UNIVERSITY OF MINNESOTA

Crookston • Duluth • Morris • Rochester • Twin Cities

Natural Resources Research Institute

NRRI Duluth
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Duluth, Minnesota 55811
218-788-2694

NRRI Coleraine
One Gayley Ave / PO Box 188
Coleraine, Minnesota 55722
218-667-4201

6/30/2022

To: Members of the Minnesota Geospatial Advisory Council Awards Committee

RE: Nomination for the Governor's Geospatial Commendation Award

Dear Committee Members:

We are writing to nominate the Minnesota Natural Resource Atlas (mnatlas.org) for the 2022 Governor's Geospatial Commendation Award. The Atlas is a free online mapping and data visualization tool for natural resource planning, management, education, and research. The Atlas provides an intuitive, easy-to-use set of tools that anyone can use to visualize and analyze spatial data without the need for expensive software or extensive training. Importantly, the Atlas is paired with a comprehensive, multi-disciplinary spatial database for broad applications.

The Minnesota Natural Resource Atlas is a collaborative project led by the Natural Resources Research Institute (NRRI) - University of Minnesota Duluth. Development funding was provided by the Minnesota State Legislature and the Environment and Natural Resources Trust Fund. Maintenance funding has been provided by the Department of Iron Range Resources and Rehabilitation and NRRI and the University of Minnesota Office of the Vice President of Research.

The Atlas, as demonstrated in the following documentation and letters of support, aligns well with the award criteria and serves as a statewide resource for all Minnesota organizations and citizens.

Thank you for your consideration.

Sincerely,

Lucinda Johnson
Senior Research Fellow
Atlas Principle Investigator

Will Bartsch
Research Group Manager
Atlas Project Manager

Minnesota Natural Resource Atlas Nomination

Background

The Minnesota Natural Resources Atlas project was started in the fall of 2016 with the goal of making spatial data more accessible in northeastern and north central Minnesota. The initial focus was placed on identifying potential users, understanding their needs, and developing a tool that could be incorporated into their decision-making processes. In general, our target end users had the following characteristics:

1. were smaller organizations,
2. had some decision-making authority that impacted natural resources, and
3. had limited in-house GIS capacity.

Through interviews and meetings, we gained a better understanding of needs and used that information to develop a beta version of the Atlas. We used an open-source software approach to develop the Atlas, providing the flexibility to design and modify the tool to meet its users' needs. It relies on a PostgreSQL database with a PostGIS extension paired with GeoServer on the server-side. The client-side was created using a combination of Leaflet, jQuery, and other JavaScript libraries. After testing and refinement, we launched the regional version of the Atlas in the fall of 2018.

In 2019, a second round of development funding was secured. These funds were used to expand the Atlas' geographical extent statewide, increase the number of available data layers, expand the mapping tool's functionality, improve the user experience, and expand its user base through training and outreach. Extensive input was sought from users and members of our advisory committee and incorporated into the expansion. The project was completed in June of 2022.

Benefits and Results

The Atlas improves access to spatial data in Minnesota. Individuals and organizations without the necessary skills, training, or licensing to do desktop GIS can easily view and analyze spatial data within the Atlas, allowing for the information contained within the data to be incorporated into their decision-making processes. Those experienced with GIS use the Atlas for data discovery and quick visualization of more than 500 data layers. (Extensive image tile caching is completed for each data layer to enhance map drawing speed and improve user experience.) These vetted data have been developed by academic institutions, non-governmental organizations, and local, state, and federal agencies and are checked for updates quarterly. Topics range from water and agriculture to infrastructure and society and beyond, providing important context for users. Data categories include:

- Water
- Geology and Topography
- Agriculture
- Biota
- Boundaries
- Climate
- Environment
- Imagery and Landcover
- Infrastructure
- Society and Economy

Data use monitoring reveals that the most frequently accessed layers vary by month (Table 1), but across months, data within the Water, Boundaries, and Biota categories are the most frequently accessed (Table 2).

Table 1. The fifteen most frequently requested data layers in the Atlas for each month from January through May 2022.

	January	February	March	April	May
1	Watersheds - USGS HUC 12	Wetlands - NWI - Circular 39	Wetlands - NWI - Circular 39	State Lands - DNR Management Units	Water Table - Depth
2	State Lands - DNR Management Units	Wetlands - NWI - Cowardin	Wetlands - NWI - Cowardin	Protected Areas	Lakes - Muskie
3	Depth to Bedrock - State	Forestry - Lidar: Canopy Height - 2019	State Lands - DNR Management Units	Water Table - Depth	Invasive Species - Aquatic
4	Water Table - Depth	Forest Inventory Module - Unit of Measurement	State Lands - Forests	Watersheds - USGS HUC 12	Land Cover - 2019 - NLCD
5	Rivers & Streams	Forest Inventory Module - Boundaries	Rivers & Streams	Calcareous Fens	Rivers & Streams
6	Cropland - 2020 - NASS	Forest Inventory Module - Main Species Volume	Roads - MN DOT	Easements - RIM	Conservation Opportunity Areas
7	Calcareous Fens	Wetlands - NWI - Plant Community	Calcareous Fens	Public Water Access	State Lands - DNR Management Units
8	Roads - MN DOT	Trails - State	Lakes - Muskie	Native Plant Communities	Trails - Water
9	Watersheds - USGS HUC 10	Watersheds - USGS HUC 12	Watersheds - USGS HUC 12	Depth to Bedrock - State	Calcareous Fens
10	Public Land Survey - Qrtr-Qrtr Sections	Public Water Access	Watersheds - 1 Watershed 1 Plan	Biodiversity Significance	Soils
11	Watersheds - DNR Level 4	Feedlots	Invasive Species - Aquatic	Watersheds - USGS HUC 10	Native Plant Communities - Biodiversity Sig.
12	Topography - Digital Elevation Model	Forest Inventory Module - 2019 LidarAttributes	Native Plant Communities	Crop Productivity Index	Geomorphology
13	US Census Boundaries - Tracts	Forestry - Lidar: Forest - 2019	Public Land Survey - Qrtr-Qrtr Sections	Rivers & Streams	Infested Waters
14	Easements - RIM	State Lands - DNR Management Units	Depth to Bedrock - State	Easements - NCED	Open Water
15	Wetlands - NWI - Circular 39	Rivers & Streams	Water Table - Depth	Lakes - Muskie	Wild Rice - MN DNR

Table 2. The average number of data layers from each data category in the monthly fifteen most frequently accessed data layers from January through May 2022.

Category	Average Number of Layers in Monthly Top 15
Water	4.2
Boundaries	3.4
Biota	3.2
Infrastructure	1.2
Geology & Topography	1.2
Environment	1
Agriculture	0.6
Imagery & Landcover	0.2
Climate	0
Society & Economy	0

From feedback we received through conversations, surveys, and trainings, we know that our users have expanded beyond our initial target population and now include:

1. individuals at large agencies or companies who use the Atlas to perform basic GIS or to refine the mapping/analysis requests they have for their in-house GIS departments,
2. experienced GIS analysts who use the Atlas for data discovery or quick data visualization,
3. members of the public who use it to plan recreational activities.

Specific Atlas uses vary by individual and organization but include planning for environmental field work, evaluation of natural resources and the assessment of potential impacts on them from activities, evaluation of sites for conservation or preservation activities, information sharing with clients and land owners, and the evaluation of parcels for economic development.

Testimonials

“The Minnesota Natural Resources Atlas is a valuable tool for BWSR and our partners. Whether working on a conservation plan or analyzing data to provide recommendations, this easy to use tool provides quick access to a wide range of data sets. With budgets always being stretched, having this free, high quality GIS tool provides many benefits for resource concern identification and treatment design to all conservation staff in Minnesota.” - **Jon Sellnow - Technical Training and Certification Program Coordinator - Minnesota Board of Water and Soil Resources**

“And when we all started working from home, I didn’t immediately have access to my curated maps on my work computer. I could quickly get the data I needed on the Atlas on an even broader scale.” - **Kari Jacobson-Hedin - Watershed Specialist - Fond du Lac Resource Management**

Impact Outside of Home Organization

The Atlas is a statewide resource. To meet the specific needs of our users, we offer both statewide and regional data sets. Atlas use is tracked through Google analytics on the website and custom software that monitors image tile requests.

Unique monthly users have been trending upward since the project began, with a substantial increase in the spring of 2022 (Figure 1). Growth is driven through word of mouth, targeted media campaigns, and training events. Although users are concentrated in the Duluth and Twin Cities Metropolitan areas, there is a broad distribution in the location of users across the state (Figure 2). Similar patterns are seen in the geographical distribution of areas for which data is requested (Figure 3).

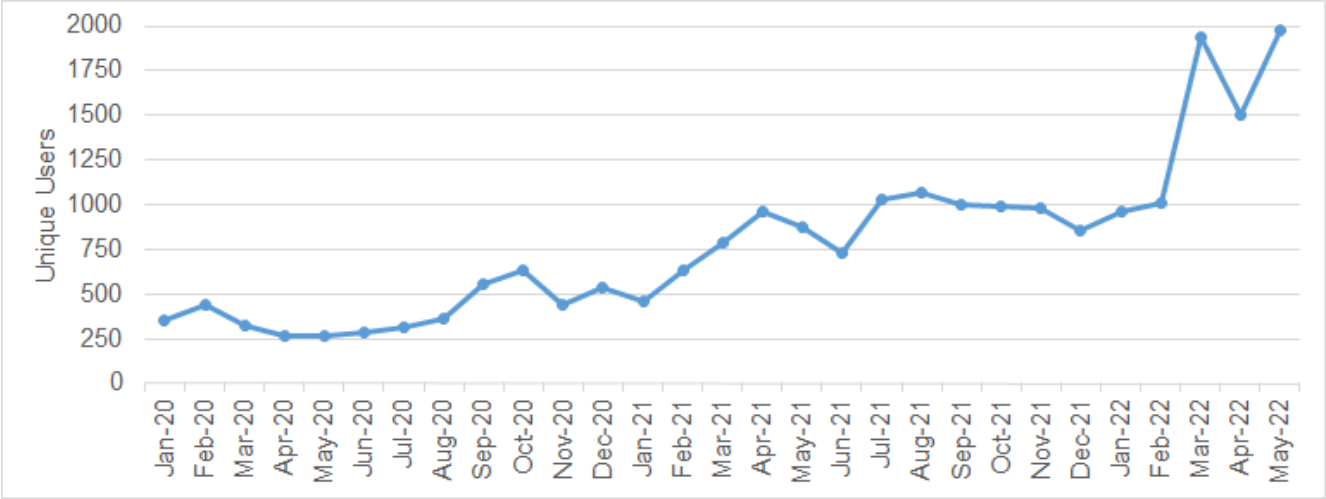


Figure 1. Number of unique monthly users of the Atlas website from January through May of 2022. Data provided by Google analytics.

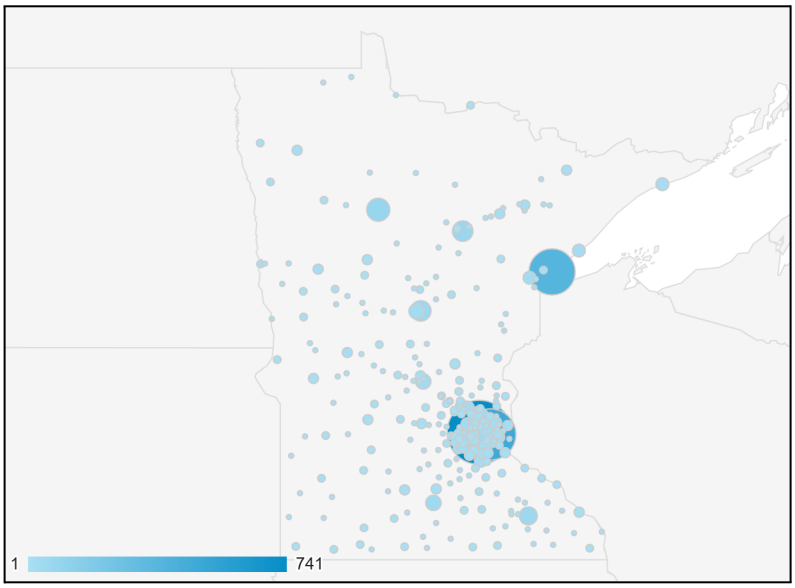


Figure 2. Distribution of internet access points for Atlas website users within the state of Minnesota from January through May of 2022. Data provided by Google analytics.

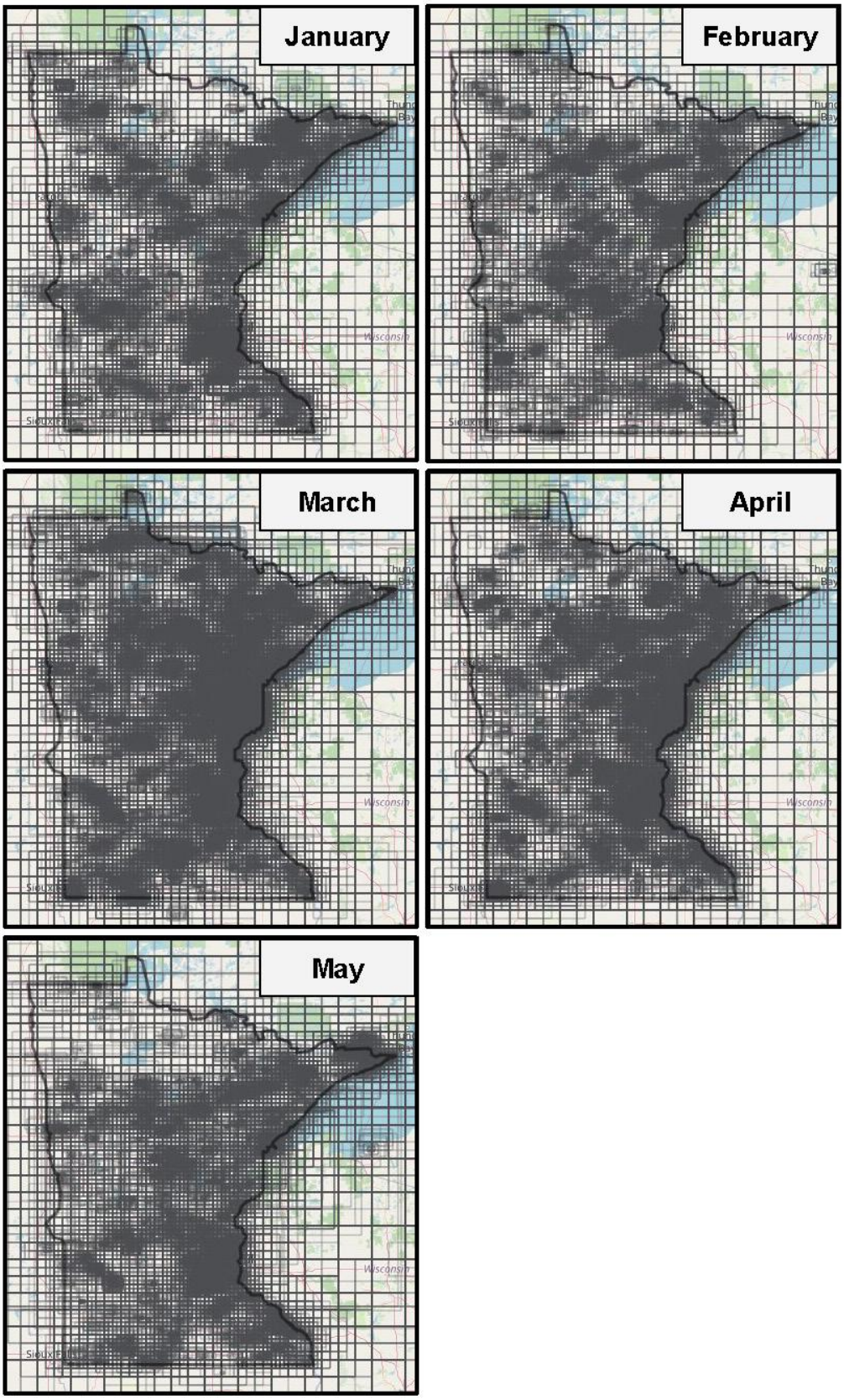


Figure 3. Boundaries of image tile requests for January through May of 2022. Higher density indicates more image tile requests for those areas.

Demonstration of Goals

Sharing of geospatial data, expertise, and technology
As highlighted throughout this document, the Atlas facilitates the sharing of spatial data and the information that it contains, especially for organizations and individuals with limited GIS capabilities.

Efficient investments in geospatial information
The Atlas uses existing state resources to efficiently provide users access to a wide variety of spatial data. Over 50% of the data on the Atlas are acquired directly from the Minnesota Geospatial Commons or provided as a Web Map Service by the Minnesota Geospatial Information Office. Additionally, the use of open-source software and NRRI's past experience in developing mapping applications were leveraged during development for efficient and effective design.

Delivery of quality education and training programs
Training, outreach, and education are key components of the Atlas project. Free 60 or 90 minute training sessions are offered to organizations or groups of individuals. An emphasis is placed on providing training for local and tribal governments. We have also partnered with the Board of Soil and Water Resources to extend the reach of our training through their annual spring and fall training events, which aim to increase the technical skills of the employees of local government units. Additionally, we conducted eight 15 to 30 minute project overview presentations that included Atlas demonstrations. To date, 47 testing/training/demonstration events have been conducted with over 1100 individuals participating. Organizations and sectors participating in the training include:

- Township Governments
- County Governments
- State Agencies
- Federal Agencies
- Soil and Water Conservation Districts
- Watershed Districts
- Non-Governmental Organizations
- Environmental Consulting Firms
- K-12 and Post-Secondary Education
- Academia

Training Highlights:

47 - Testing/Training/Demonstration events conducted
33 - Professionals participated in testing events
270 - Professionals participated in short project overview/demonstration events
653 - Professionals trained
23 - K-12 educators trained
153 - Post-Secondary students trained

Additionally, five lesson plans have been developed for Minnesota teachers and students. Three of the plans are targeted at 6th grade geography students and two of the plans are adaptable in level and target science students in grades 7-12. These plans meet Minnesota teaching standards and are ready for classroom implementation this fall.

Conclusion

The Minnesota Natural Resource Atlas is a valuable resource for the state of Minnesota, complementing and integrating with the state's geospatial data infrastructure. It is lowering or removing the barriers that prevent spatial data from informing the decision-making processes of professionals, being incorporated into the classroom, and being used and understood by citizens. Ultimately, the Atlas is making spatial data more accessible for all Minnesotans.

DEPARTMENT OF IRON RANGE
RESOURCES & REHABILITATION

PO Box 441
4261 Hwy 53 South
Eveleth, MN 55734-0441
218-735-3000
mn.gov/irrrb

June 27, 2022

RE: Governor's Geospatial Commendation Award

Dear Minnesota Geospatial Advisory Council Awards Committee,

On behalf of the Department of Iron Range Resources & Rehabilitation, I am pleased to write this letter of support of the Minnesota Natural Resources Atlas's in consideration for the Governor's Geospatial Commendation Award.

The Department of Iron Range Resources & Rehabilitation is a unique State of Minnesota economic development agency that serves the state's historic iron ore mining communities across northeastern Minnesota. IRRR's mission is to invest taconite production taxes in fostering vibrant growth and economic prosperity and diversifying northeastern Minnesota by enhancing livable communities, maximizing collaborations and partnerships, and strengthening businesses and worker education. Every year our agency financially supports projects that serve local school districts, community development, and business development efforts across the region.

The agency has financially supported the development of the Minnesota Natural Resources Atlas because it provides an accessible online mapping tool that can bring forth data in an easy to view way for local and regional decision making, especially as it relates to business and community development. The Atlas has many uses such as providing baseline data to better understand land development barriers and opportunities including wetlands, soil conditions, infrastructure availability, land ownership, and more. The MN Natural Resource Atlas makes a one stop shop where there is a multitude of data that is much more accessible to everyone, including small rural communities who often lack the capacity in staff and technical expertise to house GIS departments and staffing.

Thank you for your consideration of the Minnesota Natural Resources Atlas's for the Governor's Geospatial Commendation Award.

Sincerely,

Mark Phillips
Commissioner
Department of Iron Range Resources & Rehabilitation

1854 Treaty Authority

4428 HAINES ROAD • DULUTH, MN 55811-1524
218.722.8907 • 800.775.8799 • FAX 218.722.7003
www.1854treatyauthority.org

June 17, 2022

Members of the Minnesota Geospatial Advisory Council Awards Committee

Re: Natural Resources Research Institute (NRRI) – Minnesota Natural Resource Atlas

The 1854 Treaty Authority is an inter-tribal resource management agency governed by the Bois Forte Band of Chippewa and Grand Portage Band of Lake Superior Chippewa. The organization is charged to preserve, protect, and enhance treaty rights and related resources in the 1854 Ceded Territory. This ceded territory encompasses present-day northeastern Minnesota. We remain concerned about the health of the environment and availability of a variety of natural/cultural resources for the exercise of treaty rights.

The 1854 Treaty Authority has coordinated with the University of Minnesota Duluth – NRRI in the development and use of the Minnesota Natural Resource Atlas. We have contributed data on wild rice locations in the 1854 Ceded Territory, with the hope that increased information sharing and availability will lead to better acknowledgement and protection of this important resource. The NRRI has provided support to us through training sessions on use of the Atlas. Our staff make use of the Atlas for a variety of tasks. It is an easy-to-use tool to assist in fieldwork planning, especially for those not highly skilled in the use of geographic information systems. We also use the Atlas to better understand the resources within the 1854 Ceded Territory and determine potential impacts from management decisions or proposed projects. This tool assists us in protecting the resources within the 1854 Ceded Territory for present and future generations.

We support the Atlas for the Governors Geospatial Commendation Award. Thank you.

Sincerely,

Darren Vogt
Resource Management Division Director

BOARD OF WATER AND SOIL RESOURCES

June 24, 2022

To: Members of the Minnesota Geospatial Advisory Council Awards Committee

RE: “Continuous Living Cover 101 - Building a Foundation for Early Career Conservation Professionals.”

Dear Committee Members,

On behalf of the Minnesota Board of Water and Soil Resources (BWSR), I am pleased to submit this letter of support for the Minnesota Natural Resource Atlas.

The Minnesota Natural Resources Atlas is a valuable tool for BWSR and our partners. Whether working on a conservation plan or analyzing data to provide recommendations, this easy to use tool provides quick access to a wide range of data sets. With budgets always being stretched having this free, high quality GIS tool provides many benefits for resource concern identification and treatment design to all conservation staff in Minnesota.

We have collaborated with subject matter experts on several occasions to provide training on the use of the Atlas for local conservation employees. These trainings covered the functionality of the Atlas and the vast datasets that are available. Training attendees gain access to an approachable GIS tool that doesn’t require a lot of technical skills or added expense, yet it allows them to assess their local resource concerns and implement local conservation.

Jonathan Sellnow
Coordinator, Technical Training and Certification Program

Equal Opportunity Employer

DEPARTMENT OF NATURAL RESOURCES

Minnesota Department of Natural Resources
Forestry Resource Assessment Program
500 Lafayette Rd
St Paul, MN 55155

June 30, 2022

From: Jennifer Corcoran, Remote Sensing Program Consultant
Re: Letter of Support – Governor's Commendation Award

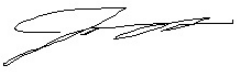
Dear Members of the Minnesota Geospatial Advisory Council Awards Committee,

It is my pleasure to support the Minnesota Natural Resource Atlas nominated for a Certificate of Commendation from the Governor. The Atlas addresses several data sharing and dissemination challenges that are important to the MN DNR's Resource Assessment Program, including providing access to new high density lidar derived products to our stakeholders, partners, and collaborators. This information needs to get in the hands of practitioners in a timely manner to realize the greatest return on investment for the incredibly valuable data. Our program engages with county and federal governments on forest inventory innovation using new high density lidar for forest inventory and forest canopy monitoring purposes. We also have a fast growing need to engage with private citizens on these data, who are often nestled within a landscape of multiple public ownerships.

The Atlas mission shares many or our needs and goals, effectively creating solutions for many of our mutual ongoing challenges. Our program cares greatly about engagement with all-lands on the use of this new technology, and the Atlas team are committed to providing the same level of service to Minnesotans through the Atlas. The Atlas ensures that more Minnesota communities are included in broader landscape scale data-driven decision making while using the most up-to-date geospatial information to do so. The Atlas support team have been incredibly collaborative and a joy to work with – we could not have been successful in our recent training events if it were not for the Atlas and the dedication from their team. I fully support this nomination and hope you will give it full consideration for a Commendation Award.

Please contact me if you need further information.
Work: 651-259-5898
Email: Jennifer.corcoran@state.mn.us

Sincerely,



Jennifer Corcoran
Resource Assessment Remote Sensing Program Consultant

Re: Nomination Letter for Minnesota Natural Resources Atlas

Dear Members of the Minnesota Geospatial Advisory Council Awards Committee,

On behalf of myself and the planning team at Emmons and Olivier Resources (EOR), I am pleased to share the impact the Minnesota Natural Resources Atlas (Atlas) has had for us, and to provide my support for their nomination for this well-deserving award. EOR, an environmental consulting firm based in St. Paul, Minnesota, has used the Atlas to increase efficiency, transparency, and collaboration in planning and research and we are grateful to their team for creating such a valuable resource.

The Atlas has enabled us to create a planning process that is more transparent and empowering for the local stakeholders. During the St. Louis River One Watershed, One Plan, we used the Atlas to provide the planning partners with links to relevant data to explore the different natural features and pollution hot spots more easily for themselves. The partners were grateful to have the ability to make quick observations about the landscape without ArcGIS or QGIS software downloaded on their computers. Internally, many of our project managers who are not well versed in using spatial mapping software have appreciated being able to use this tool to get quick and easy summaries of data for reports without the hassle of asking someone else to do this. Project managers have said they are far more efficient with this resource available. Being someone who uses mapping software in my work, I have greatly appreciated the data catalog feature, which makes it easy and quick to find the sources of all the layers so they could be downloaded and used on ArcGIS or QGIS to do more in-depth analysis. This is especially important since the data comes from many different entities who all store their data in different locations.

The Atlas team maintains a positive feedback loop with all of their users, and are diligent about keeping the tool relevant and up-to-date as new requests and comments come in. I first learned about the Atlas during a graduate course I was taking at the University of Minnesota. The Atlas team gave an excellent training presentation, where students had the opportunity to visualize data, analyze data, print simple maps, and provide feedback on the different features of the mapping tool. I immediately shared this resource with my colleagues at EOR who requested a presentation about how to use it. The Atlas team was more than happy to provide a free training to our staff, which led to many follow up requests for additional socioeconomic data to be added to the Atlas, such as the Social Vulnerability Index, racial covenants, and Home Owners Loan Corporation grading maps. They always took our requests and promptly updated us when the changes had been made. Many other mapping tools become static the moment they are created, unless someone is diligent about updating them. Since using the tool, the Atlas team has continued to keep the data relevant as new information is released. This keeps me coming back to use it.

We are grateful to the Natural Resources Research Institute's Atlas team for developing this tool, and look forward to continuing to providing input on updates to new data and features. We will continue to share this Atlas with stakeholders as we work on watershed and surface water management plans throughout the State of Minnesota to increase access to data and to improve transparency. I truly believe the Atlas team are well-deserving of this award, and I hope you will consider them for this nomination.

With gratitude,

Rosie Russell, Environmental Planner at EOR

DEPARTMENT OF NATURAL RESOURCES

Minnesota's Lake Superior Coastal Program
1568 Hwy 2 Two Harbors, MN 55616

June 29, 2022

Members of the Minnesota Geospatial Advisory Council Awards Committee

Dear committee members,

It's with great pleasure that I nominate the Minnesota Natural Resource Atlas for the Governor's Geospatial Commendation. I believe the Minnesota Natural Resource Atlas is an excellent choice for this annual reward.

As I type this letter, Minnesota's Lake Superior Coastal Program is wrapping up a two year project to develop the Minnesota Coastal Vulnerability Assessment Protocol for Public Access Sites. Built on an approach developed by the National Park Service, the protocol utilizes the best available data which includes all types from intensive GIS data to qualitative information from site managers, and everything in between. A key priority for project partners was to include a tool that supports users with limited access to GIS data, software, and technical expertise. The Minnesota Natural Resource Atlas provides quick access to much of the data needed to complete site vulnerability assessment.

Key factors in choosing the Minnesota Natural Resource Atlas in protocol development.

- It has improved access to spatial data for our skilled and novice GIS data users.
- Atlas staff outreach and training events have increased geospatial data access to coastal communities, resource managers, and nonprofits addressing climate related impacts to Lake Superior's coast.
- Many of our project partners were already using the atlas either as primary access to geospatial data or a resource that they had accessed frequently.
- It served as a resource for workers adjusting to home office scenarios where the desktop GIS came home but the GIS data remained on office servers.

Thank you for your time and consideration. While celebrating my 25th year in State service, I am noticing a positive shift from stories describing barriers to geospatial data and software. To success stories about uses of geospatial data. Most of those stories start with "I was using the Minnesota Natural Resource Atlas".

Sincerely,

Clinton Little

Coastal Program Specialist
Minnesota's Lake Superior Coastal Program