



Missouri
Department of
Natural Resources

Use Attainability Analysis

for

WBID 0531U-01 Brushy Creek (Unclassified)

Submitted by

Alliance Water Resources, Inc.

To

Missouri Department of Natural Resources
Water Protection Program

Date Received: February 25, 2005

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WATER PROTECTION PROGRAM

Alliance Water Resources, Inc
PO Box 245 - 2311 East Grand Avenue
Cameron, MO 64429

Mr. Phil Schroeder
Missouri Department of Natural Resources
Water Protection Program
PO Box 176
Jefferson City, MO 65102

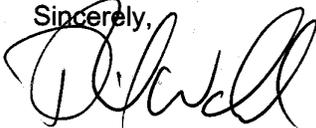
Dear Mr. Schroeder:

Over the past several weeks a Use Attainability Analysis (UAA) has been conducted on Brushy Creek. Brushy Creek is located in SE DeKalb and NW Caldwell counties. The UAA focused on a 3.5 mile stretch of Brushy Creek that begins at the City of Cameron WWTP 001 discharge (located in DeKalb County) to the second Brushy Creek, Highway 36 overpass (located in Caldwell County). The UAA was performed on a section of Brushy Creek that is currently unclassified. Brushy Creek becomes a classified stream at the confluence of Long Brach Creek, which is located approximately ~~3.8~~ 2.7 miles downstream from the City of Cameron WWTP 001 discharge.

The purpose of the UAA is to determine what uses are currently being attained in the abovementioned section of Brushy Creek. To determine the current attainment of uses, a creek survey was performed, and interviews with landowners and users of Brushy Creek were conducted. Data collected from these two activities is presented in this report.

If you have any questions, or find that there is insufficient data in the UAA to determine a use, please call me at 816-632-7361.

Sincerely,



Phil Webster, Alliance Water Resources, Inc. Local Manager, Cameron Division

Use Attainability Analysis Brushy Creek

Statement of the Issue

The UAA consisted of four steps: reviewing UAA protocol, conducting a survey of Brushy Creek, conducting interviews with landowners and creek users, and compiling the data into the final report.

The survey conducted on Brushy Creek occurred on October 31, 2004. The main purpose of the survey was to collect data on creek depths, signs of human use, and catalogue creek sites by location, description and photographic record. During the survey, observed signs of human use were two ATV crossings. The first located approximately 1.5 miles (2.4 km) from the WWTP 001 discharge, and the second, located approximately 3.2 miles (5.1 km) from the WWTP 001 discharge. Maximum water depths in the creek were measured at 3 feet (0.92 m), and the average depth of the creek was calculated at 1.38 feet (0.42 m). Maximum and average water depths listed in criteria #2 of the evaluation protocol for recreational use attainability analysis, are 3.28 feet (1 m), and 1.64 feet (0.5 m) respectively.¹

For the interview phase of the study, a set of “open ended” questions was developed for people (young and old) who either: owned land around the creek, lived near the creek, or had a history of using the creek for recreational attainment. A total of 7 interviews were conducted. The interviews revealed that the primary uses of the creek were for agriculture (watering cows), and providing a preferred route of transportation for area hunters.

Based on data collected from the creek survey and interviews, the following attainment of uses were documented:²

- Use #2: Livestock and Wildlife Watering
- Use #9: Boating and Canoeing
- Use #13: Habitat for resident and migratory wildlife species
- Use #14: Recreational, cultural, educational, scientific, and natural aesthetic values and uses.

1- Recreation Use Attainability Analysis Protocol, Missouri Department of Natural Resources, Water Protection Program, September 29, 2004. Page 11.

2 - Recreation Use Attainability Analysis Protocol, Missouri Department of Natural Resources, Water Protection Program, September 29, 2004. Pages 7, 8, & 9.

Presentation and Evaluation of Data

Brushy Creek Study Area

Brushy Creek begins in NE Clinton County as a Class C stream. As the creek flows north into extreme SE DeKalb County, the City of Cameron WWTP 001 discharge enters the creek. At this point the creek becomes a class P stream. The creek flows along the border between DeKalb and Caldwell Counties, and crosses Highway 36, flowing north. The creek meanders through agriculture land and bends to the east. At approximately 2 miles downstream from the 001 discharge, the creek flows under Sale Barn Road. The creek continues to meander east through more agriculture land. At approximately 3 miles (4.8 km) downstream from the 001 discharge the creek bends to the south and crosses under Highway 36 again. At approximately 3.8 miles (6.11 km) from the 001 discharge, Long Branch Creek enters Brushy Creek.

Brushy Creek is located geographically in the glaciated plains of NW Missouri. The topography of the area is gently rolling hills with steep to broad valleys. Land use in the area is predominately agricultural, with row cropping and beef production making up most of the agriculture economy. Creek channels tend to be cut well into the topography, and are typically lined with stands timber. There is abundant wildlife in the area, making hunting a popular activity. The area around the study area is lightly populated, typically a house for every 100 or so acres of ground.

Picture 1



A downstream view of Brushy Creek (location: 39 45 04 N; 94 12 19 W). This view is very typical of the first mile of the creek. Cobble and gravel predominate, with the creek meandering between pool and riffle. Maximum pool depth measured 2.5 feet (0.76 m).

Picture 2



A downstream view of Brushy Creek (location: 39 45 43 N, 94 11 42 W). This view is very typical of the second mile of the creek. Maximum pool depths measured 1.9 feet (0.58 m), Riffles becoming less predominant with pools being connected by narrow runs. Bars are composed of mud and sand. Creek bottom is composed of gravel overlaid in places by mud and sand.

Picture 3



Downstream view of Brushy Creek (location: 39 45 37 N; 94 10 44 W). This view is very typical of the third mile of the creek. Maximum pool depth measured 3 feet (0.92 M). Riffles are few, the creek meanders from run to pool. Bars are composed mostly of sand.

Map



Copy of USGS topographic map (scale 1:24,000) . Map depicts study area with sites identified. Site #1 is the Cameron WWT plant 001 outfall structure. Site #12 is the second highway 36 overpass.

Field Data Sheet for Recreational Use Stream Surveys

Field Sheet A – Water Body Identification

Water Body Name: Brushy Creek
8 Digit HUC: 10280101
Missouri WBID#: 00531

DOQQ
KC East
• Winston
• Cameron East

County: DeKalb and Caldwell

Upstream Legal Description:

- SE1/4, SW1/4, Sec. 13, T57N, R30W, DeKalb County

Downstream Legal Description: All of the following:

- SE1/4, Sec. 13, T57N, R30W, DeKalb County
- NW1/4, Sec. 18, T57N, R29W, Caldwell County
- SE1/4, Sec. 7, T57N, R29W, Caldwell County
- SW1/4, Sec. 8, T57N, R29W, Caldwell County
- NE1/4, Sec. 17, T57N, R29W, Caldwell County

Upstream Coordinates: NA

Downstream Coordinates: Presented in Brushy Creek Survey data

Discharger Facility Name: Cameron Wastewater Treatment Facility
Discharger Permit #: MO-0104299

Number of Sites Evaluated: 12

Name of Surveyor and Telephone Number: Phil Webster, 816-632-7361
Organization: Alliance Water Resources, Inc.

Position: Local Manager

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: _____



Date: _____

2-23-05

Brushy Creek Survey

General Notes:

- Phil Webster conducted a survey of Brushy Creek on October 31, 2004. The survey started at 12:00 pm and ended at 3:30 pm.
- The survey began at the Cameron WWT plant 001 discharge structure (site #1) and concluded at the second highway 36 overpass (site #12), covering a distance of approximately 3.4 miles.
- The survey was conducted by physically walking the creek in order to take digital pictures, water depth measurements and GPS readings at significant locations.
- There were 3 road overpasses, one abandoned RR overpass, and two ATV crossings encountered during the survey.
- No other evidence of human use was observed. The surveyor specifically looked for burnt wood, fire rings, rope swings, trash (beer cans, bottles, etc.), footpaths, and foot tracks.
- Several species of wildlife and several schools of fish were observed during the survey.
- Field Data Sheet B – Site Characterization, is incorporated into the presentation of data collected from the Brushy Creek Survey.

Data

- Widths and lengths of runs, riffles and pools are approximations. Maximum depths are accurate measurements taken to the nearest inch. Average depth was calculated by averaging all depth measurements recorded during the survey. Flow was approximately by using daily flow data from the Cameron WWT plant.

Weather

- Weather for the day of the survey and the previous 7 days is listed in the table below:

Date	Precipitation (inches)	Min. Temp	Max. Temp	Barometric Pressure	Wind
10-24-04		44	68	29.88	6mph-SSE
10-25-04		48	66	29.96	7mph-NNE
10-26-04	0.64	55	65	29.93	5mph-NE
10-27-04	0.35	57	63	30.04	7mph-ENE
10-28-04		57	72	29.96	9mph-SSE
10-29-04	0.46	55	79	29.60	14mph-SSW
10-30-04		45	61	29.79	23mph-W
10-31-04		40	66	29.89	2mph-ESE

- At the time of the survey, the temperature was in the 60's, with cloudy skies and light and variable winds.

Site #1

Location: 001 Discharge Structure

Site GPS Coordinates	39 44 58 N; 94 12 28 W
Date & Time	10-31-04; 12 noon
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	Stairs
Evidence of Human Use	NPDES Discharge

Picture 4



Upstream View

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Pool	10 feet	ND	ND	ND

Picture 5



Downstream View

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Pool	20 feet	40 feet	2.16 feet	1.08 feet

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
	50%		10%	40%	

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	Fine Sediments	None

Aquatic Vegetation: Algae growth on approximately 25% of the creek bottom.
 Flow: 2.4 ft³/sec

Site #2

Location: Waterfall (downstream)

Site GPS Coordinates	39 45 04 N 94 12 19 W
Date & Time	10-31-04
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	None
Evidence of Human Use	None

Picture 6



Upstream View

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	15 feet	50 feet	1.33 feet	0.67 feet

Picture 7



Downstream View

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Riffle	15 feet	40 feet	0.58 feet	

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
50%	50%				

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	None	None

Aquatic Vegetation: None

Flow: 2.4 ft³/sec

Site #3

Location: Highway 36 Overpass

Site GPS Coordinates	39 45 04 N 94 12 19 W
Date & Time	10-31-04
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	Steep Slopes
Evidence of Human Use	None

Picture 8



Upstream View

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	10 feet	40 feet	1.25 feet	0.63 feet

Picture 9



Downstream View

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Concrete Channel	12 feet	250 feet	ND	ND

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
	60%			40%	

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	None	None

Aquatic Vegetation: None

Flow: 2.4 ft³/sec

Site #4

Location: Abandoned RR Crossing

Site GPS Coordinates	39 45 06 N 94 12 19 W
Date & Time	10-31-04
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	Steep Slopes
Evidence of Human Use	None

Picture 10



Upstream View

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Pool	20 feet	50 feet	2.31 feet	1.16 feet

Picture 11



Downstream View

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Riffle	7 feet	15 feet	.41 feet	

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
	50%		25%	25%	

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	Fine Sediments	None

Aquatic Vegetation: None

Flow: 2.4 ft³/sec

Site #5

Location: Another Creek #1

Site GPS Coordinates	39 45 33 N 94 12 07 W
Date & Time	10-31-04
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	Steep Slopes
Evidence of Human Use	None

Picture 12



Upstream View

Picture 13



Another Creek #1

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Pool	20 feet	40 feet	1.75 feet	0.89 feet

Picture 14



Downstream View

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	8 feet	100 feet	2.72 feet	1.36 feet

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
	60%	20%		20%	

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	None	None

Aquatic Vegetation: None

Flow: 2.4 ft³/sec

Site #6

Location: Another Creek #2

Site GPS Coordinates	39 45 38 N 94 11 52 W
Date & Time	10-31-04
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	Steep Slopes
Evidence of Human Use	None

Picture 15



Upstream View

Picture 16



Another Creek #2

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Riffle	10 feet	20 feet	0.5 feet	

Picture 17



Downstream View

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	20 feet	75 feet	1.92 feet	0.96 feet

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
	50%	20%		30%	

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	None	None

Aquatic Vegetation: None

Flow: 2.4 ft³/sec

Site #7

Location: ATV Crossing #1

Site GPS Coordinates	39 45 42 N 94 11 20 W
Date & Time	10-31-04, 2:00 pm
Personnel	Phil Webster
Uses Observed	ATV Tracks
Surrounding Conditions	ATV Tracks
Evidence of Human Use	ATV Crossing

Picture 18



ATV Tracks

Upstream Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Riffle	20 feet	15 feet	0.41 feet	

Picture 19



Downstream

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	20 feet	50 feet	1.5 feet	0.75 feet

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
75%	25%				

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	None	None

Aquatic Vegetation: None

Flow: 2.4 ft³/sec

Site #8

Location: Sale Barn Road Overpass

Site GPS Coordinates	39 45 39 N 94 11 10 W
Date & Time	10-31-04, 2:20 pm
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	Steep Slopes
Evidence of Human Use	None

Picture 20



Upstream View

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	20 feet	75 feet	1.5 feet	0.75 feet

Picture 21



Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	20 feet	100 feet	2.31 feet	1.16 feet

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
	60%	15%		25%	

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	Fine Sediments	None

Aquatic Vegetation: None

Flow: 2.4 ft³/sec

Site #9

Location: First Bend Past 'Boat Creek'

Site GPS Coordinates	39 45 40 N 94 10 52 W
Date & Time	10-31-04
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	None
Evidence of Human Use	None

Picture 22



Upstream View

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Pool	25 feet	40 feet	2.23 feet	1.12 feet

Picture 23



Downstream View

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Riffle	12 feet	20 feet	0.58 feet	

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
	50%	25%		25%	

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	Fine Sediments	None

Aquatic Vegetation: None

Flow: 2.4 ft³/sec

Site #10

Location: Approximately 3 Miles Downstream From 001 Discharge Structure

Site GPS Coordinates	39 45 22 N 94 10 14 W
Date & Time	10-31-04, 3:10 pm
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	None
Evidence of Human Use	None

Picture 24



Upstream View

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	20 feet	50 feet	0.58 feet	

Picture 25



Downstream View

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	20 feet	50 feet	0.58 feet	

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
	50%	25%		25%	

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	Fine Sediments	None

Aquatic Vegetation: None

Flow: 2.4 ft³/sec

Site #11

Location: ATV Crossing #2

Site GPS Coordinates	39 44 18 N 94 10 08 W
Date & Time	10-31-04
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	None
Evidence of Human Use	ATV Crossing

Picture 26



ATV Tracks

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	15 feet	40 feet	1.5 feet	0.75 feet

Picture 27



Downstream View

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	15 feet	40 feet	1.58 feet	0.79 feet

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
	50%	25%		25%	

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	Fine Sediment	None

Aquatic Vegetation: None

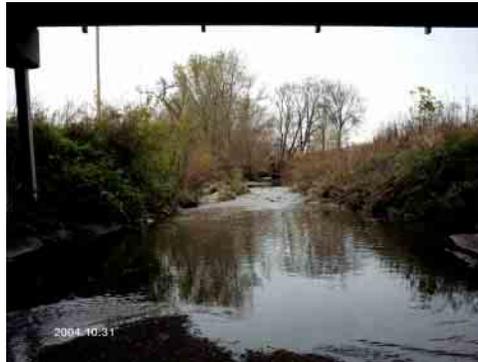
Flow: 2.4 ft³/sec

Site #12

Location: Highway 36 Overpass

Site GPS Coordinates	39 45 07 N 94 10 05 W
Date & Time	10-31-04, 3:30 pm
Personnel	Phil Webster
Uses Observed	None
Surrounding Conditions	None
Evidence of Human Use	None

Picture 28



Upstream View

Upstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	15 feet	40 feet	3.0 feet	1.5 feet

Picture 29



Downstream View

Downstream View Physical Dimensions

Feature	Width	Length	Max. Depth	Avg. Depth
Run	15 feet	ND	ND	

Substrate

Cobble	Gravel	Sand	Silt	Mud/Clay	Bedrock
	25%	50%		25%	

Water Characteristics

Odor	Color	Bottom Deposit	Surface Deposit
None	Clear	Fine Sediments	None

Aquatic Vegetation: None

Flow: 2.4 ft³/sec

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on the UAA datasheets for sites 1 through 12, is true and accurate.

Signed:



Date:

2-23-05

Organization:

Alliance Water Resources, Inc.

Position:

Local Manager - Cameron Division

Interviews

The following interviews were conducted with landowners and/or creek users. Phil Webster conducted all interviews.

A specific set of questions was developed for the interviews. These questions are as follows:

- How do you utilize the creek?
- What value does the creek have to you?
- How many times do you use the creek?
- What are these uses?
- Do you know anyone who uses the creek?
- Do you plan to use the creek in the future?
- If, so what for?

The interviews consisted of me (Phil Webster), asking the questions, and writing down the answers to these questions. The interviews were either conducted in person or over the telephone. The results of the interviews are presented below in narrative form.

Name: Cory Stuedel

Date: 11-24-04

Note: Cory is a local resident, and a senior in high school.

Cory uses the creek to trap furbearers. Cory sets his traps in the creek at the second highway 36-bridge crossing, and at the old highway 36-bridge crossing. Cory stated that he would get creek water splashed on him while running his traps. Cory stated that he has set traps in the creek for several years and plans to continue to use the creek for trapping. Cory stated that he does not see any future changes in how he is using the creek.

Name: Gene Robeson

Date: 11-3-04

Note: Gene is a landowner.

Gene stated that he uses the creek to water his cows from late December to March. He also uses the creek to trap minnows. The creek is valuable to Gene because it saves him money when he uses the creek to water his cows. Gene uses the creek for approximately 3 months, every winter. Gene stated that he does not know of anyone who uses the creek other than his son (Scott). His son uses the creek when hunting. Gene stated that Cory Stuedel asked if he could run traps in the creek on Gene's property, but Gene denied the request because he does not want his dogs to get caught in the traps. Gene stated that he does not anticipate any changes in how he currently utilizes the creek.

Name: Scott Robeson

Date: 11-11-04

Note: Scott is Gene's son. He is a sophomore in college.

Scott stated that he uses the creek as a convenient way to get around when hunting. Scott stated that he used the creek to swim in once, about 6 or 7 years ago. Scott stated that he uses the creek every (deer) hunting season. Scott stated that a friend of his, Luke Schlorf, also uses the creek for hunting. Scott does not anticipate any changes in the way he uses the creek. Scott stated that he does not anticipate anyone using the creek for at least the next 10 to 15 years.

Name: Mike Earley

Date: 10-25-04

Note: Mike is a landowner.

Mike stated that he does not utilize the creek. Mike row crops in a field adjacent to the creek and stated that in dry years he can raise more crops (bushel per acre) because of the influence the creek has on increasing soil moisture. Mike stated that another landowner; Bill Watkins may utilize the creek. Mike stated that he may use the creek in the future for irrigation, but had no immediate plans to do so.

Name: Betsy McClure

Date: 10-25-04

Note: Betsy is a landowner.

Betsy stated that she does not utilize the creek. Betsy has seen hunters around the creek, but does not know who they are, and stated that she does not allow anyone to walk on her property in order to access the creek. Betsy remembers playing in the creek in the late 1970's.

Name: Steve Heldenbrand

Date: 10-27-04

Note: Steve is a landowner.

Steve stated that he does not use the creek but does hunt around it. Steve stated that he has no future plans to utilize the creek except, maybe for irrigation. Steve does not know of anyone who uses the creek.

Name: Bill Watkins

Date: 11-2-04

Note: Bill is a landowner.

Bill stated that he does not use the creek at all and that all it can be used for is to maybe catch minnows. Bill claims that the creek is too shallow for fishing. Bill stated that he has never used the creek, does not plan to use the creek, and does not know of anyone who uses the creek.