APPENDIX A: TRAJECTORY PROJECT PARTICIPANTS, 2018

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APPENDIX B: FRESHWATER REVIEW OF 2003-2004 "G-16" RECOMMENDATIONS

Background

First, it's important to note just how far we've come. The Impaired Waters Stakeholder Process pulled together about 16 organizations for 18 meetings in 2003-2004, which resulted in 31 recommendations plus an additional 56 unresolved policy and programmatic issues.

The table below offers a quick view of where the state started its effort, and where we are now after ten years of CWF spending.

Where we started	Ten years later	Comments
Needing thousands of TMDLs for individual pollutants on individual reaches…	Hundreds of TMDLs conducted on a major watershed basis for multiple pollutants	Huge cost, stakeholder, and modeling efficiencies were secured
Greater than four years per TMDL…	About four years for a more comprehensive TMDL, plus supporting products	
Spotty baseline monitoring that was mostly chemistry based…	Hundreds of coordinated quality, biologic, and flow monitoring sites established	Load and condition monitoring is systematically carried out
Hundreds of barely coordinated local (nonpoint) water plans of variable quality…	Half as many plans now being built on solid technical data and analysis	
Extremely focused on satisfying TMDL requirements for the EPA...	Exceeding federal requirements and driving on-the-ground improvements for Minnesota	Shifted from a focus on impairments to one including protection
Erratic state funding w/ declining general fund, and dependent upon EPA funds…	More stable state funding with shrinking general, EPA and USDA funds	Leveraging of federal funds seems lower than anticipated
"Pretty good" water management state…	Minnesota in top handful of states with integrated water management approaches	

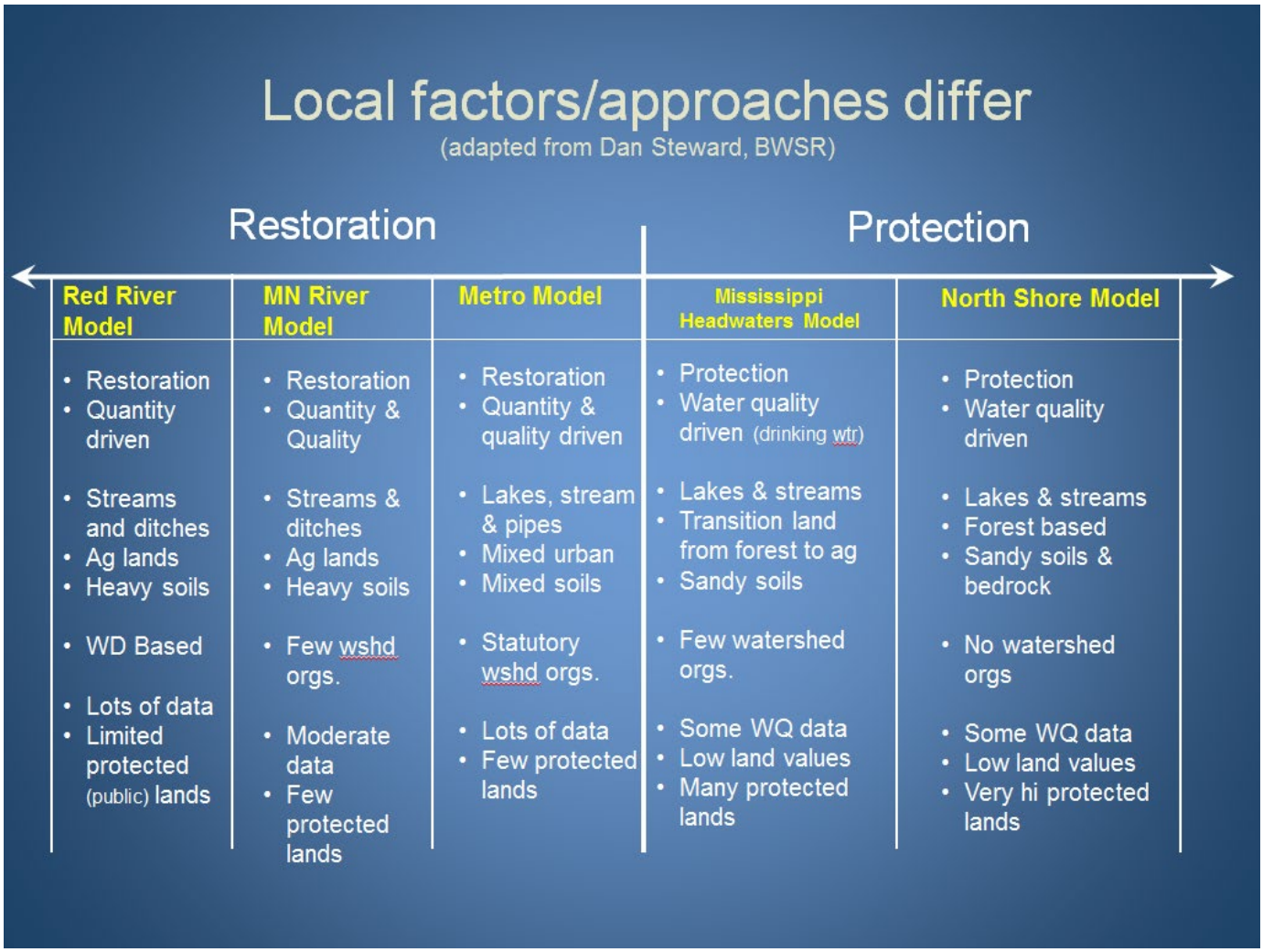
The following table details the 31 recommendations developed by the Impaired Waters Stakeholder Process. A surprising amount of progress actually happened – with 27 of the 31 either in progress or done – demonstrating what can happen when consensus is reached by a variety of interested parties and funding is available.

No.	2004 recommendation	Outcome/status
1	Agencies should engage many parties in TMDL and implementation processes	**Occurring**
2	Agencies should enter into agreements with feds	Not to extent envisioned; do have CREP, Great Lakes Restoration Initiative, EPA
3	Create a new council to advise	**Done** – Clean Water Council
4	Develop statewide impaired waters plan	**Done** – major watershed focus
5	Prevent impairments	**Occurring** – value of protection measures recognized in funding processes
6	Educate and invite stakeholders	**Occurring** across Executive Branch agencies
7	Encourage voluntary options over new regulation	**Mostly came true**; AWQCP; buffers were seen as new
8	Allocate resources across Minnesota, programs, and spectrum of impairments	**Occurring** – though implementation is being mostly driven by bottom-up local proposals
9	Develop decision-making matrix to weigh prioritization criteria	**Done** somewhat with major watersheds and NonPoint Prioritization Plan
10	Fund both point- and nonpoint solutions	**Occurring**
11	Create a water fund which doesn't supplant	**Done** – Clean Water Fund
12	Create a fee on sanitary sewers & SSTS to raise $75-100M per year with 20% to assessment and TMDLs and 60% to restoration projects	**Created** 3/8 of 1% sales tax instead that raises $120M per year; allocations are similar in magnitude to desired percentages
13	Prioritize assessments for human health, impairments, and where there is potential for delisting	Unsure - Nonpoint Priority Funding Plan mentions the delisting priority
14	Use data while legally viable (within 10 years)	**Occurring**
15	Aim for 10-year assessment cycle	Slipped a little behind schedule

16	Prioritize submittal of TMDLs to EPA based on human health, local readiness, and local coordination	**Incorporated** into major watershed schedule
17	Use “TMDL report”, not “TMDL study” in writing	Continued inconsistent messaging
18	Conduct preliminary evaluation of an impaired body to increase efficiency	Made mostly moot by whole-watershed TMDLs
19	Work with locals to engage them	**Occurring**
20	Execute multiple TMDLs and allocations in a single project	**Occurring**
21	Evaluate which geographic approach is most economical, efficient, effective	Major watershed scale was selected, and reinforced through One Watershed One Plan
22	Have work plan for each TMDL project	**Occurring**
23	Develop implementation plans using public input	**Occurring**
24	Consider contracting with third parties	**Occurring**
25	Increase TMDL transparency with a guidance manual and use of outside experts	**Occurring**, however, the science supporting standards still attracts debate
26	Submit TMDL reports in timely manner	**Occurring**
27	Support work on impaired waters even if a TMDL has not yet been completed	**Occurring** – lack of TMDL doesn’t influence competitive scoring of implementation funds
28	Target resources toward restoration (delisting)	Somewhat – scoring prioritizes waters closest to state water quality standards, which includes protection efforts
29	Include effectiveness-monitoring in restoration activities	**Done** as part of regular monitoring, but not on an expensive project-by-project basis
30	Develop restoration activities with local governments	**Occurring**
31	Address both point and nonpoint sources in restoration activities	**Occurring**

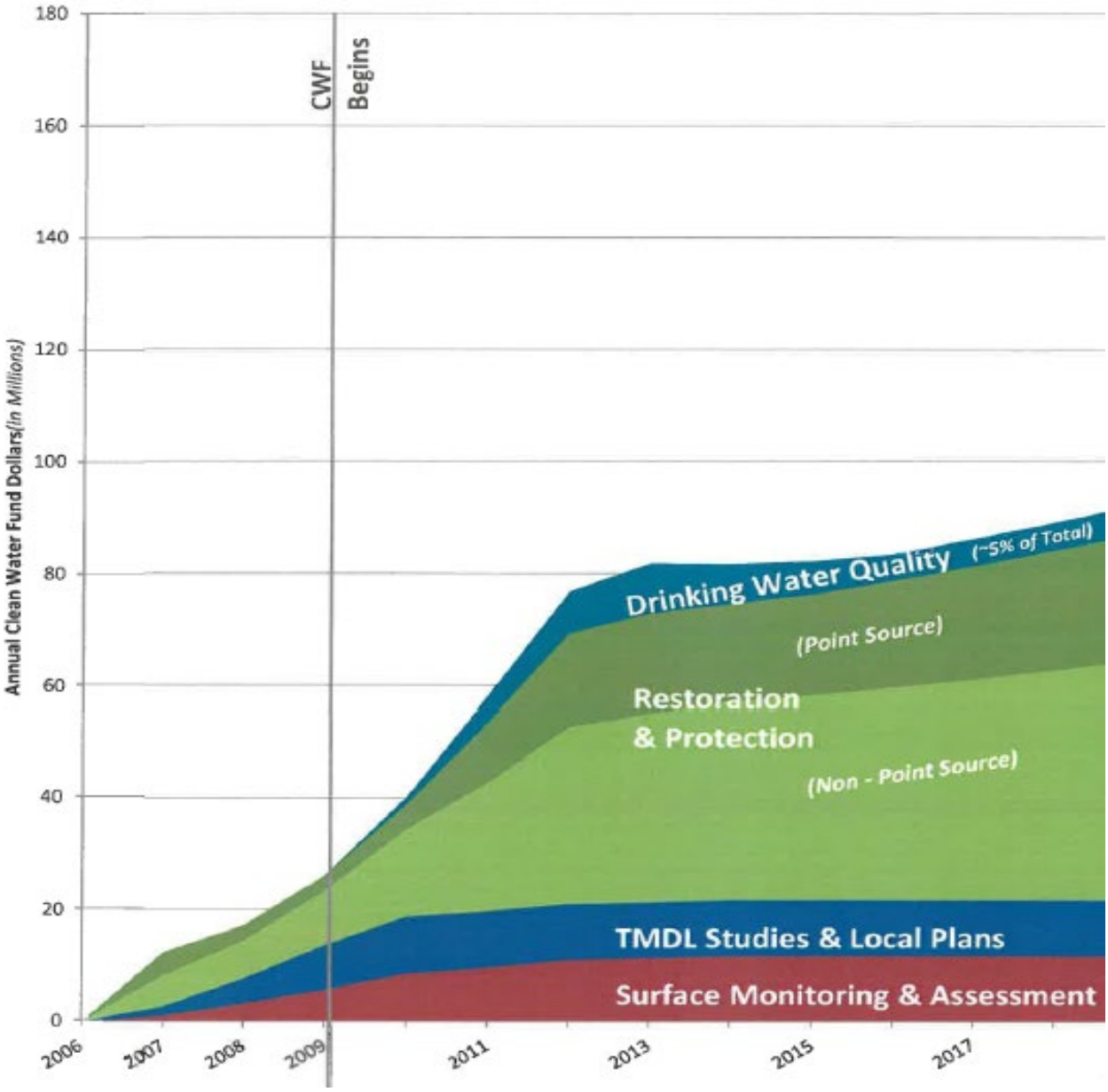
APPENDIX C

Identifying similarities in drivers, issues, and opportunities across watersheds can result in increased collaboration between watersheds as well as an increased ability to leverage funding to address the most pressing issues. As One Watershed One Plans are completed, BWSR should consider aggregating this information into a table similar in structure to the one below to identify and develop new strategies where similarities exist.



APPENDIX D: 2012 DIRECTION OF CLEAN WATER FUND SPENDING

The conversation on "trajectories" is not new, but making shifts in how funding happens requires intentional consideration. In 2012, the following graph was used in discussing the future direction of Clean Water Fund spending. The Trajectories process used this as a reference in considering what would be needed to prepare for 2034. It would be worthwhile for the CWC to update this graph using the funding directions described on page 9



of this report.

APPENDIX E: NOTES AND LINKS

This is not meant to be a fully comprehensive background on each of the issues. A few hyperlinks have been provided for further information.

Comprehensive assessment of the state's surface water

The MPCA has completed the initial assessment of all 81 of Minnesota's major watersheds. The 10-year cycle of intensive monitoring of water quality standards and stressors led to the development of Watershed Restoration and Protection Strategies (WRAPS), to be implemented through local water plans.

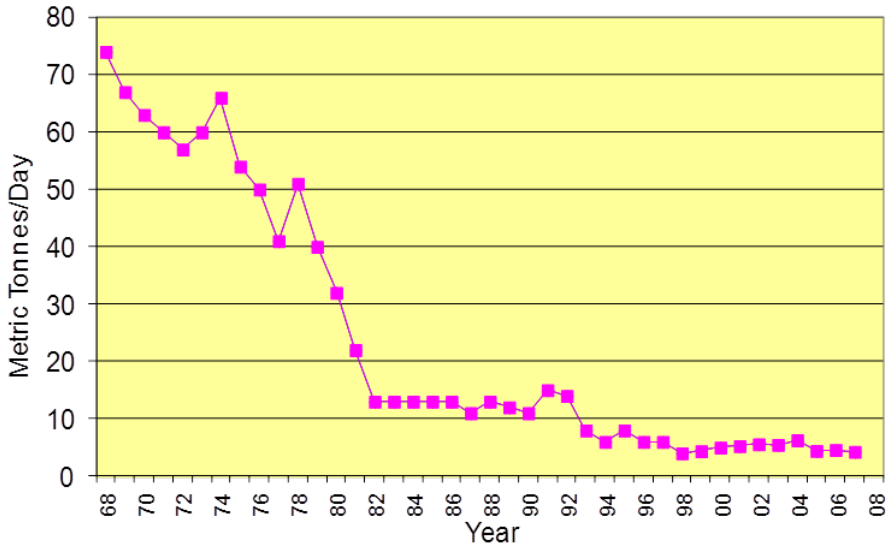
https://www.pca.state.mn.us/water/watershed-approach-restoring-and-protecting-water-quality

TMDLs completed statewide

A central aim of the G-16 fourteen years ago was to complete TMDLs statewide. This was for compliance with the Federal Clean Water Act, avoidance of litigation, and having a factual basis for actually addressing impairments.

Municipal wastewater treatment plan discharges

One snapshot tells the story: Metro WWTP Total Phosphorus reduced by an order of magnitude.



Industrial wastewater discharges

NPDES permit program was authorized in 1974 with authorization of other parts of the program occurring in phases for pretreatment program (1979) and general permits (1987).

Runoff from industrial sites

Ten categories of industrial sites have been regulated since 1997. Basic on-site BMPs were identified and built to bring sites into compliance.

Runoff from forested lands

The Minnesota Forest Resources Council released guidelines for voluntary site-level forest management in 1999 (last rev. 2012). Overall implementation is improving for riparian zones, filter strips, retention of snags and woody debris on biomass harvest sites, rutting of wetland crossings, and coarse woody debris retention. Guidelines needing improvement include avoidance of wetland crossings and use of erosion control.

"Voluntary Forest Management Guidelines," developed in the mid-1990s and updated frequently defines best practices to mitigate impacts to forest resources during management activities. In 2015-16, these guidelines were used to monitor 10 major watersheds for disturbance patterns and their influence on water quality.

http://mn.gov/frc/docs/MFRC_2015-2016_Biennial_Report.pdf

Runoff from urban lands

New urban development is fully regulated and significant retrofitting of older systems is occurring. A 1982 mandate for the metro area required multijurisdictional watershed organizations . Municipal Separate Storm Sewer Systems (MS4) permits compelled actions in Minneapolis and St. Paul beginning in 2000. Smaller cities and townships with a population of at least 10,000 followed in 2007.

Runoff from agricultural lands

The Shoreland Management Act of 1969 led to most counties adopting an ordinance by 1973 when cities were added. Updated standards were promulgated in 1989 for setbacks, buffers, lot sizes and more. Supplemental guidance has also been issued. Drainage authorities were given an ability to require 1-rod grass strips along public drainage ditches in 1959. In 1977, this became a requirement triggered by certain proceedings. Minnesota's 2015 buffer law provides an umbrella approach and schedule which requires perennial vegetation buffers of up to 50 feet along lakes, rivers, and streams and buffers of 16.5 feet along ditches.

Erosion from construction sites

Many metro cities and most watershed organizations required erosion and sediment control plans (permits) for construction sites with greater than five acres of disturbed area. Beginning in 1998, MPCA began requiring permits statewide and increased standardization of inspection and maintenance requirements.

Wetland protection, mitigation, and restoration

Minnesota identified and began regulating public waters in 1937. Needed jurisdictional clarity was provided via inventory procedures in the late 1970s to address most of the state's Type 3, 4, and 5 wetlands. Much broader authorities began with the Wetland Conservation Act of 1991 (WCA) which allowed for local regulation of Types 2 -8 via more rigorous delineation methods and an avoid-minimize-mitigate framework. There is also a federal process that is largely redundant with WCA. Available numbers (from 2001-2003) show approximately 2000 regulatory acres lost and 2200 acres gained over the two years; and 92,400 acres of non-regulatory gains (from 1986 to 2010) protected by perpetual easements .

Nitrogen in surface water

Nutrient Reduction Strategy is to achieve a progress milestone of a 20 percent nitrate load reduction by 2025 and 45 percent by 2040.

Phosphorus in surface water

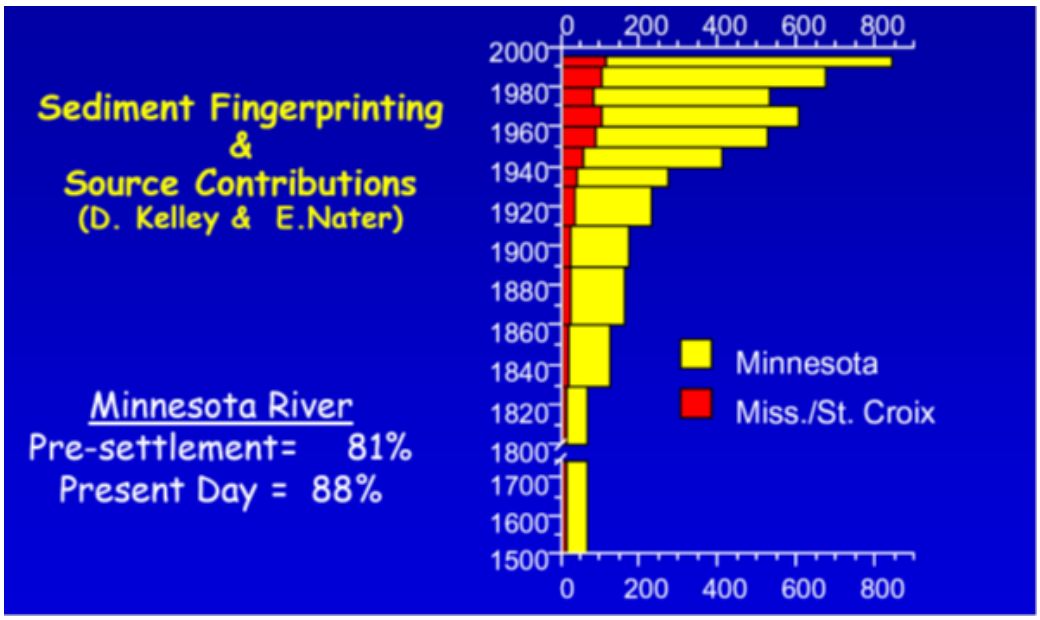
Nutrient Reduction Strategy is to reduce phosphorus by 45 percent in nearly 500 lakes impaired for eutrophication and a 40 percent reduction in phosphorus for many eutrophication-impaired Minnesota rivers.

Chloride in surface water

There are a total of 39 chloride impairments in the Metro. Approximately 11% of the 340 waterbodies assessed were determined to be impaired. An additional 11% were classified as high risk. Public road use appears to be declining, yet private applications and water softeners remain significant sources.

River scour and sedimentation

Overall erosion is low in northern part of state, regulated in urban areas, and the challenge is in southern rivers where a four-fold increase has been seen since European settlement:



http://www.bwsr.state.mn.us/drainage/dwg/resources/CSSR_Final_Report.pdf

Contaminants of emerging concern

Between 2009 and 2012, the U.S.G.S. and MPCA sampled 118 wells located in vulnerable sand and gravel or bedrock aquifers. 38 out of 127 CECs analyzed were detected among all water samples collected and were more likely close to landfills and septic or wastewater treatment systems. The antibiotic sulfamethoxazole was in 11 % of wells. DEET was detected at the highest concentration of any CEC, at 7.9 micrograms per liter. Bisphenol A was detected second most frequently of all chemicals. Samples from bedrock wells, most of which are deeper than glacial wells, had a higher percentage of wells with CEC detections.

https://pubs.usgs.gov/sir/2014/5096/pdf/sir2014-5096.pdf

Assessment of groundwater quantity

Minnesota is not as blind as other states, but has yet to quantify allowable (sustainable) withdrawals from most aquifers. Metro region has adequate understanding of which aquifers are rising or falling, and models showing predicted effects of future demand. DNR and MDH now coordinate preliminary Well Construction Assessments to advise drillers of potential supply limitations.

A network of ~7,000 monitoring wells collects baseline data on groundwater fluctuations. Special reports on the Mt. Simon aquifer in south-central Minnesota and the Metro have raised awareness of the age and unsustainable rate of withdrawal of these aquifers.

http://www.dnr.state.mn.us/waters/groundwater_section/obwell/index.html

Assessment of groundwater quality

Both natural and introduced contaminants are present in the groundwater in Minnesota. Groundwater is protected by state statute with a goal of non-degradation. https://www.revisor.mn.gov/statutes/?id=103H

Sensitive areas are to be identified and protected and groundwater quality monitored. The Minnesota Department of Health (MDH) is the agency in charge of making sure our drinking water is safe. The Pollution Control Agency (MPCA) tests for pollutants except in the case of agricultural chemicals. When it comes to those contaminants, the Department of Agriculture (MDA) is in charge.
http://www.health.state.mn.us/divs/eh/risk/rules/water/

Long term major aquifer levels
Balancing withdrawal with recharge. Aquifer levels are declining in multiple spots, adversely impacting communities and impeding economic growth and, unlike water crises playing out in southern and western states, these local declines are not caused by severe drought. Minnesota has devised a system of shared groundwater management. Public water suppliers can influence groundwater supplies through planning, rate, and infrastructure management, and can significantly change the long-term adequacy of local supplies to meet future needs. The DNR has a charge to ensure that groundwater use is sustainable.

http://freshwater.org/wp-content/uploads/2012/07/Groundwater-Report-WEB_12-02-16.pdf

DNR manages large users of water by improving information and compliance on permits and concentrates on areas of high groundwater use or limited groundwater supply.

http://www.dnr.state.mn.us/gwmp/planning.html

Subsurface sewage treatment systems (SSTS)
SSTS guidelines to effectively treat wastewater in unsewered areas appeared in 1974 with a certification program for professionals in 1976. Statewide standards and licensing began in 1996. MPCA published a 10-year plan for addressing upgrades in 2004.

Herbicides and pesticides in groundwater
Though none presented a known public health risk, MDH and MDA found certain pesticides (or degradates) in roughly 2/3 of sample collected from community public water systems, private wells, and surface waters monitored in high-risk areas.

Nitrate in groundwater
Nitrate contamination generally has not changed over the last 15 years; however, concentrations remain high in the aquifers in central and southwestern Minnesota. In central Minnesota, about 40 percent of the shallow wells contained water with nitrate concentrations that were greater than the maximum contaminant level.

Chloride in groundwater
One-third of monitoring wells across the state show an increase in chloride concentrations (i.e. mostly in urbanized areas). Groundwater in urban areas is impacted by high chloride concentrations with 27 percent of the wells in metro shallow aquifers having concentrations greater than drinking water guidelines.