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

Project Title: **ENRTF ID: 042-AH**

Data Foundations to Enable Open Research at Itasca

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

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

Total Project Budget: $ 140,000

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

Summary:

The University of Minnesota recently committed to building research capacity and data resources at Itasca Biological Station. Our project would leverage this investment, at its outset, for sustained region-wide benefit.

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Sponsoring Organization: U of MN

Title: Professor

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Location

Region: Central, Metro, Northwest

County Name: Becker, Beltrami, Clearwater, Hubbard, Mahnomen

City / Township: Bemidji, Park Rapids

Alternate Text for Visual:

University of Minnesota purchased 60+ acres (shown) to encourage research at Itasca Biological Station, limited previously to State Park sanctuaries. This will enable University researchers, but could be leveraged, regionally.

_____ 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: Data foundations to enable open science at Itasca

I. PROJECT STATEMENT

Itasca State Park (established 1891) is the oldest state park in Minnesota, and one of the oldest, most iconic parks in the United States. Situated entirely within this 32,690-acre park, the University of Minnesota's Itasca Biological Station & Laboratories (49 acres) was established in 1909 as one of the first Roosevelt-era field research stations. The relationship between the Park and the Station has been fruitful over the years, including observational research by faculty working inside the Park (counting birds, measuring trees). Opportunities, however, for manipulative research (cutting limbs, trenching roots) have been limited due to necessary permit restrictions inside the Itasca State Park sanctuary. This has limited the number of researchers utilizing Itasca Station and has, over time, focused it as a destination for teaching and academic retreats. This has steered the focus of the Station toward activities *within* rather than *beyond* its borders, creating an academic 'island.'

To boost research and engagement at Itasca Biological Station & Labs, the University of Minnesota **took two recent steps**. **1)** The University negotiated a purchase of 63 acres just north of the Park in Fall 2017, to make it possible to do manipulative research. **2)** The Station strategically hired a research Staff Biologist (Dr. Lesley Knoll) and hired a new Director (Dr. Jonathan Schilling) with an active, externally-funded research program.

We believe that these *internal* University steps to boost research and engagement at Itasca can be leveraged for an *external* benefit to the State of Minnesota by developing an **Itasca *regional* resource**, using a strategic ENRTF investment (Category H.). There are two reasons for the Station to think regionally. First, steps taken to attract researchers to Itasca Station will not only boost manipulative science - they will foster *all* science, within and beyond Park borders. A dedicated effort to coordinate new University data with ongoing non-University efforts (by integrating data protocols, formatting, accessibility) promises net gains for the region, and there will be more scientists on site to share it via public engagement at Itasca. Second, DNR and County land managers already generate a wealth of natural resource data in this region, with more consistency than 'come-an-go' faculty. Rather than grow research in isolation as a University-only initiative, it would be logical at this transition moment to synergize with external entities who share a common focus on Itasca.

Goal: Leverage new University investments in research at Itasca with a targeted investment from ENRTF to create an Itasca-specific data resource that includes and enables non-University, regional stakeholders.

Activity 1: Integrate, in an open and accessible platform, the new University data collection efforts with non-University data sources, to produce an Itasca regional data resource, laying a foundation for research growth.

Activity 2: Collect baseline data on recently-purchased University land, using formats for site-level information (biotic & abiotic variables) that enable meta-data analyses & integration with State- and County-level data.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: **Title:** Building a data foundation at Itasca

Description: Data management plans (DMPs) are the 'new normal' for collaborative research - once a confusing expectation, DMPs are now increasingly prescriptive. Specifically, there are three core components to DMPs: 1) categories of data, 2) standards for formatting/metadata, and 3) data accessibility and sharing. We believe that with regional State- and County-based data collection efforts already in place, the new University research initiatives should aim to integrate their new data, not isolate it. **As an example**, a scientist initiating a study on tree regeneration could query data already collected in 90,000 acres of forest managed by Clearwater County - *both* parties would benefit if the scientists adopts similar data protocols. To build this data foundation, we would hire a technician trained computationally in natural sciences. This hire, based in the Twin Cities but traveling regularly to Itasca, would use University computing and library resources to unearth, assimilate, and integrate data (including non-digitized data) from Station-based research with data from regional sources (DNR, etc.). To enable this 'foundations' effort, the technician would network regional data managers, capitalizing on existing

Station relationships with Itasca State Park and with Clearwater County land managers. The **outcomes** of this activity will be 1) an in-hand (website-enabled) resource to guide and link new research efforts in the Itasca region and 2) a data management framework for integrating data generated in Activity 2.

Activity 1 ENRTF BUDGET: $89,000

Outcome	Completion Date
1. Research resource guide for Itasca region to attract, enable, & coordinate new science.	*Dec. 31, 2020*
2. Regional data management plan (DMP-Itasca) to enable accessibility of Activity 2 data.	*June 30, 2021*

Activity 2: **Title:** Seeding baseline data to 'open' new research at Itasca

The 63-acre University of Minnesota land acquisition at Itasca (*see* 'Visual' attachment), will increase the options for researchers visiting the Itasca Biological Station & Labs. It can also enable non-University data collection efforts and have a bigger regional impact. **As an example**, a faculty-led study on milkweed pollination might, as a 'co-product,' generate census data on monarch butterflies – this would be valuable to State Park naturalists who could share census numbers and the science behind them with visitors on hikes.

We will hire summer undergraduate interns to catalog soil, plant, microbial and other relevant data on the new land. Interns would work closely with our technician to create a site-specific DMP, enabling the Station to share data and results as a regional resource. This can be used to a) inform and attract researchers, b) as a 'time zero' benchmark for longer-term research, and c) integrate with State-/County-level data for the same area. The interns will have valuable opportunities for public engagement via a website and by site tours with State Park visitors using an existing collaboration with State Park naturalists. This will yield three **outcomes**, 1) baseline assessments of biotic and abiotic (geological, etc.) features on the property, including a map of resources, 2) pilot testing of DMP-Itasca using real data, coupled with University-enabled public engagement at Itasca State Park, and 3) a second summer sampling effort to allow a measure of *rates* of change among variables measured.

Activity 2 ENRTF BUDGET: $51,000

Outcome	Completion Date
1. Foundational natural resources data, including maps, for newly-acquired plots at Itasca	*June 30, 2020*
2. Pilot test run of DMP-Itasca using real data	*Aug. 31, 2020*
3. Annual resampling to infer rates of change on-site, added to the DMP	*June 30, 2021*

III. PROJECT PARTNERS:

Funded partners: A field technician, two years ($88,620); Two undergraduate interns, two summers ($12,000).
Non-funded partners: All University of Minnesota - **Dr. Jonathan Schilling** – Director, Itasca Biological Station & Laboratories, Assoc. Prof., Project Lead*;* **Dr. Lesley Knoll** – Station Biologist, Itasca Biological Station & Laboratories, Adjunct Asst. Prof., Co-lead; **Dr. Clarence Lehman** – Prof., College of Biological Sciences, Co-lead

IV. LONG-TERM- IMPLEMENTATION AND FUNDING:

Our proposal fits Category H. (<$200,000) and in line with Category A. (foundational data). Building a foundation with ENRTF funding, there will be a low operating budget long-term to update results in a design that is fundable. This work will enable Department of Energy and National Science Foundation standard grants, and will create baseling for Long-term Research in Environmental Biology (LTREB), requiring 6 years of past research.

V. TIME LINE REQUIREMENTS:

Part of the logic for Category H. funding is timing – the Itasca Station has made a quick transition, and **this strategic funding would enable a quick response** with Statewide benefits that otherwise, we believe, could be lost if we wait. We are planning a 2-year proposal period, starting July 1, 2019. The dates listed as completion dates, above, create only one timeline challenge, given a start-date mid-summer when summer interns are mid-completion. We can absorb this cost for June 1-June 30 in the first year, with an annual undergraduate research intern initiated at Itasca Station.

2019 Proposal Budget Spreadsheet

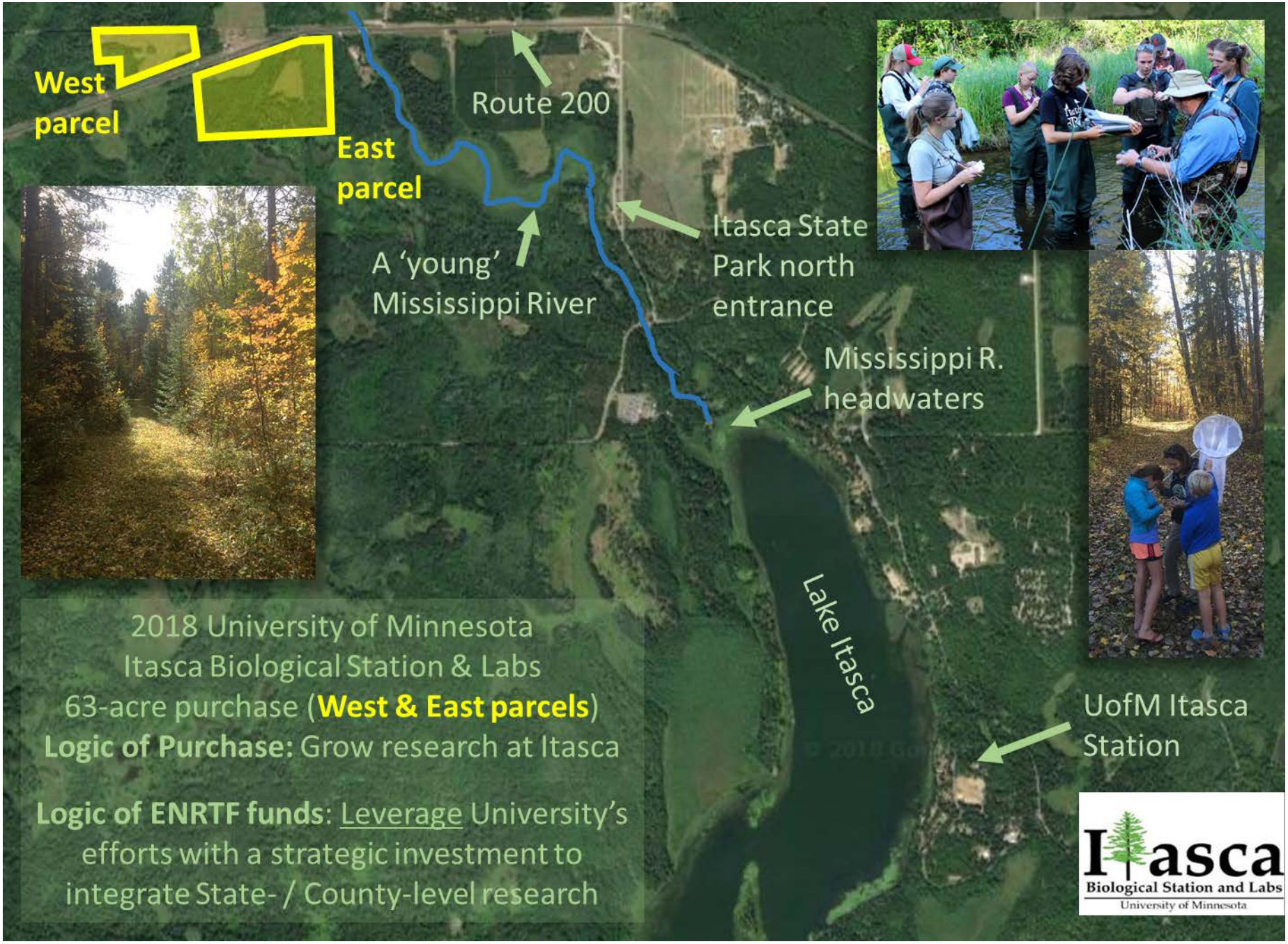
Project Title: Data foundations to enable open research at Itasca

IV. TOTAL ENRTF REQUEST BUDGET - *2* **years**

BUDGET ITEM (See "Guidance on Allowable Expenses")	**AMOUNT**
Personnel: Civil Service employee ($34,320 in year 1; $35350 in year 2) plus fringe (27.2%; $9335 in year 1; 9615 in year 2) = $88,620. Undergraduate summer intern ($6000 in both years) = $12,000	$ 101,000
Professional/Technical/Service Contracts: DNA extraction and sequencing costs for soil/terrestiral microbial communties (bacteria and fungi).	$ 8,500
Equipment/Tools/Supplies: Dedicated computer ($2000); Field sampling materials (examples: whirlpak bags, ziplocks, field measuring tapes, boots, bug shirts, soil sampling kits; $3000); Laboratory analytical supplies (reagents, chemicals, latex gloves, sundry materials; $8000); on site, open access microclimate monitors (aka 'Hobo' detectors; $1000)	$ 14,000
Acquisition (Fee Title or Permanent Easements):	$ -
Travel: Travel to/from/within the Itasca Region, with lodging complementary at the Itasca Biological Station & Laboratories. Food costs for dining hall or in the field, as per diems.	$ 14,000
Additional Budget Items: Server access and website development for the project ($2000); Regional DMP networking lunches x 2 (one per year; $500).	$ 2,500
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 140,000

V. OTHER FUNDS *(This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)*

SOURCE OF FUNDS	**AMOUNT**	**Status**
Other Non-State $ To Be Applied To Project During Project Period:	$ -	
Other State $ To Be Applied To Project During Project Period:	$ -	
In-kind Services To Be Applied To Project During Project Period: 54% indirect costs not recovered by the Unversity of Minnesota on this grant (applied to personnel, fringe, and equipment, including computer).	$ 55,000	
Past and Current ENRTF Appropriation:	$ -	
Other Funding History:	$ -	


West parcel
East parcel
Route 200
A 'young' Mississippi River
Itasca State Park north entrance
Mississippi R. headwaters
Lake Itasca
UofM Itasca Station
2018 University of Minnesota
Itasca Biological Station & Labs
63-acre purchase (West & East parcels)
Logic of Purchase: Grow research at Itasca
Logic of ENRTF funds: Leverage University's efforts with a strategic investment to integrate State- / County-level research
Itasca
Biological Station and Labs
University of Minnesota

Project Manager Qualifications & Organization Description

Dr. Jonathan S. Schilling, the Project Manager, was appointed the Director of the Itasca Biological Station & Laboratories in 2018, where Co-lead Dr. Lesley Knoll is the Station Biologist (appointed in 2016). Dr. Schilling has been at the University of Minnesota for 12 years, and is an Associate Professor who is in the process of going up for Full Professor. He is in the Plant & Microbial Sciences (PMB) department in the College of Biological Sciences. Dr. Schilling has managed many large grants since 2006, including several over $1M for the Department of Energy (DOE) with many collaborators and engagement aspects. He has been awarded several research and teaching awards, including three 'early career' grants from the Andrew W. Mellon Foundation, the Institute on the Environment, and the Department of Energy. The Schilling laboratory group has been highly productive, with publications focused on microbiology in high-tier journals such as the Proceedings of the National Academy of Sciences. The Director job at Itasca was a recent move, enabled by the University, to boost research at the Station and to enable engagement.

Duties & Management: Dr. Schilling, as the Project Manager, will handle the budget distributions and management, as well as human resources management for this project. The hires and management of everyday duties of the undergraduate hires will be co-lead by Dr. Knoll. Specific to the two Activities listed in the proposal, Dr. Knoll will be integral in Activity 1 & 2 efforts targeting data management that networks the Station with the DNR, Clearwater County, and other local entities. She has been fostering these connections, already, and lives on-site at Itasca (adjacent to the new land parcels) year-round. She will also be co-advising undergraduate interns at the station, with Dr. Schilling. Dr. Schilling will be at Itasca May-August, annually, and can enable work at the Station as well as in the Twin Cities, where the technician will be based. He has office space in Cargill building, including a shared 'computational' lab for in silico research, with links to the Minnesota Supercomputing Institute.

The Twin Cities campus of the **University of Minnesota**—Twin Cities is a public institution founded in 1851. The total undergraduate enrollment nearly 35,000, and the campus total size is 1,204 acres. Students are on the semester system. The College of Biological Sciences (CBS) has 145 tenured and tenure-track faculty, over 2000 undergraduate students and approximately 250 graduate students. CBS runs two field stations, including the Itasca Biological Station & Laboratories. Its mission is research, education and outreach that is place-based, focusing on the Itasca region and the links between the region and the University of Minnesota. It has a long tradition of education, including its establishment to train foresters in 1909. The campus at Itasca is 49 acres, including many cabins, research laboratories, and gathering/discussion spaces.