Environment and Natural Resources Trust Fund

2025 Request for Proposal

General Information

Proposal ID: 2025-127

Proposal Title: Green Heron as an Indicator of Wetland-Dependent Species

Project Manager Information

Name: Elena West

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

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Project Basic Information

Project Summary: Green Herons have declined across much of their range. Information on their annual cycle habitat use and migratory movements is needed to understand and address conservation concerns for wetland-dependent birds.

ENRTF Funds Requested: $440,000

Proposed Project Completion: June 30, 2028

LCCMR Funding 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?
During the Project and In the Future

Narrative

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

The loss or degradation of wetland habitats may be a key factor in the decline of many wetland-dependent species that rely on these habitats for breeding, foraging, and migratory stopover habitat. These species are often difficult to study due to their cryptic habits and use of brushy, forested wetlands, which can impede detection. Despite their widespread distribution and use of diverse wetland habitats, Green Herons are in steep decline across much of their range. In Minnesota, recent gains in wetland acreage may support wetland-dependent species like Green Herons, but significant gaps in our understanding of this species' breeding, wintering, and migratory habits (i.e. annual cycle) inhibits conservation efforts. Here, we will test competing hypotheses around Green Heron population dynamics: 1) declines are due to degradation of wetland habitats (and, perhaps, lack of use of newly created wetlands), and 2) declines are due to factors outside of Minnesota (e.g., habitat on the wintering grounds, stopover sites). This study will help us to determine which hypothesis is more likely, and importantly, the implications for Green Herons and many other wetland-dependent bird species.

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 study will provide critical information on the ecology of Green Herons, particularly their use of wetland habitats during the annual cycle, including migration. First, we will mark and monitor individuals from breeding populations in Minnesota using GPS satellite tracking technology. Data derived from marked birds will allow us to identify important regions for Green Herons during post-breeding, migration, and wintering periods and quantify habitats used during the full annual cycle. Resulting information can be used to identify potential factors influencing population dynamics and conservation strategies to benefit Green Herons and other wetland birds. Next, we will deploy acoustic recording units (ARUs) at Green Heron sampling locations to better understand how these areas support other secretive wetland-dependent species that may also be in decline. We will use the results of our study to identify the habitat factors that support wetland-dependent species and develop standardized survey protocols for other secretive bird species associated with forested and brushy wetland cover types, including Belted Kingfishers (Megaceryle alcyon) and Yellow-billed Cuckoos (Coccyzus americanus), both of which are difficult to study and lack key information on their population status.

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?

We will: 1) describe the annual cycle habitat use and migratory movements of Green Herons in Minnesota, 2) quantify Green Heron habitat use and selection during the breeding season and identify post-breeding, stopover, and wintering habitats, 3) evaluate Green Heron migratory connectivity, and 4) characterize wetland-dependent bird communities using data from acoustic recordings at Green Heron sampling locations. This project will provide data to assess wetland habitats for Green Herons and other wetland-dependent birds and provide insights for conservation planning to ensure long-term sustainability of this critical habitat for Minnesota's wetland species.

Activities and Milestones

Activity 1: Field Sampling and Data Collection
Activity Budget: $123,000

Activity Description:
To better understand Green Heron annual cycle habitat use and migration, we will: 1) identify potential study areas that are representative of Green Heron breeding sites across Minnesota by processing land cover maps to determine suitable sites to survey for Green Herons, 2) survey for Green Herons and capture individuals using mist nets, and deploy GPS tracking devices (n=20) in 2025 and 2026 to track individuals throughout the breeding and non-breeding season, 3) deploy ARUs at each Green Heron sampling location to assess the breeding wetland-dependent bird community. These data will provide critical information that will be used to understand the ecology of Green Herons and potential causes of population declines throughout their range.

Beginning with transmitter deployment in 2025, we will acquire high-resolution location data for Green Herons breeding in Minnesota, and evaluate local and regional movements and habitat use. The GPS satellite transmitters will record and save GPS locations several times each day for two years and can record locations at different intervals throughout the day and at different times of the year. The data are uploaded using ARGOS satellite technology and will be archived in Movebank, a free repository for animal location and biologging data.

Activity Milestones:

Description	Approximate Completion Date
Identify potential sampling areas (wetlands) across Minnesota	August 31, 2025
Capture Green Herons and deploy GPS tracking devices	August 31, 2026
Deploy ARUs at each Green Heron sampling location	August 31, 2026
Acquire high-resolution GPS data for marked Green Herons	August 31, 2026

Activity 2: Quantify Green Heron annual cycle habitat use, migratory movements, and connectivity; assess wetland bird community using ARU data
Activity Budget: $317,000

Activity Description:
We will fit statistical models to the location data to describe seasonal movement and habitat-use patterns, including a comparison of the use and availability of different wetland types as an index of habitat selection or preference. We will map migration pathways and fit movement models or movement-based home range estimators (e.g., Brownian Bridges) to summarize local movement patterns. We will assess land-cover abundance and distribution using publicly available land-cover data along with high-resolution movement data derived from marked herons, to identify patterns in use of wetlands by marked birds. We will evaluate acoustic data from each sampling location to identify target vocalizations (i.e., vocalizations indicative of presence and breeding). Results from our acoustic recordings will be used to assess the relationship between wetland bird species richness and wetland characteristics from land cover data (heterogeneity, vegetation cover, height, variability, and texture). We will also develop a website to showcase Green Heron migratory movement patterns as part of our outreach and dissemination efforts. This website will be patterned after the one we developed for our LCCMR-funded study of trumpeter swans, which has been viewed over 30,000 times by ~19,000 unique viewers in 60 different countries.

Activity Milestones:

Description	Approximate Completion Date
Acquire habitat data from Green Heron sampling locations and across migratory routes and wintering locations	December 31, 2027
Assess acoustic data to identify wetland bird vocalizations and relationship to wetland characteristics	December 31, 2027
Assess annual cycle habitat use and migration patterns	May 31, 2028
Submit final report and activity summary	June 30, 2028

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. David E. Andersen	Minnesota Cooperative Fish and Wildlife Research Unit	The Minnesota Cooperative Fish and Wildlife Research Unit will provide in-kind and other support, including purchase and loan of additional supplies (2 ARGOS GPS Solar Pinpoint Tags). Dr. Andersen will also serve as a scientific advisor to the project.	No
Dr. Michael Wells	U.S. Fish and Wildlife Service	Dr. Wells will assist with coordination of field logistics, data management and analyses, and will co-advise the graduate research assistant. Dr. Wells will also contribute in-kind support, including the purchase of 3 ARGOS GPS Solar Pinpoint Tags and an ARGOS Data Subscription for 5 tags.	No

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?

This study will provide critical information needed for assessing the factors that may be driving Green Heron declines in much of their range and declines in other wetland-dependent species. Understanding whether population dynamics are driven by degradation of wetland habitats and lack of use of newly created wetlands, or factors outside of Minnesota will support wetland restoration efforts and conservation strategies that will benefit multiple migratory and wetland-dependent species during both breeding and non-breeding seasons. Information on important migration corridors and wintering areas can be used to inform conservation and habitat management decisions from the Refuge to the Flyway scale.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Minnesota Trumpeter Swan Migration Ecology and Conservation	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03d	$300,000
Red-headed Woodpeckers as Indicators of Oak Savanna Health	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03j	$171,000
Bioacoustics for Broad-Scale Species Monitoring and Conservation	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 03n	$305,000

Project Manager and Organization Qualifications

Project Manager Name: Elena West

Job Title: Teaching Assistant Professor

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

Dr. Elena West is a faculty member in the Department of Fisheries, Wildlife, and Conservation Biology at the University of Minnesota. Dr. West completed her M.S. in Natural Resource Ecology and Management at the University of Michigan where she also received a graduate certificate in GIS and Spatial Analysis. She completed her PhD in Zoology at the University of Wisconsin-Madison where she examined the influence of anthropogenic food subsidies on the behavior and movement ecology of Steller's jays in California state parks. Dr. West has been leading research on the annual cycle demography, habitat associations, and migration ecology of red-headed woodpeckers since 2017. She is also currently leading research on the use of passive acoustic technology for broad-scale species monitoring and conservation at the statewide scale.

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Organization Description:
The Department of Fisheries, Wildlife, and Conservation Biology at the University of Minnesota Twin Cities provides world-class training and expertise to contribute to the management, conservation, and sustainable use of fisheries and wildlife resources. Our goal is to use innovative teaching, research, and outreach to respond to societal needs for information and education pertaining to natural resources.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Principle Investigator		Responsible for overall project management and supervision of graduate research assistant.			37.1%	0.66		$73,715
Co-Principle Investigator		Assists with data management and analyses to achieve project activities. Co-advises graduate student researcher.			37.1%	0.36		$43,395
Graduate Student Researcher		Responsible for field work, data management, and analyses required to achieve project activities. One 75% GRA for three years.			48%	1.88		$227,533
Undergraduate Student - Field Technician		Assist with field work, data collection, data entry and management.			0%	0.2		$7,220
							Sub Total	**$351,863**
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Tools and Supplies	ARGOS Pinpoint GPS Solar Tags	GPS tags collect and store location information for individually marked birds (10 tags/year @$2100/tag x 2 years)					$42,000
	Tools and Supplies	ARGOS Data Subscription	Required to upload GPS location data to ARGOS system ($780/tag/year x 20 tags x 2 years/tag)					$31,200
	Tools and Supplies	Bird capture equipment	Mist nets and associated supplies to capture birds at wetland sites ($100/net x 10 nets), safety goggles ($20/pair x 4 pairs), waders ($150/pair of waders x 2 pairs)					$1,380
							Sub Total	**$74,580**
Capital Expenditures								

							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Lodging: $107/night/person x 2 nights/location x 7 locations/year x 2 years x 2 persons	Lodging for graduate student and field technician conducting field work					$5,992
	Miles/ Meals/ Lodging	Meals: ($59/full day + ($44.25/partial day x 2 partial days) x 2 people) x 7 trips	Meal reimbursement for graduate student and field technician conducting field work					$2,065
	Miles/ Meals/ Lodging	$0.67/mile x 2238 miles/year x 2 years	Mileage for one vehicle for each of two field seasons					$3,000
							Sub Total	**$11,057**
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
	Publication	Planning for the publication of 2-3 papers based on this research project.	Publishing peer reviewed papers					$2,500
							Sub Total	**$2,500**
Other Expenses								
							Sub Total	-
							Grand Total	**$440,000**

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				
In-Kind	Minnesota Cooperative Fish and Wildlife Research Unit, University of Minnesota	Purchase of 2 ARGOS GPS Solar Pinpoint Tags	Pending	$4,200
			State Sub Total	**$4,200**
Non-State				
In-Kind	U.S. Fish and Wildlife Service	Purchase of 3 ARGOS GPS Solar Pinpoint Tags and ARGOS Data Subscription for 5 tags	Pending	$14,100
In-Kind	U.S. Fish and Wildlife Service	Salary of USFWS Biologist (1 month salary/year x 3 years)	Pending	$30,000
			Non State Sub Total	**$44,100**
			Funds Total	**$48,300**

Total Project Cost: $488,300

This amount accurately reflects total project cost?

 Yes

Attachments

Required Attachments
Visual Component
File: 12d2442e-ad5.pdf

Alternate Text for Visual Component
The problem we seek to address: Green Herons have declined across much of their range yet information on their annual cycle habitat use and migratory movements is needed to understand and address conservation concerns for wetland-dependent birds....

Supplemental Attachments
Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
UMN Board of Regents Endorsement Letter	5e98d4c0-c84.pdf

Administrative Use

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

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?
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

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing $10,000 or more or large-scale stream or wetland restoration?
No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?
No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Dr. John Fieberg, Dr. David Andersen, Dr. Michael Wells