



Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-061

Proposal Title: Restoring Minnesota's Historical Fluid Collections

Project Manager Information

Name: Cassandra Ford

Organization: U of MN - Bell Museum

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Project Basic Information

Project Summary: This project seeks to restore and enhance the Bell Museum's Minnesota alcohol-preserved (fluid) collections by improving long-term storage and digital records, and strengthen our connection to broader Minnesota through outreach.

ENRTF Funds Requested: \$400,000

Proposed Project Completion: June 30, 2029

LCCMR Funding Category: Fish and Wildlife (D)

Project Location

What is the best scale for describing where your work will take place?

Region(s): Metro

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.

The Bell Museum is Minnesota's official natural history museum, housing millions of specimens from Minnesota and around the world. These specimens are used for research by state (MNDNR, MPCA) and federal (USDA, USFWS) agencies, conservation societies, and academic institutions. Since the museum's inception, the alcohol-preserved fluid collections (e.g. fishes, reptiles, amphibians, insects, algae) have experienced periods of rapid growth resulting in specimens being stored using now-outdated methods. Deteriorating storage now jeopardizes the stability of the specimens inside and their scientific utility for research. Despite making incremental improvements to the fluid collections, the museum has been unable to pursue a comprehensive collection restoration plan due to limited staff capacity and reduced funding opportunities.

We will ensure the persistence of these specimens as valuable scientific assets by addressing the storage deficiencies and modernizing how we care for and share our fluid collections. This project also presents a unique opportunity to honor our commitment to the broader Minnesota community by documenting and sharing the restoration process through outreach. We request funding to support a work plan that ensures the longevity, accessibility, and utility of the fluid collections, and strengthens the connections between Minnesotans and the incredible stories housed inside.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

We will address the immediate physical risk to specimens by transferring them from their damaged containers to appropriate, permanent storage, replace damaged tags, refresh denatured or evaporated preservative, and develop a long-term plan for future maintenance. We will improve researcher access to these specimens by implementing a barcode organizational scheme throughout the fluid zoological collection (with room for expansion) and facilitate digitization of specimens in our historical backlog. We will incorporate visual data, field data, and cultural context wherever possible to fill gaps in the digital collection record and expand the research utility of the fluid collections in-house and statewide. To bridge the gap between Bell collections and Minnesotans, we will collaborate with the Bell Museum's media team to launch blog posts, specimen spotlights, and other forms of media content to highlight the restoration process, historical specimen and collector stories, and to continue examining the complicated history of collections. Additionally, we will promote the scientific value of these improvements through talks, seminars, and conferences, particularly those attended by frequent visitors/users to our research collections.

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?

We seek to:

- Ensure long-term preservation of the Bell Museum's historical fluid collection (>15,000 specimens), spanning across four major zoological and botanical groups.
- Implement modern organizational tools (e.g., barcoding, databasing) to facilitate future use, maintenance, and growth of our scientific collections.
- Enrich the research value of specimens and digital records by incorporating historical collection information and visual data into existing records.
- Provide opportunities for all Minnesotans to engage, both scientifically or casually, with the many unique and valuable resources at the Bell Museum (1-3 stories/posts per month at min)

Activities and Milestones

Activity 1: Implement large scale storage improvements to historical fish, reptile & amphibian, insect and algae fluid collections

Activity Budget: \$240,000

Activity Description:

This activity addresses the immediate risk of specimen damage and loss caused by defunct or inadequate storage infrastructure. This work includes confirming the inventory of specimens affected, ordering and receiving permanent storage containers, ethanol and other equipment, hiring and training staff to complete specimen transfers. This activity will immediately halt any ongoing deterioration caused by outdated storage methods, and will provide a long-term storage solution for the specimens. This activity provides the groundwork that will enable future project activities and scientific research using these fragile specimens. The timeline for specimen transfer (including inventory, transfer, waste disposal, and installation) is likely to vary somewhat between the collections included in this work plan. Insect and herbarium specimens will be completed within nine months from the start of the grant period (June 2027); however, we expect the transfer of fish and herpetology specimens to take nearly two fiscal years due to the high volume of large specimens and additional safety considerations of the work.

Activity Milestones:

Description	Approximate Completion Date
Place order for all storage tanks, chemicals, and equipment needed for the specimen transfer	September 30, 2027
Draft workflows for the major activities and procedures (transfer, imaging, barcoding, etc)	September 30, 2027
Hire and train support staff in designated collection areas	September 30, 2027
Complete/confirm inventory of fish and herpetological specimens to be transferred	December 31, 2027
Complete the restoration of vialled insect and algae collections into new containers	June 30, 2028
Complete restoration and transfer of all herpetology and fish specimens into new containers	March 31, 2029

Activity 2: Enhance the scientific value and accessibility of the historical fluid collections

Activity Budget: \$158,000

Activity Description:

We aim to maximize the scientific value of the specimens and their records by ensuring completeness, filling data gaps, and linking visual data to existing records. We also aim to make both specimens and their records more easily accessible by implementing a barcode organizational system, which will facilitate scientific use and ongoing maintenance of restored collections. We will first establish the digital infrastructure required for barcoding the collection, then attach, scan, and link the barcodes to the specimens. At this time, we will also take research-quality photos of each specimen to link to the digital record. Finally, we will update digital records with specimen condition notes and ensure parity between the digital and historical field records. To maximize efficiency of this work plan, we envision this activity to occur in tandem with Activity 1. This approach also allows us to monitor the progress of this activity using the specimen inventories previously described, and adjust our workflows as needed to ensure efficiency and effectiveness.

Activity Milestones:

Description	Approximate Completion Date
Establish a repository of data and materials for deposition into U of M archives	September 30, 2027
Produce a skeletal catalog of vialled insect and algae collections	June 30, 2028
Produce research quality photographs for 50% of restored fish collections	March 31, 2029
Complete barcoding throughout the fish and herpetology historical collections	March 31, 2029

Implement a barcode system throughout the fluid collections	June 30, 2029
Update digital records with specimen condition and link relevant supplemental material	June 30, 2029

Activity 3: Connect Minnesotans with the collections and our work

Activity Budget: \$2,000

Activity Description:

This activity will connect and familiarize more Minnesotans with the precious resources housed within the Bell's collections, reiterate their scientific value, and offer a glimpse into otherwise inaccessible areas of the collections. We will document the restoration process, interesting field notes, and specimen spotlights for future content development. We will work collaboratively with the Bell Museum's communications team to tell the story of the restoration process, the history of the collections, and the unique specimens we encounter along the way. We will do this by developing a variety of digital content posts to be shared via social media, blog posts, newsletters, and more. Additionally, social media offers a unique opportunity to monitor and record viewer engagement with posts highlighting project activities. We will also produce a conference poster and talk outlining the objectives, process, and research benefits gained by this project to be presented at least one state research conference. This activity will be ongoing, beginning from the project start, and extending beyond the project completion with these public posts.

Activity Milestones:

Description	Approximate Completion Date
Produce 6-9 media posts highlighting insect and algae collections (beg. Oct 2027)	June 30, 2028
Develop a conference talk that summarizes project objectives, value of specimen restoration, and research applications	March 31, 2029
Identify specimens, field notes, historical anecdotes, or other content suitable for media release	March 31, 2029
Produce an engagement report that includes outreach engagement and research use/impact metrics	June 30, 2029
Produce additional 9-12 media posts focused on fish and herpetology collection (beg. Oct 2027)	June 30, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Angela Hornsby	Bell Museum, University of Minnesota	Zoological Collections Manager	Yes
Robin Thomson	Bell Museum, University of Minnesota	Entomological Collections Manager	Yes
Tim Whitfeld	Bell Museum, University of Minnesota	Herbarium Collections Manager	Yes
Faith Kelly	University of Minnesota	Research Professional 2-- Zoology	Yes

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.

1. Document the entire conservation process across each collection included in the work plan. Photos, videos, scans, and other media gathered will be used to create a chronological account of the project's milestones and unique discoveries that evidently occur while curating historical collections. The majority of this content will be shared through the Bell Museum media channels.*
2. Establish a project-specific communication network between the included collections' managers, the project manager, and curatorial staff as necessary. This network will provide a designated space to establish and report on project timelines, troubleshoot issues with colleagues, share unique stories or ideas for content, and reaffirm the project objectives throughout the work period.
3. Produce a working inventory and plan to catalog two historical sub-collections; a large Minnesota-based insect accession, and a legacy algae collection curated by the University of Minnesota's first female professor, Josephine Tilden.
4. Enhance the existing historical records within our fish and herpetology collections by adding visual media and filling data gaps where possible. A list of previously incomplete or inaccessible specimens will be maintained, and shared with interested parties. We are particularly eager to offer this information to the state and federal agencies with whom we host and collaborate with often, including the Minnesota DNR, MPCA, and USDA.
5. We will maintain biannual reports that track the total number of conserved specimens, specimen and/or collection use metrics, social media content engagement, and adherence to collection-specific and broader timelines. The comprehensive reports will be shared with our collaborators and the broader Bell Museum team, but relevant metrics may also be shared more widely for use in social media content, blog posts, newsletters, or other news outlets as available.*
6. We will develop talks and posters promoting the work being carried out in the Bell collections and its scientific and cultural value to be presented at state conferences as appropriate. These talks will highlight the project objectives, emphasize the research value of our historical collections, and provide opportunities to connect with colleagues whose work may benefit from this work now or in the future. *

*We will acknowledge the Environmental and Natural Resources Trust Fund in any printed or verbal presentations, including but not limited to social media posts, blog posts, printed materials, or interviews.

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 work be funded?

The Bell Museum of Natural History allocates yearly funding for standard maintenance of the scientific collections. These funds cover basic upkeep, but are not sufficient for large-scale restoration efforts as described in this proposal. After the immediate physical threats to the collection are mitigated by the activities outlined in this proposal, the costs to maintain such improvements will be covered by internal funding allotments. Additionally, the planning and development of organizational schema and operating procedures specified in the work plan will further facilitate long-term maintenance of the collections following the initial conservation plan.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Salvaged Wildlife to Inform Environmental Health, Ecology, Education	M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 03i	\$486,000
Minnesota Biodiversity Atlas - Phase 3	M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 03s	\$797,000
Northward Expansion of Ecologically-Damaging Amphibians and Reptiles	M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 06a	\$163,000
Visualizing Minnesota's Natural Resources with CT-Scanning	M.L. 2025, First Special Session, Chp. 1, Art. 2, Sec. 2, Subd. 03n	\$955,000

Project Manager and Organization Qualifications

Project Manager Name: Kassandra Ford

Job Title: Assistant Professor, Curator of Fish and Mollusks

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

The project manager is a tenure-track assistant professor and museum curator with the University of Minnesota - Twin Cities and the Bell Museum of Natural History. They are responsible for managing a large ichthyology collection, mentoring graduate students, and performing research at a high caliber. The manager has knowledge and experience with fieldwork identifications and active collaborations with state agencies.

Organization: U of MN - Bell Museum

Organization Description:

The Bell Museum is the official natural history museum of Minnesota, established in 1872 by the legislature and held in trust at the University of Minnesota. In addition to providing interpretation and educational programming onsite and throughout greater Minnesota, the Bell Museum also maintains a rich collection of scientific specimens, including vertebrates, insects, mollusks, plants, and fungi.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Faculty Salary-- Summer and AY, 2 months summer salary for 2 yrs (Kassandra Ford)		PI, budget consultation, point of contact for curator-level decisions involving fish specimens.			36.6%	0.4		\$62,000
Research Professional 2 Employee-- 100% salary for 2 yrs (Faith Kelly)		Project manager: maintains communication with project collaborators, trains and manages fish and herpetology support staff, maintains project timeline and activities log, develops project workflows, and reports on deliverables			32.3%	2		\$173,000
Zoological Collections Manager Salary-- 3% annual salary for 2 yrs (Angela Hornsby)		Consults on high-level collection organization, barcode system implementation, and associated best practices.			36.6%	0.06		\$7,400
Entomological Collections Manager Salary-- 2% annual salary for 1 yr (Robin Thomson)		Trains and supervises entomology support staff, monitors and reports progress metrics and collection-specific needs as work progresses.			36.6%	0.02		\$2,500
Herbarium Collections Manager Salary-- 2% annual salary for 1 yr (Tim Whitfeld)		Trains and supervises Herbarium support staff, monitors and reports progress metrics and collection-specific needs as work progresses.			36.6%	0.02		\$2,500

Temp/Casual Curatorial Support-- 0.25 FTE for 2 years		Assists with specimen transfer, record updates, photography, barcode placement, chemical waste disposal, and assists with documenting project highlights as possible.			8%	0.5		\$23,800
Temp/Casual Curatorial Support-- 0.25 FTE for 2 years		Assists with specimen transfer, record updates, photography, barcode placement, chemical waste disposal, and assists with documenting project highlights as possible.			8%	0.5		\$23,800
3x Undergraduate Curatorial Support (0.25 FTE, 9-month appointment)		Assists with specimen transfer (limited to entomology and algae collections), maintains specimen inventory and/or skeletal catalog, documents project highlights as needed.			0%	0.3		\$20,000
							Sub Total	\$315,000
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Tools and Supplies	1x Digital Hydrometer	Efficient and accurate measurement of ethanol preservative concentrations					\$2,200
	Tools and Supplies	2x 3M 6000 Series Full-face respirators and 4x replacement filter cartridges	Essential for respiratory protection when handling large volumes of ethanol, formaldehyde, and other hazardous chemicals.					\$700
	Tools and Supplies	Miscellaneous PPE + lab safety (nitrile gloves, lab coats, knee pads/mats, absorbent mats, formalin test strips, etc)	Essential PPE and chemical testing equipment for duration of project.					\$1,580
	Tools and Supplies	2x Barcode scanner(s) and printed barcodes (19x 10k/roll)	Stickers and scanners needed to implement a barcoded organizational scheme throughout the zoological collections.					\$5,000
	Tools and Supplies	1x Plastic Utility Cart	Required for safe transport of large or heavy specimens and their containers.					\$300
	Tools and Supplies	1x LDPE siphon with stopcock	Facilitates the safe removal of waste chemicals from immovable containers					\$200

			(chemical drums, carboys, buckets, or tanks)					
	Equipment	1x 2TB External SSD	Serves as essential data backup for visual media, specifically research quality photos of specimens included in project activities.					\$500
	Tools and Supplies	Archival quality label materials (Curatorial paper reams, micron pens, archival adhesives, etc)	Specialty archival materials are needed when producing labels for museum specimens, especially those in fluid collections.					\$3,500
	Tools and Supplies	Glass vials w/ stoppers (~20,000 in total, 19 boxes of 1,200/box), associated freight charges	Entomological specimens will be transferred from original containers into curatorial quality glass vials for long term storage.					\$10,000
	Tools and Supplies	Chemical Preservatives: 190 proof ethanol (55 gallon/drum, 20 drums total), lab grade glycerin (1-2 Liters), synthetic sea water mix (1 50-gal package)	Ethanol serves as the main, long term preservative across the fluid collections. Some algae must be preserved in a mixture of ethanol and glycerin, or sea water and glycerin to avoid specimen damage.					\$15,000
	Equipment	Delta Designs Stainless steel specimen tanks (Approximate costs are 12x 18-gallon tank w/ dolly @ \$1450/unit, 12x 35-gallon tank w/ dolly @ \$2025/unit, total freight charge of \$2,300)	Stainless steel tanks are the industry standard for storing large, fluid-preserved specimens. They are resistant to the chemical preservatives used in fluid collections, provide ease of access to specimens, and are mobile when mounted on a rolling dolly. Delta Designs are the industry leader in manufacturing stainless steel specimen tanks, and guarantee exceptional protection against leakage, preservative evaporation, and product longevity. See attached quote.					\$44,000
							Sub Total	\$82,980
Capital Equipment								
							Sub Total	-

Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Conference Registration Miles/ Meals/ Lodging	TBD state conference focused on natural resource management, conservation, or environment (MN AFS Chapter, MN Naturalists Association, etc). We include registration (300-400/ea), lodging (165/night), and meal stipends (68/day) for two attendees for two and a half days, as well as travel reimbursement for up to 300 miles at \$0.72/mile.	We will present our talk detailing the process, scientific utility, and highlights of this project as one of several means of disseminating the progress we make, and the value of this project.					\$1,900
							Sub Total	\$1,900
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
	Printing	Conference poster summarizing conservation process, highlighting unique specimens, and describing added benefits for scientific use	This poster will be presented at at least one state conference to share the restoration and collection improvement work funded by this grant. Additionally, it will be used to showcase the improved ease of use and scientific value of previously inaccessible subgroups of the Bell Museum collections.					\$120
							Sub Total	\$120
Other Expenses								
							Sub Total	-
							Grand Total	\$400,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Total Project Cost: \$400,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [2a4001b0-134.pdf](#)

Alternate Text for Visual Component

A collage of natural history collection imagery, including specimens in jars, imaging equipment, field notes, and a computer. Call out bubbles describe the activities and benefits of the project; outreach, enhanced digital records, storytelling, modern organization, and appropriate specimen storage. Bell Museum, UMN, and CFANS logos are included as well...

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Ford UMN Board Resolution Letter	4d9b8a94-b4d.pdf
Support Letter-- J Moriarty	ad8d5777-9f4.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I understand the UMN Policy on travel applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

No

Does the organization have a fiscal agent for this project?

No

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing \$10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care,

treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Faith Kelly (University of Minnesota - Twin Cities); Jennifer Olson (Bell Museum)

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A