



Environment and Natural Resources Trust Fund

2021 Request for Proposal

General Information

Proposal ID: 2021-291

Proposal Title: Factors Influencing Wild Turkey Productivity in Southeast Minnesota

Project Manager Information

Name: Matt Weegman

Organization: National Wild Turkey Federation

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Project Basic Information

Project Summary: Our study will provide important data on wild turkey reproductive ecology in southeastern Minnesota, including the effect of habitat and environmental factors on nesting success and brood survival.

Funds Requested: \$809,000

Proposed Project Completion: 2025-12-31

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?

Region(s): SE

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.

Wild turkeys are a charismatic and highly valued game species in Minnesota (MN), however the MN Department of Natural Resources (DNR) long term action plan for managing the species expired in 2012. Additionally, concerns have been raised in large portions of the eastern subspecies range across the eastern US regarding regional declines in productivity and abundance, and it is unknown if similar trends are occurring in MN. Thus, contemporary research on wild turkey population status and ecology in MN is needed to properly inform future conservation and management decisions. We propose to study the reproductive ecology of wild turkeys in southeastern MN over a 4 year period. Our research will provide important information on how environmental factors such as habitat, weather, forage availability, and predator abundance and distribution affect nest success and poult survival. Our study will inform management actions that maximize turkey production. Our proposed project also would complement planned work on nest success and poult survival in Missouri, facilitating an unprecedented comparison of Midwestern turkey demography for more holistic conservation.

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.

We will study reproductive ecology using a comprehensive landscape-level approach across three field seasons that incorporates several key data streams stemming from Global Positioning System (GPS)/Very High Frequency (VHF) radio tracking of females and poults, remote sensing satellite data, weather station data, vegetation and arthropod surveys, capture-recapture data of mammalian nest predators, and camera survey data of mesocarnivore distribution, all in the same study area in southeast MN. This work will be completed via a PhD student supervised by Drs. Byrne and Weegman at University of Missouri (faculty already supervising complementary turkey research in Missouri). The student will lead field efforts capturing birds and predators, deploying camera traps, conducting invertebrate and vegetation sampling, and supervising technicians who will assist with field work. The individual bird is the sampling unit and will be the basis for tests explaining variation in nest success and poult survival as a function of behavior and movements as well as habitat measures, invertebrate abundance, and predator densities in the study area. Individual females (with and without broods) represent the sampling unit for our brood-rearing habitat selection work. This will allow us to holistically assess the current status and drivers of wild turkey productivity in MN.

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?

1. Quantify reproductive parameters of wild turkeys in southeastern MN, including nest success, poult survival, and reproductive phenology.
2. Determine how weather (temperature and precipitation), habitat, landscape characteristics, predator densities, forage availability and their interactions affect turkey nest success and poult survival, and identify causes of poult mortality.
3. Assess turkey brood-rearing habitat selection, identify important characteristics of quality brood-rearing habitat, and determine habitats where turkeys and predators are most likely to interact.

Activities and Milestones

Activity 1: Determine how weather (temperature and precipitation), landscape characteristics, predator densities, and their interactions affect turkey nest success.

Activity Budget: \$444,117

Activity Description:

We will deploy 45 tracking devices during January to March annually (n = 135) on female wild turkeys. We will use GPS and VHF tracking to monitor nesting phenology and success annually. We will estimate mammalian nest predator densities (raccoon, opossum, skunk) on the study area by using capture-recapture sampling. To capture rainfall and temperature variability across the study area during the nesting and brood-rearing seasons, we will place 10 weather stations (consisting of a rain gauge and temperature data logger) throughout the study area from March to July. We will quantify nest-site habitat conditions by conducting vegetation surveys at nest sites. Landscape characteristics (e.g., percent open land, forested land, and edge habitat) will be calculated based on existing GIS layers and remotely-sensed data for our study area. Thus, we will quantify nesting success in this population, and the extent to which annual variation in nesting success is explained by annual variation in nest-predator densities, weather conditions, micro-habitat conditions, and landscape characteristics in each year.

Activity Milestones:

Description	Completion Date
Capture turkeys annually in Jan-Mar using rocket nets, deploy GPS-VHF tracking devices on adult hens.	2024-03-31
Capture and recapture predators, deploy weather stations, conduct vegetation surveys, calculate landscape characteristics.	2024-07-31
Estimate nesting success, link variation with predator densities, weather conditions, micro-habitat conditions, and landscape characteristics.	2024-10-31

Activity 2: Determine how temperature and precipitation, landscape characteristics, predator densities, and invertebrate abundance and diversity affect poult survival.

Activity Budget: \$185,641

Activity Description:

Within 24 hours of a female successfully hatching a brood, we will capture poults by hand and fit them with 1 g mortality-sensitive VHF transmitters (Advanced Telemetry Systems). One poult will be left at the flush site to ensure the female continues to exhibit brooding behavior. Marked broods will be radio-tracked intensively (>1 location daily) for 30 days post-hatch to quantify poult survival and cause-specific mortality. When a mortality signal is detected, the carcass will be collected and an assessment of cause of death determined. We plan to fit 65 poults (i.e., ~8 poults per brood, 8 broods) with VHF transmitters per year across 3 years. We will use known-fate modeling to estimate daily and seasonal poult survival. Annual variation in poult survival will be described as a function of annual variation in weather conditions, landscape characteristics and arthropod abundance. Arthropod abundance will be quantified based on regular sampling at 50 vegetation survey plots distributed across the study area during the brood-rearing season, as well as at a subset of locations used by GPS-tagged adult females with broods.

Activity Milestones:

Description	Completion Date
Conduct arthropod sampling, identify to lowest taxonomic level.	2024-08-31
Determine cause of mortality	2024-08-31

Activity 3: Assess turkey brood-rearing habitat selection and determine habitats where turkeys and predators are most likely to interact.

Activity Budget: \$179,242

Activity Description:

We will quantify turkey resource selection relative to four functional environmental variables that influence physiology, spatial behavior and fitness of brood-rearing females and their young:

1. Arthropod biomass as a measure of food availability for poults.
2. Temperature at ground level, as poults are sensitive to thermal stress.
3. Vegetation density and height, which can provide thermal refugia and cover from predators, or act as an impediment.
4. Predation risk, which influences habitat use and activity.

Resource selection will be quantified using step-selection functions, which compare resource use at sequential GPS locations to associated resource availability. Vegetation density, arthropod biomass, and ground-level temperature will be modeled across the landscape based on 50 vegetation plots sampled once weekly during the brood-rearing season. Distribution of potential mammalian poult predators will be quantified based on camera trapping and will inform occupancy models that predict the probability of predators as a function of habitat. Accelerometer data collected on the GPS tracking devices will be used to identify behaviors of adult females (e.g., resting, feeding) to construct daily activity budgets during the brood-rearing season. These data will uniquely augment habitat use and resource selection inferences by identifying behavior in habitat types.

Activity Milestones:

Description	Completion Date
Capture turkeys annually in Jan-Mar using rocket nets, deploy GPS-VHF tracking devices on adult hens.	2024-03-31
Deploy weather stations, conduct vegetation and arthropod surveys, calculate landscape characteristics, deploy and monitor cameras	2024-08-31
Perform resource selection analyses as a function of habitat, predation risk, and forage availability. Compare between females with and without broods to make inferences on brood-specific habitat requirements.	2024-10-31

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Michael Byrne	University of Missouri	Project PI	Yes
Dr. Mitch Weegman	University of Missouri	Project PI	Yes

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?

Results from this research will inform population and habitat management decisions for wild turkeys and associated species at a statewide scale. We anticipate our results will guide a much-needed update of the long-term turkey management plan for MN. Management implications can be used in other Midwestern states where turkey populations have declined in the last 5-10 years. Results from this project will be shared at natural resources conferences such as the Midwest and Eastern Wild Turkey Technical Committee Meetings, and form the subject of a PhD dissertation and minimum of 3 peer-reviewed publications (one for each project outcome).

Project Manager and Organization Qualifications

Project Manager Name: Matt Weegman

Job Title: NWTF District Biologist for MN, WI, & IA

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

Matt Weegman is responsible for developing new conservation projects and managing all existing NWTF conservation projects in Minnesota, Wisconsin, and Iowa. He also manages the NWTF Super Fund dollars that are earmarked for habitat work, land acquisition, and equipment purchases in these three states. Matt grew up in Winona, MN, the heart of the MN Driftless Region, and attended South Dakota State University for a Bachelors of Science in Wildlife and Fisheries (2009) and Mississippi State University for a Masters of Science in Wildlife, Fisheries, and Aquaculture (2013). Past positions with The National Wild Turkey Federation, Minnesota DNR, Ducks Unlimited, Mississippi State University, the U.S. Fish and Wildlife Service, and South Dakota Game Fish and Parks have given him a wealth of experiences that qualify him to manage this project.

Organization: National Wild Turkey Federation

Organization Description:

The National Wild Turkey Federation (NWTF) was founded in 1973, there were approximately 1.3 million wild turkeys in North America. After decades of work, that number hit a historic high of almost 7 million turkeys. To succeed, the NWTF stood behind science-based conservation and hunters' rights while working diligently with partners to help restore wild turkeys across North America. Today, the NWTF is focused on the future of hunting and conservation through its 10-year initiative, Save the Habitat. Save the Hunt., a charge that mobilizes science, fundraising and devoted volunteers to conserve or enhance more than 4 million acres of essential wildlife habitat, recruit at least 1.5 million hunters and open access to 500,000 acres for hunting. The NWTF has conducted conservation work in the US and throughout 15 other countries. We currently manage 300+ grants/agreements across the US for a variety of partners. For more information, visit NWTF.org.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
District Biologist		Project Manager			35%	0.3		\$32,176
Grant Administrator		Grant Management			35%	0.21		\$19,500
							Sub Total	\$51,676
Contracts and Services								
University of Missouri	Sub award	Personnel: 1 PhD stipend, tuition & benefits (\$162,069); 3 technicians & benefits (\$139,750). Field lodging, travel & conferences (\$98,984). Capital, equipment, supplies: turkey trapping/marketing equipment (\$288,800), predator trapping/marketing equipment (\$43,590); computer (\$2,000); weather recording equipment (\$12,720). Publications (\$6,000). Detailed budget uploaded in Attachments.		X		9.24		\$753,913
							Sub Total	\$753,913
Equipment, Tools, and Supplies								
							Sub Total	-
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-

Travel In Minnesota								
	Miles/ Meals/ Lodging	NWTF Personal vehicle mileage and meals	Partner meetings and site visits to assist with research operations					\$1,499
							Sub Total	\$1,499
Travel Outside Minnesota								
	Conference Registration Miles/ Meals/ Lodging	NWTF Travel for Midwest Deer and Turkey Study Group Meetings	Research presentations	X				\$1,912
							Sub Total	\$1,912
Printing and Publication								
							Sub Total	-
Other Expenses								
							Sub Total	-
							Grand Total	\$809,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Contracts and Services - University of Missouri	Sub award	<p>Personnel: 1 PhD stipend, tuition & benefits (\$162,069); 3 technicians & benefits (\$139,750). Field lodging, travel & conferences (\$98,984). Capital, equipment, supplies: turkey trapping/marketing equipment (\$288,800), predator trapping/marketing equipment (\$43,590); computer (\$2,000); weather recording equipment (\$12,720). Publications (\$6,000).</p> <p>Detailed budget uploaded in Attachments.</p>	<p>1. Travel from Missouri to Minnesota (\$1,500). The PhD student and technicians will be based in Minnesota, but travel from Missouri to Minnesota to begin and end field operations across 3 years. 2. Conference travel (\$7,100). The PhD student and Drs. Mike Byrne and Mitch Weegman will present research findings at two Ecological Society of America annual meetings (out of state). This will be an important experience for the student to discuss project results and learn from other researchers.</p>
Travel Outside Minnesota	Conference Registration Miles/Meals/Lodging	NWTF Travel for Midwest Deer and Turkey Study Group Meetings	If the research is funded, I will be giving presentations at two years of Midwest deer and turkey study group meetings at a cost of \$1,000 per year for travel and lodging.

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
In-Kind	MN DNR	MN DNR has contributed staff salary and fringe (\$20,181), staff travel (\$3841), equipment (e.g., rocket nets to capture adult hen turkeys; \$735) and consumables (i.e., rocket charges; \$243) to help carry field operations associated with this project.	Secured	\$25,000
			State Sub Total	\$25,000
Non-State				
In-Kind	NWTF Indirect Rate @ 16.98%	This is an unrecoverable indirect rate	Secured	\$129,897
Cash	NWTF Super Funds	The MN NWTF State Chapter has committed cash from the Super Fund to support this research	Secured	\$5,000
			Non State Sub Total	\$134,897
			Funds Total	\$159,897

Attachments

Required Attachments

Visual Component

File: [0094d465-82f.pdf](#)

Alternate Text for Visual Component

This attachment is a one page document that summarizes the research and includes a map showing the proposed work area in southeast Minnesota.

Financial Capacity

File: [c8751a0b-c3b.pdf](#)

Board Resolution or Letter

Title	File
Board Resolution	419b827b-f4d.pdf

Optional Attachments

Support Letter or Other

Title	File
Letter of In-Kind Support from MN DNR	f819ae57-c3f.pdf
Sub-award detailed budget	ffd4b087-fc3.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Does your project have patent, royalties, or revenue potential?

No

Does your project include research?

Yes

Does the organization have a fiscal agent for this project?

No

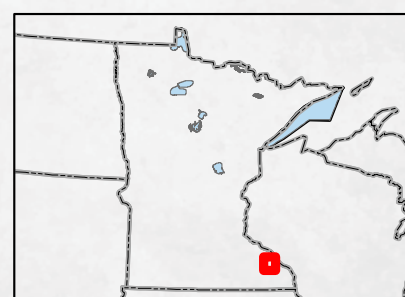
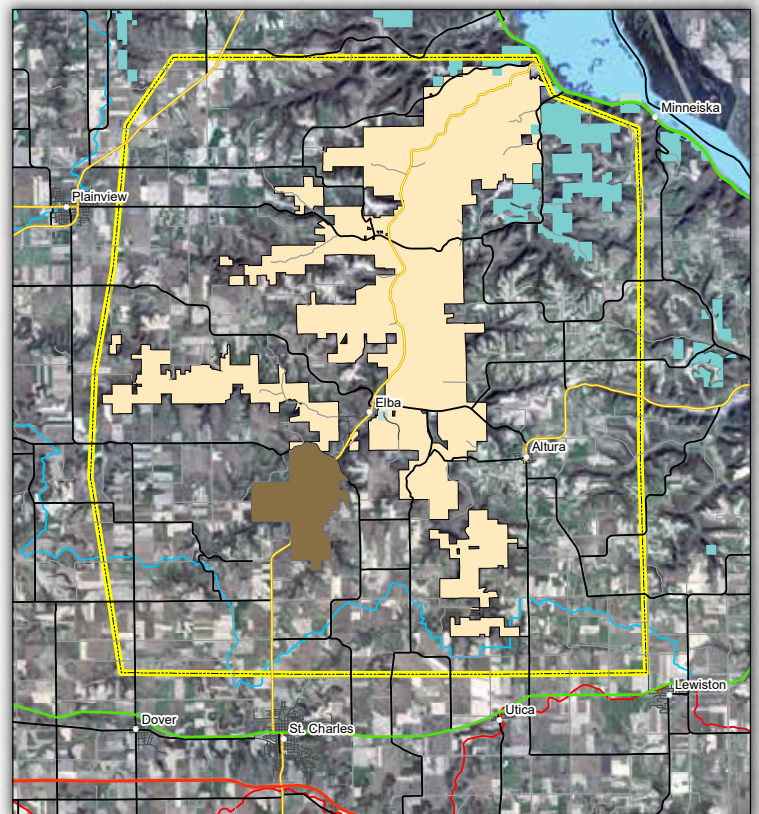






MINNESOTA WILD TURKEY RESEARCH

Legislative-Citizen Commission on Minnesota Resources

GRANT PROPOSAL

- The drivers of wild turkey populations in Minnesota are unknown, yet this is a priority species for Minnesotans and the Minnesota DNR.
- We propose a holistic research project that targets the early phase of life in turkeys, which is believed to be the most sensitive for population dynamics and conservation planning.
- Our project combines deployment of state-of-the-art tracking devices on adult turkey hens and their young (poults) with holistic data of hypothesized drivers of hen and poult survival: habitat, food availability, predator abundance, temperature and precipitation collected at the same spatial and temporal scale in southeast Minnesota.
- This research will take place concurrently with similar research in Missouri, which will result in a collaborative study of unprecedented scale that will help us understand worrying declines observed in the eastern wild turkey population across much of its range, and inform potential actions to mitigate further declines.
- Our research will uniquely inform Minnesota DNR and NWTf conservation planning for turkeys by addressing 8 of 19 research priorities identified in the Long Range Plan for the Wild Turkey in Minnesota.



-  Proposed Study Area
-  Whitewater State Park
-  Richard J. Dorer Memorial Hardwoods State Forest
-  Whitewater Wildfire Management Area



