APPENDIX A

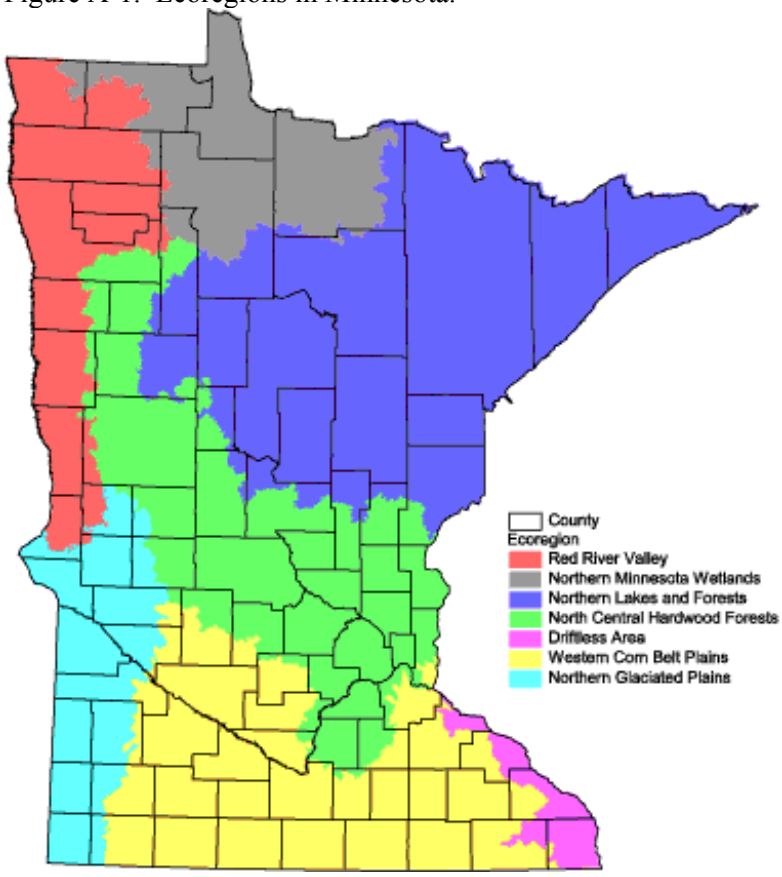
Explanation of Ecoregions and Water Quality Parameters

Ecoregions

Ecoregions are areas where the land form, land use, and water resources are similar. The U.S. Environmental Protection Agency mapped ecoregions for the lower 48 states based on overlying maps of land form, soil type, land use, and potential natural vegetation. The Minnesota Pollution Control Agency (PCA) has developed annual mean water quality measures for the ecoregions in Minnesota (Figure A-1). The PCA uses these mean concentrations per ecoregion as a criterion (when a water quality *standard* is not available) to determine the health and status of a waterbody.

The NCRWMO lies in two different ecoregions: the very western edge of the watershed lies in the north central hardwood forest ecoregion while the remainder of the watershed lies in the western corn belt plains ecoregion. For comparison purposes, the mean total phosphorus and total suspended solids for the western corn belt plains ecoregion is used in this plan.

Figure A-1. Ecoregions in Minnesota.



Water Quality Parameters

Water quality parameters are discussed and reported in this plan in milligrams per liter (mg/l), which is equivalent to parts per million (ppm).

Ammonia

Ammonia is a form of nitrogen found in organic materials and many fertilizers. It is the first form of nitrogen released when organic matter decays. It can be used by most aquatic plants and algae and therefore is an important nutrient. Ammonia converts quickly to nitrate when oxygen is present. Nitrate can be a health concern if ingested, especially in infants and small children. Ammonia is toxic to fish at relatively low concentrations in pH-neutral or alkaline waters. The state standard for ammonia is 0.04 mg/l in streams such as Chub Creek and the upper reaches of Pine Creek. Lower Pine Creek and Trout Brook have a standard of 0.016 mg/L.

Total Kjeldahl Nitrogen (TKN)

TKN includes both organic nitrogen and ammonia. Organic nitrogen includes such natural materials as proteins and peptides, nucleic acids and urea, as well as numerous synthetic organic materials. TKN is an indicator of the amount of nutrient components in the water.

Nitrate

Nitrate is a form of nitrogen and a product of the nitrification process. Although there is not a surface water quality standards for nitrate, the drinking water standard is 10 mg/L. Additionally, EPA's "suggested limit" of nitrate for aquatic life and warmwater fish is 90 mg/L. Agricultural sources include: livestock excrement (from barnyards, pastures, rangeland, feedlots, and uncontrolled manure storage areas); nitrogenous fertilizers; irrigation return flows; and decomposing plant debris.

Atmospheric deposition of nitrogen is another way the nutrient can reach land and water. The Environmental Protection Agency estimates that most of the Midwest, including the southern 2/3 of Minnesota receives less than or equal to 7 kilograms of nitrogen from atmospheric deposition of nitrate and ammonia per hectare per year. However, it is extremely difficult to estimate how much of this deposition is actually reaching waterbodies.

Phosphorus

Phosphorus is the key nutrient influencing plant and algae growth in lakes and streams. Its sources include fertilizers from agricultural fields and residential lawns; human and animal waste from fields, pastures, feedlots and septic systems; detergents; and the natural breakdown of organic materials such as leaves. Total phosphorus includes the amount of phosphorus in solution (available for uptake) and in particulate form. Soluble phosphorus includes only the phosphorus in solution and available for uptake by plants and algae.

The natural background levels of total phosphorus are generally less than 0.03 mg/l. The EPA water quality criteria state that phosphates should not exceed .05 mg/l if streams discharge into lakes or reservoirs, .025 mg/l within a lake or reservoir, and .1 mg/l in streams or flowing waters not discharging into lakes or reservoirs to control algal growth (USEPA, 1986). Surface waters that are maintained at .01 to .03 mg/l of total phosphorus tend to remain uncontaminated by algal blooms.

The 25th and 75th percentiles for total phosphorus in the western corn belt plains ecoregion are 0.16 and 0.33 mg/l, respectively, with a mean of 0.24 mg/l. The 25th and 75th percentiles for total phosphorus in the north central hardwood forests ecoregion are 0.06 and 0.15 mg/l, respectively, with a mean of 0.90 mg/l.

Suspended Solids and Turbidity

Solids refer to matter suspended or dissolved in water and may affect water quality in a number of ways. Suspended solids can make water appear muddy or dirty, making it aesthetically unpleasing. Suspended solids also affects aquatic life by making hunting prey and fleeing predators more visually difficult. Suspended materials can increase water temperature by absorbing the sun's energy similar to how dark fabric gets hotter in the sun than lighter fabrics. When solids settle to the bottom of the stream they cover important habitat ultimately changing a rocky streambed into mud.

Solids in water can originate from a variety of sources including eroding streambanks; soil and other particles washing off fields, pastures, feedlots, and lawns; free floating algae; and natural materials such as leaves and organic debris. Solids can also carry nutrients and other pollutants with them into the stream as attached particles.

Total suspended solids refers to the total amount of solids suspended in the water. The 25th and 75th percentiles for total suspended solids in the western cornbelt plains ecoregion are 10 and 61 mg/l, respectively, with a mean of 27mg/l. The 25th and 75th percentiles for total suspended solids in the north central hardwood forests ecoregion are 4.8 and 16 mg/l, respectively, with a mean of 8.8 mg/l.

Volatile suspended solids refers roughly to the amount of organic solids suspended in the water.

Turbidity is another measure of the amount of suspended matter in the water. Technically, it is the ability of water to scatter light, which is an effect of the suspended particles in the water column. The higher the turbidity, the less clear the water. The state standard for turbidity in streams such as Chub Creek and the upper reaches of Pine Creek is 25 NTU (nephelometric turbidity units). Lower Pine Creek and Trout Brook have a standard of 10 NTU.

APPENDIX B

Example NCRWMO Evaluation Questionnaire

1. Natural Area Protection

Goal: To promote the protection, expansion, and restoration of high quality natural areas throughout the watershed including wetlands, woodlands, prairies, and riparian corridors (preferably in large contiguous tracts of land) for the betterment of water-based recreation, fish and wildlife habitat, and water quality.

Evaluation:

1. Was the NCRWMO asked to serve as facilitator or cooperator for a natural area protection or restoration effort? If yes, did the NCRWMO act in that capacity? How or why not?

2. Did the NCRWMO identify and prioritize natural areas in need of protection or restoration according to the schedule set forth in the implementation program?

3. Did the NCRWMO supply member communities with natural area inventory information and maps?

4. Did the NCRWMO provide educational materials on the benefits and importance of natural area protection and restoration to member communities, developers, and citizens?

5. How did the NCRWMO work with the County to evaluate extending the County Shoreland Ordinance?

2. Wetlands

Goal: To protect wetlands from destruction or deterioration due to development, drainage, and other adverse activities.

Evaluation:

1. How many WCA applications and DNR permits were submitted to the NCRWMO? On how many of these did the NCRWMO provide comments?

2. Did the NCRWMO apply for or support the application for funding any wetland assessments?

3. Did the NCRWMO draft and distribute a model wetland management and protection ordinance to members? How many communities have adopted a wetland management and protection ordinance?

4. How many acres of wetlands were adversely impacted as a result of WCA applications?

5. How many acres of wetlands were restored or created?

3. Groundwater

Goal: To protect groundwater quality and quantity.

Evaluation:

1. Did the NCRWMO gather information on the location of sinkholes and other karst features through landowner surveys or other means? Did the NCRWMO provide this information to its member communities?

2. How did the NCRWMO educate landowners on the importance of groundwater protection?

3. Did the NCRWMO request that Dakota County perform an ISTS compliance inspection and upgrade program in all shoreland areas within the WMO? How did the County respond? If the program was instituted, how many ISTS's were upgraded?

4. Did the NCRWMO work with the Environmental Management Department at Dakota County to inventory and investigate potential sources of pollution?

5. Did the NCRWMO compile existing and/or new data on the aquifers under the WMO?

6. Did the NCRWMO compile data on the nitrate levels in wells throughout the WMO?

7. Did the NCRWMO assess environmental reviews (Environmental Impact Statements, etc.) for adverse impacts to groundwater quality or quantity?

4. Soil Erosion

Goal: To reduce soil erosion throughout the watershed.

Evaluation:

1. How many estimated tons of soil loss were prevented through practices cost shared by the NCRWMO? Describe projects and NCRWMO cost sharing.

2. How did the NCRWMO promote soil erosion control best management practices and seek additional funding to alleviate soil erosion?

3. How many member communities have adopted a local erosion control ordinance?

4. How many communities have entered into a contract with the Dakota County SWCD for construction site erosion control evaluations and inspections?

5. How did the NCRWMO work with the Minnesota Department of Transportation and/or seek funding to return Chub Creek to its original channel at the confluence with Lake Byllesby? Describe progress.

5. Surface Water and In-stream Habitat Quality

Goal: To protect and improve the surface water quality and in-stream habitat of streams, rivers, and lakes such that each water body is "fully supporting" for its use designation according to PCA's "Water Quality Criteria – Aquatic Life Use Support in Rivers and Streams."

Evaluation:

1. Did the NCRWMO seek funding for TMDL projects in Chub Creek and Trout Brook? What was the outcome?

2. Was Chub Creek monitored at the permanent monitoring station? Were Chub Creek, Pine Creek, or Trout Brook sub-watersheds monitored according to the implementation program?

3. Were the biological communities of Chub Creek, Trout Brook, or Pine Creek and their habitats monitored according to the implementation program?

4. Was water quality or biological health degradation detected in any surface water? If yes, what is planned to reverse the negative trend?

5. Did the NCRWMO work the DNR to improve trout habitat in Pine Creek and Trout Brook?

6. How many feedlot improvement projects and/or fencing projects were cost shared by the NCRWMO? Describe the projects and NCRWMO cost sharing.

6. Surface Water Quantity

Goal: To decrease the rate and volume of water that may contribute to flooding or non-point source pollution from overland runoff and/or dewatering activities.

Evaluation:

1. Did the NCRWMO monitor Chub Creek water quantity at the permanent monitoring station? Did the NCRWMO monitor water quantity in the Pine Creek, Trout Brook, or Chub Creek sub-watersheds according to the implementation program?

2. What projects were cost shared by the NCRWMO to reduce the rate and/or volume of water? Describe the project and the number of acres it affects and/or the potential amount of water retained by the practice.

3. How did the NCRWMO educate landowners and communities about the use of buffers, wetland restoration, and natural area protection rather than the installation of additional tile lines?

4. Did the NCRWMO request that its members adopt ordinances regulating the dewatering activities of quarries and gravel mines? How many communities adopted such an ordinance?

5. Did the NCRWMO encourage that its members to pass ordinances regulating the installation and/or maintenance of drainage tile lines? How many communities adopted such an ordinance?

7. Development

Goal: To protect groundwater, surface water, wetlands, and natural areas from accelerated development pressures.

Evaluation:

1. How did the NCRWMO encourage its members to keep development limited to one home per 40 acres?

2. Did the NCRWMO develop and distribute a model ordinance requiring development to maintain the original hydrology of the development site through the use of infiltration and evaporation? How many members adopted such an ordinance?

3. How does the NCRWMO require member communities to scrutinize development plans for impacts to water quality and quantity, natural areas, riparian areas, and wetlands?

4. Did the NCRWMO suggest that member communities and transportation departments prohibit the storage of plowed snow piles or temporary fill/storage piles in or near wetlands, floodplains, ditches, or other waterbodies? Were any practices changed?

8. Information and Education

Goal: To inform landowners, children, and local units of government about the watershed, and human impacts on water quality and quantity, and to invite public participation in watershed management processes.

Evaluation:

1. Did the NCRWMO provide funding and/or support for citizen stream, lake, and wetland monitoring?

2. How did the NCRWMO educate citizens and local governments?

3. Were any Citizen or Technical Advisory Committee meetings held during the year? Why or why not?

4. Did the NCRWMO publicly notice their regular and special Board meetings? How?

5. Did the NCRWMO work with road authorities to install stream name signs and watershed signs along major roads? How? Were signs installed?

APPENDIX C

Raw Chemical Data

Chub Creek Watershed Assessment, 1999 – 2000
Pine Creek and Trout Brook Watershed Assessment, 2001

Chub Creek at Hwy. 23 (Site CHB23)

Date of Sample	pH	Dissolved Oxygen (mg/l)	Total Suspended Solids (mg/l)	Total Phosphorus (mg/l)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Volatile Suspended Solids (mg/l)	Turbidity (NTU)	Total Alkalinity (mg/l $CaCO_3$)	Ortho Phosphorus (mg/l)
06/18/99	8.1	6.45	10	0.08	0.12	1.5	2	2.8	233	0.13
07/21/99	7.1		35		0.05		8	10	145	0.17
07/26/99	7.7		28	0.32	0.06	1.2	7	5.9	211	0.21
08/06/99	8	6.08	6	0.2	0.02	0.56	2	2.8	253	0.19
09/08/99	7.8		10	0.19	0.06	1	2	5.4	221	0.07
09/17/99	8	7.83	4	0.2	0.02	0.86	2	3.1	242	0.14
10/11/99	7.4	8.68	2	0.03	0.02	0.8	2	3.3	249	0.09
02/24/00	7.5	11.7	10	0.28	0.56	1.9	5	6.9	150	0.2
04/14/00	8.4	11.52	9	0.05	0.02	0.73	2	4.7	210	0.04
05/08/00	7.7		32	0.27	0.04	1.6	10	12	238	0.06
05/18/00	7.8		58	0.25	0.14	1.5	10	15	200	0.12
06/05/00	7.1	5.67	29	0.23	0.03	1.2	6	5.9	193	0.16
06/26/00	7.9	6.59	13	0.18	0.06	1	3	4.6	270	0.12
07/10/00	8.6	3.33	19	0.26	0.03	1.2	4	7.4	186	0.18
07/24/00	8.5	8.66	8	0.15	0.03	1.1	3	2.2	286	0.14
08/14/00	7.8	4.08	18	0.32	0.02	1.7	9	6.4	281	0.38
08/17/00	7.9	7.35	9	0.25	0.11	1	3	4.6	232	0.16
09/19/00	8.3	4.84	20	0.16	0.02	1	7	7.5	283	0.1
10/09/00	8.5	7	12	0.19	0.02	1.3	12	8.2	318	0.1
11/02/00	8.3	7.39	25	0.27	0.09	1.4	9	13	264	0.12
11/07/00		9.7	12	0.22	0.27	1.2	3	5.9	215	0.1
Average	7.92	7.304	17.6	0.205	0.085	1.19	5.3	6.55	232.4	0.142

Chub Creek at Hwy. 3 (Site CHB3)

Date of Sample	pH	Dissolved Oxygen (mg/l)	Total Suspended Solids (mg/l)	Total Phosphorus (mg/l)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Volatile Suspended Solids (mg/l)	Turbidity (NTU)	Total Alkalinity (mg/l $CaCO_3$)	Ortho Phosphorus (mg/l)
06/18/99	8		19	0.08	0.1	1.2	3	4.1	245	0.09
07/21/99	7.4	8.41	25		0.06		6	6.1	202	0.14
07/26/99	7.9		48	0.61	0.08	1.3	10	9.5	220	0.22
08/06/99	8.1	7.58	11	0.14	0.02	0.61	2	3.6	290	0.1
09/08/99	7.9	7.77	34	0.37	0.03	1.1	6	17	213	0.17
09/17/99	8.1		8	0.16	0.02	0.82	3	3.3	257	0.11
10/11/99	7.6	9.61	2	0.04	0.02	0.52	2	2.7	287	0.05
02/24/00	7.6	11.58	24	0.59	0.75	3.2	10	12	158	0.55
04/14/00	8.5	11.11	11	0.11	0.02	0.37	2	3.7	339	0.06
05/08/00	8.1		62	0.15	0.11	1.7	13	14	260	0.05
05/18/00	7.8		130	0.36	0.18	2.2	21	27	227	0.17
06/05/00	7.3	7.61	24	0.18	0.02	1.2	5	6.7	203	0.12
06/26/00	8.2	7.93	27	0.18	0.04	0.84	5	7.1	275	0.14
07/10/00	8.5	6.2	35	0.3	0.03	1.4	7	6.1	189	0.15
07/24/00	8.5	8.4	15	0.11	0.03	0.79	4	4.4	298	0.08
08/14/00	7.9	6.95	14	0.1	0.05	0.43	3	5.1	302	0.08
08/17/00	7.8	7.39	25	0.17	0.02	1.3	7	7.3	251	0.07
09/19/00	8.3	7.05	11	0.09	0.02	0.51	4	4.7	309	0.06
10/09/00	8.4		3	0.04	0.06	0.28	2	2.3	310	0.05
11/02/00	8.3	8	6	0.13	0.08	0.34	2	4.1	298	0.14
11/07/00		10.06	18	0.27	0.05	1.1	7	5	279	0.11
Average	8.01	8.377	26.3	0.209	0.085	1.06	5.9	7.42	257.7	0.129

Chub Creek at Hwy. 47 (Site CHB47)

Date of Sample	pH	Dissolved Oxygen (mg/l)	Total Suspended Solids (mg/l)	Total Phosphorus (mg/l)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Volatile Suspended Solids (mg/l)	Turbidity (NTU)	Total Alkalinity (mg/l $CaCO_3$)	Ortho Phosphorus (mg/l)
06/18/99	8.2		27	0.14	0.04	0.95	5	5.5	237	0.09
07/21/99	7.3	8.7	105		0.03		24	23	150	0.15
07/26/99	8		88	0.47	0.03	0.84	17	16	211	0.14
08/06/99	8.3	10.82	4	0.11	0.02	0.74	2	2	241	0.09
09/08/99	8.2	8.57	24	0.39	0.02	0.43	3	4.5	245	0.02
09/17/99	8.8		8	0.12	0.02	0.53	3	3.1	240	0.11
10/11/99	7.5	10.35	2	0.01	0.02	0.31	2	2.1	234	0.05
02/24/00	7.5	12.27	68	0.41	0.5	2.5	13	16	121	0.39
04/14/00	8.6	12.9	4	0.05	0.02	0.28	2	2	251	0.02
05/08/00	8		37	0.13	0.08	0.95	7	5.5	249	0.03
05/18/00	7.9		137	0.25	0.18	1.7	26	24	197	0.06
06/05/00	7.3	8.17	70	0.26	0.05	1.7	12	20	175	0.07
06/26/00	8.2	8.45	29	0.15	0.12	0.7	7	7.1	261	0.06
07/10/00	8.4	5.99	80	0.4	0.05	1.7	14	20	162	0.05
07/24/00	4.9	9.86	9	0.12	0.02	0.48	3	3	264	0.08
08/14/00	8	8.69	12	0.08	0.02	0.45	3	4.3	259	0.09
08/17/00	8	8.03	33	0.18	0.03	0.65	8	6.9	211	0.19
09/19/00	8.4	9.34	10	0.06	0.02	0.42	4	3	241	0.06
10/09/00	8.4		7	0.01	0.02	0.31	2	2.6	241	0.09
11/02/00	8.3	8.84	3	0.09	0.04	0.42	2	2.6	239	0.12
11/07/00		10.32	17	0.13	0.02	0.53	5	5	246	0.06
Average	7.91	9.420	36.9	0.178	0.064	0.83	7.8	8.49	222.6	0.096

Chub Creek in Randolph (Site CHBRD)

Date of Sample	pH	Dissolved Oxygen (mg/l)	Total Suspended Solids (mg/l)	Total Phosphorus (mg/l)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Volatile Suspended Solids (mg/l)	Turbidity (NTU)	Total Alkalinity (mg/l $CaCO_3$)	Ortho Phosphorus (mg/l)
06/18/99	8.2		27	0.1	0.03	0.99	5	5.2	237	0.12
07/21/99	7.3	8.96	145		0.02		27	32	140	0.16
07/26/99	8.1		102	0.51	0.04	1.4	18	20	193	0.15
08/06/99	8.3	9.42	5	0.09	0.02	0.96	2	1.7	242	0.08
09/08/99	8.2	8.76	10	0.21	0.02	0.51	2	2.9	227	0.02
09/17/99	8.3		7	0.17	0.02	0.5	3	3	242	
10/11/99	7.7	9.88	2	0.01	0.02	0.34	2	1.7	238	0.02
02/24/00	7.8	12.82	37	0.59	0.74	3.3	11	15	120	0.47
04/14/00	8.6	13.14	2	0.02	0.02	0.26	2	1.8	241	0.02
05/08/00	8.1		29	0.13	0.06	0.98	7	4.9	242	0.18
05/18/00	8		132	0.27	0.12	2.1	23	26	211	0.07
06/05/00	6.7	8.79	91	0.29	0.05	1.7	15	24	172	0.13
06/26/00	8.2	8.77	31	0.15	0.02	0.82	7	7	259	0.12
07/10/00	8.5	6.67	122	0.42	0.04	1.8	21	25	155	0.2
07/24/00	8.5	9.69	8	0.15	0.02	0.58	3	3	266	0.1
08/14/00	8.1	8.48	10	0.06	0.03	0.28	2	2.6	261	0.07
08/17/00	8.1	8.28	35	0.16	0.05	0.69	8	7.5	232	0.07
09/19/00	8.4	9.53	7	0.08	0.02	0.45	4	2.4	243	0.04
10/09/00	8.2		2	0.02	0.02	0.22	2	1.8	246	0.03
11/02/00	8.4	9.85	3	0.06	0.04	0.28	2	2	243	0.05
11/07/00		10.98	21	0.19	0.02	0.66	5	5.6	233	
Average	8.09	9.601	39.4	0.184	0.068	0.94	8.1	9.29	221.1	0.111

Mud Creek at Hwy. 3 (Site MUD3)

Date of Sample	pH	Dissolved Oxygen (mg/l)	Total Suspended Solids (mg/l)	Total Phosphorus (mg/l)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Volatile Suspended Solids (mg/l)	Turbidity (NTU)	Total Alkalinity (mg/l $CaCO_3$)	Ortho Phosphorus (mg/l)
06/18/99	8		17	0.03	0.15	1.3	4	5.8	242	0.09
07/21/99	7.2	7.91	9		0.08		4	2.5	286	0.14
07/26/99	7.6		71	0.4	0.32	1.1	13	15	188	0.29
08/06/99	7.8	5.42	12	0.2	0.05	0.95	3	3.3	296	0.17
09/08/99	7.8	7.22	5	0.22	0.03	0.8	2	1.8	274	0.1
09/17/99	7.6		4	0.16	0.03	0.59	2	2.3	283	0.12
10/11/99	7.5	9.02	2	0.04	0.02	0.36	2	2.6	316	0.08
02/24/00	7.4	10.13	16	0.25	0.19	1.4	5	5.2	212	0.17
04/14/00	8.4	10.55	4	0.03	0.02	0.32	2	2.6	273	0.04
05/08/00	7.9		10	0.2	0.21	1	4	4.1	257	0.13
05/18/00	7.7		193	0.66	0.3	3.4	37	37	193	0.23
06/05/00	7.1	7.06	32	0.29	0.03	1.3	5	9.3	170	0.23
06/26/00	7.9	7.66	27	0.26	0.06	1.1	6	10	260	0.2
07/10/00	8.2	4.72	22	0.37	0.04	1.3	5	7.9	150	0.31
07/24/00	8.3	7.95	10	0.18	0.04	0.8	3	3.5	276	0.12
08/14/00	7.7	4.2	12	0.21	0.06	0.62	3	4	292	0.22
08/17/00	7.9	6.84	12	0.23	0.06	0.74	4	4.9	277	0.19
09/19/00	8.1	3.72	10	0.14	0.02	0.31	4	4.2	294	0.12
10/09/00	8.5		4	0.09	0.02	0.28	2	3.1	323	0.09
11/02/00	8.3	5.8	7	0.23	0.39	0.49	2	4.3	295	0.18
11/07/00		9.08	11	0.3	0.21	1	4	5.9	284	0.24
Average	7.85	7.152	23.3	0.225	0.111	0.96	5.5	6.63	259.1	0.165

North Branch Chub Creek at 290th St. (Site NB47)

Date of Sample	pH	Dissolved Oxygen (mg/l)	Total Suspended Solids (mg/l)	Total Phosphorus (mg/l)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Volatile Suspended Solids (mg/l)	Turbidity (NTU)	Total Alkalinity (mg/l $CaCO_3$)	Ortho Phosphorus (mg/l)
06/18/99	7.9		13	0.05	0.03	0.97	2	2.7	195	0.04
07/21/99	7.3	9.89	44		0.2		8	6.7	162	0.1
07/26/99	7.7		91	0.32	0.03	1.1	14	17	152	0.13
08/06/99	8.1	10.06	4	0.11	0.02	0.37	2	1.9	191	0.06
09/08/99	7.8	7.81	18	0.18	0.02	0.51	3	4.4	180	0.07
09/17/99	7.9		7	0.28	0.02	0.28	2	2.4	192	0.06
10/11/99	7.5	8.72	2	0.03	0.02	0.25	2	2.7	190	0.04
02/24/00	7.5	11.89	84	0.52	0.49	3.3	16	19	78	0.39
04/14/00	8.5	11.81	5	0.06	0.02	0.2	2	1.4	176	0.02
05/08/00	7.9		44	0.12	0.03	0.98	9	5.6	181	0.03
05/18/00	7.5		234	0.42	0.25	2	37	38	134	0.06
06/05/00	7.2	8.08	62	0.18	0.05	1.3	11	18	133	0.07
06/26/00	8.1	9.56	14	0.04	0.02	0.29	4	3.2	196	0.06
07/10/00	8.5	6.86	51	0.16	0.03	1.1	10	16	161	0.05
07/24/00	8.4	10.4	7	0.04	0.04	0.25	2	1.6	199	0.08
08/14/00	7.9	9.64	3	0.05	0.02	0.2	2	1.6	198	0.09
08/17/00	7.8	7.65	35	0.25	0.02	0.83	6	6.9	157	0.19
09/19/00	8.2	9.67	4	0.04	0.02	0.2	4	2.2	192	0.06
10/09/00	8.4		4	0.03	0.02	0.22	2	2	185	0.09
11/02/00	8.3	9.31	3	0.1	0.03	0.31	2	2	190	0.12
11/07/00		9.96	11	0.15	0.02	0.52	2	3.6	172	0.14
Average	7.92	9.421	35.2	0.157	0.067	0.76	6.8	7.57	172.1	0.093

Chub Creek Watershed Assessment Fecal Coliform Sampling - 2000

CHB23 = Chub Cr. at Hwy. 23
MUD3 = Mud Cr. at Hwy 3
CHB3 = Chub Cr. at Hwy 3
NB47 = North Br. Chub Cr. near Hwy 47
CHB47 = Chub Cr. at Hwy 47
CHBRD = Chub Cr. in Randolph

FEBRUARY Fecal Coliform CFU/100ml

Lab	Type	Date	CHB23	MUD3	CHB3	NB47	CHB47	CHBRD
MCES	Event- snow melt	2/24/00	490	280	2000	700	490	27000

APRIL Fecal Coliform CFU/100ml

Lab	Type	Date	CHB23	MUD3	CHB3	NB47	CHB47	CHBRD
MCES	Low Flow	4/14/00	N/A	N/A	N/A	10	N/A	20

MAY Fecal Coliform CFU/100ml

Lab	Type	Date	CHB23	MUD3	CHB3	NB47	CHB47	CHBRD	
MVTL	Low Flow	5/3/00	40	50	50	140	180	280	
MVTL	Event	5/8/00	4500	1100	2700	2200	1200	3600	
MVTL	Semi-Event	5/9/00	800						
MVTL	Low Flow	5/16/00	90						
MVTL	Low Flow	5/17/00		40	400	600	180	1800	
MCES	Event	5/18/00	680	87000	31000	13000	1900	5700	
MVTL	Low Flow	5/22/00		500					
MVTL	Low Flow	5/23/00	140		110				
MVTL	Low Flow	5/24/00				200	280	350	
MVTL	Semi-Event	5/30/00			380				
MVTL	Semi-Event	5/31/00		1700					
		Geo Mean	327.5	738.9	641.9	863.6	460.4	1293.4	All samples
		Geo Mean	79.6	100.0	130.1	256.1	208.6	560.8	Non-storm samples on

JUNE Fecal Coliform CFU/100ml

Lab	Type	Date	CHB23	MUD3	CHB3	NB47	CHB47	CHBRD	
MVTL	Event	6/5/00		8000	2800				
MCES	Event	6/5/00	720	8700	3600	600	3200	7300	
MVTL	Semi-Event	6/6/00	240					1300	
MVTL	Semi-Event	6/13/00	600		500			680	
MVTL	Semi-Event	6/14/00		1400		720	1100		
MVTL	Semi-Event	6/19/00		1200					
MVTL	Semi-Event	6/20/00	400		1400			1100	
MVTL	Low Flow	6/21/00				330	400		
MVTL	Low Flow	6/26/00	100	300					
MVTL	Low Flow	6/27/00	90			130	50	500	
MVTL	Low Flow	6/28/00			200				
MCES	Low Flow	6/29/00				140	240		
		Geo Mean	268.3	2037.1	1071.3	304.0	442.1	1288.3	All samples
		Geo Mean	94.9	300.0	200.0	181.8	168.7	500.0	Non-event samples
		Geo Mean	220.3	795.8	519.2	256.4	269.6	835.0	Semi- and Non-event s

Chub Creek Watershed Assessment Fecal Coliform Sampling - 2000

JULY

			Fecal Coliform CFU/100ml						
Lab	Type	Date	CHB23	MUD3	CHB3	NB47	CHB47	CHBRD	
MVTL	Event	7/5/00	2400		1900	4700	4300	5000	
MCES	Event	7/10/00	1400	5600	1000	1400	2500	9700	
MVTL	Event	7/11/00		700					
MVTL	Event?	7/11/00	170					160	
MVTL	Low Flow	7/18/00	50	1000		240	300	2100	
MVTL	Low Flow	7/19/00			160				
MCES	Low Flow	7/24/00	200	540	200	1900	300	1200	
MVTL	Low Flow	7/24/00		1200					
MVTL	Low Flow	7/25/00			100			5000	
MVTL	Low Flow	7/26/00	270			5000	1400		
MVTL	Low Flow	7/31/00	1900	250					
		Geo Mean	434.6	927.1	360.4	1718.8	1062.6	2146.4	All samples
		Geo Mean	244.4	634.4	147.4	1316.2	501.3	1191.6	Non-event samples

AUGUST

			Fecal Coliform CFU/100ml						
Lab	Type	Date	CHB23	MUD3	CHB3	NB47	CHB47	CHBRD	
MVTL	Low Flow	8/1/00	3300			1700	1700	280	
MVTL	Low Flow	8/2/00			3600				
MVTL	Low Flow	8/7/00		140					
MVTL	Low Flow	8/8/00				5000	3600	5000	
MVTL	Low Flow	8/9/00	3100		1000				
MVTL	Low Flow	8/14/00		280					
MVTL	Low Flow	8/15/00				2900	1100	5000	
MVTL	Low Flow	8/16/00	1500		1300				
MCES	Event	8/17/00	1000	10000	1800	53000	16000	4600	
MVTL	Low Flow	8/21/00	200			310	300		
MVTL	Low Flow	8/22/00						3600	
MVTL	Low Flow	8/23/00			330				
MVTL	Low Flow	8/29/00	70	1700				700	
MVTL	Low Flow	8/30/00			1800	290	330		
		Geo Mean	773.9	903.5	1307.8	2213.0	1483.6	2080.7	All samples
		Geo Mean	735.2	405.4	1226.9	1172.5	922.1	1775.4	Non-event samples

SEPT

			Fecal Coliform CFU/100ml						
Lab	Type	Date	CHB23	MUD3	CHB3	NB47	CHB47	CHBRD	
MVTL	Low Flow	9/5/00			280			460	
MVTL	Low Flow	9/6/00	550	600		300	2200		
MVTL	Low Flow	9/11/00		2900					
MVTL	Low Flow	9/12/00	1300		230		290	1100	
MVTL	Low Flow	9/13/00				400			
MVTL	Low Flow	9/18/00		1700					
MVTL	Low Flow	9/19/00	4600			900	800	1200	
MVTL	Low Flow	9/20/00	1000						
MVTL	Low Flow	9/25/00		60					
MVTL	Low Flow	9/26/00	210				220	330	
MVTL	Low Flow	9/27/00			130	120	300		
		Geo Mean	928.7	649.1	203.1	337.4	507.6	669.1	All samples

Trout Brook - East Branch (Site TB1)

Date of Sample	Type of Sample	Turbidity (NTU)	Conducitvity (umho/cm)	pH	Total Alkalinity (mg/l CaCO3)	Fecal Coliform (bacteria/100ml)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Total Phosphorus (mg/l)	Nitrite Nitrogen (mg/l)	Nitrate Nitrogen (mg/l)	Total Suspended Solids (mg/l)	Volatile Suspended Solids (mg/l)	Ortho Phosphorus (mg/l)
4/9/01	Event	1.4	601	7.8	211	1	0.02	0.2	0.04	0.03	14.1	2	2	0.07
4/12/01	Event	11	577	7.5	199	700	0.02	0.2	0.1	0.03	13.4	11	3	0.08
4/23/01	Event	32	589	8.1	205	100	0.02	1.3	0.18	0.03	12.4	38	10	0.04
5/17/01	Base	0.6	604	8	212	4	0.02	0.2	0.02	0.03	14.3	2	2	0.04
5/24/01	Base	0.6	595	7.7	214	20	0.02	0.2	0.04	0.03	13.4	2	2	0.05
6/13/01	Event	1400	64.8	7	5	60000	0.16	21	7.9	0.12	1.74	3000	540	0.23
6/22/01	Base	1.2	597	8	216	30	0.02	0.2	0.06	0.03	13.5	2	2	0.04
7/9/01	Base	0.6	601	8	227	9	0.02	0.2	0.03	0.03	13.8	2	2	0.05
7/23/01	Base	0.5	597	7.7	217	50	0.02	0.2	0.05	0.03	13.2	2	2	0.03
8/28/01	Base	0.5	600	7.9	221	10	0.02	0.2	0.05	0.03	13.3	2	2	0.05
9/28/01	Base	0.5	596	7.8	221	4	0.02	0.2	0.06	0.03	13.2	2	2	0.06
10/24/01	Base	0.5	591	8	219	1	0.02	0.2	0.05	0.03	12.8	2	2	0.04
Overall Average		120.78	551.1	7.79	197.3	27.4	0.032	2.03	0.715	0.038	12.43	255.6	47.6	0.065
Event Average		361.10	458.0	7.60	155.0	254.6	0.055	5.68	2.055	0.053	10.41	762.8	138.8	0.105
Base Average		0.63	597.6	7.89	218.4	9.0	0.020	0.20	0.045	0.030	13.44	2.0	2.0	0.045

Trout Brook - West Branch (Site TB2)

Date of Sample	Type of Sample	Turbidity (NTU)	Conducitvity (umho/cm)	pH	Total Alkalinity (mg/l CaCO3)	Fecal Coliform (bacteria/100ml)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Total Phosphorus (mg/l)	Nitrite Nitrogen (mg/l)	Nitrate Nitrogen (mg/l)	Total Suspended Solids (mg/l)	Volatile Suspended Solids (mg/l)	Ortho Phosphorus (mg/l)
4/9/01	Event	1.2	639	7.9	219	20	0.02	0.2	0.08	0.03	16.6	2	2	0.08
4/12/01	Event	55	248	7.5	52	870	0.03	1.3	0.34	0.05	6.64			0.17
4/23/01	Event	220	380	7.8	105	6000	0.32	6.7	2.3	0.06	5.96	1160	136	0.26
5/17/01	Base	0.8	647	8.2	224	10	0.02	0.2	0.03	0.03	16.1	2	2	0.03
5/24/01	Base	0.3	648	8	225	58	0.02	0.2	0.05	0.03	16	2	2	0.06
6/13/01	Event	450	324	7.4	90	60000	0.63	13	4.1	0.11	6.08	990	230	0.92
6/22/01	Base	0.6	646	8.2	222	310	0.02	0.2	0.08	0.03	15.9	3	2	0.06
7/9/01	Base	0.7	640	8.1	237	50	0.02	0.2	0.01	0.03	16.2	2	2	0.01
7/23/01	Base	1.2	637	7.9	224	712	0.02	0.2	0.07	0.03	15.8	4	2	0.07
8/28/01	Base	0.5	648	8	231	50	0.02	0.2	0.08	0.03	16.2	2	2	0.31
9/28/01	Base	0.5	653	8	229	35	0.02	0.2	0.04	0.03	16.3	2	2	0.07
10/24/01	Base	0.6	654	7.9	229	5	0.02	0.2	0.05	0.03	15.4	3	2	0.14
Overall Average		60.95	563.7	7.91	190.6	163.0	0.097	1.90	0.603	0.041	13.60	197.5	34.9	0.182
Event Average		181.55	397.8	7.65	116.5	1582.0	0.250	5.30	1.705	0.063	8.82	717.3	122.7	0.358
Base Average		0.65	646.6	8.04	227.6	52.3	0.020	0.20	0.051	0.030	15.99	2.5	2.0	0.094

Trout Brook at mouth (Site TB3)

Date of Sample	Type of Sample	Turbidity (NTU)	Conducitvity (umho/cm)	pH	Total Alkalinity (mg/l CaCO3)	Fecal Coliform (bacteria/100ml)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Total Phosphorus (mg/l)	Nitrite Nitrogen (mg/l)	Nitrate Nitrogen (mg/l)	Total Suspended Solids (mg/l)	Volatile Suspended Solids (mg/l)	Ortho Phosphorus (mg/l)
4/23/01	Event	260	459	8	167	1700	0.1	6.2	1	0.03	7.93	1200	96	0.1
5/17/01	Base	1.4	600	8.4	233	20	0.02	0.2	0.02	0.03	11.6	14	2	0.02
5/24/01	Base	0.8	592	8.2	233	42	0.02	0.2	0.03	0.03	11.6	8	2	0.03
6/13/01	Event	2000	74.7	7.3	9	107000	0.27	29	10	0.12	0.94	5860	840	0.23
6/22/01	Base	3.1	604	8.3	232	100	0.02	0.2	0.09	0.03	11.4	15	3	0.05
7/9/01	Base	2	610	8.3	244	67	0.03	0.2	0.03	0.03	12	6	2	0.05
7/23/01	Base	1.1	594	8.1	230	512	0.02	0.2	0.05	0.03	11.7	6	2	0.05
8/28/01	Base	0.5	603	8.2	238	49	0.02	0.2	0.04	0.03	11.8	3	2	0.09
9/28/01	Base	1.4	604	8.2	236	23	0.02	0.2	0.05	0.03	11.9	3	2	0.07
10/24/01	Base	0.9	604	7.7	236	10	0.02	0.2	0.04	0.03	11.4	4	2	0.06
Overall Average		227.12	534.5	8.07	205.8	150.4	0.054	3.68	1.135	0.039	10.23	711.9	95.3	0.075
Event Average		1130.00	266.9	7.65	88.0	13487.0	0.185	17.60	5.500	0.075	4.44	3530.0	468.0	0.165
Base Average		1.40	601.4	8.18	235.3	48.9	0.021	0.20	0.044	0.030	11.68	7.4	2.1	0.053

Note: Arithmetic means used for all parameters except fecal coliform bacteria. Geometric means used for bacteria.

Pine Creek at Hwy. 56 (Site PC1)

Date of Sample	Type of Sample	Turbidity (NTU)	Conducitvity (umho/cm)	pH	Total Alkalinity (mg/l CaCO3)	Fecal Coliform (bacteria/100ml)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Total Phosphorus (mg/l)	Nitrite Nitrogen (mg/l)	Nitrate Nitrogen (mg/l)	Total Suspended Solids (mg/l)	Volatile Suspended Solids (mg/l)	Ortho Phosphorus (mg/l)
4/9/01	Event	1.8	618	7.7	208	26	0.02	0.2	0.03	0.03	14.5	2	2	0.06
4/12/01	Event	3.2	586	7.7	197	10	0.02	0.2	0.07	0.03	15	24	9	0.06
4/23/01	Event	50	518	8	146	140	0.02	0.72	0.08	0.03	12.3	48	10	0.03
5/17/01	Base	0.7	623	8.1	217	20	0.02	0.2	0.01	0.03	15.8	2	2	0.01
5/24/01	Base	0.7	621	7.9	219	20	0.02	0.2	0.03	0.03	15.8	2	2	0.03
6/13/01	Event	21	493	7.8	164	536	0.1	0.74	0.14	0.05	14.2	30	6	0.09
6/22/01	Base	1.2	631	8.2	209	180	0.02	0.21	0.03	0.04	17.3	4	2	0.02
7/9/01	Base	1	640	8.1	230	230	0.02	0.26	0.02	0.05	17.1	3	2	0.03
7/23/01	Base	2.2	630	8	226	870	0.05	0.21	0.05	0.1	16	10	2	0.03
8/28/01	Base	3.4	639	7.9	225	330	0.02	0.46	0.06	0.15	15.8	19	3	0.34
9/28/01	Base	2.3	652	8.1	227	77	0.02	0.2	0.03	0.06	16.6	5	2	0.04
10/24/01	Base	1.8	660	7.8	235	110	0.02	0.28	0.04	0.17	16.1	5	2	0.03
Overall Average		7.44	609.3	7.94	208.6	98.0	0.029	0.32	0.049	0.064	15.54	12.8	3.7	0.064
Event Average		19.00	553.8	7.80	178.8	66.5	0.040	0.47	0.080	0.035	14.00	26.0	6.8	0.060
Base Average		1.66	637.0	8.01	223.5	119.0	0.024	0.25	0.034	0.079	16.31	6.3	2.1	0.066

Pine Creek at Hogan Ave. (Site PC2)

Date of Sample	Type of Sample	Turbidity (NTU)	Conducitvity (umho/cm)	pH	Total Alkalinity (mg/l CaCO3)	Fecal Coliform (bacteria/100ml)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Total Phosphorus (mg/l)	Nitrite Nitrogen (mg/l)	Nitrate Nitrogen (mg/l)	Total Suspended Solids (mg/l)	Volatile Suspended Solids (mg/l)	Ortho Phosphorus (mg/l)
4/9/01	Event	1.9	561	7.7	200	10	0.02	0.34	0.05	0.03	7.35	3	2	0.06
4/12/01	Event	14	426	7.6	145	190	0.05	0.6	0.18	0.03	4.51			0.12
4/23/01	Event	80	429	8	140	2700	0.1	2	0.22	0.03	4.02	92	26	0.07
5/17/01	Base	0.8	580	8	215	7	0.02	0.2	0.01	0.04	7.24	2	2	0.01
5/24/01	Base	0.7	569	7.9	216	34	0.02	0.2	0.02	0.03	7	2	2	0.01
6/13/01	Event	8.3	475	7.9	179	648	0.07	0.46	0.12	0.06	4.64	15	4	0.06
6/22/01	Base	1.2	584	8.2	207	30	0.02	0.24	0.05	0.03	7.85	3	2	0.03
7/9/01	Base	1.2	567	7.9	213	62	0.03	0.35	0.02	0.03	7.11	2	2	0.02
7/23/01	Base	0.9	547	7.7	202	180	0.04	0.39	0.04	0.05	5.87	2	2	0.05
8/28/01	Base	0.5	552	7.8	210	120	0.02	0.24	0.05	0.03	6.15	2	2	0.02
9/28/01	Base	0.5	563	7.8	208	22	0.02	0.2	0.03	0.03	6.68	2	2	0.04
10/24/01	Base	0.8	566	7.9	212	6	0.02	0.2	0.03	0.03	6.83	3	2	0.01
Overall Average		9.23	534.9	7.87	195.6	63.4	0.036	0.45	0.068	0.035	6.27	11.6	4.4	0.042
Event Average		26.05	472.8	7.80	166.0	240.1	0.060	0.85	0.143	0.038	5.13	36.7	10.7	0.078
Base Average		0.83	566.0	7.90	210.4	32.6	0.024	0.25	0.031	0.034	6.84	2.3	2.0	0.024

Pine Creek at 280th (Site PC3)

Date of Sample	Type of Sample	Turbidity (NTU)	Conducitvity (umho/cm)	pH	Total Alkalinity (mg/l CaCO3)	Fecal Coliform (bacteria/100ml)	Ammonia Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Total Phosphorus (mg/l)	Nitrite Nitrogen (mg/l)	Nitrate Nitrogen (mg/l)	Total Suspended Solids (mg/l)	Volatile Suspended Solids (mg/l)	Ortho Phosphorus (mg/l)
4/9/01	Event	2.2	559	7.8	196	4	0.02	0.37	0.09	0.03	8.42	8	2	0.05
4/12/01	Event	17	430	7.5	143	110	0.03	0.98	0.2	0.04	5.44			0.14
4/23/01	Event	28	473	8.1	165	1040	0.06	3.8	1.4	0.08	4.79	53	12	0.06
5/17/01	Base	1.6	580	8.1	208	10	0.02	0.2	0.01	0.03	8.89	5	2	0.02
5/24/01	Base	1.2	570	7.9	207	25	0.02	0.2	0.06	0.04	8.25	5	2	0.04
6/13/01	Event	8	500	7.9	173	350	0.06	0.57	0.11	0.05	8.41	30	7	0.06
6/22/01	Base	1.2	594	8.2	198	10	0.02	0.25	0.06	0.03	8.73	4	2	0.02
7/9/01	Base	1	578	8.1	208	32	0.02	0.26	0.04	0.03	9.1	3	2	0.01
7/23/01	Base	0.9	568	7.9	198	612	0.04	0.2	0.06	0.03	9.19	3	2	0.05
8/28/01	Base	0.5	568	7.9	206	90	0.02	0.25	0.06	0.03	9.05	2	2	0.34
9/28/01	Base	0.6	566	7.9	202	23	0.02	0.2	0.05	0.04	9	2	2	0.05
10/24/01	Base	0.7	571	7.8	202	10	0.02	0.2	0.04	0.04	9.23	5	2	0.04
Overall Average		5.24	546.4	7.93	192.2	48.3	0.029	0.62	0.182	0.039	8.21	10.9	3.4	0.073
Event Average		13.80	490.5	7.83	169.3	112.5	0.043	1.43	0.450	0.050	6.77	30.3	7.0	0.078
Base Average		0.96	574.4	7.98	203.6	31.7	0.023	0.22	0.048	0.034	8.93	3.6	2.0	0.071

Note: Arithmetic means used for all parameters except fecal coliform bacteria. Geometric means used for bacteria.

APPENDIX D

North Cannon River Watershed Management Organization

Joint Powers Agreement

(Signed by the eleven members between May 22, 2000 and June 26, 2000)

JOINT POWERS AGREEMENT TO
PROTECT AND MANAGE THE NORTHERN CANNON RIVER WATERSHED
Agreement #2000

THIS AGREEMENT, made and entered into as of the date of execution, by and between the units of government within the Northern Cannon River Watershed, helps each party realize that the success or failure of the Northern Cannon River Watershed Management Organization created by this agreement is dependent upon the sincere desire of each member community to cooperate in the exercise of a joint power to address mutual concerns. Each party to this agreement pledges this cooperation.

WITNESSETH:

WHEREAS, units of government, including but not limited to Cities/Townships within the Northern Cannon River Watershed, have authority, pursuant to Minn. Stat. 471.59, to jointly or cooperatively, by agreement, exercise any powers common to the contracting bodies; and

WHEREAS, the parties are desirous of jointly and cooperatively developing a surface water management plan for the watershed and instituting programs to conserve soil and water resources through implementation of practices that preserve and use natural water storage areas, control excessive volumes and rates of runoff, effectively reduce or prevent erosion and sedimentation, promote and protect ground water recharge, preserve and enhance water quality and prevent unnatural flooding in order to protect and manage the natural and artificial water conveyance systems of the Northern Cannon River Watersheds.

NOW, THEREFORE, the parties to this Agreement do mutually agree as follows:

SECTION 1
GENERAL PURPOSE

It is the general purpose of the parties to this Agreement to establish an organization to jointly and cooperatively develop a surface water management plan and program for management and protection of the soil and all water resources of the Northern Cannon River Watershed and to develop an intergovernmental mechanism which will jointly and severally implement said surface water management

plan and program. The program shall operate within the legal boundaries of the Northern Cannon River Watershed.

This agreement is to provide an organization which can investigate, survey, study, plan, monitor and supervise the construction of facilities to drain or pond storm waters; to alleviate damage by flood waters; to assist in planning for land use, to repair, improve, relocate, modify, consolidate or abandon in whole or in part, drainage systems within the watershed areas to do whatever is necessary to assist in water conservation and the abatement of water pollution within the Northern Cannon River Watershed area.

The legal boundaries of the Northern Cannon River Watershed are set forth in Exhibit A, attached hereto and hereafter referred to an the 'Area". In general, the surface water management program may include projects, which accomplish the following:

1. Preserve and use natural water storage and retention systems in order to reduce to the greatest practical extent the public capital expenditures necessary to control excessive volumes and rates of runoff.
2. Protect and improve existing surface water quality through proper land use and appropriate soil and water conservation practices.
3. Prevent flooding and erosion by implementing floodplain management and erosion control programs.
4. Protect and enhance fish and wildlife habitat and water recreational facilities by reducing pollutant loads to surface waters, restoring and protecting streambanks and riparian areas, establishing greenways, and performing other activities.
5. Undertake programs to promote groundwater recharge and protect groundwater quality.
6. Provide a mechanism for the review of local land and water management plans.
7. Provide a form for resolution of intergovernmental disputes relating to water management and protection of the Northern Cannon River Watershed.
8. Cooperate on a united basis on behalf of all units of government within the Area with all other levels of government for the purpose of facilitating surface and ground water management in the Area.

The above descriptions are not intended to be exclusive or overly restrictive of the surface water management plan and programs, but rather are intended to act as guidelines.

SECTION II

DEFINITIONS

For the purposes of this agreement, the terms used herein shall have the meanings as defined in this article.

Subdivision 1. "Watershed Management Organization" hereinafter referred to as WMO, means the organization created by this agreement, the full name of which is "Northern Cannon River Watershed Management Organization:" hereinafter referred to as the WMO. It shall be a public agency of its members.

Subdivision 2. "Board" means the Board of managers of the WMO, consisting of one Manager from each of the governmental units which is a party to this agreement and which shall be the governing body of the WMO.

Subdivision 3. "Council or Board" means the governing body of a governmental unit, which is a member of this WMO.

Subdivision 4. "Governmental Unit" means any City, County, Town, Township, and other political subdivision as cited in M.S.A. 471.59 Subd. 1.

Subdivision 5. "Member" means a governmental unit, which enters into this agreement.

Subdivision 6. "Multi-jurisdictional Project" means any project or capital improvement undertaken in more than one member community, or any project or capital improvement that involves contribution or benefit from more than one member community.

Subdivision 7. "Northern Cannon River Watershed" means the area contained within a line drawn around the extremities of all terrain whose surface drainage is tributary to the Northern Cannon River.

Subdivision 8. "Local Comprehensive Plan" has the meaning given it in Section 473.852, Subdivision 5.

Subdivision 9. "Local Government Units" or "local unit" has the meaning given it in Section 473.852.

Subdivision 10. "Official Controls" has the meaning given it in Section 473.852.

Subdivision 11. "Capital Improvement Program" means an itemized program for at least a five year prospective period, and any amendments to it, subject to at least biennial review, setting forth the schedule, timing, and details of specific contemplated capital improvements by year, together with their

estimated cost, the need for each improvement, financial sources, and the financial effect that the improvements will have on the local government unit or the WMO.

Subdivision 12. "Plan" means the watershed management plan adopted by the WMO pursuant to Minnesota Statutes Section 103B.231.

SECTION III
BOARD OF MANAGERS

Subdivision 1. Appointment. The governing body of the WMO shall be its Board. Each member shall be entitled to appoint one representative on the Board, and said representative shall be called a "Manager." Dakota County, Rice County, Goodhue County and the Dakota County Soil and Water Conservation District may be requested to appoint a non-voting advisory member.

Subdivision 2. Eligibility or Qualifications. The Council / Board of each member shall determine the eligibility or qualification of its representative on the WMO but the terms of each Manager shall be as established by this agreement. Pursuant to Minn. Stat. 103B.227 Subd. 2, staff of local units of government that are members of the watershed management organization are not eligible to be appointed to the board.

Subdivision 3. Term. The members of the WMO Board of Managers shall not have a fixed term but shall serve at the pleasure of the governing body of the local unit appointing each member to the WMO.

Subdivision 4. Vacancy. Any vacancy shall be filled within 90 days for the unexpired term of any Manager by the Council/Board of the governmental unit of the member who appointed said Manager. The watershed management organization shall notify the Board of Water and Soil Resources within 30 days of any vacancies. Vacancies will be filled and published according to Minn. Stat. 103B.227.

Subdivision 5. Filing. Each member shall within 30 days of appointment file with the Secretary of the Board of Managers a record of the appointment of its Manager. The watershed management organization shall notify the Board of Water and Soil Resources within 30 days of any new appointments.

Subdivision 6. Compensation. Managers shall attend regular and special WMO meetings without compensation from the WMO, but this shall not prevent a governmental unit from providing compensation for its Manager for serving on the Board, if such compensation is authorized by local governmental unit and by law.

Subdivision 7. Commission. At the first or second meeting of the year the WMO shall elect from its Managers a Chairman, a Vice-Chairman, a Secretary, a Treasurer, and such other officers as it deems necessary to conduct its meetings and affairs. At the organizational meeting or as soon thereafter as it may be reasonably done, the WMO shall adopt rules and regulations governing its meetings. Such rules and regulations may be amended from time to time at either a regular or a special meeting of the WMO provided that a ten day period notice of the proposed amendment has been furnished to each person to whom notice of the WMO meetings is required to be sent; a majority vote of all eligible votes shall be sufficient to adopt any proposed amendment to such rules and regulations.

Subdivision 8. Alternate Members. One alternate member to the WMO shall be appointed by appropriate resolution of the governing body of each party to this Agreement and filed with the WMO. The alternate shall attend any meeting of the WMO where the regular member is absent; and vote on behalf of the party the member represents only if the regular member is absent from the meeting. If a WMO member is also an officer of the WMO, the alternate shall not be entitled to serve as such officer.

Subdivision 9. Quorum. A majority of all voting members to the WMO shall constitute a quorum, but less than a quorum may adjourn a scheduled meeting.

Subdivision 10. Voting. Except as hereinafter provided, Board action shall be by a majority vote of the entire Board. Decisions regarding capital improvement projects shall require a 2/3 majority of the entire Board.

Subdivision 11. Meetings. Regular meetings of the WMO shall be held at least quarterly on a day selected by the WMO. Special meetings may be held at the call of the Chair or by any three members by giving not less than seventy-two (72) hours written notice of the time, place and purpose of such meeting delivered or mailed to the residence of the WMO member. Notification of all meetings with date, time and location will be made not less than seventy-two (72) hours prior to meeting. All meetings of the WMO are subject to Minn. Stat. 471.705.

Subdivision 12. Operating Funds. On or before August 1 or each year, the WMO shall prepare an operating budget for the following year for the purpose of providing funds to operate the WMO's business. The annual contribution of each member shall be based on fifty percent (50%) on the assessed valuation of all real property and fifty percent (50%) on the basis of the total area of each member within the boundaries of the watershed each year to the total area in the Northern Cannon River Watershed. In no event shall any assessment require a contribution by a local unit of government in any calendar year to exceed $0.0005 on each dollar of assessed valuation of its territory within the watershed. The annual operating budget shall be recommended to the parties for ratification upon majority approval of all voting

members of the WMO, through its finance committee delegate. After approval, the Secretary shall certify the recommended budget to each party on or before September 1 of each year, together with a statement showing the amounts due from each party. Each party shall pay over to the WMO the amount owing in two equal installments, the first on or before January 1 and the second on or before July 1, in accordance with the tax year for which the amount due is being paid.

Subdivision 13. Capital Improvement Program.

a) An improvement fund shall be established for each improvement project ordered by the Board. Each member agrees to contribute to the funds, its proportionate share of the engineering, legal and administrative costs, as determined by the amount to be assessed against each member as a cost of the improvement. The Board shall submit in writing, a statement to each member setting forth in detail, the expenses incurred by the Board for each project. Each member further agrees to pay its proportionate share of the cost of the improvement in accordance with the determination of the Board. The Board or the member awarding the contract shall submit in writing copies of the engineer's certificate authorizing payment during construction, and the member being billed agrees to pay its proportionate share of the costs within 60 days after receipt of the statement. The Board or the member awarding the contract shall advise other contributing members of the tentative time schedule of the work and the estimated times when the contributions shall be necessary.

b) Notwithstanding the provisions of paragraph (a) of this subdivision, the Board may fund all or any part of the cost of a capital improvement contained in the capital improvement program of the plan in accordance with Minn. Stat. 103B.251. The Board may establish a maintenance fund to be used for normal and routine maintenance of an improvement constructed in whole or in part with money provided by Dakota County pursuant to Minn. Stat. 103B.251 Subd. 5, 8 and 9. The levy and collection of an ad valorem tax levy for maintenance shall be by Dakota County based upon a tax levy resolution adopted by the Board and remitted to the county on or before October 1st of each year. When it is determined to levy for maintenance, the Board shall be required to follow the hearing process established by Minn. Stat. 103B.251 Subd. 3. Mailed notice shall also be sent to the Clerk of each member at least 30 days prior to the hearing.

Subdivision 14. Capital Cost Allocation of Improvements in the Board's Watershed Management Plan. All capital improvement costs of improvements designated in the Board's adopted watershed management plan for construction by the Board which the Board determines

will provide multi-jurisdictional benefits shall be constructed and financed pursuant to Min. Stat. 103B.245 Subd 1, 103B.251 Subd 5, 8, 9, or in a manner to be determined by each member. The members understand and agree that the costs will be levied on all taxable property in the watershed.

Capital costs or the financing thereof shall be apportioned to each member fifty percent (50%) on the assessed valuation of all real property and fifty percent (50%) on the basis of the total area in the Northern Cannon River Watershed.

Subdivision 15. Works of Improvement. All construction, reconstruction, extension or maintenance of the Northern Cannon River Watershed, including outlets, lift stations, dams, reservoirs, or appurtenances of a surface water or storm sewer system of a multi-jurisdictional nature, ordered by the WMO which involve potential construction by or assessment against any member governmental unit or against privately or publicly-owned land within the watershed if the law provides therefore; and which has been identified in the capital improvement program shall follow the statutory procedures such as in outlined in Minn. Stat. Chapter 429. The Board shall secure from its engineers or some other competent person a preliminary report advising it whether the proposed improvement is feasible and as to whether it shall best be made as proposed or in connection with some other improvement and the estimated cost of the improvement as recommended. The Board shall then hold a public hearing on the proposed improvement after mailed notice in the Board's official newspaper. The WMO shall not be required to mail notice except by notice to the clerks of the member communities. The notice shall be mailed not less than 45 days before the hearing, shall state the time and place of the hearing, the general nature of the improvement, the estimated total cost and the estimated cost to each member governmental unit.

To order the improvement, a resolution setting forth the order shall require a favorable vote of 2/3 of all of the then existing Board of Managers. The order shall describe the improvement, shall allocate in percentages the cost allocation between the member governmental units, shall designate the engineers to prepare plans and specifications, and shall designate who will contract for the improvement.

After the Board has ordered an improvement, it shall forward the preliminary report to all member governmental units with an estimated time schedule for the construction of the improvement. The Board shall allow an adequate amount of time, and in no event less than 90 days, for each member governmental unit to conduct hearings, in accordance with the provisions

of Chapter 429 or the charter requirements of any city, or to ascertain the method of financing which the member governmental unit will use to pay its proportionate share of the costs of the improvement.

If the WMO proposed to use Dakota County's bonding authority, or if the WMO proposes to certify all or any part of a capital improvement to Dakota County for payment, then and in that event all proceedings shall be carried out in accordance with Minn. Stat. 103B.251 Subd. 5, 8, 9.

The Board shall not order and no engineer shall prepare plans and specifications before the Board has adopted a resolution ordering the improvement. The Board may order the advertising for bids upon receipt of notice from each member governmental unit who will be assessed that it has completed its hearing or determined its method of payment, or upon expiration of 90 days after the mailing of the preliminary report to the members whichever comes first.

Subdivision 16. Implementation of Capital Improvements. The WMO shall not undertake a capital improvement project until the watershed plan and the Capital Improvement Program have been adopted.

Subdivision 17. Local Projects. The WMO may provide assistance to a member on a project that is only of a local nature, but the WMO shall not order a member to undertake a local project.

Subdivision 18. Arbitration. Any member governmental unit aggrieved by the determination of the Board as to the allocation of the costs of an improvement, the implementation of the Plan or local water management plan, or items related to this agreement shall have 30 days after the WMO resolution ordering the improvement to appeal the determination. The appeal shall be in writing and shall be addressed to the Board asking for arbitration. The determination of the members appeal shall be referred to a Board of Arbitration. The Board of Arbitration shall consist of three persons: one to be appointed by the Board of Managers; one to be appointed by the appealing member governmental unit; and one to be appointed by the two so selected. In the event the two persons so selected do not appoint the third person within 15 days of their appointment, then the chief judge of the district court of Dakota County shall have jurisdiction to appoint, upon application of either or both of the two earlier selected, the third person to the Board. The third person selected shall not be a resident of any member governmental unit. The Arbitrators expenses and fees, incurred in the conduct of the

Arbitration shall be divided equally between the WMO and the appealing member. Arbitration shall be conducted in accordance with the Uniform Arbitration Act. Minn. Stat. Chapter 572 and the decision reached through Arbitration shall be final.

Subdivision 19. Tax District. Each city of township, a party to this Agreement, may establish a watershed management tax district in the territory within the watershed, for the purpose of paying costs of the planning required to develop a surface water management plan for the Northern Cannon River Watershed. Any local government unit which has part of its territory within a watershed for which a watershed plan has been adopted and which has a local water management plan adopted and approved by the WMO may establish a watershed management plan adopted and approved by the WMO may establish a watershed tax district in the territory within the watershed, for the purpose of paying capital costs of the water management facilities described in the capital improvement program of the plans and for the purpose of paying for normal and routine maintenance of the facilities.

Subdivision 20. Procedure. The tax district shall be established by ordinance adopted after a hearing by the local government unit, following provision of Minnesota Statutes ~~473.883~~. 103B.251 Subd. 5, 8 ,9.

Subdivision 21. Tax. After adoption of the ordinance under Subdivision ~~18~~ 19, a local government unit may annually levy a tax on all taxable real property in the district for the purposes for which the tax district is established.

Subdivision 22. Bonds. After adoption of the ordinance under Subdivision 19 and after a contract for the construction of all or part of an improvement has been entered into or the work has been ordered done by day labor, the local government unit may issue obligations in the amount it deems necessary to pay in whole or in part the capital cost incurred and estimated to be incurred in making the improvements; all in accordance with Minn. Stat 103B.251 Subd. 5, 8 ,9.

Subdivision 23. Capital Improvements Payment by County. The WMO after adoption of a Watershed Plan may certify for payment by the County as provided in Minn. Stat. 103B.251 Subd. 5, 8 ,9 all or any part of the cost of a capital improvement contained in the capital improvement program of the plan.

SECTION IV

POWER AND DUTIES OF THE BOARD

Subdivision 1. WMO. The WMO, acting by its duly appointed Board of Managers, shall as it relates to surface water management, flood prevention, erosion control, water quality improvement, and other benefits associated with the proper management of surface water of the Northern Cannon River, have the powers and duties set out in this section.

Subdivision 2. Surface Water Management Plan. The WMO undertakes to prepare a second generation surface water management plan and schedule its operation so that it will be completed by December 31, 2002. This plan will cover all of the area of the Northern Cannon River Watershed and comply with the requirements of Chapter 509, Laws of 1982, Minnesota Statute Section 103B.231. The plan will describe the existing physical environment, local and metropolitan comprehensive plans. In addition the plan will:

a) Present information on the hydrologic system and its components and existing and potential problems related thereto:
b) State objective and policies, including management principles, alternatives and modifications, for water quality, and protection of natural characteristics;
c) Set forth a management plan, including the hydrologic and water quality conditions that will be sought and significant opportunities for improvement;
d) Describe conflicts between the watershed plan and existing plans of local government units;
e) Set forth an implementation program consistent with the management plan, which includes a capital improvement program and standards and schedules for amending the comprehensive plans and official controls of local government units in the watershed to bring about conformance with the watershed plan; and
f) Set out a procedure for amending the plan.

Subdivision 3. Personal and Real Property. ~~It~~ The Board may acquire necessary property to carry out its powers and its duties.

Subdivision 4. Committees. The WMO may appoint ~~such~~ committees such as citizen and technical advisory committees and sub-committees as it deems necessary.

Subdivision 5. Rules and Regulations. The WMO may prescribe and develop such rules and regulations as it deems necessary or expedient to carry out its duties and the purposes of this Agreement unless specifically prohibited elsewhere in this document.

Subdivision 6. Review and Recommendations. Where the WMO is authorized or requested to review and make recommendations on any matter, the WMO shall act on such matter within sixty (60) days. Failure to act shall constitute a waiver of the WMO's authority to make recommendations.

Subdivision 7. Local Water Management Plan. After consideration but before adoption by the governing body, each local unit shall submit its water management plan to the WMO for review for consistency with the watershed plan for the Northern Cannon River. The WMO shall approve or disapprove the local plan or parts thereof. The WMO shall have 60 days to complete its review. If the WMO fails to complete its review within the prescribed period, unless an extension is agreed to by the local unit, the WMO waives its authority to make recommendations.

Subdivision 8. Use and Development of Land. If, within the time frame prescribed by the Northern Cannon River Watershed Plan, a local unit does not have an approved local water management plan, the WMO may have the authority of a Watershed District under Minn. Stat. Chapter 112 to regulate the use and development of land within that local units jurisdiction. The WMO may also have the authority to regulate the use and development of land when an amendment to, or variance from, the adopted local water management plan is applied for.

Subdivision 9. Data. The Board may establish and maintain devices for acquiring and recording hydrological data within the Northern Cannon River Watershed.

Subdivision 10. Claims. The Board may enter upon lands within or without the watershed to make surveys and investigations to accomplish the purposes of the WMO. The WMO shall be liable for actual damages resulting therefrom but every person who claims damages shall serve the Chairman or Secretary of the Board of Managers with a Notice of Claim as required by Chapter 466.05 of the Minnesota Statutes.

Subdivision 11. Legal and Technical Assistance. The Board may provide legal and technical assistance in connection with litigation or other proceedings between one or more of its members and any other political subdivision, commission, board or agency relating to the planning or construction of water management facilities within the Northern Cannon River Watershed. The use of WMO funds for litigation shall be only upon a favorable vote of a majority of the eligible votes of the then existing members of the WMO.

Subdivision 12. Reserve Funds. The Board may accumulate reserve funds for the purpose herein mentioned and may invest funds of the WMO not currently needed for its operations, in the manner and subject to the laws of Minnesota applicable to townships and cities.

Subdivision 13. Monies Collectable. The Board may collect monies subject to the provisions of this agreement, and state law, from its member and from any other source approved by a majority of its board.

Subdivision 14. Contracts. The Board may make contracts, incur expense and make expenditures necessary and incidental to the effectuation of these purposes and powers and may disburse therefore in the manner hereinafter provided. Every contract for the purchase or sale of merchandise, materials, equipment or services by the WMO shall be let in accordance with the Uniform Municipal Contracting Law, Minn. State. 471.345 and the Joint Exercise of Power Statute, Minn. Stat. 471.59. No Manager of the WMO shall take part in any vote on any contract in which a direct or indirect conflict of interest is present.

Subdivision 15. Surveys. The Board may make necessary surveys or utilize other reliable surveys and data and develop projects to accomplish the purposes for which the WMO is organized.

Subdivision 16. Other Governmental Units, Agencies. It may cooperate or contract with the State of Minnesota or any subdivision thereof or federal agency or private or public organization to accomplish the purposes for which it is organized.

Subdivision 17. Water Conveyances. The Board may order the construction, cleaning, repair, alteration, abandonment, consolidation, reclamation or changes in the course or terminus of any ditch, drain, storm sewer, water course, natural or artificial within the Northern Cannon River Watershed.

Subdivision 18. Watershed Operations. The Board may order the construction, acquisition, operation or maintenance of dams, dikes, reservoirs and appurtenant works.

Subdivision 19. Water Pollution. The Board may investigate on its own initiation or shall investigate upon petition of any member all complaints relating to pollution of the Northern Cannon River or its tributaries. Upon finding that ground or surface waters are being polluted, the Board may order the member governmental unit to abate this nuisance and each member agrees that it will take all reasonable action available to it under the law to alleviate the pollution and to assist in protecting and improving the water quality of surface and ground water in the watershed.

Subdivision 20. Permits. The Board may require permits for the establishment or expansion of any solid water, hazardous waste, sewage sludge, sludge ash disposal, application or treatment facility or any project that may degrade surface or ground water quality.

Subdivision 21. Surface Waters. The Board may regulate, conserve and control the use of storm and surface water within the Northern Cannon River Watershed.

Subdivision 22. Insurance. The Board may contract for or purchase such insurance as the Board deems necessary for the protection of the WMO.

Subdivision 23. Audit. The Board shall cause to be made an annual audit of the books and accounts of the WMO and shall make and file a report to its members at least once each year including the following information:

g) The financial condition of the WMO
h) The status of all WMO projects and work within the watershed.
i) The business transacted by the WMO and other matters which affect the interests of the WMO.

Copies of said report shall be transmitted to the clerk of each member governmental unit.

Subdivision 24. Records. The Board's books, reports and records shall be available for and open to inspection by its members at all reasonable times.

Subdivision 25. Amendments. The Board shall recommend all changes in this agreement to its members. Any amendments shall require ratification by all member units of government.

Subdivision 26. Other Powers. The Board may exercise all other powers necessary and incidental to the implementation of the purposes and powers set forth herein.

Subdivision 28. Local Studies. Each member reserves the right to conduct separate or concurrent studies on any matter under study by the WMO.

Subdivision 29. Gifts; Grants; Loans. The WMO may within the scope of this Agreement: accept gifts, apply for and use grants or loans of money or other property from the United States, the State of Minnesota, a unit of government or other governmental unit or organization, or any person or entity for the purposes described herein; enter into any reasonable agreement required in connection therewith; comply with any laws or regulations applicable thereto; and hold, use and dispose of such money or property in accordance with the terms of the gift, grant, loan or agreement relating thereto.

SECTION V
DURATION

Subdivision 1. Duration of Agreement. Each member agrees to be bound by the terms of this agreement until January 1, 2020 and it may be continued thereafter at the option of the parties.

Subdivision 2. Termination of Agreement. This agreement may be terminated prior to January 1, 2020 by the unanimous consent of the parties.

Subdivision 3. Petition to Dissolve Agreement. Any member may petition the Board to dissolve the agreement. Upon 60 days notice in writing to the clerk of each member governmental unit the Board shall hold a hearing and upon a favorable vote by three-fourths of all eligible votes of then existing Board members, the Board may by Resolution recommend that the WMO be dissolved. Said Resolution shall be submitted to each member governmental unit and if ratified by three-fourths of the Council/Boards of all eligible members within 60 days, said Board shall dissolve the WMO allowing a reasonable time to complete work in progress and to dispose of personal property owned by the WMO.

SECTION VI
DISSOLUTION

Upon dissolution of the WMO, the Board shall provide at least a 90 days notice of the intent to dissolve to the affected counties and the Board of Water and Soil Resources.

Upon dissolution of the WMO, all property of the WMO shall be sold and the proceeds thereof, together with monies on hand after payment of all obligations, shall be distributed to the members. Such distribution of the WMO assets shall be made in proportion to the total contributions to the WMO required by the last annual budget.

SECTION VII

EFFECTIVE DATE

This agreement shall be in full force and effect upon the filing of a certified copy of the resolution approving said agreement by each member. Said resolutions shall be filed with Dakota County Planning Services, who shall notify all members in writing of its effective date.

SECTION VIII

COUNTERPARTS

This agreement may be executed in several counterparts and all so executed shall constitute one Agreement, binding on all of the parties hereto notwithstanding that all of the parties are not signatory to the original of the same counterpart.

IN WITNESS WHEREOF, the parties hereto have executed the Agreement as of the day of complete execution hereof by the parties.