

Stream Water Quality Monitoring

MICKELSON TRIBUTARY TO MARTIN LAKE

at Typo Creek Drive, Linwood Township
 STORET SiteID: Mickelson_TypoCreekDr

Years Monitored

2001 and 2003

Background

Mickelson Tributary to Martin Lake, also known as Judicial Ditch 2, is a small stream that originates near the Gordie Mickelson Wildlife Management Area and enters Martin Lake at about the same location as Typo Creek. The stream's watershed of 2,412 acres is about half wetland, 16% developed, 5% agricultural, and the remainder is natural or vacant. The stream carries a small volume of water, having flows of <2 cfs during storms.

Results

This stream shows little indication of pollution from chemical runoff, but does have low dissolved oxygen that would limit fish (Tables 2-5 and 2-6). Dissolved oxygen is often lower than would be required for many fish species, but the waterway is so narrow (1-2 ft in many areas) and shallow that gamefish usage is likely limited. The low dissolved oxygen is natural. It is likely due to the stream flowing through large shallow wetland complexes.

Decomposition of plentiful organic matter uses up oxygen and there are few inputs.

Other water quality factors fall within the range that would be expected, including turbidity, total phosphorus, and total suspended solids. Conductivity, salinity, and chlorides are lower than county and ecoregion averages.

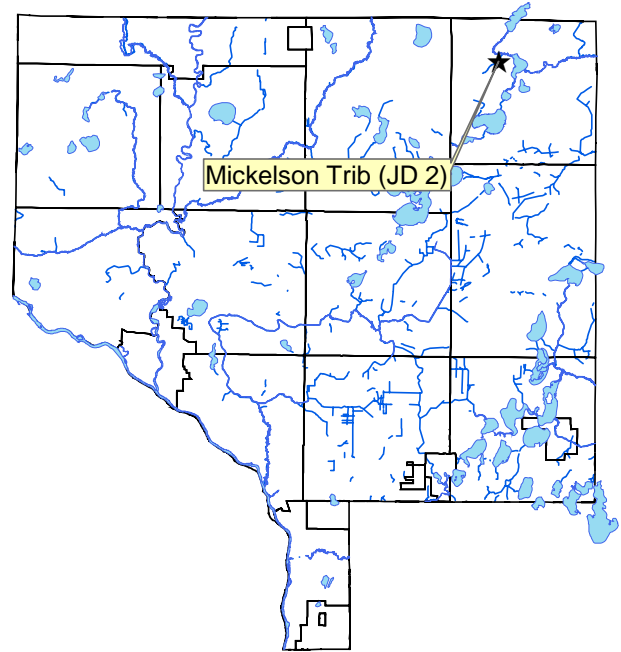


Table 2-5: 2003 monitoring results for Mickelson Tributary to Martin Lake

Date	Type	pH	Cond (mS/cm)	Turb NTU	DO mg/l	Temp C	Sal %	TP ug/l	TSS mg/l	VSS mg/l	Cl mg/l	Stage ft
3/31/2003	base	7.34	0.207	5		2.1	0	169	5	5	11	
4/16/2003	storm	6.21	0.162	8		1.5	0	306	38	26	15	892.21
5/5/2003	storm	7.20	0.155	0		6	0	82	5	5	12	891.23
6/2/2003	base	7.33	0.206	2	5.4	18.7	0	50	6	5	11	890.88
6/25/2003	storm	7.12	0.152	2	2.5	18.1	0	103	5	5	12	891.88
8/4/2003	base	6.97	0.295	10	3	18.2	0.01	204	5	5	10	890.63
9/8/2003	base	7.26	0.379	5	2.38	20	0.01	153	5	5	24	889.92
10/11/2003	storm	7.81	0.289	6	5.12	13	0.01	169	12	5	20	890.23

Table 2-6: Historical summary of water quality data for Mickelson Tributary to Martin Lake

Year	Event Type	# Measurements	pH	Cond (mS/cm)	Turb NTU	DO mg/l	Temp C	Sal %	TP ug/l	TSS mg/l	VSS mg/l	Cl mg/l
2001	Base	3	6.60	0.187	13	3.29	19.77	0.00	184	15		7.00
	Storm	4	6.80	0.190	4	4.56	17.50	0.00	138	10		9.00
	All	7	6.71	0.189	9	4.13	18.47	0.00	158	12		8.14
2003	Base	4	7.23	0.272	6	3.59	14.75	0.01	144	5	5	14.00
	Storm	4	7.09	0.190	4	3.81	9.65	0.00	165	15	10	14.75
	All	8	7.16	0.231	5	3.68	12.20	0.00	155	10	8	14.38
Anoka County Median			7.49	0.308	11	7.30	NA	0.01	134	14	NA	11
NCHF Ecoregion Mean				0.389					220			
NCHF Ecoregion Minimally Impacted Stream			8.10	0.298	7				130			8

Stream Water Quality Monitoring

NORTH MARTIN LAKE INLET

at Typo Creek Drive, Linwood Township

STORET SiteID = TypoCreek_TypoCreekDr

Years Monitored

1998, 2000, 2001, and 2003

Background

The northern inlet to Martin Lake, also called Typo Creek, flows from the outlet of Typo Lake about 1.9 miles south to Martin Lake. It is the primary inlet to Martin Lake. This stream has been monitored in 2001 and 2003 as part of a TMDL impaired waters study for the two lakes it links. The watershed is primarily undeveloped. This stream carries a relatively large volume of water, with flows ranging from 4-6 cfs during baseflow and 10-17 cfs during stormflow.

Results

In 2003 this stream continues to have below average water quality and is a concern (Tables 2-7 and 2-8). The stream does not suffer from elevated chemical pollutants such as road salts or industrial chemicals, or low dissolved oxygen. Rather, it has high phosphorus and suspended solids. About half of the suspended material in the water is algae, and half is sediment. The primary sources are from Typo Lake, as well as the stream wetland complex. The stream, like Typo Lake, is shallow and has a very loose, unconsolidated that is easily mixed into the water column. The results from 2003 were similar to previous years. It is anticipated that water quality improvement projects associated with the Typo and Martin Lakes TMDL will directly and indirect address water quality

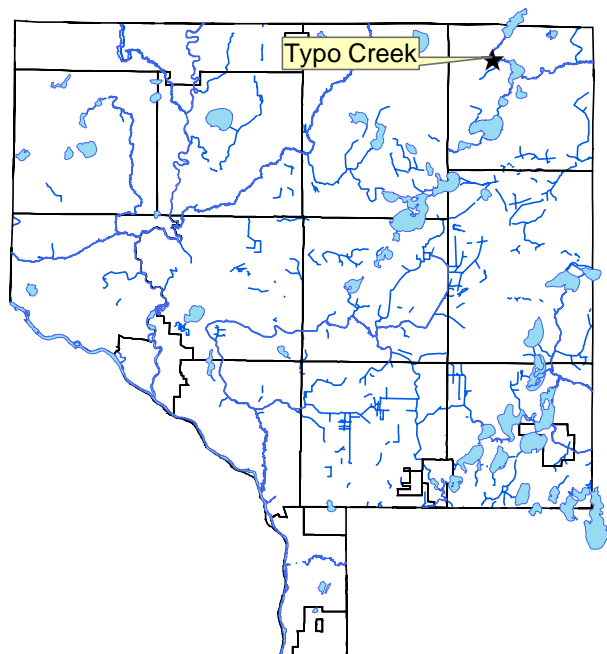


Table 2-7: 2003 monitoring results for North Martin Lake Inlet

Date	Type	pH	Cond (mS/cm)	Turb NTU	DO mg/l	Temp C	Sal %	TP ug/l	TSS mg/l	VSS mg/l	Cl mg/l	Stage ft
3/31/2003	base	7.87	0.267	5		5.5	0.00	88	6	5	8	892.79
4/16/2003	storm	6.23	0.236	12		6.4	0.00	183	28	18	10	892.88
5/5/2003	storm	7.48	0.245	11		9.6	0.00	140	26	13	9	893.04
6/2/2003	base	8.54	0.273	12	11.50	22.3	0.01	137	7	7	8	893.10
6/25/2003	storm	7.17	0.224	23	4.00	20.2	0.00	260	51	9	9	893.18
8/4/2003	base	8.35	0.291	30	9.65	20.8	0.01	220	40	30	10	892.82
9/8/2003	base	8.96	0.318	16	10.30	23.2	0.01	154	22	15	12	892.55
10/11/2003	storm	8.19	0.327	15	9.17	15.2	0.01	136	34	13	10	892.61

Table 2-8: Historical summary of water quality data for North Martin Lake Inlet

Year	Event Type	# Measurements	pH	Cond (mS/cm)	Turb NTU	DO mg/l	Temp C	Sal %	TP ug/l	TSS mg/l	VSS mg/l	Cl mg/l
1998	All	4	8.02	0.237	77	6.46	23.3	0.00	278	48		9
2000	All	1	7.15	0.266	66	8.88	14.7	0.01	142	26		9
2001	Base	5	7.88	0.251	63	10.48	21.9	0.01	167	52		8
	Storm	5	8.13	0.238	42	11.03	18.0	0.00	156	27		7
	All	10	8.01	0.244	53	10.78	20.0	0.00	162	41		7
2003	Base	4	8.43	0.287	16	10.48	18.0	0.01	150	19	14	10
	Storm	4	7.27	0.258	15	6.59	12.9	0.00	180	35	13	10
	All	8	7.85	0.273	16	8.92	15.4	0.01	165	27	14	10
Anoka County Median			7.49	0.308	11	7.30	NA	0.01	134	14	NA	11
NCHF Ecoregion Mean				0.389					220			
NCHF Ecoregion Minimally Impacted Stream			8.10	0.298	7				130			8

Stream Water Quality Monitoring

SOUTH MARTIN LAKE INLET

at Martin Lake Road, Linwood Township
 STORET SiteID = SouthMartinLakeInlet

Years Monitored

2000, 2001, and 2003

Background

South Martin Lake Inlet stream flows from the outlet of Island Lake about 0.7 miles north to Martin Lake. This stream has been monitored in 2001 and 2003 as part of a TMDL impaired waters study for Martin and Typo Lakes. The watershed is primarily undeveloped. This stream carries a smaller volume of water than the northern inlet to Martin Lake, with typical flows ranging from 4-8 cfs.

Results

Water quality of this stream is exceptionally good (Tables 2-9 and 2-10). The water is clear, with turbidity rarely exceeding 4 NTU. Phosphorus concentrations are also less than one-third the county-wide average. Chloride and conductivity readings suggest little road or chemical runoff. The in-lake processing of this water in Island Lake, as well as the wetlands and natural landscapes the stream flows through probably contribute to the good water quality.

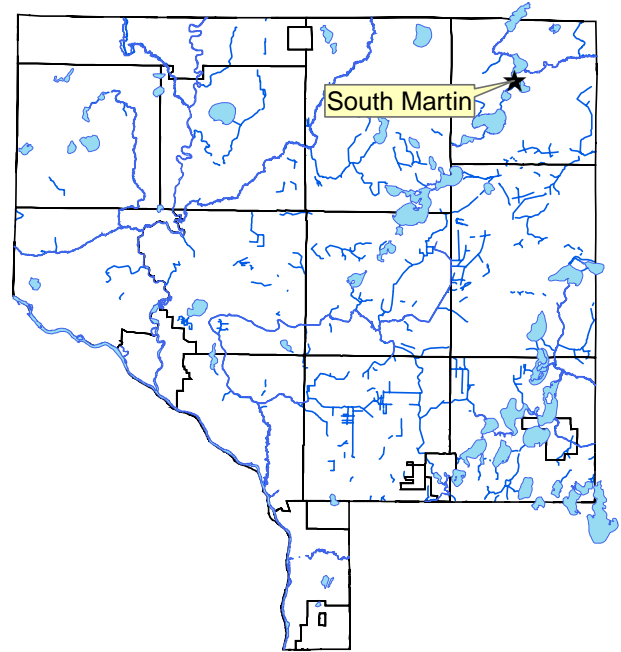


Table 2-9: 2003 monitoring results for South Martin Lake Inlet

Date	Type	pH	Cond (mS/cm)	Turb NTU	DO mg/l	Temp C	Sal %	TP ug/l	TSS mg/l	VSS mg/l	Cl mg/l	Stage ft
3/31/2003	base	7.37	0.259	1		5.4	0	30	5	5	11	893.65
4/16/2003	storm	5.96	0.255	0		8.5	0	50	5	5	12	893.66
5/5/2003	storm	7.05	0.266	0		11.2	0.01	30	5	5	13	893.87
6/2/2003	base	7.18	0.267	1	8.1	21.5	0.01	29	10	10	13	894.10
6/25/2003	storm	7.02	0.225	1	2.4	22.1	0	53	6	5	10	894.11
8/4/2003	base	7.08	0.28	0	3.3	21.8	0.01	34	5	5	13	893.87
9/8/2003	base	7.47	0.346	1	3.61	22	0.01	59	5	5	16	893.20
10/11/2003	storm	7.91	0.346	1	5.21	15	0.01	40	6	5	16	893.26

Table 2-10: Historical summary of water quality data for South Martin Lake Inlet

Year	Event Type	# Measurements	pH	Cond (mS/cm)	Turb NTU	DO mg/l	Temp C	Sal %	TP ug/l	TSS mg/l	VSS mg/l	Cl mg/l
2000	All	1	6.60	0.278	13	9.89	14.5	0.01	69	6		10
2001	Base	3	6.83	0.256	4	6.00	21.0	0.01	37	11		11
	Storm	5	7.11	0.247	1	7.18	17.0	0.01	42	6		11
	All	8	7.01	0.250	3	6.84	18.5	0.01	40	8		11
2003	Base	4	7.28	0.288	1	5.00	17.7	0.01	38	6	6	13
	Storm	4	6.99	0.273	1	3.81	14.2	0.01	43	6	5	13
	All	8	7.13	0.281	1	4.52	15.9	0.01	41	6	6	13
Anoka County Median			7.49	0.308	11	7.30	NA	0.01	134	14	NA	11
NCHF Ecoregion Mean				0.389					220			
NCHF Ecoregion Minimally Impacted Stream			8.10	0.298	7				130			8

Stream Water Quality Monitoring

DATA CREEK

at Typo Creek Drive, Linwood Township
 STORET SiteID = DataCreek_TypoCreekDr

Years Monitored

2001, 2002, and 2003

Background

This stream/ditch is the primary inlet to Typo Lake. It has been monitored in 2001, 2002, and 2003 as part of a TMDL impaired waters study for Martin and Typo Lakes. The watershed of 7674 acres is 40% agricultural, 26% wetland, and 2% residential, with the remainder being forests, grassland, and shrubland. Just upstream from the monitoring site the ditch flows through extensive wetlands. This stream carries a moderate volume of water, with typical flows ranging from 2-12 cfs.

Results

This ditch has high total phosphorus, and contributes to the hypereutrophic state of Typo Lake (Tables 2-15 and 2-16). However, total phosphorus in 2003 was lower than in 2001. In 2001 it was determined that one significant phosphorus source to this stream was phosphorus release from soils during sustained saturated, and especially alternating wet/dry conditions in one segment of ditched wetland. In 2003 releases by both of these mechanisms would have been lower because conditions after mid-June were very dry. Turbidity was also lower in 2003, perhaps due to lower flows.

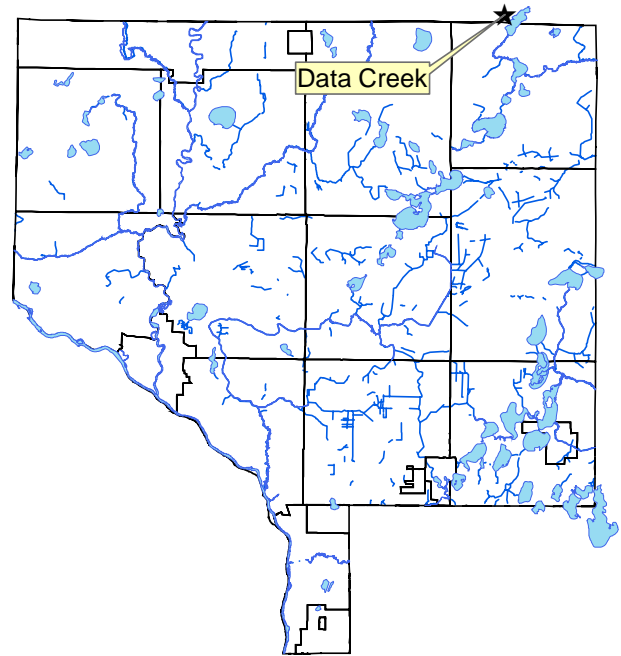


Table 2-15: 2003 monitoring results for Data Creek

Date	Type	pH	Cond (mS/cm)	Turb NTU	DO mg/l	Temp C	Sal %	TP ug/l	TSS mg/l	VSS mg/l	Cl mg/l	Stage ft
3/31/2003	base	7.84	0.304	4		5	0.01	150	6			897.94
4/16/2003	storm	6.32	0.275	11		3.7	0.01	271	37		10	898.50
5/5/2003	storm	7.24	0.300	3		6.7	0.01	134	13		7	898.58
6/2/2003	base	7.46	0.339	7	7.8	17.6	0.01	198	19		8	898.34
6/25/2003	storm	7.54	0.160	9	2.3	18.1	0.00	215	14		4	899.56
8/4/2003	base	7.74	0.364	3	8.7	17.1	0.01	97	23		8	898.05
9/8/2003	base	8.5	0.387	10	8.15	17.4	0.01	75	5		8	897.55
10/11/2003	storm	7.61	0.390	8	6.36	12.4	0.01	200	22		10	897.64
10/27/2003	base	7.74	0.389	3	10.15	6	0.01	72	5			897.53

Table 2-16: Historical summary of water quality data for Data Creek

Year	Event Type	# Measurements	pH	Cond (mS/cm)	Turb NTU	DO mg/l	Temp C	Sal %	TP ug/l	TSS mg/l	VSS mg/l	Cl mg/l
2001	Base	4	7.36	0.334	22	8.17	19.3	0.01	333	24	13	7
	Storm	4	7.33	0.300	20	6.41	18.8	0.01	282	26	8	7
	All	8	7.34	0.314	21	7.11	19.0	0.01	307	25	10	7
2002	All	2							332			
2003	Base	5	7.86	0.357	5	8.70	12.6	0.01	118	12		8
	Storm	4	7.18	0.281	8	4.33	10.2	0.01	205	22		8
	All	9	7.55	0.323	6	7.24	11.6	0.01	157	16		8
Anoka County Median			7.49	0.308	11	7.30	NA	0.01	134	14	NA	11
NCHF Ecoregion Mean				0.389					220			
NCHF Ecoregion Minimally Impacted Stream			8.10	0.298	7				130			8

Stream Water Quality Monitoring

SUNRISE RIVER

at Highway 77, Linwood Township

STORET SiteID = SunriseRiver_Hwy77

Years Monitored

2001 and 2003

Background

This monitoring station is the bottom of the Sunrise River's watershed in Anoka County. This segment of the Sunrise River originates from the Martin Lake's outlet structure about 3 miles upstream from the monitoring site. Typical stream flows at baseflow are about 12 cfs and can reach >40 cfs during spring runoff.

Results

This river has roughly average water quality. In 2003 turbidity was lower than in 2001, perhaps because of lower flows. Conductivity, chlorides, and salinity were near the county-wide median, suggesting moderate chemical pollution from sources such as road runoff, failing septic systems, and other chemicals. Dissolved oxygen levels are generally maintained within an acceptable range.

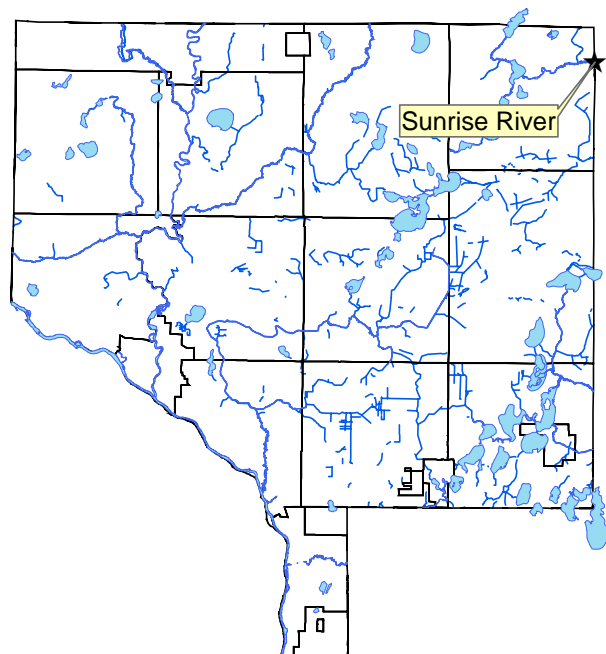


Table 2-17: 2003 monitoring results for the Sunrise River

Date	Type	pH	Cond (mS/cm)	Turb NTU	DO mg/l	Temp C	Sal %	TP ug/l	TSS mg/l	VSS mg/l	Cl mg/l	Stage ft
3/31/2003	base	7.97	0.299	2		5.5	0.01	55	10		12	884.07
4/16/2003	storm	6.39	0.248	2		5.7	0.00	104	22		13	884.74
5/5/2003	storm	7.34	0.247	1		9.7	0.00	61	13		11	884.80
6/2/2003	base	7.67	0.247	4	7.7	21	0.00	84	18		10	884.99
6/25/2003	storm	7.19	0.162	3	4	20.5	0.00	129	18		7	885.49
8/4/2003	base	7.49	0.279	7	6.75	22.1	0.01	99	20		11	884.27
9/8/2003	base	8.45	0.314	4	10.1	25.1	0.01	112	11		14	883.05
10/11/2003	storm	7.91	0.322	13	6.95	15.4	0.01	154	32		13	883.34

Table 2-18: Historical summary of water quality data for the Sunrise River

Year	Event Type	# Measurements	pH	Cond (mS/cm)	Turb NTU	DO mg/l	Temp C	Sal %	TP ug/l	TSS mg/l	VSS mg/l	Cl mg/l
2001	Base	3	6.92	0.232	8	7.21	21.2	0.00	67	15		8
	Storm	5	7.58	0.225	26	8.28	17.1	0.00	121	35		47
	All	8	7.33	0.228	20	7.98	18.6	0.00	101	27		36
2003	Base	4	7.90	0.285	4	8.18	18.4	0.01	88	15		12
	Storm	4	7.21	0.245	5	5.48	12.8	0.00	112	21		11
	All	8	7.55	0.265	5	7.10	15.6	0.01	100	18		11
Anoka County Median			7.49	0.308	11	7.30	NA	0.01	134	14	NA	11
NCHF Ecoregion Mean				0.389					220			
NCHF Ecoregion Minimally Impacted Stream			8.10	0.298	7				130			8