

# LITTLE CANNON AT OXFORD MILL



## Little Cannon River near Oxford Mill (LCO-5)

Location:

River mile: 25

U.S.G.S. quad: Sogn; 44092-D8

Township: T112N R18W S25

Lat./Long: 44°28'30"/92°56'

Other info:

Type: Midsize stream 4 miles upstream from mouth

Stream Order: 4

Drainage area: 89 square miles

Riparian: Residential, Old field

Instream: Cobble, sand, gravel, and fine sand forming bars in slow current

Gradient: 8.55 ft/mi



# QUALITATIVE HABITAT EVALUATION INDEX (QHEI) SCORING FORM

Date 6/15/95 River Mile 25 Watershed Number \_\_\_\_\_  
 Location LCO-5 U.S.G.S. quad Sogn  
 Township T112N R18W Section 25 Lat./Long. 44°28'30"/92°56'

71.5

  
 Total QHEI

## 1. SUBSTRATE (Check ONLY two substrate TYPES). % Pool/Riffle substrates optional.

Type	Pool	Riffle	Type	Pool	Riffle	Quality
<input type="checkbox"/> Boulder (7)	_____	_____	<input type="checkbox"/> Gravel (5)	_____	_____	<input type="checkbox"/> Silt covered (-1)
<input checked="" type="checkbox"/> Cobble (6)	_____	_____	<input checked="" type="checkbox"/> Sand (4)	_____	_____	<input checked="" type="checkbox"/> Silt free (1)
<input type="checkbox"/> Hardpan (3)	_____	_____	<input type="checkbox"/> Bedrock (3)	_____	_____	<input type="checkbox"/> Boulders as slabs (1)
<input type="checkbox"/> Silt (3)	_____	_____	<input type="checkbox"/> Detritus (2)	_____	_____	<input type="checkbox"/> Embedded (-2)
<input type="checkbox"/> Muck (2)	_____	_____	<input type="checkbox"/> Sludge (1)	_____	_____	

11

  
 Substrate

Comments \_\_\_\_\_

## 2. INSTREAM COVER

Type (Check ALL that apply)

<input type="checkbox"/> Undercut banks (1)	<input type="checkbox"/> Deep pools (1)	Amount (Check ONLY one) <input type="checkbox"/> Extensive (7) <input type="checkbox"/> Moderate (5) <input checked="" type="checkbox"/> Sparse (3) <input type="checkbox"/> Nearly absent (1)
<input checked="" type="checkbox"/> Overhanging vegetation (1)	<input type="checkbox"/> Oxbows (1)	
<input checked="" type="checkbox"/> Shallows (in slow water) (1)	<input checked="" type="checkbox"/> Boulders (1)	
<input checked="" type="checkbox"/> Logs or woody debris (1)	<input type="checkbox"/> Aquatic macrophytes (1)	

7

  
 Cover

Comments \_\_\_\_\_

## 3. CHANNEL MORPHOLOGY (Check ONLY one under each category)

Sinuosity	Development	Channelization	Stability	Other
<input checked="" type="checkbox"/> High (4)	<input checked="" type="checkbox"/> Excellent (4)	<input checked="" type="checkbox"/> None (4)	<input type="checkbox"/> High (3)	<input type="checkbox"/> Impound
<input type="checkbox"/> Moderate (3)	<input type="checkbox"/> Good (3)	<input type="checkbox"/> Recovered (3)	<input checked="" type="checkbox"/> Moderate (2)	<input type="checkbox"/> Islands
<input type="checkbox"/> Low (2)	<input type="checkbox"/> Fair (2)	<input type="checkbox"/> Recovering (2)	<input type="checkbox"/> Low (1)	<input type="checkbox"/> Leveed
<input type="checkbox"/> None (1)	<input type="checkbox"/> Poor (1)	<input type="checkbox"/> Recent or no Recovery (1)		

14

  
 Channel

Comments \_\_\_\_\_

## 4. RIPARIAN ZONE AND BANK EROSION \*River right looking downstream\*

(Check single most predominant, on each bank, under each category)

Riparian Width	Flood Plain Quality	Bank Erosion
<b>L R</b>	<b>L R</b>	<b>L R</b>
<input type="checkbox"/> Extensive >100m (3)	<input type="checkbox"/> Open pasture (1)	<input type="checkbox"/> None (5)
<input type="checkbox"/> Wide 50-100m (4)	<input type="checkbox"/> Fenced pasture (2)	<input type="checkbox"/> Little (4)
<input checked="" type="checkbox"/> Moderate 10-50m (3)	<input checked="" type="checkbox"/> Old field (3)	<input checked="" type="checkbox"/> Moderate (3)
<input type="checkbox"/> Narrow 5-10m (2)	<input type="checkbox"/> Rowcrop (1)	<input type="checkbox"/> Heavy (2)
<input type="checkbox"/> Very Narrow 1-5m (1)	<input type="checkbox"/> Conservation tillage (2)	<input type="checkbox"/> Severe (1)
<input type="checkbox"/> None (0)		

8.5

  
 Riparian

Comments \_\_\_\_\_

## 5. POOL/GLIDE AND RIFFLE/RUN QUALITY

Maximum Depth (Check 1)	Pool Cover (Check 1)	Overall Current Velocity (Check ALL that apply)	Morphology (Check 1)
<input type="checkbox"/> > 1m (3)	<input type="checkbox"/> Extensive (3)	<input type="checkbox"/> Torrential (-1)	<input checked="" type="checkbox"/> Pool width > riffle width (2)
<input checked="" type="checkbox"/> 0.7-1m (2)	<input type="checkbox"/> Moderate (2)	<input checked="" type="checkbox"/> Fast (1)	<input type="checkbox"/> Pool width = riffle width (1)
<input type="checkbox"/> 0.4-0.7m (1)	<input checked="" type="checkbox"/> Sparse (1)	<input checked="" type="checkbox"/> Moderate (1)	<input type="checkbox"/> Pool width < riffle width (0)
<input type="checkbox"/> < 0.4m (0)	<input type="checkbox"/> Nearly absent (0)	<input checked="" type="checkbox"/> Slow (1)	
<input type="checkbox"/> No Pool		<input type="checkbox"/> Intermittent (-2)	
		<input type="checkbox"/> Eddies (1)	
		<input type="checkbox"/> Interstitial (-1)	

12

  
 Pool/Riffle

## 6. GRADIENT (ft/mi)

Comments \_\_\_\_\_

8.6

Riffle/Run Substrate (Check 1)

Stable (cobble, boulder) (1)  
 Unstable (gravel, sand) (0)

Riffle/Run Substrate Quality (Check 1)

Embedded (0)  
 Not embedded (1)

8

  
 Gradient

## 7. DRAINAGE AREA (square mile)

89

11

  
 Drainage Area

# QUALITATIVE HABITAT EVALUATION INDEX (QHEI) SCORING FORM

Date 6/11/96 River Mile 25 Watershed Number \_\_\_\_\_  
 Location LCO-5 U.S.G.S. quad \_\_\_\_\_ Sogn \_\_\_\_\_  
 Township T112N R18W Section 25 Lat./Long. 44°26.72N 92°52.66W

**71.5**  
Total QHEI

**1. SUBSTRATE** (Check ONLY two substrate TYPES). % Pool/Riffle substrates optional.

Type	Pool	Riffle	Type	Pool	Riffle	Quality
<input type="checkbox"/> Boulder (7)	_____	_____	<input type="checkbox"/> Gravel (5)	_____	_____	Check all that apply: <input checked="" type="checkbox"/> Silt covered (-1) <input checked="" type="checkbox"/> Silt free (1) <input type="checkbox"/> Boulders as slabs (1) <input type="checkbox"/> Embedded (-2)
<input checked="" type="checkbox"/> Cobble (6)	_____	_____	<input checked="" type="checkbox"/> Sand (4)	_____	_____	
<input type="checkbox"/> Hardpan (3)	_____	_____	<input type="checkbox"/> Bedrock (3)	_____	_____	
<input type="checkbox"/> Silt (3)	_____	_____	<input type="checkbox"/> Detritus (2)	_____	_____	
<input type="checkbox"/> Muck (2)	_____	_____	<input type="checkbox"/> Sludge (1)	_____	_____	

**10**  
Substrate

Comments \_\_\_\_\_

**2. INSTREAM COVER**

Type (Check ALL that apply)	Amount (Check ONLY one)
<input type="checkbox"/> Undercut banks (1)	<input type="checkbox"/> Extensive (7)
<input checked="" type="checkbox"/> Overhanging vegetation (1)	<input checked="" type="checkbox"/> Moderate (5)
<input checked="" type="checkbox"/> Shallows (in slow water) (1)	<input type="checkbox"/> Sparse (3)
<input checked="" type="checkbox"/> Logs or woody debris (1)	<input type="checkbox"/> Nearly absent (1)
<input type="checkbox"/> Deep pools (1)	
<input type="checkbox"/> Oxbows (1)	
<input checked="" type="checkbox"/> Boulders (1)	
<input checked="" type="checkbox"/> Aquatic macrophytes (1)	

**10**  
Cover

Comments \_\_\_\_\_

**3. CHANNEL MORPHOLOGY** (Check ONLY one under each category)

Sinuosity	Development	Channelization	Stability	Other
<input checked="" type="checkbox"/> High (4)	<input type="checkbox"/> Excellent (4)	<input checked="" type="checkbox"/> None (4)	<input type="checkbox"/> High (3)	<input type="checkbox"/> Impound
<input type="checkbox"/> Moderate (3)	<input checked="" type="checkbox"/> Good (3)	<input type="checkbox"/> Recovered (3)	<input type="checkbox"/> Moderate (2)	<input type="checkbox"/> Islands
<input type="checkbox"/> Low (2)	<input type="checkbox"/> Fair (2)	<input type="checkbox"/> Recovering (2)	<input checked="" type="checkbox"/> Low (1)	<input type="checkbox"/> Leveed
<input type="checkbox"/> None (1)	<input type="checkbox"/> Poor (1)	<input type="checkbox"/> Recent or no Recovery (1)		

**12**  
Channel

Comments \_\_\_\_\_

**4. RIPARIAN ZONE AND BANK EROSION** \*River right looking downstream\*

(Check single most predominant, on each bank, under each category)

Riparian Width	Flood Plain Quality	Bank Erosion
<b>L R</b>	<b>L R</b>	<b>L R</b>
<input type="checkbox"/> Extensive >100m (5)	<input type="checkbox"/> Open pasture (1)	<input type="checkbox"/> None (5)
<input type="checkbox"/> Wide 50-100m (4)	<input type="checkbox"/> Fenced pasture (2)	<input checked="" type="checkbox"/> Little (4)
<input checked="" type="checkbox"/> Moderate 10-50m (3)	<input checked="" type="checkbox"/> Old field (3)	<input type="checkbox"/> Moderate (3)
<input type="checkbox"/> Narrow 5-10m (2)	<input type="checkbox"/> Rowcrop (1)	<input type="checkbox"/> Heavy (2)
<input type="checkbox"/> Very Narrow 1-5m (1)	<input type="checkbox"/> Conservation tillage (2)	<input type="checkbox"/> Severe (1)
<input type="checkbox"/> None (0)		
	<input type="checkbox"/> Forest, swamp (3)	
	<input checked="" type="checkbox"/> Shrub (4)	
	<input type="checkbox"/> Residential, Park (2)	
	<input type="checkbox"/> Urban	

**9.5**  
Riparian

Comments \_\_\_\_\_

**5. POOL/GLIDE AND RIFFLE/RUN QUALITY**

Maximum Depth (Check 1)	Pool Cover (Check 1)	Overall Current Velocity (Check ALL that apply)	Morphology (Check 1)
<input type="checkbox"/> > 1m (3)	<input type="checkbox"/> Extensive (3)	<input type="checkbox"/> Torrential (-1)	<input checked="" type="checkbox"/> Pool width > riffle width (2)
<input checked="" type="checkbox"/> 0.7-1m (2)	<input type="checkbox"/> Moderate (2)	<input checked="" type="checkbox"/> Fast (1)	<input type="checkbox"/> Pool width = riffle width (1)
<input type="checkbox"/> 0.4-0.7m (1)	<input checked="" type="checkbox"/> Sparse (1)	<input checked="" type="checkbox"/> Moderate (1)	<input type="checkbox"/> Pool width < riffle width (0)
<input type="checkbox"/> < 0.4m (0)	<input type="checkbox"/> Nearly absent (0)	<input checked="" type="checkbox"/> Slow (1)	
<input type="checkbox"/> No Pool		<input type="checkbox"/> Intermittent (-2)	
		<input type="checkbox"/> Eddies (1)	
		<input type="checkbox"/> Interstitial (-1)	

**11**  
Pool/Riffle

Riffle/Run Depth (Check 1)	Riffle/Run Substrate (Check 1)	Riffle/Run Substrate Quality (Check 1)
<input checked="" type="checkbox"/> Generally <10cm (1)	<input checked="" type="checkbox"/> Stable (cobble, boulder) (1)	<input type="checkbox"/> Embedded (0)
<input type="checkbox"/> Generally >10cm Max <50 (2)	<input type="checkbox"/> Unstable (gravel, sand) (0)	<input checked="" type="checkbox"/> Not embedded (1)
<input type="checkbox"/> Generally >10cm Max >50 (3)		
<input type="checkbox"/> No riffle (0)		

Comments \_\_\_\_\_

**6. GRADIENT**

(ft/mi) \_\_\_\_\_ 8.6 \_\_\_\_\_

**8**  
Gradient

**7. DRAINAGE AREA**

(square mile) \_\_\_\_\_ 89 \_\_\_\_\_

**11**  
Drainage Area

SITE **LCO-5** Location LITTLE CANNON AT OXFORD MILL

	1994	1995	1996
SUBSTRATE	12	11	10
INSTREAM COVER	5	7	10
CHANNEL MORPHOLOGY	12	14	12
RIPARIAN	8.5	8.5	9.5
CHANNEL QUALITY	9	12	11
GRADIENT 8 DRAINAGE 11	QHEI 1994 <b>65.5</b>	QHEI 1995 <b>71.5</b>	QHEI 1996 <b>71.5</b>

EXTENT OF CHANGE IN LOCATION  
No change

RAPID HABITAT BIOASSESSMENT 1995 **180**

FISH COVER	12
MACRO COVER	18
EMBEDDEDNESS	15
VELOCITY\DEPTH	18
CHANNEL	20
SEDIMENT	10
RIFFLES	13
CHANNEL FLOW	16
BANK EROSION	10
VEGETATION	14
GRAZING	19
RIPARIAN	15

# LITTLE CANNON RIVER (LCO-5)

Near Oxford Mill

Riparian: Residential, old field

Instream: Cobble, gravel, sand

## Macroinvertebrate Metrics

Metric	1994	1995	1996	Average	Overall Impact
QHEI	65.5	71.5	71.5	69.5	
ICI	29	32	34	31.7	Slight
Richness	11.5	19.5	31	20.7	Slight
Diversity	2.6	2.9	3.6	3.0	Slight
Equitability	0.99	0.54	.59	.71	Slight
Scraper/Filterer Ratio	0.88	0.31	1.81		
Tolerance Range	2-7	2-6	2-8	2-7	

## Macroinvertebrate Taxa and Numbers of Individuals

[#] = Tolerance Values (Source is Illinois Environmental Protection Agency)

	June 94	July 94	June 95	July 95	June 96	July 96
<b>Stoneflies</b>						
Perlesta [3]	17	-	3	-	1	-
Pteronarcys [2]	4	7	9	28	2	16
Isoperla [2]	-	-	-	-	3	-
<b>Beetles</b>						
Dubiraphia [5]	-	-	-	-	1	-
Optioservus [4]	2	-	3	-	1	3
Stenelmis [7]	3	-	-	-	11	1
Macronychus [2]	-	-	2	10	13	5
Hydrobius [?]	-	-	11	-	-	-
<b>Mayflies</b>						
Baetis [4]	2	-	3	2	91	1
Ephemerella [2]	-	-	-	-	58	2
Heptagenia [3]	4	-	20	12	41	19
Stenacron [4]	-	-	7	-	-	1
Stenonema [4]	17	21	7	62	28	21
Isonychia [3]	10	-	40	84	10	36
Caenis [6]	-	-	10	-	2	20
Tricorythodes [5]	-	-	3	-	-	2
Pseudocloeon [4]	-	-	-	-	29	-
Leucrocuta [?]	-	-	-	-	1	-
<b>Caddisflies</b>						
Brachycentrus [1]	-	-	3	42	1	10
Cheumatopsyche [6]	3	-	2	7	14	2
Hydropsyche [5]	61	14	48	217	13	48
Pycnopsyche [3]	-	-	-	-	1	1
Hydroptila [2]	-	-	-	2	5	-
<b>True Flies</b>						
Simuliidae [4-6]	-	-	-	-	2	1
Antocha [5]	-	-	1	8	-	18
Hemerodromia [6]	-	-	-	40	11	21
Atherix [4]	1	6	-	30	3	138
Tipula [4]	-	-	-	-	-	2
<b>Midges</b>						
Brillia [?]	-	-	139	-	4	-
Cryptochironomus [8]	1	-	-	-	-	-
Cricotopus [8]	1	-	-	-	24	139
Microtendipes [6]	-	-	46	2	-	-
Polypedilum [6]	4	-	277	-	52	69
Eukiefferiella [4]	-	-	-	-	28	-

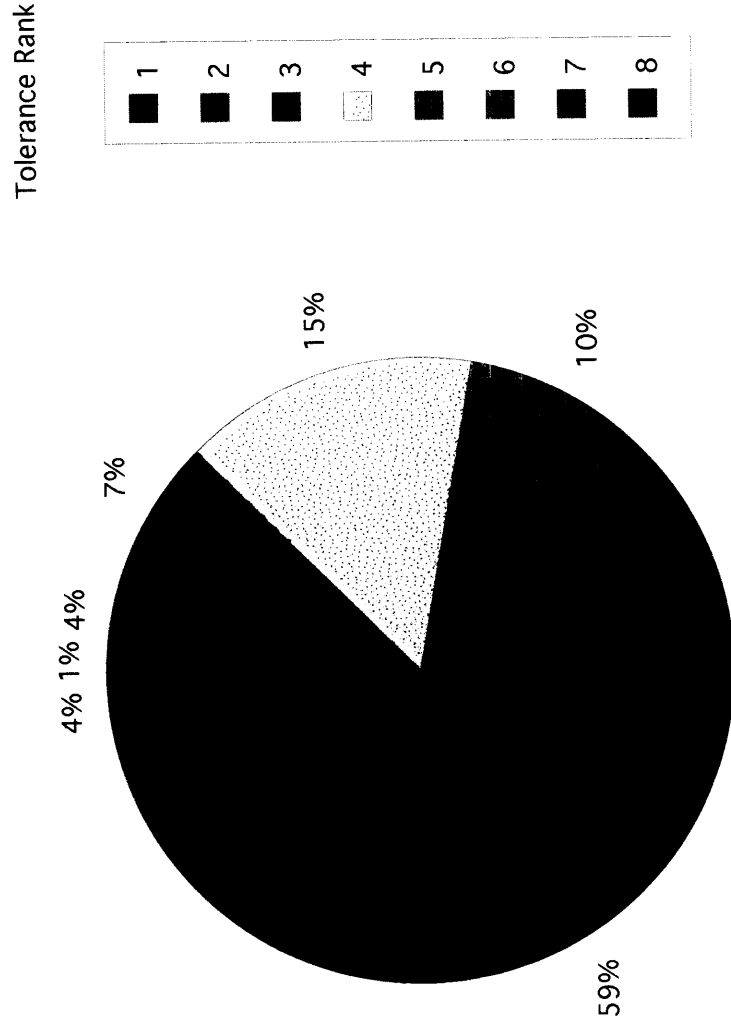
**LITTLE CANNON RIVER (LCO-5) page 2**

Rheotanytarsus	[6]	4	-	879	-	4	592
Paratanytarsus	[?]	-	-	-	-	4	-
Parametrioconemus	[4]	-	-	46	-	20	116
Cardiocladius	[6]	-	-	-	-	-	11
Thienemannimyia	[6]	9	-	277	6	8	209
Endochironomus	[6]	3	-	-	-	-	-
Rheocrictopus	[6]	-	-	-	-	4	23
Stenochironomus	[3]	-	-	-	-	-	12
Thienemanniella	[2]	-	-	-	-	-	12

### Little Cannon at Oxford Mill (LCO-5)

Site	NUMBER OF INSECTS BY TOLERANCE RATING									PERCENT IN TOLERANCE RANK									
	1	2	3	4	5	6	7	8	9	TOTAL	1	2	3	4	5	6	7	8	9
LCO 1994	0	11	31	49	75	23	3	2	0	194	0%	6%	16%	25%	39%	12%	2%	1%	0%
LCO 1995	45	51	171	161	277	1546	0	0	0	2251	2%	2%	8%	7%	12%	69%	0%	0%	0%
LCO 1996	11	116	123	482	82	1046	12	163	0	2035	1%	6%	6%	24%	4%	51%	1%	8%	0%
LCO TOTAL	56	178	325	692	434	2615	15	165	0	4480	1%	4%	7%	15%	10%	58%	0%	4%	0%

PERCENT MACROINVERTEBRATE BY TOLERANCE RANK





## LITTLE CANNON AT OXFORD MILL [LCO]

DATE	JULY 1994	JULY 1995	JUNE 1996	JULY 1996
<b>SURFACE WATER</b>				
NITRATE NITROGEN	1.95	2.7	4.33	1.98
AMMONIA NITROGEN	0.034	0.013	0.018	LB
KJELDAHL NITROGEN	2.27	3.13	4.44	2.18
ORTHOPHOSPHATE	0.008	0.012	0.015	0.007
TOTAL PHOSPHORUS	0.376	0.038	0.053	0.03
<b>PORE WATER</b>				
NITRATE NITROGEN	0.306	0.625	4.12	1.76
AMMONIA NITROGEN	2.21	1.03	0.053	0.028
KJELDAHL NITROGEN	8.79	2.27	4.34	2.06
ORTHOPHOSPHATE	0.128	0.039	0.022	0.012
TOTAL PHOSPHORUS	0.237	0.071	0.063	0.032
<b>STREAM LOAD</b>				
TURBIDITY	----	----	24	9
TOTAL SUSPENDED SOLIDS	----	----	86.79	75.33
TOTAL VOLATILE SOLIDS	----	----	16.89	16.21
CONDUCTIVITY	0.616	0.645	0.651	0.625
<b>OTHER</b>				
pH	8.3	8.7	8.1	8.4
ALKALINITY	----	----	400	300
TEMPERATURE	20	22.6	19.9	22.5

## LITTLE CANNON RIVER AT OXFORD MILL

The Little Cannon River empties into the Cannon River at river mile 25 in downtown Cannon Falls. Oxford Mill is located about 4 miles upstream from the mouth. The Little Cannon is a 4th order stream at Oxford Mill and drains 89 square miles, most of which is in what is known as Sogn Valley. At the sample site there is a combination of riffles, runs, and pools providing a diversity of instream cover. One of the softer rock layers that is exposed on the slopes of Sogn Valley is the Saint Peter Sandstone and much of the bed load of the Little Cannon at this site is composed of this fine quartz sand. The riparian zone is made up of natural grasses and forested slopes. In recent years, new residential housing has been encroaching this part of the watershed, however at this time the impact of that encroachment is unknown. During the course of the study I have been aware of several large trout that were caught at this site. The QHEI score in 1994 was about 6 points lower than in recent years, this was due to high water levels making it difficult to accurately evaluate the substrate. The QHEI score is about average for the Lower Cannon Tributaries. The entire Little Cannon watershed was 26% forest land, 60% cultivated land, 12% grassland and 1.6% rural residential as of 1989. The topography is very steep and there is more forest than in the other tributary watersheds. The flow tends to be very flashy because of the steep slopes and the intensive agriculture in the upper reaches. There is only one major impoundment in the watershed and that is near the mouth in downtown Cannon Falls.

The Macroinvertebrate population increased significantly each year during the course of the study. This site had one of the most diverse populations of all the tributaries in the Cannon River Basin. The highest average richness score (31) was obtained at this site in 1996 with 3 different kinds of stoneflies, 5 kinds of beetles, 10 kinds of mayflies, 5 kinds of caddisflies, and 5 different kinds of true flies in the sample. The metrics consistently were in the slight impact range and the tolerance rating ranged from 1 to 8, with the majority in the 2-6 range. Almost 60% of the population was in tolerance rank 6 with 15% in rank 4, 10% in rank 5, and 11% in ranks 2 and 3. The average scraper to filterer ratio change (.88 and .31 in 94 and 95 compared to 1.81 in 96) was due to the very high June value of 3.51, while the July value was a very low 0.11. The large number of mayflies probably influenced the ratio in the June set.

Nutrient values at this site were consistently some of the lowest of all of the sites tested. Bed load and alkalinity values however were quite high at this site. The stream bed has much fine sand that has been eroded from the Saint Peter Sandstone, which outcrops at many locations in the valley. Where the current slows there are sand bars of this fine grained quartz sand. High alkalinity values indicate large amounts of calcium carbonate that is being dissolved from limestone outcrops in the river valley. This is a positive indicator, as alkalinity helps buffer pH and prevent any abrupt lowering of the pH of the stream as a result of acid rain. Because water temperatures remain cool, a trout population is capable of surviving in the stream at this location.