

PINE CREEK



QUALITATIVE HABITAT EVALUATION INDEX (QHEI) SCORING FORM

Date 6/15/95 River Mile 17 Watershed Number _____
 Location PNC-4 U.S.G.S. quad Miesville
 Township T112N R17W Section 5 Lat./Long. 44°32'92°52'30"

71
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 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)	_____	_____	
Comments _____						

11
Substrate

2. INSTREAM COVER

Type (Check ALL that apply)	Amount (Check ONLY one)
<input checked="" type="checkbox"/> Undercut banks (1)	<input checked="" type="checkbox"/> Extensive (7)
<input checked="" type="checkbox"/> Overhanging vegetation (1)	<input type="checkbox"/> Moderate (5)
<input 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 type="checkbox"/> Aquatic macrophytes (1)	
Comments _____	

11
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 checked="" type="checkbox"/> High (3)	<input type="checkbox"/> Impound
<input type="checkbox"/> Moderate (3)	<input type="checkbox"/> Good (3)	<input type="checkbox"/> Recovered (3)	<input type="checkbox"/> Moderate (2)	<input type="checkbox"/> Islands
<input checked="" 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 _____				

13
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 checked="" type="checkbox"/> None (5)
<input checked="" type="checkbox"/> Wide 50-100m (4)	<input type="checkbox"/> Fenced pasture (2)	<input type="checkbox"/> Little (4)
<input 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)		
	<input checked="" type="checkbox"/> Forest, swamp (3)	
	<input type="checkbox"/> Shrub (4)	
	<input type="checkbox"/> Residential, Park (2)	
	<input type="checkbox"/> Urban	
Comments _____		

12
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 checked="" type="checkbox"/> Extensive (3)	<input type="checkbox"/> Torrential (-1)	<input type="checkbox"/> Pool width > riffle width (2)
<input type="checkbox"/> 0.7-1m (2)	<input type="checkbox"/> Moderate (2)	<input type="checkbox"/> Fast (1)	<input checked="" 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 checked="" 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 checked="" type="checkbox"/> Eddies (1)	
		<input type="checkbox"/> Interstitial (-1)	
Comments _____			

11
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)

55.8

4
Gradient

7. DRAINAGE AREA (square mile)

23

9
Drainage Area

QUALITATIVE HABITAT EVALUATION INDEX (QHEI) SCORING FORM

Date 6/6/96 River Mile 17 Watershed Number _____
 Location PNC-4 U.S.G.S. quad Miesville
 Township T112N R17W Section 5 Lat./Long. 44° 31.98N 92° 52.39W

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 type="checkbox"/> Silt covered (-1) <input checked="" type="checkbox"/> Silt free (1) <input type="checkbox"/> Boulders as slabs (1) <input type="checkbox"/> Embedded (-2)
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<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)
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Comments _____	

12

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 checked="" type="checkbox"/> High (3)	<input type="checkbox"/> Impound
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<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																									
<table style="width: 100%;"> <tr> <td style="width: 50%;">L</td> <td style="width: 50%;">R</td> </tr> <tr> <td><input checked="" type="checkbox"/> Extensive >100m (5)</td> <td><input type="checkbox"/> Open pasture (1)</td> </tr> <tr> <td><input type="checkbox"/> Wide 50-100m (4)</td> <td><input type="checkbox"/> Fenced pasture (2)</td> </tr> <tr> <td><input type="checkbox"/> Moderate 10-50m (3)</td> <td><input type="checkbox"/> Old field (3)</td> </tr> <tr> <td><input type="checkbox"/> Narrow 5-10m (2)</td> <td><input type="checkbox"/> Rowcrop (1)</td> </tr> <tr> <td><input type="checkbox"/> Very Narrow 1-5m(1)</td> <td><input type="checkbox"/> Conservation tillage (2)</td> </tr> <tr> <td><input type="checkbox"/> None (0)</td> <td></td> </tr> </table>	L	R	<input checked="" type="checkbox"/> Extensive >100m (5)	<input type="checkbox"/> Open pasture (1)	<input type="checkbox"/> Wide 50-100m (4)	<input type="checkbox"/> Fenced pasture (2)	<input type="checkbox"/> Moderate 10-50m (3)	<input type="checkbox"/> Old field (3)	<input type="checkbox"/> Narrow 5-10m (2)	<input type="checkbox"/> Rowcrop (1)	<input type="checkbox"/> Very Narrow 1-5m(1)	<input type="checkbox"/> Conservation tillage (2)	<input type="checkbox"/> None (0)		<table style="width: 100%;"> <tr> <td style="width: 50%;">L</td> <td style="width: 50%;">R</td> </tr> <tr> <td><input checked="" type="checkbox"/> Forest, swamp (3)</td> <td><input type="checkbox"/> Shrub (4)</td> </tr> <tr> <td><input type="checkbox"/> Little (4)</td> <td><input type="checkbox"/> Residential, Park (2)</td> </tr> <tr> <td><input type="checkbox"/> Moderate (3)</td> <td><input type="checkbox"/> Urban</td> </tr> <tr> <td><input type="checkbox"/> Heavy (2)</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Severe (1)</td> <td></td> </tr> </table>	L	R	<input checked="" type="checkbox"/> Forest, swamp (3)	<input type="checkbox"/> Shrub (4)	<input type="checkbox"/> Little (4)	<input type="checkbox"/> Residential, Park (2)	<input type="checkbox"/> Moderate (3)	<input type="checkbox"/> Urban	<input type="checkbox"/> Heavy (2)		<input type="checkbox"/> Severe (1)	
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Comments _____																											

12.5

Riparian

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11

Pool/Riffle

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<input type="checkbox"/> Generally >10cm Max >50 (3)		
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Comments _____		

6. GRADIENT

(ft/mi) 55.8

4

Gradient

7. DRAINAGE AREA

(square mile) 23

9

Drainage Area

SITE **PNC-4** Location PINE CREEK NEAR CANNON FALLS

	1994	1995	1996
SUBSTRATE	11	11	11
INSTREAM COVER	11	11	12
CHANNEL MORPHOLOGY	13	12	12
RIPARIAN	12	12	12.5
CHANNEL QUALITY	11	12	11

GRADIENT 4
DRAINAGE 9

QHEI 1994

71

QHEI 1995

71

QHEI 1996

71.5

EXTENT OF CHANGE IN LOCATION
No change

RAPID HABITAT BIOASSESSMENT 1995

228

FISH COVER 18
MACRO COVER 20
EMBEDDEDNESS 17
VELOCITY\DEPTH 20
CHANNEL 20
SEDIMENT 18
RIFFLES 19
CHANNEL FLOW 18
BANK EROSION 19
VEGETATION 20
GRAZING 20
RIPARIAN 19

Pine Creek (PNC-4)

Goodhue County Highway 17

Riparian: Forest

Instream: Cobble, gravel, sand

Macroinvertebrate Metrics

<u>Metric</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>Average</u>	<u>Overall Impact</u>
QHEI	70	71	71.5	71	
ICI	20	23	24	22	Moderate
Richness	7.5	17	13	13.2	Moderate
Diversity	1.5	2.4	2.1	2.0	Moderate
Equitability	0.52	0.36	0.50	.46	Moderate
Scraper/Filterer Ratio	0.26	0.36	1.81		
Tolerance Range	2-8	1-8	1-7	3-6	

Macroinvertebrate Taxa and Numbers of Individuals

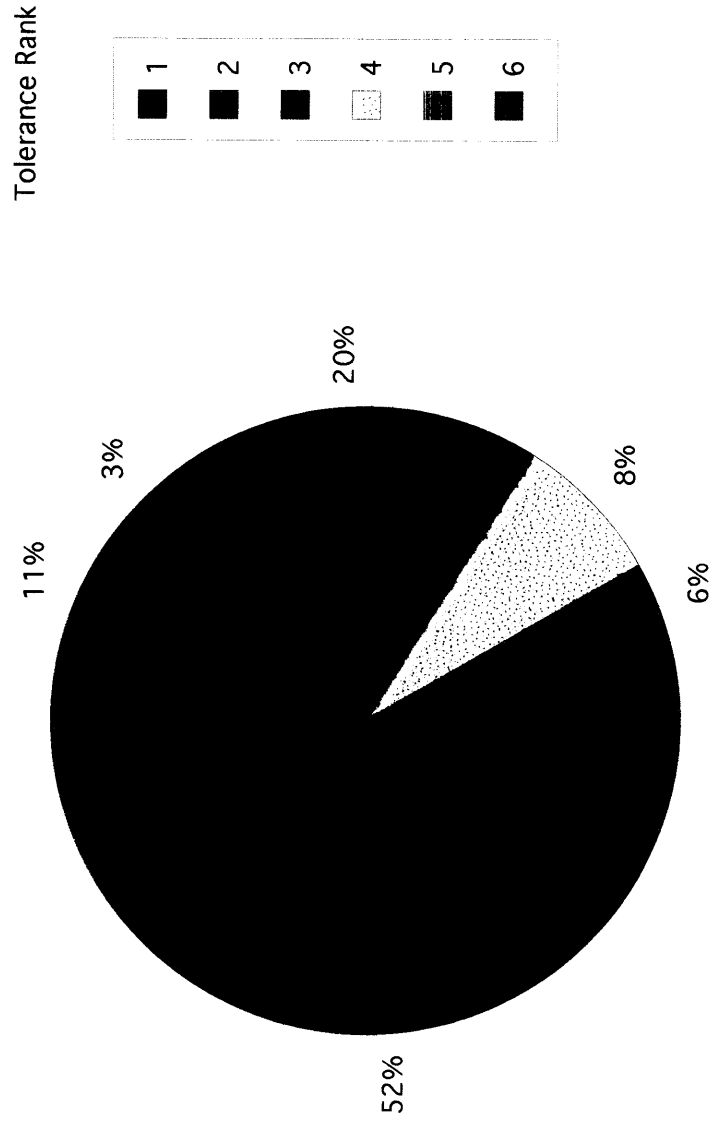
[#] = Tolerance Values (Source is Illinois Environmental Protection Agency)

	<u>June 94</u>	<u>July 94</u>	<u>June 95</u>	<u>July 95</u>	<u>June 96</u>	<u>July 96</u>
Leeches						
Erpobdella [8]	1	-	8	-	-	-
Amphipods						
Gammarus [3]	15	22	582	16	29	24
Stoneflies						
Perlesta [4]	-	-	2	-	-	-
Beetles						
Stenelmis [7]	-	-	2	-	-	-
Optioservus [4]	-	-	2	-	3	15
Agabus [?]	-	-	2	-	-	-
Mayflies						
Baetis [4]	4	-	12	8	106	5
Ephemereella [2]	45	-	2	-	50	-
Heptagenia [3]	1	-	2	-	-	-
Stenonema [4]	2	-	-	-	-	1
Isonychia [3]	-	-	-	-	-	1
Caddisflies						
Brachycentrus [1]	-	-	296	87	14	3
Cheumatopsyche [6]	-	2	-	1	-	1
Hydropsyche [5]	44	-	20	80	48	3
True Flies						
Simuliidae [4-6]	-	-	350	274	7	148
Atherix [4]	-	-	-	1	-	-
Tipula [4]	-	-	-	1	-	-
Hemerodromia [6]	-	-	-	1	-	-
Dicranota [4]	-	-	-	-	-	-
Midges						
Brillia [?]	1	-	16	8	-	-
Cardiocladius [6]	-	-	8	-	-	-
Rheotanytarsus [6]	-	-	8	24	-	7
Thienemannimyia [6]	-	-	16	-	-	-
Polypedilum [6]	-	-	284	53	6	667
Parametriocnemus [4]	2	-	8	4	9	7
Paratanytarsus [?]	1	-	-	-	-	-
Eukiefferiella [4]	3	-	8	-	56	-
Phaenopsectra [4]	-	-	-	16	-	-
Paratendipes [3]	-	-	-	4	-	-
Tanytarsus [7]	-	-	-	-	3	-
Nanocladius [3]	-	-	-	-	-	7

Pine Creek near Cannon Falls (PNC-4)

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
PNC 1994	0	45	37	11	44	2	0	1	0	140	0%	32%	26%	8%	31%	1%	0%	1%	0%
PNC 1995	383	2	604	62	100	1019	2	8	0	2180	18%	0%	28%	3%	5%	47%	0%	0%	0%
PNC 1996	17	50	61	202	51	836	3	0	0	1220	1%	4%	5%	17%	4%	69%	0%	0%	0%
PNC TOTAL	400	97	702	275	195	1857	5	9	0	3540	11%	3%	20%	8%	6%	52%	0%	0%	0%

Percent Macroinvertebrates by Tolerance Rank



PINE CREEK NORTHEAST OF CANNON FALLS [PNC]

DATE	JULY 1994	JULY 1995	JUNE 1996	JULY 1996
SURFACE WATER				
NITRATE NITROGEN	----	----	8.15	8.1
AMMONIA NITROGEN	----	----	LB	LB
KJELDAHL NITROGEN	----	----	8.6	9.6
ORTHOPHOSPHATE	----	----	0.027	0.007
TOTAL PHOSPHORUS	----	----	0.056	0.02
PORE WATER				
NITRATE NITROGEN	----	----	6.89	7.66
AMMONIA NITROGEN	----	----	0.118	0.109
KJELDAHL NITROGEN	----	----	7.04	8.66
ORTHOPHOSPHATE	----	----	0.049	0.03
TOTAL PHOSPHORUS	----	----	0.132	0.059
STREAM LOAD				
TURBIDITY	----	----	20	12
TOTAL SUSPENDED SOLIDS	----	----	55.69	49.21
TOTAL VOLATILE SOLIDS	----	----	12.93	13
CONDUCTIVITY	0.577	----	0.556	0.548
OTHER				
pH	8.7	----	8.1	8.4
ALKALINITY	----	----	240	240
TEMPERATURE	14.8	----	16	16.2

PINE CREEK SUMMARY

Pine Creek enters the Cannon River at river mile 22, northeast of Cannon Falls. Pine Creek Watershed drains about 23 square miles and has a very steep gradient of almost 56 feet per mile. It is a 2nd order stream and its headwaters is primarily agricultural, with a deep limestone faced gorge at the midreach and a relatively level mouth that is surrounded by forest. During the dry season, the stream flow is made up mostly of ground water and its temperature is quite cool and the water is very clear. Very little change took place at this site over the course of the study, the QHEI was very consistent and water levels were not as flashy as they were in other tributaries. Because of the steep rocky slopes, there is very little human impact in the mid reach and the lack of suitable access leaves the mouth relatively unimpacted by human activity. Even during heavy flow periods, the stream is quite clear, which probably indicates good land use practices in the headwater agricultural region.

The largest number of insects were collected in 1995. In the second set in 1996 a disappointingly low number of insects were found in the stream, especially during the qualitative kick/pick sample. The second set of 1994 was partially out of the water resulting in the low number of insects collected. The 1995 set had a very large number of *Brachycentrus* which has a tolerance rating of 1, a very good sign. About one third of the collection in June was made up of Amphipods with a tolerance rating of 3. However, 1996 populations of *Brachycentrus* and Amphipod populations were relatively low with the *Polypedilum* Midge (tolerance rating 6) making up 65% of the sample. 52% of the population was in rank 6, 14% in rank 4 and 5, 20% in rank 3, and 11% in tolerance rank 1. The metrics were fairly consistent with a slight drop off in 1996 and the overall impact stayed in the moderate range over the course of the study. The average scraper to filterer ratio change (.26 and .36 in 94 and 95 compared to 1.81 in 96) was due to the very high June value of 3.59, while the July value was a very low 0.03.

This site has some of the highest nitrogen concentrations of all of the sites tested. Surface water is in the 8 mg/L range and pore water is slightly lower, in the 6-7 mg/L range. Even though the nitrogen values are high, they do not appear to be a serious problem. Even though the nitrogen values are high the phosphorus values are low compared to most other sites. Water temperatures are typically the lowest of all the sites tested.

The most puzzling thing about this site is that during the last kick/pick, we were able to find very few insects. All other sites typically had increases in the richness and density of the insect population, this site however had very few. In previous years it was always quite easy to find a large variety of insects by picking up rocks from the stream bed. Why this abrupt change took place is not known and it was not investigated because of a lack of time and resources.