UPPER MISSISSIPPI BASIN INFORMATION DOCUMENT
APPENDICES
TABLE OF CONTENTS

Appendix A
References

A Citizens' Guide to Lake Protection. 1985. Minnesota Pollution Control Agency, St. Paul, Minnesota and Freshwater Foundation, Navarre, Minnesota. 16 pages.

Andrews, William J., James D. Fallon, and Sharon E. Kroening, "Water-Quality Assessment of Part of the Upper Mississippi River Basin, Minnesota and Wisconsin-Volatile Organic Compounds in Surface and Ground Water, 1978-94." U.S. Geological Survey, Water Resources Investigations Report 95-4216. 1995.

Arneman, H.F. 1963. Soils of Minnesota. University of Minnesota, Agricultural Extension Service and U.S. Department of Agriculture.

Barstad, Wayne and Karasov, Deborah Lake Development, How Much Is Too Much. MDNR Division of Waters, 1987

Bassett Creek Water Management Commission, Bassett Creek Watershed Water Management Plan. 1986.

Becker County Comprehensive Local Water Planning Task Force, The International Coalition, Moorhead, Minnesota, Dr. James Van Alstine, University of Minnesota, Morris, and DPA International, Ltd; "Becker County Comprehensive Water Plan"; December 1990.

Bloom, Arthur L. Geomorphology - A Systemic Analysis of the Late Cenozoic andforms. Prentice-Hall, Englewood Cliffs, N.J. 1991.

Borchert, J.R., G.W. Orning, J. Stinchfield, and L. Maki. 1970. Minnesota's Lakeshore: Resources, Development, Policy Needs. Summary of the Minnesota Lakeshore Development Study, University of Minnesota, Department of Geography and C.U.R.A., Minneapolis, Minnesota.

Brezonik, Patrick, L., V. J. Bierman, R. Alexander, J. Anderson, J. Barko, M. Dortch, L. Hatch, D. Keeny, D. Mulla, V. Smith, C. Walker, T. Whitledge, and W. Wiseman, Jr. 1999. Draft Effects of Reducing Nutrient Loads to Surface Waters Within the Mississippi River Basin and the Gulf of Mexico, Topic 4, Gulf of Mexico Hypoxia Assessment. NOAA Coastal Ocean Program Decision Analysis Series No. xx NOAA Coastal Ocean Office, Silver Springs, MD. .

Carlson, R.E. 1977. A Trophic State Index for Lakes. Limnology and Oceanography 22:361-369.

Central Ramsey Watershed Management District, Watershed Management Plan, James M. Montgomery Engineering, Inc., 1991.

Delaney, Rober,t, L., Kenneth Lubinski, and Charles Theiling, "Ecological Status and Trends of the Upper Mississippi River System 1998: A Report of the Long Term Resource Monitoring Program." United States Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin. April 1999. LTRMP 99-T001. 236 pp.

Delin, G.N., M.K. Landon, J.A. Lamb, and R.H. Dowdy., "Effects Of 1992 Farming Systems On Ground-Water Quality At The Management Systems Evaluation Area Near Princeton, Minnesota." U.S. Geological Survey, Water Resources Investigations Report 95-4104. 1995.

Dennis, Noel., Phosphorus Control In Lake Watersheds. Maine Department of Environmental Protection, 1989

Diaz, Robert and Andrew Solow. 1999, Draft Ecological and Economic Consequences of Hypoxia Topic 2, Gulf of Mexico Hypoxia Assessment. NOAA Coastal Ocean Program Decision Analysis Series No. xx NOAA Coastal Ocean Office, Silver Springs, MD. 86 pp + appendices.

Doering, O. C., F. Diaz-Hermelo, C. Howard, R. Heimlich, F. Hitzhusen, R. Kazmierczak, J. Lee, L. Libby, W. Milon, T. Prato, and M. Ribaudo. 1999. Draft Evaluation of Economic Costs and Benefits of Methods for Reducing Nutrient Loads to the Gulf of Mexico, Gulf of Mexico Hypoxia Assessment. NOAA Coastal Ocean Program Decision Analysis Series No. xx NOAA Coastal Ocean Office, Silver Springs, MD.

East Central Regional Development Commission, Mille Lake Lake Watershed, An Evaluation As An Area of Critical State Concern, 1976.

Fallon, James, D. Alison L. Fong, and William J. Andrews, "Water-Quality Assessment of Part of the Upper Mississippi River Basin, Minnesota and Wisconsin-Pesticides in Streams, Streambed Sediment, and Ground Water, 1974-94." U.S. Geological Survey, Water Resources Investigations Report 97-4141. 1997.

Fandrei, G.L., S.A. Heiskary, and S. McCollar. Descriptive Characteristic of Minnesota's Seven Ecoregions. Minnesota Pollution Control Agency, St. Paul, Minnesota. 1988.

Farnsworth, D.K., Thompson, E.S., and Peck, E.L., Annual free water surface (FWS) evaporation shallow lake, 1956-1970, Map 3, Evaporation atlas for the contiguous 48 United States: National Oceanic and Atmospheric Administration Technical Report NWS 33, scale 1:4,800,000.

Fenneman, N.M., Physsiography of Eastern United States, McGraw-Hill Book Company: New York, NY., 691 pages. 1938.

Fenneman, N.M., and D.W. Johnson, D.W., Physical divisions of the United States; U.S. Geological Survey, scale 1:7,000,000. 1946.

Finnerty, Bonnie. "Erosion Inventory of the Mississippi Headwaters". Crow Wing County Soil and Water Conservation District and Mississippi Headwaters Board. December 1998.

Fong, Alison L., W. J. Andrews, and J. R. Stark. "Water-Quality Assessment of Part of the Upper Mississippi River Basin, Minnesota and Wisconsin-Ground Water Quality in the Prairie du Chien-Jordon Aquifer, 1996." U.S. Geological Survey, Water Resources Investigations Report 98-4248. 1998.

Goolsby, Donald A., W. A. Battaglin, G. B. Lawrence, R. S. Artz, B. T. Aulenbach, R. P. Hooper, D. R. Keeney, and G. J. Stensland. Draft Flux and Sources of Nutrients in the Mississippi-Atchafalaya River Basin. Topic 3, Gulf of Mexico Hypoxia Assessment. NOAA Coastal Ocean Program Decision Analysis Series No. xx NOAA Coastal Ocean Office, Silver Springs, MD. 90 pp + appendices.

Gunard, Kurt T. 1985. U.S. Geological Survey. Water Supply Paper 2300. U.S.G.S. 702 Post Office Building, St. Paul, Minnesota.

Headwaters Regional Development Commission and the Beltrami County Soil and Water Conservation District; "Beltrami County Water Plan"; May, 1996.

Headwaters Regional Development Commission and the Clearwater County Soil and Water Conservation District; "Clearwater County Water Plan"; Clearwater County Board of Commissioners; August, 1996.

Heiskary, S.A. and C. Bruce Wilson, Minnesota Pollution Control Agency; " The Regional Nature of Lake Water Quality Across Minnesota: An Analysis for Improving Resource Management", 1988.

Heiskary, S.A. and W.W. Walker. 1988. Developing Phosphorus Criteria for Minnesota's Lakes. Lake and Reservoir Management. 4(1):1-10.

Heiskary, S.A and C.B. Wilson. 1988. Minnesota Lake Water Quality Assessment. Minnesota Pollution Control Agency, St. Paul, Minnesota.

Heiskary, S.A. and C.B. Wilson. 1990. Minnesota Lake Water Quality Assessment Report, 2nd edition. Minnesota Pollution Control Agency, St. Paul, Minnesota.

Heiskary, S.A. and C. Dinndorf. 1988. Child, Woman, and Girl Lakes Assessment Report, Minnesota Pollution Control Agency. St. Paul, Minnesota.

Heiskary, S.A., Koser, J. and Hodgson J.B., Lake Mille Lacs 1992 Clean Lakes Study (314a) Water Quality Report, Minnesota Pollution Control Agency. St. Paul, Minnesota.

Helgesen, J. O., D. W. Ericson, and G. F. Lindholm., 1975. Water Resources of the Mississippi and Sauk Rivers Watershed, Central Minnesota. United States Geological Survey Hydrologic Investigations Atlas HA 534, 3 sheets.

Henry, Roderick and Welle, Dr. Patrick , Tourism In North Central Minnesota, Headwaters Regional Development Commission, Nov. 1987

Hodgson, J.B. 1991. Mississippi Headwaters Counties, Water Plan Summaries, Cass County, Minnesota Pollution Control Agency, St. Paul, Minnesota.

Hodgson J.B., Fredrick, J., Schaffer C., Baumann, H., and Stetson, C. 1992. Ordinance Summary Report, Minnesota Pollution Control Agency, St. Paul, Minnesota.

Kroening, Sharon E., and William J. Andrews. "Water-Quality Assessment of Part of the Upper Mississippi River Basin, Minnesota and Wisconsin-Nitrogen and Phosphorus in Streams, Streambed Sediment, and Ground Water, 1971-94", U.S. Geological Survey, Water-Resources Investigations Report 97-4107., 1997.

Larson, S., Additions and Corrections To The Economic Portions Of The Draft Environmental Impact Statement, Bemidji Wastewater Treatment System Beltrami County Mn., 1980

Lindholm, G.F., E. L. Oakes, D. W. Ericson, and J.O. Helgesen., 1972. Water Resources of the Crow Wing River Watershed, Central Minnesota. United States Geological Survey Hydrologic Investigations Atlas HA 380, 4 sheets.

Lower Run River Watershed Management Organization, Watershed Management Plan, Short Elliott Hendrickson, Inc., 1996.

Maine Department of Environmental Protection, Phosphorus Control in Lake Watersheds, Sept. 1989

Mitsch, W.J., J. W. Day Jr., J.W. Gilliam, P. M. Groffman, D. L. Hey, G. Y. Randall, and N. Wang. 1999. Draft Reducing Nutrient loads, Especially Nitrate-Nitrogen, To Surface Water, Ground Water and the Gulf of Mexico, Gulf of Mexico Hypoxia Assessment. NOAA Coastal Ocean Program Decision Analysis Series No. xx NOAA Coastal Ocean Office, Silver Springs, MD.

Middle Mississippi River Watershed Management Organization, Watershed Management Plan, Rani Engineering, Inc., 1996.

Minnesota Board of Water and Soil Resources, "Comprehensive Local Water Planning - A Decade of Protection 1989-1999. 1999. MnBWSR, St. Paul, Minnesota.

Minnesota Department of Health, St. Paul, Minnesota; "Minnesota Fish Consumption Advisory"; 1996.

Minnesota Department of Natural Resources, Division of Fish and Wildlife, Section of Fisheries. 1993. Manual of Instructions For Lake Surveys. Special Publication No. 147. MDNR, St. Paul, Minnesota.

Minnesota Department of Natural Resources, St. Paul, Minnesota; "Public Recreation Information Maps".

Minnesota Department of Natural Resources. 1968. An Inventory of Minnesota Lakes: Bulletin 25. MDNR, St. Paul, Minnesota.

Minnesota Office of the Revisor of Statutes, St. Paul, Minnesota; "Minnesota Rules, Chapter 7050, Waters of the State'; 1998.

Minnesota Pollution Control Agency, St. Paul, Minnesota; "Nitrate in Minnesota Ground Water - A GWMAP Perspective," 1998.

Minnesota Pollution Control Agency, St. Paul, Minnesota; "Baseline Water Quality of Minnesota's Principal Aquifers - North Central Region," 1998.

Minnesota Pollution Control Agency, St. Paul, Minnesota; "Baseline Water Quality of Minnesota's Principal Aquifers," 1998.

Minnesota Pollution Control Agency, St. Paul, Minnesota; "Baseline Water Quality of Minnesota's Principal Aquifers - Northeast Region," 1999.

Minnesota Pollution Control Agency, St. Paul, Minnesota; "Water Quality in the Upper Fifteen Feet of a Shallow Sand Aquifer - In A Variable Land Use Setting - St. Cloud Area, Minnesota," 1998.

Minnesota Pollution Control Agency, St. Paul, Minnesota; "Minnesota's Nonpoint Source Management Program 1994".

Minnesota Pollution Control Agency, St. Paul, Minnesota; "Effects of Land Use on Ground Water Quality - St. Cloud Area, Minnesota, 1997 Results," 1998.

Minnesota Pollution Control Agency, St. Paul, Minnesota; "Effects of Land Use on Ground Water Quality - St. Cloud Area, Minnesota, 1998 Results," 1999.

Minnesota Pollution ControlAgency., Protecting Minnesota's Waters..The Land Use Connection. 1988.

Minnesota Pollution Control Agency., Baseline Water Quality of Minnesota's Principal Aquifers. 1998.

Minnesota Pollution Control Agency., Lake Water Quality Assessment Data: 1997. 1998.

Minnehaha Creek Watershed District, Water Resources Management Plan, 1997.

Morrison, Joseph J. An Analysis of Low Dissolved Oxygen Levels in the Upper Mississippi River in Late Summer to Early Fall. Bemidji High School, Bemidji, MN. 1993.

Nicollet, Joseph N. The Journals of Joseph N. Nicollet, A Scientist on the Mississippi Headwaters With Notes on Indian Life, 1836-37., Translated by Andre'Fertey., Edited by Martha Coleman Bray, Minnesota Historical Society, 1970.

North American Lake Management Society. 1988. Lake and Reservoir Restoration Guidance Manual. Developed for the Office of Res. and Dev. Corvallis ERL and for the Office of Water Criteria and Standard Div. Nonpoint Source Branch.

North American Lake Management Society. 1992. Maine Non-degradation Goals.

Oakes, E.L. and L. E. Bidwell, 1968. Water Resources of the Mississippi Headwaters Watershed North-Central Minnesota. United States Geological Survey Hydrologic Investigations Atlas HA 278, 4 sheets.

Omernik, J.M. 1977. Nonpoint Source -- stream nutrient level relationships: a nationwide study. Corvallis ERL U.S. Environmental Protection Agency, EPA-6001 3-77-105.

Omernik, J.M. 1987, Ecoregions of the conterminous United States: Annuals of the Association of American Geographers, v. 77(1): p. 118-125.

Omernik, J.M. and A.L. Gallant., 1988, Ecoregions of the Upper Midwest States: U.S. Environmental Protection Agency, EPA/600/3-88/037, 56 p.

Otter Tail County Comprehensive Local Water Planning Task Force, The International Coalition, Moorhead, Minnesota, Dr. James Van Alstine, University of Minnesota, Morris, and DPA International, Ltd.; "Otter Tail County Comprehensive Water Plan"; 1989.

Payne, G.A., "Ground-Water Baseflow to the Upper Mississippi River Upstream of the Minneapolis-St. Paul Area, Minnesota During July 1988. U.S. Geological Survey, Open-File Report 94-478. 1995.

Pioneer-Sarah Creek Watershed Management Commission, Pioneer-Sarah Creek Watershed Management Plan, Hennepin Conservation District, 1986.

Prairie, Y.T. and J. Kalff. 1986. Effect of Catchment Size on Phosphorus Export. Water Resource Bulletin 22 (3):465-470.

Rabalais, N. N., R. E. Turner, D. Justic, Q. Dortch and W.J. Wiseman, Jr. 1999. Draft Characterization of Hypoxia. Topic 1, Gulf of Mexico Hypoxia Assessment. NOAA Coastal Ocean Program Decision Analysis Series No. xx NOAA Coastal Ocean Office, Silver Springs, MD. 144 pp + 3 appendices.

Ramsey-Washington Metro Watershed District, Watershed Management Plan, Ramsey Washington Metro Watershed District Board, 1997.

Reckhow, K.H., and J.T. Simpson. 1980. A Procedure Using Modeling and Error Analysis for the Prediction of the Lake Phosphorus Concentration from Land Use Information. Can. J. Fish Aquat Sci. 37:1439-1448.

Region 5 Development Commission, Our Rural Economy, An Overall Economic Development Report, 1991.

Rice Creek Watershed District, Water Resources Management Plan, 1997.

Richfield-Bloomington Watershed Management Organization, Watershed Management Plan, 1991.

Sauk River Watershed District, Overall Plan for Water Management, Wenck and Associates, 1987.

Schupp, D.H. 1994. An Ecological Classification of Minnesota Lakes With Associated Fish Communities. Minnesota Department of Natural Resources, Fisheries Investigational Report 417, St. Paul, Minnesota.

Shingle Creek Watershed Management Commission, Watershed Management Plan, E.A. Hickok and Associates, 1988.

Sims, P.K., and Morey, G.B., 1972, Geology of Minnesota, Minnesota Geological Survey, 632 p.

Six Cities Watershed Management Organization. Watershed Management Plan, Short Elliott Hendrickson, Inc, 1997.

South Washington Watershed District, Watershed Management Plan, Bonestroo Rosene Anderlik and Associates, 1997.

Southwest Ramsey Watershed Management Organization, Southwest Ramsey Watershed Management Plan, James M. Montgomery Consulting Engineers. 1991.

Stark, James R., William J. Andrews, James D. Fallon, Alison L. Fong, Robert M. Goldstein, Paul E. Hanson, Sharon E. Kroening, and Kathy E. Lee, "Water-Quality Assessment of Part of the Upper Mississippi River Basin, Minnesota and Wisconsin-Environmental Setting and Study Design. U.S. Geological Survey, Water Resources Investigations Report 96-4098. 1996.

State Climatology Office. 1989. Unpublished Map of Hydrologic Year Precipitation. Oct. 1987 - Sept. 1988. MDNR Div. of Waters.

Upper Rum River Watershed Management Organization, Watershed Management Plan, Short Elliott Hendrickson Inc., 1996.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Blackhoof Lake, Crow Wing County, Minnesota, EPA Region V, Working Paper 87. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1974.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Buffalo Lake, Wright County, Minnesota, EPA Region V, Working Paper 88. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1974.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Cass Lake, Beltrami and Cass and Counties, Minnesota, EPA Region V, Working Paper 92. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1974.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Cokato Lake, Wright County, Minnesota, EPA Region V, Working Paper 94. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1974.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Gull Lake (South Basin), Cass and Crow Wing Counties, Minnesota, EPA Region V, Working Paper 102. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1975.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Leech Lake, Cass County, Minnesota, EPA Region V, Working Paper 105. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1974.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Big Lake, Stearns County, Minnesota, EPA Region V, Working Paper 124. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1975.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Trace Lake, Todd County, Minnesota, EPA Region V, Working Paper 130. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1974.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Cranberry Lake, Crow Wing County, Minnesota, EPA Region V, Working Paper 138. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1975.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Carrigan Lake, Wright County, Minnesota, EPA Region V, Working Paper 139. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1975.

United States Environmental Protection Agency, National Eutrophication Survey, Report on Wallmark (Mud) Lake, Chisago County, Minnesota, EPA Region V, Working Paper 146. National Environmental Research Center - Corvallis, Oregon and Las Vegas, Nevada. 1975.

Vadnais Lakes Area Water Management Organization, Water Management Plan, 1997.

Vanek, Vladimir Riparian Zone as a Source of Phosphorus for a Groundwater-Dominated Lake, 1990

Verry, E.S. and D.R. Timmons. 1982. Waterborne nutrient Flow Through and Upland-Peatland Watershed in Minnesota. Ecology 63 (5):1456-1467.

Waters, Thomas F., "The Streams and Rivers of Minnesota"; University of Minnesota Free Press, Minneapolis, Minnesota; 1977.

Walker, W.W., Jr. 1985. Urban Nonpoint Source Impacts on a Surface Water Supply. Pages 129-137. Perspectives on Nonpoint Source Pollution. Proceedings of a national conference. Kansas City, Missouri, May 19-22, 1985. U.S. EPA 440/5-85-01.

Walker, W.W., Jr. 1986. Empirical Methods for Predicting Eutrophication in Impoundments: Report 4, Phase III: Applications Manual Technical Report E-18-9 prepared by W.W. Walker Jr. Env. Engr. Concord, Mass. for U.S. ACE Waterways Experiment Station, Vicksburg, Mississippi.

Walker, W.W., Jr., Statistical bases for mean chlorophyll-a criteria. Lake and Reservoir Management 2:57-62, 1985.

Wetzel, R.G., Limnology. Saunders College Publishing, Philadelphia, PA.

Wilson, C.B. 1988. Lake Water Quality Modeling Used in Minnesota. Presented at National Conference on Enhancing State Lake Management Programs. May 12-13, 1988. Chicago, Illinois.

Wilson, C.B. and W.W. Walker. 1989. Development of Lake Assessment Methods Based Upon the Aquatic Concepts. Lake and Reserv. Manage. 5(2):11-22.

Winter, Thomas C. ed. "Hydrological and Biochemical Research in the Shingobee River Headwaters Area, North Central Minnesota", U.S. Geological Survey, Water-Resources Investigations Report 96-4215., 1997.

Appendix B
Minnesota Rules Chapter 7050
Classification of Waters

Subp. 4. Upper Mississippi River Basin. The water use classifications for the listed waters in the Upper Mississippi River Basin are as identified in items A, B, and D.

A. Streams:

(1) Alcohol Creek, (T.143, 144, R.34): 2C;
(2) Arramba Creek, (T.40, R.30): 2C;
(3) Barbour Creek, (T.44, R.28, S.28): 1B, 2A, 3B;
(4) Basswood Creek, (T.141, 142, R.36): 2C;
(5) Battle Brook, (T.35, R.26, 27): 2C;
(6) Battle Creek, (T.120, R.30, 31): 2C;
(7) Bear Brook, (T.144, R.27): 2C;
(8) Bear Creek, (T.145, R.36): 2C;
(9) Beautiful Creek, (T.127, R.31): 2C;
(10) Beaver Creek, (T.136, 137, R.32, 33): 2C;
(11) Belle Creek, (T.117, 118, R.32): 2C;
(12) Black Bear Brook, (T.44, R.28, S.7, 8): 1B, 2A, 3B;
(13) Birch Brook, (T.141, R.25): 2C;
(14) Black Brook, (T.41, 42, R.26): 2C;
(15) Black Brook, (T.42, 43, R.30): 2C;
(16) Blackhoof Creek, (T.46, R.29, S.16): 1B, 2A, 3B;
(17) Blackwater Creek, (T.55, R.26): 2C;
(18) Blueberry River, (T.138, 139, R.35, 36): 2C;
(19) Bluff Creek, (T.135, 136, R.36, 37): 2C;
(20) Bogus Brook (excluding Class 7 segment), (T.37, 38, R.26): 2C;
(21) Bogus Brook, Bock, (T.38, R.26, S.13, 14): 7;
(22) Borden Creek, (T.44, R.28, S.8, 9, 17, 20): 1B, 2A, 3B;
(23) Briggs Creek, (T.35, R.29, S.2, 11, 12, 14, 15, 22): 1B, 2A, 3B;
(24) Buckman Creek (excluding Class 7 segment), (T.39, 40, R.30, 31): 2C;
(25) Buckman Creek, Buckman, Buckman Coop Cry., (T.39, R.30, S.4, 5, 6, 9; T.39, R.31, S.1, 2, 10, 11; T.40, R.30, S.31; T.40, R.31, S.36): 7;
(26) Bungo Creek, (T.137, R.30, S.6; T.137, R.31, S.1, 11, 12, 14, 21, 22, 23; T.138, R.30, S.31): 1B, 2A, 3B;
(27) Bungoshine Creek, (T.145, R.32, S.28, 29, 30; T.145, R.33, S.25, 26, 34, 35): 1B, 2A, 3B;
(28) Bunker Hill Brook, (T.38, R.30, S.6; T.38, R.31, S.1, 2, 10, 11): 1B, 2A, 3B;
(29) Camp Creek, (T.43, R.28, S.4, 5): 1B, 2A, 3B;
(30) Camp Ripley Brook, (T.132, R.30, S.13, 24): 1B, 2A, 3B;
(31) Cat Creek, (T.137, R.35, S.4, 9, 10, 11, 12, 13): 1B, 2A, 3B;
(32) Cat River (excluding trout waters), (T.136, 137, R.33, 34, 35): 2C;
(33) Cedar Lake Creek, (T.138, R.31, S.14, 23, 26, 27, 28): 1B, 2A, 3B;
(34) Chase Brook, (T.38, 39, R.27): 2C;
(35) Clearwater Creek, (T.56, 57, R.24, 25): 2C;
(36) Cold Creek, (T.145, R.33, S.19): 1B, 2A, 3B;
(37) Cold Spring Creek, (T.123, R.30, S.14, 15): 1B, 2A, 3B;
(38) Coon Creek, (T.43, R.29, 30): 2C;
(39) Corey Brook, (T.135, R.30, S.9, 15, 16, 21, 22, 27): 1B, 2A, 3B;
(40) County Ditch No. 15 (Bear Creek), Bertha, (T.132, R.35, S.2; T.133, R.34, S.7; T.133, R.35, S.12, 13, 24, 25, 26, 35): 7;
(41) County Ditch No. 23, Garfield, (T.129, R.38, S.26, 27): 7;
(42) County Ditch No. 23A, Willmar, (T.119, R.34, S.29, 30; T.119, R.35, S.23, 25, 26): 7;

(43) County Ditch No. 42, McGregor, (T.47, R.23, S.6; T.47, R.24, S.1; T.48, R.23, S.29, 31, 32): 7;
(44) County Ditch No. 63, Near Hutchinson, West Lynn Coop Cry., (T.116, R.30, S.19, 20, 21, 28, 33): 7;

(45) County Ditch No. 132, Lakeside, Lakeside Coop Cry., (T.116, R.31, S.16, 21): 7;
(46) Crane Creek (excluding Class 7 segment), (T.116, 117, R.26, 27): 2C;
(47) Crane Creek, Winsted, (T.117, R.27, S.14, 20, 21, 22, 23, 24, 25): 7;
(48) *Crow River, North Fork, [11/5/84R] (From the Lake Koronis outlet to the Meeker - Wright County line): 2B, 3B;
(49) Cullen Brook, (T.136, R.28, S.18, 19, 30; T.136, R.29, S.13): 1B, 2A, 3B;
(50) Dabill Brook, (T.137, R.31, S.1, 2, 9, 10, 11, 16; T.138, R.31, S.36): 1B, 2A, 3B;
(51) Dagget Brook, (T.43, R.29, 30): 2C;
(52) Duel Creek, (T.129, R.32, S.20): 1B, 2A, 3B;
(53) Eagle Creek, (T.120, R.29): 2C;
(54) Elk River, Little, (T.130, 131, R.30, 31): 2C;
(55) Elk River, South Branch, Little, (T.130, R.30, 31, 32): 2C;
(56) Estes Brook, (T.36, 37, 38, R.27, 28): 2C;
(57) Everton Creek, (T.149, R.30): 2C;
(58) Fairhaven Creek, (T.121, R.28, S.5; T.122, R.28, S.29, 31, 32): 1B, 2A, 3B;
(59) Farley Creek, (T.147, R.28): 2C;
(60) Farnham Creek, (T.135, R.32, S.5, 6, 7; T.136, R.32, S.2, 3, 9, 10, 16, 19, 20, 21, 29, 31, 32): 1B, 2A, 3B;
(61) Fawn Creek, (T.134, R.33, S.22, 27, 33, 34): 1B, 2A, 3B;
(62) Finn Creek, (T.135, R.37, S.27, 34): 1B, 2A, 3B;
(63) Fish Creek, (T.28, R.22): 2C;
(64) Fletcher Creek, (T.42, R.31): 2C;
(65) Foley Brook, (T.141, R.25): 2C;
(66) Frederick Creek, (T.119, R.25): 2C;
(67) Frontenac Creek, (T.145, R.34): 2C;
(68) Hanson Brook, (T.40, R.27): 2C;
(69) Hanson Brook (Three-Mile), (T.122, R.28, S.21, 22, 25, 26, 27, 36): 1B, 2A, 3B;
(70) Hasty Brook, (T.49, R.19, S.18; T.49, R.20, S.4, 5, 9, 10, 13, 14, 15, 23; T.50, R.20, S.28, 29, 32, 33): 1B, 2A, 3B;
(71) Hay Creek, (T.43, 44, R.30, 31): 2C;
(72) Hay Creek, (T.134, R.33, S.7, 8, 9, 10, 11, 17, 18): 1B, 2A, 3B;
(73) Hay Creek, (T.135, R.31, S.8, 9, 17): 1B, 2A, 3B;
(74) Hazel Creek, (T.127, R.29, 30): 2C;
(75) Hellcamp Creek, (T.140, R.33, S.19; T.140, R.34, S.24): 1B, 2A, 3B;
(76) Hennepin Creek, (T.144, R.35, S.3, 10, 15, 16, 21; T.145, R.35, S.34): 1B, 2A, 3B;
(77) Hennepin Creek (excluding trout waters), (T.144, 145, 146, R.34, 35): 2C;
(78) Hoblin Creek, (T.137, R.30, S.17, 18, 19): 1B, 2A, 3B;
(79) Indian Creek, (T.141, 142, R.36, 37): 2C;
(80) Irish Creek, (T.129, R.31): 2C;
(81) Iron Creek, (T.135, R.32): 2C;
(82) Jewett Creek, (T.119, 120, R.30, 31): 2C;
(83) Johnson Creek, (T.137, R.28): 2C;
(84) Judicial Ditch No. 1, Lakeside, Lakeside Coop Cry., (T.116, R.31, S.28, 33): 7;
(85) Judicial Ditch No. 15, Buffalo Lake, Iowa Pork Industries, Hector, (T.115, R.31, S.15, 16, 20, 21, 29, 30; T.115, R.32, S.22, 25, 26, 27, 28, 32, 33): 7;
(86) Kabekona River, (T.143, R.32, S.6, 7, 18, 19; T.143, R.33, S.2, 3, 4, 9, 11, 12, 24; T.144, R.33, S.29, 30, 32, 33; T.144, R.34, S.24, 25, 36): 1B, 2A, 3B;
(87) Kawishiwash Creek, (T.142, R.32, S.12): 1B, 2A, 3B;
(88) Kettle Creek, (T.138, R.35, 36, 37): 2C;
(89) Kinzer Creek, (T.123, R.30, S.27, 34): 1B, 2A, 3B;
(90) Kitchi Creek, (T.146, 147, R.29, 30): 2C;

(91) Kitten Creek, (T.137, R.34, 35): 2C;
(92) Larson Creek, (T.128, R.32, S.6): 1B, 2A, 3B;
(93) LaSalle Creek (excluding trout waters), (T.143, 144, R.35): 2C;
(94) LaSalle Creek, (T.143, R.35, S.6; T.144, R.35, S.19, 30, 31): 1B, 2A, 3B;
(95) LaSalle River, (T.144, 145, R.35): 2C;
(96) Laura Brook, (T.141, R.26): 2C;
(97) Libby Brook, (T.50, R.23, S.5, 6; T.50, R.24, S.1, 2): 1B, 2A, 3B;
(98) Long Brook, Lower South, (T.44, R.30, S.12, 13): 1B, 2A, 3B;
(99) Long Brook, Upper South, (T.44, R.29, S.6, 7): 1B, 2A, 3B;
(100) Long Lake Creek, (T.46, R.25, S.10, 15): 1B, 2A, 3B;
(101) Luxemburg Creek, (T.123, R.28, S.16, 17, 18, 19, 20, 21, 22, 30): 1B, 2A, 3B;
(102) Matuska's Creek, (T.54, R.26, S.35, 36): 1B, 2A, 3B;
(103) Meadow Creek, (T.128, R.30): 2C;
(104) Meyers Creek, (T.122, R.28, S.4; T.123, R.28, S.22, 27, 33, 34): 1B, 2A, 3B;
(105) Michaud Brook, (T.140, R.25, S.7, 17, 18): 1B, 2A, 3B;
(106) Mike Drew Brook, (T.38, 39, R.26, 27): 2C;
(107) Mink Creek, Big, (T.41, 42, R.30, 31): 2C;
(108) Mink Creek, Little, (T.41, 42, R.29, 30, 31): 2C;
(109) *Mississippi River, [11/5/84R] (From Lake Itasca to Fort Ripley): 2B, 3B;
(110) *Mississippi River, [11/5/84R] (From Fort Ripley to the southerly boundary of Morrison County): 1C, 2Bd, 3B;
(111) Mississippi River, (From the southerly boundary of Morrison County to County State Aid Highway 7 bridge in Saint Cloud): 1C, 2Bd, 3B;
(112) *Mississippi River, [11/5/84R] (County State Aid Highway 7 bridge in Saint Cloud to the northwestern city limits of Anoka): 1C, 2Bd, 3B;
(113) Mississippi River, (From the northwestern city limits of Anoka to the Upper Lock and Dam at Saint Anthony Falls in Minneapolis): 1C, 2Bd, 3B;
(114) Mississippi River, (Outlet of Metro Wastewater Treatment Works in Saint Paul to river mile 830, Rock Island RR Bridge): 2C, 3B;
(115) Morrison Brook, (T.52, R.26, S.4, 9, 10, 14, 15; T.53, R.26, S.7, 8, 18, 19, 29, 30, 32, 33): 1B, 2A, 3B;
(116) Muckey Creek, (T.139, R.33, S.1, 2, 10, 11, 12): 1B, 2A, 3B;
(117) Necktie River (T.145, R.32, S.6, 7, 8, 9, 16; T.145, R.33, S.1): 1B, 2A, 3B;
(118) Nelson Hay Creek, (T.130, R.31, S.1, 2): 1B, 2A, 3B;
(119) Northby Creek, (T.140, R.27): 2C;
(120) Norway Brook, (T.139, R.30): 2C;
(121) O'Brien Creek, (T.56, 57, R.22): 2C;
(122) O'Neill Brook, (T.38, R.26): 2C;
(123) Oak Ridge Creek (Oak Creek), (T.133, 134, R.36): 2C;
(124) Olson Brook, (T.136, R.30, S.12, 13, 14): 1B, 2A, 3B;
(125) Peterson Creek, (T.134, R.30, S.29, 33): 1B, 2A, 3B;
(126) Pickedee Creek, (T.144, R.32, S.29, 30; T.144, R.33, S.24, 25): 1B, 2A, 3B;
(127) Pickerel Creek, (T.56, R.22, S.7, 18; T.56, R.23, S.13): 1B, 2A, 3B;
(128) Pigeon River, (T.147, R.27): 2C;
(129) Pike Creek (excluding Class 7 segment), (T.129, R.30): 2C;
(130) Pike Creek, Flensburg, (T.129, R.30, S.17, 18, 19, 20): 7;
(131) Pillager Creek, (T.133, R.30): 2C;
(132) Pioneer Creek, (T.118, R.24): 2C;
(133) Pokegama Creek, (T.54, R.26, S.26, 27, 28): 1B, 2A, 3B;
(134) Pokegama Creek, Little, (T.54, R.26, S.26, 27, 34, 35): 1B, 2A, 3B;
(135) Poplar Brook, (T.135, R.32, S.5, 6; T.136, R.32, S.22, 27, 28, 32, 33): 1B, 2A, 3B;
(136) Prairie Brook, (T.36, R.27): 2C;
(137) Rat Creek, (T.144, 145, R.34): 2C;
(138) Rice Creek, (T.30, 31, 32, R.22, 23, 24): 1C, 2Bd, 3B;
(139) Rice Creek, (T.35, R.29): 2C;

(140) Robinson Hill Creek, (T.123, R.28, S.4, 9, 10, 15; T.124, R.28, S.31, 32, 33): 1B, 2A, 3B;
(141) Rock Creek, Little (Benton), (T.38, R.31, S.3, 4, 10, 15, 21, 22, 28; T.39, R.30, S.17, 18, 20, 21, 22; T.39, R.31, S.13, 14, 22, 23, 26, 27, 33, 34): 1B, 2A, 3B;
(142) Rogers Brook, (T.134, R.30, S.29, 32): 1B, 2A, 3B;
(143) Rosholt Creek, (T.55, R.23, S.22, 23, 24): 1B, 2A, 3B;
(144) Round Creek, (T.43, R.31, S.14, 15): 1B, 2A, 3B;
(145) Round Prairie Creek, (T.127, R.33, S.4; T.128, R.33, S.20, 29, 32, 33): 1B, 2A, 3B;
(146) *Rum River, [11/5/84P] (From the Ogechie Lake spillway to the northernmost confluence with Lake Onamia): 2B, 3B;
(147) *Rum River, [11/5/84R] (From the State Highway 27 bridge in Onamia to Madison and Rice Streets in Anoka): 2B, 3B;
(148) Sand Creek, (T.45, R.30, S.2, 3, 11, 13, 14; T.46, R.30, S.34): 1B, 2A, 3B;
(149) Sand Creek, (T.55, R.23, S.15, 22, 27, 28, 29, 32, 33): 1B, 2A, 3B;
(150) Sauk Creek, Little, (T.127, R.34, S.1; T.128, R.34, S.36): 1B, 2A, 3B;
(151) Schoolcraft Creek, (T.142, R.34, S.5, 7, 8, 17): 1B, 2A, 3B;
(152) Seven Mile Creek, (T.133, 134, R.30, 31): 2C;
(153) Shingobee River (Cass), (T.141, R.31, S.16, 17, 18, 19; T.141, R.32, S.24): 1B, 2A, 3B;
(154) Sisseebakwet Creek, (T.54, R.26, S.19, 29, 30): 1B, 2A, 3B;
(155) Six Mile Brook, (T.143, 144, R.26, 27): 2C;
(156) Skimmerhorn Creek, (T.149, R.30): 2C;
(157) Skunk Creek, (T.144, R.34): 2C;
(158) Skunk River (Co. Dt. No. 37) (Co. Dt. No. 29), Brooten, (T.123, R.35, S.4, 5, 9; T.123, R.35, S.9, 10, 11, 12; T.123, R.34, S.3, 4, 5, 6, 7, 8): 7;
(159) Smart's Creek, (T.126, R.28, S.17, 18, 20): 1B, 2A, 3B;
(160) Smith Creek, (T.53, R.26, S.1, 9, 10, 11, 12, 13, 14, 15; T.54, R.26, S.35, 36): 1B, 2A, 3B;
(161) Smith Creek, Unnamed Tributary, (T.53, R.26, S.11, 12): 1B, 2A, 3B;
(162) Smith Creek, Unnamed Tributary, (T.54, R.26, S.35, 36): 1B, 2A, 3B;
(163) Snake River, (T.33, R.28, S.1; T.34, R.28, S.2, 11, 14, 23, 26, 35, 36; T.35, R.28, S.20, 28, 29, 33, 34, 35): 1B, 2A, 3B;
(164) Snowball Creek, (T.56, R.23): 2C;
(165) Split Hand Creek, (T.53, R.24): 2C;
(166) Spring Brook, (T.121, R.28, S.7; T.121, R.29, S.12): 1B, 2A, 3B;
(167) Spring Brook, (T.138, R.28, S.27, 34): 1B, 2A, 3B;
(168) Spring Brook, (T.139, R.26, S.3, 10, 11, 14): 1B, 2A, 3B;
(169) Spring Brook, Lower, (T.57, R.25, S.6; T.58, R.25, S.31): 1B, 2A, 3B;
(170) Spring Creek, (T.55, R.23, S.25, 26, 27): 1B, 2A, 3B;
(171) Spruce Creek (Douglas), (T.131, R.36, S.28, 29, 31, 32, 33, 34): 1B, 2A, 3B;
(172) Spruce Creek (Otter Tail), (T.130, R.36, S.3, 4, 9, 10): 1B, 2A, 3B;
(173) Stag Brook, (T.121, 122, R.30, 31): 2C;
(174) Stall Creek, (T.143, R.33, S.12, 13, 14): 1B, 2A, 3B;
(175) Stanchfield Branch, Lower Braham, (T.37, R.23, S.3, 10, 15, 22): 7;
(176) Stocking Creek, (T.138, R.35): 2C;
(177) Stoney Brook, (T.135, R.29, S.5, 8, 9; T.136, R.29, S.30, 31, 32; T.136, R.30, S.20, 21, 22, 25, 26, 27, 29, 30; T.136, R.31, S.24, 25, 26): 1B, 2A, 3B;
(178) Stony Brook (Stoney Brook), Foley, (T.36, R.29, S.2, 9, 10, 11, 16; T.37, R.29, S.35, 36): 7;
(179) Stony Creek, (T.140, R.28): 2C;
(180) Stony Point Brook, (T.147, R.28): 2C;
(181) Straight Creek, Upper, (T.141, R.36, S.30, 31; T.141, R.37, S.24, 25): 1B, 2A, 3B;
(182) Straight Lake Creek, (T.140, R.36, S.6; T.140, R.37, S.1, 2): 1B, 2A, 3B;
(183) Straight River, (T.139, R.34, S.7; T.139, R.35, S.4, 5, 6, 9, 10, 11, 12; T.139, R.36, S.1; T.140, R.36, S.28, 29, 33, 34, 35, 36): 1B, 2A, 3B;
(184) Sucker Brook (Gould Creek), (T.144, R.36, S.27, 28, 29, 30, 32, 33): 1B, 2A, 3B;
(185) Sucker Creek, (T.118, R.30, S.4, 5, 6, 7): 1B, 2A, 3B;
(186) Sucker Creek (Gould Creek) (excluding trout waters), (T.143, R.36): 2C;
(187) Swamp Creek, Big, (T.137, 138, 139, R.32, 33): 2C;

(188) Swamp Creek, Little, (T.136, 137, R.33): 2C;
(189) Swan Creek, (T.134, 135, R.32): 2C;
(190) Swan Creek, Little, (T.135, R.32): 2C;
(191) Swift River, (T.142, R.27): 2C;
(192) Taylor Creek, (T.128, R.31): 2C;
(193) Ted Brook Creek, (T.130, R.31): 2C;
(194) Thiel Creek (Teal), (T.121, R.28, S.5, 6, 8): 1B, 2A, 3B;
(195) Tibbits Brook, (T.33, 34, R.26, 27): 2C;
(196) Tibbetts Creek (Tibbetts Brook), (T.39, 40, R.27, 28): 2C;
(197) Tower Creek, (T.135, R.32, 33): 2C;
(198) Two Rivers, South Branch, Albany, (T.125, R.31, S.21, 22, 23): 7;
(199) Two Rivers Springs, (T.51, R.23, S.19; T.51, R.24, S.24, 25, 26): 1B, 2A, 3B;
(200) Union Creek, (T.134, R.35, S.4, 5, 7, 8, 18, 19, 30, 31; T.135, R.35, S.27, 28, 33, 34): 1B, 2A, 3B;
(201) Unnamed Creek, (T.137, R.31, S.4, 5): 1B, 2A, 3B;
(202) Unnamed Creek, (T.139, R.26, S.3, 10): 1B, 2A, 3B;
(203) Unnamed Creek, Calumet, (T.56, R.23, S.21): 7;
(204) Unnamed Creek, Hiller Mobile Home Court, (T.119, R.26, S.22, 26, 27, 35): 7;
(205) Unnamed Creek, Rogers, (T.120, R.23, S.15, 16, 22, 23): 7;
(206) Unnamed Creek, Grove City, (T.120, R.32, S.34, 35, 36): 7;
(207) Unnamed Creek, Albertville, (T.121, R.23, S.30; T.121, R.24, S.25, 36): 7;
(208) Unnamed Creek, Eden Valley, Ruhland Feeds, (T.121, R.31, S.2; T.122, R.31, S.35): 7;
(209) Unnamed Creek, Lake Henry, (T.123, R.33, S.11, 14): 7;
(210) Unnamed Creek, Miltona, (T.129, R.36, S.6; T.130, R.36, S.30, 31): 7;
(211) Unnamed Ditch, Braham, (T.37, R.23, S.2, 3): 7;
(212) Unnamed Ditch, Ramey, Ramey Farmers Coop Cry., (T.38, R.28, S.4, 5; T.39, R.28, S.29, 30, 32; T.39, R.29, S.25, 26, 27, 28): 7;
(213) Unnamed Ditch, McGregor, (T.48, R.23, S.31, 32): 7;
(214) Unnamed Ditch, Nashwauk, (T.56, R.22, S.4, 5; T.57, R.22, S.32): 7;
(215) Unnamed Ditch, Taconite, (T.56, R.24, S.22): 7;
(216) Unnamed Ditch, Glencoe, Green Giant, (T.115, R.28, S.21, 22, 27, 28): 7;
(217) Unnamed Ditch, Glencoe, Green Giant, (T.115, R.28, S.14, 23): 7;
(218) Unnamed Ditch, Winsted, Green Giant, (T.117, R.27, S.10, 11): 7;
(219) Unnamed Ditch, Hiller Mobile Home Court, (T.119, R.26, S.34, 35): 7;
(220) Unnamed Ditch, Kandiyohi, (T.119, R.34, S.10, 15, 21, 22, 28, 29, 32): 7;
(221) Unnamed Ditch, Rogers, (T.120, R.23, S.15): 7;
(222) Unnamed Ditch, Belgrade, (T.123, R.34, S.19, 30): 7;
(223) Unnamed Ditch, Flensburg, (T.129, R.30, S.30; T.129, R.31, S.25): 7;
(224) Unnamed Ditch, Miltona, (T.130, R.36, S.30; T.130, R.37, S.25, 36): 7;
(225) Unnamed Stream, Winsted, (T.117, R.27, S.11, 12): 7;
(226) Unnamed Stream, Flensburg, (T.129, R.30, S.19, 30): 7;
(227) Vandell Brook, (T.37, 38, R.26): 2C;
(228) Van Sickle Brook, (T.138, R.26, S.14, 15, 23, 24): 1B, 2A, 3B;
(229) Vermillion Creek, Little, (T.143, R.25, S.22, 27): 1B, 2A, 3B;
(230) Wallingford Brook, (T.139, R.33, S.1, 2, 11; T.140, R.33, S.25, 36): 1B, 2A, 3B;
(231) Warba Creek, (T.54, R.23, S.13, 14, 15, 21, 22, 23, 24): 1B, 2A, 3B;
(232) Welcome Creek, (T.56, 57, R.22): 2C;
(233) Whitley's Creek, (T.45, R.30, S.16, 17, 20, 21): 1B, 2A, 3B;
(234) Whitney Brook, (T.39, R.26, 27): 2C;
(235) Willow Creek, (T.133, R.38, S.2, 11; T.134, R.38, S.26, 35): 1B, 2A, 3B;
(236) Willow Creek, (T.121, R.29, S.10, 11, 14, 23): 1B, 2A, 3B;
(237) Willow River, North Fork, (T.142, R.25): 2C;
(238) Willow River, South Fork, (T.142, R.25): 2C;
(239) Wilson Creek, (T.137, R.30): 2C;
(240) Wolf Creek, (T.42, R.30): 2C.

B. Lakes:

(1) Allen Lake, (T.138, R.26W, S.5): 1B, 2A, 3B;
(2) Bald Eagle Lake, (T.30, 31, R.21, 22): 1C, 2Bd, 3B;
(3) Bee Cee Lake, (T.58, R.25W, S.28, 33): 1B, 2A, 3B;
(4) Benedict Lake, (T.142, R.32): 1B, 2A, 3B;
(5) Benjamin Lake, (T.148, R.30W, S.7, 18; T.148, R.31W, S.13): 1B, 2A, 3B;
(6) Blacksmith Lake, (T.142, R.35W, S.13): 1B, 2A, 3B;
(7) *Blue Lake, [3/7/88R] (T.46, 47, R.27): 1B, 2A, 3B;
(8) *Blue Lake, [3/7/88R] (T.141, R.34): 1B, 2A, 3B;
(9) *Bluewater Lake, [3/7/88R] (T.57, R.25): 1B, 2A, 3B;
(10) Cenaiko Lake (Unnamed), (T.31, R.24W, S.26): 1B, 2A, 3B;
(11) Centerville Lake, (T.31, R.22): 1C, 2Bd, 3B;
(12) Charley Lake, (T.30, R.23): 1C, 2Bd, 3B;
(13) Crappie Lake, (T.143, R.33W, S.31): 1B, 2A, 3B;
(14) Deep Lake, (T.30, R.22): 1C, 2Bd, 3B;
(15) Diamond Lake, (T.141, R.30W, S.26, 27, 34): 1B, 2A, 3B;
(16) Hazel Lake, (T.141, R.29W, S.25): 1B, 2A, 3B;
(17) Hay Lake, Lower, (T.137, R.28, 29): 1B, 2A, 3B;
(18) *Kabekona Lake, [3/7/88R] (T.142, 143, R.32, 33): 1B, 2A, 3B;
(19) Kennedy Lake, (T.58, R.23): 1B, 2A, 3B;
(20) Kremer Lake, (T.58, R.26W, S.33, 34): 1B, 2A, 3B;
(21) LaSalle Lake, Lower, (T.145, R.35): 1B, 2A, 3B;
(22) Little Mud Lake, (T.121, R.30W, S.22, 23): 1B, 2A, 3B;
(23) Loon (Townline) Lake, (T.50, R.22W, S.7; T.50, R.23W, S.12, 13): 1B, 2A, 3B;
(24) Lucky Lake, (T.57, R.26W, S.14): 1B, 2A, 3B;
(25) Mallen Mine Pit, (T.46, R.29W, S.17): 1B, 2A, 3B;
(26) Manuel (South Yawkey) Mine Pit, (T.46, R.29W, S.1): 1B, 2A, 3B;
(27) Margaret Lake, (T.139, R.26W, S.16): 1B, 2A, 3B;
(28) Marion Lake, (T.139, R.26W, S.16, 17): 1B, 2A, 3B;
(29) Martin (Huntington, Feigh) Mine Pit, (T.46, R.29W, S.9, 10, 16): 1B, 2A, 3B;
(30) Moonshine Lake, Little (Moonshine), (T.58, R.25W, S.28, 33): 1B, 2A, 3B;
(31) Newman (Putnam) Lake, (T.145, R.34W, S.10, 11): 1B, 2A, 3B;
(32) Otter Lake, (T.30, 31, R.22): 1C, 2Bd, 3B;
(33) Pennington (Mahnomen, Alstead, Arco) Mine Pit, (T.46, R.29W, S.3, 9, 10, 11): 1B, 2A, 3B;
(34) Perch Lake, (T.139, R.31W, S.33): 1B, 2A, 3B;
(35) Pleasant Lake, (T.30, R.22, 23): 1C, 2Bd, 3B;
(36) Pleasant Lake, (T.137, R.27W, S.19): 1B, 2A, 3B;
(37) *Pokegama Lake, [3/7/88R] (T.54, 55, R.25, 26): 1B, 2A, 3B;
(38) Portsmouth Mine Pit, (T.46, R.29W, S.1, 2, 11): 1B, 2A, 3B;
(39) *Roosevelt Lake, [3/7/88R] (T.138, 139, R.26): 1B, 2A, 3B;
(40) Sagamore Mine Pit, (T.46, R.29W, S.19; T.46, R.30W, S.24): 1B, 2A, 3B;
(41) Section 6 Mine Pit, (T.46, R.29W, S.6): 1B, 2A, 3B;
(42) Snoshoe Mine Pit, (T.46, R.29W, S.17, 18): 1B, 2A, 3B;
(43) Snowshoe (Little Andrus) Lake, (T.139, R.26W, S.29, 30): 1B, 2A, 3B;
(44) Strawberry Lake, (T.137, R.28W, S.27, 34): 1B, 2A, 3B;
(45) Sucker Lake, (T.30, R.22): 1C, 2Bd, 3B;
(46) Taylor Lake, (T.52, R.25W, S.16): 1B, 2A, 3B;
(47) Teepee Lake, (T.141, R.29W, S.30; T.141, R.30W, S.25): 1B, 2A, 3B;
(48) Tioga Mine Pit, (T.55, R.26W, S.26): 1B, 2A, 3B;
(49) Trout Lake, (T.55, 56, R.24): 1B, 2A, 3B;
(50) *Trout Lake, Big, [3/7/88R] (T.57, 58, R.25): 1B, 2A, 3B;
(51) *Trout Lake, Big, [3/7/88R] (T.137, 138, R.27, 28): 1B, 2A, 3B;

(52) *Trout Lake, Little, [3/7/88R] (T.57, R.25): 1B, 2A, 3B;
(53) Unnamed Swamp, Flensburg, (T.129, R.31, S.25): 7;
(54) Unnamed Slough, Miltona, (T.130, R.37, S.26, 35, 36): 7;
(55) Unnamed Swamp, Staples, (T.133, R.33, S.1): 7;
(56) Unnamed Swamp, Taconite, (T.56, R.24, S.22): 7;
(57) Vadnais Lake, (T.30, R.22): 1C, 2Bd, 3B;
(58) Wabana Lake, (T.57, R.25): 1B, 2A, 3B;
(59) Watab Lake, Big, (T.124, R.30): 1B, 2A, 3B;
(60) Wilkinson Lake, (T.30, R.22): 1C, 2Bd, 3B;
(61) Willard Lake, (T.139, R.30W, S.15): 1B, 2A, 3B; and
(62) Yawkey (North Yawkey) Mine Pit, (T.46, R.29W, S.1): 1B, 2A, 3B.

C. Calcareous Fens: None currently listed.

D. Scientific and Natural Areas:

(1) *Itasca Wilderness Sanctuary, [11/5/84P] Waters within the Itasca Wilderness Sanctuary, Clearwater County, (T.143, R.36): 2B, 3B, except wetlands which are 2D;
(2) *Iron Springs Bog, [11/5/84P] Waters within the Iron Springs Bog Scientific and Natural Area, Clearwater County, (T.144, R.36): 2B, 3B, except wetlands which are 2D;
(3) *Pennington Bog, [11/5/84P] Waters within the Pennington Bog Scientific and Natural Area, Beltrami County, (T.146, R.30): 2B, 3B, except wetlands which are 2D; and
(4) *Wolsfeld Woods, [11/5/84P] Waters within the Wolsfeld Woods Scientific and Natural Area, Hennepin County, (T.118, R.23): 2B, 3B, except wetlands which are 2D.

Appendix C
Minnesota Rules Chapter 7050
Classification of Waters

UPPER MISSISSIPPI RIVER BASIN
WATER PLAN 2000
PUBLIC INPUT REPORT

INTRODUCTION

The Upper Mississippi River Basin – Water Plan 2000 public input process was initiated by the Minnesota Environmental Quality Board Water Resources Committee (EQB-WRC) to provide feedback on the Goals, Objectives, and Indicators developed for the Water Plan 2000 prior to submission to the Minnesota Legislature.

As part of the process, the EQB-WRC, following input from the various state agencies charged with water management responsibilities, decided to follow the hydrologic watershed boundaries for the planning process. By following the Basin boundaries the EQB-WRC would ensure consistency with other state agencies planning processes, including the Minnesota Pollution Control Agency's (MPCA) Basin Planning Process.

BASIN BACKGROUND

The Upper Mississippi River Basin from the Headwaters to the seven county metropolitan area is a large, diverse and complex system (Attachment A for a Map of the Basins), draining portions of three different ecoregions. The Northern Lakes and Forests (NLF) ecoregion comprises the largest portion of the Basin (50 percent). In this ecoregion, the Basin includes all or parts of Becker, Clearwater, Beltrami, Itasca, Cass, Hubbard, Crow Wing and Aitkin Counties. Some of the major watersheds in this portion of the Basin are the Leech Lake River, Pine River, and Crow Wing River. As the Mississippi flows south from Crow Wing County and into Morrison County there is a transition to the North Central Hardwoods Forests (NCHF) ecoregion which comprises about 44 percent of the Basin. In this area the Basin includes all or parts of Douglas, Otter Tail, Todd, Morrison, Mille Lacs, Benton, Stearns, Sherburne, Kanabec, Isanti and Wright Counties. Prominent watersheds within the NCHF portion include the Long Prairie, North Fork of the Crow, Sauk, and Rum Rivers. A very small portion of the Basin includes the Counties of Kandiyohi, Renville, Meeker and McLeod Counties in the Western Corn Belt Plains (WCBP) ecoregion. This area is drained primarily by the South Fork of the Crow River. Differences in land form, soils, land use and glacial geology between these regions contribute to differences in surface and ground water quality and quantity issues of the Basin.

Socio/Demographic Characteristics

The Upper Mississippi River Basin contains all or portions of 30 counties with more than 60 percent of the state's 4.7 million residents. Demographically, the area is representative of population and growth patterns throughout the state, containing metropolitan populations, growing urban/suburban populations, areas of rural growth, and rural areas with declining populations. Growth of the 30-county region over the past 25 years has been slightly higher (28 percent) than the state average (24 percent). This is primarily due to the rapid growth in counties bordering the Twin Cities Metropolitan area.

The Northern segment, including the headwaters counties, contains a significant number of seasonal homes and has seen moderate growth over the past 25 years. Between 1970 and 1980 growth in the area was about 18 percent. Between 1980 and 1990 growth was at a standstill (less than 1 percent) and, since 1990, has again shown steady, moderate growth. The areas of highest growth have been in the lake counties of Hubbard, Crow Wing, Cass, and Beltrami (all over 40 percent growth since 1970). The smallest growth has occurred in western counties of Wadena and Clearwater.

The St. Cloud segment includes six counties influenced by population growth in St. Cloud and in the Twin Cities suburban area of Sherburne County. Growth in Sherburne County has been rapid throughout the past 25 years, increasing 63 percent between 1970 and 1980 and 40 percent and 35 percent respectively for the decades from 1980 to 1990 and 1990 to 1997. This represents a total population increase of more than 200 percent during the 25-year period. Growth in this segment is expected to continue but not as rapidly; an 18 percent increase between 2000 and 2020 is projected. While the City of St. Cloud is located in Stearns County, the majority of the County has remained rural. Benton County's rapid growth (63 percent) reflects the majority of growth in the St. Cloud metropolitan area. However, between 2000 and 2020, Stearns' County population is expected to grow at a faster rate (52 percent) than other counties in this Basin segment.

The Crow River segment of the Basin has seen the greatest percentage growth since 1970 (57 percent) and is expected to continue to have the highest percentage growth within the Basin, although this growth is projected to slow to 22 percent in the first two decades of the millenium. Both Carver and Wright counties, located at the edge of the Twin Cities metropolitan area, have grown the most rapidly with population increases of 116 percent and 112 percent respectively between 1970 and 1997. Renville County, located in the extreme southwest part of the Basin is a rural, agricultural area and its 17 percent population loss is a reflection of the decrease in populations in agricultural areas. Renville County is expected to continue to experience a population loss (11 percent) over the next 20 years. Meeker County, another primarily agricultural area adjacent to Renville County showed an 18 percent population gain between 1970 and 1997, it is projected to have a slight loss (1 percent) in the next 20 years.

The two counties that make up the Mille Lacs/Rum segment of the Basin, Istanti and Mille Lacs, have also shown significant population increase (56 percent) between 1970

and 1997, primarily due to rapid growth of Istanti County. Rapid population increase in Isanti County (79 percent) again reflects the movement of Twin Cities residents to more rural areas that are still within commute distance. In the next 20 years, both Isanti and Mille Lacs counties are expected to have moderate population gains (12 percent each).

The rapid growth in many areas of the Upper Mississippi River Basin has caused a major concern on the impact of growth on the surface and ground water quality and quantity.

Surface Water Resources

> The numerous lakes and streams in the Basin are known for their clarity, but are particularly sensitive to impacts related to pollution and use. The management of the nutrients of nitrogen and phosphorus is a primary concern for the lakes, rivers, and streams in the Upper Mississippi Basin. The water quality, quantity, and pollution impacts in the lakes, streams, and the Mississippi River in the Basin gradually increases southward, particularly with inflows from the Crow and Sauk Rivers. These two tributary Basins drain intensely agricultural areas and carry more sediments, nutrients and oxygen-depleting materials than the other rivers in the Basin. Total suspended solids appear to be increasing in the northwest and south-central portions of the Basin due to agriculture and urban development along the rivers. Phosphorus and nitrogen levels are lower than State average throughout the Basin, but increase southwardly in the watersheds from the Mississippi Headwaters to the Seven County Metropolitan area. Fecal coliform levels are higher than average as the Mississippi River passes Camp Ripley and further south.

In terms of trophic status 132 lakes (15 percent) are oligotrophic, 328 (37 percent) are mesotrophic, 303 (34 percent) are eutrophic, and 122 (14 percent) are hypereutrophic based on Carlson's Trophic State Index. A majority of the oligotrophic (92 percent) and mesotrophic (66 percent) lakes are located in the NLF ecoregion. In comparison, a majority of the eutrophic lakes (62 percent) and hypereutrophic lakes (92 percent) are located in the NCHF ecoregion.

The Northern Lakes and Forests portion of the Basin is characterized by predominately forested and wetland land uses. Low phosphorus loading to the lakes combined with the morphometry (moderate size and depth) of the lakes contribute to the generally good water quality in the lakes in this Basin. The NCHF portion of the Basin is characterized by a mosaic of land uses with cultivated and pastured land uses common in the western portion and a predominance of urbanized uses in the eastern or Twin Cities portion of the Basin. These types of land uses export high amounts of nutrients -- urbanized areas as the result of high amounts of impervious areas and the agricultural areas as a result of soil fertility and management practices. The NCHF portion of the Basin had 411 lakes assessed and, of these, less than 50 percent fully supported swimmable uses in the Basin.

The WCBP portion of the Basin is highly agricultural and has extremely shallow lakes. Of the nine lakes assessed in this portion of the Basin none support swimmable use.

Ground Water Resources

The ground water of the Basin consists of surficial sand and gravel aquifers and bedrock aquifers. The ground water is the principal source of drinking water for approximately 60 percent of the urban population and about 98 percent of the rural population in the state.

In general, the ground water of the Basin meets drinking water standards, although local degradation has occurred due to a number of contaminants including spills of chemicals, leachate from solid-waste landfills, leaks from underground storage and pipelines, and feedlots and agricultural uses. At this time, regionally or Basin-wide characteristics of the ground water are unavailable.

PUBLIC INPUT PROCESS

Advisory Team

To oversee the public input process the EQB-WRC appointed Basin Teams composed of representatives of the Minnesota Pollution Control Agency (MPCA), the Minnesota Board of Water and Soil Resources (BWSR), the Minnesota Department of Health (DOH), the Minnesota Department of Agriculture (DOA), Minnesota Department of Natural Resources (DNR), and the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS). See Attachment C for Team Membership.

The charge for the Advisory Committee was to seek input for the key Goals, Objectives, and Indicators as developed by the EQB-WRC for the Upper Mississippi Basin from the Headwaters to the boundary of the seven county metropolitan area.

Public Input Process

Based on knowledge of the Basin, the committee decided to hold three public information meetings as the primary method of public input. The three meeting locations were chosen to divide the Basin into smaller geographic areas to encourage more local participation and also to reflect the geographic differences in the Basin. The committee started with a January 4, 2000 meeting in Walker to gain perspective on the upper part of the Basin; characterized by lakes and forests. The second meeting was a January 11, 2000 meeting in Onamia to focus on the issues of the Rum River watershed and Lake Mille Lacs. The third and final meeting was held on January 18, 2000 in St. Cloud to focus on the North Fork and South Fork of the Crow watersheds, Sauk River watersheds, and the watershed surrounding St. Cloud, where agricultural land uses are more dominant.

The meetings were put on public noticed in the official newspapers of the Counties in the geographic setting area. In addition, personal letters were sent the to the local water planners, county board chairs, and principal city officials in the three geographic areas explaining the meetings (See Attachment D for copies of the newspaper notices and sample letters). All three meetings were held from 4:00 p.m. to 7:00 p.m. in order to make it most convenient for both water professionals and the general public to attend. Turnout at the meetings was light, ranging from a low of 8 to a high of 25. Attachment E is a roster of meeting attendance.

The WQB-WRC Upper Mississippi Basin Advisory Team members facilitated the meetings. The facilitators followed a modified small group nominal process to seek input from the participants. Participants were allowed to submit verbal comments, written comments or a combination. All comments were recorded on flip charts and are attached by meeting in Attachment F. Written comments received by the project are attached in Attachment G.

The general meeting format was the same for the three meetings. In each case we provided background context on the Minnesota Water Plan, the Upper Mississippi Basin issues and why their comments were needed. The facilitators then proceeded thorough the sections of the plan's goals, objectives and indicators.

As part of the comment process, the Stearns County Water Planning Task Force requested a separate meeting with the one of the Co-Chairs of the Advisory to forward specific comments concerning the Water 2000 process. These comments are included and identified as a separate comment process in this document.

PUBLIC INPUT SUMMARY

The comments are summarized in three ways: General Water Issues and Program Comments, Specific Comments on the Goals and Objectives; Indicators developed by the EQB-WRC. For this document the comments have been paraphrased, with the intent of not losing the overall tone and content of the comment, and placed into these categories or breakdown corresponding to the original goal, objective or indicator. A complete list of comments as received are included as Attachments F and G.

The reader is reminded that since the Upper Mississippi River Basin is a diverse and complex system as it flows from the Headwaters to the Twin Cities metro area, many of the public comments received reflected the local characteristics at the individual public meetings. For a more geographic breakdown refer to Appendix F and G.

General Comments

During each of the meetings a number of comments were received that were universal to water management. Many of these comments concerned current programmatic or general issues of water management and not a specific goal, objective or indicator.

- The overall goals are not adequate; the goals are too general. That the State needs to plan and develop goals that are specific, achievable, and have a strong local involvement. In addition the State needs Integrated Biological Indicators (IBI) with state and regional goals; and more defined local indicators.
- Need to develop workable mechanisms for the transfer of information back to the local units of government.
- Establish and monitor some "key" undeveloped lakes facing development to look at impacts over time.
- In general, the State of Minnesota needed to monitor withdrawals to prevent the mining of the ground water resources.
- As a general comment, concentrate as many indicators on a particular water resource, i.e. the same lake, aquifer, land or vegetation cover.
- In North Planning Unit (watersheds and area of the Basin North of Morrison County) many of the stream flows are controlled by outside groups. Need to include more local impacts in flow decisions made by these outside groups.
- The State needs to establish optimum flows on rivers for fish habitat; waste assimilation, property values; and local needs and factors.
- An indicator needs to be developed that measures or integrates environment protection and management versus tax return.
- A general observation that Natural Environmental Lakes, particularly lakes with large tracts of undeveloped lands need a stricter use classification and rules.
- A general observation that the funding needs should be tied to reflect natural resource priorities, needs and goals.
- The State of Minnesota should develop and give local units of governments incentives for environmental stewardship.
- A general statement that all governmental units need or should be required to follow its own best management practices.
- A concern expressed about the impact of the Water 2000 Plan on Local Units of Government, particularly on funding issues.
- A general or universal methodology needs to be developed for land use information and support of land use mapping.
- Planning groups need to keep in mind that over 1 million people rely on the Mississippi River for drinking water; need to develop indictors for the Mississippi Basin with this use in mind.
- In general, State Agencies need to do a better job of using data collected.
- In general, the State needs to recognize that it has a lot of amenity areas, under development pressure; that need protecting.
- The state needs to adopt a "risk management" system or approach that stresses focusing on the worst issue first. For example, from the local level - nitrates in ground water and phosphorus in lakes and streams followed by nitrogen and the hypoxia issues from a national level for lake and streams.
- State Agencies need to work on inexpensive models for assessing watershed needs. For example the Secchi Disk for lake water quality.
- In general, lakes are more stable and easier to monitor, so the State should concentrate on lakes as an indicator of water quality.

Specific Goals, Objectives and Indicator Comments

Goal: MINNESOTANS WILL IMPROVE THE QUALITY OF WATER RESOURCES.

The majority of the input at the three meetings concerned the quality of the surface and ground waters. The comments were both specific and general in nature to the three objectives.

General Comments for this Goal

- The State needs to consider adding non-conforming on-site or septic systems as an indicator for both surface and ground water. *If the State set this as an indicator, it would give local units of government more political support to implement the requirements of rules.*
- Climate and weather issues can impact indicators and objectives.
- Encourage and use land management, conservation, or water quality protection strategies in land development plan approvals. Monitor and record the use of these strategies as an indicator.
- For both surface and ground water, all of the identified indicators do not address any long- term needs identification. The indicators should also focus on the long-term culminative impacts, including the issues of new tax burden versus the tax return of environmental or natural resource impacts.
- For both surface and ground water use indicators that measure or integrate environment protection versus tax return for a property.
- In ground and surface water management, the State should develop an indicator that considers demographics and the growth that is driving the trends and the water indicators are measuring. In many cases, growth and demographics can be measured now, while the impacts from this growth and demographics will not show up in the water data for a period of time, maybe years.
- For both water quality and quantity goals (Goals 1 and 2), the indicators developed are reactive, the State should develop indicators that are more proactive.
- In water quality and quantity goals (Goals 1 and 2), a new tread that the State should consider monitoring as an indicator is land acquisitions/conservancy/trusts that are being formed. The use of non-profits and foundations is a new cultural response to the demographics and changing framework for resource and environmental management.
- In water quality and quantity goals (Goals 1 and 2), increased development is requiring a need to look at issues from a culminative standpoint. One single 160-acre development might not cause measurable environmental impacts, but a number of 160-acre developments in a watershed will have a culminative impact. Track development and potential impacts from a culminative standpoint.
- As part of water quality and quantity management goals, objectives and indicators (Goals 1 and 2), development tracking will also assist in other management goals such as Blandings Turtle protection.
- The water quality and quantity indicators need to measure upland impacts and loss of upland resources, particularly in areas where countywide zoning does not exist.

- In water quality and quantity management if would be helpful if the State measured the supply and demand of land property values and shifts in uses. An example is the large number of 40-acre parcels being purchased for hunting, fishing, and other recreational uses and not for agricultural uses.
- As an indicator, measure the increased use of buffer strips, the increase in acreage under buffering, and the water quality characteristics and improvements from buffering.
- In surface and ground water, use best management practices for siltation and sedimentation reduction as an indicator.

Objective A – Protect and improve water quality in streams.

Specific comments for Objective A and Indicators 1 through 6 from the meetings are discussed below. Many of the indicators could also apply to Objective B – Lake Water Quality:

- Need a good water quality statistical program.
- Indicators need to reflect local water quality characteristics; not just Secchi Transparency and not just total phosphorus.
- Need a good baseline of background water quality. Water quality before impacts, natural versus man-caused impacts.
- Utilize programs such as River Watch to develop local indicator information and then bring this information back to the local units of government.
- Concern about whom is going to collect the information for all the indicators. Concerns about the money to do it.
- As a land use or socio-indicator, monitor the use of covenants in plats and subdivisions. Also encourage the use of convenants.
- Use CRP lands as an indicator for surface water. Measure the land-use changes resulting from lands coming out of CRP and the impacts on water quality.
- Use as an indicator of the socio-economic trends or impacts on water quality and quantity the decline in smaller land holdings in a watershed.
- Use the amount of rented land for large farm irrigation.
- Use pH as an indicator in surface waters.
- Use macroinvertebrates as an indicator of water quality.
- Add phosphorus as an indicator in streams to make streams and lakes more compatible.
- Add pesticides as an indicator for streams and lakes.
- Establish fixed monitoring sites for surface waters and use these sites as indicator sites.
- Measure the changes in land use and vegetation and use as an indicator.
- Use dissolved oxygen as an indicator of water quality in streams and lakes.
- For surface waters, develop an indicator based on swimming suitability and Carlson's Tropic Statue Index.
- Use existing municipal wastewater discharge data as an indicator.
- Use the percent of riparian buffers as an indicator of water quality.

Objective B – Protect and improve lake water quality.

Specific comments for Objective B and Indicators 7 are discussed below. Many of the indicators could also apply to Objective A – Stream Water Quality.

- Indicators need to reflect local water quality characteristics; not just Secchi Transparency and not just total phosphorus.
- Need or consider percent of shoreland alternation as an indicator.
- Establish and monitor some "key" undeveloped lakes facing development to look at impacts over time.
- Develop an indicator for chlorophyll a and Trophic State Indexes (TSI) for lakes.
- Use as an indicator mercury and PCB levels in the lakes and fish consumption advisories.
- Add pesticides as an indicator for lake and stream water quality.
- Establish and use fixed lake monitoring sites to track overall trends.
- For lakes and streams, measure the changes in land use and vegetation and use as an indicator.
- Use dissolved oxygen as an indicator of water quality in streams and lakes.
- Include dissolved oxygen, chlorophyll a, ortho-phosphorus and Carlson's Trophic Status Indicator as lake water quality indicators.
- Measure the change in shoreland impervious areas as an indicator of potential lake water quality.
- Measure the number of upgraded on-site systems as an indicator of potential lake and stream water quality.
- Need to develop an indicator based on swimming suitability and Carlson's Tropic Statue Index.

Objective C – Prevent degradation of ground water quality and reduce concentrations of contaminants.

Specific comments for Objective C and Indicators 8 through 12 are discussed below. Many of the indicators could also apply to Objective D and E – Water Quantity.

- Use as a measurement the number of communities adopting source water protection measures.
- For ground water monitoring, atrazine and volatile organic compounds are good indicators, but are costly. Use total organic carbon as a first step.
- As an indicator measure the amount of irrigated lands over sand plain aquifers.
- Use the amount of rented land for large farm irrigation measurements.
- As a social indicator include wellhead protection zones or plans.
- As a social indicator track the number of Class V injection well and underground injection control wells in the state. This would also include better tracking of on-site septic or wastewater treatment systems.
- Monitor the number of delineations of wellhead protection areas and the associated water monitoring of wellhead areas.
- Use the number of feedlots and the animal units per square mile as an indicator.
- Use the number of abandoned wells as an indicator.

Goal: MINNESOTANS WILL CONSERVE WATER SUPPLIES AND MAINTAIN THE DIVERSE CHARACTERISTICS OF WATER RESOURCES TO GIVE FUTURE GENERATIONS A HEALTHY ENVIRONMENT AND A STRONG ECONOMY.

Specific comments for Objective D, E, and F and Indicators 13 through 15 are discussed below. Many of the indicators could also apply to Objective A, B, and C on water quality.

Objective D – Maintain ground water levels to sustain surface water bodies and provide water supplies for human development.

- The measurement of water levels in wells is appropriate and needed. In addition, the State needs to think about expanding the existing system and put more wells into it.
- As in Objective C, an indicator is needed for the amount of irrigated lands over sand plain aquifers.
- As in Objective C, measure the amount of rented land for large farm irrigation.
- Need to establish a baseline of information on the ground water quality and quantity of the culminative impacts of irrigation, intensive farming, and feedlots.
- The State needs to maintain rather than observe the ground water levels.
- As an indicator, the State Plan should develop a method of determining the economic value of ground water.
- Manage and use, as a measure, the amount impervious surfaces for surface and ground water impacts on quality and quantity/flow levels.
- Monitor and measure the amount of wetland acres as an indicator of water quality/quantity and natural conditions and can be used for Goal 3, Objective G and H.

Objective E – Maintain flow of rivers and streams within historical range of variation.

- In North Planning Unit (watersheds and area of the Basin North of Morrison County) many of the stream flows are controlled by outside groups. Need to include more local impacts in flow decisions.
- How will the "Historical Levels" be defined?
- Manage and measure the impervious surfaces for surface and ground water impacts/flow levels.
- Need to establish, as an indicator, watershed land use changes.

Objective F – Maintain the quality and diversity of Minnesota's lakes and wetlands while acknowledging regional variation.

- Need to use a biologic or similar indicator of wetland diversity (ex. the IBI as a biological indicator) for wetland mitigation measures and not just a number of acres measurement.

- A wetland diversity indicator should also include indicators such as changes in wetland types, changes in wetland functions, and changes in wetland locations.

GOAL: MINNESOTANS WILL RESTORE AND MAINTAIN HEALTHY ECOSYSTEMS THAT SUPPORT DIVERSE PLANTS AND WILDLIFE.

Objective G – Ensure that aquatic environments have conditions suitable for the maintenance of healthy, self-sustaining communities of plants and animals.

- Need to include sensitive or native vegetation populations as an indicator, add allow for indicators to reflect the native regional variations.
- Consider including natural mussel populations as an indicator.
- Need to include in any IBI developed for the Upper Mississippi Basin, naturally occurring invertebrates.
- Develop an indicator to monitor changes in aquatic vegetation.
- Consider using Blandings Turtle populations as an indicator of healthy ecosystems.
- As an indicator, select fish indictors appropriate to the individual lakes (i.e. not every lake is a walleye lake). Look at the species communities.
- The application of Indicator 17 and 22 is very narrow. The State indicators also need to take into consideration the region and individual ecological community characteristics.

Objective H – Limit introduction and spread of exotic species.

- Consider including, as indicators, the number of waterbodies with purple loosestrife and curlyleaf pondweed.
- Add "undesirable" to the exotics definition. Example Purple Loosestrife or Curly Leaf Pondweed.
- Add Purple Loosestrife or reference a standard list of exotics.

GOAL: MINNESOTANS WILL HAVE REASONABLE AND DIVERSE OPPORTUNITIES TO ENJOY THE STATE'S WATER RESOURCES.

The participants addressed primarily the indicators of this section. Over all they offered more indicators for the EQB-WRC to consider for the measurement of the goal and objectives and did not address the Goals or Objectives.

Objective I: Provide appropriate access to water recreation sites.

Specific recommendations for Objective I include:

- The use of various license sales should also be used as an indicator.
- Use public riparian zones or beaches as an indicator.

Objective J: Improve or maintain the quality of water recreation.

Specific recommendations for Objective J include:

- Use passive recreation surveys (non-fishing; non-boating) as an indicator.
- Use land shore owner satisfaction surveys as an indicator.

A number of comments were received that addressed both Objective I and J, or were of a general nature concerning water recreation opportunities. These recommendations include:

- Encourage the establishment of lake quiet zones or similar recreational zones, prohibiting some of the other uses causing noise impacts.
- Measure the use of surface management or zoning of lake surface uses and diversity as an indicator.
- Use of beaches and establishment of swimming beaches as an indicator of water recreation resources. Swimming can also be use as an indicator for water quality.
- Use public riparian zones as an indicator.