The Upper Manistee River Water Quality Monitoring Project collects benthic macro-invertebrates from five sites on the river, its branches and tributaries. Initiation of this project was a collaborative effort between The Upper Manistee River Association, Huron Pines, and the Paul H. Young Chapter of Trout Unlimited. Since 2009, data have been collected from four sites in late spring (late May or early June) and fall (late September or October). A fifth site (Mecum) was added in 2012. Methodology for sampling, collection and identification follows that of the Michigan Clean Water Corps (MiCorps) which is administered by the Great Lakes Commission and supported by the Michigan Department of Environmental Quality. The project is conducted by volunteers from throughout Michigan, and from all walks of life whose common interest is the health of the Upper Manistee watershed.

A Stream Quality Index score (SQI) for each site is calculated using a MiCorps datasheet (see page 9). Benthic macroinvertebrates (bugs) are used as indicators of water quality, with different groups having different sensitivity thresholds. For instance, certain taxa (e.g., caddisflies, mayflies, stoneflies) are more sensitive to water quality and score higher. Taxa that can tolerate lower water quality score less. There are four SQI categories, as indicated in the box to the right. Additional identification of specimens to Family level is undertaken and entered onto another datasheet (see pages 10 and 11). This allows total numbers of taxa and EPTs (Ephemeroptera, Plecoptera and Trichoptera (Mayflies, Stoneflies, and Caddisflies)) to be determined and tabulated. All of the aforementioned data are then entered into the MiCorps database on their website (https://micorps.net/data/view/).

> Excellent = SQI>48
> Good = SQI 34-48
> Fair = SQI 19-33
> Poor = SQI<19

A water quality monitoring project is also being undertaken on the AuSable River. For ease of comparison, the format of the tables and figures in this document will be similar to those in the AuSable River document.

The contents of this document are as follows:

Upper Manistee River Water Quality Average Scores (2009-2016)

	Spring			Fall		
	SQI	TT	EPT	SQI	TT	EPT
Average of all sites	48.8	27.6	14.3	49.5	30.2	15.6
Goose	52.6	30.7	16.4	56.8	35.3	18.8
Portage	53.9	29.4	15.3	61.4	36.6	17.1
Mecum	45.1	23.6	11.0	38.7	21.0	11.2
Thorsen	54.0	31.9	16.1	50.0	29.4	16.1
Deward	38.2	21.4	11.7	41.6	25.4	13.1

SQI = MiCorps Stream Quality Index score
TT = Total Taxa: number of major groups, usually to Family level
EPT = total of Ephemeroptera, Plecoptera and Trichoptera (Mayflies, Stoneflies, and Caddisflies)

MiCorps SQI average scores (2009-2016). Error bars represent one standard deviation.
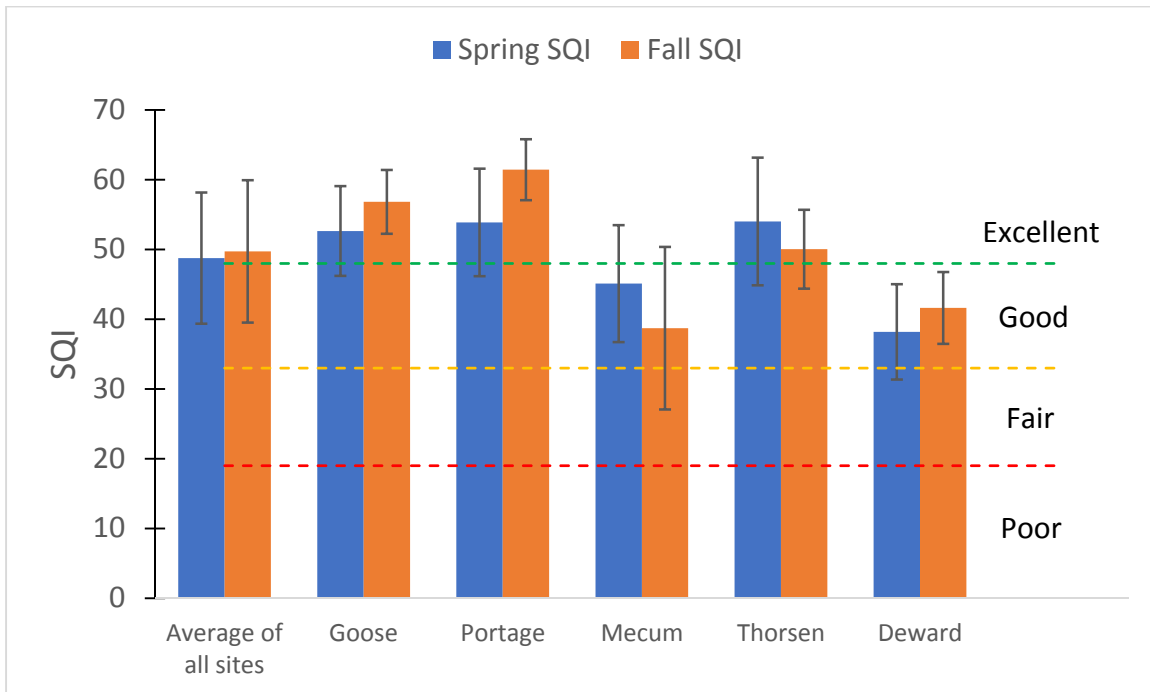
Average number of taxa (2009-2016). Error bars represent one standard deviation.

Average number of EPTs (2009-2016). Error bars represent one standard deviation.
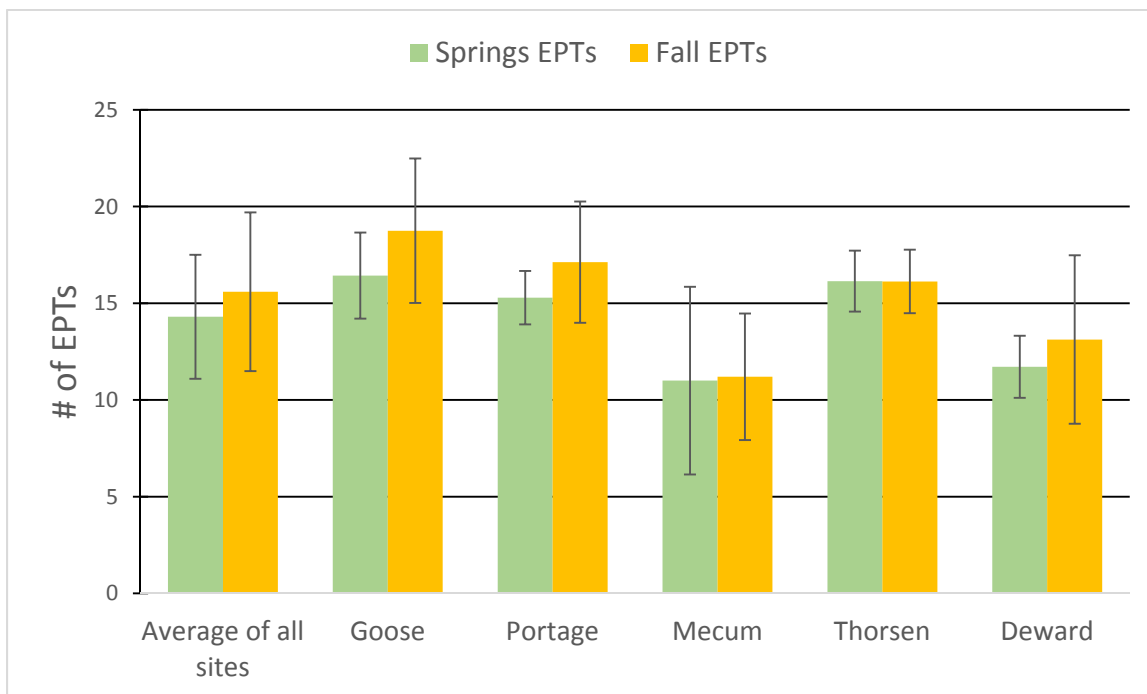
Goose Creek at Goose Creek Road

	Spring			Fall		
	SQI	TT	EPT	SQI	TT	EPT
Average	52.6	30.7	16.4	56.8	35.3	18.8
2009	50.3	25	14	52.9	27	12
2010	NS	NS	NS	54.2	32	19
2011	42.6	23	13	51.9	30	16
2012	61.8	40	19	61.9	34	18
2013	51.7	30	18	63.9	41	20
2014	54.7	30	16	58.7	40	25
2015	58.7	36	17	52.6	37	20
2016	48.6	31	18	58.5	41	20

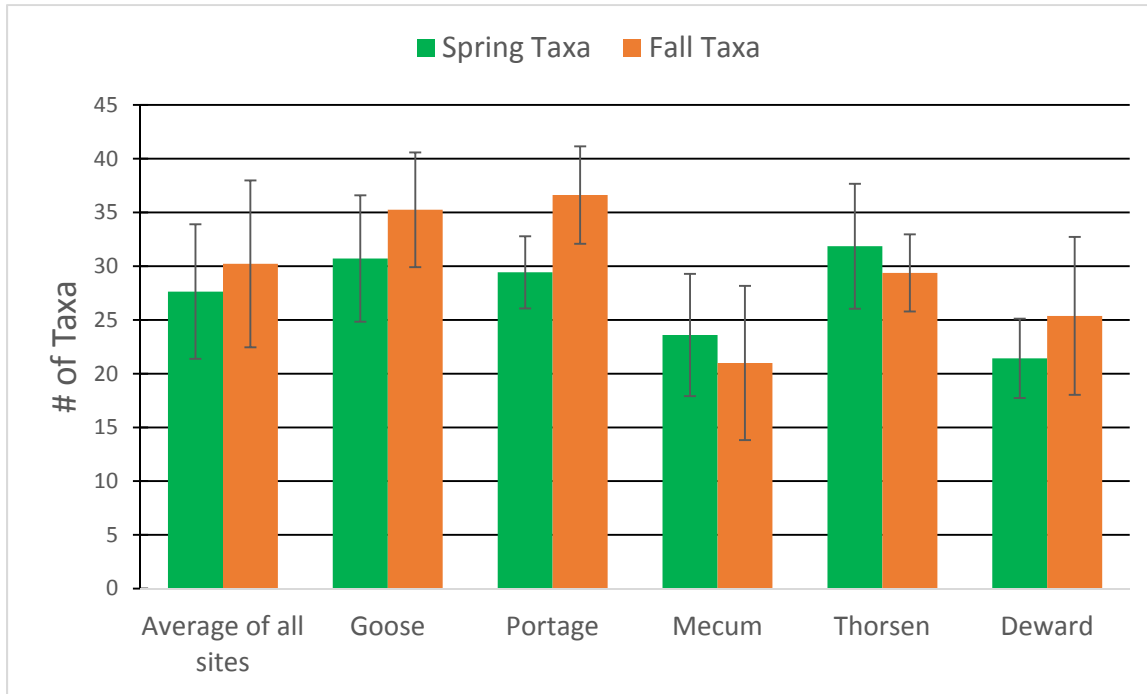SQI = MiCorps Stream Quality Index score
TT = Total Taxa: number of major groups, usually to Family level
EPT = total of Ephemeroptera, Plecoptera and Trichoptera (Mayflies, Stoneflies, and Caddisflies)
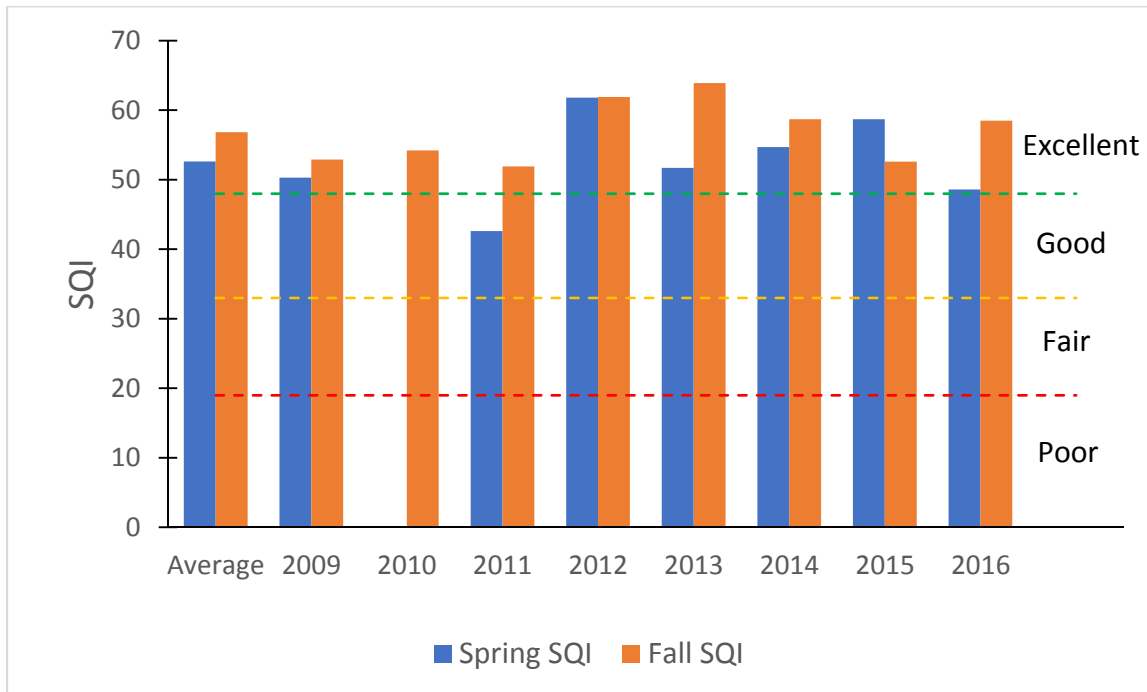
Portage Creek at Portage Creek Road

	Spring			Fall		
	SQI	TT	EPT	SQI	TT	EPT
Average	53.9	29.4	15.3	61.4	36.6	17.1
2009	42.0	26	15	62.1	32	13
2010	NS	NS	NS	68.6	42	20
2011	61.4	34	17	57.3	33	15
2012	48.7	27	14	59.5	34	17
2013	54.6	28	14	61.7	34	15
2014	65.0	34	17	57.2	34	17
2015	54.3	30	16	58.0	43	23
2016	51.1	27	14	67.0	41	17

SQI = MiCorps Stream Quality Index score
TT = Total Taxa: number of major groups, usually to Family level
EPT = total of Ephemeroptera, Plecoptera and Trichoptera (Mayflies, Stoneflies, and Caddisflies)

North Branch Manistee River at Mecum Road

	Spring			Fall		
	SQI	TT	EPT	SQI	TT	EPT
Average	45.1	23.6	11.0	38.7	21.0	11.2
2012	53.7	26	10	44.3	24	12
2013	41.3	28	19	56.6	32	16
2014	54	29	11	31	15	7
2015	41.4	17	6	28.9	15	11
2016	35.1	18	9	32.7	19	10

SQI = MiCorps Stream Quality Index score

TT = Total Taxa: number of major groups, usually to Family level

EPT = total of Ephemeroptera, Plecoptera and Trichoptera (Mayflies, Stoneflies, and Caddisflies)
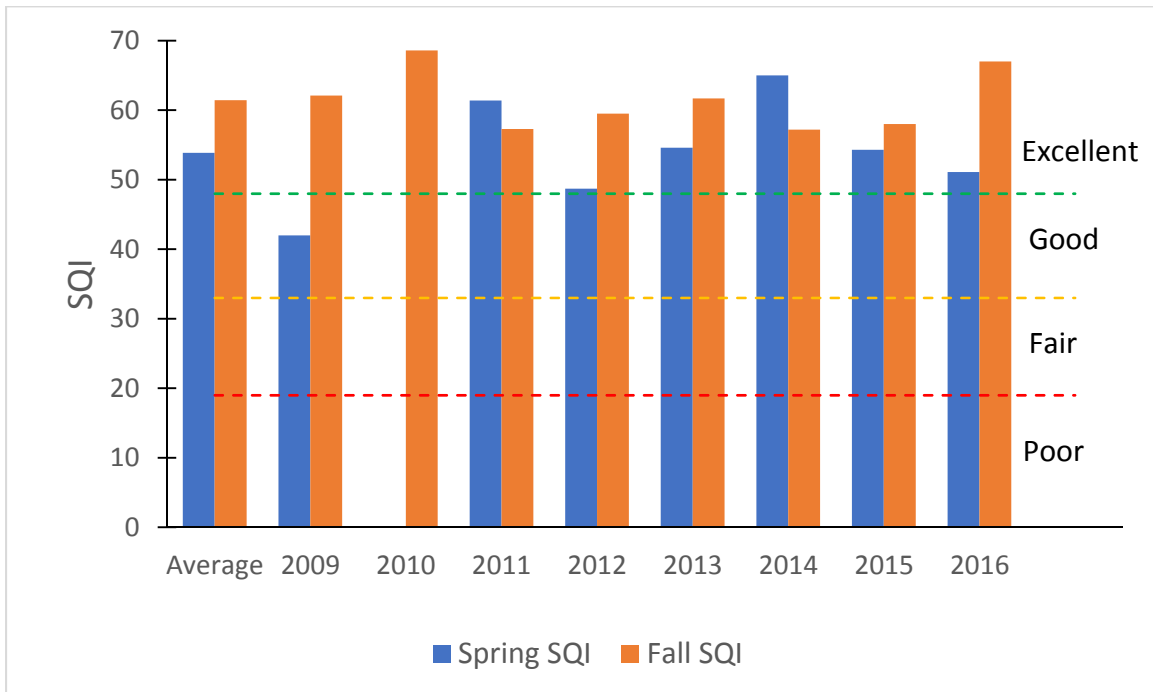
Manistee River at Thorsen's

	Spring			Fall		
	SQI	TT	EPT	SQI	TT	EPT
Average	54.0	31.9	16.1	50.0	29.4	16.1
2009	66.3	32	15	51.5	32	17
2010	NS	NS	NS	52.7	28	14
2011	55.6	34	18	41.8	24	14
2012	40.6	26	17	51.8	28	16
2013	47.4	28	15	60.8	35	17
2014	64.7	43	18	48.6	32	19
2015	51.5	33	16	47.0	30	16
2016	51.9	27	14	46.0	26	16

SQI = MiCorps Stream Quality Index score
TT = Total Taxa: number of major groups, usually to Family level
EPT = total of Ephemeroptera, Plecoptera and Trichoptera (Mayflies, Stoneflies, and Caddisflies)
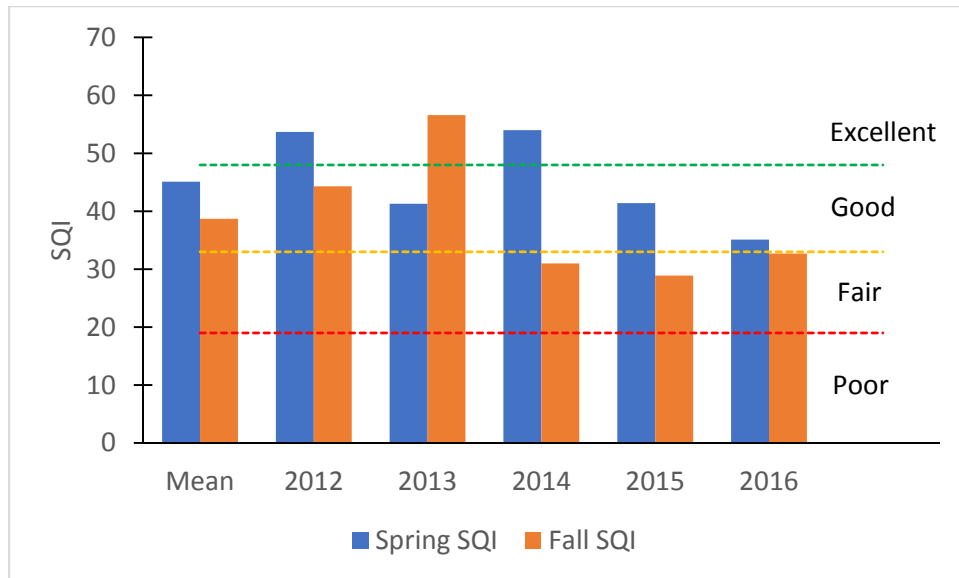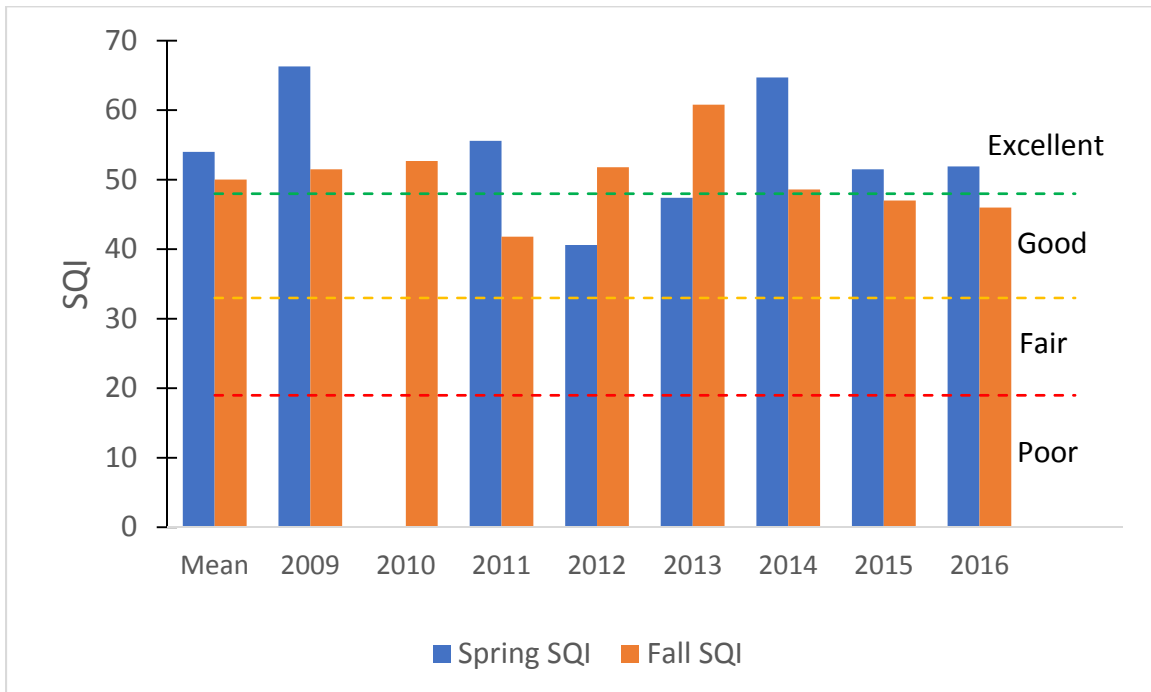
Manistee River at Deward

	Spring			Fall		
	SQI	TT	EPT	SQI	TT	EPT
Average	38.2	21.4	11.7	41.6	25.4	13.1
2009	47.6	26	11	38.6	23	14
2010	NS	NS	NS	42.5	28	13
2011	33	23	14	35.4	21	11
2012	31.4	23	13	41.4	24	12
2013	42.8	21	11	46.3	33	18
2014	43.5	24	12	37.7	15	6
2015	29.9	16	12	51.4	38	20
2016	39	17	9	39.6	21	11

SQI = MiCorps Stream Quality Index score
TT = Total Taxa: number of major groups, usually to Family level
EPT = total of Ephemeroptera, Plecoptera and Trichoptera (Mayflies, Stoneflies, and Caddisflies)
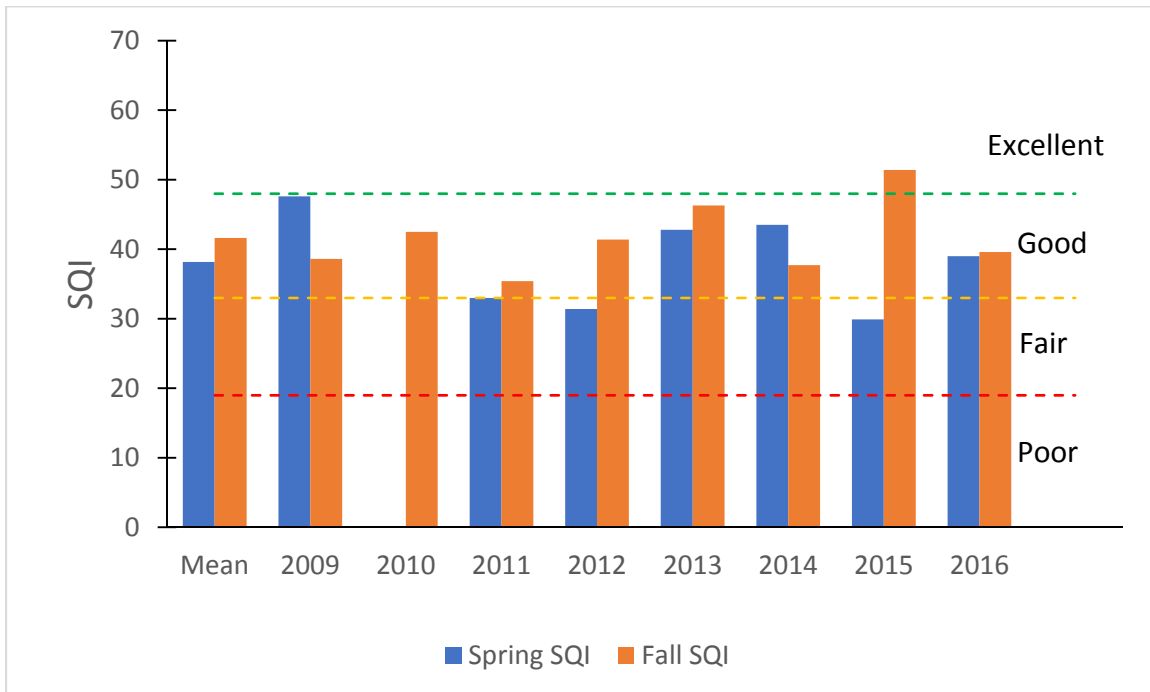
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IDENTIFICATION AND ASSESSMENT

Use letter codes [**R** (rare) = 1-10, **C** (common) = 11 or more] to record the approximate numbers of organisms in each taxa found in the stream reach.

*** Do NOT count empty shells, pupae, or terrestrial macroinvertebrates ***

Group 1: Sensitive

_____ Caddisfly larvae	(Trichoptera)
EXCEPT Net-spinning caddis	
_____ Hellgrammites	(Megaloptera)
_____ Mayfly nymphs	(Ephemeroptera)
_____ Gilled (right-handed) snails	(Gastropoda)
_____ Stonefly nymphs	(Plecoptera)
_____ Water penny	(Coleoptera)
_____ Water snipe fly	(Diptera)

Group 2: Somewhat-Sensitive

_____ Alderfly larvae	(Megaloptera)
_____ Beetle adults	(Coleoptera)
_____ Beetle larvae	(Coleoptera)
_____ Black fly larvae	(Diptera)
_____ Clams	(Pelecypoda)
_____ Crane fly larvae	(Diptera)
_____ Crayfish	(Decapoda)
_____ Damselfly nymphs	(Odonata)
_____ Dragonfly nymphs	(Odonata)
_____ Net-spinning caddisfly larvae	
(Hydropsychidae; Trichoptera)	
_____ Scuds	(Amphipoda)
_____ Sowbugs	(Isopoda)

Group 3: Tolerant

_____ Aquatic worms	(Oligochaeta)
_____ Leeches	(Hirudinea)
_____ Midge larvae	(Diptera)
_____ Pouch snails	(Gastropoda)
_____ True bugs	(Hemiptera)
_____ Other true flies	(Diptera)

STREAM QUALITY SCORE

Group 1:
_____ # of R's * 5.0 = _____
_____ # of C's * 5.3 = _____
        Group 1 Total = _____

Group 2:
_____ # of R's * 3.0 = _____
_____ # of C's * 3.2 = _____
        Group 2 Total = _____

Group 3:
_____ # of R's * 1.1 = _____
_____ # of C's * 1.0 = _____
        Group 3 Total = _____

Total Stream Quality Score = _____
(Sum of totals for groups 1-3; round to nearest whole number)

Check one:
_____	Excellent	(>48)
_____	Good	(34-48)
_____	Fair	(19-33)
_____	Poor	(<19)

Identifications made by:_____

Rate your confidence in these identifications: Quite confident   Not very confident

                                        5   4   3   2   1

Datasheet checked for completeness by:_____ Datasheet version 10/08/05
Data entered into MiCorps database by:_____ Date:_____

9

MiCorp Site ID#_____

Identification verified by:_____(optional)

Michigan Clean Water Corps

AQUATIC MACROINVERTEBRATE IDENTIFICATION WITH INSECT FAMILIES

Use letter code [R (rare) = 1-10, C (common) = 11 or more] to record the approximate numbers of organisms in each taxa found in the stream reach. Only use the blank by the main taxa heading (i.e. ANNELIDA, COLEOPTERA) when there are organisms that cannot be identified to the lower taxonomic levels. Enter both the family level data as well as the order level data into the Michigan Data Exchange.

ANNELIDA— Segmented Worm_____
Hirudinea _____
Oligochaeta _____

COLEOPTERA — Beetles_____
Chrysomelidae _____
Curculionidae _____
Dryopidae _____
Dytiscidae _____
Elmidae _____
Gyrinidae _____
Haliplidae _____
Hydraenidae _____
Hydrophilidae _____
Lampyridae _____
Lutrochidae _____
Noteridae _____
Psephenidae _____
Ptilodactylidae _____
Scirtidae _____
Staphylinidae _____

COLLEMBOLA — Springtail_____

CRUSTACEA— Crustaceans_____
Amphipoda _____
Decapoda _____
Isopoda _____

DIPTERA — True Flies_____
Athericidae _____
Blephariceridae _____
Ceratopogonidae _____
Chaoboridae _____
Chironomidae _____
Culicidae _____
Dixidae _____
Dolichopodidae _____
Empididae _____
Ephydridae _____
Muscidae _____
Phoridae _____
Psychodidae _____
Ptychopteridae _____
Sarcophagidae _____
Sciomyzidae _____
Simuliidae _____
Stratiomyidae _____

DIPTERA— continued
Syrphidae _____
Tabanidae _____
Tipulidae _____

EPHEMEROPTERA — Mayflies____
Acanthametropodidae_____
Ameletidae _____
Ametropodidae _____
Arthropleidae _____
Baetidae _____
Baetiscidae _____
Caenidae _____
Ephemerellidae _____
Ephemeridae _____
Heptageniidae _____
Isonychiidae _____
Leptohyphidae _____
Leptophlebiidae _____
Metretopodidae _____
Neoephemeridae _____
Oligoneuridae _____
Polymitarcyidae _____
Potamanthidae _____
Pseudironidae _____
Siphlonuridae _____
Tricorythidae _____

GASTROPODA — Snails, Limpets__
Ancylidae _____
Physidae _____
Planorbidae _____
Right-handed snail_____

HEMIPTERA — True Bugs_____
Belostomatidae _____
Corixidae _____
Gelastocoridae _____
Gerridae _____
Hebridae _____
Hydrometridae _____
Mesoveliidae _____
Naucoridae _____
Nepidae _____
Notonectidae _____
Pleidae _____
Saldidae _____
Veliidae _____

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AQUATIC MACROINVERTEBRATE IDENTIFICATION WITH INSECT FAMILIES (PAGE 2)

HYDRACARINA — Water mites_____

LEPIDOPTERA — Moths and Butterflies_____
Cosmopterigidiae _____
Nepticulidae   _____
Noctuidae   _____
Pyralidae   _____
Tortricidae   _____

MEGALOPTERA — Alderflies, Dobsonflies____
Corydalidae   _____
Sialidae   _____

ODONATA — Damselflies, Dragonflies_____
Aeshnidae   _____
Calopterygidae   _____
Coenagrionidae   _____
Cordulegastridae _____
Corduliidae   _____
Gomphidae   _____
Lestidae   _____
Libellulidae   _____
Macromiidae   _____
Petaluridae   _____

PELECYPODA — Bivalves_____
Corbiculidae   _____
Dreissenidae   _____
Sphaeriidae   _____
Unionidae   _____

PLATYHELMINTHES— Flatworms____
Turbellaria   _____

PLECOPTERA— Stoneflies_____
Capniidae   _____
Chloroperlidae   _____
Leuctridae   _____
Nemouridae   _____
Perlidae   _____
Perlodidae   _____
Pteronarcyidae   _____
Taeniopterygidae _____

TRICHOPTERA — Caddisflies_____
Apataniidae   _____
Brachycentridae   _____
Dipseudopsidae   _____
Glossosomatidae   _____
Goeridae   _____
Helicopsychidae   _____
Hydropsychidae   _____
Hydroptilidae   _____
Lepidostomatidae _____
Leptoceridae   _____
Limnephilidae   _____
Molannidae   _____
Odontoceridae   _____
Philopotamidae   _____
Phryganeidae   _____
Polycentropodidae _____
Psychomyiidae   _____
Rhyacophilidae   _____
Sericostomatidae _____
Uenoidae   _____

Datasheet checked for completeness by:_____ Datasheet version 6/6/08
Data entered into MiCorps database by:_____ Date:_____

11