



Missouri
Department of
Natural Resources

Use Attainability Analysis

for

WBID 0991 South Moreau Creek

Submitted by
Olsson Associates.

To
Missouri Department of Natural Resources
Water Protection Program

On
October 14, 2008

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet A – Water Body Identification

I. Water Body Information (for water body being surveyed)

Water Body Name (from USGS 7.5' quad): S. Moreau Cr.
Missouri Water Body Identification (WBID) Number: 991
8-digit HUC: 10030012
County(ies), Listed Upstream to Downstream: Miller
Upstream Legal Description (from Table H): 31, 42N, 15
Downstream Legal Description (from Table H): 7, 42N, 15W
Number of sites evaluated: 4
List all site numbers, <u>consecutively upstream to downstream</u> : 1, 2, 3, 4
Include a Site Location Map(s). The map must include all requirements detailed in the <i>Missouri Recreational Use Attainability Analyses: Water Body Survey and Assessment Protocol</i> (Section IV.D.8.a).

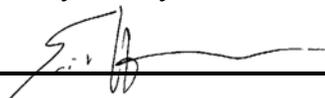
II. Facility Information (list all permitted discharges to this water body segment)

Facility Name(s) and Permit Number(s): Barnett Manor MO 0097144
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III. UAA Surveyor (please **PRINT** legibly)

Name of Surveyor: Eric Hertzler	Telephone Number: 417-890-8802
Organization/Employer: Olsson Associates	

Please verify that you have completed all sections of all data sheets, checked all applicable boxes, provided a map (that includes all requirements listed in the *Missouri Recreational Use Attainability Analyses: Water Body Survey and Assessment Protocol*) and that this form is complete.

Signed:  _____ **Date:** 08-26-08

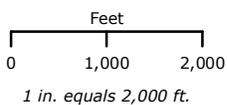


S. Moreau Cr. 1/2

**MISSOURI RECREATIONAL
USE ATTAINABILITY ANALYSIS**

Stream: S. Moreau Cr.
WBID: 991

Map Sheet: 2/2
County: Miller



Project No. 008-1298

WBID # 991

Site # 1

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 1 of 3)

(must be completed for each site)

Date & Time: 08-26-08 9:10 A.M.	Location Description (e.g., road crossing):
Stream Name: s. Moreau Cr.	Bridge @ Miller Rd.
Current Weather Conditions: sunny	Facility Name(s): Barnett Manor
Weather Conditions for Past 10 days:0.98” @ Osage Beach	Permit Number(s): MO 0097144
Official Drought Conditions at time of this survey (search DNR home page for “drought”): No drought <input checked="" type="checkbox"/> ; Phase I <input type="checkbox"/> ; Phase II <input type="checkbox"/> ; Phase III <input type="checkbox"/> ; Phase IV <input type="checkbox"/> ; Unknown <input type="checkbox"/>	

Site Location:

LOCATION COORDINATES (UNIVERSAL TRANSVERSE MERCATOR PROJECTION, IN METERS)				
Site 01	Easting (UTM X): 531498	Northing (UTM Y): 4245030	Horizontal Accuracy: (EPE / FOM / PDOP)	122 ft. Meters
Site 11	Easting (UTM X): 531570	Northing (UTM Y): 4245195	Horizontal Accuracy: (EPE / FOM / PDOP)	198 ft. Meters

Photos:

Photo ID#	Photo Purpose	Photo ID#	Photo Purpose	Photo ID#	Photo Purpose
991-1-A	Upstream looking down	991-1-D	Pool		
Photo ID#	Photo Purpose	Photo ID#	Photo Purpose	Photo ID#	Photo Purpose
991-1-B	Downstream looking up				
Photo ID#	Photo Purpose	Photo ID#	Photo Purpose	Photo ID#	Photo Purpose
991-1-C	Inner tube				

Uses Observed*: (Uses actually observed at the time of survey.)

<input type="checkbox"/> Swimming	<input type="checkbox"/> Skin diving	<input type="checkbox"/> SCUBA diving	<input type="checkbox"/> Tubing	<input type="checkbox"/> Water skiing
<input type="checkbox"/> Wind surfing	<input type="checkbox"/> Kayaking	<input type="checkbox"/> Boating	<input type="checkbox"/> Wading	<input type="checkbox"/> Rafting
<input type="checkbox"/> Hunting	<input type="checkbox"/> Trapping	<input type="checkbox"/> Fishing	<input checked="" type="checkbox"/> None of the above	<input type="checkbox"/> Other:
Describe: (Include number of individuals recreating, photo-documentation of evidence of recreational uses, etc. Use <i>Data Sheet D- Recreational Use Interview</i> when conducting interviews.)				

Site # 1

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 2 of 3)

Surrounding Conditions*: (Mark all that promote or impede recreational uses. Attach photos of evidence or unusual items of interest.)

<input type="checkbox"/> City/county parks	<input type="checkbox"/> Playgrounds	<input type="checkbox"/> MDC conservation lands	<input type="checkbox"/> Urban areas	<input type="checkbox"/> Rural Residential
<input type="checkbox"/> Campgrounds	<input type="checkbox"/> State parks	<input type="checkbox"/> National forests	<input type="checkbox"/> Nature trails	<input type="checkbox"/> Stairs/walkway
<input type="checkbox"/> Boating accesses	<input type="checkbox"/> Fence	<input type="checkbox"/> No trespass sign	<input type="checkbox"/> Steep slopes	<input type="checkbox"/> Other:
Comments: None				

Evidence of Human Use*: (Attach photos and reference in "Photos" section.)

<input type="checkbox"/> Roads	<input type="checkbox"/> Foot paths/prints	<input type="checkbox"/> Dock/platform	<input type="checkbox"/> Camping Sites	<input type="checkbox"/> Rope swings
<input type="checkbox"/> RV / ATV Tracks	<input type="checkbox"/> Fire pit/ring	<input type="checkbox"/> NPDES Discharge	<input type="checkbox"/> Fishing Tackle	<input type="checkbox"/> Livestock Watering
<input checked="" type="checkbox"/> None of the above	Comments / Other: Inner tube – see photo 991-1-C			

Substrate*: (These values should add up to 100%.)

% Cobble	60% Gravel	20% Sand	% Silt	% Mud/Clay	20% Bedrock
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Aquatic Vegetation*: (Note amount of vegetation or algal growth at the assessment site.)

Moss on rocks.

Water Characteristics*: (Mark all that apply.)

Odor:	<input type="checkbox"/> Sewage	<input type="checkbox"/> Musky	<input type="checkbox"/> Chemical	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:
Color:	<input checked="" type="checkbox"/> Clear	<input type="checkbox"/> Green	<input type="checkbox"/> Gray	<input type="checkbox"/> Milky	<input type="checkbox"/> Other:
Bottom Deposit:	<input type="checkbox"/> Sludge	<input type="checkbox"/> Solids	<input type="checkbox"/> Fine sediments	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:
Surface Deposit:	<input type="checkbox"/> Oil	<input type="checkbox"/> Scum	<input type="checkbox"/> Foam	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:

*This information is not to be used solely for removal of a recreational use designation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that affect another use.

Site # 1

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 3 of 3)

Additional Stream Morphology: (Record isolated pools or other features identified during the survey that may support recreational uses.)

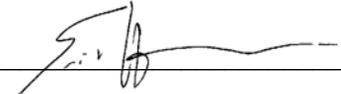
Channel Feature	Distance from access location (m)	Width (m)	Length (m)	Median Depth (m)	Max Depth (m)
Pool	400 meters	10	15	.30	.80

Comments: (Please record any additional comments here.)

Pool found upstream of transect. See photo 991-1-D

Please verify that you have completed all sections, checked all applicable boxes, and that the form is complete.

Printed Names of Personnel Collecting Data: Eric Hertzler

Surveyor's Signature:  Date of Survey: 08-26-08

Organization: Olsson Associates Position: Field Service

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet C - Field Survey Results

Stream Name: <u>S. Moreau Cr.</u> Waterbody ID: <u>991</u> Site #: <u>1</u> Estimated Channel Incision: <u>0.5</u> (m) (height between low bank width and water) GPS Location - Easting (UTM X), Northing (UTM Y), Horizontal Accuracy Estimate (EPE / PDOP / FOM) 01 UTM X: <u>531498</u> UTM Y: <u>4245030</u> +/- <u>122</u> ft. (meters) 11 UTM X: <u>531570</u> UTM Y: <u>4245195</u> +/- <u>198</u> ft. (meters) Average Stream Width: <u>4.5</u> (meters) Length of Survey Segment: <u>150</u> meters (To determine Length of Reach) (20x average stream width) Field Staff: <u>Eric Hertzler / Austin Lohkamp</u>	<h4 style="text-align: center; margin: 0;">Dissolved Oxygen</h4> Date: <u>08-26-08</u> Time: <u>9:13 a.m.</u> Dissolved Oxygen: <u>4.29</u> (mg/L) Dissolved Oxygen: <u>47.3</u> (% sat) Specific Cond: <u>282</u> (µS/cm) Water Temperature: <u>19.1</u> (°C)
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Transect Cross-Section

Station		01		02		03		04		05		06		07		08		09		10		11	
		Distance (m)	Depth (m)																				
Left Bank	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0.58	0.06	0.63	0.14	0.49	0.05	0.13	0.09	0.75	0.15	0.45	0.23	0.11	0.15	0.24	0.05	0.39	0.24	0.46	0.06	0.42	0.05
	3	1.16	0.09	1.26	0.22	0.98	0.13	0.26	0.05	1.50	0.41	0.90	0.19	0.22	0.13	0.48	0.05	0.78	0.05	0.92	0.11	0.84	0.08
	4	1.74	0.23	1.89	0.31	1.47	0.17	0.39	0.05	2.25	0.58	1.35	0.05	0.33	0.05	0.72	0.05	1.17	0.05	1.38	0.14	1.26	0.14
	5	2.32	0.29	2.52	0.24	1.96	0.13	0.52	0.05	3.00	0.51	1.80	0.05	0.44	0.05	0.96	0.05	1.56	0.05	1.84	0.12	1.68	0.10
	6	2.90	0.32	3.15	0.32	2.45	0.16	0.65	0.05	3.75	0.45	2.25	0.05	0.55	0.05	1.20	0.05	1.95	0.16	2.30	0.11	2.10	0.12
	7	3.48	0.28	3.78	0.35	2.94	0.17	0.78	0.05	4.50	0.58	2.70	0.05	0.66	0.05	1.44	0.05	2.34	0.25	2.76	0.10	2.52	0.07
	8	4.06	0.21	4.41	0.22	3.43	0.13	0.91	0.05	5.25	0.54	3.15	0.05	0.77	0.05	1.68	0.05	2.73	0.11	3.22	0.09	2.94	0.05
	9	4.64	0.17	5.04	0.14	3.92	0.12	1.04	0.05	6.00	0.53	3.60	0.05	0.88	0.05	1.92	0.05	3.12	0.05	3.68	0.11	3.36	0.05
Right Bank	9	5.22	0.07	5.67	0.10	4.41	0.05	1.17	0.05	6.75	0.49	4.05	0.05	0.99	0.05	2.16	0.05	3.51	0.05	4.14	0.07	3.78	0.05
Feature Type <small>(riffle, run, or pool)</small>		Run	Run	Run	Riffle	Pool	Pool	Riffle	Riffle	Run	Run												

Notes: Transects will be measured beginning on left descending bank (0 depth) and finishing on right descending bank (0 depth). This width is the wetted width
 GPS locations corresponds to Transect 01 and 11. Transects ordered in upstream to downstream order.
 Depth measurements taken at 10 equally spaced locations along transect (determine by dividing wetted width by ten)
 Mark dry depth measurements as 0; record actual measurements to 0.1 meter unless depth is too deep to measure (then record as > 1)
 All measurements to be taken to the nearest 0.01 meter.

MAXIMUM 0.58
 MEDIAN 0.05

Surveyor's Signature:



WBID # 991

Site # 2

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 1 of 3)

(must be completed for each site)

Date & Time: 08-26-08 10:30 a.m.	Location Description (e.g., road crossing):
Stream Name: S. Moreau Cr.	County Rd. CC-8 Bridge crossing
Current Weather Conditions: Sunny	Facility Name(s): Barnett Manor
Weather Conditions for Past 10 days: 0.98" @ Osage Beach	Permit Number(s): MO 0097144
Official Drought Conditions at time of this survey (search DNR home page for "drought"): No drought <input checked="" type="checkbox"/> ; Phase I <input type="checkbox"/> ; Phase II <input type="checkbox"/> ; Phase III <input type="checkbox"/> ; Phase IV <input type="checkbox"/> ; Unknown <input type="checkbox"/>	

Site Location:

LOCATION COORDINATES (UNIVERSAL TRANSVERSE MERCATOR PROJECTION, IN METERS)					
Site 01	Easting (UTM X): 534055	Northing (UTM Y): 4248466	Horizontal Accuracy: (EPE / FOM / PDOP)	240 ft.	Meters
Site 11	Easting (UTM X): 534031	Northing (UTM Y): 4248550	Horizontal Accuracy: (EPE / FOM / PDOP)	171 ft.	Meters

Photos:

Photo ID#	Photo Purpose	Photo ID#	Photo Purpose	Photo ID#	Photo Purpose
991-2-A	Upstream looking down				
991-2-B	Downstream looking up				
991-2-C	Pool				

Uses Observed*: (Uses actually observed at the time of survey.)

<input type="checkbox"/> Swimming	<input type="checkbox"/> Skin diving	<input type="checkbox"/> SCUBA diving	<input type="checkbox"/> Tubing	<input type="checkbox"/> Water skiing
<input type="checkbox"/> Wind surfing	<input type="checkbox"/> Kayaking	<input type="checkbox"/> Boating	<input type="checkbox"/> Wading	<input type="checkbox"/> Rafting
<input type="checkbox"/> Hunting	<input type="checkbox"/> Trapping	<input type="checkbox"/> Fishing	<input checked="" type="checkbox"/> None of the above	<input type="checkbox"/> Other:
Describe: (Include number of individuals recreating, photo-documentation of evidence of recreational uses, etc. Use <i>Data Sheet D- Recreational Use Interview</i> when conducting interviews.)				

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 2 of 3)

Surrounding Conditions*: (Mark all that promote or impede recreational uses. Attach photos of evidence or unusual items of interest.)

<input type="checkbox"/> City/county parks	<input type="checkbox"/> Playgrounds	<input type="checkbox"/> MDC conservation lands	<input type="checkbox"/> Urban areas	<input type="checkbox"/> Rural Residential
<input type="checkbox"/> Campgrounds	<input type="checkbox"/> State parks	<input type="checkbox"/> National forests	<input type="checkbox"/> Nature trails	<input type="checkbox"/> Stairs/walkway
<input type="checkbox"/> Boating accesses	<input type="checkbox"/> Fence	<input type="checkbox"/> No trespass sign	<input type="checkbox"/> Steep slopes	<input type="checkbox"/> Other:
Comments: none				

Evidence of Human Use*: (Attach photos and reference in "Photos" section.)

<input checked="" type="checkbox"/> Roads	<input type="checkbox"/> Foot paths/prints	<input type="checkbox"/> Dock/platform	<input type="checkbox"/> Camping Sites	<input type="checkbox"/> Rope swings
<input type="checkbox"/> RV / ATV Tracks	<input type="checkbox"/> Fire pit/ring	<input type="checkbox"/> NPDES Discharge	<input type="checkbox"/> Fishing Tackle	<input type="checkbox"/> Livestock Watering
<input type="checkbox"/> None of the above	Comments / Other: Bridge @ downstream end of transect.			

Substrate*: (These values should add up to 100%.)

% Cobble	50% Gravel	10% Sand	% Silt	10% Mud/Clay	30% Bedrock
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Aquatic Vegetation*: (Note amount of vegetation or algal growth at the assessment site.)

Moss on rocks.

Water Characteristics*: (Mark all that apply.)

Odor:	<input type="checkbox"/> Sewage	<input type="checkbox"/> Musky	<input type="checkbox"/> Chemical	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:
Color:	<input type="checkbox"/> Clear	<input checked="" type="checkbox"/> Green	<input type="checkbox"/> Gray	<input type="checkbox"/> Milky	<input type="checkbox"/> Other:
Bottom Deposit:	<input type="checkbox"/> Sludge	<input type="checkbox"/> Solids	<input type="checkbox"/> Fine sediments	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:
Surface Deposit:	<input type="checkbox"/> Oil	<input type="checkbox"/> Scum	<input checked="" type="checkbox"/> Foam	<input type="checkbox"/> None	<input type="checkbox"/> Other:

*This information is not to be used solely for removal of a recreational use designation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that affect another use.

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 3 of 3)

Additional Stream Morphology: (Record isolated pools or other features identified during the survey that may support recreational uses.)

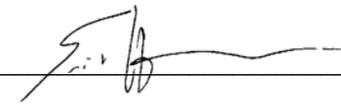
Channel Feature	Distance from access location (m)	Width (m)	Length (m)	Median Depth (m)	Max Depth (m)
Pool	1	9.5	12	.40	+1

Comments: (Please record any additional comments here.)

Pool @ lower end of transect beneath County Rd CC-8 Bridge. See photo 991-2-C.

Please verify that you have completed all sections, checked all applicable boxes, and that the form is complete.

Printed Names of Personnel Collecting Data: Eric Hertzler

Surveyor's Signature:  Date of Survey: 08-26-08

Organization: Olsson Associates Position: Field Service

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet C - Field Survey Results

Stream Name: <u>S. Moreau Cr.</u> Waterbody ID: <u>991</u> Site #: <u>2</u> Estimated Channel Incision: <u>0.17</u> (m) (height between low bank width and water) GPS Location - Easting (UTM X), Northing (UTM Y), Horizontal Accuracy Estimate (EPE / PDOP / FOM) 01 UTM X: <u>534055</u> UTM Y: <u>4248466</u> +/- <u>240</u> ft. (meters) 11 UTM X: <u>534031</u> UTM Y: <u>4248550</u> +/- <u>171</u> ft. (meters) Average Stream Width: <u>8.5</u> (meters) Length of Survey Segment: <u>170</u> meters (To determine Length of Reach) (20x average stream width) Field Staff: <u>Eric Hertzler / Austin Lohkamp</u>	<h4 style="text-align: center; margin: 0;">Dissolved Oxygen</h4> Date: <u>08-26-08</u> Time: <u>10:32 a.m.</u> Dissolved Oxygen: <u>7.93</u> (mg/L) Dissolved Oxygen: <u>88.5</u> (% sat) Specific Cond: <u>314</u> (µS/cm) Water Temperature: <u>21.2</u> (°C)
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Transect Cross-Section

Station		01		02		03		04		05		06		07		08		09		10		11	
		Distance (m)	Depth (m)																				
Left Bank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	0.92	0.12	1.15	0.31	1.33	0.24	1.09	0.24	0.35	0.05	0.43	0.05	0.46	0.17	0.95	0.16	1.06	0.17	0.89	0.29	0.75	0.54
	2	1.84	0.11	2.30	0.35	2.66	0.32	2.18	0.31	0.70	0.12	0.86	0.08	0.92	0.31	1.90	0.23	2.12	0.39	1.78	0.32	1.50	0.51
	3	2.76	0.05	3.45	0.42	3.99	0.31	3.27	0.29	1.05	0.13	1.29	0.05	1.38	0.25	2.85	0.26	3.18	0.32	2.67	0.31	2.25	0.45
	4	3.68	0.08	4.60	0.32	5.32	0.38	4.36	0.33	1.40	0.05	1.72	0.05	1.84	0.30	3.80	0.29	4.24	0.44	3.56	0.38	3.00	0.45
	5	4.60	0.05	5.75	0.41	6.65	0.46	5.45	0.41	1.75	0.05	2.15	0.09	2.30	0.36	4.75	0.28	5.30	0.37	4.45	0.43	3.75	0.49
	6	5.52	0.05	6.90	0.42	7.98	0.34	6.54	0.37	2.10	0.17	2.58	0.10	2.76	0.31	5.70	0.26	6.36	0.45	5.34	0.51	4.50	0.46
	7	6.44	0.05	8.05	0.31	9.31	0.46	7.63	0.39	2.45	0.05	3.01	0.07	3.22	0.32	6.65	0.30	7.42	0.43	6.23	0.49	5.25	0.50
	8	7.36	0.10	9.20	0.23	10.64	0.32	8.72	0.27	2.80	0.05	3.44	0.05	3.68	0.29	7.60	0.24	8.48	0.36	7.12	0.31	6.00	0.48
9	8.28	0.09	10.35	0.11	11.97	0.17	9.81	0.23	3.15	0.05	3.87	0.05	4.14	0.24	8.55	0.21	9.54	0.17	8.01	0.44	6.75	0.47	
Right Bank	9.20	0.00	11.50	0.00	13.30	0.00	10.90	0.00	3.50	0.00	4.30	0.00	4.60	0.00	9.50	0.00	10.60	0.00	8.90	0.00	7.50	0.00	
Feature Type <small>(riffle, run, or pool)</small>	Pool		Pool		Pool		Pool		Riffle		Riffle		Pool										

Notes: Transects will be measured beginning on left descending bank (0 depth) and finishing on right descending bank (0 depth). This width is the wetted width.
 GPS locations corresponds to Transect 01 and 11. Transects ordered in upstream to downstream order.
 Depth measurements taken at 10 equally spaced locations along transect (determine by dividing wetted width by ten)
 Mark dry depth measurements as 0; record actual measurements to 0.1 meter unless depth is too deep to measure (then record as > 1)
 All measurements to be taken to the nearest 0.01 meter.

MAXIMUM 0.54
 MEDIAN 0.28

Surveyor's Signature:

WBID # 991

Site # 3

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 1 of 3)

(must be completed for each site)

Date & Time: 08-26-08 11:23 a.m.	Location Description (e.g., road crossing):
Stream Name: S. Moreau Cr.	Upstream of Hwy. OO Bridge
Current Weather Conditions: sunny	Facility Name(s): Barnett Manor
Weather Conditions for Past 10 days:0.98” @ Osage Beach	Permit Number(s): MO 0097144
Official Drought Conditions at time of this survey (search DNR home page for “drought”): No drought <input checked="" type="checkbox"/> ; Phase I <input type="checkbox"/> ; Phase II <input type="checkbox"/> ; Phase III <input type="checkbox"/> ; Phase IV <input type="checkbox"/> ; Unknown <input type="checkbox"/>	

Site Location:

LOCATION COORDINATES (UNIVERSAL TRANSVERSE MERCATOR PROJECTION, IN METERS)			
Site 01	Easting (UTM X): 532491	Northing (UTM Y): 4250869	Horizontal Accuracy: (EPE / FOM / PDOP) 58 ft. Meters
Site 11	Easting (UTM X): 532537	Northing (UTM Y): 4250978	Horizontal Accuracy: (EPE / FOM / PDOP) 49 ft. Meters

Photos:

Photo ID#	Photo Purpose	Photo ID#	Photo Purpose	Photo ID#	Photo Purpose
991-3-A	Upstream looking down				
Photo ID#	Photo Purpose	Photo ID#	Photo Purpose	Photo ID#	Photo Purpose
991-3-B	Downstream looking up				
Photo ID#	Photo Purpose	Photo ID#	Photo Purpose	Photo ID#	Photo Purpose
991-3-C	Rope swing				

Uses Observed*: (Uses actually observed at the time of survey.)

<input type="checkbox"/> Swimming	<input type="checkbox"/> Skin diving	<input type="checkbox"/> SCUBA diving	<input type="checkbox"/> Tubing	<input type="checkbox"/> Water skiing
<input type="checkbox"/> Wind surfing	<input type="checkbox"/> Kayaking	<input type="checkbox"/> Boating	<input type="checkbox"/> Wading	<input type="checkbox"/> Rafting
<input type="checkbox"/> Hunting	<input type="checkbox"/> Trapping	<input type="checkbox"/> Fishing	<input checked="" type="checkbox"/> None of the above	<input type="checkbox"/> Other:
Describe: (Include number of individuals recreating, photo-documentation of evidence of recreational uses, etc. Use <i>Data Sheet D- Recreational Use Interview</i> when conducting interviews.)				

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 2 of 3)

Surrounding Conditions*: (Mark all that promote or impede recreational uses. Attach photos of evidence or unusual items of interest.)

<input type="checkbox"/> City/county parks	<input type="checkbox"/> Playgrounds	<input type="checkbox"/> MDC conservation lands	<input type="checkbox"/> Urban areas	<input type="checkbox"/> Rural Residential
<input type="checkbox"/> Campgrounds	<input type="checkbox"/> State parks	<input type="checkbox"/> National forests	<input type="checkbox"/> Nature trails	<input type="checkbox"/> Stairs/walkway
<input type="checkbox"/> Boating accesses	<input type="checkbox"/> Fence	<input checked="" type="checkbox"/> No trespass sign	<input type="checkbox"/> Steep slopes	<input type="checkbox"/> Other:
Comments:				

Evidence of Human Use*: (Attach photos and reference in "Photos" section.)

<input checked="" type="checkbox"/> Roads	<input type="checkbox"/> Foot paths/prints	<input type="checkbox"/> Dock/platform	<input type="checkbox"/> Camping Sites	<input type="checkbox"/> Rope swings
<input type="checkbox"/> RV / ATV Tracks	<input type="checkbox"/> Fire pit/ring	<input type="checkbox"/> NPDES Discharge	<input type="checkbox"/> Fishing Tackle	<input type="checkbox"/> Livestock Watering
<input type="checkbox"/> None of the above	Comments / Other: Hwy. OO Bridge @ downstream end of transect. Rope swing see photo 991-3-C			

Substrate*: (These values should add up to 100%.)

% Cobble	80% Gravel	20% Sand	% Silt	% Mud/Clay	% Bedrock
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Aquatic Vegetation*: (Note amount of vegetation or algal growth at the assessment site.)

Moss on gravels

Water Characteristics*: (Mark all that apply.)

Odor:	<input type="checkbox"/> Sewage	<input type="checkbox"/> Musky	<input type="checkbox"/> Chemical	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:
Color:	<input checked="" type="checkbox"/> Clear	<input type="checkbox"/> Green	<input type="checkbox"/> Gray	<input type="checkbox"/> Milky	<input type="checkbox"/> Other:
Bottom Deposit:	<input type="checkbox"/> Sludge	<input type="checkbox"/> Solids	<input type="checkbox"/> Fine sediments	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:
Surface Deposit:	<input type="checkbox"/> Oil	<input type="checkbox"/> Scum	<input type="checkbox"/> Foam	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:

*This information is not to be used solely for removal of a recreational use designation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that affect another use.

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 3 of 3)

Additional Stream Morphology: (Record isolated pools or other features identified during the survey that may support recreational uses.)

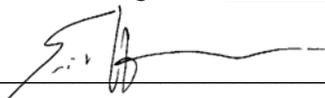
Channel Feature	Distance from access location (m)	Width (m)	Length (m)	Median Depth (m)	Max Depth (m)

Comments: (Please record any additional comments here.)

Rope swing found in transect only .30m of water below it.
 See photo 991-3-C.

Please verify that you have completed all sections, checked all applicable boxes, and that the form is complete.

Printed Names of Personnel Collecting Data: Eric Hertzler

Surveyor's Signature:  Date of Survey: 08-26-08

Organization: Olsson Associates Position: Field Service

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet C - Field Survey Results

Stream Name: <u>S. Moreau Cr.</u> Waterbody ID: <u>991</u> Site #: <u>3</u> Estimated Channel Incision: <u>0.15</u> (m) (height between low bank width and water) GPS Location - Easting (UTM X), Northing (UTM Y), Horizontal Accuracy Estimate (EPE / PDOP / FOM) 01 UTM X: <u>532491</u> UTM Y: <u>4250869</u> +/- <u>58</u> ft. (meters) 11 UTM X: <u>532537</u> UTM Y: <u>4250978</u> +/- <u>49</u> ft. (meters) Average Stream Width: <u>9</u> (meters) Length of Survey Segment: <u>180</u> meters (To determine Length of Reach) (20x average stream width) Field Staff: <u>Eric Hertzler / Austin Lohkamp</u>	<h4 style="text-align: center; margin: 0;">Dissolved Oxygen</h4> Date: <u>08-26-08</u> Time: <u>11:23 a.m.</u> Dissolved Oxygen: <u>7.11</u> (mg/L) Dissolved Oxygen: <u>83.6</u> (% sat) Specific Cond: <u>316</u> (µS/cm) Water Temperature: <u>23.1</u> (°C)
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Transect Cross-Section

Station		01		02		03		04		05		06		07		08		09		10		11	
		Distance (m)	Depth (m)																				
Left Bank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	0.20	0.05	0.31	0.05	0.38	0.05	1.38	0.09	0.67	0.05	1.48	0.12	1.07	0.54	1.14	0.34	0.87	0.32	0.76	0.19	1.57	0.11
	2	0.40	0.05	0.62	0.10	0.76	0.05	2.76	0.16	1.34	0.16	2.96	0.05	2.14	0.53	2.28	0.54	1.74	0.41	1.52	0.21	3.14	0.05
	3	0.60	0.07	0.93	0.11	1.14	0.05	4.14	0.17	2.01	0.19	4.44	0.05	3.21	0.51	3.42	0.47	2.61	0.51	2.28	0.26	4.71	0.05
	4	0.80	0.07	1.24	0.09	1.52	0.05	5.52	0.34	2.68	0.23	5.92	0.05	4.28	0.55	4.56	0.43	3.48	0.41	3.04	0.17	6.28	0.05
	5	1.00	0.05	1.55	0.07	1.90	0.10	6.90	0.19	3.35	0.27	7.40	0.05	5.35	0.40	5.70	0.39	4.35	0.42	3.80	0.05	7.85	0.13
	6	1.20	0.05	1.86	0.06	2.28	0.13	8.28	0.23	4.02	0.25	8.88	0.05	6.42	0.30	6.84	0.38	5.22	0.24	4.56	0.05	9.42	0.20
	7	1.40	0.05	2.17	0.05	2.66	0.06	9.66	0.11	4.69	0.21	10.36	0.07	7.49	0.17	7.98	0.32	6.09	0.19	5.32	0.05	10.99	0.05
	8	1.60	0.05	2.48	0.05	3.04	0.05	11.04	0.19	5.36	0.16	11.84	0.17	8.56	0.05	9.12	0.16	6.96	0.05	6.08	0.05	12.56	0.32
9	1.80	0.05	2.79	0.05	3.42	0.05	12.42	0.49	6.03	0.06	13.32	0.21	9.63	0.05	10.26	0.08	7.83	0.05	6.84	0.05	14.13	0.21	
Right Bank	2.00	0.00	3.10	0.00	3.80	0.00	13.80	0.00	6.70	0.00	14.80	0.00	10.70	0.00	11.40	0.00	8.70	0.00	7.60	0.00	15.70	0.00	
Feature Type <small>(riffle, run, or pool)</small>		Riffle	Riffle	Riffle	Riffle	Riffle	Run	Run	Run														

Notes: Transects will be measured beginning on left descending bank (0 depth) and finishing on right descending bank (0 depth). This width is the wetted width.
 GPS locations corresponds to Transect 01 and 11. Transects ordered in upstream to downstream order.
 Depth measurements taken at 10 equally spaced locations along transect (determine by dividing wetted width by ten)
 Mark dry depth measurements as 0; record actual measurements to 0.1 meter unless depth is too deep to measure (then record as > 1)
 All measurements to be taken to the nearest 0.01 meter.

MAXIMUM 0.55
 MEDIAN 0.07

Surveyor's Signature:

WBID # 991

Site # 4

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 1 of 3)

(must be completed for each site)

Date & Time: 08-26-08	Location Description (e.g., road crossing):
Stream Name: S. Moreau Cr.	Upstream of County Rd. OO.4A
Current Weather Conditions: sunny	Facility Name(s): Barnett Manor
Weather Conditions for Past 10 days:0.98” @ Osage Beach	Permit Number(s): MO 0097144
Official Drought Conditions at time of this survey (search DNR home page for “drought”): No drought <input checked="" type="checkbox"/> ; Phase I <input type="checkbox"/> ; Phase II <input type="checkbox"/> ; Phase III <input type="checkbox"/> ; Phase IV <input type="checkbox"/> ; Unknown <input type="checkbox"/>	

Site Location:

LOCATION COORDINATES (UNIVERSAL TRANSVERSE MERCATOR PROJECTION, IN METERS)				
Site 01	Easting (UTM X): 532849	Northing (UTM Y): 4252056	Horizontal Accuracy: (EPE / FOM / PDOP)	102 ft. Meters
Site 11	Easting (UTM X): 532858	Northing (UTM Y): 4252303	Horizontal Accuracy: (EPE / FOM / PDOP)	58 ft. Meters

Photos:

Photo ID#	Photo Purpose	Photo ID#	Photo Purpose	Photo ID#	Photo Purpose
991-4-A	Upstream looking down				
Photo ID#	Photo Purpose	Photo ID#	Photo Purpose	Photo ID#	Photo Purpose
991-4-B	Downstream looking up				
Photo ID#	Photo Purpose	Photo ID#	Photo Purpose	Photo ID#	Photo Purpose

Uses Observed*: (Uses actually observed at the time of survey.)

<input type="checkbox"/> Swimming	<input type="checkbox"/> Skin diving	<input type="checkbox"/> SCUBA diving	<input type="checkbox"/> Tubing	<input type="checkbox"/> Water skiing
<input type="checkbox"/> Wind surfing	<input type="checkbox"/> Kayaking	<input type="checkbox"/> Boating	<input type="checkbox"/> Wading	<input type="checkbox"/> Rafting
<input type="checkbox"/> Hunting	<input type="checkbox"/> Trapping	<input type="checkbox"/> Fishing	<input checked="" type="checkbox"/> None of the above	<input type="checkbox"/> Other:
Describe: (Include number of individuals recreating, photo-documentation of evidence of recreational uses, etc. Use <i>Data Sheet D- Recreational Use Interview</i> when conducting interviews.)				

Site # 4

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 2 of 3)

Surrounding Conditions*: (Mark all that promote or impede recreational uses. Attach photos of evidence or unusual items of interest.)

<input type="checkbox"/> City/county parks	<input type="checkbox"/> Playgrounds	<input type="checkbox"/> MDC conservation lands	<input type="checkbox"/> Urban areas	<input type="checkbox"/> Rural Residential
<input type="checkbox"/> Campgrounds	<input type="checkbox"/> State parks	<input type="checkbox"/> National forests	<input type="checkbox"/> Nature trails	<input type="checkbox"/> Stairs/walkway
<input type="checkbox"/> Boating accesses	<input type="checkbox"/> Fence	<input checked="" type="checkbox"/> No trespass sign	<input type="checkbox"/> Steep slopes	<input type="checkbox"/> Other:
Comments:				

Evidence of Human Use*: (Attach photos and reference in “Photos” section.)

<input checked="" type="checkbox"/> Roads	<input type="checkbox"/> Foot paths/prints	<input type="checkbox"/> Dock/platform	<input type="checkbox"/> Camping Sites	<input type="checkbox"/> Rope swings
<input type="checkbox"/> RV / ATV Tracks	<input type="checkbox"/> Fire pit/ring	<input type="checkbox"/> NPDES Discharge	<input type="checkbox"/> Fishing Tackle	<input type="checkbox"/> Livestock Watering
<input type="checkbox"/> None of the above	Comments / Other: Bridge @ downstream end of transect			

Substrate*: (These values should add up to 100%.)

% Cobble	80% Gravel	20% Sand	% Silt	% Mud/Clay	% Bedrock
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Aquatic Vegetation*: (Note amount of vegetation or algal growth at the assessment site.)

Moss on gravels

Water Characteristics*: (Mark all that apply.)

Odor:	<input type="checkbox"/> Sewage	<input type="checkbox"/> Musky	<input type="checkbox"/> Chemical	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:
Color:	<input checked="" type="checkbox"/> Clear	<input type="checkbox"/> Green	<input type="checkbox"/> Gray	<input type="checkbox"/> Milky	<input type="checkbox"/> Other:
Bottom Deposit:	<input type="checkbox"/> Sludge	<input type="checkbox"/> Solids	<input type="checkbox"/> Fine sediments	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:
Surface Deposit:	<input type="checkbox"/> Oil	<input type="checkbox"/> Scum	<input type="checkbox"/> Foam	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Other:

*This information is not to be used solely for removal of a recreational use designation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that affect another use.

Site # 4

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization (Page 3 of 3)

Additional Stream Morphology: (Record isolated pools or other features identified during the survey that may support recreational uses.)

Channel Feature	Distance from access location (m)	Width (m)	Length (m)	Median Depth (m)	Max Depth (m)

Comments: (Please record any additional comments here.)

Please verify that you have completed all sections, checked all applicable boxes, and that the form is complete.

Printed Names of Personnel Collecting Data: Eric Hertzler

Surveyor's Signature:  Date of Survey: 08-26-08

Organization: Olsson Associates Position: Field Service

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet C - Field Survey Results

Stream Name: <u>S. Moreau Cr.</u> Waterbody ID: <u>991</u> Site #: <u>4</u> Estimated Channel Incision: _____ (m) (height between low bank width and water) GPS Location - Easting (UTM X), Northing (UTM Y), Horizontal Accuracy Estimate (EPE / PDOP / FOM) 01 UTM X: <u>532849</u> UTM Y: <u>4252056</u> +/- <u>102 ft.</u> (meters) 11 UTM X: <u>532858</u> UTM Y: <u>4252303</u> +/- <u>58 ft.</u> (meters) Average Stream Width: <u>10.5 meters</u> Length of Survey Segment: <u>210 meters</u> (To determine Length of Reach) (20x average stream width) Field Staff: <u>Eric Hertzler / Austin Lohkamp</u>	<h4 style="text-align: center; margin: 0;">Dissolved Oxygen</h4> Date: <u>08-26-08</u> Time: <u>12:27 p.m.</u> Dissolved Oxygen: <u>7.64</u> (mg/L) Dissolved Oxygen: <u>80.6</u> (% sat) Specific Cond: <u>326</u> (µS/cm) Water Temperature: <u>22.4</u> (°C)
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Transect Cross-Section

Station		01		02		03		04		05		06		07		08		09		10		11	
		Distance (m)	Depth (m)																				
Left Bank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1	0.99	0.09	0.79	0.05	0.72	0.72	1.26	0.10	1.47	0.12	1.05	0.05	0.71	0.05	0.65	0.05	0.75	0.10	1.79	0.52	1.52	0.20
	2	1.98	0.21	1.58	0.31	0.18	0.18	2.52	0.19	2.94	0.20	2.10	0.09	1.42	0.05	1.30	0.05	1.50	0.21	3.58	0.46	3.04	0.37
	3	2.97	0.26	2.37	0.28	0.14	0.14	3.78	0.31	4.41	0.32	3.15	0.22	2.13	0.10	1.95	0.05	2.25	0.31	5.37	0.51	4.56	0.32
	4	3.96	0.28	3.16	0.27	0.11	0.11	5.04	0.49	5.88	0.50	4.20	0.31	2.84	0.17	2.60	0.05	3.00	0.43	7.16	0.48	6.08	0.41
	5	4.95	0.33	3.95	0.23	0.11	0.11	6.30	0.65	7.35	0.59	5.25	0.43	3.55	0.26	3.25	0.05	3.75	0.59	8.95	0.49	7.60	0.44
	6	5.94	0.38	4.74	0.12	0.10	0.10	7.56	0.68	8.82	0.68	6.30	0.57	4.26	0.32	3.90	0.05	4.50	1.00	10.74	0.58	9.12	0.56
	7	6.93	0.36	5.53	0.05	0.09	0.09	8.82	0.61	10.29	0.71	7.35	0.65	4.97	0.37	4.55	0.05	5.25	1.00	12.53	0.42	10.64	0.54
	8	7.92	0.31	6.32	0.08	0.05	0.05	10.08	0.54	11.76	0.79	8.40	0.69	5.68	0.39	5.20	0.05	6.00	1.00	14.32	0.44	12.16	0.59
9	8.91	0.21	7.11	0.05	0.05	0.05	11.34	0.46	13.23	0.73	9.45	0.74	6.39	0.43	5.85	0.05	6.75	1.00	16.11	0.54	13.68	0.43	
Right Bank	9.90	0.00	7.90	0.00	7.10	0.05	12.60	0.00	14.70	0.00	10.50	0.00	7.10	0.00	6.50	0.00	7.50	0.00	17.90	0.00	15.20	0.00	
Feature Type <small>(riffle, run, or pool)</small>	Run		Run		Run		Run		Run		Run		Run		Riffle		Pool		Pool		Pool		

Notes: Transects will be measured beginning on left descending bank (0 depth) and finishing on right descending bank (0 depth). This width is the wetted width.
 GPS locations corresponds to Transect 01 and 11. Transects ordered in upstream to downstream order.
 Depth measurements taken at 10 equally spaced locations along transect (determine by dividing wetted width by ten)
 Mark dry depth measurements as 0; record actual measurements to 0.1 meter unless depth is too deep to measure (then record as > 1)
 All measurements to be taken to the nearest 0.01 meter.

MAXIMUM 1.00
 MEDIAN 0.32

Surveyor's Signature:



