

BELLE CREEK



Belle Creek near Welch (BLC-2)

Location:

River mile: 11

U.S.G.S. quad: Welch; 44092-E6

Township: T113N R16W S34

Lat./Long: 44°32'30"/92°43'30"

Other info.:

Type: Midsize stream within 1 mile of mouth

Stream Order: 4

Drainage area: 75 square miles

Riparian: Forest

Instream: Cobble, gravel, sand, and silt dusting in slow current

Gradient: 13.95 ft/mi



QUALITATIVE HABITAT EVALUATION INDEX (QHEI) SCORING FORM

Date 6/19/95 River Mile 11 Watershed Number _____
 Location BLC-2 U.S.G.S. quad Welch
 Township T113NR16W Section 34 Lat./Long. 44°32'30"/92°43'30"

73

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 checked="" 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 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)	_____	_____	
Comments _____						

11

Substrate

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 type="checkbox"/> Boulders (1)	
<input type="checkbox"/> Aquatic macrophytes (1)	
Comments _____	

8

Cover

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

Sinuosity	Development	Channelization	Stability	Other
<input 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 checked="" type="checkbox"/> Moderate (3)	<input 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)		
Comments _____				

12

Channel

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
L R	L R	L R
<input type="checkbox"/> Extensive >100m (3)	<input type="checkbox"/> Open pasture (1)	<input type="checkbox"/> None (5)
<input checked="" 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 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)		
Comments _____		

11

Riparian

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 checked="" 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 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)	
Comments _____			

12

Pool/Riffle

Riffle/Run Depth (Check 1)	Riffle/Run Substrate (Check 1)	Riffle/Run Substrate Quality (Check 1)
<input type="checkbox"/> Generally <10cm (1)	<input type="checkbox"/> Stable (cobble, boulder) (1)	<input type="checkbox"/> Embedded (0)
<input checked="" type="checkbox"/> Generally >10cm Max <50 (2)	<input checked="" 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)

14.0

8

Gradient

7. DRAINAGE AREA (square mile)

75

11

Drainage Area

QUALITATIVE HABITAT EVALUATION INDEX (QHEI) SCORING FORM

Date 6/19/96 River Mile 11 Watershed Number _____
 Location BLC-2 U.S.G.S. quad Welch
 Township T113N R16W Section 34 Lat./Long. 44°32.40N 92°43.25W

74

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 checked="" 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 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)	_____	_____	
Comments _____						

11

Substrate

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 type="checkbox"/> Boulders (1)	
<input type="checkbox"/> Aquatic macrophytes (1)	
Comments _____	

8

Cover

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

Sinuosity	Development	Channelization	Stability	Other
<input 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 checked="" type="checkbox"/> Moderate (3)	<input checked="" 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)		
Comments _____				

12

Channel

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
L R	L R	L R
<input checked="" type="checkbox"/> Extensive >100m (5)	<input type="checkbox"/> Open pasture (1)	<input checked="" type="checkbox"/> Forest, swamp (3)
<input type="checkbox"/> Wide 50-100m (4)	<input type="checkbox"/> Fenced pasture (2)	<input type="checkbox"/> Shrub (4)
<input type="checkbox"/> Moderate 10-50m (3)	<input type="checkbox"/> Old field (3)	<input type="checkbox"/> Residential, Park (2)
<input type="checkbox"/> Narrow 5-10m (2)	<input type="checkbox"/> Rowcrop (1)	<input type="checkbox"/> Urban
<input type="checkbox"/> Very Narrow 1-5m (1)	<input type="checkbox"/> Conservation tillage (2)	
<input type="checkbox"/> None (0)		
Comments _____		

11

Riparian

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 checked="" 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 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			

13

Pool/Riffle

Riffle/Run Depth (Check 1)	Riffle/Run Substrate (Check 1)	Riffle/Run Substrate Quality (Check 1)
<input type="checkbox"/> Generally <10cm (1)	<input checked="" type="checkbox"/> Stable (cobble, boulder) (1)	<input type="checkbox"/> Embedded (0)
<input checked="" 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) 14.0

8

Gradient

7. DRAINAGE AREA

(square mile) 75

11

Drainage Area

SITE **BLC-2** Location BELLE CREEK NEAR WELCH

	1994	1995	1996
SUBSTRATE	11	11	11
INSTREAM COVER	9	8	8
CHANNEL MORPHOLOGY	11	12	12
RIPARIAN	11	11	11
CHANNEL QUALITY	13	12	13
GRADIENT 8 DRAINAGE 11	QHEI 1994 74	QHEI 1995 73	QHEI 1996 74

EXTENT OF CHANGE IN LOCATION
No change

RAPID HABITAT BIOASSESSMENT 1995	197
FISH COVER ?	
MACRO COVER	19
EMBEDDEDNESS	15
VELOCITY\DEPTH	15
CHANNEL	20
SEDIMENT	15
RIFFLES	15
CHANNEL FLOW	15
BANK EROSION	11
VEGETATION	15
GRAZING	20
RIPARIAN	20

Belle Creek (BLC-2)

Goodhue County Highway near Welch

Riparian: Forest

Instream: Cobble, gravel, sand, silt

Macroinvertebrate Metrics

<u>Metric</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>Average</u>	<u>Overall Impact</u>
QHEI	74	73	74	74	
ICI	27	29	36	30.7	Slight
Richness	7	19.5	22.5	16.3	Moderate
Diversity	1.7	2.6	2.9	2.4	Slight
Equitability	0.63	0.47	.51	.54	Slight
Scraper/Filterer Ratio	0.23	0.28	1.14		
Tolerance Range	2-6	1-8	1-11	1-8	

Macroinvertebrate Taxa and Numbers of Individuals

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

	<u>June 94</u>	<u>July 94</u>	<u>June 95</u>	<u>July 95</u>	<u>June 96</u>	<u>July 96</u>
Oligochaeta [10]	-	-	-	-	4	-
Leeches						
Placobdella [8]	-	-	1	-	-	-
Amphipods						
Gammarus [3]	-	15	9	4	2	-
Stoneflies						
Perlesta [3]	14	1	13	2	5	23
Pteronarcys [2]	-	1	-	5	-	-
Beetles						
Dubiraphia [5]	-	-	1	-	-	-
Optioservus [4]	-	-	4	6	2	7
Stenelmis [7]	-	-	-	3	1	-
Macronychus [2]	-	-	-	1	5	-
Mayflies						
Baetis [4]	-	2	1	41	179	133
Ephemerella [2]	-	-	4	-	67	1
Heptagenia [3]	21	3	40	20	1	5
Stenacron [4]	-	1	1	-	-	-
Stenonema [4]	9	3	17	5	8	4
Isonychia [3]	-	-	-	3	-	-
Pseudocloeon [4]	-	-	-	-	2	-
Caddisflies						
Brachycentrus [1]	-	-	10	17	44	54
Cheumatopsyche [6]	-	5	-	-	1	-
Hydropsyche [5]	-	34	102	342	87	145
Pycnopsyche [3]	-	-	2	-	-	-
True Flies						
Simuliidae [4-6]	-	-	66	22	205	24
Antocha [5]	-	-	-	-	1	3
Hemerodromia [6]	-	-	-	-	1	-
Atherix [4]	-	-	-	12	-	4
Tipula [4]	-	-	-	1	-	-
Midges						
Brillia [?]	1	-	-	-	4	-
Cryptochironomus [8]	-	-	4	-	-	-
Cricotopus [8]	-	-	-	1	18	2
Microtendipes [6]	-	-	26	-	4	-
Phaenopsectra [4]	-	-	4	-	-	-
Polypedilum [6]	-	-	51	1	18	1
Eukiefferiella [4]	-	-	-	1	62	-

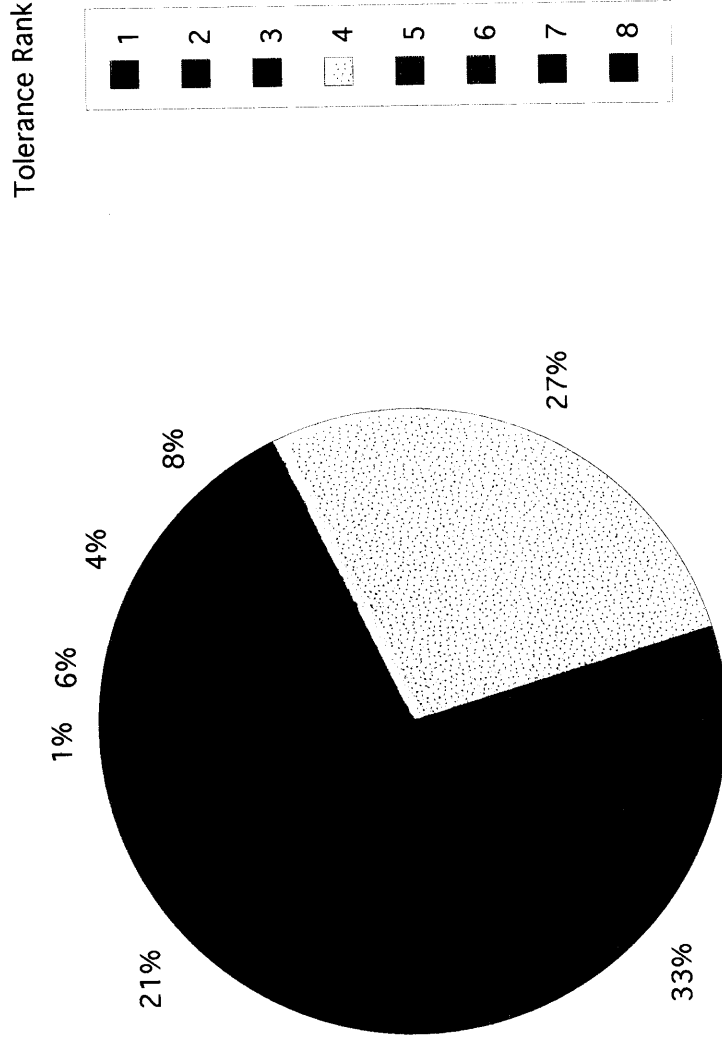
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Chironomus [11]	-	-	-	-	4	-
Rheotanytarsus [6]	-	-	-	11	22	-
Nanoclaudius [3]	-	-	-	-	-	1
Ablabesmyia [6]	-	-	-	-	-	1
Parametriocnemus [4]-	-	-	-	-	92	-
Pagastia [?]	-	-	-	-	4	-
Cardioclaudius [6]	-	-	-	-	4	6
Thienemannimyia [6]-	-	-	7	-	4	-

Belle Creek Near Welch (BLC-2)

Site	NUMBER OF INSECTS BY TOLERANCE RATING									TOTAL	PERCENT IN TOLERANCE RANK								
	1	2	3	4	5	6	7	8	9+		1	2	3	4	5	6	7	8	9
BLC 1994	0	1	54	15	34	5	0	0	0	109	0%	1%	50%	14%	31%	5%	0%	0%	
BLC 1995	27	10	93	93	445	158	3	6	0	835	3%	1%	11%	11%	53%	19%	0%	0%	
BLC 1996	98	73	37	493	236	291	1	20	8	1257	8%	6%	3%	39%	19%	23%	2%	1%	
BLC TOTAL	125	84	184	601	715	454	4	26	8	2201	6%	4%	8%	27%	32%	21%	0%	0%	

Percent Macroinvertebrates by Tolerance Rank



BELLE CREEK NEAR WELCH VILLAGE [BLC]

DATE	JULY 1994	JULY 1995	JUNE 1996	JULY 1996
SURFACE WATER				
NITRATE NITROGEN	----	0.018	2.6	2.85
AMMONIA NITROGEN	----	2.73	0.01	0.011
KJELDAHL NITROGEN	----	3.16	3.85	3.62
ORTHOPHOSPHATE	----	0.021	0.023	0.046
TOTAL PHOSPHORUS	----	0.072	0.083	0.088
PORE WATER				
NITRATE NITROGEN	----	0.307	----	1.27
AMMONIA NITROGEN	----	0.347	----	0.274
KJELDAHL NITROGEN	----	1.3	----	2.18
ORTHOPHOSPHATE	----	0.064	----	0.015
TOTAL PHOSPHORUS	----	0.088	----	0.068
STREAM LOAD				
TURBIDITY	----	----	18	7
TOTAL SUSPENDED SOLIDS	----	----	48.32	42.44
TOTAL VOLATILE SOLIDS	----	----	12.42	12.12
CONDUCTIVITY	0.592	0.608	0.588	0.579
OTHER				
pH	8.5	8.7	8.3	8.4
ALKALINITY	----	----	300	280
TEMPERATURE	16	20.2	15.2	19.2

BELLE CREEK SUMMARY

Belle Creek enters the Canon River at river mile 11 about a mile downstream from the village of Welch. Belle Creek watershed drains about 75 square miles and has one of the steepest gradients of all the Canon River Tributaries at about 14 feet per mile. It is a 4th order stream and is primarily agricultural in the headwaters and forest from the mid reach down to the mouth. There are several impoundments in the headwaters which were built to help control the flow during periods of heavy precipitation.

Just above the sample site there is a small pool which is silt covered when the flow is low. The artificial samplers were placed in a riffle with a rapid current and a depth of about 12 - 18 inches. The QHEI at this site averages 74 and has the second highest of all the Canon River Tributaries, with only Prairie Creek near Randolph (80.0) being higher. The riparian zone at this site is very wide and the impact of human activities is slight. There is a good distribution of pools, runs, and riffles with a variety of instream cover available. Because of the rapid flow and steep gradient, bank erosion and sedimentation are the major factors impacting water quality. When flow rates are average to low the water is cool and clear, however when the flow is high the stream carries a high bedload.

The predominant species found were Mayflies and Caddisflies, however in the early set in 1995 and 1996 there were a large number of black fly larva. The overall impact for the site was slight, with only the Richness being in the moderate range. The tolerance range was from 1 to 10 with the majority of the insects in the 4 - 6 tolerance range. 21% of the population was in tolerance rank 6, 33% in rank 5, 27% in rank 4, 8% in rank 3, and 10% in rank 1 and 2. There was a general increase in the number of insects collected at the site over the period of the study. This was probably due to more stable flows in the watershed. In 1994 there were very high water levels much of the year and in 1995 the water levels were very high in the spring and early summer. The scraper to filterer ratio (.23 and .28 in 94 and 95 compared to 1.14 in 96) was probably indicative of the changes in flow as well.

All of the chemistry parameters tested at this site were in the middle of the ranges of values for all of the sites tested. The only thing that stood out was the water temperature, this site consistently had the lowest water temperature of all the sites tested. Stream load values tended to be slightly above the median, but the velocity at this site was greater as well.