

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
MAY 2015

STAFF REPORT

A BIOLOGICAL AND PHYSICAL SURVEY OF SITES IN THE RABBIT RIVER WATERSHED
ALLEGAN COUNTY, MICHIGAN
AUGUST 2013



INTRODUCTION

Monitoring by Surface Water Assessment Section (SWAS) staff is implemented on a five-year rotating basis with the most recent survey reports for the Rabbit River watershed completed in 2003 (MDEQ, 2004) and 2008 (MDEQ, 2009). Biological and physical habitat conditions of the Rabbit River watershed were assessed by SWAS staff in August 2013. The primary objectives of the 2013 assessments were to:

- Qualitatively evaluate current biological, chemical, and physical habitat conditions.
- Evaluate biological integrity and general water quality trends.
- Evaluate whether stream segments are attaining Michigan Water Quality Standards (MDEQ, 2006).
- Identify possible sources of water quality impairment.
- Satisfy monitoring requests submitted by internal and external customers.

DESCRIPTION

A tributary to the lower Kalamazoo River, and approximately 293 square miles in size, the Rabbit River watershed is primarily contained within Allegan County but reaches into Barry, Ottawa, and Kent Counties. Land use is primarily agricultural with areas of forested and urban land. The Rabbit River and its tributaries are relatively low gradient streams that drain predominantly sandy soils. The entire main stem of the Rabbit River and its tributaries upstream of Green Lake Creek confluence are designated coldwater streams, as are Silver Creek, Miller Creek in Monterey Township, and the unnamed tributaries upstream of Miller Creek.

METHODS

The surveys described in this report were conducted according to the SWAS Procedure 51 (Creal, Hanshue, Kosek, Oemke, & Walterhouse, 1996). The macroinvertebrate communities were scored with metrics that rate water bodies from excellent (+5 to +9) to poor (-5 to -9). Macroinvertebrate ratings from +4 to -4 are considered acceptable. Negative ratings that are acceptable indicate water bodies that are tending toward poor, while positive ratings that are acceptable indicate slight impairment (Creal, Hanshue, Kosek, Oemke, & Walterhouse, 1996). Stream habitat was qualitatively evaluated at each station using a scoring system that ranged from 0 (poor) to 200 (excellent). Scoring sheets for macroinvertebrates and habitat can be found in Appendix A.

Sampling locations are shown in Figure 1.

SUMMARY

Nineteen locations were sampled in 2013 with scores ranging from 5 (excellent) to -6 (poor) (Table 1). Many of the locations that received lower scores were specifically targeted for sampling due to known issues and are scheduled for restoration activities or a future Total Maximum Daily Load (TMDL). Sedimentation and bank erosion were a common issue throughout the watershed due to dredged/channelized streams, unstable/flashy streams, and unrestricted animal access (Figure).

SAMPLING RESULTS

Table 1. Location and assessment scores for stations sampled during 2013 in the Rabbit River watershed.

Station	Stream	Location	STORET #	Latitude	Longitude	Invertebrate Score ²	Habitat Score ¹	Justification for Visit
A	Black Creek	d/s 140th Avenue	30601	42.710147	-85.8988835	-6	119	Livestock access site, which needs prerestoration data collected
B	Black Creek	u/s of 140th Avenue	30710	42.712029	-85.902278	-1	67	Control site for documentation of success with restoration of downstream location
C	Rabbit River	d/s confluence Green Lake Creek	30712	42.68792	-85.658193	0	80	Livestock access site, which needs prerestoration data collected
D	Rabbit River	u/s confluence Green Lake Creek	30713	42.688076	-85.656638	4	147	Control site for documentation of success with restoration of downstream location
F	Rabbit River	Cattle Access off of 130th Avenue	30707	42.636469	-85.749667	1	132	Livestock access site, which needs prerestoration data collected
G	Rabbit River	u/s of Cattle Access off of 130th Avenue	30708	42.635522	-85.7441	2	163	Control site for documentation of success with restoration of downstream location
K	Red Run Drain	u/s of 140th Avenue	30526	42.71052	-85.70311	-4	103	Listed for a future TMDL
L	Felts Drain	u/s of 136th Avenue	30709	42.68102	-85.834624	-2	102	Pre-data for planned bank stabilization work
M	Felts Drain	u/s of 137th Avenue	30711	42.688395	-85.822403	-2	82	Pre-data for planned bank stabilization work
N	Red Run Drain	d/s and East of 21st Street	30714	42.735799	-85.749656	1	119	Pre-data
O	Red Run Drain	u/s of 21st Street	30531	42.73596	-85.75061	-3	95	Pre-data
8	Black Creek	140th Avenue	30601	42.70960	-85.89870	-6	119	Status Site/ Also Targeted (Station A)
9	Bear Creek	Main Street (Hopkins)	30700	42.62403	-85.76340	-1	104	Status Site
13	Black Creek	144th Avenue	30701	42.73871	-85.89329	2	105	Status Site
14	Miller Creek	15th Street	30702	42.61375	-85.69230	4	143	Status Site
16	Miller Creek	124th Avenue	30703	42.59428	-85.66971	5	177	Status Site
19	Rabbit River	132nd Avenue	30704	42.65298	-85.71600	0	140	Status Site
1T	Black Creek	34th Street	30602	42.76000	-85.88000	2	105	Trend Site/Mussel survey
4T	Rabbit River	36th Street	30673	42.70100	-85.89900	-2	145	Trend Site

¹Habitat scores (>154-Excellent, 105-154-Good, 56-104-Marginal, <56-Poor)

²Invertebrate assessment scores (+5 to +9-Excellent, +4 to -4-Acceptable, -5 to -9-Poor)

Status Sites

Six stations (8, 9, 13, 14, 16, and 19), (Table 1) were randomly chosen for assessment and determination of the attainment status of the Rabbit River watershed (status sites). These locations ranged in scores from 5 (excellent) to -6 (poor).

Black Creek

Station 8, downstream of 140th Avenue scored -6 (poor) for the macroinvertebrate community. This location was also a targeted monitoring request due to the presence of unrestricted cattle access (Figure). This site was in the middle of a grazed cattle pasture, with cattle having unrestricted access to the creek. Sedimentation and lack of riparian vegetation were obvious issues at this location.

Station 13, upstream of 144th Avenue, scored 2 (acceptable) and had a marginal habitat score of 104. This location was an obviously dredged drain, which had some issues with in-stream habitat and bank stability due to the dredging. The area downstream of 144th Avenue was investigated after a landowner expressed concern over erosion issues. Heavy sand deposits were noted and photographed at this location (Figure).

Miler Creek

Stations 14 and 16 scored in the upper end of acceptable and excellent, respectively, and had good habitat scores. In-stream habitat was decent at both locations and the riparian habitat was an intact wooded wetland. A couple of small areas were noted as having bank stability issues.

Bear Creek

Station 9 scored -1 (acceptable) for macroinvertebrates and 104 (marginal) for habitat. This station was located off of Main Street in downtown Hopkins. The stream appeared to be dredged often near the road crossing and had substantial concrete bank armoring. In-stream habitat was lacking and available habitat was affected by a heavy silt layer. Stream banks had obvious areas of erosion and stability issues.

Rabbit River

Station 19, upstream of 132nd Street, scored 0 (acceptable) for macroinvertebrates and 140 (good) for habitat. This station appears to have issues with flashiness and was very silty. In-stream habitat consisted mainly of large woody debris. Riparian habitat was an intact, wooded wetland.

Trend Sites

Two stations (1T and 4T) (Table 1) were sampled as part of the trend program, which resamples the same locations every 5 years to provide an estimate of water quality trends based on changes in the macroinvertebrate community.

Black Creek

Station 1T scored 2 (acceptable) for macroinvertebrates and 105 (good) for habitat. These scores are similar to scores received in 2008 (-4/93) and 2003 (0/109). This location has obviously been dredged and has issues with bank stability and in-stream habitat. A large freshwater mussel community was noted at this location and a mussel survey was conducted. Ten species and 257 individuals were collected and the density was estimated at 4.0 mussels per m². Three Slippershell mussels were collected; this is a State of Michigan threatened species. The results of the survey are contained in Table 2.

Table 2. Freshwater mussel survey results from Black Creek, Station 1T.

Species	Individuals	Size range (mm)
White heelsplitter, <i>Lasmigona complanata</i>	65	56-165
Pocketbook, <i>Lampsilis ventricosa</i>	10	84-141
Strange floater, <i>Strophitus undulates</i>	13	61-108
Wabash pigtoe, <i>Fuscoania flava</i>	17	59-104
Spike, <i>Eliptio dilatata</i>	21	60-92
Giant floater, <i>Pyganodon grandis</i>	30	61-123
Fat Mucket, <i>Lampsilis siliquoidea</i>	82	55-115
Mucket, <i>Actinonaias ligamentina</i>	14	79-121
Fluted-shell, <i>Lasmigona costata</i>	2	80-119
Slippershell, <i>Alasmidonta viridis</i>	3	37-42

Rabbit River

Station 4T scored -2 (acceptable) for macroinvertebrates and 145 (good) for habitat. These scores are similar to those collected in 2008 (-1/131). This location flowed through a wooded wetland and had substantial large woody debris. Substrate habitat was lacking and the stream bottom was predominantly sand.

Targeted Monitoring

Stations A-O were sampled based on internal and external requests for monitoring, which were solicited for the Rabbit River watershed during 2013 (Table 1).

Black Creek

Stations A and B, upstream and downstream of 140th Avenue, were sampled due to cattle access issues. The area downstream of the access issue (Station B) scored significantly higher for macroinvertebrates (-1) than the impacted area (-6, Station A). The MDEQ district staff are working with the landowners to limit the cattle access to the stream.

Rabbit River

Stations C and D were requested due to cattle access issues on Green Lake Creek, a tributary to the Rabbit River. The upstream location (Station D) scored significantly higher in macroinvertebrates and habitat indicating substantial impacts from the increased sedimentation. The cattle appeared to not be accessing the stream at the time of sampling as most scars along the bank had become vegetated. This site should be revisited in the future to determine if the conditions have improved.

Stations F and G were requested as a follow-up to a cattle exclusion/crossing that was installed. The crossing was effectively controlling access to the stream, but a broken fence at the upstream end of the cattle yard was still allowing access. However, stream conditions appear to have greatly improved and were well vegetated where it was obvious that cattle had previously had access. Scores for macroinvertebrates within the crossing area (Station F) and well upstream (Station G) of the area only differed by one point and were in the “acceptable” range. This area should be revisited to determine if the fence has been fixed and the cattle are restricted from access to the stream.

Felts Drain

Stations L and M were requested for collection of baseline data for a stream bank stabilization project that is proposed. Both locations scored -2 (acceptable) for macroinvertebrates and within the marginal range for habitat.

Red Run Drain

Approximately 25 miles of Red Run Drain is scheduled for a future TMDL (AUID 040500030806-02) due to poor macroinvertebrate scores in the past. Station K was targeted and scored -4 (acceptable) for macroinvertebrates. Although this is in the acceptable range, it is on the lower end trending toward poor. Two other locations (144th and 142nd Avenues) were also scheduled for assessment. When these sites were visited, they were not flowing and thus were not suitable for Procedure 51 assessment. The fact that these locations receive inadequate water during part of the year could be a reason why they scored poorly in the past.

Stations N and O on Red Run Drain are also located within the TMDL-listed AUID, but much closer to the confluence with the mainstem of the Rabbit River. Macroinvertebrates at Station N scored 1 (acceptable) and Station O scored -3 (acceptable). Habitat at both locations scored marginal with Station O having some substantial issues with bank stability and lack of in-stream habitat. These stations were targeted for baseline sampling because a bank stabilization project is planned near Station O.

Future Needs

- Station 13 (downstream of 144th Avenue) should be investigated to determine the condition of the erosion issues.
- Stations 1T and 4T will be sampled in 2018 as continuation of the trend site monitoring.
- A freshwater mussel survey at Station 1T is suggested to monitor the mussel population.
- Stations A, C, D, F, and G should be visited to determine if cattle access has been or remains restricted.
- Stations L, M, N, and O should be visited if the bank stabilization project has been completed.
- Station K and other sites on Red Run Drain should be visited to update the status of the scheduled TMDL.

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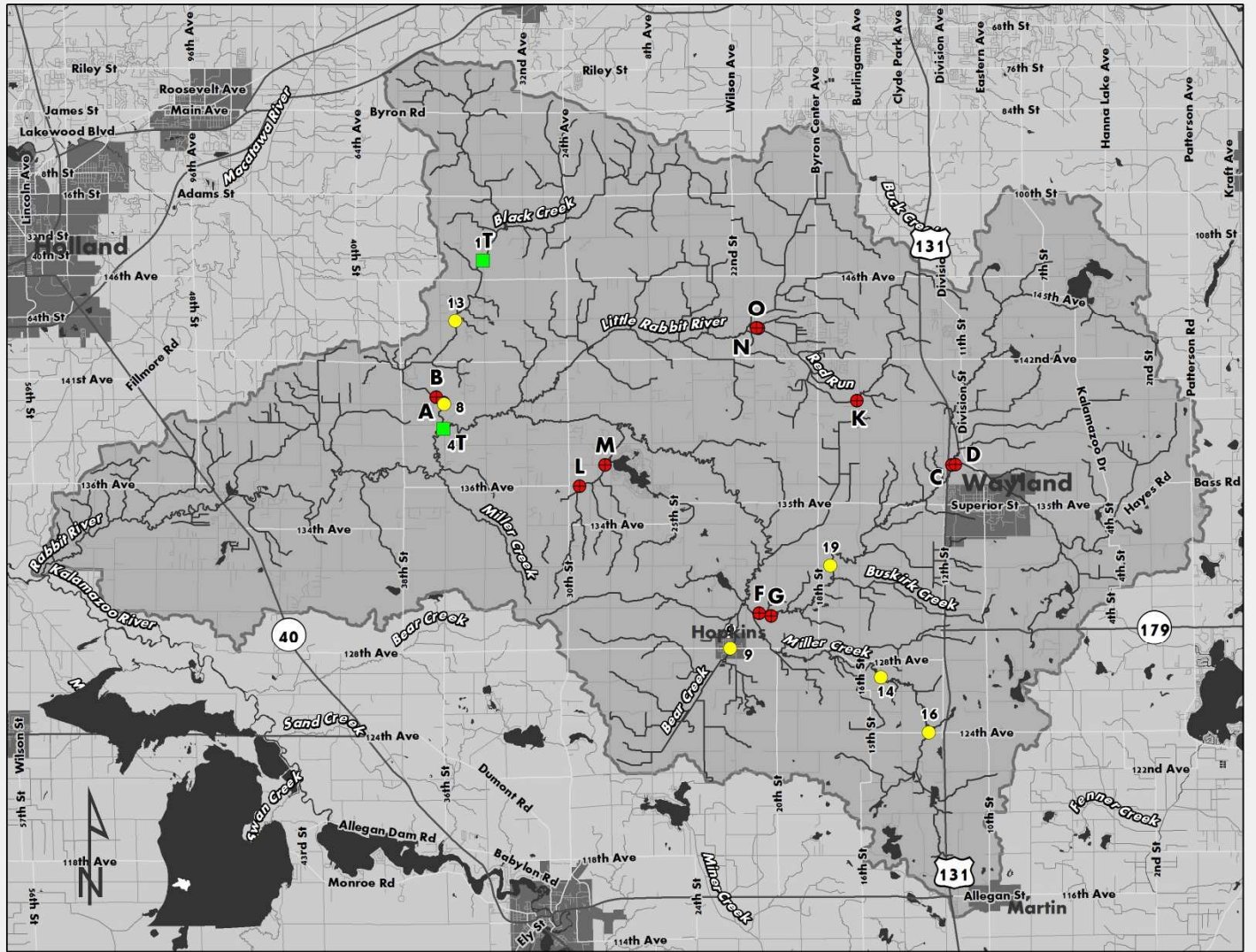


Figure 1. Stations sampled in the Rabbit River watershed 2013.



Figure 2. Station 13, Black Creek Downstream of 144th Avenue. Heavy sand deposition.



Figure 3. Station 8/A, Black Creek Upstream of 140th Avenue. Unrestricted cattle access issues.

Appendix A

Macroinvertebrate and Habitat Scores

TAXA	Black Creek 140th Avenue 8/6/2013 ation A and 8	Bear Creek Main Street 8/16/2013 Station 9	Black Creek 144th Avenue 8/6/2013 Station 13	Miller Creek 15th Street 8/8/2013 Station 14
PLATYHELMINTHES (flatworms)				
Turbellaria			3	1
ANNELIDA (segmented worms)				
Hirudinea (leeches)	4	1	1	
Oligochaeta (worms)	8	1	1	6
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	49	95	35	63
Decapoda (crayfish)	3	7	5	6
Isopoda (sowbugs)	46	14	37	
Arachnoidea				
Hydracarina	1	1	1	1
Insecta				
Ephemeroptera (mayflies)				
Baetidae	3	6	25	9
Caenidae		1		
Ephemeridae				4
Heptageniidae	4		21	21
Isonychidae				3
Metretopodidae				1
Tricorythidae		9		1
Odonata				
Anisoptera (dragonflies)				
Aeshnidae		2		2
Zygotera (damselflies)				
Calopterygidae	1	46	2	35
Coenagrionidae	1	7	1	4
Hemiptera (true bugs)				
Belostomatidae				1
Corixidae	135		9	
Gerridae		1	1	
Pleidae		4		
Velidae	1			
Megaloptera				
Corydalidae (dobson flies)				
Sialidae (alder flies)		2	1	
Trichoptera (caddisflies)				
Brachycentridae				13
Helicopsychidae				13
Hydropsychidae	1	1	139	41
Leptoceridae			1	12
Polycentropodidae	6	3	4	
Uenoidae			1	1
Coleoptera (beetles)				
Halplidae (adults)				
Dryopidae		23		
Elnidae	4	17	65	19
Diptera (flies)				
Athericidae	9			
Ceratopogonidae	1	14		1
Chironomidae	49	59	26	20
Culicidae		1		
Simuliidae			3	1
Tabanidae		2		2
Tipulidae	1	1	6	2
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	1		1	2
Hydrobiidae				1
Physidae	1	12	1	5
Viviparidae				1
Pelecypoda (bivalves)				
Pisidiidae				1
Sphaeriidae (clams)	1		1	1
Unionidae (mussels)			1	
TOTAL INDIVIDUALS	330	331	393	294

METRIC	Black Creek 140th Avenue 8/6/2013 Station A and 8		Bear Creek Main Street 8/16/2013 Station 9		Black Creek 144th Avenue 8/6/2013 Station 13		Miller Creek 15th Street 8/8/2013 Station 14	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	22	0	26	1	27	1	32	1
NUMBER OF MAYFLY TAXA	2	0	3	0	2	0	6	1
NUMBER OF CADDISFLY TAXA	2	0	2	0	4	0	5	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	2.12	-1	4.83	0	11.70	0	13.27	0
PERCENT CADDISFLY COMP.	2.12	-1	1.21	-1	36.90	1	27.21	0
PERCENT DOMINANT TAXON	40.91	-1	28.70	0	35.37	0	21.43	0
PERCENT ISOPOD, SNAIL, LEECH	15.76	-1	8.16	0	10.18	0	3.06	1
PERCENT SURF. AIR BREATHERS	41.21	-1	8.76	0	2.54	1	0.34	1
TOTAL SCORE		-6		-1		2		4
MACROINV. COMMUNITY RATING		POOR		ACCEPT.		ACCEPT.		ACCEPT.

TAXA	Miller Creek 124th Avenue 8/8/2013 Station 16	Rabbit River upstream 132nd Avenue 9/6/2013 Station 19	Black Creek 34th Avenue 8/5/2013 Station 1T	Rabbit River 36th Street 8/15/2013 Station 4T
PLATYHELMINTHES (flatworms)				
Turbellaria	1			
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1		3	
Oligochaeta (worms)	1	1	6	13
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	31	153	68	85
Decapoda (crayfish)	1	12	27	8
Isopoda (sowbugs)		34	40	18
Arachnoidea				
Hydracarina	1		1	1
Insecta				
Ephemeroptera (mayflies)				
Baetiscidae	1			
Baetidae	24	15	2	29
Caenidae	1			
Heptageniidae	11	25	26	26
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1	2		
Gomphidae	1	1		
Zygotera (damselflies)				
Calopterygidae	6	18	6	3
Coenagrionidae	1			
Plecoptera (stoneflies)				
Perlidae		1		4
Hemiptera (true bugs)				
Corixidae	1	1	4	11
Gerridae	1	1	1	
Mesoveliidae	7			2
Notonectidae		1		
Velidae		1	1	
Megaloptera				
Corydalidae (dobson flies)				
Sialidae (alder flies)			10	
Trichoptera (caddisflies)				
Brachycentridae	21	1		14
Helicopsychidae	7			
Hydropsychidae	32	11		9
Leptoceridae	1			
Limnephilidae	5	1		5
Philopotamidae	1		6	
Polycentropodidae				7
Coleoptera (beetles)				
Dytiscidae (total)				
Gyrinidae (adults)	10			
Halplidae (adults)	3		1	
Elnidae	38	9	43	9
Diptera (flies)				
Athericidae	1		1	21
Ceratopogonidae	8			4
Chironomidae	41	9	60	17
Simuliidae	56			5
Stratiomyidae			1	
Tabanidae	1	1		
Tipulidae	2		1	
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)			8	
Hydrobiidae	1		2	
Physidae	8	1		4
Planorbidae	1			
Viviparidae	1			
Pelecypoda (bivalves)				
Corbiculidae			2	
Pisidiidae		1		1
Sphaeriidae (clams)	1	1	1	
Unionidae (mussels)			10	
TOTAL INDIVIDUALS	330	302	332	298

METRIC	Miller Creek 124th Avenue 8/8/2013 Station 16		Rabbit River upstream 132nd Avenue 9/6/2013 Station 19		Black Creek 34th Avenue 8/5/2013 Station 1T		Rabbit River 36th Street 8/15/2013 Station 4T	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	37	1	24	0	26	1	23	0
NUMBER OF MAYFLY TAXA	4	1	2	0	2	0	2	0
NUMBER OF CADDISFLY TAXA	6	1	3	0	1	-1	4	0
NUMBER OF STONEFLY TAXA	0	-1	1	1	0	-1	1	1
PERCENT MAYFLY COMP.	11.21	0	13.25	0	8.43	0	18.46	0
PERCENT CADDISFLY COMP.	20.30	0	4.30	0	1.81	-1	11.74	0
PERCENT DOMINANT TAXON	16.97	1	50.66	-1	20.48	0	28.52	0
PERCENT ISOPOD, SNAIL, LEECH	3.64	1	11.92	-1	15.96	-1	7.38	0
PERCENT SURF. AIR BREATHERS	6.67	1	1.32	1	2.41	1	5.03	1
TOTAL SCORE		5		0		-2		2
MACROINV. COMMUNITY RATING		EXCELLENT		ACCEPT.		ACCEPT.		ACCEPT.

TAXA	Rabbit River cattle access off 130th Avenue 8/16/2013 Station F	Rabbit River upstreamcattle access off 130th Avenue 8/16/2013 Station G	Rabbit River upstream of Green Lake Creek 9/6/2013 Station D	Rabbit River downstream of Green Lake Creek 9/6/2013 Station C
PLATYHELMINTHES (flatworms)				
Turbellaria	1			
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1	1		
Oligochaeta (worms)	3			1
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	32	127	50	175
Decapoda (crayfish)		4	3	1
Isopoda (sowbugs)	1	8		8
Arachnoidea				
Hydracarina	4	4	1	
Insecta				
Ephemeroptera (mayflies)				
Baetidae	28	2	13	6
Caenidae	6			
Ephemerellidae	1			
Heptageniidae	1	19	13	4
Tricorythidae	1			
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	2	2	1	
Gomphidae		1		2
Zygoptera (damselflies)				
Calopterygidae	2	29	3	10
Coenagrionidae	8			
Plecoptera (stoneflies)				
Perlidae		2	1	
Hemiptera (true bugs)				
Belostomatidae	1			1
Corixidae	40	8		1
Gerridae			1	
Mesoveliidae			1	1
Nepidae		1		
Notonectidae			2	
Megaloptera				
Corydalidae (dobson flies)			1	1
Trichoptera (caddisflies)				
Brachycentridae	4	2	1	2
Hydropsychidae	22	3	117	31
Hydroptilidae	1			1
Leptoceridae	4	13		
Limnephilidae	1	1		
Phryganeidae		1		
Polycentropodidae				1
Coleoptera (beetles)				
Dytiscidae (total)				1
Halipidae (adults)	2	1		
Hydrophilidae (total)	2			
Elnidae	3	7	2	1
Diptera (flies)				
Athericidae		1		
Ceratopogonidae	22		1	4
Chironomidae	127	35	29	34
Culicidae				1
Simuliidae	9	1	106	11
Tabanidae		1	1	
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)		14		
Hydrobiidae	1			
Lymnaeidae		2		
Physidae	40	11		2
Planorbidae	1			
Viviparidae	1			
Pelecypoda (bivalves)				
Pisidiidae		1		
Sphaeriidae (clams)		1		
TOTAL INDIVIDUALS	372	303	347	300

METRIC	Rabbit River cattle access off 130th Avenue 8/16/2013 Station F	Rabbit River upstreamcattle access off 130th Avenue 8/16/2013 Station G	Rabbit River upstream of Green Lake Creek 9/6/2013 Station D	Rabbit River downstream of Green Lake Creek 9/6/2013 Station C
	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	31	1	29	1
NUMBER OF MAYFLY TAXA	5	1	2	0
NUMBER OF CADDISFLY TAXA	5	1	5	1
NUMBER OF STONEFLY TAXA	0	-1	1	1
PERCENT MAYFLY COMP.	9.95	0	6.93	0
PERCENT CADDISFLY COMP.	8.60	0	6.60	0
PERCENT DOMINANT TAXON	34.14	0	41.91	-1
PERCENT ISOPOD, SNAIL, LEECH	12.10	-1	11.88	-1
PERCENT SURF. AIR BREATHERS	12.10	0	3.30	1
TOTAL SCORE		1		2
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.

TAXA	Red Run Drain downstream 21st Street 9/27/2013 Station N	Red Run Drain 21st Street 8/5/2013 Station O	Red Run Drain 140th Avenue 8/5/2013 Station K	Black Creek upstream of 140th Avenue 8/8/2013 Station B
PLATYHELMINTHES (flatworms)				
Turbellaria				1
NEMATOMORPHA (roundworms)		1		
ANNELIDA (segmented worms)				
Hirudinea (leeches)	2			6
Oligochaeta (worms)	1	1		18
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	71	168	51	27
Decapoda (crayfish)	1	2	2	1
Isopoda (sowbugs)	31	52	90	9
Arachnoidea				
Hydracarina	61	8	14	2
Insecta				
Ephemeroptera (mayflies)				
Baetidae	44	21	2	46
Heptageniidae	1			1
Leptophlebiidae	1			
Odonata				
Anisoptera (dragonflies)				
Gomphidae				1
Zygoptera (damselflies)				
Calopterygidae	5	2	1	2
Coenagrionidae	4			1
Hemiptera (true bugs)				
Belostomatidae	1			1
Corixidae	8	2	14	42
Gerridae	1	1	3	1
Mesoveliidae	1			
Nepidae	1			
Notonectidae	1	1	2	
Pleidae				4
Veliidae				1
Trichoptera (caddisflies)				
Brachycentridae	10	12		
Hydropsychidae	45	10	15	17
Hydroptilidae	1			
Phryganeidae	1			
Polycentropodidae				1
Coleoptera (beetles)				
Dytiscidae (total)	1			
Halipidae (adults)	6		1	2
Hydrophilidae (total)	1			
Elnidae	1	1	2	4
Sciuridae (larvae)				1
Diptera (flies)				
Ceratopogonidae	6			8
Chironomidae	47	29	105	64
Culicidae			1	6
Simuliidae	16	7	2	15
Stratiomyidae			1	
Tipulidae	1	1	1	1
MOLLUSCA				
Gastropoda (snails)				
Lymnaeidae		1		
Physidae	8	4	2	98
Planorbidae	1	1		
Pelecypoda (bivalves)				
Corbiculidae			1	
TOTAL INDIVIDUALS	380	325	320	373

METRIC	Red Run Drain downstream 21st 9/27/2013 Station N	Red Run Drain 21st Street 8/5/2013 Station O	Red Run Drain 140th Avenue 8/5/2013 Station K	Black Creek upstream of 140th 8/8/2013 Station B
	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	31	1	20	0
NUMBER OF MAYFLY TAXA	3	0	1	-1
NUMBER OF CADDISFLY TAXA	4	0	2	0
NUMBER OF STONEFLY TAXA	0	-1	0	-1
PERCENT MAYFLY COMP.	12.11	0	6.46	0
PERCENT CADDISFLY COMP.	15.00	0	6.77	0
PERCENT DOMINANT TAXON	18.68	1	51.69	-1
PERCENT ISOPOD, SNAIL, LEECH	11.05	-1	17.85	-1
PERCENT SURF. AIR BREATHERS	5.53	1	1.23	1
TOTAL SCORE		1		-3
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.

TAXA	Felts Drain upstream 136th Avenue 8/15/2013 Station L		Felts Drain upstream 137th Avenue 8/15/2013 Station M	
	Value	Score	Value	Score
PLATYHELMINTHES (flatworms)				
Turbellaria	1		1	
ANNELIDA (segmented worms)				
Hirudinea (leeches)	4		1	
Oligochaeta (worms)	1		8	
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	202		75	
Decapoda (crayfish)	1			
Isopoda (sowbugs)	21		102	
Arachnoidea				
Hydracarina			1	
Insecta				
Ephemeroptera (mayflies)				
Baetidae	5		42	
Tricorythidae			1	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1			
Cordulegastridae			2	
Macromiidae			4	
Zyoptera (damselflies)				
Calopterygidae	15		7	
Coenagrionidae	4			
Hemiptera (true bugs)				
Corixidae	1		8	
Gerridae	1		1	
Mesoveliidae			1	
Notonectidae			1	
Veliidae	1		2	
Trichoptera (caddisflies)				
Brachycentridae	1			
Hydropsychidae	1		4	
Phryganeidae	1			
Coleoptera (beetles)				
Dytiscidae (total)	1		3	
Halipididae (adults)	1		1	
Elmidae	1		1	
Diptera (flies)				
Ceratopogonidae	57		9	
Chironomidae	30		48	
Dixidae	1		1	
Simuliidae	7		21	
Stratiomyidae	1			
Tabanidae	1			
Tipulidae	2		1	
MOLLUSCA				
Gastropoda (snails)				
Lymnaeidae	1		1	
Physidae	1		1	
TOTAL INDIVIDUALS	365		348	

METRIC	Felts Drain upstream 136th 8/15/2013 Station L		Felts Drain upstream 137th 8/15/2013 Station M	
	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	28	1	27	1
NUMBER OF MAYFLY TAXA	1	0	2	0
NUMBER OF CADDISFLY TAXA	3	0	1	-1
NUMBER OF STONEFLY TAXA	0	-1	0	-1
PERCENT MAYFLY COMP.	1.37	-1	12.36	0
PERCENT CADDISFLY COMP.	0.82	-1	1.15	-1
PERCENT DOMINANT TAXON	55.34	-1	29.31	0
PERCENT ISOPOD, SNAIL, LEECH	7.40	0	30.17	-1
PERCENT SURF. AIR BREATHERS	1.64	1	4.89	1
TOTAL SCORE		-2		-2
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.

	Felts Drain upstream 136th Avenue RIFFLE/RUN Station L	Felts Drain upstream 137th Avenue RIFFLE/RUN Station M			
HABITAT METRIC					
Substrate and Instream Cover					
Epifaunal Substrate Avail Cover (20)	3	2			
Embeddiness (20)*	5	3			
Velocity/Depth Regime (20)*	10	9			
Pool Substrate Characterization (20)**					
Pool Variability (20)*					
Channel Morphology					
Sediment Deposition (20)	4	1			
Flow Status - Maint. Flow Volume (10)	8	9			
Flow Status - Flashiness (10)	3	1			
Channel Alteration (20)	16	18			
Frequency of Riffles/Bends (20)*	15	11			
Channel Sinuosity (20)**					
Riparian and Bank Structure					
Bank Stability (L) (10)	7	2			
Bank Stability (R) (10)	7	2			
Vegetative Protection (L) (10)	6	3			
Vegetative Protection (R) (10)	6	3			
Riparian Veg. Zone Width (L) (10)	6	9			
Riparian Veg. Zone Width (R) (10)	6	9			
TOTAL SCORE (200):	102	82			
HABITAT RATING:	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)			
Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).					
Date:	8/15/2013	8/15/2013			
Weather:	Sunny	Cloudy			
Air Temperature:	60 Deg. F.	Deg. F.			
Water Temperature:	54 Deg. F.	56 Deg. F.			
Ave. Stream Width:	10 Feet	15 Feet			
Ave. Stream Depth:	0.25 Feet	0.25 Feet			
Surface Velocity:	0.5 Ft./Sec.	0.5 Ft./Sec.			
Estimated Flow:	1.25 CFS	1.875 CFS			
Stream Modifications:	None	None			
Nuisance Plants (Y/N):	N	N			
Report Number:					
STORET No.:	30709	30711			
Stream Name:	Felts Drain	Felts Drain			
Road Crossing/Location:	stream 136th Avenue	upstream 137th Avenue			
County Code:	03	03			
TRS:	03N13W03	04N13W34			
Latitude (dd):	42.68102	42.688395			
Longitude (dd):	-85.834624	-85.822403			
Ecoregion:	SMNITP	SMNITP			
Stream Type:	Warmwater	Warmwater			
USGS Basin Code:	4050003	4050003			
* Applies only to Riffle/Run stream Surveys					
** Applies only to Gidle/Pool stream Surveys					