

2024 Strategic Planning Subject Matter Expert Survey

Question: Is there another strategy you think would be key to achieving this goal? Strategies could include things like research, education, measurement, demonstration, or developing something in particular related to the goal.

Contents

WATER 2
RESILIENCY 8
FISH AND WILDLIFE (SPECIES) 12
LAND 16
ACCESS AND OPPORTUNITIES 19
ENERGY 22
EMERGING ISSUES..... 25

Goal 1: Minnesota's water resources are better managed for both water quantity and quality, as a result of better understanding of the connections between surface water and groundwater.

Responses

General:

- Respect the water, without water we all die.
- As I stated before, the greatness of the ENTRF is that it is open to new ideas/strategies.
- I think there should be a strategy centered around water conservation...that helps with both quantity and quality of water.
- By ensuring that quality data is used to make decisions, and that the data are published on a public website.
- An increased focus on the stress climate change is putting on our natural and human systems is needed to allow proactive adaptation in our management efforts.
- There should be separate goals for both water quantity and water quality - investing in connections is less important than investing in the correct approaches for each

Education and Outreach:

- (Education) Developing regional networks and outreach efforts to educate communities and townships on surface water and ground water, etc..
- Educate science teachers statewide on the infrastructure, chemistry, geology, politics, hazards and interconnectiveness of Minnesota water with the caveat that this investigation of water resources be integrated into their water-related curricula. (Reaching more teachers educates more students and parents.)
- Educate the public on purpose, function, and importance of water systems, to include wetlands; the interconnectivity between water and all other resources; and demonstrate how these projects and policies benefit local communities financially/economically as well as for personal health and quality of life.
- Educate legislators to take the broad view not just react.
- As we educate local officials, also educate the public, including youth, to gain support for this now and in the future.
- Public outreach on the importance of clean water and what each citizen can do to be part of the solution. This could include tv ads, radio, internet, social media, podcasts, etc.
- While I agree that educating local government on how to better manage water resources is a potentially very important thing to do, I also understand that there are also capacity issues at the local level. People are asked to wear too many hats. I'm not sure what the best solution is, but perhaps there could be more regional support for specific areas of expertise. For example, I know that several county SWCD staff have expressed a desire to have access to more expertise on shoreland management and restoration. The UMN Extension used to have staff to support this, but they no longer do.

- Education
- Education should be a key component. Education for the public and or landowners in sensitive areas. Research in terms assessments on what is working and what is not. Assessments allow the identification of problems hindering improvements. Example, river restoration projects do not assess pre-or-post project. These assessments, if implemented, can identify those parts that need addressing, such as getting rid of techniques or river restoration altogether.
- Educate the public, and high school youth, on this subject, an investment in our future.
- Education is extremely important for the general public to grasp the problem at hand.
- While I do not have expertise in this area, it's important to remember local communities, not just officials. Educating and interacting with farmers, local landowners, etc. is incredibly important for them to understand individual impact.
- Educational efforts for the general public.
- Curriculum in schools to educate students about the importance of water quality.
- "Educating" local officials is kind of a loaded term. Forums for informing them as a group and encouraging discussion may be more effective in the long run.
- There needs to be another option - none of the above. I can't get past this screen without picking them. I do not support any. Why are all of the stock options data and research? Why is education limited to local officials - state and national staff and officials should be included. These options appear to be top-down, where it is assumed that the state has a better understanding of local resources than locals. Design projects with both water quantity and quality management aspects.
- YouTube streaming videos about the subject
- Supporting outreach efforts of local watershed districts to provide community and school programming, sharing strategies individuals and businesses can take to make positive changes for water quality.

Implementation:

- Promoting non-traditional farming practices like cover crops, conservation drainage, no-till farming. More demonstrations are needed and market incentives to allow farmers to have the ability to see what works and be willing to take a chance on trying it on their fields.
- Promote soil health among farmers as a water quality strategy
- In general, I believe that less funding from the ENRTF should go toward research. There are countless opportunities that can be leveraged for research. The ENRTF funding should prioritize actions based on the goals. The best strategy for all of the goals is implementation.
- Focus on applying what we've known for a long time-not on new research--we have the science-we have the tools-we lack the will! New research is always of value-however us what we have! AG and other issue are about the social sciences--we know what the problems are-we lack trust-have siloes-pay a huge price in the continuing lag between the human dimension and the potential in what the natural sciences properly delivered can do to serve resource restoration and climate adaptation.
- Invasive species management has to be central in anything related to MN water resources, this includes HAB mitigation and management.
- There are components in each strategy that are good, but with our high land and crop prices, we need to consider ways to compensate land owners for holding water back on their land in areas that we have prioritized.

- Incentivize investment in (or reduce economic barriers to) practices that have demonstrated success (including active forest management to improve habitat and ecosystem health that protects water resources, perennial crops (including woody crops and trees), cover cropping, no-till practices, etc.)
- See my suggested strategic goal in the prior section. Truly, what is needed is economic incentives and business models that incentivize landowner participation and a reward system (economic, reduced taxes, etc.) to incentivize innovation by landowners--farmers, forest owners, urban landowners.
- Demonstrate and incentivize application of agricultural practices that improve soil health, reduce tillage, and reduce application of synthetic chemicals for crop production, including measurement of resulting farm profitability.
- Fund local projects.
- Demonstration, technology transfer and effective solution based policy development.
- Implement watershed-scale demonstrations of water quality improvements.
- Urgently address continued issues of nitrate pollution and fund strategies that show promise to meaningfully reduce nitrate levels in groundwater.
- I think we have a lot of knowledge on how to reduce impacts but there needs to be an increase in ACTION that is SPECIFIC to the region's needs. (The option about holding water back and evapotranspiration is red river valley specific and is not appropriate for all regions of MN). Really find ways to increase things we know work across the state. For example cover crops are universally beneficial. What are the barriers to having this done universally by all ag producers? Are existing incentives sufficient? Are we at a point where we need some additional regulation?
- Demonstrations of water quality trading projects and the different methods to use to deliver such projects.
- Not just research but IMPLEMENTATION. There is already a lot of research on these topics and what needs to happen is to implement projects that will actually have an effect on our environment.
- Implementation of our best science to incentivize good water management, disincentivize nutrient runoff, etc.
- The impacts of nutrients, runoff, and stormwater are well known and studied. We are at a point where we need to be making real commitments to mitigation and reductions of those impacts, and developing ways to avoid them in the first place. The cost of those things is enormous and difficult to quantify, but I believe there is value in doing so, because when we are weighing decisions on whether the cost of mitigation justifies doing the right and responsible thing, we often forget the hidden and latent costs. The passionate few will endeavor to be good stewards, but broader society will not elect to take such a path when profit and budgets are in question. We need to be able to communicate the true costs when water, ecosystems, and the environment in general are affected by our activities.
- As areas transition from agricultural to being developed, there has been an increase in volume runoff from these developed areas. I think there needs to be more consideration for water re-use projects.

Regulation and Policy:

- Stronger regulation and enforcement on metallic mining operations
- State level administrations have proven to be so bureaucratic that county level administrations find ways to work around the state impediments
- Ban watering lawns with potable water

- I wish we could regulate more; preventing pollution is SO MUCH CHEAPER than paying to clean it up. :(
- improve tax incentives for non-ag landowners who demonstrate Best Management Practices for water quality.
- Depending on the outcomes of the research and evaluations mentioned about may need additional regulations.
- Increase enforcement of water quality standards beyond EPA requirements
- Create policies that reduce the amount of toxic chemicals that enter our water. Address the fact that 98 MN landfills are leaching chemicals into the ground water.
- Hold industry accountable for pollutants, help local government solve wastewater issues, don't t prioritize economic development that jeopardizes water.
- Many parts of our State have abundant water supply of high quality. The State needs to look at limiting further development in areas of the state with compromised water quantity and quality,

Research and Demonstration:

- Create comprehensive datasets to increase understanding of past, current, and future weather and climate and assess impacts on natural resources in an unbiased way.
- Support research! Research results in innovation and new solutions. Only through funds like the ENRTF can pie in the sky type of proposals be worked on, and while many will fail, sometimes a breakthrough happens that can change things.
- Building state wide water models
- Research, implement demonstrations, and develop incentives related to protecting biodiversity affected by or related to surface and ground water use, quantity, and quality.
- funding certain pure research conducted by non-academic entities (private, non-profit, not-for-profit, qualified individuals)
- Research & Demonstrating results.
- I favor the more technical, science-based approaches.
- Research and Implement nature-based solutions to improve water quality and quantity regulations.
- long-term data collection. Most research projects are only a few years at most.
- In addition to developing "innovative, market-based policies and partnerships," as stated in the strategy above, it's important to note that we also need to develop specific technologies and systems. E.g., creating a water quality trading market (an example of a market-based policy) only goes so far if there are not viable management practices that can deliver large reductions in nutrient losses. New technologies and systems (like novel crops and associated cropping systems) are needed for new policies to be effective. Ideally, these new crops and systems are profitable in their own right, rather than relying on complex policy-driven markets to be viable.

Research - Monitoring and Evaluation:

- I suggest that LCCMR should fund a research center on water sensing and monitoring and collaborate with the Great Lake Water Innovation Engine in Chicago, otherwise the Minnesota State will fall behind other states in midwest on water innovation technologies.
- Minnesota must invest in BMP performance evaluation
- Look at policies and practices around greywater systems

- Analyze and prioritize the long term benefits of regulation and internalizing economic externalities of extractive and polluting industries, including commodity agriculture.
- Support external review of state water resource policies (esp regulatory) that should consider climate impacts to water quantity.
- While I agree that the strategies identified in the question stem are important, I would include POLICY analysis as an area of focus. How well are the current policies working? How were policies developed? Has the science changed and policies need revision? While some of this is covered by "research", I think that the research needs to extend into the realm of the rules and policies designed to protect a given resource. How well do our policies work?
- Examine the fiscal needs of managing our environment and natural resources and the fairness and efficacy of various methods like regulation, fees, etc. to cover these costs over time.
- Demonstration and evaluation of strong policies to improve water quality related to urban and agricultural land use.
- Survey all basins and understand which are being overused.

Research - Agricultural Practices:

- Research impacts of widespread tile drainage on groundwater recharge and nutrient transport.
- Create on farm trials and demonstration areas to showcase high quality seed mixes, opportunities related to diversifying crop rotations, and including things like cover crops or perennial conversions with grazing potential in mind.
- Research new cropping systems and markets that incentivize farmers to maintain continuous cover and manage perennial cover (forests, buffers, wetlands, etc.) surrounding their fields.
- Research and invest in strategies with potential to contribute to transformative change in agricultural business models that make regenerative agriculture economically competitive.
- Research and demonstrate how better agricultural practices can be sustainable, financially competitive, and ultimately better for water quality. Equipment changes, fear of failing, and other uncertainties prevent people from changing the way they currently do things.

Research - Water Quantity/Flow:

- I feel like there should be a research, demonstrations, etc related to the connection between surface and groundwater.
- Increase the understanding of surface water flow and the protection of high-quality natural areas to help push private lands and public lands to include more protections of natural areas within watersheds.
- Research and increase land management practices that build soil health, like using more prescribed fire in prairies to increase soil water holding capacity
- I think LCCMR has to focus on promoting research that will pave the way for sustainable economic growth under global warming. How we can put sustainable water supply infrastructure for new industries that need tremendous amounts of water (e.g., chip manufacturing fabs). There are some pressing issues in my mind that I would like to share: (1) The problem of eutrophication due to global warming might be a future challenge for Minnesota's water resources systems. (2) We might face more frequent flooding due to rapid snowmelt and expansion of rainfall events when snow is on the ground.

- Research that defines sustainable limits to water use and consumption.
- Understand the future needs of water across industries, especially in hydrogen-based industries.
- Develop, distribute and provide training on single statewide model that can predict water quantity and flow interactions between surface water and groundwater at larger scales.
- Improve understanding of surface and groundwater interactions by investing in research
- More comprehensive groundwater research to better understand our groundwater system throughout the state

Research - Water Quality:

- Research on "upstream" technologies to improve water quality. For example, utilizing cover crops, developing nitrogen fixing crops that reduce reliance on commercial nitrogen, advancing bio-based/bio-degradable polymers and chemicals for applications that are currently large contributors to water pollution.
- Research and demonstrate technologies to treat and utilize wastes on-site to prevent both point and non-point source pollution, and develop innovative, need-based in-situ fertilizers to mitigate pollution of soil, water, and air."
- MN should fully monitor ALL waterbodies!!!!!!
- More research on existing pollution, and remediation for polluted sources. PFAS in wells, lead and other contaminants in water lines, etc.
- Research/measurement of and clear, publicly available data about water use by non-residential users in the state. Should be detailed, confirmed by a third party (not just the reporting user), and updated regularly.
- Measure current standards to establish a baseline allow for projects for the improvement of water quality.

Restoration:

- Develop more programs that encourage the transition of monocultural suburban lawns to diverse native landscapes to decrease the use of lawn irrigation.
- We need more willing participants for wetland/prairie restoration projects, payment rates for conservation easements should be higher.
- Funding for implementation of wetland restoration and sweeping education campaigns to accompany it.
- Feasibility studies looking at best options to restore waterways and wetland area lost in development, industrialization, and agriculture.
- Prioritize targeted conservation on the landscape, with effort to direct education and funding to the most effective locations within the landscape. Modeling efforts have greatly increased the efficiencies of identifying the sites, now is the critical time to aggressively target the most effective projects, not necessarily on an entirely voluntary scale.

RESILIENCY

Goal 2: Minnesota's environment, natural resources, and communities are resilient in the face of climate change, land use changes, and extreme weather events.

Responses

General:

- Climate resiliency isn't all about water, which many of these strategies emphasize. While that's obviously a huge component, so is habitat diversity to respond to new species invasions, shifting ranges, increasing temperature etc. A strategy related to maximizing species diversity on the landscape in order to increase resiliency is warranted.
- Encourage "out of the box" thinking to bring in new solutions. Doing what we have always done is not always the answer in changing conditions.
- By ensuring that quality data is used to make decisions, and that the data are published on a public website.
- Viable is main issue.
- I don't think "water storage" is the solution.

Acquisition:

- Support strategic land protection to build connected networks of protected habitat to enable species movement and shifts as adaptation strategies to climate change.

Collaboration/Partnership:

- This goal should include more than water in the responses. Public and tribal participatory strategies should be a priority for this.
- Work with all local communities and people groups to find the balance between culturally helpful and climate resilient plant communities and trees to cool temperatures in neighborhoods, retain and improve water, and provide recreation and food.
- Collaborate with adjacent and downstream states to invest in upstream solutions (i.e, keep more of the Mississippi River water in Minnesota for longer)
- Supporting tribal, non-profit and grassroots organizations that are partnering with government agencies to address these issues (helps with capacity issues some government agencies may experience with new research, projects, etc)

Education and Outreach:

- Expanded education for all Minnesotans, work with dept of education to ensure environment and climate literacy are embedded throughout k-12 curriculum
- Educate legislators.
- Public outreach that educates about climate change in Minnesota and what each citizen can personally do to be part of the solution. This could include tv ads, radio, internet, social media, podcasts, etc.

- Develop and provide STEM education throughout the K-20 pipeline to build informed new professional scientists and land managers

Implementation:

- I think we understand the validity of climate weather concerns at this point. Further research will be done via another medium. Increasing construction standards for engineered practices has been an effective tool for practice resiliency in the face of harsher weather conditions. Those improvements are costly and would make a good home for ENRTF funding.
- Focus on the intersection between the human built environment and nature. Currently road authorities don't have sufficient funds to build climate-adapted stream crossings and there's nothing forcing them to make their crossings climate-adapted. How can we change that? It starts with funding and training. For storm run-off help communities pay for updated run-off modeling and additional stormwater infrastructure
- Creating opportunities for all of the above strategies (research, education, measurement, etc) in the context of capital investment projects and implementation beyond demonstration alone
- Create on farm trials and demonstration areas to showcase high quality seed mixes, opportunities related to diversifying crop rotations, and including things like diverse cover crops or perennial conversions with added grazing potential in mind.
- Research is critical, but moving beyond research and into implementation that can inform additional research based on what works and what doesn't and scaling up implementation based on success
- Adoption of the strategies I mentioned in Question #3 would make these lands more resilient the climate impacts as they would store more water naturally through healthier soils.
- FUND city, county, and watershed districts with climate resiliency and adaptation projects
- Support organizations and agencies with the development of climate resiliency plans by providing research and funding opportunities for implementation.
- Promote soil health practices in urban areas to sequester carbon and improve resilience of turf/vegetation to weather fluctuations.
- Again, there needs to be a None of the Above option with this dialogue box. Don't stop at funding plans - we all have plans. We have expensive, timely, 1W1Plans. We have the state water plan. Fund the projects in the plans! We don't need another plan. The problems that the plans solve don't go away just because grantors decide to shift their gaze to a new climate change term.
- Create easy incentives/ pathways for private landowners to conduct conservation enhancements on their land, adding value through ecosystem services.
- Explore innovative strategies that meaningfully reduce climate emissions (CO₂, N₂O, CH₄) in the agricultural sector, while incentivizing small and mid-sized farm operations.
- economic incentives to create a reward system for landowners to innovate solutions at scale, rapidly and as practical low cost participatory strategies/means. Empower farmers, landowners to innovate around a series of simple principles and measurable performance outcomes .
- Need incentives to motivate rural local government.
- Try to think "outside the box" on incentive programs for water; once you remove the money, the practice also disappears. Next generation is not as motivated by monetary incentives as current generations; need to change the paradigm around this.
- Make sustainable household water systems accessible and affordable.

- Water modeling to prepare our environment and come up with actual ACTIONABLE solutions that can be implemented. Less research and more demonstration and implementation of projects.
- Healthy soils have a natural ability to reduce surface waters. MN soils are by and large degraded, and the addition of compost would "recondition" the degraded soils increasing their water holding capacity, i.e., reducing storm water runoff.
- PROTECTION OF EXISTING TROUT STREAMS AND EXPANSION OF THE SAME THROUGH HABITAT AND WATER QUALITY PROJECTS
- Set aside some funds specifically supporting solutions to be demonstrated or trialed in the community.
- Many cities need natural resource professionals to help implement climate strategies. This might be something more at the legislative level, but to encourage cities to have a designated natural resource staff member aside from the forester and water resources staff.

Planning:

- Given the drought we are in, MN Forests may burn up this year, so we do need a forest strategy to prevent major forest losses = more carbon emitted.

Regulation and Policy:

- Current state administration needs to prioritize environmental health across agencies.

Research and Demonstration:

- Research, educate, and demonstrate on drainage water management and water reuse systems, with emphasis on the agricultural areas where altered hydrology (drainage) can be retrofitted to benefit agricultural operations.
- Economics of climate resiliency planning and implementation
- Research and demonstrate viable policies for land use, conservation, and other practices needed to achieve climate resiliency and water resources protection - especially in agricultural areas.
- Compile research and education on critical elements of climate resilience in farming systems. For our state, what are the indicators of climate resilience in agriculture, what farming systems (crops, animals etc) are most resilient in the face of expected climate effects.
- Deep exploration of the water-energy-agriculture nexus with a focus on technologies and project aiming to bridge gaps.
- Research, develop, and deploy profitable technologies and systems (e.g., new crops and cropping systems, or new forestry management practices) that mitigate climate change and increase resilience. An example of this is the crops and systems being developed by the UMN Forever Green Initiative. These crops/systems are designed to be profitable and therefore they will not need annual/regular public subsidies to be viable. Climate mitigation and resilience are intended to be built into these systems, e.g., through increased perennality, larger soil carbon inputs than traditional crops, and better protection of the soil against extreme rainfall events.
- Create comprehensive datasets of natural resources and the environment to understand past and current natural resource conditions to identify sensitive areas and key resources to protect for future resilience.
- Modeling future scenarios and trade offs

- Continue research and include education at multiple levels as a requirement. Have a natural approach for improving conditions. Use what is already in the landscape.
- Research and demonstrate land management practices (including the management of terrestrial invasive species) that are adaptive to anticipated climate change and preserve ecological, economic, and social benefits from the land.
- Research and/or funding for management projects relating to plant and wildlife management in the face of climate change. Practitioners might use the Resist-Accept-Direct (RAD) framework ([https://www.usgs.gov/programs/climate-adaptation-science-centers/science/resist-accept-direct-rad-framework#:~:text=The%20Resist%2DAccept%2DDirect%20\(RAD\)%20framework%20is%20a,changes%20resulting%20from%20climate%20change](https://www.usgs.gov/programs/climate-adaptation-science-centers/science/resist-accept-direct-rad-framework#:~:text=The%20Resist%2DAccept%2DDirect%20(RAD)%20framework%20is%20a,changes%20resulting%20from%20climate%20change))
- I'd love to see more closed loop research and applications such as wastewater to drinking water.
- Measure the costs of current failure to regulate private appropriation of water, failure to enforce water quality standards, and deceptive "mitigation" practices that fail to preserve wetlands.
- "Economically viable" is a term I have learned to distrust. The EPA is using it to roll back regulations on ballast water in shipping vessels in the Great Lakes. The market might not currently have an economically viable option, which means we need to create a need for one with research and regulation. The market will respond accordingly.

Restoration:

- Promote wetland restoration on agricultural lands and reduce the amount of water being carried out of the soil via drainage tile.
- Direct financial support of reforestation efforts.
- Restore the "sponges" of as much land as possible. Floodplains, wetlands, marshes. These are ecologically dense and mitigate both flood and drought as well as improving water quality. However, their multibenefit results in no good "numbers" for any one outcome.

FISH AND WILDLIFE (SPECIES)

Goal 3: Minnesota has healthy and diverse wildlife and plant populations that sustain and enhance the state's environment, economy, and quality of life.

Responses

General:

- All of the strategic offered in question 5 are good ones, would select all of them if I could.
- All the above strategies are important in different species; I have a hard time picking two.
- I think all of the above are good priority strategies for this goal.
- Do all of the above.
- No. I think this is a good list.
- Expand this strategy to Include other organisms (insects, fungi, and other soil organisms etc.) that also have important roles in achieving the stated goal.
- Develop a more integrated approach that blends water quality as habitat and upland land management as habitat.
- By ensuring that quality data is used to make decisions, and that the data are published on a public website.

Acquisition:

- Establish natural protected areas for freshwater ecosystems - not only lands - as hotspots of aquatic biodiversity and resilience. This is an area that has proven highly effective in marine ecosystems and needs to be implemented within freshwater ecosystems. Minnesota could take lead on this, and has good reason to considering its rich aquatic heritage that is worth preserving.
- I believe the best way to achieve this particular goal is through acquisition. We are fortunate in Minnesota to have as much public land as we do considering the land area and population. A broad priority for all Minnesota conservation agencies should be to make connections to those lands and provide corridors for wildlife, and outdoor recreation opportunities.
- Also agree with conserving more land to protect wildlife.
- State agencies should demonstrate competence in land management before more land is added to the state land holdings.

Collaboration/Partnership:

- Develop interstate collaborations to monitor and address issues like chronic wasting disease.
- Fostering state-to-state research relationships. Understanding what is happening in a region can better support efforts in the state (animals and plants don't have borders and something outside of the state may be affecting what is happening within state boundaries)

Education and Outreach:

- Private landowners need to be educated on the benefits of regenerative agriculture and how it relates to wildlife and plant populations.

- Educate the public on healthy and diverse wildlife and plant populations that sustain and enhance the state's environment, economy, and quality of life.
- Provide education on habitat maintenance and resources to conduct ongoing maintenance as well as one-time restoration or conservation efforts.
- Educating children on all these issues is an important step.
- Provide trustable, defensible, quantitative performance measurements and technologies so that any landowner can understand the ecosystem benefits and their economic values, provided by innovative land management/ecosystem restoration decisions that are inspired to make.

Implementation:

- Create on farm trials and demonstration areas to showcase high quality seed mixes, importance of rangeland systems for habitat, opportunities related to diversifying crop rotations, and including things like cover crops or perennial conversions with added grazing potential in mind.
- There needs to be investment and effort on both public and private lands.
- Encourage private land management thru the Local Governmental Units.
- This is a HUGE area of need. We need to avoid habitat loss and population fragmentation by reconnecting well-managed habitats.
- We have a ton of research showing us that grassland species are in trouble. The only way to turn these trends around is to have more grass on the landscape and prevent the conversion of private grasslands into intensive agriculture or development. We will never be able to own enough land in ag country to solve this problem, so private landowners adopting conservation best practices are key to success.
- Develop on-the ground projects throughout the state. We need more action on the ground.
- Most land is private; we need to lean in to private lands non-monetary conservation incentives.
- I think we should use existing research, rather than funding continuous research, and focus our dollars and our energy on taking direct action such as acquiring land, training property owners, planting trees, protecting habitat, etc.

Regulation and Policy:

- A policy of allowing a wet land to be destroyed if a landowner "recreates" one in another location is simply counterproductive. It harms the land and all living creatures that rely on the wetland area.
- Minimize development in areas that have high quality natural resources, etc.
- Develop policies to prevent habitat fragmentation and increase habitat connectivity.

Research and Demonstration:

- Predictive analysis to identify what our climate and wildlife and ecosystems will change from, TO, for 20-years out, 40-years out, and 100-years into the future. (i.e., what's coming).
- Increased focus on how climate change is influencing natural lands and habitat is needed to inform future management.
- Research and incorporate traditional ecological knowledge into management scenarios.
- Support long-term sentinel study areas.
- Research strategies to adapt to changing ecosystems.

- Research the devastating impact that the endangered species act has had on the sport of deer hunting and rural economies.
- Evaluate the effect of size on the health and resiliency of protected areas.
- Because I was limited to two choices, I'll use this box to also endorse evaluating effectiveness of current management practices and past investments.
- Support the creation of comprehensive unbiased datasets to evaluate the effectiveness of current management practices and past investments to sustain and enhance wildlife and native plant populations.
- Evaluating the relative importance and cost-effectiveness of maintenance and restoration actions is key to achieving this goal. My intuition is that now we are spending a lot to restore low quality habitat and not spending enough to maintain high quality habitat.
- This is probably within the others, but it would be useful to do a risk assessment that identifies not only key areas but to prioritize where we might have the most impact in addressing those areas. Some areas may be high risk but our ability to address it may be low -- this can help direct resources and improve overall outcomes by intensifying work in areas of greatest potential positive outcomes.
- As I stated in an earlier question, we need to know the habitats of all species in order to better manage the impacted populations.
- Stop the destruction. Research must be geared toward requiring a pause in destruction, both physical and chemical destruction.
- I think the strategies here are good. In my opinion, I think given the roles that LSOHC and CWC have, the LCCMR fills an important niche that is not really handled by these other funding bodies and that is research. I have seen several examples of management projects funded by these other groups that failed because they don't have LCCMR's level of peer review for research projects.

Restoration:

- Expanding on the restoration and corridor establishment to native prairie sites and/or areas of high ecological significance. These limited sites should be the focus of research and protection efforts through education and outreach efforts to private landowners.
- DNR is currently allowing neonic-coated seed ag use of public lands in state parks and wildlife management areas - these lands need to be returned to the public and re-wild. Leasing public lands for individual gain and neonic-coated seed crops needs to be prohibited. Federal infrastructure dollars are available for programs - but these monies are not being utilized. Promote and expand the HIGHWAYS FOR HABITAT program for county roadside habitat.
- I think there is a big challenge in funding/supporting management of already restored habitat, I'd like to see funding support ongoing maintenance activities.
- Pursue diverse solutions to restore and manage habitat in neighborhoods, private lands, and public lands.

Other:

- This may feel like my comment is out of left field, but there appears to be a lot of emerging evidence about the damage from LIGHT POLLUTION (impaired feeding/migration/mating of many species when a period of nocturnal darkness is lost). While this could fit into many of the categories above, I wonder if LIGHT POLLUTION should be called out specifically given how little we know about its influence on ecosystem health.

Goal 4: Minnesota's public and private lands, including forests, grasslands, and agricultural lands, provide long-term benefits to fish, wildlife, and people.

Responses

General:

- Do all of the above.
- I don't like picking two. They're all crucial.
- I think the strategies from the last goal fit with this goal.
- Knowing when to let it go. Sadly, we won't be able to save all endangered species and changing ecosystems, but if we prioritize and focus resources, we can save a lot of them.
- By ensuring that quality data is used to make decisions, and that the data are published on a public website.
- Migration of agriculture north in the state as reaction to climate, biosecurity and available water.
- Technical solutions are only sustainable if they can generate revenues and profits to the people or landowners. So, when selecting funding supports, we need to strike a balance between protecting wildlife and maximizing the output from the land.

Acquisition:

- You can develop crops all day long, but if no one wants to buy the crops, no one will use their paycheck to grow crops just to grow crops. Permanent easement programs are not successful because of continued land expenses. Change the permanent easement program to add more flexibility in how the land can be used.

Collaboration/Partnership:

- Prioritizing project that bring diverse groups together to focus on problem solving versus same time spent of what we differ one is a compelling need with rich potential for good.
- Elevate the practice of stewardship and the role of tribes, so that consultation is respect and informed consent, not just agency staff gritting their teeth through meetings and then proceeding without resolution of concerns.

Education and Outreach:

- Educate the public ...on forests, grasslands, and agricultural lands, provide long-term benefits to fish, wildlife, and people.
- Promote regenerative agriculture.

Implementation:

- Getting pastures on landscape, esp. in areas where intensive row crops are not very productive.

- Ag can't store carbon...Ag can slow down carbon loss. If we are going to increase carbon storage, we need to grow more forests and manage them. And have forest product markets to store even more carbon. This will help our water, wildlife and our economy.

LCCMR/ENRTF:

- Focus on simple principled strategies and clear, simply articulated performance outcomes, and provide equally simple and understandable real time reporting on program outcomes.

Research and Demonstration:

- Understand how benefits to people change over time and try to guard against providing long-term benefits that are no-longer relevant/important to future generations.
- The University of MN extension needs to start promoting and demonstrating cover crops instead of saying that they don't work in Minnesota.
- Research the habitat and environmental benefits of new cropping systems that simultaneously have new markets, are less carbon intensive, and provide continuous living cover.
- Research and understand the link between 1) site-scale implementation of restoration and improvement projects and 2) direct impacts to water resources, biodiversity, and human benefits. This will guide management decisions.
- Research and demonstration regarding retrofitting of existing operations to become more adaptive and synchronized wildlife and fisheries in today's landscape, both urban and rural. Emphasis on carbon sequestration, financial assistance to implement adaptive practices.
- Research and demonstrate practices that prevent or contain threats to Minnesota forests, grasslands, and agriculture (like invasive species). Proactive strategies are more cost-effective than reactive ones.
- Look more closely at the widespread use and harmful effects of pesticides (particularly herbicides) in public and private spaces.
- Create opportunities for rigorous research and locally-visible/ relatable outreach opportunities during planned capital investment projects.
- As mentioned in my earlier comment, issues around the impact of LIGHT POLLUTION could be targeted in research initiatives. Of particular relevance to light pollution impairments could be the "vulnerable, declining, poorly understood and sensitive species".

Restoration:

- Again, supporting long-term maintenance/monitoring funding beyond initial project installations.

Regulation and Policy:

- Is this supposed to be about 'working lands'? If not, expand the goal to include aquatic and transitional lands, and don't write off built environments, which are very beneficial to people. New strategy - Seek nation-wide standards for baseline conservation activities on working lands to create a level playing field for all American farmers and foresters. e.g. mandate cover crops nation-wide.
- Reconsider transportation goals. The more cars we drive, the more need for parking and roads. These surfaces have a large impact on vegetation and habitat especially as development spreads to

more rural areas. Even electric vehicles impact this way, along with needing a larger electric grid, they still need to be parked, stored, and have drivable surfaces.

- Incorporate indigenous knowledge in state management practices and policies.
- Best practices need to be changed to include ecologically sound practices opposed to pesticide use to force fast results. Working with land is a long process that requires adjustments over time.

ACCESS AND OPPORTUNITIES

Goal 5: All Minnesotans, especially young people, have access to and take advantage of opportunities for culturally relevant and innovative connections to the lands and waters of Minnesota.

Responses

General:

- Develop initiatives and programs that are relevant to the Minnesota culture.
- Implement policies that encourage equity for all Minnesotans regardless of social and cultural differences.
- Provide funding to existing community-based organizations working in lower-income and higher proportion POC communities to develop their own programs.
- Make sure that BIPOC communities are highlighted in these programs.
- Supporting BIPOC organizations and communities (including schools with majority BIPOC and underrepresented students) that are already addressing these ideas or have plans to address them (i.e., curriculum, capital projects, community needs/wants, etc.).
- You are standing on a cliff on this one. The iPhone generations have little interest in the outdoors. Their interest in funding these types of programs, as they enter adulthood, is going to have a major impact on this state.
- This doesn't matter if you don't protect what's here.
- By ensuring that quality data is used to make decisions, and that the data are published on a public website.
- Focus efforts on underrepresented groups of youth that are least likely to experience the outdoors through other means.
- The culturally relevant experiences need to be led by people in diverse communities. Not white people taking people of color into the woods.
- All the focus on "cultural differences" makes the differences more difficult. Treat everyone the same.

Collaboration/Partnership:

- Contact the tribes of Minnesota to help create a historical outdoor use and sustainable forms of recreations.
- Include community leaders from all people groups in decision-making meetings regarding outdoor recreation areas and local parks.
- Engage tribal communities and cultural to add relevance to program development.

Education and Outreach:

- Include all partners that provide early learning to Minnesotans including the 13+ children's museums.
- Encourage citizen science efforts to build connections between communities and their local natural areas. (BioBlitz, trailcam studies, etc...)

- Use Children's Outdoor Bill of Rights to renew Environmental Education initiatives in Minnesota -- Update the GreenPrint and reinvest state resources into curriculum resources for teachers.
- Teach a philosophy of giving back to the Earth, not just taking.
- Use mobile classrooms to bring the students to the field to see first hand our outdoors.
- Bridging the gap of environmental education to today's youth is key them taking interest in current environmental issues. Bringing environmental education to students should also be considered a strategy in delivering these critical messages, whether a traveling exhibit, curriculum, or demonstration.
- Wildlife Forever's Art of Conservation program which includes the State Fish Art Contest and Songbird Art Contest is a great avenue to connect youth to art, science, and the great outdoors. The Fish Art Program features a host of lesson plans ready to implement in classrooms.
- Include more of this education IN the school systems.
- Teacher education programs that prepare teachers to effectively use nature as a context for learning and helps create stewardship habits in all MN students. Also-environmental education should be required in K -12 graduation standards
- Solicit and obtain statewide funding to cover busing costs for schools. Identify specific grade-level benchmarks in the 2019 Minnesota Science Standards and target designated grade-levels for outdoor experiences near their school.
- Pass and fully fund Outdoor School for All.

Implementation:

- Networks of trails that allow people to navigate between green spaces in the Twin Cities seamlessly (see Bentonville, AR for a small-scale example).
- Get kids outside. Tap maple trees. Maintain a rain garden at school to learn about native plants and pollinators. Go for a hike/snowshoe in the woods. There are so many great opportunities throughout the state, big and small, where school age kids can get outside and touch our environment.
- Provide long-term funding for jobs that protect nature and the environment rather than ensure permitting for powerful and destructive interests. If there is no positive career path, education will go to waste.
- Develop a representative workforce in natural resources through creation of pathways and incentives as well as examination of hiring/recruitment/supervision/retention to ensure culturally responsive practices.
- Start promoting at a younger age, high school or elementary school, to get more diverse candidates to work in conservation careers. This would allow more diverse people to feel comfortable in the outdoors.
- Invest in activities that get young people exposed to the natural environment.
- Assess programs, activities, and physical spaces for their accessibility and effectiveness; support changes to adapt and retrofit to welcome more people.
- Get kids outside
- Improve urban parks to bring more people outdoors with management, investment, and increased safety. We can reduce economic barriers by bringing nature to urban areas.

- Give people palpable memorable, life changing experiences through direct connections with nature; my inspiration was wildlife rehabilitation; native american food and medicinal uses of native plant, and then reading the history of landscapes, ecosystems.

LCCMR/ENRTF:

- Currently ENTRF is set up to provide support as reimbursable grants to NGOs. One of the best ways to identify inequities and reduce barriers would be to have a category of grants eligible to NGOs run by or focused on BIPOC communities. Create a way to have this category (similar to the small grants category of less than \$200,000) be awarded upon proposal acceptance, not set as reimbursable. New non-profits aimed at providing nature-based experiences to diverse and underserved communities do not have the ability to apply for ENTRF grants as they are structured now because of the up-front cost barriers.

Research and Demonstration:

- Support research that helps us to understand the impacts of climate change on water resources and pave the way for research-based policy making.
- Investments in maps and the underlying spatial data that encourage responsible use of Minnesota public land resources.

ENERGY

Goal 6: Minnesota achieves reliance on nonpolluting, renewable energy in all sectors (including transportation, building, industry, agriculture, and others).

Responses

General:

- This is not a cohesive or generally high-impact list of energy solutions. Most of these are either not useful or too general to be helpful. I would recommend relying on the states Climate Action Framework for a roadmap and focus on potential gaps or good fits for LCCMR. Also, coordinating with the new Minnesota Climate Finance Authority would be a good idea to leverage funding. Or decided that LCCMR isn't the right fit for energy work.
- Do all of the above.
- Everything about the renewable energy and battery-operated vehicles is ridiculous and unsustainable.
- Avoid false solutions, center community voices when designing solutions/one size doesn't fit all.
- Ensure biomass energy is included within the portfolio of renewable energy solutions.
- As a subject matter expert, I see renewable energy, especially wind turbines, directly competing with conservation efforts on land acquisitions and bird/bat habitat. I don't know how we can have both right now.
- I don't think this is the right funding mechanism for this issue unless we're talking about the funding of small model projects, research to encourage the shift to renewables, etc.
- By ensuring that quality data is used to make decisions, and that the data are published on a public website.

Education and Outreach:

- Showcase working systems that are currently and historically have been implementing renewable energy into their business models and/or operations effectively. Creating a local network, similar to "The Natural Step for Communities" efforts of local workshops, discussions and ultimately showcasing efforts that work in way of implementing renewable energy.
- There is a misconception among law makers that EV and renewables are bad for MN or won't work in our cold winters. Education and demonstration would help.

Implementation:

- Support infrastructure that decreases the reliance on car commuting.
- Provide communities funding for electric vehicle charging stations (or match \$\$) to build out infrastructure for EV's in Minnesota - the cost of installing these in rural areas is a major barrier to our clean car goals and the expanded use of this technology in Minnesota, which can significantly reduce carbon from vehicles.
- Encourage solar farms on parking lots to provide shade for parking and energy production.

- Do not make capital investments that would be better made elsewhere (e.g., imagine that solar panels are a limited resource, it would make sense to put more in NM and AZ and not in MN if we really care about the planet as a whole).
- Seek strategies that create renewable energy development in already developed sites as in roof tops-vs largely undeveloped areas.
- Incentivize solar on buildings, rather than taking up valuable farmland.
- All renewable energy systems have tradeoffs in terms of carbon sequestration, wildlife habitat, surface and groundwater protection etc. Placing solar panels on prime farmland is a short term and potentially disastrous strategy as panels age and start to deteriorate. I'm not opposed to solar, it has a place, but prime farmland should be off the table for its development.
- More meaningful incentives to make solar/wind energy affordable and an easy choice for low-to-average income homeowners.
- Incentivize renewable energy options in primary houses or low-income rentals where utilities cost are borne by the renters. (Not vacation houses or rentals.
- Incentivize renewable energy projects that have community, regional and statewide impacts to enhance energy resiliency and reduce greenhouse gas emissions.
- Implement incentives and legislation to favor the community shift from fossil fuels to clean energy. For example, housing insulation, efficiency of appliances...
- Demonstrate, support projects relative to reducing energy use and the carbon debt of human activities.
- Distributed and dispersed renewable technologies are essential, not huge remote wind farms and solar farms that use up prime farmlands and demand new transmission lines.
- Think small. Rather than an 800 acre solar farm why not put solar panels on 800 homes? Is it more expensive? What does it cost to upgrade transmission lines and add battery storage for a mega site?
- Focus on community-scale, community-owned, and community-driven projects with consistent and rigorous environmental review rather than top-down profit-driven solutions that are central station with long-range transmission. Fund the "many solutions" approach not the singular utility-owned "answer."
- There should be a race for the first city over 20,000 to be net zero.
- Develop 10 statewide operating principles and incentivize innovation to accomplish in all ways, those principles. Adaptatively adjust principles or add principles on a regular basis as a need is recognized.
- Maximize the use of both municipal and animal wastewaters by treating them as resources rather than waste, particularly by transforming municipal wastewater into bioenergy through complete utilization.
- Let's move away from supporting corn based ethanol...
- Fund the forestry sector since that what trees are....fuel farms. Any investment in ag is a waste of resources. More sustainable fuel is produced on a per acre basis is with forests This is a no brainer.
- We need to look seriously at the potential for utilizing woody biomass for sustainable fuels production. For example, including woody biomass as an allowable feedstock in the Clean Transportation Standard would enable sustainable fuels production on a large scale.

Planning:

- Research, address, and develop plans around barriers in different communities and how to beat get these communities access. Many indigenous, BIPOC and other underrepresented communities will be the most affected by climate change, but also do not have access to resources.

Regulation and Policy:

- Assist the legislature in developing feasible renewable energy goals and strategies that are economically feasible and practical.

Research and Demonstration:

- I don't understand what you mean by encourage and demonstrate? Are you saying ENRTF would fund the work or the research to support an expansion. I don't think the ENRTF is the right mechanism to fund the work.
- Fund research related to renewable natural gas and maximize biogas production capability within the state of Minnesota. Fund research, application, and demonstration of biofuel production within the state of Minnesota. MN has been the national leader in terms of fuel ethanol, biodiesel. We should do more to maintain this leadership.
- Fund innovative projects that demonstrate using renewable energy in ways that add benefits to an installation site like agrivoltaics.
- Evaluate carbon intensive scores and new markets developed to incentivize farmers to use less carbon and grow crops used for biofuel production while maintaining continuous living cover and natural cover on their farms.
- Establish conservation metrics for natural resources and associated public health and environmental benefits.
- Research and demonstrate approaches to alternatives to massive transmission buildout which includes maximizing existing infrastructure, leveraging utility-scale and community-scale behind the meter generation and storage, and investigating the impact of the emerging hydrogen economy.
- Avoid the industrialization of rural landscapes and destruction of night skies with lights on turbines. Research and deploy technology that keeps airspace safe for aviation and night skies pristine.

EMERGING ISSUES

Goal 7: Minnesota responds quickly and proactively to emerging environmental and natural resources issues.

Responses

General:

- We need to figure out a way to keep politics out of this discussion. A lot of quality proposals are never supported because folks still disagree on whether rising greenhouse gases contribute to climate change. Nobody is going to respond quickly to an important and emerging problem when people refuse to recognize the problem.
- Being able to quickly and properly respond to emerging issues.
- Most important strategies are dependent on what the issue is. For some issues, we might not understand the cause, and might need research in that direction. For others, we might have an idea of the cause, and need research into best solutions. For others, we might have an idea of causes and solutions, and need funding to implement solutions. Generally, I think including emerging issues as a strategic goal is really important to allow for flexibility for LCCMR to respond issues that we can't anticipate in advance.
- The climate crisis is already here in Minnesota and the government primarily fiddles while the wildfires burn.
- I would leave this goal for institutions like UM research and outreach centers and other research-based entities who can get funding via academia to do research on emerging issues.
- This might not be a realistic goal for the LCCMR. I could see this being a goal of the DNR with strategies of how DNR leadership will promote flexibilities to tackle newly rising issues. Not sure how LCCMR could tackle this other than through funding research.
- Streamline the process. Problem ID, Research the approach then implement the answer. Note, there are too many agencies to solve each problem. SWCDs have been mostly ineffective. More funding won't help. DNR and BWSR should be combined and forced back to integrated district offices. We need to change the model.
- By ensuring that quality data is used to make decisions, and that the data are published on a public website.
- Compared to other states - yes
- If this year ends up being as dry as predicted, the fire danger in northern MN will be exceedingly high.
- Eliminate the goal. This leads to over-reaction and a poor allocation of limited staff and financial resources due to taking action with insufficient understanding. Good intentions don't negate unintended consequences.
- Support the University of Minnesota Climate Adaptation Partnership.
- Prepare for disease and pest infestations.
- While in the long-term environmental protection and economic development are not in opposition, this is sometimes the case on the mid to short term, thus generating widespread oppositions to needed measure. Policies to bridge those real or perceived gaps are necessary.

- Use our experts to determine priority in protecting our environment.
- Be proactive to look ahead.
- Remove barriers to addressing crises.
- Fund 'early detection and rapid response' efforts, research into eradication and control efforts for newly identified pests, public education into emerging issues.
- Provide funding to the appropriate state agency to quickly address emerging environmental and natural resources issues. In my experience, delay in responding to new issues is a function of lack of funding by state agencies and LGU's. Most already have "full plates" dealing with existing issues and do not have staff or resources to quickly pivot to addressing new concerns.
- Increase capacity of the Environmental Quality Board to research broad societal alternatives so that agencies don't simply latch onto the newest and squeakiest wheel lobbyists. Create a vision with a hierarchy of sustainable, just, and regenerative priorities and focus policy/regulation and funds/incentives on the best strategies, not every proposal that a for-profit entity claims meets some "goal."
- Continually follow national trends and have funds available to address issues earlier before they become big.
- Let local communities, nonprofits, state and local govt. agencies and researchers tell you what they are.
- Smaller is better. Big agencies move slow, while small agencies are nimble. Use small agencies to make quick decisions and get funding in the hands where it can be best used. One example is BWSR - they can react quickly and get funding out to SWCDs for boots on the ground.
- Focus on county SWCD staff for practical guidance.
- Provide funding to non-profit organizations that can take action far more quickly than government agencies.
- Consider local Governmental Unit input on strategies to be proactive towards emerging issues.

Collaboration/Partnership:

- Promote interagency collaboration to discuss and work through emerging issues.
- Promoting collaborative approaches to development of crisis, disaster, and risk management plans so relationships and systems are well established prior need.
- I think this sort of thing broadly requires networking and collaboration to address effectively. When a new issue arises there are so many organizations and agencies who can engage and bodies which enable groups to collaborate effectively are generally well-suited to help address these issues (Cooperative Weed Management is an example).
- Responding quickly is not a strong point of any state. Because they are funded by taxpayers and must represent those taxpayers' wishes, it takes time to address issues. It is possible, though, through partnerships with nonprofits that some nimbleness can be brought in to address these types of issues.
- Convene regularly groups of scientists and stakeholders to assess emerging issues that may affect MN natural resources in the future.
- Flexible partnership and funding opportunities that empower the best prepared/best-suited organization to take meaningful action.

- Form a State Climate Response "Manhattan Project" to guide state, county, and municipal practices, including response protocols.
- Utilize the University of Minnesota, Coordinate Campuses, and MNSCU to work collaboratively with Industry, Manufacturing and Technology enterprises to conduct research, provide education, monitoring, demonstration projects, for development and implementation of innovative solutions to particular issues.
- Collaborate among state agencies and communities on a statewide plan of action.
- Establish ongoing linkages with environmental and natural resource professionals and academics across North America to provide early warning of emerging issues and to foster professional networks to develop appropriate responses drawing on experience and knowledge from both inside and outside MN.
- Establish a cross sectional team from business, municipal and statewide professionals to identify and prioritize emerging natural resource issues. Pilot, with appropriate funding, alternative solutions for the top 5 issues or to address the easy solutions first.
- Collaboration with the DNR on natural resource issues and permitting timelines on all subject matter related to the environment. MN can't respond quickly due to regulations and lack of staffing levels to get the needed work done on anything environmentally related.
- Need to have strong public and tribal partnerships so that issues are raised early and then can be addressed. Strong participatory research partnerships are key.
- Work with state agencies (MN DNR, MDA, MDH MPCA) to develop an environmental response framework for emerging diseases, increasing weather severity and prolonged drought.
- Collaboration centers between industry, agencies, and research centers?
- If the ten principles are being threatened, create a rapid response program to bring appropriate stakeholders together to develop the response. Ron Nargang led the Red River of the North Flood damage mediation process is an extraordinary national example of a participatory process that was very constructive for a very diverse stakeholdership. I was on the science advisory team that supported the mediation team to help find technically relevant solutions to myriad challenges faced by that program in that region.
- I think it is important to understand the resources that exist across the state or nationally that could advance Minnesota's work in response to emerging issues. Likely there are NGOs or other organizations that have been involved in a variety of issues that could provide expertise and support in providing a fast response. Assess the resources that may exist beyond government intervention first before responding.
- Understanding this fund is MN focused, I think it would be beneficial to ensure communication with neighboring states and provinces that share similar regional ecosystems. Local measuring, testing, and publication of those results will go furthest if they can be used alongside a larger picture.
- Developing a community-based advisory group to give input on emerging problems.

Education and Outreach:

- Improve & develop online libraries to improve literature research across disciplines. For example, as rain gardens became popular twenty years ago, the stormwater industry could have benefited from the lessons learned by the onsite wastewater industry (septic systems) over the past 50 years.
- I think COVID demonstrated that public communication should be supported by best information available transmitted in a humble, transparent manner.

- I think all of the above, research, education, measurement and demonstrations are important, but to me the key is active communication and dissemination of information. The stakeholders must have access to available and evolving information to successfully respond and react in a timely and effective way.
- Research the impact of the changing environment on Minnesota public and private lands and develop methods to ameliorate environmental and economic impacts. 2. Education directed at citizen groups to recognize and report impacts on natural, agricultural and urban areas and develop mechanisms whereby citizen groups could respond.
- Better education regarding emerging environmental issues. Minnesota doesn't do great on this topic. For example, emerald ash borer spreading through wood transfer. Not many public even know about this. Another example, lead tackle is toxic to wildlife. No one is preventing Water Gremlin from continuing their lead sales or bait stores. These two topics could be stopped/prevented from being environmental issues with the public's help.
- Fund projects that address emerging issues and deliver something involving public engagement like best management practices (BMP's), public workshops, or extension bulletins.
- Stay up to date on relevant topics that need to be addressed in a timely manner. Demonstration sites that actively allow volunteer participation to further educate local people on these topics is imperative.
- Education and demonstration of emerging issues and the results of proactive response.
- Promote education related to the impacts of chemicals used in everyday life, including how chemicals move from our homes and businesses into our air, water, and food supply. There is very little public understanding of the implications of our everyday chemical use.
- Keep a lid on overreacting legislators. Educate the public on issues and then give us drills and lessons on what to do.
- Education. People won't respond quickly unless they know they must.
- Public support is most important, so education and demonstration are probably most important.
- Educate the public on all emerging environmental and natural resource issues through education programs and demonstrations.
- Research and education couple with community outreach and field demonstrations.
- Education
- Education and scientific facts.
- Fund ongoing research and educational initiatives to provide continuity in strategy development and engage new generations in sustainability and climate adaptation.
- The duty officer already responds, however, this is often met with delays in reaching sites in a timely manner to capture potential influencers. So, having multiple, localized, teams that respond to local and or regional issues is vital that goes with proper landowner awareness, education, and willingness to report environmental issues.
- Support the development of an environmentally illiterate citizenry by working toward environmental education standards for all K-12 students in Minnesota, and supporting teacher education programs that develop environmental literacy in students.
- Education that stimulates understanding of the issues and encourage behavior change that supports health ecosystems
- Improve education about what constitutes science and how science, which is peer-reviewed, robust, and published, differs from opinion and mere public pronouncement.

- Education regarding recycling various materials would be high on my list.

LCCMR/ENRTF:

- This may be beyond LCCMR/ENRTF, but change state grant-making policy to be more flexible and adaptive.
- Be nimble in the face of unpredictable challenges to provide the type of support appropriate to each unique emerging issue.
- Each year hundreds of proposals are submitted on various research areas. Develop a system that catalogs these by researcher and research area key-words. When situations arise that require quick action provide these researchers with the funds and opportunity to act/address immediately. Selection for researchers should be deemed "best fit" by the committee and budget should be discussed with the selected research/action team.
- Have funding available early to evaluate issues that have been identified as potential problems. Recognize that some of this money will be spent on issues that do not become problems, but that some will be well spent gaining understanding of an emerging issue.
- Reserve some ENRTF funds for supplements to existing awards so that newly uncovered research directions can be included quickly (e.g., a PI requesting a \$100k supplement to an existing award can be green-lighted quickly)
- Perhaps there could be a mechanism for grants similar to the NSF RAPID grants that allow researchers to more nimbly respond to emergent events.
- Keeping a pot of ENRTF monies available for emerging threats and have a special section just for those proposals.
- A rapid response fund similar to what the USFWS is doing with invasive species. This is a rolling grant program funding projects quarterly. When it comes to managing an invasive species outbreak, rapid response is particularly needed. The more you can do to get ahead of spread, the more successful you will be in controlling it.
- Have long term sustainable funding sources in place to be able to respond and be proactive.
- Reserving some ENRTF funds for (5-10%) for quick response support.
- Keep the ENRTF Emerging Issues funding option to continue to help address emerging issues. In complement, develop a funding lane and different set of checks & balances for longer-term projects that can build support systems/data/on-the-ground tools that are at the ready and set us up with modern/current foundations that allow us to be best we can be as a State at responding quickly and proactively.
- The LCCMR funding process is too slow - we need faster funding pathways if you are serious about this goal.
- Perhaps some funds could be set aside for rapid seed grant funding to quickly address issues as they emerge and researchers/agencies become aware of them. This would shorten the response time between proposal submission and funding from 1.5+ years to perhaps a month or less.
- Consider some % of each yr's budget to a rapid response fund that can be quickly deployed for arising needs through quick decision making to a certain \$ amount.
- I was recently made aware that an LCCMR grant takes well over a year to come into play. One researcher on water quality mentioned it would take two full years to begin their proposed project. How is this meant to foster a rapid response to anything? Or, allow Minnesota to be a leader in any

issue? Streamlining this funding source would allow researchers or managers to procure the funding they need to respond quickly.

- Develop a climate response fund that could be accessed to quickly and proactively if environmental or natural resource issues arise (i.e., a new source of pollution is discovered and needs immediate cessation and remediation; a major weather event washes away a stream bank that then needs to be restored).
- Set aside some funding for rapid response, instead of going through regular process that may take for a whole year to approve.
- Maintain the emerging issues account so that the state can look at emerging threats without waiting a year for the Legislature to act.
- Grants need to be available faster. These projects die waiting for enough funds. Have grant categories approved, and then allow staff to make awards.
- I think the current strategy is good. This is a certain level of funding that can be used for emerging issues. To my knowledge, some of this funding is used (demonstrating that it's useful) but that it is not fully utilized (indicating that sufficient funding is available).

Implementation:

- MN already has made great strides to emerging environmental issues. The next steps is making these existing products and resources culturally relevant and available to markets. IE: Kernza. MN has done a great job helping get Kernza growing on the landscape. However, the end user and end processor is not set up and ready to make this product scale-able. We need help ramping up the end processors and end users of these types of products.
- Fund capital projects with demonstrated ability to adapt to environmental change.
- Create a statewide hotline to take immediate action.
- Promote controlled environment food production to deal with weather, disease, insect, issues due to unavoidable climate change.
- Collect strategies already in place by organizations and people to respond to environmental changes due to climate change (not just state agencies). Develop a citizen's commission to address this topic and make a cohesive recommendation plan for the state. Our state government needs to accept and implement a plan. ""Research"" and ""planning"" is not helpful if it is not implemented. The directive needs to come from the top down (governor).
- Availability of emergency funding; rolling application windows for LCCMR funding; reduced emphasis on research to enable more work on response and implementation.
- Fund specific projects that address this goal now. We don't need more research. We need action.
- More implementation funding to get projects in the ground. More subsidies or promotion to encourage people to get engaged in actions on their land.
- Instead of being reactive to problems and issues as they develop - consider projects that are more proactive at addressing these problems and issues. Review the existing data and research to identify trends and emerging environmental/natural resources issues.
- Prioritize projects that respond to emerging issues identified during robust planning processes, such as those described in the Nutrient Reduction Strategy, State Climate Action Plan, State Soil Health Action Framework, Water Framework, and others.
- Policy to implement Best Management Practices quickly work well with an education program used to follow the implementation.

Planning:

- I do not think MN responds quickly in regards to management decisions. More emphasis on EDRR plans, including funding of plans, needs to occur. An EDRR plan would ensure proper steps are in place, including money, to properly manage, eradicate, and mitigate issues.
- Create long-term goals for the state and stick to them, rather than the "squirrel" approach of running after emerging issues.

Regulation and Policy:

- Minnesota's environmental regulations, rules and policies should provide the guidance but flexibility to adapt new and emerging environmental issues. Looking at the State's landscape as a whole, the extreme landscape modifications in productive agricultural lands should be considered (storage, altered hydrology, restoration) as a focus to naturally address emerging issues.
- There is a need to determine which state policies are inadequate in light of climate change and to ensure state agencies are adequately prepared to incorporate climate change as part of environmental regulatory decision-making.

Research and Demonstration:

- Support the creation and near real-time compilation of comprehensive datasets of natural resources such as water quality, agricultural BMP, and land use and utilize them for management decisions.
- Conduct research to better understand why decision-makers take so long to make decisions at key nexus points during emerging environmental issues. Similarly, conduct similar research to better understand why and how citizens either (1) get knowledge to be able to identify emerging issues and (2) to subsequently act by requesting actions from their representative decision-makers.
- Research on integrating science knowledge into political discourse.
- We are already behind on emerging contaminants. We need to identify emerging contaminants early and develop strategies to identify MN vulnerabilities.
- Proactively investigate impacts of emerging contaminants and corresponding creating of environmental and natural resource issues through field measurement and laboratory research.
- More funding and proactive research and action to prevent issues before they become critical.
- Research and set proactive action plans to deal with specific environmental and natural resource issues then educate the public and targeted stakeholders on those plans.
- Research effective solutions proactively not just responding reactively.
- Funding *long-term* research, especially climate change related research. Consultation/collaboration with indigenous communities/orgs and integration of TEK, intergenerational knowledge, etc.
- It's not about a rapid response but the result of long-term research and development of early warnings.
- First, we need to establish what the best practices are for these instances. A review of how other states handle these issues is a start. This can't be done in a vacuum though. We also need to review the results from how states handle these issues - the communal and environmental impacts.
- Careful research leading to practical solutions to emerging issues.
- Research of these issues and modeling of how they may develop would be vital to a solid foundation for determining responses as issues arise.

- Research the effects of the virtual collapse of the forest products industry and how the reduced harvesting of timber is affecting the habitat for deer and moose.
- Research
- Funding research.
- Research and measurement.
- Fund research targeted at emerging issues.
- Research and education.
- Supports research and development for destructive technologies.
- Dedicated research staff resources to deploy research projects and analyze data quickly.
- Research
- Research 2. Demonstration 3. Education
- Conducting or collecting the most up-to-date, accurate research on emerging threats/issues, and making clear recommendations and incentives to the public and private sectors promptly to address them before it's too late.
- Needs assessment based on risk and knowledge followed by education with pros and cons of action / inaction.
- Research, risk-assessment, and planning so we know what emerging issues really matter.
- Quick measurement and risk assessment.
- Research and education would be the most critical means to respond quickly.
- Invest in both applied and fundamental research.
- Funding research that enables training of a skillful workforce and paves the way for economic flourishing that keeps that workforce in Minnesota.
- Robust research with consistent data over time, working relationships with other international and national partners to share ideas and responses to issues, and education to groups of Minnesotans with varied socio-economic backgrounds and education.
- Research published (or updates about research provided to the public) within 1 year of identified issue.
- Ensuring a wide range of understanding throughout the community through research and education is essential in ensuring a collaborative effort to responding to environmental and natural resource issues.
- Support research and enact legislative change.
- Research the alternate benefits of new innovations (like continuous living cover crops or biochar) that are on the periphery of the primary benefits (i.e. study the benefit of winter camelina to pollinators, evaluate the impact of biochar on allelopathic invasive species, survey the nesting benefits of Kernza, etc.) that can provide additional incentives to new solutions to new issues. Also, provide more flexible spending to organizations seeking to address emerging issues.
- Research is key here. Additionally, having funding to respond quickly to these threats. Measurement and assessing means to remediate issues is also important - we need to understand the scope of the problems.
- Quickly recognizing and allowing opportunities for high-quality research on emerging topics and promoting conservation (preserving and protecting natural resources) for natural resources under threat of overexploitation and waste.

- Developing/maintaining a list of these issues along with surveilling for the absence/presence of a specific issue would be a high-level strategy. What are you looking for and are you looking?
- Research and evaluate policies. Support discussions among stakeholders.
- Integrating adaptive management in research and management.
- All of the above can be utilized by Minnesota: research, educate, measure and develop.
- Ensure we're able to measure our issues and our impact/progress towards resolving them. This will allow us to pivot when strategies aren't working and celebrate when they are
- Incentivize local industry-University partnerships for research and development at higher technology readiness levels than normally performed at Universities, but lower than typical industry R&D specific to emerging environmental and natural resources issues.
- Many emerging environmental and natural resource issues are not novel but may exhibit variations upon reemergence. The critical challenge is to develop truly effective and efficient methods to address and prevent their recurrent appearance.
- Research how we as a whole can reduce the amount of ground water, we all use. with some industry's using massive amounts of ground water, that will cause some smaller municipal water sources to potentially to run short for the people of said towns, and cities. We need to protect the ground water from contamination.
- Research to diversify cropping systems that benefit the environment including clean water and are profitable for farmers.
- New non-natives found on other states' noxious weeds lists are not well-researched in Minnesota and are becoming more of a problem. We also need to have better research and practical management on incorporating southern native plants into our native plant communities and where these new native plants fit in our Minnesota plant communities.
- Research and development of science based BMPs for management of invasive species.

Research - Climate

- A focus on keeping Minnesota's environmental data current will enable proactive management as we adapt to the effects of climate change. We need to understand the changes to manage them.
- Promote research in carbon capture.
- Regional research and action steps related to climate change in MN.
- Research on anticipated climate impacts to existing systems, Large scale tree planting demonstration projects in urban/rural and suburban applications.

Research - Demonstration

- Demonstration projects if potential solution exist, research to develop potential solutions if they do not.
- Research to be prepared for future issues, and then demonstration / education as needed to implement.
- Demonstration projects to evaluate effectiveness of different strategies.
- Research and demonstration of best practices and innovation to respond to emerging environmental and natural resource issues, including but not limited to cultural, global or current practices.

- Research, measure, and determine best practices to fully understand the human and environmental impacts of the issues. Similarly, develop educational materials and demonstration projects to proof out the best practices and further determine the most cost-effective solutions.

Research – Monitoring

- Prioritize funding mechanisms to enable research and characterization of episodic, stochastic, and / or extreme events and disturbances. Such events (e.g., large-scale flooding, intense precipitation events, high-intensity wildfire or tornado damage) can be very short in duration or occur only rarely, but may have dramatic and long-term implications for ecosystem recovery. The ability to initiate monitoring and sampling programs in the immediate aftermath of such disturbances and maintain such programs across longer time horizons will provide a more comprehensive understanding of ecosystem effects and recovery from extreme events that occur on uncertain time scales.
- Providing a monitoring network focused on early warning. An example might be an extensive shallow well network.
- Better sensing and monitoring systems are needed.
- I think further research and monitoring of lands and waters is the only way to start seeing trends in emerging issues.
- Monitor and research so we can identify emerging issues and implement a plan that can quickly shift funds and other resources to address the problem.
- Research and establish environmental monitoring programs that could detect issues as early as possible. This could involve the identification and monitoring of indicator species of plants and animals to provide an early warning system.
- Research statewide monitoring and reporting approaches to quantify the extent and degree of threats that are affecting environmental resources in the state.
- Encourage periodic monitoring of plant, animal, and water resources throughout the state for trends to detect anomalies.
- Partner with universities, research institutions, and non-profit organizations to stay at the forefront of environmental science and policy development. These partnerships can lead to innovative solutions for complex environmental issues and enhance the state's capacity to respond to emerging challenges. Establish a comprehensive environmental monitoring network across the state, leveraging advanced technologies like remote sensing, IoT sensors in critical ecosystems, and other initiatives. This will enable the collection of real-time data on water quality, air pollution, biodiversity, and other climate variables. Implementing sophisticated data analysis tools, including AI and machine learning, can help in predicting environmental changes and identifying potential issues before they become critical.
- Investments in monitoring systems for key indicators and collaboration with regional, national, and international partners.
- Investment: money in research, education, incentives, and raising awareness of the need for community support (e.g., surveillance and community monitoring, university credits, school extracurricular activities...). Develop long-term research and monitoring strategies to identify patterns and prevent if possible.
- The first step is to identify the issue which would imply the need for monitoring natural resource systems. Given advancements in sensing technologies and analytics this suggests active work to create a network and platform to do continuous sensing in water, atmospheric, land and in various

ecosystems. We are already doing this with satellite and high-tower monitoring systems as well as plant systems and wildlife. Expanding this effort combined with AI (the ability to real time predictive analytics) has real potential to game change our ability to respond.

- Effective monitoring and data analysis, along with communication of the results so leaders can make recommendations when emerging issues arise.

Restoration:

- Build on the federal IRA legislation at the state level--also review natural resource restoration project outcome visions, BMPs adjusted for climate change.
- Increase funding for upkeep and management of protected lands (public and private land).
- Provide better training for weed inspectors and Right-of-Way managers to better manage invasive species and be trained eyes for early eradication of new invasive species or species that are new to a particular area.