FN is Legislative Issues_Policy_2021D
Policy—Draft for discussion only
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Issues and Survey Results:

P1: Update to the Water Protection Act of 1989 60 %
P2: Evaluating Progress to Protect and Preserve Streams and Lakes of the Upper Mississippi Basin. 63%
P3: Address Disconnect Between Land Use and Water Quality Management 77%
P4: Plan for Changes to Water Resulting from Climate Change 69%
P 5: Increase Water Education for Minnesota's Citizens 62%
P 6: Planning for Climate Change and Drought 70%
P 7: Statewide Policy on Manure Management 51%
P 8: Water Appropriations: Inter-basin transport and protections 58%
P 9: Water Retention--Keeping Water on the Land 82 %
P 10: Water Retention—Urban Storm Water 72%
P 11: Adjusting Water Appropriation Process for Golf Courses 38%
P 12: Addressing Environmental Justice and Water, Lead and other issues 58%
P 13: Labeling for wipes to improve wastewater treatment operations 55%
P 14: Enhanced groundwater recharge 63%
P 15: Encourage Ecosystems Marketing 42%
P 16 Protecting Priority Lakes and Rivers 77%
P 17: State Assumption of Federal Wetlands Permit Responsibilities 48%
P 18: Emerging Contaminant Sentinel Monitoring Program 44%
P 19: Encourage Water Quality Trading 33%
P 20: Streamline Irrigation Water Appropriation Process 38%
P 21: Address Waters of the United States (WOTUS) and Section 401 47%
P 22: Forever Chemicals (PFOA and PFOS) in food waste compost 59%
One point given for important, ½ point given for somewhat important based on stakeholder survey

Top 14-- Grouped by Theme:

Water Sustainability:
P1: Update to the Water Protection Act of 1989 60 %
P 6: Planning for Climate Change and Drought 70%
P4: Plan for Changes to Water Resulting from Climate Change 69%
P 8: Water Appropriations: Inter-basin transport and protections 58%
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Water Quality:
P2: Evaluating Progress to Protect Streams and Lakes of the Upper Mississippi Basin. 63%

P 16 Protecting Priority Lakes and Rivers 77%
P3: Address Disconnect Between Land Use and Water Quality Management 77%
P 5: Increase Water Education for Minnesota's Citizens 62%

P 12: Addressing Environmental Justice and Water, Lead and other issues 58%
P 13: Labeling for wipes to improve wastewater treatment operations 55%
P 22: Forever Chemicals (PFOA and PFOS) in food waste compost 59%

P1: Water Policy: Update to the Water Protection Act of 1989
Issue: In 1989, the Minnesota House and Senate passed the Groundwater Protection Act. The Act solidified existing efforts to protect Minnesota's groundwater, while setting a future course of improved protections focused on preserving groundwater sustainability. The Act's passage brought diverse interests together in a bipartisan effort that fostered collective vested interests and set protective goals. The Act has been a positive influence and the Act is now more than 30 years old. Consequently, it does not address many of the emerging issues related to groundwater. Despite all the Act accomplished, some concerns have not gone away and new issues have appeared. There is need to address emerging groundwater issues not recognized when the Act passed, as well as specific issues recognized in the Act that are yet to be accomplished.

Issue: For the past thirty years the Act directed much of Minnesota's progress in safeguarding the critical groundwater resource. The Act responded to resource challenges in 1989 by outlining an integrated, coherent approach to ensuring the sustainable supply of groundwater into the future. The Minnesota Ground Water Association (MGWA) **is reviewing the ACT** from the perspective of the three decades since its passage and **is preparing a paper** on changes that need to be addressed. The review will be both retrospective and prospective. The Act is comprehensive (120 pages). A revision would be a significant effort requiring input from the Legislature, the agencies and stakeholder groups.

Background: In 1989, Minnesota Governor, Rudy Perpich, signed the Minnesota Groundwater Protection Act, Laws of Minnesota 1989 Chapter 326 (the "Act"). The Act established a framework that envisioned how the state was to use good policy and management to complement existing laws, regulations and programs. For much of the past thirty years, this framework of policy and management directed Minnesota's progress in safeguarding its groundwater. In doing so, it has become well known within Minnesota and beyond as a landmark piece of

environmental legislation.

Broad support carrying the Act to passage arose in part from recurring drought in the years leading up to 1989 and a dawning overall sense of scarcity regarding Minnesota's water supply. Widespread detection of nitrate in water-table aquifers fueled urgency, while new, low-detection analytical methods revealed the presence of pesticides and other synthetic pollutants. The authors of the Act responded to these challenges by outlining what had been lacking up until that time; an integrated, coherent approach to ensuring future groundwater quality.

This Minnesota Ground Water Association (MGWA) **is reviewing the Act** with the perspective of three decades since its passage, with the ultimate aim of suggesting future legislative directions involving groundwater protection. From today's vantage point, there are emerging threats to groundwater protection that could not be anticipated in 1989. The MGWA white paper may suggest that this is the time for a comprehensive review. The White Paper will document what has been accomplished, and what remains to be accomplished. It will consider technical and policy issues that have emerged since 1989 as well as future questions.

What needs to be considered in a revision of the Act?
(This is a draft for discussion and may not represent the content of the MGWA white paper. It is based, generally, on several papers that are listed at the end of this issue statement.)

Water Sustainability: The Act focused on groundwater quality and is primarily silent on the topic of water sustainability (quantity). In 1989, there was no formal definition of "groundwater sustainability" although the topic has since received significant attention by the scientific community. Over decades the term has evolved from "safe yield" to "sustained yield to "sustainable water supply". Sustainability is now defined in statute and includes the preservation of water quantity and water quality. Since 1989, there has been progress in addressing water sustainability. State agencies, and their partners, have made progress in collecting data to understand the effects of effects of groundwater withdrawals on aquifers, surface water, and on aquatic ecosystems. A good deal has been accomplished using funds from the LCCMR and from the Clean Water Fund. However, the state could be doing more to ensure that we maximize benefits of water while minimizing adverse impacts and by making changes to our legislative and regulatory systems to emphasize the value of water.

Innovative approaches enhance the sustainability of ground-water resources typically involve some combination of use of aquifers as storage reservoirs, conjunctive use of surface water and groundwater, artificial recharge of water through wells or surface spreading, and the use of recycled or reclaimed water. Alternative management strategies consist of approaches that involve the use of water other than from local groundwater. The main possibilities are to (1) shift the source of water, either completely or in part, from groundwater to surface water, or (2) import water (usually, but not necessarily, surface water) from outside river-basin or ground-water system boundaries. Specifically, these approaches can involve: changing the rates or spatial patterns of groundwater pumpage, increasing recharge to the groundwater system, decreased discharges from the groundwater systems possibilities can have undesirable effects on surface-water bodies or on existing biological resources, and changing the volume of ground water in storage at different time scales.

Water sustainability is a complicated topic that needs aggressive attention. The sustainable use of water needs to be based on an assessment of the consequences of withdrawals and human priorities for water. Like our personal bank accounts, any use of water has an effect on our balance. The real question we need to address is this: “What do we want to sustain?” If the answer is to maintain the wetlands, lakes, and streams at un-impacted levels, less groundwater will be available for other purposes. Alternatively if we are willing to allow some degradation of our surface water and groundwater, additional groundwater can be withdrawn. Groundwater sustainability is a function of many factors, including decreases in ground-water storage, reductions in streamflow and lake levels, loss of wetland and riparian ecosystems, and changes in groundwater quality. Each groundwater system and development situation is unique and requires an analysis adjusted to the nature of the water issues faced, including the social, economic, and legal constraints that must be taken into account. A key challenge for achieving groundwater sustainability is to frame the hydrologic implications of various alternative management strategies in such a way that they can be properly evaluated. To do this, we need to collect the right information and apply the right tools. A key challenge for achieving groundwater sustainability is to frame the hydrologic implications of various alternative management strategies in such a way that they can be properly evaluated.

Ground Water Data: A key challenge for managing groundwater is to frame the hydrologic implications of various alternative management strategies in such a way that they can be properly evaluated. This involves the importance have high-quality data. Some, such as precipitation data, are generally available and relatively easy to obtain at the time of a hydrologic analysis. Other data and information, such as geologic and hydrogeological maps, can require years to develop. Still other data, such as a history of water levels in different parts of groundwater systems, require foresight in order to obtain measurements over time, if they are to be available at all. Thus, a key starting point for ensuring a sustainable future for any ground-water system is development of a

comprehensive hydrogeological data base over time. The focus on some of this information needs to be expanded. This information includes information about the physical and chemical framework and information about hydrologic budgets and stresses.

Computer models for analyzing flow and solute transport in ground-water and surface-water systems are important in any evaluation of alternative approaches to ground-water development and management. Although forecasts of future events that are based on model simulations are imprecise, they nevertheless may represent the best available decision-making information at a given time. Groundwater models represent the essential features of the actual ground-water system by means of a mathematical counterpart. The underlying philosophy is that an accurate description of the specific system will enable a quantitative representation of the cause and effect relationships for that system that allows for making forecasts to be made for any defined conditions (Konikow and Bredehoeft, 1992). Computer models, as well as model forecasts, need to be updated periodically as the actual ground-water system continues to respond to the physical and chemical stresses imposed upon it and as new information on the ground-water system becomes available. Computer simulation models have value beyond their use as purely predictive tools. They commonly are used as learning tools to identify additional data that are required to better define and understand ground-water systems. Furthermore, computer simulation models have the capability to test and quantify the consequences of various errors and uncertainties in the information necessary to determine cause and effect relationships and related model-based forecasts. This capability, particularly as it relates to forecasts, may be the most important aspect of computer models in that information about the uncertainty of model forecasts can be defined, which in turn enables water managers to evaluate the significance, and possibly unexpected consequences, of their decisions.

Other topics could include

Geologic and hydrogeological base mapping and associated datasets comprise the foundation of ground water planning and management. Although much of the state is mapped, we still lack basic information about some of the important aquifers and aquifer properties. It is important that these efforts continue. These fundamental information sources support studies including groundwater flow modeling efforts, which are improving to become the best predictive tools available. Examples include ongoing mapping efforts such as the County Geologic Atlas (Parts A and B) program, and various hydro geochemical studies carried out by MPCA, MDH, MDA, and others.

Maintain and enhance water information and monitoring programs. Continue and accelerate the County Geologic Atlas Program. Increase emphasis on

collecting information to understand groundwater and surface water interactions. Prepare a strategy for generating and managing information needed to integrate water-sustainability assessment results into regulatory programs on a statewide basis. Support systematic water sustainability assessments by re-assessing data

Water Bank Accounts: Efforts to determine groundwater sustainability will build upon a determination of the water balance for major aquifer systems. Inputs for this determination include consumptive use, withdrawals, recharge rates, recharge chemistry, and base flows. Estimates of gains and losses between aquifer systems are needed as well. Water balance estimates will provide predictive ability to support statewide groundwater planning. We should incorporate robust water- budget information into water planning. We should improve our understanding of statewide water balances (bank account) and water sustainability by enhancing the one watershed/one plan program. Use existing information about groundwater recharge, streamflow, and water use to identify priority for sustainability implementation, based on objective criteria. Use this analysis to assess priority areas for future groundwater management area programs. A Geologic Atlas, Part C is needed to define water budgets by aquifer and watersheds.

Enhance the Water Appropriation Process: MDNR tracks water use, but does not analyze to tie water quantity pumped to particular aquifers or surface water sources. Develop an automated water-appropriation tool that assesses streamflow deletion based on the cumulative effects of groundwater pumping. Simplify the appropriation-permit process for small appropriators. Assess pumping volumes relative to watershed size, median streamflow and stream thermal regime. Expand DNR's authority to designate water-resources management areas. Expand DNR's authority to adjust appropriations when needed. However, Minnesota lacks a systematic approach to understanding groundwater sustainability.

Groundwater Analysis and Modeling: Increase efforts to construct and apply groundwater models, like the Metro Model, to assess regional groundwater availability and sustainability. Incorporate groundwater modeling into watershed planning in areas of groundwater concern. Enhance and expand the DNR's groundwater management program.

Economic Analyses: Assess costs and benefits of ensuring water sustainability. Quantify the economic value of ecosystem services provided by adequately managed streams and lakes. Assess problems and cost associated with of aging infrastructure and leaking water system.

Groundwater Recharge and Re-Use: Allow managed recharge. Protect areas where enhanced recharge makes hydrologic sense. Assess and allow water reuse where appropriate.

Inter-jurisdictional water planning: Support and encourage processes such as the Metropolitan Council's regional planning and coordination process and the DNR's groundwater-management area process. Use that process to explore options for conjunctive use and water

Enhance our Understanding of Connections between Hydrology and Aquatic Biology: Increase programs to understand the interrelationships between hydrology and aquatic ecology as well as the associated eco-services. Continue to develop criteria for assessing the critical water levels or flow conditions required to support ecosystems. Include in these analyses habitat- and population-based minimum flow, high flow protection standards for habitat-forming and silt-flushing high flows, protections for downstream needs, and protection for natural variability of flows over time (hydrograph shape).

Groundwater/Surface Water Interactions: Develop programs to better integrate groundwater/surface water interactions into rule. Increase programs to collect information to understand groundwater and surface water interactions.

Importance of Sustainable Water: Dedicate a portion of Clean Water Funds for water sustainability efforts.

Establish a Clean Water Council "Sustainability Committee" Legislation: Propose legislation to limit overuse of chloride deicing chemicals on public and commercial parking lots and sidewalks

Support programs that identify and protect vulnerable

Selected References:

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- *EQB. 2008. Managing for water sustainability: Report of the EQB water availability project. St. Paul: Environmental Quality Board.*
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- *Freshwater Society, 2008. Water is Life: Protecting a Critical Resource for Future Generations. Report to the Freshwater Society Board by the Freshwater Society Guardianship Council.*
- *Helland, John, 1986. State Water Management: Reorganization and Consolidation. Minnesota House Research Information Brief.*

- J.D. **Bredehoeft** and Leonard F. **Konikow, 1993,** Ground-water models: Validate or invalidate. **h**ttps://doi.org/10.1111/j.174
- *Legislative–Citizen Commission on Minnesota Resources. 2008. Minnesota statewide conservation and preservation plan. St. Paul. Minnesota DNR. 2010. Long-term protection of the state's surface water and groundwater resources. St. Paul: Minnesota Department of Natural Resources.*
- *University of Minnesota, Water Resources Center, 2011. Minnesota Water Sustainability Framework. Accessed April 18, 2012 at http:/ MN Session Laws 2009, c 37, § 4 directs DNR groundwater study preparation*
- *Alley, W.M, T. E. Reilly and O.L Franke, 1999, Sustainability of Ground-Water Resources; U.S. Geological Survey Circular 1186.*
- *University of Minnesota, Water Resources Center, 2020, Future of Minnesota Drinking Water.*

P2--Water Policy: Evaluating Progress needed to Protect and to Preserve Water Quality in Streams and Lakes of the Upper Mississippi River Basin.

Issue: This initiative presents an opportunity to evaluate conservation programs that are intended to preserve lands for habitat and water-quality improvement in the Upper Mississippi River Watershed. Research by the Minnesota Department of Natural Resources suggests that protecting 60 percent of a watershed is sufficient to preserve the water quality and habitat of lakes and of streams. The effort would evaluate progress made by state, federal and private organizations in meeting these goals in this important watershed. It is likely that this goal is within reach. If so, this effort would provide a good example of the importance and value of environmental programs created through amendments to the states' constitution and could serve as a "poster Chile" to demonstrate the value of these programs to the citizens of the state.

Path Forward: The value of existing conservation programs would involve the following steps:

- A compilation of the land preserved lands in the watershed.
- An assessment of the location of preserved lands with respect to lands targeted for preservation by the TNC
- Preparation of an example document providing the value of the state's constitutionally mandated environmental programs

Background: The Upper Mississippi River Watershed (watershed) is an area where water-quality preservation is within reach. The watershed, which stretches from Lake Itasca to the Metro, is so ecologically and economically significant that it needs to be prioritized for protection. The watershed supports more than 350 species of mammals, birds and other wildlife, including most of the endangered, threatened and rare species in Minnesota. The watershed is also a vital migration route for nearly half of North America's bird species and about 40 percent of its waterfowl. In all, the watershed's thirteen million acres provide drinking water for 2.5 million Minnesotans, more than 44 percent of the state's residents, including much of the Twin Cities Metropolitan Area. The Nature Conservancy's scientists have identified the locations of land within the watershed that are critical for protection and restoration. They have also found that preserving water quality in the watershed could result in nearly $500 million in direct and indirect benefits. These benefits include water- treatment costs, retained property values and taxes, reduced flood damages, retained tourism revenue and jobs, as well as avoided public health costs. Protecting the river and its surroundings will avoid billions in future costs, because cleaning dirty water is more expensive than protecting clean water. Therefore, we need to assess progress in preserving water quality and habitat in this important watershed. (Based on an editorial by Rich Biscke)

We need a better understanding of progress toward protection goals in the Upper Mississippi River watershed. In some cases, the state's dedicated funding programs preserve lands that provide multiple benefits (habitat and water quality). Unfortunately, these multiple benefits are not always accounted for, or recognized as acting in concert. Similarly lands preserved through federal and private programs are not always included in the complete accounting or lands that are protected.

A complete assessment of the combined impact of all conservation and set-aside programs is needed for the watershed and as a template for other parts of the state. The initiative would not change existing conservation programs. It would simply compile information from all of the environmental programs to understand how effectively the programs are being used and leveraged in the watershed by providing a complete assessment of land preservation programs. The effort would quantify progress in reaching preservation goals and would determine if additional emphasis is needed to reach the protection goals. It would provide an evaluation of whether the watershed has been provided with sufficient and equitable funding and would provide information about progress toward the preservation goals.

P3: Water Policy: Address Disconnect Between Land Use and Water Quality Management

Issue and Need: Land use planning and water policy and management are not well connected although they influence each other. Although the connection between land use and water quality has long been recognized, the effects of land use change on water quantity and quality are not fully understood (WRC, 2011). As statewide demographics shift, partially in response to climatic change, water quantity, quality and recharge will all be affected. The policy and management that we have does not recognize that land use affects water quality and quantity.

Path Forward: Hearings to discuss and explore options for better policy and management that recognizes the interconnections between land use planning and water resource management.

P4: Policy: Plan for Changes to Water Resulting from Climate Change
Issue and Need:

Issue: All but two years since 1970 have been wetter and warmer than 20th century averages, and the 10 combined wettest and warmest years on record occurred after 1998. During 2019, more precipitation fell across the state than any other year on record back to 1895. Minnesota has experienced 11 mega-rains in the 20 years since 2000 as compared to six in the 27 years from 1973 through 1999. Minnesota has warmed considerably, but mostly during nights and winter. Annual temperatures have climbed 2.9 °F since 1895, but winter low temperatures have increased by 6.1 °F. Climate model projections made specifically for Minnesota generally suggest we will see more precipitation by the end of this century, with continued increases in heavy rainfall and lifter intervening dry spells. All for these changes will affect water resources and we need to plan for these continued changes.

Path Forward: Hearings are needed to discuss management implications related to the EQB's Climate Change Challenges: Climate change will likely affect groundwater quality and quantity. Attention to these issues needs to be continuous because we now know that climate change is likely to play a major long term role in the movement of water across and within our landscapes. Specifically, there hearings need to address:
Safe Drinking Water, managing landscapes to protect and improve water quality, planning for built environments and infrastructure with greater resiliency, managing landscapes to hold water and reduce runoff, and promoting resiliency in quality of life. (54 – 58)

Background: The Minnesota Legislature requires that the Environmental

Quality Board (EQB) coordinate comprehensive long-range water resources planning and policy through a State Water Plan every 10 years (Minnesota Statutes 103B.151, 103A.43, 103A.204). The most current plan focuses on water and climate change. The purpose of the 2020 State Water Plan was to establish a framework for aligning state agencies, legislative priorities, local government policy, programs and actions for the coming decade. EQB developed this plan to set an agenda for tackling the complex water problems that climate change will intensify for Minnesotans. Details are available in the State Water Plan (2020). The Legislature needs to ensure that the plan is enacted.

P 5: Policy—Increase Water Education for Minnesota's Citizens

Issue: Water education requirements are outlined in Article 2 of the 1989 Groundwater Act. Education continues to be mentioned as an ongoing concern by the Minnesota Groundwater Association. Some requirements around communication could include using geologic maps.

Path Forward: A plan for an interagency education program is needed as described in a recent Minnesota Groundwater Association White Paper.

P 6: Policy-- Planning for Climate Change and Drought
Issue: Drought planning is not as clear and robust as we need. A study near Crookston addressed the connection between groundwater, surface water (wetlands), and flooding and may be important in addressing needs statewide for drought planning. There is an education issue within this topic, as a way forward in the future. Related to this topic is the continued importance of surface water quality by Minnesotans and the interaction of groundwater and surface water in the Act (Barr ET. Al)
Path Forward: Hearings leading to an interagency drought operational plan

P 7: Policy—Statewide Policy on Manure Management

Issue: Manure handling is not addressed specifically in the Groundwater Protection Act of 1989. Rules remain unclear on this issue and the topic is the responsibility of the MPCA under the NPDES facility regulation rules or with the MDA as part of their nutrient management requirements.
Path Forward: Hearings to assess policy and regulations

P 8: Policy-- Water Appropriations: Inter-basin transport and protections

Issue: Inter-basin water transfers have recently become an important issue.

The inter-basin transfer situation involving the Missouri River opened the discussion (Lewis and Clark). Recently, a Lakeville-based railroad company filed an application to drill wells in Dakota County. Water from the wells, 500 million gallons a year, was proposed to be shipped, by train, to the Southwest United States. The proposal was not approved because the aquifer involved (Mt Simon and Hinckley) has unique legislatively-mandated protection. However, that may not be the case for other aquifers. The commerce clause may prohibit future appropriation denials. The proposal was the first of its kind in Minnesota and could set a precedent about similar projects that could be allowed based on state statutes and rules.

Path Forward: There is a need to revise water appropriation policy, based on the recent water train controversy. Explore statutes and provide policy that is needed to protect the state from future similar initiatives through a report to the Legislature (DNR)

P 9: Policy--Water Retention--Keeping Water on the Land

Issue: Agricultural drainage has provided many benefits that allow farmers better access to croplands and to complete farming operations in a timely manner. Without agricultural drainage, increases in soil productivity and crop yields would be difficult and economic returns would be diminished. While drainage of Minnesota's croplands provides benefits, several environmental concerns are associated with agricultural drainage. The installation of agricultural drainage, both surface ditches and sub-surface drainage accelerates transport of water from farm fields. There are downstream issues with unmanaged or uncontrolled agricultural drainage, which may increase flooding, may affect available water recharge to wetlands, may impact migrating waterfowl population, and may degrade downstream water quality.

Path Forward: There is general agreement that the state needs to increase efforts to retain water on the land to reduce peak flows and to improve water quality.

Path Forward: A hearing is needed to provide input to support an assessment of the location and numbers or structures needed to reduce peaks and to mitigate the effects of unmanaged or uncontrolled agricultural drainage. Additional work is needed to assess mitigation efforts that best keep water on the land. These efforts would build on work being done by the One Watershed, One Plan program by additional investigation and identification of locations for additional structure installations and land management practices. This effort would consider the following topics:

- Determine which best management practices are appropriate in specific landscape settings, and how can they be encouraged to improve our water resources?
- R ecommend an effort to assess water storage needs, solutions, and benefits, and may serve others as a template.
- Promote dual storage options with wildlife habitat benefits
- Give SWCDs the authority to maintain storage facilities
- Include rate and volume limits
- Include retention and detention
- Include statewide guidelines and build them into the1W1P process
- Scale questions: Restore large basins rather than uplands and build this into the1W1P process
- Inventory existing infrastructure that includes drainage ditches and tiles, retention and detention structures.
- Prioritize best- management practices. Existing tools and systems need to be applied and used to identify the appropriate BMPs at landscape and watershed scales, Support the implementation of remedial BMP practices in critical places using the one watershed. One-plan process.
- Fund a cost/benefit/return on investment analysis of conservation drainage-management practices to understand the benefits of incentives.

Background: While drainage provides benefits, it also results in environmental concern. There is general agreement that we should increase efforts to retain water on the land to reduce peak flows and to improve water quality. A fundamental obstacle is understanding which best-management practices are most effective in specific landscapes because the beneficial impacts of water storage has not been fully assessed. Information and models are now available to assess the location and numbers of structures that are optimal. This effort would complement work being done within the One Watershed, One Plan process. Some aspects of work that need to be done include:

- Fund an analysis to identify peak-storage structures opportunities, in the most critical places, in areas such as Area II, the Red River Valley, or the Greater Blue Earth River Basin.
- Provide an assessment of best-management practices for peak storage, appropriate in specific landscape settings. This process would involve existing watershed models, flow data and water quality data.
- Based on that assessment, prioritize best-management practice locations in the most appropriate areas.
- Identify appropriate BMPs for specific landscape settings. Include a cost/benefit analysis of conservation drainage-management practices to understand benefits
- B ased on that analysis, identify an appropriate incentive process that can be built into the 1W1P process and move forward with two pilot efforts in a subsequent session. Based on success, expand this process to the state's other areas of the state.

A fundamental obstacle is understanding which best management practices are most effective in specific landscape settings. Flood reduction projects have

proven to be effective in reducing flood peaks and to improve downstream water quality, thus mitigating the effects of agricultural practices and replacing the need for many smaller best-management practices. In some areas, these structures have been in place for many years. However, the beneficial impacts of the facilities have not been assessed. Streams with these structures, and with historical streamflow and water quality information and calibrated watershed models, provide unique opportunities to assess the beneficial impacts afforded by these structures. Historical information and additional modeling are needed to estimate the effectiveness of water retention structures. This information could be used to assess the location and numbers or structures needed to reduce peaks and to mitigate the effects of unmanaged or uncontrolled agricultural drainage. Additional work is needed to assess mitigation efforts that best keep water on the land. These efforts would build on work being done by the One Watershed, One Plan program by additional investigation and identification of locations for additional structure installations and land management practices.

Increasing the use of water storage and flood retention structures, of various sizes, may provide an opportunity to mitigate the impacts of uncontrolled or unmanaged agricultural drainage in some areas. However, a thorough evaluation of the benefits of existing and planned water storage and flood retention structures has not been completed. The completion of watershed computer models for water quality, provides a unique opportunity to assess the beneficial effect of existing water storage and retention structures and to examine the potential benefits of increasing the numbers of these structures across the state.

P 10: Policy: Water Retention—Urban Storm Water

Issue: We need to evaluate, prioritize and promote water retention in urban areas storage facilities: Keeping water on the land reduces erosion, improves soil health and water quality, increase groundwater recharge and improves agricultural production.
However, the water quality impacts of storm-water capture and retention in urban areas is not well understood. There is need to assess and quantify the cumulative impacts of water storage and flood retention structures in urban areas in order to order to provide direction and policy. Research and policy are needed to ensure the quality of groundwater is not degraded as a result of leakage from these storage facilities.

Path Forward: Hearings are needed to explore policy regarding whether, and where, storm water infiltration should be encouraged, or discouraged, by funding a report from the MPCA as a first step. This could include what is needed to assess and quantify cumulative environmental benefits of water

storage and storm water and flood-retention structures in selected watershed districts in the state. The assessment would drive policy and quantify the costs and benefits of additional structures that would improve flood mitigation and meet water-quality goals in selected watersheds in various landscape positions in urban areas. This could result in policy regarding whether, and where, storm water infiltration should be encouraged, or discouraged

Background: Storm-water retention is required for construction and development in our cities. However, we do not have a clear understanding of the impacts of retained water that infiltrates into groundwater. An unproven assumption is that infiltrated storm water improves streamflow and lake levels during periods of drought. The effects on groundwater quality also are unclear. There are reasons for concerns that involve mobilization of legacy pollutants in urban soils and groundwater and movement of soluble pollutants and legacy pollutants, such as PAH compounds chloride and "forever chemicals, into groundwater systems. However, infiltration of water from pavements with low contaminant concentrations may not be a source of contamination. The policy of requiring storm water retention may have unintended negative consequences on our groundwater.

P 11: Policy: Adjusting Water Appropriation Process for Golf Courses

Issue: Golf courses that focus on water conservation and water-quality improvement should be able to irrigate during times of drought. The Minnesota golf industry has been working to financially support University of Minnesota research to develop drought-resistant and water conserving turf varieties, pursue new technologies to reduce the need for irrigation, to conserve water and to develop drought management practices.

Path Forward: Legislation is needed to create an "environmental steward" program for golf courses as well as to create a water user appropriation category for golf courses. This would create a workable solution to the current system of water allocation. The Minnesota golf industry is willing to implement sound water management initiatives with the support of state agencies, the University of Minnesota and our legislative leadership.

Background: The Minnesota golf industry (a $2.3 billion-dollar industry that employs over 25,000 individuals annually) understands that it is critical that the industry supports environmental stewardship to protect and enhance the waters of the state.

In 2002 the Minnesota Golf Course Superintendents Association partnered with the University of Minnesota to build the Turf grass Research, Outreach and Education Center on the St. Paul Campus. The industry has contributed over $2.2 million dollars in cash and in-kind contributions to make the facility an internationally recognized destination for turf grass science. Research plots

include an automated rain-out shelter to study drought tolerant turf varieties, a 50,000 square foot green surface to compare the impacts of cultural practices, a lysimetric testing platform used to test nutrient and pesticide fate, wetting agents and management strategies to reduce water use, a bee friendly section to enhance pollinator opportunities and several National Turf grass Evaluation Test Programs to determine the best suited turf to be grown in Minnesota. On an annual basis the University Turf Scientists pursue a wide variety of experiments intended to emphasize environmental stewardship on golf courses.

Minnesota Golf has embraced two initiatives at the University of Minnesota. The Science of the Green, involves a UM study about the sustainability of golf in the United States from responsible turf management to property routing intended to reduce the footprint required for the game without impacting the enjoyment of the sport. The second initiative is called the Natural Capitol Project. This program is a cohort effort of the University of Minnesota, Stanford University, The Nature Conservancy and the World Wildlife Fund to study the environmental value of managed green spaces within our urban habitat. The early information embraces the importance of managed turf tracks to mitigate pollution, sequester carbon, generate oxygen, decrease local temperatures, enhance groundwater recharge, reduce solar glare, abate noise, provide safe wildlife habitat and pollinator corridors while providing for recreation, the latter of which is critically important in an ever growing society. Minnesota Golf has partnered with the Departments of Agriculture and UM to develop Best Management Practice Guidelines for Turf grass Fertilization and also Pesticide Management. They have worked with the Department of Natural Resources and UMN to develop a set of industry Best Management Practice Irrigation Conservation and Efficiency Guidelines as well. Minnesota Golf also is involved in discussions regarding groundwater management, water reuse, road salt limits, pesticide review, pollinator habitat and climate change.

Minnesota golf courses are using new technology to enhance irrigation practices, reuse water, reduce water consumption, chemically make water “wetter”, sensing available water and opportunities to reduce the managed footprint while providing viable business and recreational destination. Most recently the Minnesota Golf Course Superintendents Association partnered with the University of Minnesota to create a new and internationally recognized program called the Soil Moisture Management Protocol that uses soil moisture, global positioning and computer programing to maximize turf irrigation efficiency.

Golf courses across Minnesota have shown willingness to work with local watersheds, state agencies, the Department of Transportation and other entities in availing their properties to enhance the community. Enhanced fisheries, groundwater recharge, pollution mitigation, water reuse and storm water retention are a few examples. Minnesota Golf considers their properties as a, “community’s largest rain garden” and encourages partnerships to use it as such.

The golf industry would like to continue to pursue good policies that are beneficial to the game, a community's health, the environment and the state's economy. Golf is a big industry made up of small businesses. Ninety percent of all participants are public players, and the local golf courses provides gainful employment to many as well as a local destination for events beyond golf. The golf industries business model has a major challenge, that of water accessibility in times of drought, because golf course irrigation is considered in State Statute, non-essential.

Surprisingly, the only specific industry singled out when the state developed water use and drought suspension guidelines in the early 1970's was golf. This notoriety, likely not assumed as such almost fifty years ago, is now limiting the industry as individual businesses must weight expensive improvements in all management efficiencies against the threat of water suspension during times of drought. As a category six, nonessential water user, golf will be the first, and actually only industry named specifically, to have their permits suspended.

Until the recent litigation over the White Bear Lake area groundwater/surface water interaction concerns, only the 20 percent of golf courses that used surface resources were in jeopardy (most recently, over a dozen courses had their permits suspended in 2011). Now every golf course in the state is much closer to potentially having its water permit suspended.

The industry appreciates that, combined and on average, 7.8 billion gallons of irrigation water are used as a business sustaining resource, under 0.8 percent of all water used in the state. Without any water, during times of drought and especially on select fine playing surfaces, an individual course could very well close permanently or experience an economy crippling and environmentally damaging recovery following a period without any irrigation.

The golf industry understands that as water availability becomes tested, every business entity, that has the ability, should and must implement irrigation efficiency, conservation and drought management plans. The golf industry has been working hard to develop a plan as specifically tailored by the individual businesses, approved by the Commissioner of the Department of Natural Resources and implemented by the professional golf course superintendent to, upon demand, reduce water consumption. The initiative, proffered in exchange for limited water resources during times of drought, could be adopted by the state golf industry as their template and for the other, currently uncreated industries' model that will consume water in the future.

There is no incentive for any golf destination in the state of Minnesota to invest in their infrastructure, especially irrigation efficiencies, if, under times of drought, the whole of their allotted water permit could be revoked. The golf industry would like to set the standard of pursuing continuous water efficiencies, conservation and irrigation reduction during drought conditions in exchange for assurances of limited access to water to maintain individual

courses business models. Those individual courses that choose to not employ the efficiency, conservation and drought management programing will not receive the benefit of limited irrigation during times of water stress.

P 12: Policy—Addressing Environmental Justice and Water, Lead and other issues:

Issue: Water from domestic wells needs to be safe for all of Minnesota's Citizens. Provide programs for a comprehensive and systematic testing of the water quality in private wells including the notification of testing results and education on possible actions. For consideration-- periodic testing of private wells providing drinking water to rental properties and requiring notification of the results before rental property owners can rent to new tenants or enter into new lease agreements

Path Forward: Hearings are needed to ensure that all drinking water is free from lead. This hearing should also explore a process to address environmental justice concerns around drinking water.

P 13: Policy--Require Labeling for wipes to improve wastewater treatment operations.

Issue: Flushable wipes clog our wastewater treatment plants and decrease the efficiency of the plants. This is a significant issue for the Metropolitan Council.
Path Forward: Policy is needed to ban to ban flushable wipes, to change labeling language, and to provide accurate consumer education.

P 14: Policy—Guide enhanced groundwater recharge.

Issue: Natural groundwater recharge occurs as precipitation falls on the land surface, infiltrates into soil, and moves to the water table. Groundwater levels in some parts of the state are declining because withdrawals exceed the rate at which aquifer are naturally replenished. In areas of groundwater depletion, artificial recharge can increase natural recharge. This can be accomplished using injection wells or surface infiltration. Artificial recharge is a common practice in many parts of the county. However, the practice has generally been discourage in Minnesota. The legislature has funded a project Freshwater Society and the University of Minnesota) to explore the feasibility of expanded groundwater recharge.

Path Forward: In order to capitalize on this study, as well as on the benefits being realized in other states, the legislature should hold hearings to adopt policy to encourage the practice, with restrictions. This would lead to policy that defines that state's position on enhanced groundwater recharge in areas with water sustainability challenges.

P15: Encourage Ecosystems Marketing: The goal of the Ecosystem Services Market

Issue: Consortium (ESMC) is to create ecosystem service credit markets that incentivize producers to improve soil health, benefiting both the farmer and society. This program's focus is just not on carbon. It also includes water quality, habitat preservation, and biodiversity. Traditionally, the value of a farm has largely been determined by its production of food, fuel and fiber. However, a well-managed farm produces more than just a crop. As we face down modern challenges like climate change and impaired waters, we are beginning to learn about the true value of our farmlands. The scope and scale of our environmental challenges position the agricultural dusted to plan a role in addressing water and climate issues through improved soil health management and economic levers like the Ecosystem Services Market Consortium. Farmers willing to implement practices like cover crops, perennial crops and reduced tillage are eligible and encouraged to enroll in the Ecosystem Services Market Consortium
Path Forward: Hold a hearing to explore ways to incentivize this process.

P 16 Policy—Protecting Priority Lakes and Rivers

Issue: Preserving and protecting our lakes. A comprehensive program to provide policy and plans to protect our lakes is needed. Minnesota is a water-rich state with a great deal of water stored in aquifers, lakes and streams. Human activities are negatively affecting our lakes and lake ecosystems. Healthy lakes enhance our quality of life. They support complex and important food web interactions and provide habitat for many types of fish and wildlife. Lakes contribute to a healthy economy: they are an important draw for tourism and provide recreational opportunities for our state's residents and our visitors. We need to protect our lakes for the future. Americans.

Path Forward: Lakes are subject to a variety of problems that can diminish their aesthetic beauty, recreational value, water quality, and habitat suitability. Among the most common lake problems is eutrophication, which is the process of physical, chemical, and biological changes ("aging") associated with nutrient, organic matter, and silt enrichment of a lake. A hearing is needed, as a first step, to define a program to protect our most important lakes.

Background: A lake really is just another component of Earth's surface water. Lakes occur where surface-water runoff or groundwater seepage have accumulated in a low spot, relative to the surrounding countryside. It's not that the water that forms lakes get trapped, but that the water entering a lake comes in faster than it can escape, either via outflow in a river, seepage into

the ground, or by evaporation. And if humans live nearby, water levels can be affected by water withdrawals for human needs.

Lakes provide many environmental, economic, and public health benefits. Lakes are highly valued for their recreational, aesthetic, scenic, and water-supply qualities, and they are one of the most treasured of our natural resources. Lakes constitute important habitats and food resources for a diverse array of fish, aquatic life, and wildlife. However, our lake ecosystems are fragile. Lake ecosystems can undergo rapid environmental changes, often leading to significant declines in their aesthetic, recreational, and aquatic ecosystem functions. Exposed to external effects from the atmosphere, inflowing streams and groundwater, lakes are subject to change through time. Human activities can further accelerate the rates of change. If the causes of the changes are known, human intervention (lake-management practices) sometimes can control, or even reverse, detrimental changes.

Following are some of the most important basic factors that give unique characteristics to lake ecosystems:

- Climate: Temperature, wind, precipitation, solar radiation all critically affect the lake's hydrologic and chemical characteristics, and indirectly affect the composition of the biological community. Precipitation is the main factor affecting runoff the delivery of nutrients and sediments.
- Atmospheric inputs: Precipitation, such as acid rain, and dry particles can be major sources of certain contaminants to a lake. Each lake also receives indirect atmospheric inputs by way of the runoff from its watershed.
- Geology, soils and groundwater: Soils and geology determine the extent, nature, and quality of groundwater inflows and outflows to lakes.
- Physiography: The area, surface topography, groundwater connection, upstream lakes and wetlands, altitude, and land slope of the lake's watershed affect surface-water runoff and the amount and nature of chemicals and sediments entering the lake. Interactions with land use by people can greatly change how these factors affect runoff and the export of nutrients and sediment.
- Land use: The type, location, extent, and history of land cover/land use (such as agriculture, rural, and urban developed areas) can greatly affect the quantity of surface-water and groundwater inflows and outflows, as well as the amounts and types of sediment, nutrients and chemicals (natural or synthetic) that are transported into the lake from the watershed.
- Lake morphology: Size, shape, and depth characteristics of a lake are critical in determining currents and mixing of the lake, as well as its thermal and chemical stratification characteristics.

Common environmental problems in lakes: Lakes are subject to a variety of problems that can diminish their aesthetic beauty, recreational value, water quality, and habitat suitability. Among the most common lake problems is eutrophication, which is the process of physical, chemical, and biological changes ("aging") associated with nutrient, organic matter, and silt enrichment of a lake. Eutrophic conditions can be exhibited with the following conditions:
Algal blooms: Extensive and rapid growth of planktonic (floating and suspended) algae, caused by an increased input of nutrients (primarily phosphorus, but sometimes nitrogen), is a common problem in lakes. Lakes normally undergo aging over centuries, but the process can be accelerated rapidly by human activities that cause increases in sedimentation and nutrient inflow to the lake. Accelerated eutrophication and excessive algal growth reduces water clarity, inhibits growth of other plants, and can lead to extensive oxygen depletion, accumulation of unsightly and decaying organic matter, unpleasant odors, and fish kills.
Sedimentation/turbidity: Increases of sediment can harm water quality and the habitat for many aquatic species. Such events usually are caused by heavy rains that produce erosion and intense runoff.

P 17: Policy: State Assumption of Federal Wetlands Permit Responsibilities (Clean Water Act, Section 404).

Issue: The EQB received funds to plan for assumption. BWSR has received an EPA grant to supplement funding for the assumption-application process. Law and Rule changes, state costs and staffing needs, associated with assumption, are unclear at this time. The role of local units of government also is unclear. The committee should be kept informed about requirements that will be needed to accomplish the assumption process which likely will take place during the 2021 session.

Path Forward: The committee needs to stay informed regarding requirements that will be needed to accomplish the state's wetland permit process that likely will take place during the 2022 session.

P 18: Policy—Emerging Contaminant Sentinel Monitoring Program.

Issue: We don't know the extent and threat of forever chemical in drinking water used by the citizens of the state. There is a great need to address drinking-water safety by expanding an LCCMR-MDH project into a program at the Department of Health, focused on emerging contaminants in drinking water. The occurrence and distribution of unregulated contaminants, including the forever chemicals (PFOA and PFOS), is unknown outside of Washington County. It is likely that this suite of chemicals is widespread across the state. This proposed program would build on results from an on-going LCCMR- MDH project. The initial step would be the development of a sentinel network of monitoring sites that includes community and non-community (transient and non- transient supply wells) as well as lakes and river that supplement the LCCMR project networks. These sites represent water that Minnesota residents

(particularly children by including schools) drink. By strategically developing an appropriate sampling network, and an appropriate list of chemicals for sampling, results can be extrapolated to identify and to prioritize areas where contaminants may be found in other wells (sensitive areas). These results also will be able to be used to identify sensitive aquifers where these emerging contaminants may be found in aquifers that supply private drinking wells. Therefore the program also would address the problem of water safety for those using private wells.
Path Forward: Provide direction and funding to design a monitoring network and reconnaissance sampling as a first step (MDH).

P 19: Policy-- Encourage Water Quality Trading

Issue: Watershed-scale pollutant trading and banking programs could be an effective management practice to reduce nutrients and sediments in rivers and lakes. Water Quality trading offers a method of meeting water-quality standards in waters of the state.
Path Forward: Policy is needed to build a reliable method to conduct trades. Agency direction is needed to allow for third-party brokers and to define and to initiate a process.
Background: The MPCA has the statutory authority to approve pollutant trading. However, there is no third-party entity to broker pollutant trading. Watershed-scale pollutant trading is needed to encourage adaptive approaches for pollutant reduction using third-party brokers to facilitate and to provide a mechanism for exchange. The approach could include the agricultural community as well as wastewater and storm-water facilities in exchanges a brokerage mechanism would provide opportunities for successful point source to point sources and point source to nonpoint-source trades. Storm-water quality credit trading options are being examined through an LCCMR grant to the Shell Rock River Watershed District. The broker system in being implemented in Wisconsin.

P 20: Policy—Streamline Irrigation Water Appropriation Process

Issue: The time required to obtain an irrigation appropriation permit is of concern. As a state, we should ensure that the process for obtaining water appropriation permits, and the environmental review of proposed project is as efficient and timely as possible. Are there ways that this process could be more efficient? If so, what would be required by the agencies?

Path Forward: The committee should require a legislative report, from the DNR and EQB, to determine policy or process changes are needed. The review would consider possible options for simplifying the process while recognizing the need to balance the need for economic development with efforts to ensure sustainable supplies of groundwater. A first step would be a hearing, with DNR staff, to determine whether an agency/legislative review process or report to the Legislature, or a policy change, are needed. This report would explore

options for simplifying the appropriation and permitting process for groundwater withdrawals. The report should incorporate the need to balance economic development with the need to ensure sustainable supplies of groundwater for the future.

P 21: Policy--Address Waters of the United States (WOTUS) and Section 401 of Clean Water Act

Issue: The federal government is expanding federal interests in waters of the Unitized States by appealing and narrowing existing federal laws and regulations. Previously, WOTUS had limited impact in Minnesota because state's laws had overriding and more stringent jurisdiction. The proposed changes would significantly limit state control. The MPCA has indicated that these changes are a step backward. EQB and the BWSR are developing a plan to address the impacts of climate change on state policy.
Path Forward: The subcommittee should actively follow this process in the development of policy considerations for the next session based on discussions with agency staff.

P 22: Policy--Forever Chemicals (PFOA and PFOS) in food waste compost

Issue: Forever chemicals in food packaging is threatening the organic composting industry and present a threat to organic recycling.
Legislative request: Provide funding and policy to support the food compost industry and the continued recycling of food waste. This would include water sampling at selected and a temporary ban on the composting of food packaging materials

Background: There is a long list of forever chemicals that are used in food packaging. As a result, they contaminate food and food packaging waste at composting sites and make the food packaging compost unusable for land application. The chemicals are in the process of being phased out by the food industry. However, the problem at composting sites likely will continue for some time. There are options to keep from derailing efforts to compost food waste and to keep the composting industry viable. These options would include limited sampling to determine whether compounds are leaching into groundwater at compost-application sites in order to determine the extent of the problem. This would help to determine whether there is a significant problem at these sites. If so, a temporary ban on food containers containing these compounds may be needed.