10	45		DRY	66		00	None noted	NSC								Very large paw prints
21-Dec-05	Skip	40		DRY	73		00		NSC								
3-Jan-06	Skip			DRY	86		00		NSC								
11-Jan-06	Skip	46		DRY	94		00		NSC								
26-Jan-06	Skip			DRY	108		00		NSC								
9-Feb-06	Skip			DRY	122		03		NSC								
21-Feb-06	Skip			Skipped	134		30, 35		NSC								
7-Mar-06	Skip	64		Skipped	148		00		NSC								
14-Mar-06	2:30	59		DRY	156		04,03	None noted	NSC								Fires to N of here; Amarillo meet.
22-Mar-06	Skip		Yes	Skipped	5		03		NSC								
3-Apr-06	Skip	60		Skipped	2		03		NSC								No rain this end of creek
17-Apr-06	Skip			Skipped	14		00		NSC								
2-May-06	Skip	80		Skipped	5		00		NSC								
10-May-06	10:51	59	Yes	DRY	1		00	None noted	NSC								One quail
22-May-06	10:45	80		DRY	13		00	None noted	NSC								
5-Jun-06	10:34	90		DRY	6		00	None noted	NSC								
13-Jun-06	Skip			Skipped	14		00,04		NSC								
27-Jun-06	Skip			Skipped	28		00,03		NSC								
12-Jul-06	9:55	85		DRY	1		00	None noted	NSC								Dove; various tracks in creek bed
1-Aug-06	Skip			DRY	21		03		NSC								
8-Aug-06	8:58	77		DRY	28		00	None noted	NSC								Mud puddle, Lucas rode along
15-Aug-06	10:10	75		DRY	35		03	None noted	NSC								No significant rainfall
23-Aug-06	Skip	84	Yes	DRY	2		00		NSC								Rancher said no water in creek
29-Aug-06	Skip			DRY	7		00		NSC								
11-Sep-06	11:20	70		DRY	9		03	None noted	NSC								Lots of cows A
20-Sep-07	11:20	73		DRY	~14		00	None noted	NSC								Photo
3-Oct-06	Skip	71		DRY	21		00		NSC								No recent rain
24-Oct-06	10:10	54		DRY	10		00	None noted	NSC								Recent flush has left some silting
7-Nov-06	10:32	64		DRY	~21		00	None noted	NSC								
13-Dec-06	Skip	47		DRY	60		00		NSC								No recent rain
10-Jan-07	Skip	58		DRY	10		00		NSC								
12-Feb-07	10:36	53		DRY	21		03,21	None noted	NSC								
6-Mar-07	Skip	63		DRY	45		00		NSC								No recent rain
27-Mar-07	10:39	62		DRY	0		00	None noted	NSC								Rained in last 3 hours, muddy
11-Apr-07	10:10	57		DRY	10		00	None noted	NSC								Deer carcass
24-Apr-07	Skip			DRY	12		00	None noted	NSC								No rain at this end of creek
7-May-07	Skip			Skipped					NSC								Water in b half of creek will run next week
14-May-07	11:00	76		DRY	5		00	None noted	NSC								Talked w/ Kendall Harris about solar pump

*= Texas Cattle Feeders Association has feedlot 3 miles past rest area on South side of Hwy 287

¹ NSC= No Sample Collected

² CRS= Can't reach site. Road is impassible in rain

Cattle count: aver 45

Rest area, 2 cattle feeding operations

Buck Creek Project
Site 02 Field Report
Count Road Z, 29 Donley County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	mg/l DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Dup. Count:	Field Comments:
10-May-04	10:10	77		Low	14	Clear	00	1.5' **	tadpoles,mosquito larva	*	*	*	No Data	*	140		Springs A&B
24-May-04	10:10	72		Dry	28	NSC ²	00			NSC							Current railroad work
5-Jun-04	12:01	76	Yes	Dry	1	NSC	00			NSC							
8-Jun-04	10:00	75		Dry	5	NSC	00,03			NSC							Pools 200' upstream
20-Jun-04	9:00	74	Yes	Dry	1	NSC	00			NSC							
27-Jun-04	15:08	79	Yes	No Flow	1	NSC	10,43			NSC							Intermittent pools
7-Jul-04	Skip			Skipped	5	NSC	00,03			NSC							
19-Jul-04	10:52	82		Dry	22	NSC	00			NSC							Tiny box turtles
11-Aug-04	9:45	89		Dry	14	NSC	00,03			NSC							
24-Aug-04	12:10	82		Dry	10	NSC	03			NSC							
9-Sep-04	9:50	84		Dry	27	NSC	00			NSC							
22-Sep-04	10:22	70		Dry	0	NSC	03,21			NSC							
6-Oct-04	11:25	67		Dry	1	NSC	03			NSC							
18-Oct-04	12:05	74		Dry	12	NSC	00			NSC							Many animal tracks,GPS
4-Nov-04	11:27	58		No Flow	1	NSC	00			NSC							A few puddles
16-Nov-04	Skip	60	Yes	CRS ¹	1	NSC	10			NSC							Road is a mess
1-Dec-04	12:00	46		No Flow	5	NSC	00			NSC							Some water above
8-Dec-04	11:35	48		Dry	2	NSC	00,01			NSC							
20-Dec-04	10:51	61		Dry	14	NSC	00			NSC							
3-Jan-05	11:45	45		Dry	1	NSC	20,03			NSC							Didn't rain here
19-Jan-05	11:30	60		Dry	15	NSC	00			NSC							
3-Feb-05	11:55	51		Dry	6	NSC	00			NSC							Water between 1&2
17-Feb-05	11:00	41		Dry	11	NSC	02			NSC							60+ turkeys
28-Feb-05	11:30	52		No Flow	1	NSC	00			NSC							Water to bridge,no flow
15-Mar-05	12:35	40	Yes	CRS	1	NSC	00			NSC							Road bad, need 4x4
29-Mar-05	10:47	64		Normal	14	Murky	01	.25'		12.55	8.14	.40	802	13.7	81	24 ec	Track:mice,possum,fox
21-Apr-05	11:07	67	Yes	Normal	1	NSC	00	.3'	Algae, Water Boatman	8.45	7.97	.42	858	19.4	181		
4-May-05	11:35	48	Yes	CRS	0	NSC	80			NSC							
17-May-05	11:26	72		No Flow	15	Scum	00	NST		NSC							
28-May-05	10:45	64	Yes	No Flow	0	NSC	12,80	NST		NSC							Intermittent pools
9-Jun-05	11:45	82		Dry	6	NSC	03			NSC							
21-Jun-05	10:37			Dry	18	NSC	03			NSC							
12-Jul-05	10:04	82		Dry	1	NSC	00	NST		NSC							
26-Jul-05	9:40	79		Dry	9	NSC	03			NSC							
9-Aug-05	Skip				2	NSC	00			NSC							Skipped site no rain
18-Aug-05	2:15	95	Yes	Dry	2	NSC	00,03			NSC							
28-Aug-05	Skip			Dry	2	NSC	00			NSC							
10-Sep-05	Skip			Dry	18	NSC	00			NSC							
24-Sep-05	Skip			Dry	7	NSC	00			NSC							

Site 02 Date:	Air °F Time:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Dup. Count:	Field Comments:
14-Oct-05	Skip		Dry	3	NSC	00			NSC							Rancher said site dry
25-Oct-05	Skip		Dry	15	NSC	00			NSC							
5-Nov-05	Skip		Dry	25	NSC	00			NSC							
14-Dec-05	11:30	45	Dry	66	NSC	00			NSC							Water between 1&2
21-Dec-05	Skip	40	Dry	73	NSC	00			NSC							
3-Jan-06	Skip		Dry	86	NSC	00			NSC							
11-Jan-06	Skip		Dry	94	NSC	00			NSC							
26-Jan-06	Skip		Dry	108	NSC	00			NSC							
9-Feb-06	Skip		Dry	122	NSC	3			NSC							
21-Feb-06	Skip		Dry	134	NSC	30, 35			NSC							
7-Mar-06	Skip		Dry	148	NSC	00			NSC							
22-Mar-06	Skip		Dry	5	NSC	45			NSC							
3-Apr-06	Skip		Dry	2	NSC	03			NSC							
17-Apr-06	Skip		Dry	14	NSC	00			NSC							
2-May-06	Skip		Dry	5	NSC	00			NSC							
10-May-06	11:07	59	Yes	Dry	1	NSC	00		NSC							Turkeys
22-May-06	Skip	81		Dry	13	NSC	00		NSC							Rancher said site dry
5-Jun-06	10:29	90		Dry	8	NSC	00		NSC							
13-Jun-06	Skip		Dry	14	NSC	00,04			NSC							
27-Jun-06	Skip		Dry	5	NSC	00,03			NSC							
12-Jul-06	10:10	85		Dry	1	NSC	00		NSC							
1-Aug-06	Skip		Dry	21	NSC	00			NSC							
8-Aug-06	9:06	77		Dry	28	NSC	00	None noted	NSC							Doves, Cardinals
16-Aug-06	Skip		Dry	35	NSC	03			NSC							Slight rain recent
23-Aug-06	Skip	84	Yes	Dry	2	NSC	00		NSC							Rain didn't reach this far
29-Aug-06	Skip		Dry	7	NSC	00			NSC							
11-Sep-06	11:43	73		Dry	9	NSC	03		NSC							Puddles A at old crossing
20-Sep-07	11:20	75		Dry	~14	NSC	00		NSC							
3-Oct-06	Skip	71		Dry	21	NSC	00		NSC							No recent rain
24-Oct-06	10:25	54		Dry	10	NSC	00	None noted	NSC							Muddy in spots. Photo burro
7-Nov-06	10:41	68		Dry	~21	NSC	00		NSC							
13-Dec-06	Skip	47		Dry	60	NSC	00		NSC							No recent rain
10-Jan-07	Skip	58		Dry	10	NSC	00		NSC							
12-Feb-07	Skip	51		Dry	21	NSC	03,21		NSC							No rain at site 1
6-Mar-07	Skip	63		Dry	45	NSC	00		NSC							
27-Mar-07	11:00	64		Normal	0	NSC	00	.33'	None noted	9.50	8.10	.3	607	17.5	428	400
11-Apr-07	10:35	58		Low	10	Clear	00	.33'	None noted	11.6	8.19	.4	820	11.8	284	243
24-Apr-07	12:10	71		Normal	12	Clear	00	.5'	None noted	11.21	8.35	.35	705	18.8	1206	
7-May-07	Skip		Skipped						NSC							Water in b half of creek will run next week
14-May-07	11:30	78		Normal	5	Clear	02	.25'	None noted	10.74	8.20	.45	905	20.5	276	910 fc

A= Above

B= Below

**= Depth at sample in feet

¹ CRS= Can't reach site

² NSC= No Sample Collected

³ Tracks:

Cattle count: 6

Clear= water is clear and creek bottom visible much like tap water

Cloudy= water has suspended particles, much like coffee with milk, creek bottom not visible

Frozen= ice has covered water surface not thick enough to be safely walked on; can't break it where a sample could be taken after

Milky=water has whitish substance at bottom of water profile usually near where beaver activity is highest

Murky= water has tint, can't see creek bottom clearly, fish are visible

Scum(y)= surface has a film on it- usually pollen, dust, or other natural substance

Slightly Cloudy(SI Cloudy)= fewer suspended particles, creek bottom not clearly visible

Buck Creek Project
Site 03 Field Report
County Road 40, Collingsworth County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
10-May-04	10:40	78		Low	14	Lite Scum	00	1.4'	Frogs	*	*	no data	*	*	211			Beaver hut in culvert
24-May-04	11:04	73		Low	28	SI Cloudy	00	.68'	Small beaver B side	12.13	7.46	no data	400	26.8	44			Beaver hut in culvert
6-Jun-04	12:37	77	Yes	Low	1	Clear	00	2'	Beaver activity	9.14	7.86	no data	2375	25.0	414			Got stuck, road bad
8-Jun-04	10:47	75		Low	5	Clear	03	2'	None noted	12.88	7.79	1.35	2610	24.9	32	10899		Cattle B
20-Jun-04		80	Yes	CRS ¹	1					CRS								2 NST Road impassible
27-Jun-04		80	Yes	CRS	1					CRS								Road impassible
7-Jul-04	10:53	82		Normal	3	Clear	00,03	3'	Bluegill, minnows	7.09	7.63	1.14	2229	26.5	63	1000		Met Bobby McAlister
19-Jul-04	10:55	86		Low	22	Scum	00	2'	Minnows, fish, algae	20.7	7.9	1.32	2668	27.3	35			Road repaired
11-Aug-04	10:18	92		Low	14	Cloudy	00,03	1.25'	Minnows, fish, algae	11.17	8.22	1.28	2495	24.3	60 A	750	54 B	Turkey, deer (photo)
24-Aug-04	12:43	84		Low	10	Scum	03	2.5'	Bluegill, beaver activity	12.67	7.94	1.29	2627	28.3	26	782	2	Beaver playing B
9-Sep-04	10:35	86		Normal	27	Clear	00	1.5'	Minnows, frogs A&B	7.75	7.89	1.37	2643	18.8	0	412		Cows in road
22-Sep-04	11:11	72		Low	0	Clear	00,23	1'	None noted	4.18	7.73	1.3	2625	21.8	620			Very large gray deer
6-Oct-04	11:55	67	Yes	CRS	1		43		None noted	CRS								Road impassible
18-Oct-04	13:08	75		Low	12	Scum	00	1.5'	Bluegill, frogs	7.38	7.82	1.51	2885	16.2	10			Cows B
4-Nov-04	12:10	58		Normal	1	Clear	00	3'	Frogs, beaver activity	7.04	8.21	1.35	2599	10.3	472			Cows B
16-Nov-04		60	Yes	CRS	1					CRS								
1-Dec-04	12:31	48		High	5	Clear	00	4' +	Fish, beaver A&B	14.96	8.45	0.93	1848	4.1	10			Water over road
8-Dec-04	12:01	48		High	2	Clear	00,01	4' +	Bluegill, beaver activity	14.76	8.13	0.96	1890	7.5	10			
20-Dec-04	11:14	64		High	14	Clear	00	5'	None noted	13.36	8.97	1.02	2000	4.4	14			Trac: coon, possum
3-Jan-05	12:07	47		High	14	Clear	20,03	5'	None noted	12.06	8.64	0.96	1884	8.8	13			Trac: deer
19-Jan-05	11:58	58		High	15	Clear	00	1.25'	None noted	14.85	8.55	0.92	1824	3.3	1			
3-Feb-05	12:14	52		High	6	Clear	00	5'	Water Boatman bugs	14.85	8.57	0.92	1811	4.4	0			
17-Feb-05	11:29	42		High	11	Clear	02	3'	Beaver activity	11.58	8.56	0.95	1862	7.7	8		4	Trac: hogs,cows
28-Feb-05	11:55	53		High	1	Clear	00	4'	Minnows	*	*	*	*	*	1			YSI not reading prop.
16-Mar-05	12:54	40	Yes	CRS	1					CRS								
29-Mar-05	11:23	65		High	14	Clear	01	4'	None noted **	8.67	8.67	1.04	2024	13.5	4			Trac: turkey,cow,deer
21-Apr-05	11:43	68	Yes	High	1	Clear	00	5'	Bass, bluegill, minnows	9.2	7.73	0.91	1792	19.5	27			Water at top culvert
4-May-05	11:55	48	Yes	CRS	0		30,50			CRS								
17-May-05	12:01	76		High	15	Clear	00	.5'	Minnows	6.99	7.86	1.13	2204	21.4	61			Water milky at culvert
26-May-05	11:05	64	Yes	CRS	0		20,80			CRS								
9-Jun-05	12:33	84		Low	6	Cloudy	03	1.5'	Minnows	2.69	7.6	1.43	2783	27.8	50			Dam gone, sulfur odor
21-Jun-05	11:03	86		Low	18	SI Cloudy	00	2.5'	Large fish, minnows	2.46	7.94	1.55	2991	26.5	0			Tracs: beaver
12-Jul-05	10:33	82		Low	1	SI Cloudy	00,03	2'	Turtle, minnows, fish	2.24	4.81	1.31	2524	26.7	50			Refenced A, tore dam
26-Jul-05	10:07	80		Low	9	Scum	03	1-2'	Bluegill	*	*	*	*	*	360			YSI cover missing
9-Aug-05	11:09	81		Low	2	Muddy	00	2'	Turtle	6.43	8.08	1.06	2072	24.6	290			Tracs: beaver
18-Aug-05	14:35	97	Yes	Normal	2	Clear	00,03	1.5'	Frogs, vegetation	5.5	8	1.21	2383	30.0	10			Beaver repairing dam
26-Aug-05	10:05	85		Low	2	SI Cloudy	00	1.5'	Minnows, beaver active	6.84	8.08	1.51	2907	25.6	670			Large Crane
10-Sep-05	11:00	82		Low	16	Murky	00	3'	Minnows,frogs,tadpoles	6.71	7.99	1.59	3056	23.6	160			Birds:Cardinals,Larks
24-Sep-05	11:10	80		Normal	7	SI Cloudy	00	1.5'	Minnows, beaver active	5.93	7.89	1.2	2328	23.5	30			

Site 03	Air °F	Rainfall	Flow	Last	Water	Weather	Sample	Biological	Salinity	Specific	Temp	E. coli	Fecal	Dup.	Field			
Date:	Time:	Temp:	Event:	Rate:	Rain:	Appear:	Code:	Depth:	Activity:	DO:	pH:	PPT:	Cond:	° C:	Count:	Count:	Count:	Comments:
14-Oct-05	10:09	86		Normal	3	Scum	00	3'+	Minnows, frogs, beaver	4.73	7.93	1.2	2317	15.5	110			Trac: turkey, pig, fox, deer
24-Oct-05	18:20	75		Low	15	Clear	00	3'+	Minnows	9.79	7.89	1.52	2907	11.6	0		16	Butterflies
6-Nov-05	13:20	79		Low	26	Scum	00	3'	Minnows	6.82	7.89	1.58	3020	14.4	0		3	Trac: deer, bobcat
14-Dec-05	12:20	45		Low	86	Clear	00	1.5'	Beaverdam	n/a ⁴	6.95	1.54	2946	10.5	0			
21-Dec-05	12:00	42		Normal	73	Clear	00	2'	Minnows	n/a ⁴	6.85	1.54	2947	9.9	0			Cows below
3-Jan-06	13:00	70		High	86	Cloudy	00	2'+	Minnows	n/a ⁴	7.17	1.64	3096	9.0	1			
11-Jan-06	12:05	48		High	94	Clear	00	3'+	Beaverdam	20.52	7.23	1.62	3114	4.5	0	1		Cows A & B
26-Jan-06	14:58	55		High	108	Clear	00	3.5'	Beaverdam	17.46	6.94	1.55	2972	6.9	1		1	Got suburban stuck
9-Feb-06	10:58	38		High	122	Murky	03	3'+	Bluegill	13.96	6.79	1.48	2841	7.3	17	25		6
21-Feb-06	10:50	29		High	134	Clear	30, 35	3'+	Beaverdam	17.45	6.96	1.4	2724	4.5	0	3		
7-Mar-06	10:52	67		High	148	Clear	00	2'+	Beaverdam	8.61	7.3	1.35	2594	14.4	1	0		Many tracks
22-Mar-06	11:00	30	Yes	High	5	Clear	45	2'+	Minnows	20.44	7.36	0.93	1840	5.6	46	55		
3-Apr-06	10:40	63		High	2	Clear	03	1.5'	Bugs: Water Strider	8.71	7.14	1.27	2455	16.5	22			Cows A&B
17-Apr-06	12:59	92		Normal	14	Cloudy	00	3'+	Fish, Water Strider	5.91	7.12	1.32	2552	19.7	6	1	2 ec	Butterflies
2-May-06	14:09	85		High	5	Clear	00	3'+	Frog, turtle	6.76	7.23	1.39	2677	19.6	24		38	
10-May-06	11:40	62	Yes	High	1	Clear	00	1.5'	Fish, minnows	4.91	7.36	1.15	2231	18.1	463		480	
22-May-06	11:27	82		Normal	13	Cloudy	00	1.5'	Minnows	5.87	7.09	1.43	2751	22.3	200			
5-Jun-06	11:16	95		Low	6	Scum	00	2'	Turtle, minnows	4.52	7.34	1.45	2801	25.4	140			
13-Jun-06	14:32	93		Low	14	SI Cloudy	00,04	2.5'	Minnows, fish, algae	4.35	7.47	1.51	2917	28.3	40			
27-Jun-06	9:50	76		Low	5	Scum	00	2'	None noted	7.9	7.26	1.41	2808	22.0	0			
12-Jul-06	10:38	88		Low	1	Clear	00	1.5'	Minnows, dragonflies, fish	11.7	7.52	1.51	2923	27.1	210	1000+	250ec	Trac: pigs, cows
1-Aug-06	10:00	87		No flow	21	Clear	03	1'	Turtles, minnows, frogs	NSC								7 Turkeys
8-Aug-06	9:40	80		No flow	28	Clear	00	1'	Turtles, minnows, frogs	NSC								Several quail, turkey
15-Aug-06	10:36	78		No flow	35	Clear	03	1'	Turtles, minnows, fish	NSC								
23-Aug-06	11:21	84	Yes	High	2	Clear	00	3'	Turtles	5.8	7.81	0.96	1892	23.6	915		975	Met rancher Above
29-Aug-06	12:46	77		Normal	7	Clear	00	2'	Turtles, minnows, frogs	3.87	7.36	1.64	3149	26.0	79			Beaver repairing dam
11-Sep-06	12:25	78		Normal	9	Murky	03	1.5'	Turtles	5.34	7.4	1.68	3215	23.9	12		8ec	Wet mud on beaver dam
20-Sep-07	11:55	80		Low	~14	Murky	00	1.5'	Blue dragonflies	7.85	7.90	1.70	3235	20.5	9			Photos
3-Oct-06	11:30	78		Low	21	Scum top	00	1.5'	Minnows, turtles	8.26	7.57	1.64	3129	21.0	14			1 juvenile beaver
24-Oct-06	11:03	59		Normal	10	Cloudy	00	2'	None noted	4.82	7.47	1.25	2419	12.4	2520		1940	Beaver repairing dam
7-Nov-06	11:24	68		Low	21	Clear	00	1.9'	Beaver activity	5.76	7.55	1.28	2471	14.7	9		13	
13-Dec-06	11:45	50		Normal	60	Clear	00	3'	Fish	*	*				7		6	YSI batteries died
10-Jan-07	13:42	63		Normal	10	Clear	00	1.75'	None noted	3.28	8.23	1.02	2006	5.6	3			Beaver repairing dam
12-Feb-07	11:34	52		High	21	Clear	03,21	2.75'	None noted	8.68	7.64	1.07	2101	7.0	14		8	Beaver repairing dam
6-Mar-07	11:45	65		High	45	Clear	00	1.75'	One fish	8.65	7.33	1.08	2101	9.5	8		5	Beaver dam larger
27-Mar-07	11:45	64		Normal	0	Clear	00	1.58'	Fish, minnows, algae	12.97	7.87	.98	1920	16.8	72			
11-Apr-07	11:20	62		High	10	Clear	00	1'	None noted	13.63	7.86	1.01	1974	11.3	14			Dams removed, B pond up
24-Apr-07	13:00	72		High	2	Clear	00	1.5'	None noted	10.72	8.24	.67	1341	19.4	98			
7-May-07	Skip			Skipped						NSC								
14-May-07	12:05	80		High	5	Clear	02	1.5	None noted	10.42	7.88	.89	1753	21.6	114			

*= YSI Machine malfunctioned

**=recent fire on North bank ~1/4 acre burned on the Below side

A=Above side of creek. All samples taken on above side unless otherwise noted

B=Below side of creek

¹ CRS= Can't reach site

² NSC= No Sample Collected

³ Returned to lab 18 minutes over the 6 hour limit for this sample only

⁴ Dissolved oxygen not working properly

⁶ Cattle count: Above 80 head, Below 40-2004; Above & Below

Clear= water is clear and creek bottom visible much like tap water

Cloudy= water has suspended particles, much like coffee with milk, creek bottom not visible

Frozen= ice has covered water surface not thick enough to be safely walked on; can't break it where a sample could be taken after

Milky=water has whitish substance at bottom of water profile usually near where beaver activity is highest

Murky= water has tint, can't see creek bottom clearly, fish are visible

Scum(y)= surface has a film on it- usually pollen, dust, or other natural substance

Slightly Cloudy(SI Cloudy)= fewer suspended particles, creek bottom not clearly visible

Buck Creek Project
Site 04 Field Report
State Hwy 1547, Collingsworth County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Dup. Count:	Field Comments:
10-May-04	11:05	78		Normal	14	Clear	00	3'	Beaver activity	*	*	No Data	*	*	467		Large beaver dam B
24-May-04	11:35	73		Normal	28	Sl Scum	00	4'	Beaver activity	4.42	7.35	No Data	2719	23.1	442		**Cliff Swallows E side
8-Jun-04	11:30	75		Normal	5	Clear	03	3'	Beaver activity	2.81	7.46	No Data	*	24.0	435		
20-Jun-04	16:21	78	Yes	High	2	Clear	00	5-6'	Moss, algae	*	*	No Data	*	*	186		Fell in hole, little beaver
27-Jun-04	15:53	81	Yes	Normal	2	Sl Cloudy	10.43	4'	Beaver activity	7.26	7.65	No Data	2383	24.5	80		
7-Jul-04	11:15	81		Normal	3	Clear	00	3'	Minnows, moss, algae	4.91	7.67	1.11	2182	25.6	460		
19-Jul-04	11:20	86		Normal	22	²	00	3'	Beaver activity, frogs	8.55	8	1.28	2493	25.8	1000+		Smells like sewage
28-Jul-04	11:00	86	Yes	Low	0	Clear	10.40	2.5'	Minnows	2.12	7.65	1.24	2406	22.0	233		Trac: pigs; less birds
11-Aug-04	10:42	92		Low	14	Murky	00.03	1.5'	Frogs, water Striders	4.98	7.69	1.26	2447	24.8	40		Dead cow B, N bank
24-Aug-04	13:00	98		Low	10	Murky	03	3'	Frogs, beaver activity	8.98	7.75	1.12	2210	27.5	0		Dead dog near water
9-Sep-04	11:00	86		Normal	27	Sl Cloudy	00	1.5'	Minnows, frogs	6.23	7.63	1.25	2415	19.3	48		Cliff swallows are gone
22-Sep-04	11:45	73		Low	1	Cloudy	21.03	1'	None noted	2.6	7.18	1.15	2247	21.2	568		
6-Oct-04	12:15	67	Yes	Low	0	Murky	03	1'	Frogs, minnows	4.21	7.76	1.07	2084	18.7	1334		Numerous tracks
18-Oct-04	13:46	76		Low	12	Clear	00	1.5'	Minnows, frogs	3.18	7.57	1.27	2453	17.4	60		GPS data
4-Nov-04	12:44	59		Low	1	Clear	00	3+	Beaver, frogs, minnows	9.04	7.8	1.17	2277	9.2	674		
16-Nov-04	12:17	58	Yes	High	0	Green	10,21,20	3+	Frogs, beaver activity	6.26	7.95	1.16	2256	10.1	2510		
1-Dec-04	12:50	50		High	5	Clear	00	6+	Beaver activity	14.63	8.3	1.06	2097	3.8	40		
8-Dec-04	12:15	49		High	2	Clear	00,01	6+	Water Striders	14.22	8.24	1.09	2137	6.6	46		
20-Dec-04	11:33	66		High	14	Clear	00	6+	None noted	12.69	8.24	1.15	2241	4.9	13		Coyote tracks
3-Jan-05	12:25	47		High	14	Clear	03	6+	None noted	10.68	8.21	1.14	2219	8.6	14		Trac:mice,skunk,coon
19-Jan-05	12:21	59		High	16	Clear	00	6+	None noted	16.03	8.46	1.03	2051	1.8	7		
3-Feb-05	12:34	53		High	6	Clear	00	6+	2nd beaver hut B	14.58	8.51	1.07	2099	4.3	4		
17-Feb-05	11:48	44		High	11	Clear	02	5'	Aquatic vegetation	11.64	8.4	1.08	2105	8.0	1	3	More water than last trip
28-Feb-05	12:30	53		High	1	Clear	00	4'	None noted	*	*	*	*	*	27		YSI not reading correctly
16-Mar-05	1:15	42	Yes	High	1	Clear	03	4'	Frogs,green vegetation	*	*	*	*	*	58		YSI not reading correctly
29-Mar-05	11:41	66		High	1	Clear	01	5'	None noted	8.16	7.86	1.26	2422	13.8	6		Turkey calling near by
21-Apr-05	12:12	68	Yes	High	14	Clear	00	5'	Minnows	7.77	7.6	1.3	2520	19.3	82		Cliff swallows are Back
4-May-05	12:05	48		High		Clear	80,30,10	5'	Minnows, bug larvae	7.69	7.81	1.32	2534	11.1	306		
17-May-05	12:29	80		High	1	Clear	00	1.25'	Frogs	4.45	7.4	1.36	2617	18.8	351		
26-May-05	11:30	66	Yes	Normal	0	Green	03	2'	Bull frog, minnows	3.3	7.88	1.45	2784	21.0	140		
9-Jun-05	12:56	85		Low	15	Milky	03	2'	Bluegill	1.74	7.79	1.51	2908	25.4	580		White substance bottom
21-Jun-05	11:25	86		Low	0	Scum	00,03	2'	Fish,minnows,frogs	1.26	7.74	1.49	2873	25.0	50		
12-Jul-05	10:53	84		Low	1	Scum	00,03	1'	Frogs,minnows,striders	7.98	7.1	1.45	2808	26.4	100		
26-Jul-05	10:35	80		No Flow	18	Scum	03	1'	Fish: bluegill,pan,bass	*	*	*	*	*	1940		No probe cover for YSI
9-Aug-05	11:35	83		Low	1	Clear	00	1.25'	Minnows	4.07	7.63	1.1	2146	24.6	250		Turkey near water
18-Aug-05	14:50	97	Yes	Normal	9	Clear	00,03	3'	Frogs,minnows,vegetat.	2.29	8	0.73	1465	25.8	170		
26-Aug-05	10:30	86		Normal	2	Clear	00	2'	Frogs,minnows, fish	3.85	7.86	0.94	1855	25.4	30		Trac:deer,possum,birds
10-Sep-05	11:30	85		No Flow	2	Clear	03	2'	Frogs,minnows,fish	3.67	7.78	1.21	2358	22.8	2250		Trac:opossum
24-Sep-05	11:35	81		Low	2	Clear	00	2.5'	Frogs,water striders,fish	2.42	7.75	0.7	1399	22.5	10		Trac:opossum

Site 04 Date:	Air °F Time:	Rainfall Temp:	Flow Event:	Last Rate:	Water Rain:	Weather Appear:	Sample Code:	Biological Depth:	DO:	pH:	Salinity PPT	Specific Cond:	Temp ° C	E. coli Count	Dup. Count	Field Comments:
14-Oct-05	10:32	67		Normal	16	Clear	00	2'								Trac:opossum
24-Oct-05	17:59	78		Normal	7	Clear	0	2.5'								
5-Nov-05	13:26	79		Normal	3	Murky	0	1.5'								Trac: opossum
14-Dec-05	12:48	45		Normal	16	Frozen	0	2'								Broke hole in ice
21-Dec-05	12:20	44		Normal	25	Clear	0	2'								
3-Jan-06	13:20	71		Normal	66	Clear	0	1.5'								Armadillo
11-Jan-06	12:26	51		Normal	73	Clear	0	1.5'								
26-Jan-06	16:48	50		Normal	86	Clear	00,03	2'								
9-Feb-06	11:28	38		High	94	Clear	03	2+								A in CRP
21-Feb-06	11:18	29		Frozen	108	n/a	30	NST								Unable to break ice
7-Mar-06	11:19	68		Normal	122	Murky	00	1.5'								Trac:skunk,raccoon
22-Mar-06	11:21	32	Yes	High	134	Clear	21,03	3'								
3-Apr-06	10:59	64		High	148	Clear	03	2'								Swallows under bridge
17-Apr-06	13:25	96		High	5	Clear	00	2'								Jake turkey
2-May-06	14:40	88		High	2	Clear	00	3+								Joe Cannon DPS
10-May-06	11:57	63	Yes	High	14	Clear	00	2'								Cliff swallows
22-May-06	11:40	82		Normal	5	Clear	00	1.5'								Cliff Swallows
5-Jun-06	11:37	98		Low	1	Scum	00	1'								
13-Jun-06	14:18	93		No Flow	22		00,04	NST								Water too low
27-Jun-06	9:30	74		No Flow	5	Scum	03	NST								Cliff Swallows gone
12-Jul-06	10:57	87		No Flow	1	Clear	00	NST								Lowest since start study
1-Aug-06	9:50	85		No Flow	21	Scum	03	NST								Even lower than before
8-Aug-06	10:03	84		No Flow	28		00	NST								Turkeys
15-Aug-06	10:53	77		No Flow	35		03	NST								
23-Aug-06	11:55	84	Yes	High	2	Clear	00	2'								
29-Aug-06	13:10	78		Normal	7	Clear	00	1.33'								
11-Sep-06	12:45	81		Normal	9	Murky	03	.89'								Tracs:Opossum, racoon
20-Sep-07	12:30	81		Low	~14	Murky	00	1.0'								Photo
3-Oct-06	10:40	77		No Flow	21	Scum	00									No flow- water below 1'
24-Oct-06	11:22	60		Normal	10	Clear	00	1.5'								
7-Nov-06	11:45	73		Low	21	Clear	00									
13-Dec-06	12:05	55		Normal	60	Clear	00	2'								YSI batteries died
10-Jan-07	13:55	63		Normal	10	Clear	00	1.5'								New house B above N bank
12-Feb-07	12:00	55		Normal	21	Clear	02	3'								28 Fecal Count
6-Mar-07	12:15	68		High	45	Clear	00	3'								Dead pigs dumped
27-Mar-07	12:23	67		High	0	Clear	00	3'								
11-Apr-07	11:45	82		High	10	Clear	00	2.8'								Turkeys, dead hog smells
24-Apr-07	13:15	72		Normal	2	Clear	00	2'								
7-May-07	Skip			Skipped												
14-May-07	12:30	82		Normal	5	Clear	02	3'								

*= YSI Machine malfunctioned, or probe cover missing

**=Cliff Swallows nesting under bridge

A=Above side of creek. All samples taken on above side unless otherwise noted

B=Below side of creek

¹ CRS= Can't reach site

² Rings of blue algae the size of 1/2 dollars.

³ Returned to lab 18 minutes over the 6 hour limit for this sample only

⁴ Dissolved oxygen not working properly

⁵ Cattle count: Above site 4 all in CPR- no livestock; site 4 all in CPR- no livestock 2005-2007

Clear= water is clear and creek bottom visible much like tap water

Cloudy= water has suspended particles, much like coffee with milk, creek bottom not visible

Frozen= ice has covered water surface not thick enough to be safe to walk on in West Texas; can't always break it where a sample could be taken after

Milky=water has whitish substance usually near where beaver activity is highest

Murky= water has tint, can't see creek bottom clearly, fish are visible

Scum(y)= surface has a film on it- usually pollen, dust, or other natural substance

Slightly Cloudy= fewer suspended particles, creek bottom not clearly visible

Buck Creek Project
Site 05 Field Report
SH 1056, Collingsworth County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
10-May-04	11:25	79		Normal	14	Clear	00	2'	Frogs, moss on edge	*	*	No Data	*	*	144			
24-May-04	11:35	74		Normal	28	Clear	00	1.5'	Minnows,moss	4.88	7.37	No Data	2725	23.0	324			
8-Jun-04	11:43	77		Normal	5	Clear	03	1.25'	Minnows,frogs	9.55	8.31	No Data		21.6	279			
20-Jun-04	16:50	80	Yes	High	0	Clear	00	1.5'	None noted	12.38	8.26	No Data		24.7	230			
27-Jun-04	16:10	80	Yes	High	0	Clear	10,43	1.5'	Moss	9.12	8.32	No Data	625	21.7	365			
7-Jul-04	11:27	82		Normal	3	Clear	00,03	1.5'	Minnows,small pan fish	8.4	8.34	No Data	614	22.6	644	4400		
19-Jul-04	11:45	86		No Flow	22		00		None noted	NSC								
28-Jul-04	11:20	86	Yes	Normal	0	Clear	10,40	0.75	None noted	2.33	7.59	1.24	2407	22.0	1000+			
11-Aug-04	11:10	92		Dry	14		00,03		None noted	NSC								
24-Aug-04	13:20	98		Dry	10		03		None noted	NSC								
9-Sep-04	11:15	86		Dry	27		00		None noted	NSC								
22-Sep-04	11:58	73		Dry	0		03,21		None noted	NSC								
6-Oct-04	12:33	67	Yes	High	1	Clear	00	1.5'	None noted	11.1	8.42	0.31	641	17.6	1208			
18-Oct-04	13:56	78		Normal	12	Clear	00	10"	Moss, minnows	13.5	8.44	0.33	678	16.9	340			GPS data
4-Nov-04	12:55	59		Normal	1	Clear	00	1'	None noted	11.58	8.22	0.34	699	12.1	612			
16-Nov-04	12:31	60	Yes	High	1	Clear	10,21,23	2'	Water Striders	12.19	8.27	0.31	625	11.7	770			
1-Dec-04	13:00	50		High	5	Clear	00	2'	None noted	14.88	8.36	0.33	679	6.9	60			
8-Dec-04	12:28	50		High	2	Clear	00,01	2'	Minnows,bugs	14.16	8.33	0.35	677	9.3	40			
20-Dec-04	11:42	66		Normal	14	Clear	00	1.25'	Moss	16.56	8.54	0.33	672	7.0	63			
3-Jan-05	12:37	47		Normal	14	Clear	03	1'	Moss	16.38	8.57	0.32	652	10.3	16			
19-Jan-05	12:30	59		Normal	15	Clear	00	1.25'	None noted	16.74	8.58	0.32	658	6.1	0			Dead possum near road
3-Feb-05	12:45	54		Normal	6	Clear	00	1'	None noted	15.71	8.63	0.33	668	7.6	30			
17-Feb-05	11:59	44		Normal	11	Clear	02	1.5'	Some moss	16.62	8.64	0.32	649	8.3	67			
28-Feb-05	12:45	54		Normal	1	Clear	00	1.5'	Water Striders,moss	*	*	*	*	*	18			
16-Mar-05	13:20	42	Yes	Normal	1	Clear	03	1.5'	Aquatic vegetation	*	*	*	*	*	134			
29-Mar-05	11:53	66		Normal	14	Clear	01	.75'	None noted	16.9	8.24	0.34	700	12.4	33		63ec	
12-Apr-05	10:30	60		Normal	27	Clear	00	.86'	Minnows	14.58	8.2	0.34	684	10.2	297			3 turkey,ScissorTail bird
21-Apr-05	12:23	69	Yes	High	1	Clear	00	1.25'	Minnows,bugs	10.47	8.05	0.34	719	17.6	159			
4-May-05	12:20	49		High	0	Clear	10,30,80	1.5'	None noted	12.31	7.99	0.35	703	10.2	233	310		
17-May-05	12:43	80		High	15	Clear	00	.75'	Water Strider, moss	10.75	8.14	0.34	698	18.6	35			
26-May-05	11:43	68	Yes	Normal	0	Clear	03	.5'	None noted	9.39	8.16	0.35	687	17.0	1060			
9-Jun-05	11:19	88		Low	6	Clear	03	.5'	Minnows	9.47	8.28	0.35	718	25.1	810			
21-Jun-05	11:40	87		Dry	18		03		None noted	Dry								Buck standing in camp
12-Jul-05	11:04	84		Dry	1		00,03		None noted	Dry								
26-Jul-05	10:55	82		Dry	9		03		None noted	Dry								
9-Aug-05	11:52	81		Dry	2		00		None noted	Dry								Campers in camp
18-Aug-05	15:00	97	Yes	Dry	2		00,03		None noted	Dry								
28-Aug-05	10:35	86		Dry	2		00		None noted	Dry								
10-Sep-05	11:45	86		Dry	16		00		None noted	Dry								

Site 05	Air °F	Rainfall	Flow	Last	Water	Weather	Sample	Biological	Salinity	Specific	Temp	E. coli	Fecal	Dup.	Field			
Date:	Time:	Temp:	Event:	Rate:	Rain:	Appear:	Code:	Depth:	Activity:	DO:	pH:	PPT:	Cond:	° C:	Count:	Count:	Count:	Comments:
24-Sep-05	11:45	81		Dry	7		00	None noted	Dry									
14-Oct-05	10:41	69		Normal	3	Clear	00	.5'	None noted	12.82	8.26	0.36	729	14.4	342			
24-Oct-05	17:51	70		Normal	15	Clear	00	.5'	None noted	15.55	8.34	0.33	492	13.0	250			
5-Nov-05	13:35	80		Normal	25	Clear	00	.33'	None noted	10.12	5.98	0.35	727	14.4	570			
14-Dec-05	12:57	45		High	66	Clear	00	.66'	None noted	***	7.67	0.34	704	5.6	46			
21-Dec-05	12:32	46		High	73	Clear	00	.66'	None noted	***	7.82	0.34	691	5.3	23			Black bird in old tree
3-Jan-06	13:29	71		Normal	86	Clear	00	.66'	None noted	47.26*	7.58	0.35	722	10.1	73			
11-Jan-06	12:34	51		High	94	Clear	00	.5'	None noted	17.46	7.75	0.36	733	5.7	26			Armadillo playing nearby
26-Jan-06	16:54	50		Normal	108	Clear	00	.37'	None noted	14.33	7.81	0.34	688	10.5	231			
9-Feb-06	11:41	39		High	122	Clear	00	.66'	None noted	17.78	7.66	0.34	704	5.8	61			
21-Feb-06	11:30	30		High	134	Clear	30,31	.66'	None noted	23.86	7.72	0.34	714	3.2	31			
7-Mar-06	11:35	68		Normal	148	Clear	00	.66'	None noted	14.43	7.8	0.35	714	14.5	38		40	
22-Mar-06	11:33	32	Yes	Normal	5	Clear	03,21	.66'	None noted	12.26	7.62	0.4	822	6.2	28			
3-Apr-06	11:13	67		Normal	2	Clear	03	.66'	Water Striders	17.86	7.87	0.36	737	14.1	101		102	
17-Apr-06	13:36	98		Low	14	Clear	00	.5'	Minnows, Water Strider	9.27	8.14	0.33	683	19.4	257	100		
2-May-06	14:50	88		Low	5	Clear	00	.5'	Minnows, vegetation	7.42	8.24	0.31	638	20.0	268			
10-May-06	12:07	63	Yes	High	1	Clear	00	.66'	None noted	8.31	7.78	0.32	646	16.1	528	200		
22-May-06	11:50	81		Normal	22	Clear	00	.5'	Water Striders	9.25	8.06	0.32	657	20.5	760	840		
5-Jun-06	11:47	98		Low	5	Clear	00	.25'	Mosquitoes	7.39	8.11	0.35	719	22.5	8100			
13-Jun-06	14:15	92		Dry	18				None noted	NSC								
27-Jun-06	9:16	75		Dry	5		03		None noted	NSC								Turkey
12-Jul-06	11:02	87		Dry	1		00,03			NSC								
1-Aug-06	9:47	86		Dry	21		03			NSC								
8-Aug-06	10:08	84		Dry	28		00			NSC								
15-Aug-06	10:56	76		Dry	35		03			NSC								
23-Aug-06	12:05	85	Yes	Dry	2		00			NSC								
29-Aug-06	12:23	74		Dry	7		00		None noted	NSC								
11-Sep-06	13:00	76		Dry	9		03			NSC								
20-Sep-07	12:45	83		Dry	~14		00		None noted	NSC								Photo
3-Oct-06	10:35	77		Dry	21		00		None noted	NSC								
24-Oct-06	11:35	64		Normal	10	Clear	00	.5'	None noted	9.10	8.03	.44	889	12.3	75		75	Large amt of animal tracks
7-Nov-06	12:00	76		Normal	21	Clear	00	.5'	None noted	8.18	8.08	.45	912	13.7	43		39	
13-Dec-06	12:14	55		Normal	60	Clear	00	.5'	Water boatman bugs	*					67		74	Fecal 58
10-Jan-07	14:10	64		Normal	10	Clear	00	.5'	None noted	3.37	8.0	.41	826	8.7	7		5	Tree has fallen over creek
12-Feb-07	12:15	59		Normal	21	Clear	02	.5-.75'	None noted	13.11	8.01	.38	781	9.6	6		7	
6-Mar-07	12:37	70		Normal	45	Clear	00	.5'	None noted	11.10	7.9	.39	794	11.6	37		25	Bees in dead tree over creek
27-Mar-07	12:40	67		High	0	Clear	00	.25'	Snail	12.96	8.03	.37	748	16.7	145		146	Little wider than usual
11-Apr-07	11:54	65		High	10	Clear	00	.66'	Water bugs, moss	8.63	8.12	.41	830	18.6	82			
24-Apr-07	13:21	73		High	2	Clear	00	.5'	Moss, algae	10.74	8.21	.38	778	18.0	157			
7-May-07	Skip			Skipped						NSC								
14-May-07	12:36	83		Normal	5	Clear	02	.33'	Moss	10.42	8.09	.29	599	19.4	102			

*= YSI not working correctly

**= Depth at sample in feet

***= Dissolved oxygen not working correctly

¹ NSC= No Sample Collected

² Returned to lab 18 minutes over the 6 hour limit for this sample only

³ Tracks:

⁴ Dissolved oxygen not working properly

⁵ Cattle count: Above 40 head, Below 25-30, Above site 4 all in CPR- no livestock

Clear= water is clear and creek bottom visible much like tap water

Cloudy= water has suspended particles, much like coffee with milk, creek bottom not visible

Frozen= ice has covered water surface not thick enough to be safely walked on; can't break it where a sample could be taken after

Milky=water has whitish substance at bottom of water profile usually near where beaver activity is highest

Murky= water has tint, can't see creek bottom clearly, fish are visible

Scum(y)= surface has a film on it- usually pollen, dust, or other natural substance

Slightly Cloudy(SI Cloudy)= fewer suspended particles, creek bottom not clearly visible

Buck Creek Project
Site 06 Field Report
CR 110, Collingsworth County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
10-May-04	11:46	79		Normal	14	Clear	00	2'	Moss	*	*	No Data	*	*	90			18' brown snake
24-May-04	12:06	75		Normal	28	Clear	00	1.5'	Minnows,tadpoles	10.37	7.79	0.84	1861	24.7	668			
08-Jun-04	11:58	77		No Flow	5	Murky	00,03		None noted	NSC ¹								Turkeys
20-Jun-04	16:46	75	Yes	Dry	2		00		None noted	NSC								
27-Jun-04	16:00	80	Yes	No Flow	2		10,43		None noted	NSC								
07-Jul-04	11:40	82		No Flow	3		00		None noted	NSC								Lazy H A dams
19-Jul-04	11:55	91		Dry	14		00		None noted	NSC								Mr. McAlister B
28-Jul-04	11:25	87	Yes	Dry	0		03,10		None noted	NSC								
11-Aug-04	11:15	75		Dry	14		00		None noted	NSC								Trac: deer,wild hog
24-Aug-04	13:22	99		Dry	10		03		None noted	NSC								Mud B
09-Sep-04	11:25	86		Dry	27		00		None noted	NSC								
22-Sep-04	12:05	74		Dry	0		21,03		None noted	NSC								
08-Oct-04	12:50	70	Yes	Dry	0		03		None noted	NSC								
18-Oct-04	14:15	79		Dry	12		00		None noted	NSC								GPS data
04-Nov-04	13:05	60		Dry	1		00		None noted	NSC								
16-Nov-04	12:50	58	Yes	CRS ²	0		00			CRS								
01-Dec-04	13:13	51		Normal	5	Clear	00	.75'	None noted	15.21	8.13	1.07	2102	6.3	0			
08-Dec-04	12:38	53		Normal	2	Clear	00,01	1.5'	None noted	14.87	7.99	1.1	2148	8.8	14			
20-Dec-04	11:54	67		High	21	Clear	00	2'	None noted	15.85	7.98	1.05	2053	6.9	108			Dead oon in creek A
03-Jan-05	12:48	47		High	14	Clear	01,03	.75'	None noted	13.28	8.18	1.01	1973	10.2	10			Dead skunk in road
19-Jan-05	12:41	60		Normal	15	Clear	00	.5'	None noted	17.03	8.3	0.99	1943	6.4	0	0		Trac:turkey,birds,dog
03-Feb-05	12:55	54		Normal	6	Clear	00	.75'	Water striders	17.95	8.5	0.99	1941	8.0	1			
17-Feb-05	12:13	45		Normal	11	Clear	02,00	.75'	Water striders	16.1	8.39	1	1955	10.2	20	26		Odor- dead coon
28-Feb-05	12:50	54		Normal	1	Clear	00	1'	Water striders	*	*	*	*	*	26			Second dead coon
16-Mar-05	13:28	42	Yes		1					CRS								
29-Mar-05	12:15	68		High	14	Clear	01	1'	Beaver activity A	12.05	7.84	1.09	2121	13.9	22			New trees cut by beaver
12-Apr-05	10:51	64		Normal	27	Clear	00	.66'	Sick bird in creek	11.01	7.61	1.06	2070	13.4	24			6 deer,tom turkey
21-Apr-05	12:34	72	Yes	High	1	Clear	00	2'	Minnows,fish	13.95	7.87	1.03	2025	22.5	28			2 tom turkeys A
04-May-05	12:32	49	Yes	High	0	Clear	80,30,10	1.5'	None noted	11.53	7.76	1.04	2021	11.9	37	80		
17-May-05	12:56	81		Normal	15	Clear	00	.75'	Moss	12.37	7.8	1.16	2261	23.6	12			Photo-cows A
28-May-05	11:54	69	Yes	Normal	0	Clear	03	.5'	Water Strider,moss	6.31	7.8	0.45	911	22.2	290			
09-Jun-05	13:31	88		Low	10	Clear	03	.5'	Minnows	8.03	8.03	0.96	1905	31.6	80			
21-Jun-05	11:50	87		Dry	18		03			NSC								Water in hole below
12-Jul-05	11:10	84		Dry	1		00			NSC								
09-Aug-05	11:58	84		Dry	2		00			NSC								
18-Aug-05	15:07	98	Yes	Dry	2		00,03			NSC								
26-Aug-05	10:43	86		Dry	2		00			NSC								
10-Sep-05	10:30	81		Skip	16		00			NSC								* skipped: no recent rain
24-Sep-05	11:00	79		Skip	7		00			NSC								Skipped

Site 06 Date:	Air *F Time:	Rainfall Temp:	Flow Event:	Last Rate:	Water Rain:	Weather Appear:	Sample Code:	Biological Depth:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
14-Oct-05	11:00	81		Dry	3		00	None noted	NSC								
24-Oct-05	17:40	72		Skip	15		00		NSC								
5-Nov-05	13:00	78		Skip	25		00		NSC								Meeting w/ Mrs Scrivner
14-Dec-05	13:10	45		Dry	88		00	None noted	NSC								
21-Dec-05	12:00	46		Dry	73		00	None noted	NSC								
3-Jan-06	13:00	71		Dry	88		00	None noted	NSC								
11-Jan-06	11:31	46		Dry	94		00	None noted	NSC								
26-Jan-06	17:00	50		Dry	108		03	None noted	NSC								
9-Feb-06	11:55	39		Dry	122		00	None noted	NSC								
21-Feb-06	11:40	30		Dry	134		30,31	None noted	NSC								Water in pool below
7-Mar-06	11:40	70		Dry	148		00		NSC								Water above 100'
22-Mar-06	11:43	34	Yes	Low	2	Clear	03,21	2'	None noted	10.91	7.81	0.51	1033	6.5	129	114ec	
3-Apr-06	11:24	86		Normal	2	Clear	03	.67'	None noted	12.05	7.83	0.97	1897	15.4	4	28	
17-Apr-06	13:50	95		Dry	10		00	None noted	NSC								Not going across road
2-May-06	14:09	88		Dry	5		00	None noted	NSC								
10-May-06	12:16	83	Yes	High	1	Cloudy	00	.67'	Minnows	8.72	7.71	1.22	2371	21.5	270	358ec	Minnows crossing road
22-May-06	12:03	82		Dry	13		00		None noted	NSC							Road dry nothing flowing
5-Jun-06	11:16	95		Dry	6		00		None noted	NSC							
13-Jun-06	14:11	92		Dry	13		00,04		None noted	NSC							
27-Jun-06	9:11	74		Dry	5		03		NSC								
12-Jul-06	11:06	88		Dry	1		00,03		NSC								
1-Aug-06	10:27	87		Dry	21		00,03		NSC								
8-Aug-06	10:15	84		Dry	28		00		NSC								Large number of turkeys
15-Aug-06	11:02	77		Dry	35		03		NSC								
23-Aug-06	12:13	88	Yes	Low	2	Cloudy	00	1.5'	Minnows,Water stri	2.01	7.56	0.21	444	24.4	632	676	Cows, broken beaver dam
29-Aug-06	12:14	73		Dry	7		00		NSC								Man made dams A;pig trac
11-Sep-06	13:05	78		Dry	9		03	None noted	NSC								Cows A&B;turkeys;pig trac
20-Sep-07	12:55	83		Dry	~14		00	None noted	NSC								Photo, bull, one deer
3-Oct-06	10:30	77		Dry	21		00	None noted	NSC								Photo Wild pigs w/ cows
24-Oct-06	11:50	64		Dry	10		00	None noted	NSC								Mud puddle below
7-Nov-06	12:10	76		Dry	21		00	None noted	NSC								Cattle A&B
13-Dec-06	11:01	51		Dry	60		00	None noted	NSC								Turkey A&B
10-Jan-07	14:25	83		Normal	10	Clear	00	1.5'	None noted	5.79	7.84	1.12	2187	7.4	0	3	80+turkey flew over road
12-Feb-07	12:55	59		Normal	21	Clear	02	1.5'	None noted	13.91	7.88	1.12	2182	9.6	6		60 Turkey hens & poultis
6-Mar-07	13:00	72		Normal	45	Clear	00	1.5'	None noted	10.9	7.80	1.21	2330	12.3	65	57	Met Mr. Roberson; 50 buffalo
27-Mar-07	13:10	70		High	0	Clear	03	1.5'	Turtle, fish	11.14	8.09	.99	1931	18.6	52	38	Deer; pig tracks- photos
11-Apr-07	12:25	88		High	10	Clear	00	1.5'	Minnows	14.87	8.15	.90	1773	14.9	6		bighorn sheep, whitetail deer
24-Apr-07	13:32	74		High	2	Clear	00	1.5'	Turtle	10.54	8.14	.58	1168	21.2	84		
7-May-07	14:20	86		Normal	1	Clear	00,02	1.5'	None noted	10.35	8.06	.89	1760	21.5	380		Turtle
14-May-07	12:40	82		High	5	Clear	02	1.5'	None noted	10.38	8.17	1.00	1969	24.9	46		

A= Above

B=Below

*= YSI Machine malfunctioned

**= Depth at sample in feet

¹ NSC= No Sample Collected

² CRS= Can't Reach Site

³ Skipped due to no recent rain fall

⁴ Dissolved oxygen not working properly

⁵ Cattle count: A=~20; B= ~30

Clear= water is clear and creek bottom visible much like tap water

Cloudy= water has suspended particles, much like coffee with milk, creek bottom not visible

Frozen= ice has covered water surface not thick enough to be safely walked on; can't break it where a sample could be taken after

Milky=water has whitish substance at bottom of water profile usually near where beaver activity is highest

Murky= water has tint, can't see creek bottom clearly, fish are visible

Scum(y)= surface has a film on it- usually pollen, dust, or other natural substance

Slightly Cloudy(Sl Cloudy)= fewer suspended particles, creek bottom not clearly visible

Bobby McAlister owned A & B site 6 but sold A to Lazy H Ranch. They are building ponds on the ranch stopping the flow down stream. 2006 Bobby sold his land B to Lazy H Ranch.

Buck Creek Project
Site 07 Field Report
FR 338, Collingsworth County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Dup. Count:	Field Comments:
10-May-04	12:15	79		Normal	14	Clear	00	2.5'	Minnows	*	*	No Data	*	*	1896		Cliff Swallows
24-May-04	12:30	77		No Flow	28	Scum	00	.5'		NSC ¹							Cows, C. Swallows
8-Jun-04	12:14	77		Dry	5	Murky	03			NSC							Pooled water, no flow
20-Jun-04	16:55	75	Yes	Dry	2		00			NSC							
27-Jun-04	16:49	81	Yes	Dry	2		10,43			NSC							
7-Jul-04	11:52	82		Dry	3		00			NSC							
19-Jul-04	12:05	91		Dry	7		00			NSC							
28-Jul-04	11:48	88	Yes	Low	14	Murky	10,40	.75'	None noted	13.42	8.76		96	22.1	1000+		Cliff Swallows still here
3-Aug-04	10:00	86		No Flow	7				None noted	NSC							Cliff Swallows still here
11-Aug-04	11:30	92		Dry	14		03,00		None noted	NSC							
24-Aug-04	13:40	100		Dry	10		03		None noted	NSC							
9-Sep-04	11:35	86		Dry	27		00		None noted	NSC							
22-Sep-04	12:20	74		Dry	0		21,03		None noted	NSC							
6-Oct-04	12:59	72	Yes	Dry	0		00		None noted	NSC							
18-Oct-04	14:40	80		Dry	12		00		None noted	NSC							GPS
4-Nov-04	13:10	60		Dry	1		00		None noted	NSC							
16-Nov-04	12:57	60	Yes	No Flow	0		10		None noted	NSC							Intermittent pooling
1-Dec-04	13:30	51		Dry	5		00		None noted	NSC							
8-Dec-04	13:00	53		Dry	2		00,01		None noted	NSC							
20-Dec-04	12:18	69		Dry	21		00		None noted	NSC							
3-Jan-05	13:12	47		Dry	14		03		None noted	NSC							
19-Jan-05	13:11	62		No Flow	15		00		None noted	NSC							
3-Feb-05	13:17	55		Low	6	Clear	00	.65'	None noted	17.24	8.48	1.07	2090	7.2	13	7	
17-Feb-05	12:45	46		Normal	11	Clear	02	1.5'	None noted	17.02	8.55	1.17	2270	8.8	78	82	
28-Feb-05	13:10	54		Low	1	Clear	00	.5'	Water Striders	*	*	*	*	*	49		YSI malfunction
16-Mar-05	13:45	46	Yes	Normal	1	Clear	03	1'	None noted	*	*	*	*	*	320		Trac: skunk,deer,rabbit
29-Mar-05	12:39	69		Low	14	Clear	01	.75'	Algae	14.43	7.77	1.35	2594	14.3	101		Dead cow in water A
12-Apr-05	11:21	66		Low	27	Scum	00	.5'	Mosquito larva	13.14	7.87	1.53	2929	15.2	665		Less pig activity
21-Apr-05	12:55	80	Yes	Low	1	Clear	00	.5'	None noted	12.84	8.01	1.47	2844	26.1	684		Few Cliff Swallows back
04-May-05	12:54	50	Yes	No Flow	0	Clear	10		None noted	NSC							Stops under bridge
17-May-05	13:22	76		No Flow	15	Scum	00		None noted	NSC							Intermittent pools
26-May-05	12:19	69	Yes	No Flow	0	Mud	03		None noted	NSC							Few puddles
09-Jun-05	13:55	88		No Flow	6	Mud	03		None noted	NSC							Swallows nesting
21-Jun-05	12:05	88		Dry	25		03		None noted	NSC							Water in pool 100 yd A
12-Jul-05	11:26	84		Dry	6		00		None noted	NSC							
26-Jul-05	Skip			Dry	11					NSC							Skipped due to no rain
09-Aug-05	12:12	85		No Flow	2	Mud	00		None noted	NSC							Puddles Below bridge
18-Aug-05	15:15	96	Yes	Dry	4		00,03		None noted	NSC							
26-Aug-05	11:00	88		Dry	2		00		None noted	NSC							

Site 07 Date:	Air °F Time:	Rainfall Temp:	Flow Event:	Last Rate:	Water Rain:	Weather Appear:	Depth: Code:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Dup. Count:	Field Comments:
10-Sep-05	Skip			NST	16				NSC							No recent precipitation
24-Sep-05	Skip			NST	7				NSC							Dry at site 6
14-Oct-05	Skip			NST	3				NSC							
25-Oct-05	Skip			NST	15				NSC							
5-Nov-06	Skip			NST	25				NSC							
14-Dec-05	Skip			NST	86				NSC							
21-Dec-05	12:58	47		Dry	73			None noted	NSC							Cows A & B
3-Jan-06	12:09	68		Dry	86			None noted	NSC							
11-Jan-06	11:20	43		Dry	94			None noted	NSC							Cows A & B
28-Jan-06	10:00	49		Dry	108			None noted	NSC							Cows A & B
2-Feb-06	12:10	39		Dry	122			None noted	NSC							
21-Feb-06	11:50	31		Dry	134		30.31	None noted	NSC							
7-Mar-06	12:00	70		Dry	148			None noted	NSC							Water in pool 100 yd A
22-Mar-06	10:18	40	Yes	Dry	5		03	None noted	NSC							
3-Apr-06	11:46	68		Dry	2		03	None noted	NSC							Water in pool 100 yd A
17-Apr-06	12:33	92		Dry	14			None noted	NSC							2 horses
2-May-06	13:38	83		Dry	5			None noted	NSC							Water in pool 100 yd A
10-May-06	12:41	64	Yes	Dry	1			None noted	NSC							Puddle below bridge
22-May-06	12:16	82		Dry	13			None noted	NSC							Turkey
5-Jun-06	12:15	95		Dry	6			None noted	NSC							
13-Jun-06	Skip			Dry	14				NSC							
27-Jun-06	8:56	74		Dry	5		03	None noted	NSC							
12-Jul-06	11:26	89		Dry	1		00,03	None noted	NSC							
1-Aug-06	9:37	88		Dry	21		03	None noted	NSC							
8-Aug-06	10:34	85		Dry	28			None noted	NSC							Cows and calves
15-Aug-06	11:17	80		Dry	35		03	None noted	NSC							
23-Aug-06	10:14	79	Yes	No Flow	2			None noted	NSC							Mud puddles A&B
29-Aug-06	11:51	73		Dry	7			None noted	NSC							
11-Sep-06	13:20	78		Dry	9		03	None noted	NSC							
20-Sep-07	13:15	85		Dry	~14			None noted	NSC							Photo
3-Oct-06	10:14	76		Dry	21			None noted	NSC							
24-Oct-06	12:00	66		Dry	10			None noted	NSC							Photo trees with fall color
7-Nov-06	12:24	76		Dry	21			None noted	NSC							
13-Dec-06	10:45	48		Dry	60			None noted	NSC							
10-Jan-07	14:36	62		Dry	10			None noted	NSC							Cattle gone
12-Feb-07	13:07	58		Dry	21		03	None noted	NSC							
6-Mar-07	11:00	62		Dry	45			None noted	NSC							Cows
27-Mar-07	13:34	67		High	0	Clear	03	None noted	9.21	8.17	1.07	2084	21.12	155	131	
11-Apr-07	12:40	64		High	10	Clear	00	None noted	14.14	8.22	1.28	2474	15.52	14	16	
24-Apr-07	13:45	77		High	2	Clear	00	None noted	10.41	8.17	.75	1496	24.11	615		
7-May-07	14:00	62		High	1	SI Cloudy	00,02	Tadpoles	10.41	8.19	.49	984	22.77	903		
14-May-07	14:00	82		Normal	5	Clear	02	Moss/ algae	11.0	8.17	1.0	1968	24.88	86	120	

*= YSI Machine malfunctioned

A= above bridge

B= Below

¹ NSC= No Sample Collected

Cattle count: 25-30 including calves

Clear= water is clear and creek bottom visible much like tap water

Cloudy= water has suspended particles, much like coffee with milk, creek bottom not visible

Frozen= ice has covered water surface not thick enough to be safely walked on; can't break it where a sample could be taken after

Milky=water has whitish substance at bottom of water profile usually near where beaver activity is highest

Murky= water has tint, can't see creek bottom clearly, fish are visible

Scum(y)= surface has a film on it- usually pollen, dust, or other natural substance

Slightly Cloudy(SI Cloudy)= fewer suspended particles, creek bottom not clearly visible

Buck Creek Project
Site 08 Field Report
CR SA, Collingsworth County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Dup. Count:	Field Comments:
17-May-04	10:07	73		Dry	22		00		None noted	NSC							
1-Jun-04	8:45	71		Dry	5		00		None noted	NSC							
15-Jun-04	8:39	78		Dry	2		03		None noted	NSC							Trac: rabbit,bobcat,quail,skunk,deer
20-Jun-04	17:30	87	Yes	Dry	2		00		None noted	NSC							Road has signs of recent rivlets, mud
27-Jun-04	16:45	88	Yes	Dry	2		10,43		None noted	NSC							
13-Jul-04	11:15	90		Dry	7		00		None noted	NSC							
3-Aug-04	10:10	91		Dry	7		03		None noted	NSC							
11-Aug-04	11:45	97		Dry	14		00,03		None noted	NSC							
24-Aug-04	13:52	100		Dry	16		03		None noted	NSC							
9-Sep-04	11:45	80		Dry	30		00		None noted	NSC							
22-Sep-04	12:30	75		Dry	0		21,03		None noted	NSC							
6-Oct-04	13:10	72	Yes	Dry	1		03		None noted	NSC							Nearby irrigation has decreased sign.
18-Oct-04	15:10	80		Dry	0		00		None noted	NSC							
4-Nov-04	13:20	60		Dry	2		00		None noted	NSC							Photos, puddle in road, water A&B no flow
16-Nov-04	Skip	60	Yes	CRS	5		10		None noted	NSC							Road pretty bad
1-Dec-04	13:40	52		Dry	5		00		None noted	NSC							
8-Dec-04	13:12	55		Dry	2		00		None noted	NSC							Creek bed muddy, scattered puddles
20-Dec-04	12:27	69		Dry	14		00		None noted	NSC							
3-Jan-05	13:30	49		Dry	14		03		None noted	NSC							Trac: deer,rabbit,opossum
19-Jan-05	13:20	61		Dry	15		00		None noted	NSC							
3-Feb-05	13:35	55		Dry	6		00		None noted	NSC							
17-Feb-05	13:15	47		Dry	11		02		None noted	NSC							Ground is damp but no pooling
28-Feb-05	13:30	50		Dry	1		00		None noted	NSC							Road crew has widened, cleaned creek
18-Mar-05	Skip		Yes	CRS	1				None noted	NSC							Roads bad, can't reach site
29-Mar-05	12:55	68		Dry	14		01		None noted	NSC							Trac: deer,pig,turkey, Hen turkey B
12-Apr-05	11:45	67		Dry	27		00		None noted	NSC							GPS
21-Apr-05	13:12	73	Yes	Dry	1		00		None noted	NSC							Odor: something dead in sacks A in weeds
4-May-05	13:12	51	Yes	Dry	0		03,41		None noted	NSC							Trac: bobcat scat in road, mud puddles
17-May-05	13:34	78		Dry	15		00		None noted	NSC							
26-May-05	12:40	68	Yes	CRS	0				None noted	NSC							
9-Jun-05	14:06	89		Dry	6		03		None noted	NSC							
21-Jun-05	12:15	89		Dry	18		03		None noted	NSC							
12-Jul-05	11:30	90		Dry	1		00		None noted	NSC							
26-Jul-05	Skip	80		Skip	11		00		None noted	NSC							No recent rain
9-Aug-05	Skip	81		Skip	2		03		None noted	NSC							
18-Aug-05	15:23	97	Yes	Dry	2		00,03		None noted	NSC							
28-Aug-05	Skip	88		Skip	2		00		None noted	NSC							
10-Sep-05	Skip			Skip	16				None noted	NSC							
24-Sep-05	Skip			Skip	7				None noted	NSC							

Site 08 Date:	Air °F Time:	Rainfall Temp:	Flow Event:	Last Rate:	Water Rain:	Weather Appear:	Depth: Code:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Dup. Count:	Field Comments:
14-Oct-05	11:15	92		Dry	3			None noted	NSC							
24-Oct-05	Skip	75		Skip	15				NSC							
5-Nov-05	Skip			Dry					NSC							
14-Dec-05	13:25	45		Dry	66			None noted	NSC							
21-Dec-05	13:14	48		Dry	73			None noted	NSC							
3-Jan-06	12:00	67		Dry	86			None noted	NSC							
11-Jan-06	11:08	43		Dry	94			None noted	NSC							
26-Jan-06	17:16	49		Dry	108			None noted	NSC							
9-Feb-06	Skip			Skip	122				NSC							
21-Feb-06	11:58	31		Dry	134		31,30	None noted	NSC							
7-Mar-06	12:15	73		Dry	148			None noted	NSC							
22-Mar-06	10:08	40	Yes	Dry	5			None noted	NSC							Looks like will rain any minute
3-Apr-06	11:57	68		Dry	2			None noted	NSC							
17-Apr-06	12:23	92		Dry	14			None noted	NSC							
2-May-06	13:29	85		Dry	5			None noted	NSC							Large volume of water has gone through
10-May-06	12:48	65	Yes	Dry	1			None noted	NSC							
22-May-06	12:23	82		Dry	13			None noted	NSC							
5-Jun-06	12:24	98		Dry	6			None noted	NSC							
13-Jun-06	13:54	92		Dry	14		00,04	None noted	NSC							
27-Jun-06	8:46	74		Dry	5			None noted	NSC							
12-Jul-06	11:37	90		Dry	1		00,03	None noted	NSC							
1-Aug-06	9:28	87		Dry	21				NSC							
8-Aug-06	10:53	88		Dry	28				NSC							
15-Aug-06	11:27	82		Dry	35			None noted	NSC							Turkeys; doe with one fawn
23-Aug-06	9:18	79	Yes	CRS	2				NSC							Photo of muddy road- puddles-no flow
29-Aug-06	11:37	73		Dry	7			None noted	NSC							Muddy at edges of roadway, pig tracks
11-Sep-06	13:27	79		Dry	9			None noted	NSC							
20-Sep-07	13:33	84		Dry	~14			None noted	NSC							Photo
3-Oct-06	10:04	77		Dry	21			None noted	NSC							
24-Oct-06	12:17	66		Dry	10			None noted	NSC							Recent rain small flush
7-Nov-06	12:33	76		Dry	21			None noted	NSC							
13-Dec-06	10:37	48		Dry	60			None noted	NSC							
10-Jan-07	14:42	63		Dry	10			None noted	NSC							
12-Feb-07	13:15	58		Dry	21			None noted	NSC							
6-Mar-07	10:52	62		Dry	45			None noted	NSC							
27-Mar-07	13:55	68		High	0	Clear	00,03	None noted	10.44	8.07	1.01	1973	19.5	146	119	
11-Apr-07	13:00	66		Low	10	SI Cloudy	00	None noted	10.01	8.22	1.33	2573	20.0	84	73	
24-Apr-07	13:57	77		High	2	Cloudy	00	Catfish	10.49	8.19	.8	1592	22.9	236		
7-May-07	13:39	66		High	1	Cloudy	00,02	None noted	10.35	8.20	.2	952	22.2	968	1064	
14-May-07	13:14	84		Normal	5	Clear	02	Minnows,Water striders	10.33	8.31	1.09	2138	27.4	62	74	

*= YSI Machine malfunctioned

**= Depth at sample in feet

Cattle Count: 0

¹ CRS= Can't reach site

² NSC= No Sample Collected

³ Dissolved oxygen not working properly

Buck Creek Project
Site 09 Field Report
CR SA-Howse Log creek, Collingsworth County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	Salinity pH:	Specific PPT:	Temp ° C:	E. coli Count:	Dup. Count:	Field Comments:
17-May-04	10:15	73		Dry	22		00		None noted	NSC ¹						Photos: road repair, raccoon
1-Jun-04	8:50	71		Dry	5		00		None noted	NSC						
15-Jun-04	8:45	78		Dry	2		03		None noted	NSC						Trac: deer,skunk,armadillo ²
20-Jun-04	16:47	86	Yes	Dry	2		00		None noted	NSC						
27-Jun-04	16:50	88	Yes	Dry	2		10,43		None noted	NSC						
13-Jul-04	11:19	90		Dry	7		00		None noted	NSC						
3-Aug-04	10:12	91		Dry	7		03		None noted	NSC						
11-Aug-04	11:50	97		Dry	14		00,03		None noted	NSC						Trac: rabbit,quail,puma,snake
24-Aug-04	13:55	100		Dry	16		03		None noted	NSC						
9-Sep-04	11:47	80		Dry	30		00		None noted	NSC						
22-Sep-04	12:35	75		Dry	0		00		None noted	NSC						
6-Oct-04	13:15	72	Yes	Dry	1		03		None noted	NSC						
18-Oct-04	15:15	80		Dry	0		00		None noted	NSC						
4-Nov-04	13:07	61		Dry	1		00		None noted	NSC						
16-Nov-04	Skip	60	Yes	CRS ³	5		10		None noted	NSC						
1-Dec-04	13:43	52		Dry	5		00		None noted	NSC						
8-Dec-04	13:15	55		Dry	2		00		None noted	NSC						
20-Dec-04	12:29	69		Dry	14		00		None noted	NSC						
3-Jan-05	13:25	49		Dry	14		03		None noted	NSC						Trac: raccoon,possum,pig,mice
19-Jan-05	13:22	61		Dry	15		00		None noted	NSC						
3-Feb-05	13:38	56		Dry	6		00		None noted	NSC						
17-Feb-05	13:17	47		Dry	11		02		None noted	NSC						
28-Feb-05	13:33	50		Dry	1		00		None noted	NSC						
16-Mar-05	Skip		Yes	CRS	1					NSC						
29-Mar-05	12:58	68		Dry	14		01		None noted	NSC						
12-Apr-05	11:50	67		Dry	27		00		None noted	NSC						GPS;Trac: squirrel,mice,turkey
21-Apr-05	13:25	73	Yes	Dry	1		00		None noted	NSC						GPS
4-May-05	13:20	51	Yes	Dry	0		50		None noted	NSC						
17-May-05	13:36	78		Dry	15		00		None noted	NSC						Recent flush
26-May-05	12:40	68	Yes	CRS	0					NSC						
9-Jun-05	14:09	89		Dry	6		03		None noted	NSC						
21-Jun-05	12:17	90		Dry	18		03,00		None noted	NSC						
12-Jul-05	11:33	87		Dry	1		00		None noted	NSC						
26-Jul-05	Skip	11		Skip	11		00			NSC						No recent rain
9-Aug-05	Skip			Skip	2		03			NSC						
18-Aug-05	15:25	97	Yes	Dry	2		00,03		None noted	NSC						
26-Aug-05	Skip	88		Skip	2		00			NSC						
10-Sep-05	Skip			Skip	16					NSC						
24-Sep-05	Skip			Skip	7					NSC						

*= YSI Machine malfunctioned

**= Depth at sample in feet

¹ NSC= No Sample Collected

² Ringtail cat on East bank of creek on below side

³ CRS= Can't Reach Site

⁴ Dissolved oxygen not working properly

⁵ Cattle count: Above, on East bank ~ 30

Buck Creek Project
Site 10A Field Report
HWY 256, Childress County

Date:	Time:	Air °F Temp:	Rain Event:	Flow Rate:	Last Rain:	Water Cond:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
17-May-04	11:25	73		Normal	6	Clear	00	1.5'	Minnows, moss/algae	11.34	7.6	No Data	4097	20.0	218			
1-Jun-04	9:50	77		Normal	19	Clear	00	1.5'	Minnows, water striders	9.2	7.6	1.8	3422	19.6	315			Trac:coon,turkey,fox
15-Jun-04	9:27	77		Normal	11	Clear	03	.75'	Minnows,frogs,dragonfly	7.78	7.85	No Data	3327	25.6	491			Trac:horse,coon,skunk
20-Jun-04	CRS		Yes		2					NSC								This drive bad after rain
27-Jun-04	CRS		Yes		2					NSC								
13-Jul-04	12:09	84		Normal	16	Clear	00	1.5'	Minnow,wild plum floating	14.32	8.01	1.76	3378	24.8	606		513	Quail
3-Aug-04	11:47	88		Normal	7	Clear	03	.66'	Minnows,frogs	10.52	7.93	1.8	3446	25.4	139	1300	132ec	Numerous variety tracs
11-Aug-04	12:36	92		Normal	3	Clear	00,03	.5'	Minnows, water striders	10.8	8.2	1.81	3451	24.8	702			Beaver are building dam
24-Aug-04	14:26	100		Normal	12	Clear	03	1'	Minnows, turtle	9.74	7.96	1.81	3461	28.1	484			Turkey,deer,quail,rabbits
9-Sep-04	12:10	76		Normal	27	Clear	00	.66'	Minnows	10.65	7.85	1.75	3341	22.2	56	396		~20 turkey,large doe
22-Sep-04	13:14	76		Normal	0	Clear	03,21	.5'	Minnows	10.56	7.95	1.52	2917	22.3	656			Feral hogs
6-Oct-04	CRS	72	Yes		0		03			NSC								
18-Oct-04	15:23	82		Normal	0	Clear	00	.75'	Minnows ¹	11.83	8.26	1.42	2727	20.4	1050			18 hen turkeys, dam A
4-Nov-04	CRS	61		CRS	1					NSC								Muddy
16-Nov-04	CRS	60	Yes		0					NSC								
1-Dec-04	14:09	51		Normal	5	Clear	00	1.5'	None noted	13.53	7.82	1.85	3500	12.6	90			Photos
8-Dec-04	13:48	60		Fast	2	Clear	00,01	1'	None noted	13.33	7.84	1.68	3185	14.3	154			1/2" of rain last 24 hours
20-Dec-04	12:58	68		Normal	21	Clear	00	.75'	None noted	13.84	7.83	1.82	3442	12.9	212			Cattle here now, turkey
3-Jan-05	14:07	50		Normal	14	Murky	03	.75'	Minnows,water striders	14.03	7.92	1.69	3211	14.2	23			Beaver dam larger
19-Jan-05	13:56	61		Normal	15	Clear	00	1.'	None noted	15.1	8.04	1.79	3398	13.0	60			Photos: dam,cows
3-Feb-05	14:25	56		High	6	Clear	00	2'	Water striders	15.75	7.63	1.85	3498	13.4	129			Dam larger
17-Feb-05	13:46	47		Normal	11	Clear	02	1'	Mosquito,2 types moss	15.63	8.18	1.86	3525	13.5	67		61	
28-Feb-05	14:15	50		Normal	1	Clear	00	.5'	Minnows, flies,algae	*	*	*	*	*	37			Turkey
16-Mar-05	CRS		Yes		1					NSC								
29-Mar-05	13:38	71		Normal	14	Clear	01	1'	Algae has died back	13.5	7.72	1.76	3340	16.6	404			3 does,hen turkeys
12-Apr-05	12:53	70		Normal	27	Clear	00	.66'	3 types of minnows	12.9	7.76	1.07	2086	18.3	238			Visit with rancher
21-Apr-05	14:01	73	Yes	Normal	1	Clear	00	.5'	Minnows,dragonflies	12.29	7.68	2.02	3817	22.9	706			
04-May-05	14:12	52		Normal	0	Clear	00	1'	Water striders, minnows	10.63	7.22	1.9	3592	14.1	66	270		Birds from 83 are here
10-May-05	13:14	88		Normal	8	Cloudy	00	.45'	Water striders, minnows	10.06	7.67	1.87	3548	23.2	660			Cows
17-May-05	14:14	82		Normal	15	Clear	00	.5'	Minnows,tadpoles	9.96	7.51	2.04	3852	22.9	636			1" rain last Wednesday
26-May-05	13:05	66	Yes	Normal	0	Clear	03	.5'	None noted	9.96	7.51	2.04	3799	20.0	1340			Bobwhite's are calling
09-Jun-05	14:45	92		Normal	6	Cloudy	03	.5+'	Minnows	9.81	7.87	*	3519	26.5	1220			1" rain
16-Jun-05	13:30	92		Normal	13	Clear	00	.5+'	None noted	10.93	7.83	1.92	3660	26.3	1890			Visit with quail hunters
28-Jun-05	10:00	87		Normal	25	Clear	00	.5'	Minnows	*	*	*	*	*	920			Photo of cliff B
12-Jul-05	12:12	89		Normal	6	Clear	00,03	0.5'	Minnows, Water Striders	9.92	7.42	1.06	2074	25.0	440			Installed rain data logger
26-Jul-05	13:05	83		Normal	9	Clear	03	0.5	Minnows,aquatic plants	*	*	*	*	*	780			Large beaver dam&pond
09-Aug-05	14:29	93		Normal	2	Clear	00	.75'	Minnows,frogs,turtles	13.09	7.9	1.62	3119	26.6	1660			Trac:horse,cows, 2bucks
18-Aug-05	16:57	98	Yes	Normal	2	Clear	00,03	.75'	None noted	10.44	7.76	1.90	3623	27.0	40			Flush took dam out
26-Aug-05	11:40	90		Normal	2	Clear	00	.66'	Dead crawfish	11.83	7.79	2.08	3928	23.5	290			Turkey

Site 10A	Air °F	Rain	Flow	Last	Water	Weather	Sample	Biological	Salinity	Specific	Temp	E. coli	Fecal	Dup.	Field		
Date:	Time:	Temp:	Event:	Rate:	Rain:	Cond:	Code:	Activity:	DO:	pH:	PPT:	Cond:	° C:	Count:	Count:	Count:	Comments:
10-Sep-05	12:30	90		Normal	16	Clear	00	.25'	Minnows,frogs,crawfish	9.47	7.73	2.01	3810	23.4	290		Cows, turkey
24-Sep-05	12:30	85		Normal	7	Clear	00	.25'	None noted	7.84	7.84	1.97	3731	23.4	750		Turkeys
14-Oct-05	13:30	78		Normal	3	Clear	00	.5'	Minnows	10.28	7.8	1.90	3599	21.1	40		Rattle snake by road
25-Oct-05	16:49	76		High	15	Clear	00	1.0'	None noted	9.94	7.60	1.94	3660	17.9	360		Badger by Hwy entry gate
5-Nov-05	17:13	81		Low	25	Clear	00	.33'	None noted	10.52	6.44	1.99	3746	17.9	490		
15-Dec-05	15:34	45		High	66	Clear	00	.83'	Fish	*	6.74	1.92	3753	11.4	53		Pig wallow,turkey feces
21-Dec-05	16:04	50		Normal	73	Clear	00	.5'	None noted	*	7.26	1.95	3671	12.0	19		Cows, turkeys
3-Jan-06	15:21	80		Normal	86	Clear	00	.83'	Minnows	21.81	7.15	1.90	3578	14.6	69		
11-Jan-06	15:34	60		Normal	94	Clear	00	.5'	Minnows	10.64	7.26	1.97	3711	12.3	357		Dead pig in water A,cows
26-Jan-06	17:51	47		Normal	108	Clear	00,03	.5'	None noted	11.69	7.23	1.99	3740	13.1	15		Getting dark-we got stuck
9-Feb-06	14:52	49		Normal	122	Clear	03	.7'	Minnows,waterstriders	13.13	7.62	1.96	3700	13.0	116		
21-Feb-06	13:48	36		Normal	134	Clear	45,50	.7'	Minnows	11.45	7.36	1.93	3640	9.6	40	24ec	
7-Mar-06	14:29	83		Normal	148	Clear	00	.4'	Minnows, aquatic veget	9.84	7.54	1.99	3757	19.6	68	84	Something has crossed
22-Mar-06	14:07	35	Yes	High	5	Clear	03	.75'	None noted	7.70	7.44	2.03	3821	11.6	167		Armadillo, pig tracks
3-Apr-06	13:47	79		Normal	2	Clear	03	.7'	Minnows, Water Striders	10.37	7.55	2.00	3779	19.7	68		
17-Apr-06	15:30	102		Normal	14	Clear	00	.7'	None noted	7.16	7.45	0.66	1318	23.1	144	138ec	Buck
9-May-06	12:54	80		Normal	2	Clear	03	.5'	None noted	6.56	7.26	1.54	2949	20.6	134	122ec	High flush, coyote scat
10-May-06	14:59	68	Yes	High	1	SI Cloudy	03	1.5'	Fish, water striders	8.78	7.25	0.64	1270	20.1	493		1foot deeper
22-May-06	14:02	91		High	13	Clear	03	1.'	Minnows, Water Striders	9.82	7.53	2.00	3793	22.8	740		
5-Jun-06	14:27	102		Low	6	Clear	00	.3'	Minnows	6.34	7.55	2.02	3835	25.0	120	130ec	Trac:deer,pig,possum
13-Jun-06	12:46	95		Low	13	Clear	00,04	.25'	None noted	7.12	7.60	1.93	3679	25.0	140	80ec	Cows moved to A
27-Jun-06	13:16	90		Normal	5	Clear	03,12	.7'	Several types minnows	6.62	7.59	1.99	3768	23.9	280		Ele fence B,Photos
12-Jul-06	13:35	101		Low	1	Clear	00,03	.25'	Minnows,moss	7.28	7.86	1.83	3516	28.8	480		Pair of Dove, Roadrunner
1-Aug-06	12:06	98		Low	12	Clear	00	.25'	Minnows,dragonflies	10.88	7.73	2.00	3802	26.6	170	150ec	Turkey,poults. Many tracs
8-Aug-06	13:04	100		Normal	4	Clear	00,03	.5'	Minnows	8.12	7.84	1.93	3693	29.4	105	70ec	Roadrunner.Curtis/Lucas
15-Aug-06	13:02	88		Low	2	Clear	03,61	.25'	Minnows	8.13	7.74	2.02	3837	24.8	380	370ec	
23-Aug-06	14:48	90	Yes	High	2	Clear	00,03	1.33'	Minnows,waterstriders	4.17	7.49	0.92	1828	28.9	436	404ec	Something just crossed
29-Aug-06	15:25	82		Low	7	Clear	00	.33'	Minnows	5.50	7.84	2.04	3874	26.9	296		Calves, cow in water
11-Sep-06	15:15	83		Low	9	Clear	03	.33'	Minnows	7.86	7.41	1.27	2476	25.4	220	200	Dozer work, crippled dove
20-Sep-06	15:42	94		Normal	~14	Clear	03	.25'	Minnows,water striders	6.16	8.05	2.03	3843	23.9	362		moss, road work
3-Oct-06	14:43	91		Low	21	Clear	00	.25'	None noted	7.48	7.88	1.68	3233	25.2	768		Calves drinking A before sample
24-Oct-06	14:16	73		Normal	10	Clear	00	.75'	None noted	7.14	7.71	1.38	2660	18.8	71	79	Trax: pig,coyote,turkey,raccoon
7-Nov-06	14:35	81		Normal	21	Clear	00	.75'	None noted	6.69	7.62	1.99	3753	18.7	232	247	
13-Dec-06	14:10	63		Normal	60	Clear	00	.5'	None noted	*					143	133	YSI- dead batteries
10-Jan-07	15:49	68		Normal	10	Clear	00	.5'	None noted	6.03	7.7	1.93	3650	12.2	10		Trax: dog, coyote,fox,pig,deer
12-Feb-07	Skip									NSC							runing low on time
6-Mar-07	15:43	73		Normal		Clear	00	.5'	Minnows,moss	11.41	7.89	1.87	3538	18.2	31	27	2 does, armadillo, lots of tracks
27-Mar-07	Skip									NSC							impassable road
11-Apr-07	14:50	70		Normal	10	Clear	03	.5'	None noted	10.45	7.82	1.53	2935	19.1	85		4.5" of rain in gauge
24-Apr-07	16:00	81		High	2	Clear	00	.67'	None noted	7.57	8.22	1.18	2289	22.7	724		hole in R front sidewall
7-May-07	12:45	70		Normal	1	Clear	00,02	.33'	Minnows, Water strider	10.54	7.91	1.95	3692	20.2	194		
14-May-07	14:40	88		Normal	5	Clear	02	.5'	None noted	6.80	8.05	1.34	2574	25.7	418	476	

*= YSI Machine malfunctioned, user error

CRS= Can't reach site

NSC= No Sample Collected

A= Above site

B= Below site

Buck Creek Project
Site 10B Field Report
 HWY 256, Childress County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
26-Jul-06	12:03	83		Normal	9	Clear	00.03								820			
09-Aug-05	13:45	93		Normal	2	Clear	00	2.0'	None noted	10.15	7.8	1.89	3699	25.4	200			Some small waterfalls
18-Aug-06	16:32	98	Yes	Normal	2	Clear	00.03	.5'	None noted	9.16	7.83	1.89	3609	27.0	140			
14-Oct-05	13:07	78		Normal	3	Scum	00		None noted	10.81	7.77	1.93	3651	18.8	80			
25-Oct-05	16:16	76		High	15	Clear	00	3.0'	None noted	9.90	7.63	1.95	3674	18.3	50			GPS
5-Nov-05	16:59	81		High	25	Clear	00	3.0'	None noted					0				Deer skull
15-Dec-05	14:54	45		High	66	Clear	00	2.5'	None noted	*	7.34	1.92	3628	12.1	32			
21-Dec-05	15:16	50		Normal	73	Clear	00	2.'	None noted	*	7.27	1.93	3634	12.1	70			Deer
3-Jan-06	Skip																	Skip B due to ext. fire dan
11-Jan-06	14:14	60		Normal	94	Clear	00	2.'	Minnows	9.26	7.37	1.93	3655	12.1	55			Quail, Cardinals
26-Jan-06	Skip																	at site 03 and running late
9-Feb-06	13:47	49		Normal	122	Clear	03	2.5'	None noted	11.66	7.65	1.93	3640	12.7	42			Can hear pigs nearby
21-Feb-06	13:24	34		Normal	134	Clear	30,31	2.5'	Minnows	10.94	7.40	1.91	3615	10.3	25			Deer
7-Mar-06	13:55	83		Normal	148	Clear	00	1.8'	Minnows	9.56	7.66	1.92	3638	19.6	312			7 huge tom turkeys,birds
22-Mar-06	13:35	34	Yes	High	5	Clear	03	3.5'	New moss growing	9.10	7.67	1.94	3656	11.7	96			3 does, 6 calves
3-Apr-06	13:20	77		Normal	2	Clear	03	2.25'	Minnows, Bluegill	11.02	7.63	1.88	3655	19.6	90			Cattle, calves
17-Apr-06	15:08	100		Normal	14	Clear	00	2.5'	Minnows, 3 types of bugs	7.14	7.67	1.91	3635	24.4	298	253ec		2 huge hen turkeys 1 cow
9-May-06	12:33	80		Low	2	Silty	03	.75'	None noted	6.22	7.30	1.93	3665	21.4	134	178ec		Photos
10-May-06	14:22	69	Yes	Low	1	Muddy	00	.7'	None noted	9.46	7.29	0.62	1242	19.8	348			2 deer, 5 turkey,
22-May-06	13:39	90		Low	13	Clear	03	.4'	Minnows	7.27	7.64	1.79	3419	23.8	690	870ec		Some beaver activity
5-Jun-06	13:50	100		Low	6	Clear	00	.3'	None noted	5.90	7.55	1.90	3615	26.3	180			Turkey calling around us
13-Jun-06	12:14	90		Low	13	Clear	00,04	.25'	None noted	6.88	7.63	1.89	3604	25.2	230	140ec		Turkey, roadrunner, dove
27-Jun-06	11:59	90		Low	5	Clear	00,03	.75'	Minnows, water striders	6.57	7.54	1.92	3649	23.5	210			Dead turkey in creek, cow
12-Jul-06	12:54	100		Low	1	Clear	00	.25'	Minnows	9.38	7.63	1.92	3664	28.5	280			3deer, 5turkey, fawn/creek
1-Aug-06	11:41	95		Low	12	Clear	00	.5'	Minnows, turtle	12.54	7.66	1.57	3026	25.7	180	270ec		Many tracks
8-Aug-06	12:37	99		Normal	4	Clear	00	1'	Minnows	9.09	7.72	1.90	3618	26.6	150	160ec		Deer, pig tracks
15-Aug-06	12:31	87		Low	2	Clear	03,61	.5'	Minnows	8.34	7.60	1.70	3256	23.5	250	250ec		Fawn next to road, rabbit
23-Aug-06	14:10	89	Yes	Low	2	Cloudy	00,03	.5'	None noted	4.15	7.48	0.93	1836	27.9	388			Doe, few cardinals
29-Aug-06	14:43	80		Low	7	Clear	00	.5'	Minnows	5.49	7.70	0.97	1920	25.0	241			
11-Sep-06	14:48	87		Normal	9	Clear	03	.5'	Turtle, 3 types of minnows	5.69	7.88	1.76	3366	25.4	175			Signs of deer, new vegetation
20-Sep-06	15:00	94		High	~14	Clear	00,03	1.0'	Minnows	5.97	7.79	1.93	3656	22.7	113			New beaver activity
3-Oct-06	14:06	92		Normal	21	Clear	00	1.5'	Minnows	7.60	7.68	1.82	3470	22.4	175			Beaver dam right below Xing
24-Oct-06	13:32	70		Normal	10	Clear	00	1.15'	Minnows	7.01	7.72	1.94	3665	17.7	22			Trax: pig, coyote, turkey, opossum
7-Nov-06	14:00	80		Normal	21	Clear	00	.5'	Minnows	6.7	7.67	1.94	3659	18.1	113	120		
13-Dec-06	13:45	59		Normal	60	Clear	00	1.5'	Beaver dam	*				44	38			
10-Jan-07	14:29	67		Normal	10	Clear	00	1.25'	None noted	5.35	7.81	1.93	3640	13.6	8	3		Lots of turkey on N bank
12-Feb-07	Skip									NSC								need to check 12 and 13
6-Mar-07	15:03	74		Normal		Clear	00	1.5'	Minnows, Beaver feces	15.50	7.89	1.90	3592	14.3	37	34		
27-Mar-07	Skip									NSC								impassable road
Site 10B Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
11-Apr-07	Skip						03			NSC								skip due to time constraints
24-Apr-07	15:40	81		High	2	Cloudy	00	1.66'	Water strider	8.07	8.17	1.23	2382	22.9	780			Rain gauge says 1.5"
7-May-07	12:15	69		Normal	1	Cloudy	02	1'	Minnows	10.87	7.83	1.92	3628	19.1	70			Beaver activity
14-May-07	14:20	88		Normal	5	Clear	02	.5'	None noted	6.79	7.99	1.33	2694	25.3	472	474		

*= YSI Machine malfunctioned, user error
 CRS= Can't reach site
 NSC= No Sample Collected

A= Above site
 B= Below site

Buck Creek Project
Site 10C Field Report
HWY 256, Childress County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
26-Jul-06	11:40	83		Normal	9	Clear	00,03								630		220 B	Checked below dam also
09-Aug-05	13:17	93		Normal	2	Clear	00	A3;B2'	B= Minnows,turtle	9.6	7.8	1.88	3581	23.0	110		30 B	1" rain
18-Aug-06	16:15	98	Yes	Normal	2	Clear	00,03	1.5'	None noted	8.44	8.01	1.95	3727	27.0	80		40 B	
14-Oct-06	12:45	78		Normal	3	Clear	00	3.0'	Minnows,frogs	13.89	8.13	1.38	2665	18.9	60			Beaver building again
26-Oct-06	16:54	76		High	15	Clear	00	3.0'	Fish, minnows	11.63	7.91	1.93	3650	18.4	80			GPS, beaver activity
5-Nov-05	15:04	81		High	25	Clear	00	2.0'	Fish	12.42	5.04	1.89	3583	17.9	180			Beaver activity,heron
15-Dec-05	14:27	45		High	66	Clear	00	3.0'	None noted	*	7.53	1.92	3633	9.6	20			
21-Dec-06	14:41	50		Normal	73	Clear	00	3.1'	None noted	*	7.43	1.92	3639	9.2	63			Photos:armadillos,dam
3-Jan-06	14:45	80		Normal	86	Clear	00	3.0'	Minnows,snails	36.15	7.82	1.93	3631	12.9	56			
11-Jan-06	13:53	60		Normal	94	Clear	00	3.5'	Minnows,beaver dam	10.06	7.47	1.92	3623	9.2	12			Cardinals
26-Jan-06	Skip																	so skipped 10b.c
9-Feb-06	13:26	49		High	122	Clear	03	13"	Minnows, fish	12.69	7.63	1.93	3645	9.7	32			Sample below dam,pond
21-Feb-06	13:05	34		Normal	134	Clear	30,31	.6"	None noted	12.79	7.44	1.91	3622	7.4	24			50+ turkey,11quail
7-Mar-06	13:30	83		Normal	148	Clear	00	.7"	Minnows, fish	9.78	7.50	1.91	3610	16.8	39	3		2 road runners
22-Mar-06	13:07	35	Yes	High	5	Clear	03	.6"	Minnows,fish- deep water	11.49	7.75	1.95	3690	9.6	65			Turkey,cows,roadrunner
3-Apr-06	12:53	77		Normal	2	Clear	03	.3"	Minnows, frog	12.30	7.46	1.91	3603	16.8	106	149		Turkey roosting in trees
17-Apr-06	14:47	100		Normal	14	Clear	00	.6"	Minnows, tadpoles	7.55	7.64	1.92	3635	21.0	34		29ec	3 cows, turkey feathers
9-May-06	12:14	78		Low	2	Cloudy	03	1.5'	2 turtles	7.26	7.53	1.89	3583	21.0	274		386ec	Dam and pond gone
10-May-06	13:54	69	Yes	Low	1	Cloudy	00	.7"	None noted	7.64	7.39	0.50	1004	19.5	435			
22-May-06	13:16	88		Low	13	Clear	03	.3"	None noted	7.93	7.83	1.93	3671	23.2	1120			3 deer
5-Jun-06	13:26	99		Low	6	Clear	00	.3"	None noted	5.98	7.72	1.90	3625	26.5	360		110ec	Cows
13-Jun-06	11:49	91		Low	13	Clear	00,04	.4"	Minnows,perch	7.78	7.82	1.93	3671	24.9	300		280ec	Deer bones,bobcat trac
27-Jun-06	11:17	87		Normal	5	Clear	03	2.0'	Minnow,pan fish	8.46	7.77	1.93	3650	20.4	200		220ec	Beaver activity
12-Jul-06	12:23	95		Normal	1	Clear	00	3'	Minnows,fish,dragonflies	6.31	7.93	1.90	3627	26.2	430			1turkey,dam
1-Aug-06	11:21	90		Normal	12	SI Cloudy	03	3.5'	Minnows	14.11	7.81	1.92	3668	27.6	830		530ec	Beaver activity,1 Coyote
8-Aug-06	14:09	95		Normal	4	SI Cloudy	00	3.5'	Deer	9.93	8.02	1.90	3628	27.3	10		50ec	4 Bucks
15-Aug-06	12:07	84		Normal	2	SI Cloudy	03	3.5'	Turtle	6.17	7.75	1.90	3618	26.3	10		40ec	Has rained some here
23-Aug-06	13:39	90	Yes	Low	2	Muddy	00,03	1'	None noted	4.49	7.66	0.76	1513	27.8	392		324ec	Dam half gone, photots
29-Aug-06	14:17	79		Low	7	Clear	00	.5'	Minnows,turtle	6.19	7.99	1.86	3561	27.4	123		119ec	20-25 turkeys,2 dams
11-Sep-06	14:13	84		Normal	9	Clear	03	.75'	Small striped snake, Striders	6.10	8.09	1.70	3260	26.1	86			New beaver activity
20-Sep-06	14:46	90		Low	~14	Clear	03	.89'	Minnows, little brown snake	6.66	8.27	1.88	3588	25.1	90			
3-Oct-06	13:11	86		Normal	21	Clear	00	1.5'	Minnows	6.29	7.91	1.90	3608	22.7	96			Recent beaver activity,turkey
24-Oct-06	12:58	68		Normal	10	Clear	00	.75'	Minnows	8.55	7.83	1.5	2862	15.9	18		21	Rain gauge sys 3.86",hog waller
7-Nov-06	13:40	79		Normal	21	Clear	00	1.5'	minnows, glimpse of fox	7.59	7.78	1.93	3644	15.7	28		40	rabbit, fox tracks
13-Dec-06	13:23	57		Normal	60	Clear	00	1.5'	Minnows, Beaver feces	*					12		11	
10-Jan-07	15:23	64		Normal	10	Clear	00	1'	None noted	6.95	7.93	1.90	3594	10.5	5			recent flush ~8' above normal
12-Feb-07	14:05	64		Normal	21	Clear	02,00	.67'	None noted	15.95	7.80	1.82	3465	11.9	5		2	
6-Mar-07	14:36	74		Normal		Clear	00	.66'	Minnows	15.95	7.81	1.83	3454	13.7	4		1	Cows, lots of tracks
27-Mar-07	Skip								NSC									impassable road

*= YSI Machine malfunctioned, user error
CRS= Can't reach site
NSC= No Sample Collected

A= Above site
B= Below site

Buck Creek Project
Site 11 Field Report
Hwy 83, Childress County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
17-May-04	11:06	76		Normal	6	Scum	00	A: 2.5'	Minnows	9.99	5.13		999 *	24.0	199	533		Cliff Swallows E side bridge
17-May-04	11:00	76		Normal	6	Scum	00	B: 1.8'	Minnows	9.99	6		1001	24.0	247	4300		
1-Jun-04	10:15	72		High	19	Cloudy	00	A: 3.0'	Minnows, snake	9.64	7.68	1.75	3333	21.0	318	10600		Chased small snake away
1-Jun-04	10:10	72		High	19	Cloudy	00	B: 1.8'	Minnows	9.64	7.63	1.75	3332	21.0	186	7200	5350 f	
15-Jun-04	9:10	76		Normal	11	Clear	03,00	A: 2.5'	Minnows, frogs	7.69	7.85		3328	25.6	394	142	142 f	Cliff Swallows E side bridge
15-Jun-04	9:06	76		Normal	11	Clear	03,00	B: 1.5'	Minnows, frogs	7.3	7.85		3326	25.5	502	96		
20-Jun-04	17:45	81	Yes	High	2	Clear	03	A: 3.0'	Minnows, frogs	12.39	8.16		3337	27.0	98	2300		Dead sparrows
20-Jun-04	17:40	81	Yes	High	2	Clear	03	B: 2.0'	Moss, Water Striders	12.3	8.15		3335	27.0	89	2500		
27-Jun-04	16:55	81	Yes	Normal	2	Clear	00	A: 2.0'	Minnows, dragonflies	16.15	8.23		3269	27.4	238			
27-Jun-04	16:50	81	Yes	Normal	2	Clear	00	B: 1.25'	Water Striders	16.15	8.22		3264	27.0	198	400		
13-Jul-04	11:34	92		Normal	16	Clear	00	A: 1.25'	Minnows, bluegill	10.8	7.9	1.69	3242	27.3	182	10800		
13-Jul-04	11:30	92		Normal	16	Clear	00	B: 0.5'	Minnows, bluegill	11.96	8.18	1.51	3113	27.8	272	1600		
28-Jul-04	12:17	90	Yes	Normal	0	Clear	01,80	A: 1.0'	Minnows, bluegill	9.48	7.84	1.59	3058	23.0	611	8050		Few Swallows left
28-Jul-04	12:10	90	Yes	Normal	0	Clear	01,80	B: 0.6'	Minnows, bluegill	9.48	7.83	1.59	3055	23.0	484	9550		
3-Aug-04	12:25	90		No Flow	7	Scum	00,03		None noted	NSC								Water pooled A&B
11-Aug-04	12:00	92		Dry	3		00,03		None noted	NSC								Irrigation all around here
24-Aug-04	14:03	100		Dry	12		03		None noted	NSC								Birds leaving
9-Sep-04	12:00	80		Dry	27		00		None noted	NSC								Visited with Curtis Scrivner
22-Sep-04	13:10	75		Dry	0		21,03		None noted	NSC								Met Abernathy foreman, said
6-Oct-04	13:35	72	Yes	Dry	0		03		None noted	NSC								Beaver dams below 11
18-Oct-04	15:55	80		Dry	0		00		None noted	NSC								Numerous wildlife tracks
4-Nov-04	13:45	61		Low	1	Clear	00	.9'	Minnows	13.55	8.04	1.44	2763	10.7	900	8100		
16-Nov-04	13:20	60	Yes	High	0	Cloudy	10,21	A: 2.3'	Bluegill	12.6	8.15	0.68	1359	12.5	4030	500		
16-Nov-04	13:15	60	Yes	High	0	Cloudy	10,21	B: 2.0'	Bluegill	12.59	8.14	0.6	1346	12.2	1000	364		
1-Dec-04	13:58	50		High	5	Clear	00	A: 2.0'	None noted	18.65	8.28	1.76	3362	7.2	10	100		Photos
1-Dec-04	13:53	50		High	5	Clear	00	B: 1.5'	None noted	18.65	8.22	1.73	3360	7.2	0	0		
8-Dec-04	13:22	50		High	2	Clear	00,01	A: 1.25'	None noted	18.72	8.16	1.66	3163	10.2	16	0	0f	
8-Dec-04	13:17	50		High	2	Clear	00,01	B: 1.0'	None noted	18.72	8.16	1.65	3159	10.2	0	0		
20-Dec-04	12:35	69		High	21	Clear	00	1.5'	None noted	18.26	8.35	1.64	2707	7.4	11	0	1f	
3-Jan-05	13:36	50		Normal	14	Clear	03	10"	None noted	17.16	8.21	1.64	3114	11.3	59	0	4f	Owl lives under bridge
19-Jan-05	13:30	61		Normal	15	Clear	00	1"	Few minnows, bug	20.12	8.45	1.76	3341	8.1	0	0	0f	E. coli dup: 1
3-Feb-05	14:00	56		Normal	6	Clear	00	.75'	Water Striders	19.71	8.45	1.77	3361	9.8	6	7		
17-Feb-05	13:18	47		High	11	Clear	02	1"	Rotting moss	16.81	8.45	1.78	3385	10.7	10	15		2 Redheaded Woodpeckers
28-Feb-05	14:45	50		Normal	1	Clear	00	1"	None noted	*	*	*	*	*	3	9		Owl, turkey calling
16-Mar-05	14:10	44	Yes	Normal	0	Clear	03	1.6'	Minnows	*	*	*	*	*	9	66	98f	Trac: mice, rabbits
29-Mar-05	13:11	69		Normal	14	Clear	01	1.33'	Minnows	19.07	7.93	1.89	3574	15.9	65	173		Owl, turkey, swallows-few
12-Apr-05	12:11	70		Normal	1	Clear	00	.75'	Water Striders	12.49	7.79	1.96	3697	15.6	21	196	182f	Photo of birds, nests
21-Apr-05	13:34	72	Yes	High	1	Clear	00	1"	Dragonflies	12.25	8.01	1.92	3648	24.6	68	90	100f	
4-May-05	13:41	51		High	0	Clear	10,30	1.5'	Minnows, crawfish	12.61	7.81	1.91	3608	12.0	132	280	220f	

Site 11	Air °F	Rainfall	Flow	Last	Water	Weather	Sample	Biological	Sailnity	Specific	Temp	E. coli	Fecal	Dup.	Field			
Date:	Time:	Temp:	Event:	Rate:	Rain:	Appear:	Code:	Depth:	Activity:	DO:	pH:	PPT:	Cond:	° C:	Count:	Count:	Count:	Comments:
10-May-05	13:35	89		Normal	5	Clear	00	1'	Minnows	12.47	7.27	1.96	3729	27.2	5	184		
17-May-05	13:48	83		Normal	15	Pollen	00	1'	None noted	12.21	7.8	1.93	3679	25.9	24	210	144f	Seven dead birds
26-May-05	12:38	69	Yes	Normal	0	Clear	03	1.25'	None noted	9.34	7.8	1.89	3592	22.2	180			Cows in area
9-Jun-05	14:19	91		Normal	10	Clear	03	A: 1.5'	Frog eggs	10.83	8.05	1.86	3561	31.0	180	270		Six dead birds
9-Jun-05	14:14	91		Normal	10	Clear	03	B: 1.66'						250	520			
16-Jun-05	13:00	90		Normal	13	Clear	00	1.25'	3 types minnows	11.41	7.95	1.9	3648	29.4	270	710		Below: 2120f
28-Jun-05	12:26	97		Low	25	Scum	00	1'	Minnows,algae	7.31	7.92	1.92	3660	25.4	600	3660		Below: 160 E. coli
12-Jul-05	11:50	87		No-flow	6	Scum	00	5'	None noted									No flowing water, B=dry
26-Jul-05	11:10	82		Dry	11		00		None noted	Dry								
9-Aug-05	12:30	94		Dry	2		00		None noted	Dry								
18-Aug-05	15:40	98	Yes	Normal	4	Clear	00,03	A: 1'	None noted	11.93	8.1	1.9	3645	32.0	0	220		
18-Aug-05	15:35	98	Yes	Normal	4	Clear	00,03	B:1'	None noted						10			
26-Aug-05	11:20	88		Dry	1		00		None noted	NSC								
10-Sep-05	12:00	88		Dry	15		00		None noted	NSC								
24-Sep-05	12:10	85		Dry	7		00		None noted	NSC								
14-Oct-05	11:27	82		Dry	3		00		None noted	NSC								
25-Oct-05	Skip			Skip	7					NSC								No recent rainfall
5-Nov-05	Skip			Skip	3					NSC								
14-Dec-05	13:46	45		High	15	Clear	00	2'	None noted	*	7.56	1.85	3530	5.1	6	16	8f	DO sensor broken
21-Dec-05	13:32	49		High	25	Clear	00	1.8'	Water Striders	*	7.65	1.89	3595	5.5	0	8		Owl under bridge
3-Jan-06	14:10	74		Normal	66	Clear	00	.7'	None noted	*	7.61	0.93	1816	11.3	2	15	14f	Armadillo
11-Jan-06	13:07	54		Normal	73	Clear	00	.5'	None noted	17.45	7.41	1.91	3636	6.0	0	6	11f B	
26-Jan-06	17:29	49		Normal	86	Clear	00	.7'	Water Striders	17.85	7.87	1.91	3612	11.0	2	0	0f B	
9-Feb-06	12:38	39		High	94	Clear	03	A: 1'	None noted	18.39	7.64	1.91	3628	7.3	0	0		
9-Feb-06	12:35	39		High	94	Clear	03	B: 1'	None noted	18.45	7.60	1.90	3620	7.3	86	210		Cattle count: 40 + Below
21-Feb-06	12:25	31		Normal	134	Clear	30,31	A: 1.5'	None noted	21.23	7.63	1.87	3569	3.0	12	18		Ice
21-Feb-06	12:20	31		Normal	134	Clear	30,32	B: 1.0'	None noted	21.03	7.63	1.86	3568	3.2	17	36		Ice
7-Mar-06	12:38	75		Normal	148	Clear	00,03	A: 1.5'	None noted	12.64	7.68	1.81	3428	17.8	14	15		
7-Mar-06	12:34	75		Normal	148	Clear	00,03	B: 0.7'	None noted	12.60	7.79	1.89	3434	17.9	23	15		15-20 Cliff Swallows, Owl
22-Mar-06	12:13	32	Yes	High	5	Clear	21,45	A: 2.0'	None noted	11.32	7.80	1.95	3693	8.8	12	28		Over 100 Turkey at corner
22-Mar-06	12:09	32	Yes	High	5	Clear	21,45	B: 1.5'	None noted	11.91	7.81	1.92	3637	9.5	5	27		of 83/256, Owl
3-Apr-06	12:09	77		Normal	2	Clear	03	A: 1.25'	Minnows	12.59	7.56	1.93	3641	19.2	22	38		50 Cliff Swallows, Owl
3-Apr-06	12:05	77		Normal	2	Clear	03	B: 0.75'	Minnows	15.05	7.63	1.92	3627	18.9	30	51		
17-Apr-06	14:15	99		Normal	14	Clear	00	A: 1.2'	Minnows,Tadpoles	6.60	7.57	1.92	3652	25.5	4	96		Some Swallows
17-Apr-06	14:10	99		Normal	14	Clear	00	B: 1.5'	Water Striders	5.73	7.61	1.81	3459	24.9	14	41		
2-May-06	15:30	85		High	5	Cloudy	03	A: 2.2'	None noted	6.42	7.73	1.92	3639	22.6	114	245		Recent flush has debris 8"
2-May-06	15:25	85		High	5	Cloudy	03	B: 1.0'	None noted	6.42	7.76	1.82	3470	22.5	84	268		above todays water level
10-May-06	13:06	67	Yes	High	1	Cloudy	00	A: 2.0'	None noted	9.62	7.64	0.90	1775	20.3	2010	2920		Photo of Cliff Swallows
10-May-06	13:00	67	Yes	High	1	Cloudy	00	B: 1.5'	None noted	7.37	7.63	0.92	1801	20.2	1440	1875		Someone hit Owl
22-May-06	12:36	84		Normal	13	Clear	00,03	A: 1.2'	Minnows	6.97	7.81	1.94	3692	26.3	50	320		Cliff Swallows all back
22-May-06	12:30	84		Normal	13	Clear	00,03	B: 0.7'	Minnows	9.14	7.85	1.94	3693	25.9	150	460		

Site 11 Date:	Time:	Air Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
5-Jun-06	12:41	97		Normal	6	Clear	00	A: 1'	None noted	7.78	7.92	1.79	3421	25.9	300	90		Swallows, cattle
5-Jun-06	12:36	97		Normal	6	Clear	00	B: 1'	None noted	8.85	7.93	0.95	1880	26.1	190	150		
13-Jun-06	13:29	91		Normal	14	Clear	00,04	A: .75'	Bluegill	7.51	7.85	1.95	3725	29.3	20	60		
13-Jun-06	13:25	91		Normal	14	Clear	00,04	B: .6'	Bluegill	8.41	7.82	1.94	3708	29.2	110	70		
27-Jun-06	8:35	68		Dry	5		03			NSC								Cliff Swallows gone
12-Jul-06	11:15	91		Dry	1		00			NSC								
1-Aug-06	9:16	86		Dry	21		03			NSC								
8-Aug-06	11:11	89		Dry	28		00			NSC								walked up creek 1/4 mile
15-Aug-06	9:23	76		Dry	35		03			NSC								
23-Aug-06	12:47	88	Yes		1	Cloudy	00,03	A: 2'	None noted	4.58	7.71	0.32	671	26.8	214	1350	278ec	
23-Aug-06	12:45	88	Yes		1	Cloudy	00,03	B: 1.5'	None noted	4.82	7.71	0.33	673	26.8	234	1050	900fc	
29-Aug-06	9:50	69		Dry	7		00			NSC								
11-Sep-06	13:43	80		Dry	9		03			NSC								
20-Sep-07	14:00	86		Dry	~14		00		None noted	NSC								Photo
3-Oct-06	9:50	74		Dry	21		00		None noted	NSC								Turkeys
24-Oct-06	12:37	67		Dry	10		00		None noted	NSC								Recent rain has flushed site
7-Nov-06	12:47	75		Dry	21		00		None noted	NSC								
13-Dec-07	12:40	56		Normal	60	Clear	00		None noted	*					21	39		* YSI -dead batteries
13-Dec-06	12:37	56		Normal	60	Clear	00		None noted	*					21	38		
10-Jan-07	14:50	64		Normal	10	Sl Cloudy	00	A: 1'	None noted	4.20	8.02	1.89	3592	7.7	1	11		
10-Jan-07	14:47	64		Normal	10	Sl Cloudy	00	B: 1'	None noted	4.37	8.01	1.91	3618	7.7	3	20		Dead Bobcat under bridge
12-Feb-07	13:35	63		Normal	10	Clear	00	A: 1.2'	Minnows	9.65	7.98	1.12	2182	11.6	1	5	1ec	
12-Feb-07	13:30	63		Normal	21	Clear	00	B: .65'	Minnows	9.35	7.96	1.12	2182	11.5	1	1	1ec	
6-Mar-07	13:50	71		Normal	45	Clear	00	A: 1.2'	Mosquito larva	11.03	7.89	1.89	3562	13.7	37	4		
6-Mar-07	11:16	71		Normal	45	Clear	00	B: .65'	Mosquito larva	11.01	8.00	1.89	3563	13.5	100	86		
27-Mar-07	14:20	68		Low	0	Clear	03	A: .67'	twigs,leaves floating	10.09	8.02	1.77	3361	19.9	74	200		
27-Mar-07	14:15	68		Low	0	Clear	03	B: .5'		10.19	8.01	1.78	3379	19.7	131	245		
11-Apr-07	13:53	66		Normal	10	Sl Cloudy	00	A: .9'	Some floating debris	13.19	8.12	1.95	3674	16.4	55	266		
11-Apr-07	13:48	66		Normal	10	Sl Cloudy	00	B: .75'	A few Cliff Swallows	13.21	8.13	1.95	3675	16.3	100	250		
24-Apr-07	14:20	77		Normal	2	Sl Cloudy	00	A: 2'	None noted	13.56	8.12	1.39	2682	22.6	795	0	0 fc	
24-Apr-07	14:15	77		Normal	2	Sl Cloudy	00	B: .5'	None noted	12.69	8.11	1.39	2687	22.5	693	0	0 fc	More birds are back
7-May-07	13:18	70		Normal	1	Sl Cloudy	00,02	A: .9'	Huge bullfrog	10.46	8.03	1.93	3656	22.0	75	91		Most birds are back
7-May-07	13:13	70		Normal	1	Sl Cloudy	00,02	B: .5'	Minnows	10.45	8.03	1.93	3655	22.0	95	83		
14-May-07	13:30	84		Normal	5	Cloudy	02	A: 1.5'	Minnows	10.28	8.12	1.40	2702	25.0	332	1920		Photos
14-May-07	13:25	84		Normal	5	Cloudy	02	B: .5'	Minnows	10.28	8.12	1.40	2702	25.0	320	1960		

A: = ABOVE
B: = Below
*- YSI Machine malfunctioned
** - Depth at sample in feet
¹ CRS - Can't reach site
² NST - No Sample Taken
³ Tracks:
⁴ Dissolved oxygen not working properly
⁵ Cattle count: Above ~30; Below ~60

Buck Creek Project
Site 12 Field Report
Hwy 62, Childress County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Dup. Count:	Field Comments:
17-May-04	12:00	80		Low	6	Murky	00	1.66'	None noted	11.51	6.2		1000	22.0	113		Construct. work
1-Jun-04	10:38	71		Low	19	Cloudy	00	2'	Minnows	16.97	6.8		5000	21.8	21		Construct. work
15-Jun-04	9:58	77		Normal	11	Clear	03,12,80	3'	None noted	8.76	7.6		3400	20.8	151		Trac: coon
20-Jun-04	18:05	82	Yes	Normal	2	Clear	03	1.25'	Minnows, frog	15.28	8.39		3644	30.0	38		
27-Jun-04	17:45	82	Yes	Normal	2	Murky	00,03	1.66'	Minnows	15.8	8.29		3272	27.5	85		
13-Jul-04	12:35	87		Normal	16	Murky	00	.5'	Turtle	13.27	7.79	1.74	3338	26.5	135		Trac: coon,turkey,skunk
28-Jul-04	12:34	89	Yes	Low	0	Clear	10	.75'	Minnows, frog	5.03	7.72	1.62	3108	22.8	1000	1280	Nest of quail
3-Aug-04	12:30	90		Low	10	Cloudy	00,03	.75'	Minnows, frog,turtle	13.96	8.49	1.55	3014	28.9	74		
11-Aug-04	13:20	92		No Flow	3	Scum	00,03		None noted	NSC							Water pooled
24-Aug-04	15:00	100		No Flow	12	Scum	03		None noted	NSC							
9-Sep-04	12:40			Dry	27		00		None noted	NSC							
22-Sep-04	14:05	77		Dry	0		21,03		None noted	NSC							
6-Oct-04	13:42	72	Yes	Dry	0		03		None noted	NSC							
18-Oct-04	16:15	80		Dry	0		00		None noted	NSC							Lots of wildlife tracs
4-Nov-04	14:10	61		Dry	1		00		None noted	NSC							
16-Nov-04	13:35	60	Yes	Dry	0		10		None noted	NSC							
1-Dec-04	14:39	51		Dry	5		00		None noted	NSC							Lots of wildlife tracs
8-Dec-04	14:15	60		Dry	2		00		None noted	NSC							Trac: coon,rabbit,cat
20-Dec-04	13:28	69		Dry	21		00		None noted	NSC							
3-Jan-05	14:35	50		Dry	14		03		None noted	NSC							
19-Jan-05	14:25	62		No Flow	15		00		None noted	NSC							3 adult pigs, 8-9 piglets
3-Feb-05	14:50			Dry	6		00		None noted	NSC							
17-Feb-05	14:35	49		Dry	11		02		None noted	NSC							Nest of Eagles??
28-Feb-05	14:45	61		Dry	1		00		None noted	NSC							
16-Mar-05	14:17		Yes	No Flow	0		03		None noted	NSC							Puddles
29-Mar-05	14:05	74		Dry	14		01		None noted	NSC							Lots of wildlife tracs
12-Apr-05	9:50	52		No Flow	1		00		None noted	NSC							Quail nest
21-Apr-05	14:26		Yes	High	1		00	1'	None noted	8.12	7.68	1.53	2957	25.4	43	29	Photos of wildlife tracs
04-May-05	14:46	62	Yes	High	0		30,10	.5'	None noted	11.69	7.69	2	3761	12.0	80		Lots of wildlife tracs
10-May-05	13:50	89		Normal	5		00	1.25'	Minnows	11.13	7.63	2.24	4217	24.3	45		
17-May-05	14:45	83		Normal	15		00	1.66'	None noted	11.79	7.87	2.19	4135	25.9	69		
26-May-05	13:44	66	Yes	Low	0		03	1	None noted	5.82	7.56	1.9	3608	20.5	60		Tracs: bobcat,canine
09-Jun-05	15:12	91		Low	10	Clear	03	1.5'	None noted	9.65	7.81	2.02	3864	30.6	180		
16-Jun-05	14:17	93		Low	13	Cloudy	00	.66'	None noted	7.46	7.58	1.92	3677	28.5	80		Lots of wildlife tracs
28-Jun-05	12:45	96		No-flow	25	Scum	00		None noted	NSC							Intermittent pools
12-Jul-05	13:00	89		No-flow	6		00		None noted	NSC							Puddles
26-Jul-05	15:20	95		Dry	11		00		None noted	Dry							
09-Aug-05	Skip	81		Dry	2		03			Dry							
18-Aug-05	17:25	99	Yes	Dry	4		00,03		None noted	Dry							

Site 12	Air °F	Rainfall	Flow	Last	Water	Weather	Sample	Biological	Salinity	Specific	Temp	E. coli	Dup.	Field			
Date:	Time:	Temp:	Event:	Rate:	Rain:	Appear:	Code:	Depth:	Activity:	DO:	pH:	PPT:	Cond:	° C:	Count:	Count:	Comments:
26-Aug-05	12:17	93		Dry	1		00		None noted	Dry							
10-Sep-05	Skip	88		Dry	15		00			Dry							
24-Sep-05	Skip	85		Dry	7		00			NSC							Site 11 dry
14-Oct-05	Skip	82		Dry	3		00			NSC							Site 11 dry
24-Oct-05	Skip	74		Dry	15		00			NSC							Site 11 dry
5-Nov-05	Skip	77		Dry	25		00			NSC							Site 11 dry
14-Dec-05	16:10	45		Dry	66		00		None noted	NSC							
21-Dec-05	10:56	42		Dry	73		00		None noted	NSC							Photos
3-Jan-06	11:45	66		Dry	66		00		None noted	NSC							
11-Jan-06	10:52	42		Dry	94		00		None noted	NSC							Cows Below
26-Jan-06	14:00	54		Dry	108		00		None noted	NSC							
9-Feb-06	10:15	37		Dry	122		00,03		None noted	NSC							
21-Feb-06	14:38	34		Dry	134		30,01		None noted	NSC							17 turkeys
7-Mar-06	14:58	78		Dry	148		00		None noted	NSC							
22-Mar-06	15:05	36	Yes	Dry	5		00		None noted	NSC							
3-Apr-06	9:47	63		Dry	2		03		None noted	NSC							Quail pair N side of bridge
17-Apr-06	12:08	90		Dry	14		00		None noted	NSC							
2-May-06	13:10	84		No-flow	5	Mud	00		None noted	NSC							Puddles;lots of tracks
10-May-06	15:31	70	Yes	High	1	Murky	00,03	.67'	None noted	7.33	8.04	1.89	3606	25.3	1255	1200	Turtle Above
22-May-06	14:35	93		Dry	13		00		None noted	NSC							
5-Jun-06	14:58	103		Low	6	Clear	00	2.'	2 Bluegill, turtle	6.22	8.01	1.87	3573	28.6	10	30	
13-Jun-06	9:17	77		Dry	14		03,04		None noted	NSC							Pair of Quail
27-Jun-06	8:30	68		No-flow	5		03		None noted	NSC							13 turkeys,rabbits,puddles
12-Jul-06	14:05	98		Dry	20		00,03		None noted	NSC							
1-Aug-06	9:12	86		Dry	39		03		None noted	NSC							
8-Aug-06	13:40	96		Dry	47		00,03		None noted	NSC							Numerous tracks
15-Aug-06	9:18	75		Dry	55		03		None noted	NSC							Cleaning B creek bed out
23-Aug-06	15:26	93	Yes	Normal	1	Cloudy	00,03	2'	None noted	4.23	8.05	0.17	368	27.8	346		Pools dug B are now full
29-Aug-06	15:46	81		Dry	7		00		None noted	NSC							
11-Sep-06	15:45	82		Dry	9		00		None noted	NSC							
20-Sep-07	16:20	94		Dry	14		00		None noted	NSC							Photo
3-Oct-06	9:40	73		Dry	21		00		None noted	NSC							
24-Oct-06	9:30	49		Dry	10		00		None noted	NSC							Colony of prarie dogs A to W
7-Nov-06	14:58	81		Dry	21		00		None noted	NSC							
13-Dec-06	10:15	48		Dry	60		00		None noted	NSC							
10-Jan-07	12:40	58		Dry	10		00		None noted	NSC							
12-Feb-07	15:50	59		Dry	21		02,00		None noted	NSC							
6-Mar-07	10:35	59		Dry	45		00		None noted	NSC							
27-Mar-07	14:30	69		Dry	0		02		None noted	NSC							few puddles
11-Apr-07	15:15	74		No Flow	10		00		None noted	NSC							intermittant pools
24-Apr-07	14:37	79		High	2	Cloudy	00	2'	None noted	13.62	8.08	1.97	3750	25.3	1200	1137	
7-May-07	10:42	65		Dry	1		02		None noted	NSC							intermittant pools
14-May-07	15:05	86		Normal	5	Sl Cloudy	02	0.8	Turtle	5.09	8.25	1.37	2676	29.4	174		2 water snakes, brown 3'

*= YSI Machine malfunctioned
 **= Depth at sample in feet
 Cattle count: Above~20; Below~ 15
¹ CRS= Can't reach site
² NSC= No Sample Collected
 * Dissolved oxygen not working properly

Buck Creek Project
 Site 13 Field Report
 Cr 19, Childress County

Date:	Time:	Air °F Temp:	Rainfall Event:	Flow Rate:	Last Rain:	Water Appear:	Weather Code:	Sample Depth:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
17-May-04	12:25	73		No flow	21	Skum	00		None noted	NSC ¹								Water pooled
1-Jun-04	11:16	72		No flow	5	Skum	00		None noted	NSC								2 does N
15-Jun-04	10:30	78		Normal	11	Clear	03,41	.75**	Minnows	9.72	7.88	1.91	3640	25.8	1000		1000	Trac: turkey
20-Jun-04	18:27	89	Yes	Normal	2	Clear	03	1'	Moss	16.46	8.04		4759	31.7	124			
27-Jun-04	18:55	90	Yes	Normal	2	Clear	03	17"	Minnows, frogs	15.14	8.17		3677	28.1	1000			
13-Jul-04	13:01	88		Low	16	Murky	00	13"	Minnows	9.51	7.95	2.34	4447	33.6	329			
28-Jul-04	Skip		Yes	Skip	0					NSC								
3-Aug-04	13:00	90		No flow	7	Murky	00,03		None noted	NSC								Muddy
11-Aug-04	13:40	93		No flow	14	Scum	00,03		None noted	NSC								
24-Aug-04	15:16	100		Dry	16		03		None noted	NSC	13:00							5 hogs 1/2 mile N
9-Sep-04	12:50	82		Dry	30		00		None noted	NSC								
22-Sep-04	14:10	77		Dry	0		00		None noted	NSC								
6-Oct-04	13:55	72	Yes	Dry	0		03		None noted	NSC								Less than 1/2" rain here
18-Oct-04	16:30	80		Dry	0		00		None noted	NSC								
4-Nov-04	14:25	61		Dry	1		00		None noted	NSC								
16-Nov-04	CRS ²	60	Yes	CRS	0		10,21			CRS								
1-Dec-04	14:51	51		Dry	5		00		None noted	NSC								Puddles
8-Dec-04	14:30	53		No flow	2		00,01		None noted	NSC								Mud
20-Dec-04	13:39	70		Dry	21		00		None noted	NSC								Mud puddles
3-Jan-05	14:45	48		Dry	14		03		None noted	NSC								Robins everywhere
19-Jan-05	14:38	62		High	15	Clear	00	1.5'	Moss, Water Boatman	17.07	7.6	1.97	3719	9.54	4			
3-Feb-05	15:18	57		High	6	Clear	00	1.5'	Water Strider bugs	20.38	8.31	2.48	4613	10.43	10			
17-Feb-05	14:42	49		Normal	11	Clear	02	1'	None noted	19.8	7.85		4710	11.6	19		24	New fence construction
28-Feb-05	15:10	62		Normal	1	Clear	00	1'	None noted	*	*	*	*	*	20			Photos of new fence
16-Mar-05	14:40	49	Yes	Normal	0	Clear	03,41	.66'	None noted	*	*	*	*	*	37			
29-Mar-05	14:15	74		Normal	14	Clear	01	.75'	None noted	14.94	7.84	2.77	5118	17	58			Trac: turkey
12-Apr-05	13:56	73		Normal	1	Clear	00	1'	Minnows, larvae, moss	11.49	7.82	2.65	4935	21.6	103			
21-Apr-05	14:49	73	Yes	High	1	Clear	00	.75'	Minnows	9.79	7.8	2.13	4044	26.7	116			Trac: coyote
04-May-05	15:26	59		High	0	Clear	30,10	1'	Dead crayfish	11.71	7.66	2.6	4817	12.9	75	290		Turkeys, photo bridge
10-May-05	14:11	91		Normal	5	Clear	00	0.5	Minnows, frogs	8.46	7.8	2.6	4893	30.74	0			
17-May-05	15:11	85		Normal	15	Clear	00	1.25'	Minnows, tadpoles	11.52	7.92	2.58	4836	27.9	115			
26-May-05	14:06	68	Yes	Low	0	Clear	03	1.5'	Minnows	9.99	7.8	2.56	4778	21.19	220			Coyote, turkey, beaver dam
09-Jun-05	15:30	93		Low	6	Clear	03	.66'	Minnows, water bugs	7.38	7.95	2.21	4228	34.04	110			
16-Jun-05	14:38	93		Low	13	Scum	00	.5'	Minnows, frogs	8.18	7.86	2.37	4515	34.7	620			Trac: turkey, deer, hog, quail
28-Jun-05	13:05	98		Dry	25		00		None noted	NSC								
12-Jul-05	13:15	90		Dry	6		00		None noted	NSC								
26-Jul-05	15:45	96		Dry	11		00		None noted	NSC								
09-Aug-05	Skip	81		Skip	2		03			NSC								
18-Aug-05	17:42	98	Yes	Dry	4		00,03		None noted	NSC								

Site 13 Date:	Air °F Time:	Rainfall Temp:	Flow Event:	Last Rate:	Water Rain:	Weather Appear:	Depth: Code:	Biological Activity:	DO:	pH:	Salinity PPT:	Specific Cond:	Temp ° C:	E. coli Count:	Fecal Count:	Dup. Count:	Field Comments:
26-Aug-05	Skip	88		Skip	2		00		NSC								
10-Sep-05	Skip	86		Skip	15		00		NSC								
24-Sep-05	Skip	81		Dry	7		00		NSC								
14-Oct-05	Skip	69		Skip	3		00		NSC								
25-Oct-05	Skip	69		Skip	15		00		NSC								
5-Nov-05	Skip	80		Skip	25		00		NSC								
14-Dec-05	16:30	45		Dry	66		00	None noted	NSC								Trees and bushes cleared
21-Dec-05	10:35	42		Dry	73		00	None noted	NSC								
3-Jan-06	11:27	66		Dry	86		00	None noted	NSC								
11-Jan-06	10:36	94		Dry	94		00	None noted	NSC								
26-Jan-06	13:45	54		Dry	108		00	None noted	NSC								
2-Feb-06	9:55	36		Dry	122		00	None noted	NSC								Three does
21-Feb-06	14:50	35		Dry	134		01	None noted	NSC								Six deer-3 does, 3 bucks
3-Mar-06	15:15	80		Dry	148		00	None noted	NSC								
22-Mar-06	Skip	36		Skip	5		00		NSC								
3-Apr-06	9:38	62		Dry	2		03	None noted	NSC								Few cattle A&B ~26 total
17-Apr-06	11:50	88		Dry	14		00	None noted	NSC								Photo
2-May-06	12:50	85		Dry	5		00	None noted	NSC								Recent flush-entire bottom
10-May-06	15:33	71	Yes	High	1	Cloudy	03	None noted	6.35	7.97	1.48	2859	26.4	900		1410	One deer
22-May-06	14:48	95		Dry	13		00	None noted	NSC								Turkey hens
5-Jun-06	15:23	101		Dry	6		00	None noted	NSC								Puddles
13-Jun-06	8:57	76		Dry	14		03,04	None noted	NSC								Bucks, 16 turkey, quail, dove
27-Jun-06	8:11	65		Dry	5		03		NSC								2 deer
12-Jul-06	14:24	99		Dry	1		00,03		NSC								Turkey: hen and poult
1-Aug-06	Skip			Dry	21				NSC								
8-Aug-06	13:55	97		Dry	28		00,03		NSC								Spring B is dry
15-Aug-06	8:51	76		Dry	35		03	None noted	NSC								4 deer, huge bobcat, quail
23-Aug-06	15:45	96	Yes	Normal	1	Cloudy	00,03	1'	None noted	3.62	7.86	0.12	259	31.9	262		Photo A
29-Aug-06	16:00	81		Dry	7		00	None noted	NSC								0
11-Sep-06	16:00	84		Dry	9		03	None noted	NSC								
20-Sep-07	16:20	94		Dry	~14		00	None noted	NSC								Photo
3-Oct-06	Skip	73		Dry	21		00	None noted	NSC								OK and site 12 dry, no rain
24-Oct-06	Skip	49		Dry	10		00		NSC								OK and site 12 dry, no rain
7-Nov-06	Skip	81		Dry	21		00		NSC								OK and site 12 dry, no rain
13-Dec-06	10:01	48		Dry	60		00	None noted	NSC								
10-Jan-07	Skip	58		Dry	10		00		NSC								
12-Feb-07	Skip	59		Dry	21		00,02		NSC								
6-Mar-07	10:10	59		Dry	45		00	None noted	NSC								1 deer
27-Mar-07	15:00	69		Dry	0		02	None noted	NSC								Puddles below
11-Apr-07	15:26	72		Dry	12		00	None noted	NSC								
24-Apr-07	Skip			Skip	2		00		NSC								running late
7-May-07	10:28	64		NSC	1		02	None noted	NSC								Puddles, turkey, road runner
14-May-07	15:30	88		High	5	Cloudy	02	2.33'	None noted	4.53	8.29	1.43	2795	31.1	46		54

*= YSI Machine malfunctioned
**= Depth at sample in feet
¹ NSC= No Sample Collected
² CRS= Can't reach site
~ Dissolved oxygen not working properly

Appendix B: Buck Creek Sampling Site Report

Buck Creek Project Site Sampling Report

Collecting Agency: Texas Agricultural Experiment Station-Vernon

Rainfall Event: Yes No

Date: _____ Time: _____ Temperature: _____ °F

Site ID: _____ Station Description: _____

Collector Name(s): _____

Flow Severity: 1-no flow 2-low 3-normal 4-flood 5-high 6-dry

Water Level: norm low high Days since last significant rainfall: _____

Samples Taken: 0 1 2 3 Above Below

Water appearance: _____

Weather Observations: _____

Water Depth: _____

Stream Uses: Wildlife, Livestock

Unusual Odors: _____

Biological Activity: _____

FIELD PARAMETERS:

Dissolved Oxygen: _____ mg/l pH: _____ Salinity ppt: _____

Specific Conductance: _____ µs/cm Temperature: _____ °C TDS: _____

Technician(s): _____

LAB REPORT:

In Lab: _____

Incubator @ 35° C: Time In: _____ Out: _____

W/J Incubator @ 44.5°C: Time In: _____ Out: _____

LAB COUNTS:

Fecal Count:	Above:		colonies /100ml	Duplicate:	colonies /100ml
	Below:		colonies /100ml	Duplicate:	colonies /100ml
E. coli Count:	Above:		colonies /100ml	Duplicate:	colonies /100ml
	Below:		colonies /100ml	Duplicate:	colonies /100ml
Field Control:			colonies /100ml		
Positive Control:			colonies /100ml		
Lab Control:			colonies /100ml		

Dishes Prewarmed: Yes No

Lab Technician(s): _____

FIELD COMMENTS:

Appendix C: Field Data Reporting Form

Field Data Reporting Form

Station ID

Date

Time

Depth (ft)

Sample ID

COC Number

Collector Name(s)

Collecting Agency

Station Description

Circle one:

Flow Severity: 1-no flow 2-low 3-normal 4-flood 5-high 6-dry

Days since last significant rainfall:

Weather Observations (use codes from back)

Field Parameters

Dissolved Oxygen (DO)

.

ppm

pH

Specific Conductance

μS/cm

Temperature

°C

Other Observations:

00: No significant weather observed
 01: Clouds generally dissolving or becoming less developed
 02: State of sky on the whole unchanged during the past hour
 03: Clouds generally forming or developing during the past hour
 04: Haze, smoke, or dust in suspension in the air,
 visibility equal to or greater than 1 km
 05: Smoke
 10: Mist
 12: Distant lightning
 18: Squalls
 20: Fog during previous hour,
 21: Precipitation during previous hour
 22: Drizzle (not freezing) or snow grains during previous hour
 23: Rain (not freezing) during previous hour
 25: Freezing drizzle or freezing rain during previous hour,
 26: Thunderstorm (with or without precipitation) during previous hour,
 27: Blowing or drifting snow or sand
 28: Blowing or drifting snow or sand,
 visibility equal to or greater than 1 km
 29: Blowing or drifting snow or sand, visibility less than 1 km
 30: Fog
 31: Fog or ice fog in patches
 32: Fog or ice fog, has become thinner during the past hour
 33: Fog or ice fog, no appreciable change during the past hour
 34: Fog or ice fog, has begun or become thicker during the past hour
 35: Fog, depositing rime
 40: Precipitation
 41: Precipitation, slight or moderate
 42: Precipitation, heavy
 43: Liquid precipitation, slight or moderate
 44: Liquid precipitation, heavy
 45: Solid precipitation, slight or moderate
 46: Solid precipitation, heavy
 50: Drizzle
 51: Drizzle, not freezing, slight
 52: Drizzle, not freezing, moderate
 53: Drizzle, not freezing, heavy
 54: Drizzle, freezing, slight
 55: Drizzle, freezing, moderate
 56: Drizzle, freezing, heavy
 57: Drizzle and rain, slight
 58: Drizzle and rain, moderate or heavy
 60: Rain
 61: Rain, not freezing, slight
 62: Rain, not freezing, moderate
 63: Rain, not freezing, heavy
 64: Rain, freezing, slight
 65: Rain, freezing, moderate
 66: Rain, freezing, heavy
 67: Rain or drizzle and snow, slight
 68: Rain or drizzle and snow, moderate or heavy
 80: Showers or intermittent precipitation
 81: Rain showers or intermittent rain, slight
 82: Rain showers or intermittent rain, moderate
 83: Rain showers or intermittent rain, heavy
 84: Rain showers or intermittent rain, violent
 90: Thunderstorm
 91: Thunderstorm, slight or moderate, with no precipitation
 92: Thunderstorm, slight or moderate,
 with rain showers and/or snow showers
 93: Thunderstorm, slight or moderate, with hail
 94: Thunderstorm, heavy, with no precipitation
 95: Thunderstorm, heavy, with rain showers and/or snow
 96: Thunderstorm, heavy, with hail

