TURTLE CREEK

QUALITATIVE HABITAT EVALUATION INDEX (QHEI) SCORING FORM

Date 6/16/95 River Mile _____ Watershed Number _____

Location TUC-27 U.S.G.S. quad Owatonna

Township T107N R20W Section 33 Lat./Long. 44°02′/93°15′

51 Total QHEI

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

Type	Pool	Riffle
☐ ☐ Boulder (7)		
☒ ☐ Cobble (6)		
☐ ☐ Hardpan (3)		
☐ ☐ Silt (3)		
☐ ☐ Muck (2)		

Type	Pool	Riffle
☐ ☐ Gravel (5)		
☐ ☒ Sand (4)		
☐ ☐ Bedrock (3)		
☐ ☐ Detritus (2)		
☐ ☐ Sludge (1)		

Quality
Check all that apply:
- ☒ Silt covered (-1)
- ☐ Silt free (1)
- ☐ Boulders as slabs (1)
- ☐ Embedded (-2)

9 Substrate

Comments _____

2. INSTREAM COVER

Type *(Check ALL that apply)*
- ☒ Undercut banks (1)
- ☐ Overhanging vegetation (1)
- ☒ Shallows (in slow water) (1)
- ☐ Logs or woody debris (1)
- ☐ Deep pools (1)
- ☐ Oxbows (1)
- ☒ Boulders (1)
- ☐ Aquatic macrophytes (1)

Amount (Check ONLY one)
- ☐ Extensive (7)
- ☐ Moderate (5)
- ☒ Sparse (3)
- ☐ Nearly absent (1)

6 Cover

Comments _____

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

Sinuosity
- ☐ High (4)
- ☒ Moderate (3)
- ☐ Low (2)
- ☐ None (1)

Development
- ☐ Excellent (4)
- ☐ Good (3)
- ☒ Fair (2)
- ☐ Poor (1)

Channelization
- ☒ None (4)
- ☐ Recovered (3)
- ☐ Recovering (2)
- ☐ Recent or no Recovery (1)

Stability
- ☐ High (3)
- ☐ Moderate (2)
- ☒ Low (1)

Other
- ☐ Impound
- ☐ Islands
- ☐ Leveed

10 Channel

Comments _____

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

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

Riparian Width

L	R	
☐	☐	Extensive >100m (3)
☐	☐	Wide 50-100m (4)
☐	☐	Moderate 10-50m (3)
☐	☐	Narrow 5-10m (2)
☐	☐	Very Narrow 1-5m (1)
☒	☒	None (0)

Flood Plain Quality

L	R		L	R	
☒	☒	Open pasture (1)	☐	☐	Forest, swamp (3)
☐	☐	Fenced pasture (2)	☐	☐	Shrub (4)
☐	☐	Old field (3)	☐	☐	Residential, Park (2)
☐	☐	Rowcrop (1)	☐	☐	Urban
☐	☐	Conservation tillage (2)			

Bank Erosion

L	R	
☐	☐	None (5)
☐	☐	Little (4)
☒	☒	Moderate (3)
☐	☐	Heavy (2)
☐	☐	Severe (1)

4 Riparian

Comments _____

5. POOL/GLIDE AND RIFFLE/RUN QUALITY

Maximum Depth *(Check 1)*
- ☐ > 1m (3)
- ☐ 0.7-1m (2)
- ☒ 0.4-0.7m (1)
- ☐ < 0.4m (0)
- ☐ No Pool

Pool Cover *(Check 1)*
- ☐ Extensive (3)
- ☐ Moderate (2)
- ☒ Sparse (1)
- ☐ Nearly absent (0)

Overall Current Velocity *(Check ALL that apply)*
- ☐ Torrential (-1)
- ☐ Intermittent (-2)
- ☐ Fast (1)
- ☒ Eddies (1)
- ☒ Moderate (1)
- ☐ Interstitial (-1)
- ☒ Slow (1)

Morphology *(Check 1)*
- ☐ Pool width> riffle width (2)
- ☒ Pool width = riffle width (1)
- ☐ Pool width < riffle width (0)

Riffle/Run Depth *(Check 1)*
- ☐ Generally <10cm (1)
- ☐ Generally >10cm Max <50 (2)
- ☐ Generally >10cm Max >50 (3)
- ☒ No riffle (0)

Riffle/Run Substrate *(Check 1)*
- ☐ Stable (cobble, boulder) (1)
- ☒ Unstable (gravel, sand) (0)

Riffle/Run Substrate Quality *(Check 1)*
- ☒ Embedded (0)
- ☐ Not embedded (1)

6 Pool/Riffle

Comments _____

6. GRADIENT

(ft/mi) 6.6

6 Gradient

7. DRAINAGE AREA

(square mile) 37

10 Drainage Area

QUALITATIVE HABITAT EVALUATION INDEX (QHEI) SCORING FORM

Date 6/14/96 River Mile _____ Watershed Number _____

Location TUC-27 U.S.G.S. quad Owatonna

Township T107N R20W Section 33 Lat./Long. 44°05.40N 93°18.22W

50 Total QHEI

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

Type	Pool	Riffle
☐ ☐ Boulder (7)		
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Check all that apply:
- ☒ Silt covered (-1)
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Type *(Check ALL that apply)*
- ☒ Undercut banks (1)
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6 Cover

Comments _____

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Sinuosity
- ☐ High (4)
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*(Check single most predominant, **on each bank**, under each category)*

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☐	☐	Narrow 5-10m (2)
☐	☐	Very Narrow 1-5m(1)
☒	☒	None (0)

Flood Plain Quality

L	R		L	R	
☒	☒	Open pasture (1)	☐	☐	Forest, swamp (3)
☐	☐	Fenced pasture (2)	☐	☐	Shrub (4)
☐	☐	Old field (3)	☐	☐	Residential, Park (2)
☐	☐	Rowcrop (1)	☐	☐	Urban
☐	☐	Conservation tillage (2)			

Bank Erosion

L	R	
☐	☐	None (5)
☐	☐	Little (4)
☒	☒	Moderate (3)
☐	☐	Heavy (2)
☐	☐	Severe (1)

4 Riparian

Comments Cattle in pasture cause erosion of banks

5. POOL/GLIDE AND RIFFLE/RUN QUALITY

Maximum Depth *(Check 1)*
- ☐ > 1m (3)
- ☐ 0.7-1m (2)
- ☒ 0.4-0.7m (1)
- ☐ < 0.4m (0)
- ☐ No Pool

Pool Cover *(Check 1)*
- ☐ Extensive (3)
- ☐ Moderate (2)
- ☒ Sparse (1)
- ☐ Nearly absent (0)

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- ☐ Torrential (-1)
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- ☐ Fast (1)
- ☐ Eddies (1)
- ☐ Moderate (1)
- ☐ Interstitial (-1)
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Morphology *(Check 1)*
- ☒ Pool width> riffle width (2)
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5 Pool/Riffle

Riffle/Run Depth *(Check 1)*
- ☐ Generally <10cm (1)
- ☐ Generally >10cm Max <50 (2)
- ☐ Generally >10cm Max >50 (3)
- ☒ No riffle (0)

Riffle/Run Substrate *(Check 1)*
- ☐ Stable (cobble, boulder) (1)
- ☒ Unstable (gravel, sand) (0)

Riffle/Run Substrate Quality *(Check 1)*
- ☒ Embedded (0)
- ☐ Not embedded (1)

Comments _____

6. GRADIENT

(ft/mi) 6.6

6 Gradient

7. DRAINAGE AREA

(square mile) 37

10 Drainage Area

SITE **TUC-27** Location TURTLE CREEK SOUTH OF OWATONNA NEAR I35

	1994	1995	1996
SUBSTRATE	9	9	9
INSTREAM COVER	7	6	6
CHANNEL MORPHOLOGY	10	10	10
RIPARIAN	4	4	4
CHANNEL QUALITY	5	6	5
GRADIENT 6			
DRAINAGE 10			
QHEI	1994 **51**	1995 **51**	1996 **50**

EXTENT OF CHANGE IN LOCATION
Moved out from under bridge to a riffle about 40 meters up stream in the pasture.

RAPID HABITAT BIOASSESSMENT 1995 **135**

FISH COVER	10
MACRO COVER	13
EMBEDDEDNESS	12
VELOCITY\DEPTH	12
CHANNEL	19
SEDIMENT	9
RIFFLES	7
CHANNEL FLOW	16
BANK EROSION	8
VEGETATION	12
GRAZING	7
RIPARIAN	10

TURTLE CREEK (TUC-27)

At Steele County Highway 60
Riparian: Pasture
Instream: Boulders, cobble, gravel, sand, and silt

Macroinvertebrate Metrics

Metric	1994	1995	1996	Average	Overall Impact
QHEI	51	51	50	50.3	
ICI	33	30	31	31.3	Slight
Richness	12	20	18.5	16.8	Moderate
Diversity	2.3	3.3	3.2	2.9	Slight
Equitability	0.59	0.72	0.73	0.68	Non Impacted
Scraper/Filterer Ratio	0.18	0.44	2.81		
Tolerance Range	2-8	3-8	3-8	3-6	

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
Gastropoda						
Ferrissa [7]	-	-	-	-	-	5
Stoneflies						
Perlesta [3]	2	-	14	2	14	7
Pteronarcys [2]	1	-	-	-	-	-
Megaloptera						
Sialis [4]	1	-	-	-	-	-
Beetles						
Dubiraphia [5]	2	-	1	-	7	-
Stenelmis [7]	-	-	-	-	1	1
Odonata						
Boyeria [3]	-	-	-	-	-	2
Mayflies						
Baetis [4]	-	2	-	7	-	-
Heptagenia [3]	7	10	25	21	13	12
Stenacron [4]	2	-	3	6	11	13
Stenonema [4]	-	5	2	17	43	7
Isonychia [3]	3	6	-	80	1	87
Pseudocloeon [4]	-	-	-	-	68	-
Caenis [6]	9	-	1	-	7	-
Tricorythodes [5]	-	-	-	-	-	1
Hexagenia [6]	-	-	-	-	-	1
Leucrocuta [?]	-	-	-	-	-	2
Caddisflies						
Cheumatopsyche [6]	21	2	5	17	11	52
Hydropsyche [5]	25	84	3	71	15	57
Pycnopsyche [3]	2	-	3	3	6	5
Polycentropus [3]	-	-	-	-	1	-
Nyctiophylax [1]	-	-	1	-	-	-
True Flies						
Simulidae [4-6]	-	-	-	2	-	-
Antocha [5]	-	-	-	-	2	-
Atherix [4]	-	-	-	8	-	2

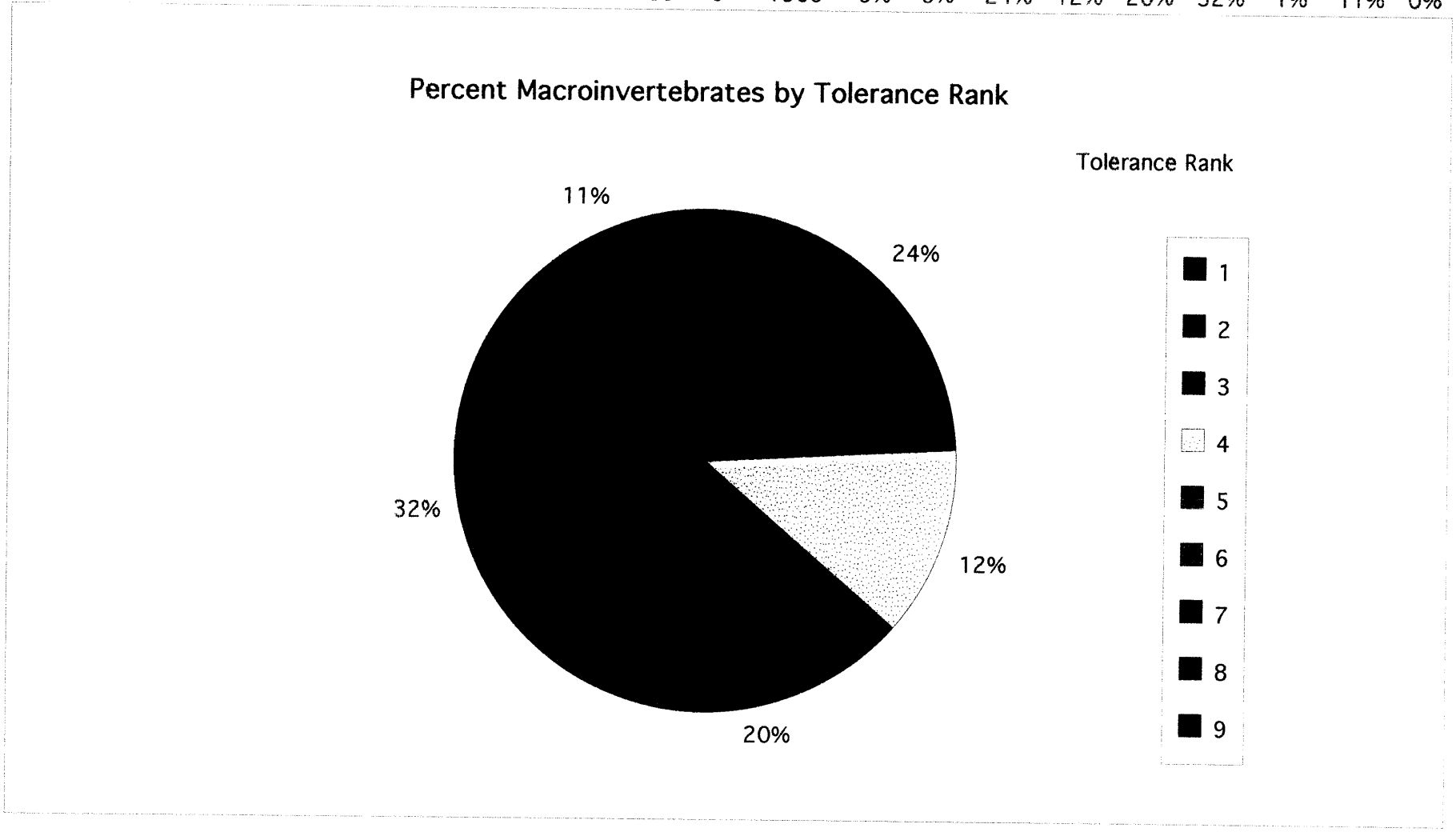
TURTLE CREEK (TUC-27) page 2

Midges

Ablabesmyia [6]	-	-	8	-	-	3
Brillia [?]	1	-	8	-	23	-
Cricotopus [8]	-	5	20	3	67	57
Microtendipes [6]	4	-	68	-	-	-
Polypedilum [6]	-	3	24	1	4	-
Rheotanytarsus [6]	-	-	8	6	-	-
Paratanytarsus [?]	-	-	8	3	27	-
Thienemannimyia[6]	-	1	40	5	-	105
Microcricotopus [?]	-	-	-	-	12	-
Rheocricotopus [6]	-	-	4	-	-	-
Phaenopsectra [4]	-	-	20	-	-	-
Stenochironomus [3]	-	-	-	3	-	-
Pentaneura [3]	-	-	4	-	-	-
Cryptochironomus[8]	1	-	-	-	-	-

Turtle Creek near Owatonna (TUC-27)

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
TUC 1994	0	1	30	10	110	40	0	6	0	197	0%	1%	15%	5%	56%	20%	0%	3%	0%
TUC 1995	1	0	152	63	75	189	0	23	0	503	0%	0%	30%	13%	15%	38%	0%	5%	0%
TUC 1996	0	0	148	94	82	210	7	124	0	665	0%	0%	22%	14%	12%	32%	1%	19%	0%
TUC TOTAL	1	1	330	167	267	439	7	153	0	1365	0%	0%	24%	12%	20%	32%	1%	11%	0%



TURTLE CREEK SOUTH OF OWATONNA [TUC]

DATE	JULY 1994	JULY 1995	JUNE 1996	JULY 1996
SURFACE WATER				
NITRATE NITROGEN	----	----	7.64	1.6
AMMONIA NITROGEN	----	----	0.035	0.02
KJELDAHL NITROGEN	----	----	8.02	2.19
ORTHOPHOSPHATE	----	----	0.051	0.035
TOTAL PHOSPHORUS	----	----	0.036	0.077
PORE WATER				
NITRATE NITROGEN	----	----	5.4	1.1
AMMONIA NITROGEN	----	----	0.737	0.211
KJELDAHL NITROGEN	----	----	6.57	1.96
ORTHOPHOSPHATE	----	----	0.023	0.024
TOTAL PHOSPHORUS	----	----	0.034	0.072
STREAM LOAD				
TURBIDITY	----	----	23	16
TOTAL SUSPENDED SOLIDS	----	----	76.34	66.81
TOTAL VOLATILE SOLIDS	----	----	16.77	12.98
CONDUCTIVITY	0.586	----	0.693	0.624
OTHER				
pH	8.6	----	8.1	8.6
ALKALINITY	----	----	340	280
TEMPERATURE	21.8	----	20.1	----

TURTLE CREEK SOUTH OF OWATONNA

Turtle Creek is a 3rd order stream with a drainage area of 37 square miles. This stream drains an area that is a relatively flat glacial outwash plain with very rich soils and poor drainage. Agriculture is the major land use in the sub watershed. Many of the fields have drain tiles which empty into Turtle Creek causing water level to fluctuate rapidly. The substrate consists of sand and silt in the run while gravel, cobble, and a few boulders dominate in the riffle. The artificial samplers were located under a bridge in 1994 and June of 1995, but because of the frequent vandalism to the samplers, the site was moved about 50 yards upstream to a small riffle in a cow pasture. It was not uncommon to have cows looking over your shoulder while processing samplers at this location. The flow at this site was comperable to that at Pine and Heath Creeks. The QHEI score at this site was 50 which tied for the lowest score with the Little Cannon at Sogn. Riparian zone quality, bank erosion, and instream cover all scored very low causing the low overall score. This stream is extremly "flashy", the artificial samplers were set following a 5 inch rain in May of 1995 and water levels were over 8 feet deep at the sample site. Three weeks later the water depth at that same location was only 12 inches. The stream has many sand bars made up of very fine sand and silt.

Mayflies, caddisflies, and midges dominated the macroinvertebrate community at this site. Mayflies and caddisflies were about the same all three years however, the midge population increased significantly in 1995 and continued to be high in 1996. Ten different species of mayflies, five species of caddisflies, and fourteen species of midges were found at the site. The ICI and Diversity Indices were in the slight impact range while Richness was in the moderate range and the Equitability Index was in the non impacted range. In 1994 and 1995 filterers outnumbered the scrapers, however that changed in 1996 when the scrapers outpaced the filterers. The average tolerance range was between 3 and 8 with 11% from rank 8, 32% from rank 6, 20% from rank 5 12% from rank 4, and 24% from rank3.

We do not have much chemistry from 1994 or 1995 when water levels fluctuated frequently with the major storm events. In 1996, nitrogen levels were much higher in June (7-8 mg/l) when there was a lot of runoff than in July when there was very little runoff (1-2 mg/l). Phosphorus levels were very low and did not change as the nitrogen levels did. TSS and TVS levels were almost as high as they were on the Little Cannon indicating this stream also has a high bed load. Evidence of this is also found in the many deposits of fine sand found wherever the current slows. When water levels are high the water is very cloudy and has a high turbidity. When water levels are low the stream is almost clear. These levels also went down as the runoff decreased from June to July. Alkalinity and pH levels are consistent with the other streams in the Cannon River Basin.