

Environment and Natural Resources Trust Fund

M.L. 2022 Approved Work Plan

General Information

ID Number: 2022-048 Staff Lead: Mike Campana Date this document submitted to LCCMR: June 14, 2022 Project Title: Enhancing Natural Resource Conservation through Species Distribution Modeling Project Budget: \$200,000

Project Manager Information

Name: Holly Bernardo

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Project Reporting

Date Work Plan Approved by LCCMR: June 27, 2022

Reporting Schedule: April 1 / October 1 of each year.

Project Completion: June 30, 2025

Final Report Due Date: August 14, 2025

Legal Information

Legal Citation: M.L. 2022, Chp. 94, Art. , Sec. 2, Subd. 03b

Appropriation Language: \$200,000 the second year is from the trust fund to the commissioner of natural resources to create distribution models for rare species in Minnesota to provide new tools for natural areas conservation.

Appropriation End Date: June 30, 2025

Narrative

Project Summary: Create Species Distribution Models (SDMs) for rare species in Minnesota to provide new tools for natural areas conservation and rare species surveys.

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

To help conserve Minnesota's native flora and fauna, conservation planners, environmental impact reviewers, land managers and landowners have to know where the plants and animals are—especially rare species that are in danger of vanishing from the state.

DNR biologists have been conducting field surveys to document where rare species remain in Minnesota. Yet, our information is incomplete. First, we cannot get to all potential locations for every species, and second, we do not have good information for many species on the extent of other unsearched locations where those species also likely reside. As a result:

1. For sites where rare species have not been surveyed, environmental review and conservation planners have no way of predicting the likelihood of a rare species being present, or of identifying other suitable habitat for a given rare species for mitigating environmental impacts.

2. Rare species field surveys can be hit-or-miss when surveyors are uncertain about how likely a species will occur in a given location – this makes surveys expensive and inefficient.

3. Public and private demand for DNR rare species data and expertise exceeds our staff capacities resulting in lost opportunities to protect biodiversity.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

This project will address the above issues by developing Species Distribution Models (SDMs) for Minnesota rare species. The project will use: (1) GIS modeling software to integrate known rare species locations with GIS data layers (e.g. LiDAR, climatology, soils, LandSat, and land-use data) to generate predictive habitat suitability maps for a given species, (2) test model predictions by conducting field surveys, and (3) refine the models' predictive success by integrating the new field data back to the model. The final product will include a tested and refined process for modeling species distributions in Minnesota and data-driven maps that identify locations that have the highest likelihood of supporting a specific rare species in Minnesota. For projects undergoing environmental review that lack previous surveys, these maps will become one of the standard tools used for determining the likelihood of a rare species being present and for targeting field surveys.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

This project will:

1. Increase our ability to locate suitable habitat in decisions to require field surveys or mitigate environmental impacts in regulatory processes.

2. Increase precision in decisions, such as state listing decisions, by providing data-driven estimates of a species' viability, vulnerability and available suitable habitat.

3. Increase the sharing of knowledge about rare species distributions and habitats by synthesizing an immense amount of subject matter expertise that currently resides inside the heads of a few biologists.

4. Increase the effectiveness of rare species field surveys by identifying and ranking unsurveyed locations where rare species are likely to occur.

Project Location

What is the best scale for describing where your work will take place? Statewide

What is the best scale to describe the area impacted by your work? Statewide

When will the work impact occur?

During the Project and In the Future

Activities and Milestones

Activity 1: Develop Species Distribution Models

Activity Budget: \$50,000

Activity Description:

Assemble and meet with a technical team of collaborators within and outside the DNR to develop model applications, data inputs and modeling protocols. Consult with other organizations that have experience with SDM, including NatureServe (an international network of conservation science organizations). Identify target species to model that have at least 10 known locations. Assemble SDM software and other tools. Assemble continuous coverage GIS data layers (LiDAR, climatology, soils, LandSat, land-use). Run SDM models on at least 100 rare plant species (and a similar number of rare animal species with federal funding for which these LCCMR dollars are a match). Convene the technical team to review model outputs. Refine and rerun models.

Activity Milestones:

Description	Approximate Completion Date
A technical team identifies target species, model applications, needs, parameters and protocol	September 30, 2022
SDM models are completed for at least 100 species	February 28, 2023
SDM model outputs are reviewed by technical team and protocol adjustments identified	March 31, 2023
Models are refined and rerun based on technical team reviews.	April 30, 2023

Activity 2: Test Model Predictions by Conducting Field Surveys

Activity Budget: \$120,000

Activity Description:

Field surveys guided by SDM outputs are conducted in the 2023 and 2024 field seasons. For each field season, a minimum of 10 new SDM-generated locations will be surveyed for at least 10 species (i.e.>100 field survey locations). Results are compiled into the DNR's Natural Heritage Information System databases including the Observation Database and the Rare Features Database.

Activity Milestones:

Description	Approximate Completion Date
At least 10 SDM-identified locations for at least 10 species are surveyed by field staff in 2023 field	September 30, 2023
season	
2023 field season data are compiled into databases	December 31, 2023
At least 10 SDM-identified locations for at least 10 species are surveyed by field staff in 2024 field	September 30, 2024
season	
2024 field season data are compiled into databases	December 31, 2024

Activity 3: Refine Models by Integrating New Field Data

Activity Budget: \$30,000

Activity Description:

Refine the models' predictive success by integrating new data back in the models and rerunning the models. Apply standard evaluation methods to assess model results. Incorporate validated models in DNR data delivery sites that are available for use by a wide range of people inside and outside the DNR, including environmental review biologists and contractors licensed to access rare species data.

Activity Milestones:

Description	Approximate Completion Date
New data are incorporated into models and models are rerun	February 28, 2025
Technical team evaluates model results and identifies improvements	March 31, 2025
Outputs from validated models are made available for use	June 30, 2025

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Regan Smyth	NatureServe	Guidance on tools and procedures developed for species distribution modeling.	No

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines. MBS data are stored primarily in the DNR Natural Heritage Information System. SDMs will become one of the standard Natural Heritage Information System (NHIS) data delivery products that are provided by the Minnesota DNR through the same means as rare species data and information. MBS often delivers data in response to requests from researchers at academic institutions, government agencies, and other organizations. Staff routinely make presentations that describe MBS methodologies and results to a wide range of audiences including county boards, local planning groups, citizen advisory groups, other biologists, land managers, and students. MBS staff provide local planners with ecological interpretations describing important native and rare species, ecological communities, and sites of biodiversity significance to assist with management plans.

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgement Guidelines.

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

Once built, tested and refined, SDMs will become one of the standard Natural Heritage Information System (NHIS) data delivery products that are provided by the Minnesota DNR through the same means as rare species data and information. The SDMs will be trained over time to improve their predictions through the input of new field survey data and advancements in the related datasets. Ongoing financial support for SDMs will be covered by program funding.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineli	% Bene	# FTE	Class ified	\$ Amount
				gible	fits		Staff?	
Personnel								
Natural Resource		Create and evaluate SDM models; field survey			30%	1.5		\$151,023
Specialist/Intermediate		SDM-identified locations						
- Plant Ecologist								
Natural Resource		Create and refine SDM models; conduct field			30%	0.2		\$25,000
Specialist SR - Plant		surveys to SDM-identified locations						
Ecologist								
							Sub	\$176,023
							Total	
Contracts and Services								
							Sub	-
							Total	
Equipment, Tools, and								
Supplies								
							Sub	-
							Total	
Capital Expenditures								
							Sub	-
							Total	
Acquisitions and								
Stewardship								
							Sub	-
							Total	
Travel In Minnesota								
	Miles/ Meals/	Travel for one 1-2-person 2 field seasons to	Fleet, lodging, meal expenses while					\$10,000
	Lodging	sample approximately 20 sites, approximately	in travel status for field surveys.					
		10,000 miles. Vehicles (\$5,900), lodging						
		(\$2,700), and meals (\$1,400) in accordance with						
		the Commissioner's Plan.		_				440.000
							Sub	\$10,000
Traval Outside							Total	
Ninnesete								
willinesota							Sub	
							Total	-

Printing and Publication					
				Sub Total	-
Other Expenses					
	DNR Direct & Necessary	DNR's direct and necessary costs pay for activities that are directly related to and necessary for accomplishing appropriated projects. HR Support (~\$2,829), Safety Support (~\$438), Financial Support (~\$2,371), Communication Support (~\$1,311), IT Support (~\$6,019), and Planning Support (~\$1,008).			\$13,977
				Sub Total	\$13,977
				Grand Total	\$200,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or	Description	Justification Ineligible Expense or Classified Staff Request
	Туре		

Non ENRTF Funds

Category	Specific Source	Use	Status	\$ Amount
State				
In-Kind	State Heritage Enhancement	In kind funds for 0.25 FTE (existing classified NR Specialist SR and	Pending	\$65,000
		Research Scientist 2) for 2 years; DNR GIS/IT professional services.		
Cash	State mitigation dollars	Funds earmarked for SDM for goblin fern (Botrychium mormo).	Secured	\$50,000
In-Kind	General Fund	0.1 FTE for Project management, supervision, administrative support	Pending	\$20,000
			State Sub	\$135,000
			Total	
Non-State				
In-Kind	Federal State Wildlife Grant	LCCMR dollars would be State match to Federal dollars; Federal dollars	Secured	\$130,000
		used for animal SDMs		
			Non State	\$130,000
			Sub Total	
			Funds	\$265,000
			Total	

Attachments

Required Attachments

Visual Component File: <u>2548c54d-ac0.pdf</u>

Alternate Text for Visual Component

Graphic illustration of a species distribution model for blanket flower....

Optional Attachments

Support Letter or Other

Title	File
Background Check Certification Form	<u>cb8e36f6-12e.pdf</u>

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

A new reporting schedule was requested. Additions were made to the Dissemination page as instructed. An error in the project managers contact information was corrected. And, information was added to the travel budget justification as requested.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes? N/A

Do you agree travel expenses must follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan? Yes, I agree to the Commissioner's Plan.

- Does your project have potential for royalties, copyrights, patents, or sale of products and assets? No
- Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10? $$\rm N/A$$
- Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF? N/A
- Does your project include original, hypothesis-driven research? Yes
 - res
- Does the organization have a fiscal agent for this project?

No

Species Distribution Models (SDMs) Improving natural resource conservation

The more conservation planners, land managers and environmental impact reviewers know where Minnesota's rare natural features are, the better they can plan the future to conserve them.

- Rare species field surveys can be costly, take time and not all possible habitat can be surveyed.
- SDMs are computer-generated models that build on existing data to identify and prioritize unsurveyed locations where species are likely to occur.



Tangible...actionable results:

✓ Increase our ability to locate suitable habitat in decisions to require field surveys or mitigate environmental impacts in planning and regulatory processes.

✓ **Optimize precision in decisions,** such as state and federal listing decisions, by providing data-driven estimates of a species' viability, vulnerability and available suitable habitat. Expand the sharing of knowledge about rare species distributions and habitats by synthesizing an immense amount of subject matter expertise that currently resides inside the heads of a few biologists.

✓ Improve the effectiveness of rare species field surveys by identifying and ranking unsurveyed locations where rare species are likely to occur.

