Environment and Natural Resources Trust Fund

2022 Request for Proposal

General Information

Proposal ID: 2022-153

Proposal Title: Conserving Black Terns and Forster's Terns in Minnesota-Resubmission

Project Manager Information

Name: Annie Bracey

Organization: U of MN - Duluth - NRRI

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Project Basic Information

Project Summary: Black and Forster's tern populations have declined. Comprehensive assessment of distribution and breeding status will identify population limiting factors to inform best management practices and prioritize conservation and restoration.

Funds Requested: $199,000

Proposed Project Completion: June 30 2025

LCCMR Funding Category: Small Projects (H)
      Secondary Category: Foundational Natural Resource Data and Information (A)

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?
      In the Future

Narrative

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

Black and Forster's terns are waterbirds that breed in freshwater wetlands with extensive emergent vegetation and open water, preferably located within large wetland complexes. These species have similar habitat preferences and can often be found nesting in the same wetlands. Populations of both species have declined significantly throughout their range in North America over the last 50 years. In Minnesota, Black Terns have experienced a large and statistically significant decline since 1966, decreasing an average of 5.8% per year for a loss of nearly 96% of the state population over 53 years. It has been suggested that the distribution and abundance of Forster's Terns has remained relatively unchanged in the state since the 1980s, although numbers remain low, likely <1,000 nesting pairs. For these reasons, both species are designated as Species in Greatest Conservation Need by the Minnesota Department of Natural Resources and Target Conservation Species by Audubon Minnesota. The main cause of population declines in Minnesota is hypothesized to be loss of suitable nesting habitat and habitat degradation due to invasive plants such as Phragmites, purple loosestrife, and hybrid cattail.

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

Based on habitat preferences, suitable nesting habitat appears to exist in the state that is not currently being used by these species. Therefore, it is important to characterize changes associated with development, hydrology, and invasive species that have occurred in wetlands that have historically been used for breeding. Given the low site fidelity of Black Terns and the apparent lack of colonization of new sites by Forster's Terns, quantifying landscape changes associated with abandoned colonies in addition to identifying important characteristics of breeding colonies that have persisted over time will allow us to prioritize and develop recommendations for habitat restoration.
1) We will conduct a comprehensive assessment of the current and historical distribution and abundance of the Black Tern and Forster's Tern in Minnesota.
2) We will identify population limiting factors associated with habitat suitability and identify key habitat features associated with colony stability, which will allow us to provide recommendations for best management practices and to prioritize conservation and restoration efforts.
3) We will develop systematic protocols for long-term monitoring of these species in the state.

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 develop long-term monitoring and conservation management plans for Black and Forster's Terns in Minnesota. It will identify management actions for land managers at both site-specific and landscape-level scales. Our results will help inform managers and landowners about best practices for restoring nesting habitat for these species of conservation concern and will help identify where restoration efforts are most likely to be effective. We will share outcomes with land managers, state and federal government agencies, and non-profit organizations working to conserve these species.

Activities and Milestones

Activity 1: Data integration of historical and current breeding sites and wetland monitoring prioritization

Activity Budget: $36,740

Activity Description:

To develop a comprehensive assessment of potential priority wetland complexes, we will communicate with project partners to obtain historical and current breeding records for Black and Forster's terns in Minnesota. We will contact wildlife partners from MNDNR, MNBBA, Minnesota Ornithologists' Union, and Audubon Minnesota to obtain all relevant data and compile it into one geospatial database. We will then use the Global Surface Water dataset (https://global-surface-water.appspot.com/) to characterize changes in water occurrence; the US Geological Survey (USGS) National Land Cover Database (NLCD; https://www.mrlc.gov/data/nlcd-land-cover-change-index-conus) to characterize land cover at multiple spatial scales (e.g., 500m,1km, 50km) and to quantify changes in land use (e.g., % agriculture and development); and the USGS Nonindigenous Aquatic Species (NAS) Database (https://nas.er.usgs.gov/default.aspx) and/or the Early Detection & Distribution Mapping System (EDDMapS) Database (https://www.eddmaps.org/) to identify the presence of invasive plant species at wetlands that have historically been used and/or are currently being used as breeding sites for one or both species (Fig. 2). We will use these data to model landscape-level wetland characteristics of successful colonies and identify priority wetlands for detailed monitoring efforts.

Activity Milestones:

Description	Completion Date
Obtain and merge data sources and integrate into the breeding colony geospatial database.	October 31 2022
Characterize wetlands used for breeding and analyze impacts of landscape changes on colony persistence	April 30 2023
Identify priority wetlands to use as focal study sites.	May 31 2023

Activity 2: Determine site quality and habitat characteristics of priority wetlands

Activity Budget: $132,860

Activity Description:

We will locate and inventory potential nesting areas to monitor the status of breeding colonies in priority wetlands. Monitoring will be conducted using a combination of in-person visits and drones. This activity will allow us to assess the feasibility of using drones as part of a long-term monitoring program for tern colonies across the state. We will measure hydrological changes, water quality, and food availability to assess site-specific conditions. We will also quantify habitat characteristics of breeding colony locations in the wetlands along with features of individual nest locations. Specifically, we will characterize features associated with presence of both species relative to breeding status, including interspersion of hemi-marsh, water level control mechanisms, presence of invasive species, and land use around the wetlands. These data will allow us to determine characteristics of productive colonies, identify features that impact colony success, develop best practices for public land managers, and provide metrics for restoration and conservation initiatives.

Activity Milestones:

Description	Completion Date
Conduct tern monitoring at priority wetlands for two breeding seasons using in-person surveys and drones	August 31 2024
Collect data to characterize site quality and habitat features at a subset of priority wetlands	August 31 2024

Determine characteristics of productive colonies and identify limiting factors for breeding colonies across the state	December 31 2024

Activity 3: Identify priority wetland sites for restoration and develop long-term monitoring protocol for breeding tern colonies.

Activity Budget: $29,400

Activity Description:

To increase the availability of suitable breeding habitat for Black and Forster's terns in the state we will use the landscape model developed in Activity 1 to identify wetland sites that are most likely to sustain breeding tern colonies. We will use the information from Activity 2 to develop site specific restoration plans for these wetlands to ensure the restored sites meet the site quality and habitat characteristics needed for successful breeding colonies. We will use the monitoring data collected in Activity 2 to develop best practices for restoration and long-term monitoring of breeding Black and Forster's tern colonies in Minnesota.

Activity Milestones:

Description	Completion Date
Identify priority sites for restoration and develop site specific restoration plans.	June 30 2025
Determine viability of using drones for monitoring and develop protocol for long-term monitoring	June 30 2025

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 be funded?

This project builds on several current and previous LCCMR funded projects including the "Minnesota Breeding Bird Atlas" (NRRI/Audubon Minnesota), "Implementing Conservation Plans for Avian Species of Concern" (Audubon Minnesota), and "Creating a Statewide Wetland Bird Survey" (Audubon Minnesota). Our breeding colony monitoring protocol and restoration guide will be distributed to land mangers throughout the state. Additional funding will be needed to continue long-term monitoring of breeding terns; we will seek additional funds from available state and federal resources to ensure the long-term conservation of these imperiled species.

Project Manager and Organization Qualifications

Project Manager Name: Annie Bracey

Job Title: Avian Ecologist

Provide description of the project manager's qualifications to manage the proposed project.

Annie Bracey has worked as an Avian Ecologist at the Natural Resources Research Institute, University of Minnesota Duluth for over 10 years, working primarily on projects related to marsh birds in Great Lakes coastal wetlands. Annie obtained her Master's degree at the University of Minnesota Duluth and will have completed her PhD in the Conservation Sciences program at the University of Minnesota Twin Cities in April 2021. Her research is focused on conservation and management issues related to Common Terns in the Great Lakes region including: 1) documenting exposure to contaminants, 2) tracking terns using light-level geolocators and GPS tags to document migration routes, wintering areas, and foraging habitats, and 3) using Integrated Population Models to make inferences about population dynamics. Her broad interest is determining how human activities influence bird populations and how research that integrates ecology, biology, and conservation sciences can be used to better inform management decisions.

Most project personnel are NRRI research staff (not teaching faculty) who receive minimal salary support from the University of Minnesota Duluth; they are largely paid on grant monies and their effort on this project will be paid from ENTRF.

Organization: U of MN - Duluth - NRRI

Organization Description:

The Natural Resources Research Institute (NRRI) is an applied research and economic development engine for the University of Minnesota research enterprise. NRRI employs over 130 scientists, engineers and technicians to deliver on its mission to deliver research solutions to balance our economy, resources and environment for resilient communities. NRRI collaborates broadly across the University system, the state and the region to address the challenges of a natural resource based economy.

NRRI scientists have extensive experience in managing large, interdisciplinary projects. Major objectives include the development of tools for environmental assessment and resource management. NRRI's role is as an impartial, science-based resource that develops and translates knowledge by characterizing and defining value-resource opportunities, minimizing waste and environmental impact, maximizing value from natural resource utilization and maintaining/restoring ecosystem function.

The NRRI Avian Ecology Lab is led by Dr. Alexis Grinde (over 15 years of wildlife and education experience) and consists of five full-time research scientists. Our research focuses on the development of economically sustainable conservation

strategies and land management guidelines to preserve and enhance the species diversity of Minnesota bird populations and to protect species of conservation concern.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Principal Investigator		Project management and coordination.			26.7%	0.54		$48,932
Co-Investigators		Provide advice and guidance on project implementation, analyses, and interpretation.			26.7%	0.03		$5,646
Research Scientists		Assist with project design, data collection and analysis.			24.1%	0.3		$21,975
Field Technician		Assist with data collection.			7.4%	0.3		$10,311
Graduate Student (MS)		Lead field data collection and analysis.			49.4%	1		$83,478
							Sub Total	$170,342
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Equipment	Unmanned Aerial Vehicle (UAV) monitoring equipment (DJI Matrice 600 and batteries)	Required to collect UAV aerial imagery which is crucial for data analyses					$8,030
	Tools and Supplies	Wildlife monitoring and hydrology equipment	Includes remote cameras to monitor colony status, pressure transducers for monitoring water levels, misc. supplies for data collection (e.g., batteries, waders, SD cards)					$10,188
							Sub Total	$18,218
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								

							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Miles (~8,285 x $0.56 per mile), Meals ($45/day x 40 days x 2 people), Lodging ($100/night x 40 nights) x 2 years	Funds required to travel to field sites and conduct fieldwork					$10,440
							Sub Total	$10,440
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
							Sub Total	-
							Grand Total	**$199,000**

Classified Staff or Generally Ineligible Expenses

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

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
-			**State Sub Total**	-
Non-State				
In-Kind	UMN unrecovered indirect costs are calculated at the UMN negotiated rate for research of 55% modified total direct costs.	Indirect costs are those costs incurred for common or joint objectives that cannot be readily identified with a specific sponsored program or institutional activity. Examples include utilities, building maintenance, clerical salaries, and general supplies. (https://research.umn.edu/units/oca/fa-costs/direct-indirect-costs)	Secured	$86,965
			Non State Sub Total	**$86,965**
			Funds Total	**$86,965**

Attachments

Required Attachments
Visual Component
File: f6ac1677-05e.pdf

Alternate Text for Visual Component
Text Reads: Problem: Marsh nesting tern species have declined significantly throughout their range in North America, including in Minnesota.
Black Tern and Forster's Tern are pictured in flight. Maps of the distribution of the species in the state.
Test Reads: Solution: We will conduct a comprehensive assessment of the current and historical distribution of Black Tern and Forster's Tern in Minnesota.
Typical wetland habitat and a shallow nest with three eggs on a floating mat of vegetation ar...

Optional Attachments
Support Letter or Other

Title	File
Sponsored Projects Transmittal Letter	9d68214c-3fe.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?
> No

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?
> 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

Does the organization have a fiscal agent for this project?
> Yes, Sponsored Projects Administration

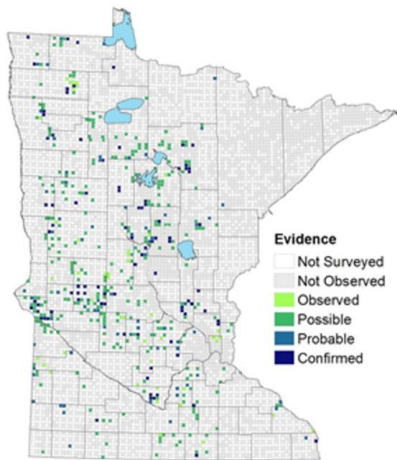# Conserving Black Terns and Forster's Terns in Minnesota

Problem: Marsh-nesting tern species have declined significantly throughout their range in North America, including in Minnesota.
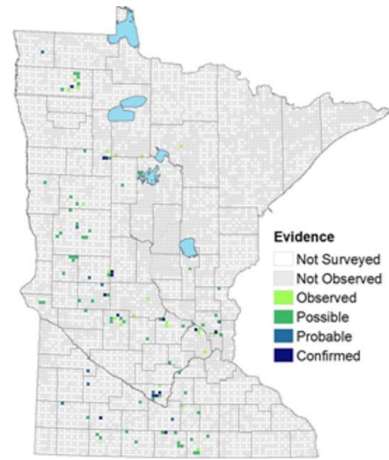

Black Tern in flight. Photo credit: Steve Kolbe

Forster's Tern in flight, Photo credit: Steve Kolbe

Black Tern occurrence map.
mnbirdatlas.org

Forster's Tern occurrence map.
mnbirdatlas.org

Solution: We will conduct a comprehensive assessment of the current and historical distribution of Black Tern and Forster's Tern in Minnesota.

Breeding habitat

Tern nest

Project Outcomes: Determining site quality and habitat characteristics will inform managers and land owners about best practices for restoring nesting habitat for Black and Forster's Terns and inform long-term monitoring protocols for these species.