Environment and Natural Resources Trust Fund
2019 Request for Proposals (RFP)

Project Title: **ENRTF ID: 014-A**

Minnesota Trumpeter Swan Migration Ecology and Conservation

Category: A. Foundational Natural Resource Data and Information

Sub-Category:

Total Project Budget: $ 414,372

Proposed Project Time Period for the Funding Requested: June 30, 2023 (4 yrs)

Summary:

We propose to radio-mark and monitor movements of Minnesota trumpeter swans to provide foundational information necessary for management and conservation.

Name: David Andersen

Sponsoring Organization: U of MN

Title: Leader, MN Cooperative Fish and Wildl. Res. Unit

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Location

Region: Statewide

County Name: Aitkin, Anoka, Becker, Beltrami, Carver, Cass, Clearwater, Crow Wing, Hennepin, Kandiyohi, Mahnomen, Ramsey, Sherburne, Wright

City / Township:

Alternate Text for Visual:

Distribution and population growth of trumpeter swans in Minnesota

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____%
____ If under $200,000, waive presentation?			

PROJECT TITLE: Minnesota Trumpeter Swan Migration Ecology and Conservation

I. PROJECT STATEMENT

Trumpeter swans (*Cygnus buccinator*) have high intrinsic and economic value in Minnesota (MN) as a protected wildlife species. MN citizens enthusiastically invested in the restoration of trumpeter swans through the check off donation and other funding sources to the MN Department of Natural Resources (MNDNR) Nongame Program since the mid-1980s. The Interior Population of trumpeter swans (of which MN swans comprise ~63%) has increased dramatically since they were re-established in the 1960s and 1970s and both population size and distribution have expanded significantly in MN since the MNDNR Alaska-egg project began in 1986. The original MN reintroduction goal of 15 breeding pairs and the revised interim goal of 500 individuals by 2001 have been greatly exceeded, with a current estimate of nearly 17,000 swans (an average annual finite rate of increase of ~1.20 since 2000). Better understanding of trumpeter swan ecology will be extremely useful in developing future management strategies for this growing population.

In MN, trumpeter swans currently breed throughout most of the state, but beyond recent estimates of population size and trend and distribution, relatively little is known about their ecology, hindering conservation decision-making. To address current information needs, we propose to mark a sample of Interior Population trumpeter swans in MN with GPS-GSM transmitters. These transmitters record high-resolution, high frequency location and related data and transmit those data through cellular phone networks, and will allow us to:

1. Evaluate year-round swan movements, including determining what proportion of trumpeter swans winter outside of the state, the locations where swans spend the winter, and the timing and duration of their movements.
2. Determine whether and where trumpeter swans make molt migrations.
3. Evaluate year-round habitat use and selection patterns of trumpeter swans.
4. Estimate annual survival rates of trumpeter swans.

Results of this study will inform current and future trumpeter swan conservation in MN by providing basic information about migration, year-round movements, mortality risks, and use of agricultural landscapes. The data from the project will be archived with *movebank* (https://www.movebank.org/) and made available to the public via a website that summarizes trumpeter swan movements and habitat use. Thus, the project will also offer the opportunity to actively engage and inform MN citizens about how their past investment in conservation made a positive difference to MN's natural heritage today.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Capture and mark 50 trumpeter swans with GPS-GSM transmitters in MN, including graduate student and field technician support **Budget: $290,320**

We propose to mark 50 trumpeter swans in MN with GPS-GSM transmitters, distributed across the state and on both breeding and non-breeding swans. In cooperation with the MNDNR, Three Rivers Parks, and the U.S. Fish and Wildlife Service, we will capture swans and monitor their movements via transmission of high-resolution location data collected at 15-minute intervals throughout the year via cellular networks. Capturing and marking swans will be conducted by a graduate student and field technicians during 2019 through 2021.

Outcome	Completion Date
1. Mark 20 swans with GPS-GSM transmitters	December 2020
2. Mark an additional 30 swans with GPS-GSM transmitters	December 2021

Activity 2: Acquire movement and habitat data for radio-marked swans **Budget: $124,052**

Beginning with transmitter deployment in 2019, we propose to acquire high-resolution location data for trumpeter swans marked in MN, and evaluate local and regional movements and habitat use. Transmission of high-resolution location data will commence with transmitter deployment in 2019 and continue through 2022.

Outcome	Completion Date
1. Acquire high-resolution GPS-GSM data for marked swans	June 2023
2. Acquire local habitat data	June 2023
3. Assess survival and year-round habitat use and selection patterns of trumpeter swans	June 2023

III. PROJECT STRATEGY

A. Project Team/Partners

This project will be conducted cooperatively through the MN Cooperative Fish and Wildlife Research Unit at the University of MN. Project partners include University of MN principal investigators, MNDNR biologists, U.S. Fish and Wildlife Service biologists, Three Rivers Park District, and the Trumpeter Swan Society. Funds received from this Environmental and Natural Resources Trust Fund (ENRTF) request will be through an agreement with the University of MN with Drs. Andersen and Fieberg as co-Principal Investigators.

Receiving ENTRF funding:

Assistant Professor John Fieberg, University of MN, Department of Fisheries, Wildlife, and Conservation Biology

Not receiving ENTRF funding:

David E. Andersen, U.S. Geological Survey, MN Cooperative Fish and Wildlife Research Unit, University of MN

Steve Cordts, Christine Herwig, Carrol Henderson, MNDNR

Tom Cooper, U.S. Fish and Wildlife Service

John Moriarty, Three Rivers Park District

B. Project Impact and Long-Term Strategy

The proposed project period is July 2019 – June 2023. Given the timing of availability of project support (the beginning of a state fiscal year) from the ENRTF, we propose marking a small number of swans with partner funds in 2019 and the remainder of our sample in 2020 and 2021, with movement data collection through June 2023. Results of this project will provide information about MN trumpeter swans that will be disseminated to state and federal management agencies, published in the peer-reviewed literature, included in a Ph.D. dissertation, and made available to the general public via a website and popular articles. The public education component, with up to 50 stories of individual trumpeter swans (where they nest, winter, migrate and stop along the way, how far they travel, how much time they spend in wetlands, fields, rivers and lakes) is an excellent engagement tool to support and even increase the interest of MN citizens in its natural resources.

C. Timeline Requirements

The project duration is 4 years (July 2019 – June 2023) which affords time to acquire tracking devices for primary deployment in 2020 and 2021, and collection of movement data beginning in 2019. We plan to select a graduate student who would begin working on this project in July 2019, mark swans with GPS-GSM transmitters in 2019, 2020, and 2021, and acquire movement data in 2019, 2020, 2021, 2022, and early 2023. Data analysis and interpretation will be completed by June 2023.

2019 Detailed Project Budget

Project Title:*Minnesota Trumpeter Swan Migration Ecology and Conservation*

IV. TOTAL ENRTF REQUEST BUDGET 4 years

BUDGET ITEM	AMOUNT
Personnel (Graduate student, academic salary, and field technicians):	
Ph.D. Graduate Research Assistant (50% Research Assistantship, 50% FTE for 3.5 years, 54.9% stipend, 8.2% benefits, 36.8% tuition)	$152,811
University of Minnesota Assistant Professor John Fieberg, quantitative ecologist (4.5 - 9% FTE for 3 years, 66.3% salary, 33.7% fringe)	$34,837
1 (2019-2020) or 2 (2020-2021) field technicians @ 11 weeks per year (42% FTE for each of 2 years, 92.1% salary, 7.9% fringe)	$22,314
Professional/Technical/Service Contracts (cellular phone contracts for satellite transmitters):	
Cellular data fees ($300 per transmitter per year; 20 data contracts in 2019, 50 data contracts in 2020, 50 data contracts in 2022, and 30 data contracts in 2023; data include GPS locations at 15-minute intervals, transmitter status, temperature, and other parameters, stored onboard devices until connecting and downloading data when in range of cellular networks)	$45,000
Equipment/Tools/Supplies (transmitters, neck-collar material, capture and handling supplies):	
GPS-GSM transmitters (50 @ $2,600 each; 30 deployed in 2018-2019 and 30 deployed in 2019-2020)	$130,000
Miscellaneous supplies (neck collar materials and neck collars, rocket nets, rocket-net propellant, etc.)	$4,000
Travel (field crews and graduate student travel to capture swans in wetland and other settings in Minnesota):	
4-wheel drive vehicle mileage [1 (2019-2020) or 2 (2020-2021) vehicles @ $0.565/mile x 100 miles/day x 80 days/year]	$13,560
Lodging for 1 (2019-2020) or 2 (2021-2020) field crews 1-2 rooms per night @ $40 per night x 80 nights x 2 field seasons)	$9,600
Field crew food and supplies in lieu of per diem [$75 (2019-2020) or $150 (2020-2021)/week x 10 weeks/year]	$2,250
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST	$ 414,372

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ To Be Applied To Project During Project Period: U.S. Fish and Wildlife Service, Migratory Birds ($25,000)	$ 25,000	*Pending*
Other State $ To Be Applied To Project During Project Period: University of Minnesota, Minnesota Cooperative Fish and Wildlife Research Unit	$ 15,000	*Pending*
In-kind Services To Be Applied To Project During Project Period: U.S. Geological Survey, David E. Andersen salary and benefits (1 month/year; $42,000) Minnesota Department of Natural Resources, Wildlife (1 month/year; $15,000) Minnesota Department of Natural Resources, Nongame (1 month/year: $15,000)	$ 42,000	*Pending*
Funding History: *Funding associated with Three Rivers Parks and MN Department of Natural Resources reintroduction efforts and population monitoring. ENRTF funding for related project on sandhill cranes (M.L. 2014. Chp. 226, Sec. 2, Subd. 05h)*	$ 250,000	*Project completed*
Remaining $ From Current ENRTF Appropriation*None*	N/A	N/A

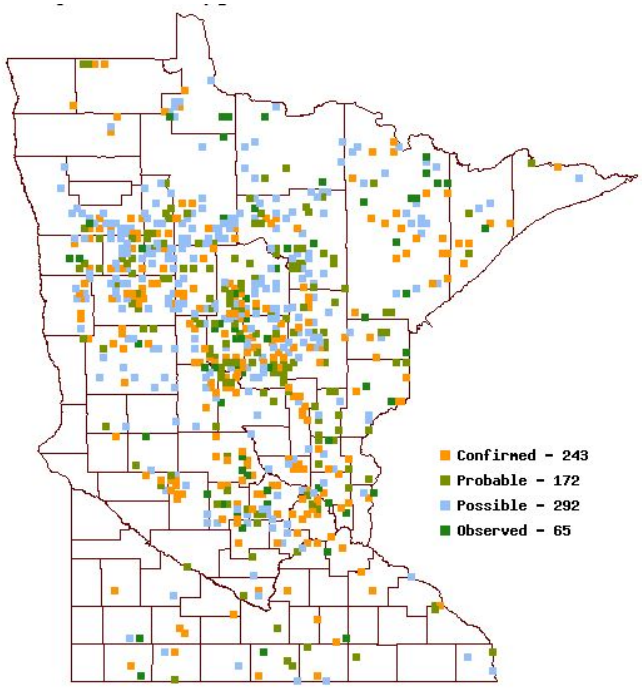

Figure 1. Current trumpeter swan distribution in Minnesota following re-establishment in the 1960s and 1970s and the Alaska-egg program initiated by the Minnesota Department of Natural Resources in 1986. (MN Breeding Bird Atlas Project)

Figure 2. Little information exists about Interior Population trumpeter swan movements, habitat use and selection, and survival. Photo courtesy of Beau Liddell.

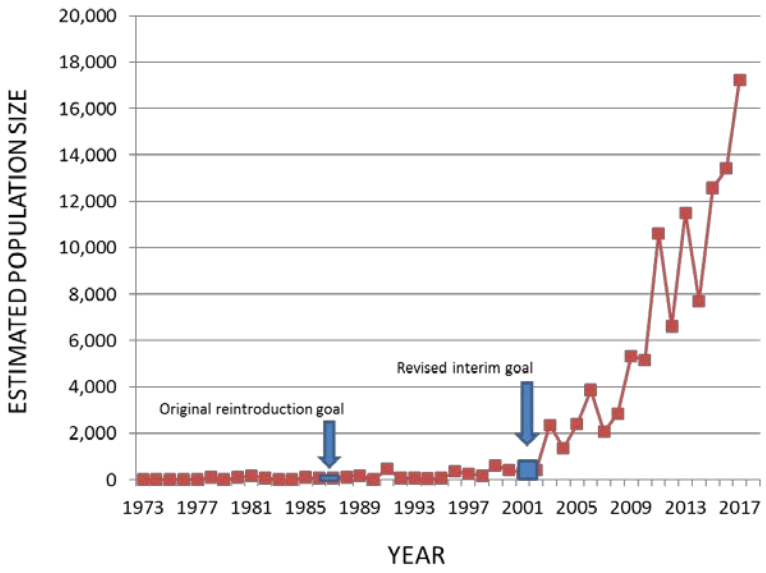

Figure 3. Minnesota trumpeter swan population size estimated from waterfowl surveys conducted over approximately 39% of the area of the state (MN DNR, unpublished data). The trumpeter swan population in Minnesota has increased substantially, dramatically exceeds original and interim population goals, and is currently growing at an annual rate of ~1.20.

Project Manager Qualifications & Organization Description

David E. Andersen is the Leader of the U.S. Geological Survey (USGS), Minnesota Cooperative Fish and Wildlife Research Unit (MN CFWRU; mncoopunit.cfans.umn.edu) and Adjunct Professor in the Department of Fisheries, Wildlife, and Conservation Biology on the St. Paul Campus of the University of Minnesota. Dr. Andersen received a Ph.D. in Wildlife Ecology (1988) and a Ph.D. in Zoology (1988) from the University of Wisconsin-Madison, an M.S. in Wildlife Ecology (1984) from the University of Wisconsin-Madison, and a B.S. from St. Olaf College (1981). He has worked at the MN CFWRU since 1989, having conducted research in avian ecology and conservation, working with graduate students on projects involving raptors, forest-nesting birds, waterfowl, shorebirds, and cranes. Dr. Andersen has advised or co-advised 29 M.S. students and 4 Ph.D. students, authored or co-authored over 100 scientific publications, and has served as Principal Investigator on dozens of research projects totaling several million dollars in external funding.

Dr. Andersen will serve as project coordinator, working with collaborators at the University of Minnesota, the Minnesota Department of Natural Resources (MN DNR), the U.S. Fish and Wildlife Service (FWS), and Three Rivers Parks, to conduct the proposed research. Dr. Andersen will serve as co-advisor for a Ph.D. student on the project. Dr. Fieberg will serve as co-Principal Investigator at the University of Minnesota and will co-advise a Ph.D. student who will lead the field portion of this project. Mr. Cordts (MN DNR) will help coordinate field logistics, develop project protocols, and provide advice and expertise to the PH.D. student who will lead the field portion of this project. Dr. Cooper (FWS) will help coordinate field logistics, develop project protocols, and serve on the advisory committee of the Ph.D. student who will lead the field portion of this project. Ms. Herwig (MN DNR) has experience surveying, capturing, and marking swans, and will aid in the field portion of this project, assist in developing research protocols, and provide advice to the Ph.D. student working on this project. Mr. Henderson (MN DNR) will provide input into project protocols and objectives. Mr. Moriarity will provide logistical assistance and help develop project protocols. The Trumpeter Swan Society has committed to helping disseminate information from this study to the public. Along with project collaborators, Dr. Andersen will seek funding from other entities (e.g., MN DNR, FWS); develop project protocols; aid in data collection, management, and analyses; and provide logistical support to field activities. Drs. Andersen and Fieberg currently completed a related satellite telemetry project evaluating migration patterns and population affiliation of sandhill cranes in Minnesota.

Minnesota Cooperative Fish and Wildlife Research Unit – The MN CFWRU was established in 1987 and staffed beginning in 1989. The MN CFWRU's primary mission is to conduct research related to fish and wildlife conservation addressing issues of regional, national, and international significance. Cooperators of the MN CFWRU include the USGS, FWS, MN DNR, University of Minnesota, and the Wildlife Management Institute. The MN CFWRU is currently staffed by 2 USGS scientists, who conduct research, train graduate students, teach graduate-level courses, and provide outreach. The MN CFWRU currently is involved in upwards of 15 projects involving over $3 million in external research funding.

University of Minnesota – The University of Minnesota is a land-grant institution of higher education, and ENRTF funding granted for this project would be managed by the University of Minnesota.