

**Environment and Natural Resources Trust Fund  
2020 Request for Proposals (RFP)**

---

**Project Title:**

**ENRTF ID: 128-C**

UMD Boreal Observatory at Chik-Wauk on the Gunflint

---

**Category:** C. Environmental Education

**Sub-Category:**

---

**Total Project Budget: \$** 514.865

**Proposed Project Time Period for the Funding Requested:** June 30, 2023 (3 yrs)

**Summary:**

The University of Minnesota Duluth Boreal Observatory is where the public learns first hand about Minnesota's boreal forest, and future scientists and educators hone their skills.

---

**Name:** Joel Halvorson

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

**Job Title:** \_\_\_\_\_

**Department:** Swenson College of Science and Engineering and College of Education and Human Service P

**Address:** 1049 University Drive  
Duluth MN 55812

**Telephone Number:** (612) 770-8642

**Email** halvor@d.umn.edu

**Web Address:** d.umn.edu

---

**Location:**

**Region:** Statewide

**County Name:** Statewide

**City / Township:** Grand Marias, Duluth

---

**Alternate Text for Visual:**

Location map and program examples

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____ %



## I. PROJECT STATEMENT

At the end of the Gunflint Trail and surrounded by the Boundary Waters Canoe Area Wilderness (BWCAW) sits the Chik-Wauk Museum and Nature Center. This unique location is where the University of Minnesota Duluth plans to develop the Boreal Observatory<sup>1</sup>. The plan will increase the program offerings of this facility through a collaborative partnership with the Gunflint Trail Historical Society and the Superior National Forest. The Boreal Observatory will leverage the research and expertise of UMD to create unique place-based learning experiences that will enhance the public's understanding of all things boreal: *sky, earth, water, flora, fauna, and culture*. In addition, the project will establish the site as a *forest-based university venue* that is welcoming of the public and a place where future scientists and educators can hone their skills.

The BWCAW is in the only level 1 dark sky<sup>2</sup> region in the Eastern US. Efforts are underway to establish a Dark Sky Sanctuary designation over this region. In August of 2018, UMD and community partners launched a 7-day Dark Sky Caravan from Duluth to the end of the Gunflint Trail. This was followed in December by a Dark Sky Festival in Grand Marais. Featuring UMD's mobile planetarium, telescopes and experts, the public response was impressive. The August Caravan launched with a small gathering in Duluth and culminated with over 200 visitors at the end of the Gunflint Trail. Similarly, the December festival drew capacity crowds to Grand Marais during an otherwise quiet time of year. People have a natural attraction to dark skies, and they are an important component of nature conservation, and the ecological integrity of protected areas. As the National Park Service slogan states: *Half the Park is After Dark*. Acknowledging this fact, the Boreal Observatory will embrace the dark, and extend the learning to include a more holistic window into *all things boreal*, informed by university expertise and research.

Within UMD, the Boreal Observatory is a partnership between two colleges: The Swenson College of Science and Engineering<sup>3</sup> and the College of Education and Human Service Professions<sup>4</sup>. Collectively, they are preparing Minnesota's future scientists, engineers, environmental educators and leaders. Developed through interdisciplinary teams, learning experiences will include formal presentations, hands on activities, and site-specific tours. Experiences will be designed to be engaging, and accessible to as wide an audience as possible.

### GOALS

- To leverage university expertise and knowledge, to enhance the public's understanding and awareness of the boreal forest and protected Wilderness of the BWCAW
- To use the unique location of Chik-Wauk as a place for students and faculty to teach, learn, and engage with the public.
- To establish high quality programs that are mobile and strategically offered to area communities, camps, parks, and resorts.

## II. PROJECT ACTIVITIES AND OUTCOMES

### Activity 1: Identify boreal forest program themes for development

Budget: \$164,907

To help define and refine the program elements of this project, UMD students and staff will work under contract to Chik-Wauk to run their summer 2019 programming. This includes running the nature center and scheduling public programs. In addition to running the existing programs, an ad hoc committee of university and community partners, will identify candidate topics for future development through this project. This will include identifying key faculty experts to guide program development, defining media and educational elements necessary for development, and identifying critical outside organizations or agencies important to the topic. Project staff will work with UMD faculty and community partners, to identify boreal forest topics for program development. University faculty experts will be identified and enlisted as content advisors. Program outlines will be developed for review. Programs will be designed to create a global to local perspective and feature first person insights of UMD and community experts, and geographic locales that the public can visit to reinforce place-based learning. E.g. programming about Minnesota's moose, would include an understanding of the global distribution, the people behind the research of Minnesota declining moose populations, how and where to see moose while visiting, moose artifacts, and activities, etc.

<sup>1</sup> Like the UMD Large Lake Observatory, The Boreal Observatory will be a place that focuses on understanding the boreal or taiga forest, the largest land biome in North America.

<sup>2</sup> Based on the Bortle scale, a 1-9 measurement of light pollution

<sup>3</sup> This includes departments like Physics and Astronomy home to the UMD Planetarium

<sup>4</sup> This includes the Center for Environmental Education



**Environment and Natural Resources Trust Fund (ENRTF)**  
**2020 Main Proposal**  
**PROJECT TITLE: UMD Boreal Observatory at Chik-Wauk on the Gunflint**

<b>Outcome</b>	<b>Completion Date</b>
1. Based on results of summer 2019 UMD pilot at Chik-Wauk, program topics for first year development selected and tested during the summer of 2020	September 2020
2. Informed by formative evaluation, program topics refined, and new and/or refined elements selected for inclusion	March 2021
3. New and improved program experiences tested during the summer of 2021	September 2021
4. Informed by formative evaluation, program topics refined, and new and/or refined elements selected for inclusion	March 2022
5. New and improved program experiences tested during the summer of 2022	September 2022
6. Informed by formative evaluation, program topics refined, and final versions completed	March 2023
7. Transitional post project funding plan implemented. Summer programming implemented and supported through other TBD sources.	June 2023

**Activity 2: Production of multimodal learning experiences**

Budget: \$203,538

Develop elements for public programs. Write narrative scripts, collect and integrate data and digital content for use in an immersive display. Collect artifacts, develop manipulatives, and craft hands-on activities. Create the technical structure that will allow presenters to interactively deliver programs. Create multi-modal versions of presenter lead programs. This includes print and web-based versions to support self-guided Boreal Tours and/or for use by others.

<b>Outcome</b>	<b>Completion Date</b>
1. Informed by summer 2019 UMD pilot at Chik-Wauk, refine existing programs to include new content elements and mixed media delivery. i.e. use of immersive display in conjunction with hands on activities.	September 2020
2. Draft outline, script, and production plan reviewed and approved by community partners	November 2020-2022
3. Completed learning experience pilot tested at UMD with students and staff	March 2021-2023
4. Informed by formative evaluation, program elements refined and print and web-based versions completed. Multitmodal learning experience ready for use with public	May 2021-2023

**Activity 3: Public engagement and evaluation**

Budget: \$146,420

Develop an outreach schedule for the year that includes full-time summer programming at Chik-Wauk and off-site opportunities at resorts, camps, parks and community events. Work with UMD evaluator to establish a formative evaluation schedule to inform the iterative development and refinement of programming. The bulk of the programming will take place in the summer. Selected fall, winter, and spring events will be supported in consultation with community partners.

<b>Outcome</b>	<b>Completion Date</b>
1. Work with community partners to scope out program schedule for the summer. Identify appropriate times for evaluation of programming (2-3 times/year)	April 2020-2023
2. Work with community partners to identify selected community events to provide programming	July 2020-2022
3. Complete and submit final project evaluation results to the LCCMR.	July, 2023

**III. PROJECT PARTNERS AND COLLABORATORS:**

Swenson College of Science and Engineering (UMD); College of Education and Human Service Professions (UMD); Gunflint Trail Historical Society (Chik-Wauk Museum and Nature Center); Superior National Forest (USFS); Visit Cook County.

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

The experiences will become integrated programs of the Chik-Wauk Museum and Nature Center, with resources available on-line. The programs will increase the awareness and understanding of the boreal forest, and the issues that impact the stewardship of this region. These programs will leave a sustainable program structure in place that benefits UMD students and faculty, and the communities served. Place matters, people matter, and by harnessing our shared intellectual capital, we can sustain these special places and experiences for generations to come. We estimate reaching over 40,000 visitors over the three years of funding.

**Attachment A: Project Budget Spreadsheet**  
**Environment and Natural Resources Trust Fund**  
**M.L. 2020 Budget Spreadsheet**



**Legal Citation:**

**Project Manager:**

**Project Title:** Boreal Observatory at Chik-Wauk

**Organization:** University of Minnesota Duluth

**Project Budget:** \$514,865

**Project Length and Completion Date:** 3 years, June 30, 2023

**Today's Date:** 3/10/2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET		Budget	Amount Spent	Balance
<b>BUDGET ITEM</b>				
<b>Personnel (Wages and Benefits)</b>		\$ 444,609	\$ -	\$ 444,609
Joel Halvorson, Principle Investigator - Project Manager: \$191,760 (Salary 74% fringe rate 26% ), 50% Effort for 3 years;				
Julie Ernst - Evaluator: \$51,396 (Salary 74% fringe rate 26% ), 40% Effort Summer only (3 months), for 3 years;				
TBD, Researcher - Science Content Advisor: \$20,511 (Salary 74% fringe rate 26% ), 15% Effort for 3 months, (Summer), for 3 years;				
Graduate Student Research Assistant: \$123,106 (Salary 53% tuition 39% fringe 8%), 50% Effort for 9 months, 50% Effort 3 months (summer), for 3 years;				
Undergraduate Student Worker/Presenter: \$28,418, 100% Effort for 3 months (summer), for 3 years;				
Undergraduate Student Worker/Presenter: \$28,418, 100% Effort for 3 months (summer), for 3 years;				
<b>Professional/Technical/Service Contracts:</b>		\$ 15,000		\$ 15,000
TBD -Media and WWW content production support 100 hrs/yr @ \$50 hr				
<b>Equipment/Tools/Supplies:</b>		\$ 47,553		\$ 47,553
Portable Panoramic immersive display screen \$15,000, 4k projector with fisheye lens \$12,000, fulldome video camera \$6,000, DSLR Camera with fisheye lens \$4,500, Aerial drone octocopter with camera mount \$3,500, Production workstation \$3,000, Production software (Adobe suite) \$2,008, Duplicating/Photocopying \$1,545				
<b>Travel expenses in Minnesota</b>		\$ 7,703		\$ 7,703
Travel related to production: \$4,636 (6 - 3 Day trips ~ \$250/day)				
Travel related to evaluation: \$3,067 (4 - 3 Day trips ~ \$250/day based on UMD travel <i>Travel from UMD to Chik-Wauk, and associated area sites</i> )				
<b>Other</b>				
		\$ -	\$ -	\$ -
<b>COLUMN TOTAL</b>		\$ 514,865	\$ -	\$ 514,865
<b>SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT</b>				
	<b>Status (secured or pending)</b>	<b>Budget</b>	<b>Spent</b>	<b>Balance</b>
<b>Non-State:</b>		\$ -	\$ -	\$ -
<b>State:</b>		\$ -	\$ -	\$ -
<b>In kind:</b>				
Gunflint Trail Historical Society will contribute toward this project with facilities and equipment .	Secured	\$ 36,000	\$ -	\$ 36,000
Because the project is overhead free, space, electricity, and other facilities/adminstrative costs (33% of direct costs excluding permanent equipment and graduate student tuition benefits) are provided in-kind. This includes use of the Chik-Wauk Museum during the summer and UMD campus during the academic year.	Secured	\$ 143,185		\$ 143,185
<b>Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS</b>		<b>Budget</b>	<b>Spent</b>	<b>Balance</b>
			\$ -	\$ -

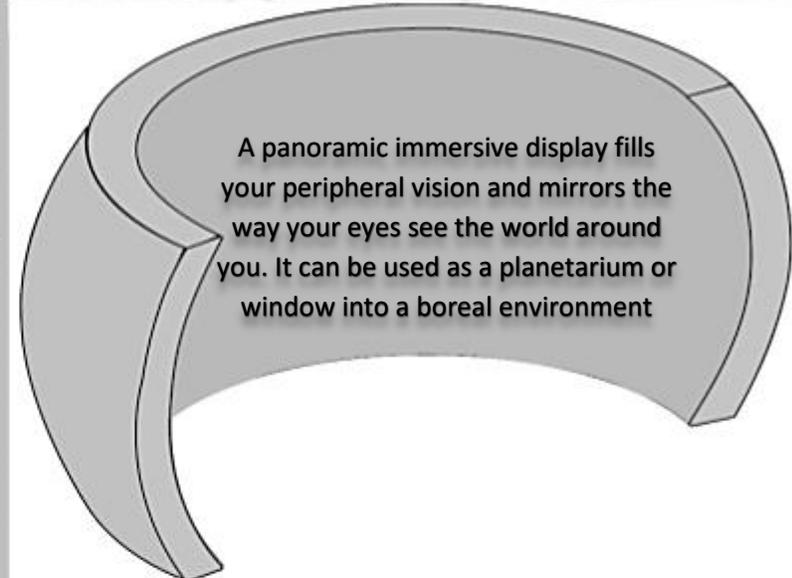
Chik-Wauk Museum and Nature Center is a partnership of the Gunflint Trail Historical Society and Superior National Forest, Gunflint Ranger District.



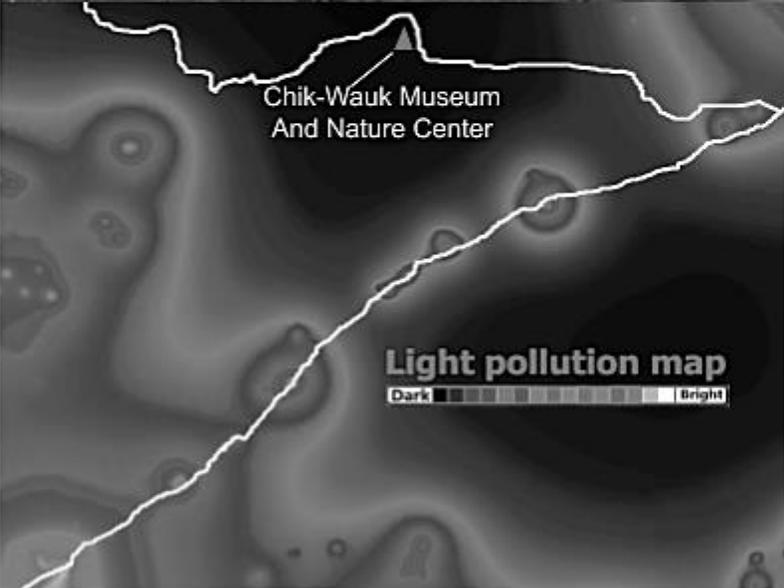
Program Examples



Panoramic display at the Aldo Leopold Nature Center



A panoramic immersive display fills your peripheral vision and mirrors the way your eyes see the world around you. It can be used as a planetarium or window into a boreal environment



Forest Change Observatory  
Chik-Wauk Museum, home to the 1999 Blowdown and 2007 Ham Lake Fire



The Ham Lake fire revealed 1.85-billion-year-old asteroid impact ejecta



Nature Center at Chik-Wauk



**PROJECT TITLE:** UMD Boreal Observatory at Chik-Wauk on the Gunflint

**Joel Halvorson, Swenson College of Science and Engineering, University of Minnesota Duluth**

**Key Qualifications:** Joel is a Science Communications Specialist, who has spent the past 30 years working in formal and informal education settings. This includes teaching, launching new museums, creating exhibits and educational programs, and nurturing partnerships between scientists and institutions. He has worked for the Science Museum of Minnesota, the new Bell Museum, and numerous national and international collaborators. He is currently working for UMD to develop new public engagement programs and strategies.

**EDUCATION:**

M.A., 1992 University of St. Thomas, Learning Technology and Instructional Design  
B.A., 1983. St. Olaf College, Mathematics

**Dr. Julie Ernst, College of Education and Human Service Professions, University of Minnesota Duluth**

**Key Qualifications:** Julie earned her Ph.D. at the University of Minnesota Duluth with an emphasis in environmental education and education research and evaluation methodology. She is a full professor at the University of Minnesota Duluth. Her doctoral work included a focus in education research and evaluation, and she currently teaches graduate coursework in educational research, environmental education program evaluation, and quantitative statistical analysis. She has co-authored a text for environmental education program evaluation, and has conducted evaluations of NSF-, EPA- and NOAA-funded environmental education and STEM-focused projects, as well as for state and non-profit agencies and organizations.

**EDUCATION:**

Ph.D., 2003 University of Florida, Environmental Education; Education Research & Evaluation  
M.Ed., 1998 University of Minnesota Duluth, Environmental Education  
B.A., 1995 College of St. Benedict, Education/Environmental Studies

**Dr. Marc Seigar, Swenson College of Science and Engineering, University of Minnesota Duluth**

**Key Qualifications:** Marc is a professor in the Department of Physics and Astronomy and is currently serving as an Associate Dean of the Swenson College of Science and Engineering. His research interests include Extragalactic Astrophysics, Galaxy Dynamics and Structure, Dark Matter, and Black Holes.

**Dr. Ken Gilbertson, College of Education and Human Service Professions, University of Minnesota Duluth**

**Key Qualifications:** Ken is a professor and Department Head for the Center for Environmental Education. His interests include teaching outdoor and environmental education in non-formal settings, wilderness education and interpretation, resource management and planning, and sustainability of nature-based tourism in protected nature areas.

**ORGANIZATION DESCRIPTION**

**UMD Swenson College of Science and Engineering** educates students in the natural sciences, mathematical sciences, engineering, technology, and interdisciplinary work branching into these fields. The college has more than 3,200 undergraduate and 200 graduate students. It is the largest college at UMD and the third largest in the University of Minnesota system

**UMD College of Education and Human Service Professions** prepares students for careers in industry, school and non-school educational settings, community agencies, and government. Our collective teaching, scholarship, and service supports student development as engaged citizens, reflective learners, critical thinkers, and evidence-informed practitioners in a culturally-sensitive, socially-just learning environment.

**The Gunflint Trail Historical Society**, a 501c3 nonprofit organization, operates **Chik-Wauk Museum and Nature Center** through a special use permit with the US Forest Service. Chik-Wauk is located 57 miles from Grand Marais, Minnesota, near the end of the Gunflint Trail. Chik-Wauk's campus consists of a museum, nature center, historic watercraft exhibit building, a cabin replica, administration building, and 50 acres of forest on Saganaga Lake adjacent to the Boundary Waters Canoe Area Wilderness. The facility occupies the site of a 1930s era resort and is listed on the National Register of Historic Places

**Visit Cook County** is a collaboration of the existing Cook County, Minnesota community tourism associations, the Cook County Events and Visitors Bureau and the members of the Grand Portage Band of Chippewa Ojibwe.