Environment and Natural Resources Trust Fund
2018 Request for Proposals (RFP)

Project Title: **ENRTF ID: 009-A**

Minnesota Trumpeter Swan Migration Ecology and Conservation

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: $ 389,988

Proposed Project Time Period for the Funding Requested: 4 years, July 2018 to June 2022

Summary:

Obtain information essential to managing Minnesotas rapidly growing trumpeter swans, using GPS-GSM satellite transmitters to delineate migration patterns and survival, and year-round habitat use and selection.

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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	_____%

PROJECT TITLE: Minnesota Trumpeter Swan Migration Ecology and Conservation

I. PROJECT STATEMENT

Trumpeter swan (*Cygnus buccinator*) abundance in Minnesota has increased dramatically since they were re-established in the 1970s and both population size and distribution have expanded significantly since the MN Department of Natural Resources Alaska-egg project began in 1986. The original 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 1.29 with a doubling time of ~ 3 years). The trumpeter swan population in Minnesota constitutes the bulk of the Interior Population; however, little information exists to inform trumpeter swan conservation in Minnesota, and there is a lack of information about basic ecology and potential conflicts with humans, particularly agriculture. Better understanding trumpeter swan ecology and interactions with humans for this rapidly increasing population is critical. To address those information needs, we propose 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

In Minnesota, trumpeter swans currently breed throughout most of the state, but beyond recent estimates of population size and distribution, relatively little is known about trumpeter swans in Minnesota, or about migration and habitat use of Interior Population trumpeter swans in general. Few trumpeter swans have been marked in Minnesota, and little is known about where breeding swans spend the winter (beyond a few areas where trumpeter swans congregate in central Minnesota), whether and to where they make molt migrations, where subadult swans occur across the landscape and throughout the year, and to what extent groups of swans use agricultural landscapes. To address these information needs, we propose to mark a sample of Interior Population trumpeter swans with GPS-GSM transmitters. These transmitters record high-resolution, high frequency location and related data and transmit those data through cellular phone networks. Results of this study will inform current and future trumpeter swan conservation in Minnesota by providing basic information about migration, year-round movements, mortality risks, and use of agricultural landscapes. For this rapidly growing population, it is important to provide information from which to base future conservation strategies prior to when and if trumpeter swans become a potential management problem.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Capture and mark 50 trumpeter swans with GPS-GSM transmitters in Minnesota, including graduate student and field technician support **Budget: $277,812**

We propose to mark 50 trumpeter swans in Minnesota with GPS-GSM transmitters, distributed across the state and on both breeding and non-breeding swans. In cooperation with the MN Department of Natural Resources, Three Rivers Parks, the Trumpeter Swan Society, 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 2018 through 2020.

Outcome	Completion Date
1. Mark 20 swans with GPS-GSM transmitters	December 2019

2. Mark an additional 30 swans with GPS-GSM transmitters	December 2020

Activity 2: Acquire movement and habitat data for radio-marked swans **Budget: $112,176**

Beginning with transmitter deployment in 2018, we propose to acquire high-resolution location data for trumpeter swans marked in Minnesota, and evaluate local and regional movements and habitat use. Transmission of high-resolution location data will commence with transmitter deployment in 2018 and continue through 2022.

Outcome	Completion Date
1. Acquire high-resolution GPS-GSM data for marked swans	June 2022
2. Acquire local habitat data	June 2022
3. Assess survival and year-round habitat use and selection patterns of trumpeter swans	June 2022

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, MN Department of Natural Resources 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 request will be received by the University of MN in an agreement 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, MN Department of Natural Resources

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 2018 – June 2022. Given the timing of availability of project support (the beginning of a state fiscal year) from the Environmental and Natural Resources Trust Fund (ENRTF), we propose marking a small number of swans with partner funds in 2018 and the remainder of our sample in 2019 and 2020, and data collection through June 2022. Results of this project will provide information about Minnesota 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.

C. Timeline Requirements

The project duration is 4 years (July 2018 – June 2022) which affords time to acquire tracking devices for primary deployment in 2019 and 2020, and collection of movement data beginning in 2018. We plan to select a graduate student who would begin working on this project in July 2018, mark swans with GPS-GSM transmitters in 2018, 2019, and 2020, and acquire movement data in 2018, 2019, 2020, 2021, and early 2022. Data analysis and interpretation will be completed by June 2022.

2018 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 years, 55.6% stipend, 7.2% benefits, 37.2% tuition)	$126,578
University of Minnesota Assistant Professor John Fieberg, quantitative ecologist (4.5 - 9% FTE for 3 years, 66.3% salary, 33.7% fringe)	$30,956
1 (2018-2019) or 3 (2019-2020) field technicians @ 11 weeks per year (42% FTE for each of 2 years, 92.1% salary, 7.9% fringe)	$28,044
Professional/Technical/Service Contracts (cellular phone contracts for satellite transmitters):	
Cellular data fees ($300 per transmitter per year; 20 data contracts in 2018, 50 data contracts in 2019, and 50 data contracts in 2020, 30 contracts in 2021; 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 (2018-2019) or 2 (2019-2020) vehicles @ $0.565/mile x 100 miles/day x 80 days/year]	$13,560
Lodging for 1 (2018-2019) or 2 (2109-2020) field crews (2-4 people; 1-2 rooms x 80 nights x 2 field seasons)	$9,600
Field crew food and supplies as per U of MN policy [$75 (2018-2019) or $150 (2019-2020)/week x 10 weeks/year]	$2,250
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 389,988

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) U.S. Fish and Wildlife Service, Joint Ventures ($104,424)	$ 129,424	*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; $32,500) Minnesota Department of Natural Resources, Wildlife (1 month/year; $15,000) Minnesota Department of Natural Resources, Nongame (1 month/year: $15,000)	$ 62,500	*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	Crane project completion June 2017
Remaining $ From Current ENRTF Appropriation: *None*	N/A	N/A

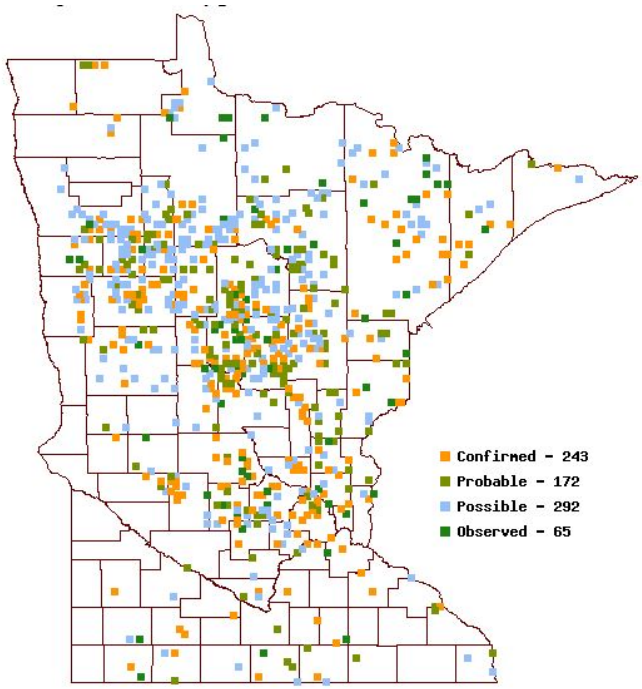

Figure 1. Current trumpeter swan distribution in Minnesota following re-establishment in the 1970s and the Alaska-egg program initiated by the Minnesota Department of Natural Resources in 1986. (MN Breeding Bird Atlas Project)

Figure 2. Little information exists about Interior Population trumpeter swan movements, habitat use and selection, survival, and conflicts with agriculture. Photo courtesy of the Trumpeter Swan Society and Richard Sonnen.

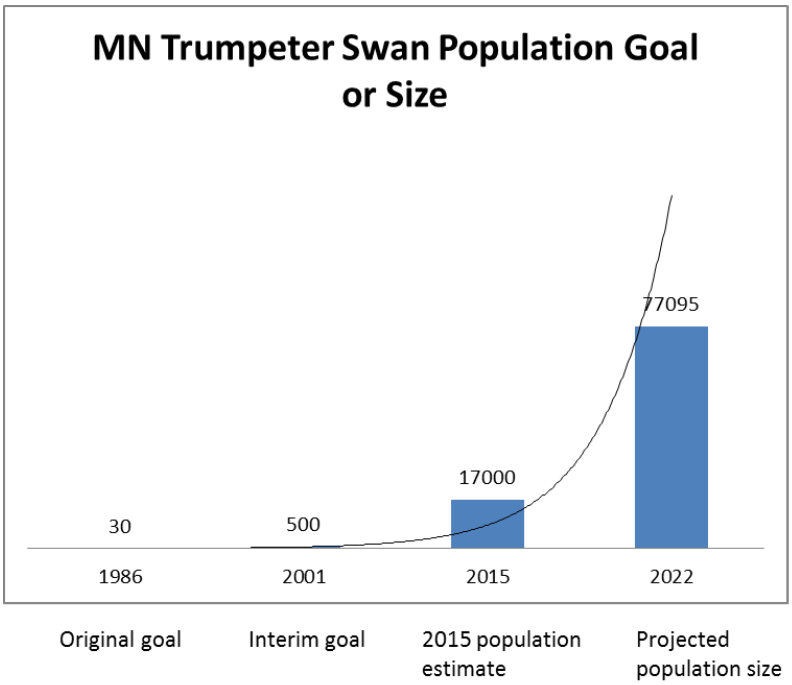

Figure 3. Trumpeter swan population size has increased substantially in Minnesota, and dramatically exceeds original and interim population goals.

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), Three Rivers Parks, and the Trumpeter Swan Society 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. Along with project collaborators, Dr. Andersen will seek funding from other entities (e.g., MN DNR, FWS, Trumpeter Swan Society); develop project protocols; aid in data collection, management, and analyses; and provide logistical support to field activities. Drs. Andersen and Fieberg are currently working on 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.