

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

---

**Project Title:**

**ENRTF ID: 040-AH**

Characterizing St. Louis River Estuary Aquatic Habitats

---

**Category:** H. Proposals seeking \$200,000 or less in funding

**Sub-Category:** A. Foundational Natural Resource Data and Information

---

**Total Project Budget: \$** 198,000

**Proposed Project Time Period for the Funding Requested:** June 30, 2021 (2 yrs)

**Summary:**

This project will characterize and map aquatic habitats in the St. Louis River estuary to advance restoration planning, and inform conservation of fish and wildlife habitats and critical species populations.

**Name:** Carol Reschke

**Sponsoring Organization:** U of MN - Duluth

**Title:** Research Program Manager

**Department:** Natural Resources Research Institute

**Address:** 5013 Miller Trunk Hwy  
Duluth MN 55811-1442

**Telephone Number:** (218) 788-2738

**Email** resc0032@d.umn.edu

**Web Address** https://www.nrri.umn.edu/

---

**Location**

**Region:** Northeast

**County Name:** St. Louis

**City / Township:**

---

**Alternate Text for Visual:**

St. Louis River Estuary location; and map of 2002 Aquatic Habitats in central portion of estuary, with recent vegetation samples. Vegetation patterns are not well-reflected in broadly defined 2002 habitats.

<input type="checkbox"/>	Funding Priorities	<input type="checkbox"/>	Multiple Benefits	<input type="checkbox"/>	Outcomes	<input type="checkbox"/>	Knowledge Base
<input type="checkbox"/>	Extent of Impact	<input type="checkbox"/>	Innovation	<input type="checkbox"/>	Scientific/Tech Basis	<input type="checkbox"/>	Urgency
<input type="checkbox"/>	Capacity Readiness	<input type="checkbox"/>	Leverage	<input type="checkbox"/>		TOTAL	<input type="checkbox"/> %
<input type="checkbox"/> If under \$200,000, waive presentation?							



**PROJECT TITLE: Characterizing St. Louis River Estuary Aquatic Habitats**

**I. PROJECT STATEMENT**

This project will characterize and map aquatic habitats in the St. Louis River estuary to advance restoration planning. Extensive data on estuary biota have been collected since 2010, but no analyses have integrated data on plants, macroinvertebrates, fish, and birds to evaluate aquatic habitat types being used in conservation plans. Therefore, we will evaluate aquatic habitats that were broadly defined in 2002 and refine habitat types and maps so they accurately reflect the biota present, ecosystem functions, and ecosystem services that habitats provide to the benefit of people of Minnesota. Results will guide and inform conservation of 1) fish and wildlife habitats, and 2) critical wildlife populations in a Great Lakes Area of Concern. We will use results to characterize aquatic habitat types, predict species assemblages in aquatic habitats, and document habitat availability and use for critical populations such as Lake Sturgeon, native mussels, Common Tern, and rare marsh birds (Virginia Rail, Sora, American Bittern, Least Bittern). Using high resolution imagery, we will develop information-rich maps of aquatic habitats designed to inform restoration and management decisions in the estuary. Our process will:

- 1) **Characterize aquatic habitat types** to integrate plant, bird, aquatic macroinvertebrate, and fish species assemblages in the estuary, and emphasize their ecological function and ecosystem services provided. Our analysis will identify spatial patterns of habitat types, availability of habitat, and habitat usage by using water depths, water flow models, vegetation structure, assessment of food base, and landscape context. We will describe aquatic habitats in terms of ecological communities of species that live together or use similar habitats.
- 2) **Revise aquatic habitat maps** from the 2002 Lower St. Louis River Habitat Plan to reflect refined habitats and ecological community types characterized, using recent high-resolution imagery from satellites and from unmanned aerial vehicles; and summarize habitat condition and ecosystem services of mapped aquatic habitats.
- 3) **Create a web-based smart map tool** to make the revised maps, habitat condition metrics, and summaries of ecosystem services readily available to agencies, non-government organizations, and interested citizens working on habitat restoration, conservation planning, and recreation design in the St. Louis River estuary.

**II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1: Compile maps** showing locations of available data on aquatic plants, birds, macroinvertebrates, and fishes for at least twelve estuary sites. **Identify data gaps** where additional data are needed for characterizing habitats. **Conduct field surveys** to collect biological data, measure bathymetry, and sample habitat complexity.

**ENRTF BUDGET: \$ 60,000**

Outcome	Completion Date
1. Maps showing locations of available recent data for aquatic plants, birds, aquatic macroinvertebrates, and fish for a set of at least 12 St. Louis River estuary sites.	November 2019
2. Updated water depth bathymetry for estuary sites not yet sampled since 2012 flood.	January 2020
3. Additional biological data collected and compiled, habitat complexity evaluated.	February 2020

**Activity 2: Characterize aquatic habitats** using habitat models that incorporate habitat complexity (such as physical structure of vegetation), ecological function, water depths, water currents, landscape features, food base, and ecosystem services. **Run statistical analyses** to compare model results in distinguishing aquatic habitats. **Select habitat types** showing the strongest correlations with fish and wildlife assemblages.

**ENRTF BUDGET: \$ 74,000**

Outcome	Completion Date
1. Multiple habitat models to distinguish habitats developed for review by regional experts.	October 2020
2. Selection of most effective models of aquatic habitats for fish and wildlife assemblages.	November 2020



**Environment and Natural Resources Trust Fund (ENRTF)  
2019 Main Proposal**

**Activity 3: Refine the classification of aquatic habitats** to reflect the most effective habitat models. **Prepare aquatic habitat maps** that delineate the refined types of aquatic habitats. **Develop an online smart mapping tool** in collaboration with NOAA to make new, information-rich aquatic habitat maps available for use in planning and review of restoration, conservation, and urban recreation projects. Publish this map tool on NOAA’s online map system, called ERMA, to provide easy-to-use maps that inform users about habitat conditions and ecosystem services in the St. Louis River estuary. Meet with conservation managers and interested citizens to review this mapping tool and use their feedback to improve usefulness of maps for conservation planning.

**ENRTF BUDGET: \$ 64,000**

<b>Outcome</b>	<b>Completion Date</b>
1. Updated descriptions and maps of aquatic habitat types for the St. Louis River estuary	February 2021
2. Meeting with St. Louis River habitat partners to review descriptions and maps of aquatic habitats, summaries of habitat conditions, ecological function of habitats, and ecosystem services provided, plus review of the online mapping tool to solicit suggestions from partners	April 2021
3. An online smart mapping tool published on NOAA’s website to make informative aquatic habitat maps of the St. Louis River estuary available to managers and the public	June 2021

**III. PROJECT PARTNERS:**

**A. Partners receiving ENRTF funding (None)**

**B. Partners NOT receiving ENRTF funding**

*\* provided letter of support*

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Role</b>
Mark Pearson, Greg Peterson	Aquatic biologists	EPA Mid-Continent Ecology Division	Hydroacoustic bathymetry, and fish habitat specialists.
Daryl Peterson Diane Desotelle	Director of Restoration Natural Resource Manager	Minnesota Land Trust * City of Duluth *	Review aquatic habitat types and online map tool
Jeremy Pinkerton Melissa Sjolund	Fisheries biologists AOC Coordinator	MN DNR*	Fish & habitat specialists, review habitats and maps
Robb Wright, Nicolas Eckhardt, Ben Shorr	GIS and data management specialists	NOAA	Share St. Louis River habitat maps on ERMA website

**IV. LONG-TERM- IMPLEMENTATION AND FUNDING:**

Our map products will be contributed to NOAA’s Great Lakes ERMA website.

**V. TIME LINE REQUIREMENTS:**

This is a two-year project including fieldwork in the first year, and analysis and mapping in the second year.

**VI. SEE ADDITIONAL PROPOSAL COMPONENTS:**

- A. Proposal Budget Spreadsheet**
- B. Visual Component or Map**
- C. Parcel List Spreadsheet**
- D. Acquisition, Easements, and Restoration Requirements**
- E. Research Addendum (not required at proposal stage)**
- F. Project Manager Qualifications and Organization Description**
- G. Letter or Resolution**
- H. Certified Audit or 990 Tax Information**

## 2019 Proposal Budget Spreadsheet

**Project Title:** Characterizing St. Louis River Estuary Aquatic Habitats

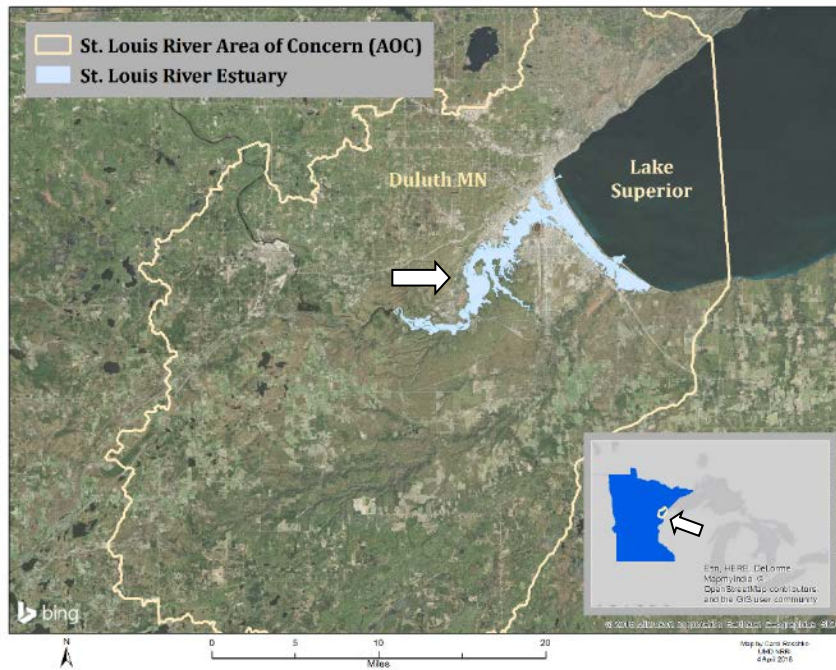
### IV. TOTAL ENRTF REQUEST BUDGET 2 years

BUDGET ITEM	AMOUNT
<b>Personnel:</b>	<b>\$ 176,751</b>
Carol Reschke, Principal Investigator: \$62,563 (fringe rate 27.2%); 40% FTE each year for 2 yrs	
Katya Kovalenko, Co-Investigator: \$22,208 (fringe rate 33.5%); 12.9% FTE each year for 2 years	
Annie Bracey, Avian Ecologist: \$16,715 (fringe rate 33.5%); 10% FTE each year for 2 years	
Kristina Nixon, GIS Analyst: \$13,765 (fringe rate 27.2%); 9.85% FTE each year for 2 years	
Paul Meysembourg, GIS Analyst: \$5,680 (fringe rate 33.5%); 3% FTE each year for 2 years	
Gerald Niemi, Senior Program Manager: \$2,217 (fringe rate 33.5%); 0.5% FTE each year for 2 years	
Jay Austin, Physicist: \$1,635 (fringe rate 33.5%); 0.5% FTE each year for 2 years	
Meijun Cai, Statistician: \$9,418 (fringe rate 33.5%); 5% FTE each year for 2 years	
Daniel Titze, Research Scientist, Physics: \$13,695 (fringe rate 33.5%); 10% FTE each yr for 2 yrs	
Invertebrate Field/Lab Technicians: \$17,899 (fringe rate 27.2%); 25% FTE in Y1, 5% FTE in Y2	
Graduate Research Assistant: \$6,900 (fringe rate 15%); 20% FTE in SUM each year for 2 years	
Undergraduate Field Assistant, Boat Operator: \$4,056 (100% salary); 25.35% FTE in SUM each year for 2 years:	
<b>Professional/Technical/Service Contracts:</b>	<b>\$ 2,600</b>
Services contract for facilitator (\$2,600): Facilitator will be selected competitively with preference given to Minnesota contractors. We will follow University procedures to select a qualified collaborative facilitator	
<b>Equipment/Tools/Supplies:</b>	<b>\$ 2,364</b>
Field supplies (\$1,510): Garmin GPSMAP 64st; accessories and case, to provide accurate GPS coordinates for field checking polygon data (\$290); \$410 for Olympus Tough TG-5 waterproof digital camera to illustrate habitat types; 4 pairs breathable waders and boots (\$180/pair), 2 pair each year for field crew doing veg sampling and field checks of polygons (\$720); batteries, sunscreen, bug repellent, write-in-rain paper and pencils for field work in wet conditions (\$90).	
Lab/Field Supplies for macroinvertebrate habitat complexity (\$506): sample bags (\$85), preservative (\$119), box sampler and mesh (\$50); supplies for stable isotope sample preparation \$172 [(300 Aluminum Weighing Dishes: 2 packs of 150 for \$36/pack from Fisher Scientific),(500 vials \$100)]; \$80 for misc field supplies including boat gas and ice.	
Boat Decontamination Supplies (\$348): \$174/year for supplies ("Virkon Aquatic" and car wash expense) for disinfection of boat and sampling gear to remove/kill aquatic invasive species	
<b>Acquisition (Fee Title or Permanent Easements):</b>	<b>\$ -</b>
<b>Travel:</b>	<b>\$ 2,892</b>
Meetings with local stakeholders (\$123): 4 trips x 28 miles per trip = 112 mi @ \$0.545/mi: \$61 year 1, \$62 year 2	
Fieldwork (\$2,769): 1) Travel to field check uncertain habitat classifications (10 trips), collect aerial imagery with UAV (unmanned aerial vehicle, 10 trips), and sample vegetation where needed (8 trips)(\$1,939): 28 trips x 36 miles/trip = 1008 mi @ \$0.545/mi: \$549.36 each year (\$1,099 total, rounded); and 15 trips x \$15/day truck and boat trailer fees = \$420 each year (\$840 total). 2) Travel to sample habitat complexity (\$415): 12 trips x 36 miles per trip = 432 mi @ \$0.545/mi = \$235 first year; 12 trips x \$15/day truck and boat trailer fees = \$180 first year. 3) Travel for bird surveys first year (\$415): 14 trips x 36 miles/trip = 504 mi @ \$0.545/mi: \$275 first year; 14 days x \$10 per day truck fees = \$140 first year	
<b>Additional Budget Items:</b>	<b>\$ 13,393</b>
Scientific Services from TBD Lab (\$6,250): Lab services for stable isotope mass spectroscopy analysis, to evaluate food chain length and assess reliability of food sources for fish. Lab will be selected competitively, with preference for lab located in Minnesota if possible.	
Shipping (\$112): Cost to ship samples to lab for isotope analysis	
GIS lab fees (\$1,066): 130 hours x \$4.10/hr each year x 2 yrs for use of GIS software, computers, and plotters	
UAV usage fees (\$5,625): fees for use of NRRI Unmanned aerial vehicle (UAV) for collecting high-resolution imagery where needed to complete mapping or fill data gaps. Estimated 6 hrs/day x 15 days x \$62.50/hr	
Software (\$200): PCORD 7 Software: \$100 to upgrade site license for PCORD 7 multivariate community analysis software, plus \$50 x 2 for two simultaneous users.	
Printing/Publication Costs (\$140): printing expenses for draft maps and final report	
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 198,000</b>

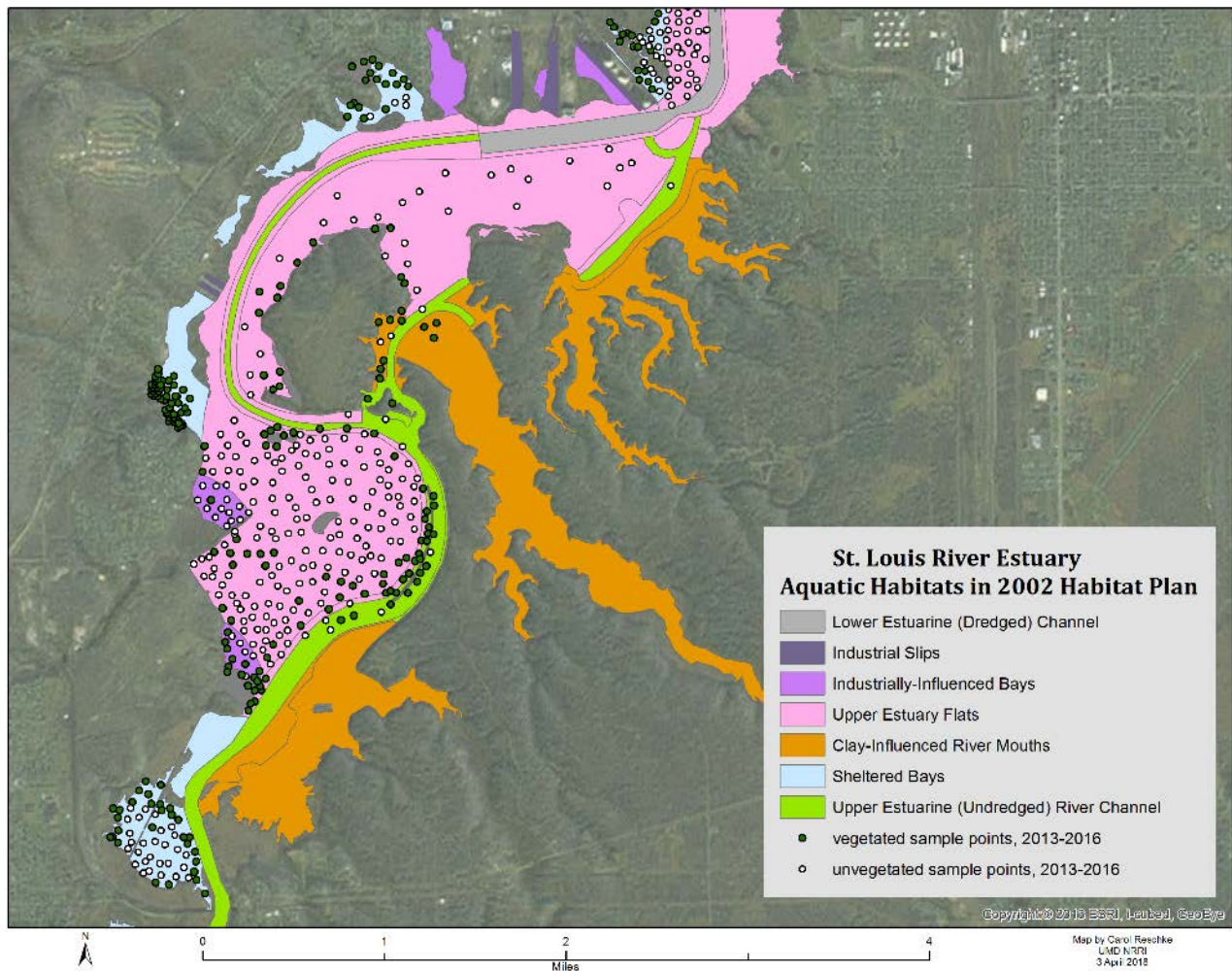
### V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
<b>Other Non-State \$ To Be Applied To Project During Project Period:</b>	\$ -	N/A
<b>Other State \$ To Be Applied To Project During Project Period:</b>	\$ -	N/A
<b>In-kind Services To Be Applied To Project During Project Period:</b>	\$ -	
Unrecovered indirect: 54% on total direct costs (\$198,000 base)	\$ 106,920	Secured
<b>Past and Current ENRTF Appropriation:</b>	\$ -	N/A
<b>Other Funding History:</b>	\$ -	N/A

# Characterizing St. Louis River Estuary Aquatic Habitats



**Above:** Location of St. Louis River Estuary. **Below:** Aquatic Habitats in central portion of estuary, with recent vegetation samples, showing that vegetation patterns are not well-reflected in broadly defined 2002 Aquatic Habitat types.



**PROJECT TITLE:** Characterizing St. Louis River Estuary Aquatic Habitats

**2019 LCCMR Project Manager Qualifications and Organization Description:**

**Carol Reschke, Natural Resources Research Institute (NRRI), University of Minnesota Duluth (UMD)**

**Key Qualifications**

Carol Reschke is a Community Ecologist at NRRI; her recent research has focused on the ecology of plant communities in the St. Louis River estuary. She has conducted aquatic and wetland vegetation studies within the St. Louis River estuary, and run experiments comparing growth of aquatic plants in sediments from both unvegetated restoration sites and vegetated reference sites to evaluate factors limiting growth of aquatic plants in the estuary. Carol worked on mapping plant communities for the 2002 Lower St. Louis River Habitat Plan. In early 2003, Carol received a Willard Munger Sr. Environmental Stewardship Award in recognition of her work with the team that produced the maps for the 2002 Habitat Plan. Carol is an active member of the St. Louis River Habitat Work Group. She has served on two teams involved with St. Louis River restoration projects: the Kingsbury Bay - Grassy Point Site Restoration Team, and the Kingsbury Bay - Grassy Point Health Impact Assessment Advisory Committee.

**EDUCATION**

**M.S. Botany** (Plant Ecology), University of Wisconsin Madison, 1985. **Thesis:** Vegetation of the Conglomerate Rock Shoreline of the Keweenaw Peninsula, Northern Michigan. **Advisor:** Dr. John Thomson; **B.S. Art**, University of Wisconsin Madison, 1978.

**RELEVANT RESEARCH EXPERIENCE**

Carol Reschke has over 34 years of professional experience as a Community Ecologist, including technical coordination for the International Alvar Conservation Initiative, and development of a statewide classification of fish and wildlife habitats in New York State. She has worked at the University of Minnesota Duluth's NRRI since 2004 as scientist, senior scientist, and research program manager.

**PUBLICATIONS**

**Reschke, Carol**, Valerie Brady, Holly Wellard Kelly, and Bob Hell. 2017. Munger Wetlands Invertebrate and Aquatic Vegetation Sampling, St. Louis River Estuary. Technical Report submitted to USFWS. Natural Resources Research Institute Technical Report NRRI/TR-2017/10. 53 pp + 6 appendices.

**Reschke, Carol**. 2016. St. Louis River Area of Concern Aquatic Plant Restoration Experiment. Technical Report submitted to Minnesota Lake Superior Coastal Program. Natural Resources Research Institute Technical Report NRRI/TR-2016/32. 24 pp.

Angradi, Ted, Mark S. Pearson, David W. Bolgrien, Brent Bellinger, Matt Starry, and **Carol Reschke**. 2013. Predicting submerged aquatic vegetation cover and occurrence in a Lake Superior estuary. *Journal of Great Lakes Research* 39(4):536-546.

**Reschke, Carol**, Ron Reid, Judith Jones, Tom Feeney, and Heather Potter. 1999. Conserving Great Lakes Alvars. Final Technical Report of the International Alvar Conservation Initiative. The Nature Conservancy, Great Lakes Program, Chicago, IL. 81 pp.

**Reschke, Carol**. 1990. Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Latham, NY. 96 pp.

**ORGANIZATION DESCRIPTION**

**The Natural Resources Research Institute** is a University of Minnesota Duluth applied research organization. NRRI's mission is to deliver research solutions to balance Minnesota's economy, resources and environment for resilient communities.