

## **2017 Project Abstract**

For the Period Ending June 30, 2019

**PROJECT TITLE:** Expanding Raptor Center Online Education

**PROJECT MANAGER:** Julia Ponder

**AFFILIATION:** University of Minnesota

**MAILING ADDRESS:** 1920 Fitch Avenue

**CITY/STATE/ZIP:** St. Paul, MN 55108

**PHONE:** (612)624-3431

**E-MAIL:** ponde003@umn.edu

**WEBSITE:** [www.TheRaptorCenter.org](http://www.TheRaptorCenter.org)

**FUNDING SOURCE:** Environment and Natural Resources Trust Fund

**LEGAL CITATION:** M.L. 2017, Chp. 96, Sec. 2, Subd. 05d

**APPROPRIATION AMOUNT:** \$270,000

**AMOUNT SPENT:** \$268,308

**AMOUNT REMAINING:** \$ 1,692

### **Sound bite of Project Outcomes and Results**

Expanding Raptor Center Online Education reached 520 teachers in 28 counties throughout Minnesota serving more than 15,000 students with a state-of-the-art education program to engage students in authentic outdoor learning and science to equip and inspire Minnesota's next generation of conservationists.

### **Overall Project Outcome and Results**

If Minnesota students are to grow into adults who are capable of making meaningful contributions to conservation, both they and their teachers need effective tools to foster meaningful outdoor experiences. This project expanded Raptor Center Online Education to give both teachers and students those much-needed tools with a goal of facilitating experiential outdoor learning and inspiring conservation mind-sets.

The major project objectives were to expand a current education program (Raptor Lab) to support students in conducting an investigation, provide teachers with demonstrations on how to use the learning module, and bring in environmental education experts to teach teachers skills and techniques to facilitate meaningful outdoor learning experiences for their students.

We partnered with University of Minnesota Extension and Learning Technologies Media Lab to build an interactive environment for students, based on a proven curriculum developed by Extension, Driven to Discover. We created a web-based interactive version titled "Outdoor Investigator." Outdoor Investigator is six-part educational tool engaging students, step-by-step, through the scientific method to complete an outdoor investigation.

Once Outdoor Investigator was completed, The Raptor Center, Extension, Eagle Bluff and Wolf Ridge worked together to design and develop teacher demonstrations. Demonstrations explored each section of Outdoor Investigator, the technology and functionality of the online environment, integrated outdoor teaching techniques, and expanded Teacher Toolbox with extra materials and resources. Three model conservation projects were also created and included in the Teacher Toolbox to guide teachers in the process of conducting a Citizen Science-based outdoor investigation.

Over the course of the 2018 – 2019 school year demonstrations were provided to 520 teachers in 28 counties throughout Minnesota. These teachers will serve an estimated population of 15,000 to 25,000 students. Minnesotans will benefit from this work when as many as 25,000 children a year, throughout the state of Minnesota, engage in authentic and meaningful learning experiences in their local environment to inspire our next generation of scientists and future conservationists.

### **Project Results Use and Dissemination**

Throughout the two year grant period we have been intensively disseminating Outdoor Investigator in a number of venues where we would be interacting directly with teachers. We presented and/or exhibited at numerous conferences, such as Minnesota Education Academy Conference (MEA), the Minnesota Science Teachers Association Conference, Sci/Math and Ignite After school conference, the Agriculture Teachers Tech Conference, Minnesota Association of Agricultural Educators, the Conference of Middle and High School Principles, Minnesota's Grand Challenges Conference at the University of Minnesota, the Minnesota Department of Natural Resources Forest School Program Conference, the 3M Visiting Wizards Teacher's Workshop (hosted by 3M), Bell Museum's Educator's Open House, Prior Lake Teacher Development Workshop, University of Minnesota Extension Driven to Discover Teacher Training, and the Minnesota Field Trip Fair.

During these exhibits we had printed materials to highlight the main components of Outdoor Investigator, a computer for teachers to see and interact with the Raptor Lab and Outdoor Investigator, and forms to capture teacher information to contact them directly with information to access the website and to communicate important information about upcoming Teacher Demonstrations.



# Environment and Natural Resources Trust Fund (ENRTF)

## M.L. 2017 LCCMR Work Plan Final Report

**Date of Report:** 16 August 2019

### Final Report

**Date of Work Plan Approval:** 06/07/2017

**Project Completion Date:** 30 June 2019

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**PROJECT TITLE:** Expanding Raptor Center Online Education

**Project Manager:** Julia Ponder

**Organization:** University of Minnesota

**Mailing Address:** 1920 Fitch Avenue

**City/State/Zip Code:** St. Paul, MN 55108

**Telephone Number:** (612)624-3431

**Email Address:** ponde003@umn.edu

**Web Address:** www.TheRaptorCenter.org

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**Location:** Statewide

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<b>Total ENRTF Project Budget:</b>	<b>ENRTF Appropriation:</b>	<b>\$270,000</b>
	<b>Amount Spent:</b>	<b>\$268,308</b>
	<b>Balance:</b>	<b>\$1,692</b>

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**Legal Citation:** M.L. 2017, Chp. 96, Sec. 2, Subd. 05d

### Appropriation Language:

\$270,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota, Raptor Center, to provide environmental education for approximately 15,000 middle-school students and 600 teachers, combining classroom learning and outdoor experiences with technology, scientific investigation of birds, and conservation projects. This appropriation is available until June 30, 2022, by which time the project must be completed and final products delivered.

## I. PROJECT TITLE: Bridging Classroom and Outdoor Learning by Studying Birds

### II. PROJECT STATEMENT:

The Raptor Center (TRC) will partner with the University of Minnesota (UMN) Learning Technologies Media Lab (LTML), University of Minnesota Extension, and regional environmental education experts from Wolf Ridge Environmental Learning Center and Eagle Bluff Environmental Learning Center, to create the *Bridging Classroom and Outdoor Learning by Studying Birds* program. This program will blend two existing curriculum, the web-based Raptor Lab platform with Extension's Driven to Discover (D2D) citizen science curriculum to create an online platform that utilizes technology to guide students in the completion of outdoor citizen science projects involving birds. The Raptor Lab will also focus on empowering teachers by providing tools they need to successfully implement outdoor learning projects with their students. Demonstrations, offered by experts in environmental education, will model for teachers how to effectively use these tools in outdoor settings.

The *Bridging Classroom and Outdoor Learning by Studying Birds* program will integrate TRC's Raptor Lab, funded by the Minnesota Environment and Natural Resources Trust Fund in 2014, with the University of Minnesota Extensions' *D2D Facilitator's Guide to Citizen Science / Birds* curriculum funded by the National Science Foundation. D2D is a proven curriculum aimed at fifth through tenth grade students. Integrating this curriculum into the Raptor Lab platform will allow these outdoor student scientists to upload images, sounds, videos, GPS points, and observation notes of the birds they observe in the wild directly into their online environmental science projects.

If Minnesota students are to grow into adults who are capable of making meaningful contributions to conservation, both they and their teachers need effective tools to guide outdoor environmental learning projects. This project will give both teachers and students those much-needed tools. Specifically, we will leverage the Raptor Lab online platform for the *Bridging Classroom and Outdoor Learning by Studying Birds* project by:

- Modifying part three of the Raptor Lab to integrate established paper-based curriculum, *D2D Facilitator's Guide to Citizen Science / Birds*, into online lessons for the Raptor Lab platform. The existing Raptor Lab platform, which already offers a visually engaging and interactive online environment, will allow students to share the findings of their science-based "mini-investigations" they conduct outdoors on birds as described in the D2D curriculum. Students will be able to share their projects with classmates, teachers, students in other schools, and people in their community.
- Expanding the Raptor Lab to include a teacher management system allowing educators to track student progress and evaluate student work.
- Expanding the Raptor Lab's existing teacher toolbox to effectively support teachers in the implementation of the online version of the D2D curriculum.

To develop the *Bridging Classroom and Outdoor Learning by Studying Birds* program, LTML will provide the technical and educational expertise to modify the Raptor Lab's online environment. Modifications will include: integration of the D2D curriculum into module 3 of the Raptor Lab, integration of an in-depth teacher management system allowing teachers to access, track, and provide feedback on student work, expanded teacher toolbox providing teachers with the appropriate resources, curriculum, and activities to accommodate the D2D modification of the Raptor Lab in their classrooms, and the integration of ArcGIS mapping software allowing students to engage with technology to do robust data analysis and mapping.

Extension will provide the D2D curriculum expertise. Extension will advise on the design and development of the Raptor Lab module 3 modifications to retain content and general look and feel of the Extension-branded D2D curriculum materials so participants can easily recognize the online environment as a complementary component of the D2D materials. The D2D modified online environment will directly support students in the process of conducting student driven environmental investigations allowing students to directly apply their critical thinking skills and knowledge of the process of scientific investigation developed in parts 1 and 2 of the

Raptor Lab. Extension will consult with TRC on the design and development of the teacher demonstrations. Based on their experience with the D2D project (which included similar demonstrations), Extension will help set the agenda for the teacher demonstrations, develop training materials, and instructional activities. Extension will also assist in the development and delivery of training the coordinators and instructors who will be responsible for presenting the demonstrations around the state.

Regional experts in environmental education, Wolf Ridge and Eagle Bluff, will also consult on the design and development of the teacher demonstrations. Staff from Wolf Ridge will be responsible for providing 20 teacher demonstrations in northern Minnesota, Eagle Bluff 20 demonstrations in southern Minnesota, and TRC 20 demonstrations in central Minnesota, including the metro area. A total of sixty teacher demonstrations will be provided throughout the state to achieve maximum adoption by Minnesota schools. These demonstrations will strive to bring the Raptor Lab and its outdoor investigation curriculum to 600 classrooms and reach nearly 15,000 fifth through tenth grade students. The *Bridging Classroom and Outdoor Learning by Studying Birds* program will empower teachers to feel comfortable bringing their classrooms outdoors in an effort to create in their students a knowledge of environmental issues facing birds, inspire these young minds to become more conservation oriented and even consider careers in the environmental sciences.

### **III. PROJECT STATUS UPDATES:**

#### **Project Status as of 6 December 2017:**

The design process for the Module 3 online learning environment is underway with eight team meetings having taken place to define and refine the content needs, the branding requirements and the functionality requirements. Specific curriculum content from the University of Minnesota's Extension Service paper product has been identified for integration into the interactive online format. User functionality of module 3 has been outlined, linked to curriculum content and is ready for the actual design process to begin. The Raptor Lab, including this planned expansion with teacher demonstrations, has been presented or exhibited at the Minnesota Education Academy (MEA), Minnesota Science Teacher Association Conference, and the Sci/Math and Ignite Afterschool Conference. A data base of teacher contacts and possible host-sites for teacher demonstrations is being developed.

#### **Amendment Request (12/06/2017):**

We are requesting the following budgetary changes:

- \$18,000 from Personnel wages (Activity 1) to Service Contracts (Activity 1): This request results from the move of the University of Minnesota online designer out –of-state. Due to time constraints on other projects at LT Media Lab and the need to institute the redesign of Raptor Lab with enough time to complete the build before beginning teacher workshops, we are requesting a shift in some of the funds from an in-house designer to a contract-basis designer in order to keep our project on schedule.
- \$8,500 from Service Contracts (Activity 2) to Service Contracts (Activity1): A draft workshop calendar has been set up and it has been determined that it can be delivered primarily by current project personnel with less need for contract instructors. We are proposing to move the monies that would have been used for some of the contract instructors to a service contract for the development of training videos (videographer - \$8,500).
- \$4,000 reduction in printing budget (Activity 2): Complete teacher guides will be provided as digital downloads with a smaller “Quick Start” mini-curriculum as the only printed item. This change reflects the teacher feedback we have received. The \$4,000 will be moved to:
  - \$3,000 for service contract for curriculum writer/editor (Activity 1)

- \$1,000 for travel and conference fees to present and exhibit directly to teachers throughout the state.

Amendment Approved by LCCMR 2/6/2018

**Project Status as of 30 June 2018:**

The design process for module 3, now called Outdoor Investigator, has been completed and has been sent the Learning Technologies Media programmer to build. The beta version of the environment is complete and is currently going through testing, both of its functionality and its content. This review process is about 50% complete. The Raptor Center, Eagle Bluff, and Wolf Ridge have been steadily working on locating host sites for training and recruiting teacher participants. Twenty-seven teacher demonstrations have been scheduled throughout the state. Content, activities, and resources required for these demonstrations have been identified, drafted, reviewed and are in the final process of development.

**Amendment Request (12/14/2018):**

We are requesting the following outcome change:

- Based on teacher and Outdoor Investigator instructor feedback, we feel a better way to connect with teachers after using the environment is to offer regular office hours, webinars, and a newsletter in lieu of the 120 follow-up teleconference calls. Specifically we propose to replace the teleconference calls with:
  - (1) Ten webinars
  - (2) Dedicated office hours providing one-on-one time for teachers with Raptor Lab staff.
  - (3) A newsletter highlighting Raptor Lab changes and resources.

We are requesting the following budgetary change:

- \$1,263 from printing into Service Contract – Copy Editor/Designer. After speaking to teachers and to be more sustainable, we decided to offer the teacher guides digitally and house it permanently as a main component of the Teacher Toolbox. Moving these funds to service contracts will allow us to do a full copy edit of the text within the Outdoor Investigator module in addition to the accompanying curriculum.

Amendment approved by LCCMR 1/29/2019.

**Project Status as of 14 December 2018:**

- Outdoor Investigator online environment will remain in a beta version until the end of the grant period. The first thorough review of the environment is completed. A final review will be conducted to incorporate teacher feedback into the online environment. The Outdoor Investigator program will be finalized by June 30, 2019.
- To date, TRC and its partners have completed 20 demonstrations for 142 teachers in 14 counties across the state. We are partnering with several organizations to offer content focused demonstrations. Partnerships include Project Wild, Project Wet, Metropolitan Mosquito Control District, Bell Museum, Great Lakes Worm Watch, Minnesota Amphibian and Reptile Survey, HerpMapper, the MN DNR School Forest Program.

**Overall Project Outcomes and Results:**

If Minnesota students are to grow into adults who are capable of making meaningful contributions to conservation, both they and their teachers need effective tools to foster meaningful outdoor experiences. This

project expanded Raptor Center Online Education to give both teachers and students those much-needed tools with a goal of facilitating experiential outdoor learning and inspiring conservation mind-sets.

The major project objectives were to expand a current education program (Raptor Lab) to support students in conducting an investigation, provide teachers with demonstrations on how to use the learning module, and bring in environmental education experts to teach teachers skills and techniques to facilitate meaningful outdoor learning experiences for their students.

We partnered with University of Minnesota Extension and Learning Technologies Media Lab to build an interactive environment for students, based on a proven curriculum developed by Extension, Driven to Discover. We created a web-based interactive version titled “Outdoor Investigator.” Outdoor Investigator is six-part educational tool engaging students, step-by-step, through the scientific method to complete an outdoor investigation.

Once Outdoor Investigator was completed, The Raptor Center, Extension, Eagle Bluff and Wolf Ridge worked together to design and develop teacher demonstrations. Demonstrations explored each section of Outdoor Investigator, the technology and functionality of the online environment, integrated outdoor teaching techniques, and expanded Teacher Toolbox with extra materials and resources. Three model conservation projects were also created and included in the Teacher Toolbox to guide teachers in the process of conducting a Citizen Science-based outdoor investigation.

Over the course of the 2018 – 2019 school year demonstrations were provided to 520 teachers in 28 counties throughout Minnesota. These teachers will serve an estimated population of 15,000 to 25,000 students. Minnesotans will benefit from this work when as many as 25,000 children a year, throughout the state of Minnesota, engage in authentic and meaningful learning experiences in their local environment to inspire our next generation of scientists and future conservationists.

#### **IV. PROJECT ACTIVITIES AND OUTCOMES:**

##### **ACTIVITY 1: Expand Raptor Lab Online Platform**

**Description:** The Raptor Lab online learning environment enhancements will be designed and developed by the Learning Technologies Media Lab (LTML) based on feedback from teachers using the existing Raptor Lab online environment. These enhancements will ensure that the environment encompasses all facets of a successful adventure learning (AL) program as well as ensure that scaffolds and supports for teachers as well as learners are firmly in place. The Raptor Lab online learning environment enhancements include an innovative new Outdoor Birding Module based on existing D2D curriculum. We will also design, develop, and build a teacher management system that will allow educators to effectively manage and assess student learning, increasing the functionality of the curriculum. We will add ArcGIS capability to the Raptor Lab environment to provide enhanced data analysis tools for students, and expand the Teacher Toolbox to include added resources, updated activities, adapted curriculum, new assessment tools, and benchmarks linking the curriculum to state standards. We will also create two outdoor conservation projects that clearly demonstrate both to teachers and students how to conduct an outdoor conservation project using the Raptor Lab online environment. Previously developed online assessment tools for both students and teachers will be evaluated and improved by an assessment consult to maximize the effectiveness of Raptor Lab student assessments and teacher evaluations.

##### **Summary Budget Information for Activity 1:**

**ENRTF Budget: \$ 112,377**

**Amount Spent: \$ 112,211**

**Balance: \$ 166**

Outcome	Completion Date
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1. Add a new Outdoor Birding online module to the existing Raptor Lab platform by adapting the existing paper-based Driven to Discover curriculum	12-31-2017
2. Add a Teacher Management System to the existing Raptor Lab platform	12-31-2017
3. Integrate ArcGIS capability into the existing Raptor Lab platform	6-1-2018
4. Expand the existing Raptor Lab Teacher Toolbox to accommodate the Driven to Discover curriculum	6-1- 2018
5. Create two online outdoor conservation projects	6-1- 2018

#### **Activity 1 Status as of 31 December 2017:**

“Outdoor Investigator” has been tentatively selected as the program title (and name of module 3 of the Raptor Lab) to reflect its outdoor learning focus. Curriculum content from the University of Minnesota’s Extension Services has been identified for integration into module 3. The content for the Outdoor Investigator module has been drafted and sent to the website designer. The environment will be broken into six interactive sections that directly engage students in the process of scientific investigation: (1) Observe and wonder, (2) Question, (3) Hypothesis, (4) Planning and Testing, (5) Analyzing, and (6) Conclude and Report. Initial prototype layouts of the Outdoor Investigator online environment are being developed by the website designer.

The user functionality has been outlined, linked to curriculum content, and is ready for the design process to begin. Planning has begun on the design and development of the content and functionality of Teacher Management System, as well as the design and development of the Teacher Toolbox. The Teacher Management system will allow teachers to choose between a basic and in-depth version of the investigation tool for their students. The basic version will allow students to create an outdoor investigation with the majority of supporting material provided by the teacher. The in-depth version will provide all the supporting material students will need to complete their projects. Additional material will be provided for teachers in the Teacher Toolbox.

#### **Activity 1 Status as of 30 June 2018:**

The Outdoor Investigator learning module has been designed and built. Team members are using the fully functional beta version to review its functionality and curriculum content. The environment includes six interactive components, organized in a wheel to more accurately model the process of scientific investigation, which students will use to create an outdoor research project. Each component is based on the science standards for teaching the scientific method. Two versions have been developed for teachers, a basic and in-depth version. The basic version offers minimal content support and provides a simple, functional tool for students to build a research project with content being provided by the teacher. This allows the teacher to use the environment with their classroom curriculum. The in-depth version is largely self-sustaining, with minimal teacher-provided support needed. The in-depth version is not only a tool students use to build their research project, but the supporting content within each section helps guide students through completing each step of the process. As students work through their research project, the environment automatically migrates their work. This builds a linear presentation for students use as they present their findings, not only to their teachers, but to their classmates and their community as well.

The Teacher Management System (TMS) has been designed and integrated throughout the environment. The TMS allows teachers to create classes within the environment. They can invite students, manage student groups, review student work and participation, and provide feedback. To further support teachers, the Raptor Lab now provides direct access to the Teacher Toolbox, currently a Google Site. By the start of the 2018-2019 school year, the Teacher Toolbox will be redesigned to integrate seamlessly, both aesthetically and functionally, into the Raptor Lab learning environment. Curriculum, activities, and resources will be readily available to support teachers in using the Raptor Lab with their students.

The design and development of the Outdoor Investigator module took longer than expected. This delay pushed back the development of the Teacher Toolbox and the ability for Raptor Lab team members to use the environment. This in turn delayed the design and development of the Teacher Demonstrations. The original plan was to have the beta version of the Outdoor Investigator completed by mid-March, although it was not actually completed until early June. In addition, this also delayed the development of the two model conservation projects. They are now slated to be created and available for teachers by September 1, 2018. This also includes the development of evaluations protocols and tools which will be used to ensure the Outdoor Investigator module meets teacher's needs. The University of Minnesota's Office of Measurement Studies has been hired to develop and implement programmatic evaluations. Evaluations are in the initial stage of development.

**Activity 1 Status as of 31 December 2018:**

Project partners have completed a thorough review of the Outdoor Investigator online learning environment that is currently in its beta stage of development. The review identified aesthetic issues, bugs, need for a copy editor, new reflect and rethink prompts, and new usability features. The review also identified the need for a redesign of the Presentation mode included within the environment. This component will be taken down and redeveloped.

Now that the beta version of Outdoor Investigator has been developed, the Media Lab will begin to integrate ArcGIS into the functionality of the environment allowing students access to an expansive mapping program. ArcGIS will be fully integrated into the Outdoor Investigator module by the end of the grant period.

The Teacher Toolbox continues to be designed and developed. Content and resources are being identified and organized for easy teacher access. Supporting materials will provide additional resources building on the tools teachers were introduced to in the demonstrations. The plan for the design and development of the Teacher Toolbox is to be completed by late February allowing several months to fully integrate it into the online environment.

Two online conservation projects utilizing citizen science have been introduced during the teacher demonstrations and will be housed within the Teach Toolbox. Themes, content, and partners have been identified and organized in digital teacher guides focused on explaining the process of completing these projects step-by-step with their students.

Due to delays in the design, development, and implementation of Outdoor Investigator, the development of the evaluation program was delayed. Now that the beta version has been fully reviewed, the Raptor Lab team is situated to begin developing the evaluation program with the University of Minnesota's Office of Measurement Services.

**Final Report Summary:**

1. Add a new Outdoor Birding online module to the existing Raptor Lab platform by adapting the existing paper-based Driven to Discover curriculum

The Driven to Discover paper curriculum developed by the University of Minnesota Extension, funded by a National Science Foundation Grant, was designed, developed, and integrated into the Raptor Lab as module 3, Outdoor Investigator. Outdoor Investigator creates an online space where students directly engage with the scientific method to complete a model research project. The interactive environment guides students step-by-step in completing their project. Once students have completed each step their work can be printed as a model research paper saved as a PDF they can easily submit to their teachers. Their reports can also be easily be shared with other students and members of their community.

2. Add a Teacher Management System to the existing Raptor Lab platform

To support teachers in using Outdoor Investigator with their students, the University of Minnesota Learning Technologies Media Lab integrated their teacher management system, LT Basecamp, into the Raptor Lab. Basecamp allows teachers to manage student access, see student work in Outdoor Investigator, monitor progress, and give feedback.

### 3. Integrate ArcGIS capability into the existing Raptor Lab platform

Within Outdoor Investigator's Plan and Test section ArcGIS technologies were included to add mapping functionality for students. This functionality allows students to map the locations where their research project takes place.

### 4. Expand the existing Raptor Lab Teacher Toolbox to accommodate the Driven to Discover curriculum

The Raptor Lab Teacher Toolbox was also redesigned, expanded and improved. It offers the complete Raptor Lab curriculum, relevant components of the Drive to Discover curriculum, all activities and supporting materials, and a vast array of teaching materials guiding teachers in how to create conservation projects, how to utilize Citizen Science, and how to conduct outdoor learning projects with students.

### 5. Create two online outdoor conservation projects

Three model outdoor conservation projects were developed to guide teachers in how to complete a conservation project with their students. Project varied in subjects allowing teachers an opportunity to conduct projects in fall, winter, and spring. Each model project outlined the process and materials needed to complete a project with their students. The three models were based on the Metropolitan Mosquito Control District, Great Lakes Worm Watch, and the Minnesota Amphibian and Reptile Survey.

#### **ACTIVITY 2:** Obtaining Maximum Adoption

**Description:** To obtain maximum adoption, TRC will partner with Extension and regional experts in Environmental Education, Wolf Ridge and Eagle Bluff Environmental Learning Centers, to design and develop teacher demonstrations of the Raptor Lab with D2D modifications aimed at modeling outdoor student investigations. Demonstrations will be free to participants and will take place throughout the state of Minnesota. Scheduling demonstrations will be coordinated in northern Minnesota by staff at Wolf Ridge, in southern Minnesota by staff at Eagle Bluff, and in central Minnesota (including the metro area) by staff at TRC. Each organization will use their robust database of schools engaged in their programming to identify potential schools interested in hosting a Raptor Lab demonstration. Each region will be responsible for conducting 20 demonstrations from June 2018 through the end of June 2019 reaching approximately 200 teachers in their region. Overall, 60 demonstrations will be held throughout the state reaching 600 teachers using the Raptor Lab in their classrooms engaging nearly 15,000 students. Staff from these organizations, in cooperation with staff from Extension, will identify, acquire, and or create all the supporting materials required for the demonstrations. Locations with the proper technology, computer labs or media centers with internet access, will be identified so participants can have a hands-on experience with the Raptor Lab. Teacher guides will be created that break down the main learning outcomes of the curriculum, how those outcomes meet state standards, identification of important principles of environmental education and outdoor classroom management, step-by-step instructions on the process of conducting an outdoor investigation, and access to important resources to support teachers and to build content knowledge for students. In order to provide support for teachers using the environment, ten webinars will be offered in the second year. Each will have a focused presentation with time for Q&A and sharing of experiences at the end. Webinars will be taped and available in the Teacher Toolbox as an additional resource. In addition, Raptor Lab staff will offer virtual office hours when they will be available to talk directly with teachers. These opportunities as well as announcements concerning new resources and changes to the online environment will be shared through a digital newsletter. An assessment consultant will assist in the design and development of teacher evaluation forms to allow teachers to evaluate the teacher demonstrations. Teacher evaluations will continue to inform future demonstrations.

**Summary Budget Information for Activity 2:**

**ENRTF Budget: \$157,623**

**Amount Spent:** \$ 156,097  
**Balance:** \$ 1,526

<b>Outcome</b>	<b>Completion Date</b>
1. Develop supporting materials such as teacher guides	6-1-2018
2. Design and develop demonstrations	6-1-2018
3. Through partnerships with regional experts present 60 demonstrations	6-30-2019
4. Facilitate 120 follow-up teleconference meetings with schools to obtain maximum buy-in	6-30-2019
5. Reach more than 15,000 students with the Outdoor Birding module	6-30-2019

#### **Activity 2 Status as of 31 December 2017:**

Presenting and exhibiting at conferences has led to connections with ten potential host sites for the teacher demonstrations and the contact information of 50 teachers interested in participating. A database of teacher contacts and possible teacher demonstration host sites is being developed. Teacher contact information will be pulled from existing program databases at The Raptor Center, Eagle Bluff, Wolf Ridge, and Project Wild. Once the design and development of module 3 has been finalized, teacher demonstrations and supporting materials will be designed and developed.

#### **Activity 2 Status as of 30 June 2018:**

The Teacher Demonstrations have been designed to be full-day experiences for teachers. The demonstrations will provide teachers with hands-on opportunities to explore the environment. Teachers will learn how the environment works and where to find its curriculum and supporting materials. The facilitators, all environmental education experts, will model how to effectively conduct outdoor learning projects. The goal of the workshops will be to build teacher confidence in using the Outdoor Investigator learning module. This will allow teachers to feel more comfortable and confident and encourage them to bring their students outside to effectively conduct outdoor research projects.

The demonstrations will guide teachers through each component of the curriculum offering them opportunities to interact with the environment from the perspective of their students. Instructors will model outdoor activities, classroom management, reflections, and assessments for the teacher participants. Each of these elements will be designed and supporting resources will be made available in the Teacher Toolkits. Teachers will be shown exactly how to find and use these digital artifacts. Throughout the demonstrations, as teachers take part in guided activities, they will use the Outdoor Investigator learning environment to create a sample project. Teachers will learn about the environment by using it. Teachers will also learn how to use the Teacher Management System by taking part in guiding activities. The teacher demonstrations have been designed in such a way that teachers will interact with each core component of the learning model to maximize their comfort with the environment and its adoption into their classroom curriculum.

Each regional team is busy identifying and scheduling teacher demonstration locations. Currently 27 out of 60 (45%) teacher demonstrations have been scheduled. Each region has used their program database and contact information gathered from various conferences and exhibits, to identify host locations for the demonstrations. The northern region has scheduled 8 out of 20 demonstrations (40%) in locations such as Duluth, Proctor, Crookston, and Waubun. The central region has schedule 9 out of 20 (45%) in locations such as the twin cities, Rockford, Prior Lake, Hutchinson, Fergus Falls, and Stillwater. The southern region has scheduled 10 out of 20 (50%) demonstrations in locations such as Winona, La Crescent, Pipestone, Northfield, Caledonia, and Albert Lea. Some teacher demonstrations will take place over the summer months, but the majority will take place throughout the 2018-2019 school year. The delay in developing the online environment delayed being able to offer more workshops over the summer. The last component of the demonstrations, the development of the follow-up teleconference calls, are in the early stages of development.

**Activity 2 Status as of 31 December 2018:**

- Digital teacher guides, focused on supporting teachers in completing outdoor investigations with their students, are being developed and will be housed in the Teacher Toolbox. Each conversation project will have an accompanying teacher guide. Guides include resources, topic ideas, sample “I wonder” questions, model data sets, and explanations on how to access student collected data from participating patterns.
- Teacher demonstrations have expanded to include numerous partnerships around the state which have developed curriculum that can be utilized by teachers using Outdoor Investigator. Those partnerships include Project Wild, Project Wet, Metropolitan Mosquito Control District, Bell Museum, Great Lakes Worm Watch, Minnesota Amphibian and Reptile Survey, HerpMapper, the MN DNR School Forest Program. Each of these projects allows students to utilize citizen science to work with and analyze data generated either by students or by Minnesota agencies. All the data is real and available to students to analyze as part of an outdoor investigation.
- Seventy percent of the 60 required demonstrations have either been presented or have been scheduled. The completed demonstrated have reached 142 teachers from 14 counties serving an estimated 8,000 students. Demonstrations introduce teachers to the Outdoor Investigator online learning module, Minnesota-based citizen science projects, how to conduct effective outdoor learning projects, and various resources to help guide and support their teaching.

**Final Report Summary:****1. Develop supporting materials such as teacher guides**

Within the Teach Toolbox a wide array of supporting materials has been identified and developed to assist teachers in successfully using Outdoor Investigator with their students. Supporting materials include an all-inclusive curriculum, core activities, extra activities, answer keys, tutorial videos, links to content videos for students, teaching support materials, model conservation projects, and skills and techniques for teaching outdoors.

**2. Design and develop demonstrations**

Staff from The Raptor Center, University of Minnesota Extension, Eagle Bluff ELC (Environmental Learning Center), and Wolf Ridge ELC came together over several meetings to design and develop the teacher demonstrations. Demonstrations focused on engaging teachers with Outdoor Investigator by having teachers do a model outdoor project. Teachers learned how to use each component of the Outdoor Investigator as they worked through their projects. While they were outside, instructors modeled different techniques and activities for teacher to effectively work with students outdoors.

**3. Through partnerships with regional experts present 60 demonstrations**

Teacher demonstrations were conducted throughout the state. Eagle Bluff ELC conducted 15 demonstrations in southern Minnesota reaching 87 participants. Eagle Bluff has an additional 5 demonstrations planned during the 2019-2020 school year to reach an additional 35 participants. The Raptor Center conducted 21 demonstrations in central Minnesota reaching 250 participants. TRC has additional 7 workshops scheduled to reach an estimated 100 participants. Wolf Ridge conducted 24 demonstrations in northern Minnesota reaching 183 participants. Altogether, 60 demonstrations were presented to 520 teachers in 28 different counties in Minnesota serving more than 15,600 students. During the 2019-2020 school year another 11 workshops are planned estimated to reach 135 more teachers.

**4. Develop a newsletter, offer office hours, and 10 webinars to obtain maximum buy-in**

Based on teacher feedback we requested and had approved an amendment to replace our outcome of 120 follow-up teleconference meetings with offering more one-on-one direct support to teachers. To do so, staff from UMN Extension, TRC, Eagle Bluff, and Wolf Ridge all held office hours from January 30th through June 30th. For 22 weeks, one staff member was available for 5 hours for teachers to call in with questions, problems, or concerns so that we could work directly with them to meet their needs. In addition, a newsletter was developed and sent out to keep teachers up-to-date with changes to the Outdoor Investigator module as it was updated in the spring and summer of 2019. Staff identified and have scheduled 10 webinars on different topics to be presented during the 2019-2020 school year while teachers are using the Raptor Lab with their students. Each webinar will be recorded and included in the Teacher Toolbox.

##### 5. Reach more than 15,000 students with the Outdoor Birding module

The teachers that took part in the teacher demonstrations will reach an estimated 15,600 students at a minimum, throughout the state of Minnesota.

#### **V. DISSEMINATION:**

**Description:** TRC, LTML, Wolf Ridge, and Eagle Bluff all have databases of schools that have directly engaged in their programming. These databases will provide a robust and diverse listing of schools from all over the state currently integrating environmental education into their classrooms. These databases will be used to contact schools to identify those willing and interested in hosting Raptor Lab demonstrations. Email advertisements, direct calling, and in person meetings will be used to establish connections to host demonstrations. In addition, TRC and partners will present at teacher conferences, administrator/principle conferences, Minnesota Education Conference, and Minnesota Science Teachers Association conference to reach new audiences. Lastly, the Raptor Lab will be presented at professional conferences within the fields of education, environmental education, and learning technologies to help advance these fields in education.

#### **Status as of 31 December 2017:**

The Raptor Lab, including its planned expansion with teacher demonstrations, has been presented or exhibited at the Minnesota Education Academy (MEA), Minnesota Science Teacher Association Conference, and the Sci/Math and Ignite Afterschool Conference. The Raptor Center has been invited to present at the Agriculture Tech Conference in January of 2018. A proposal has been written and submitted to take part in the University of Minnesota's Grand Challenges Conference in 2018. The Raptor Center was also invited to present on the Raptor Lab and how it uses technology to engage in outdoor learning projects for Prior Lake School Districts' Professional Development day on January 15, 2018.

#### **Status as of 30 June 2018:**

TRC's Workshop Coordinator was able to coordinate with the Forest School Program to locate many potential host sites and identify teachers interested in the outdoor learning opportunities the Outdoor Investigator curriculum offers. Their contact information has been shared with each regional coordinator. The Minnesota Department of Natural Resources has allowed access to their data base with the School Forest Program (SFP). More than 100 schools with school forest affiliations have been contacted and many of them are interested in hosting teacher demonstrations. Although they have the resource available in the form of an outdoor area many of those spaces are being underutilized. The SFP has found this is often the case as educators are sometimes wary of taking their students into an environment where they may not be capable of answering all of their students' questions. Important aspects of the Outdoor Investigator module include developing a sense of wonder, questioning things not known or understood, and finding ways to learn the answers to those questions. This process helps take the burden of "omnipotence" off the teacher's shoulders.

In January, a two-hour demonstration was presented for teachers attending the Minnesota Association of Agricultural Educators. They will be returning for another workshop, focused on the Outdoor Investigator module in July. During this time staff have submitted and have had those abstracts approved to present at

several important education conferences in the fall. Initial discussions have also been made to include Outdoor Investigation workshops during the week-long Driven to Discover teacher trainings.

**Status as of 31 December 2018:**

In July, TRC staff presented a second workshop for a different group of teachers attending the Minnesota Association of Agricultural Educators conference in the Twin Cities. In August, staff presented at the Audubon Center of the Northwoods during an outdoor education conference in conjunction with Project Wild. Staff also presented on Outdoor Investigator during a one-hour presentation at the Minnesota Education Academy (MEA) conference. Appropriate conferences are being identified that would meet our audience for the spring of 2019.

**Final Report Summary:**

The Raptor Lab and Outdoor Investigator have been and will continue to be disseminated in several ways. In October of 2018 we did not report that we took part in the 3M Visiting Wizards Teacher's Workshop (hosted by 3M). Over 200 teachers took part in this event. In January we presented to teachers taking part in Driven to Discover's Teacher Training program. In February of 2019 we were invited to present and exhibit for the Minnesota School Forest Program Conference hosted by the Minnesota Department of Natural Resources. In May of 2019 we were invited to exhibit during the Bell Museum's Educators Open House. In May, we also presented for the Minnesota Master Naturalist Annual Conference. In early August we exhibited during the Minnesota Field Trip Fair. In October of 2019 we have been approved to present and exhibit at Minnesota Educators Association (MEA) Conference.

**VI. PROJECT BUDGET SUMMARY:**

**A. Preliminary ENRTF Budget Overview:**

\*This section represents an overview of the preliminary budget at the start of the project. It will be reconciled with actual expenditures at the time of the final report.

Budget Category	\$ Amount	Overview Explanation
Personnel:	\$147,237	Project manager (1) 3% FTE, 2 years (UMN faculty on 100% soft/philanthropic money): Grant oversight and sponsor reporting Program manager (1) 50% FTE, 2 years: Responsible for day-to-day logistics, adaption of content into online format, teacher assessment question development, interdepartmental communications, team planning, payroll reporting, and contractor invoicing management. Computer programmer (1) 40% FTE 1.5 years Responsible for building the redesign of the online learning environment, teacher management system, integration of ArcGIS, and expanded teacher toolbox Coordinator (1) 40% FTE, 2 years Responsible for providing expertise on the design and development of the teacher demonstrations, managing 11 instructors (2 regional coordinators and 8 instructors), overseeing demonstration scheduling and presentation development, scheduling 20 demonstrations in the central Minnesota and

Budget Category	\$ Amount	Overview Explanation
		<p>metro area, presenting 10 demonstrations, facilitating 10 follow-up cohort tele-meetings, reimbursement for invoicing, and budget.</p> <p>Content expert (1) 8% FTE 1 year</p> <p>Responsible for advising the development of the D2D modifications within the Raptor Lab, assisting with the design and development of teacher demonstrations, and assisting with the design and delivery of the Train-the-Trainers workshop.</p>
Professional/Technical/Service Contracts:	\$120,763	<p>Wolf Ridge and Eagle Bluff ELC for regional coordination of outstate workshops</p> <p>Design and development of the teacher demonstrations, including teacher materials, the identification and scheduling of demonstration locations, and the presentation of 20 teacher demonstrations each in outstate MN</p> <p>Three instructors (20% FTE each) for metro area workshops</p> <p>Responsible for 10 workshops and facilitate 10 follow-up cohort tele-meetings.</p> <p>Videographer</p> <p>Responsible for videography and editing for training videos for the online environment.</p> <p>Writer/editor</p> <p>Responsible for writing/editing of the digital download curriculum</p>
Printing	\$ 0	
Travel	\$2,000	Travel for citizen science content expert from Rochester to metro area and workshop/conference attendance
<b>TOTAL ENRTF BUDGET:</b>	<b>\$ 270,000</b>	

**Explanation of Use of Classified Staff:** N/A

**Explanation of Capital Expenditures Greater Than \$5,000:** N/A

**Total Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: 3.0**

**Total Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: 2.2**

**B. Other Funds:**

<b>Source of Funds</b>	<b>\$ Amount Proposed</b>	<b>\$ Amount Spent</b>	<b>Use of Other Funds</b>
<b>Non-state</b>			
In-kind services during project period	\$ 3,922	\$ 1,961	1% effort for 2 years for Aaron Doering (LTM/LTML/UMN faculty) – project design
<b>TOTAL OTHER FUNDS:</b>	<b>\$ 3,922</b>	<b>\$ 1,961</b>	

## VII. PROJECT STRATEGY:

### A. Project Partners:

#### Project Partners Receiving Funds:

- Dr. Julia Ponder, Principal Investigator, University of Minnesota: \$9,753: Project Management
- Andrea Lorek Strauss, Citizen Science and Driven to Discover Consultant, University of Minnesota Extension: \$6,295: Citizen Science content expert
- Wolf Ridge E.L.C., Northern Minnesota Regional Coordinator: \$40,000:
- Eagle Bluff E.L.C., Southern Minnesota Regional Coordinator: \$40,000:

#### Project Partners Not Receiving Funds:

- Aaron Doering, co-PI, University of Minnesota Learning Technologies Media Lab, will provide overall design and development of all components of the online learning environment.

**B. Project Impact and Long-term Strategy:** This project is important because it directly addresses the need to improve science literacy among Minnesota students where the latest testing shows 50% of students are not proficient in science. Understanding the process of scientific investigation and how it can inform decision-making is critical to having an informed citizenry. This project will use birds to engage students in science as they investigate local, real-world environmental issues. Students will apply what they have learned from their classroom investigation in their own outdoor research projects.

TRC has been using raptors as education ambassadors for nearly 40 years. Traditionally, these programs have been a one-hour, one-time experience of 3 to 4 birds on the fist. In the fall of 2011, TRC created a pilot curriculum integration program at Rockford Middle School Center for Environmental Studies that focused on providing students with multiple experiences of raptors to create more powerful educational experiences. Repeat exposure to curriculum content reinforces learning allowing for greater retention than a single one-hour experience and therefore better facilitates long-term learning. The program also used live birds to create concrete learning opportunities for students focusing on specific Minnesota science standards to assist teachers in effectively covering those topics. This program was expanded in 2012 to Twin Oaks and Hidden Oaks Middle Schools in Prior Lake. The curriculum designed and integrated over this three-year period informed the development of the Raptor Lab online environment.

By expanding this curriculum into an online learning environment allowed:

- Students and schools to access the curriculum no matter their location or socio-economic situation.
- Technology and multimedia to be utilized to better teach about the curriculum content and provide opportunities to learn directly from experts out in the field.
- For a more resource efficient method for TRC to fulfill its outreach mission and provide world-class environmental education programming
- For a more economical alternative for teachers than the cost of having TRC come to their school

During its two years of development staff working on the Raptor Lab discovered teachers needed more resources to be empowered to take on outdoor learning projects with their students. To address this need, TRC

and its partners are going to create the *Bridging Classroom and Outdoor Learning by Studying Birds* program to provide teachers with a proven outdoor science investigation curriculum driven by technology to support teachers in their efforts to get students outdoors. Direct impact of this project will be providing demonstrations on how to use the Raptor Lab to 600 teachers around the state and the nearly 15,000 students these teachers will reach. Integrated partnerships between TRC, UMN LTML, Extension, Wolf Ridge Environmental Learning Center, and Eagle Bluff Environmental Learning will provide long-term Raptor Lab exposure as these organizations highlight the Raptor Lab to the schools they serve.

**C. Funding History:**

Funding Source and Use of Funds	Funding Timeframe	\$ Amount
The Raptor Center	2011-2014	\$21,600
ENRTF	2015-2016	\$186,000
		\$ 207,600

**VIII. REPORTING REQUIREMENTS:**

- The project is for 2 years, will begin on 07/01/17, and end on 06/30/2019.
- Periodic project status update reports will be submitted December 31 and June 30 of each year.
- A final report and associated products will be submitted between June 30 and August 15, 2019.

**IX. VISUAL COMPONENT or MAP(S):** See attached

**X. FEE TITLE ACQUISITION/CONSERVATION EASEMENT/RESTORATION REQUIREMENTS:** N/A

**Environment and Natural Resources Trust Fund**  
**Final M.L. 2017 Project Budget**

**Project Title:** Expanding Raptor Center Online Education

**Legal Citation:** M.L. 2017, Chp. 96, Sec. 2, Subd. 05d

**Project Manager:** Julia Ponder

**Organization:** University of Minnesota

**M.L. 2017 ENRTF Appropriation:** \$270,000

**Project Length and Completion Date:** 2 Years, June 30, 2019

**Date of Report:** 1 Aug 2019



ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	TOTAL BUDGET	TOTAL BALANCE
<b>BUDGET ITEM</b>								
<b>Personnel (Wages and Benefits)</b>	\$76,114	\$76,114	\$0	\$71,123	\$71,123	\$0	\$147,237	\$0
Principal investigator/project manager 1, \$9,753 (68% salary 32% fringe, 3% FTE each year for 2 years)								
Program manager 1, \$49,761 (77% salary, 23% fringe, 50% FTE each year for 2 years)								
Online designer 1, \$4,869 (68% salary 32% fringe, 5% FTE each year for 1.5 years)								
Computer programmer 1, \$38,342 ((77% salary 23% fringe, 40% FTE each year for 1.5 years)								
Teacher demonstrations coordinator 1, \$38,220 (77% salary 23% fringe, 40% FTE each year for 2 years)								
Content expert - citizen science 1, \$6,295 (77% salary, 23% fringe, 8% FTE each year for 1 year)								
<b>Professional/Technical/Service Contracts</b>								
Wolf Ridge Environmental Learning Center - regional coordination of 20 workshops over 2 years, including design, development, logistics and delivery.			40000	\$40,000	\$0	\$40,000	\$0	
Eagle Bluff Environmental Learning Center - regional coordination of 20 workshops over 2 years, including design, development, logistics and delivery.			40000	\$40,000	\$0	\$40,000	\$0	
Instructors (3) to present at workshops and provide 10 follow-up cohort tele-training meetings in the metro area			\$5,000	\$4,974	\$26	\$5,000	\$26	
Assessment consultant - consulting on design and implementation for teacher evaluation of online platform and project curriculum	\$5,000	\$5,000	\$0				\$5,000	\$0
Contract on-line designer	\$18,000	\$17,989	\$11				\$18,000	\$11
Contract videographer	\$8,500	\$8,500	\$0				\$8,500	\$0
Contract writer for editing and layout design of curriculum	\$4,263	\$4,263	\$0				\$4,263	\$0
<b>Printing</b>								
<b>Travel expenses in Minnesota</b>								
Travel expenses for A Strauss (Citizen Science content expert) to travel 6 trips from Rochester to St. Paul for design meetings and teacher workshops (\$100/trip) and one to NE Minnesota for workshop.	\$500	\$345	\$155	\$1,500		\$1,500	\$2,000	\$1,655
<b>COLUMN TOTAL</b>	<b>\$112,377</b>	<b>\$112,211</b>	<b>\$166</b>	<b>\$157,623</b>	<b>\$156,097</b>	<b>\$1,526</b>	<b>\$270,000</b>	<b>\$1,692</b>

# Raptor Lab (<https://raptorlab.umn.edu/>)

The home page features a large, close-up image of a bald eagle's head on the right. On the left, there are three sections: "Vet in Training" showing two people handling a bird, "Researcher" showing a person working at a desk, and "Outdoor Investigator" showing a close-up of a hawk's head. The footer includes copyright information and links to About, Contact, and Terms.

Vet in Training  
Explore The Raptor Center and join the team as a vet in training.

Researcher  
Test your skills as a wildlife researcher as you investigate a pressing environmental mystery.

Outdoor Investigator  
Apply your learning and conduct your own outdoor investigation.

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## Outdoor Investigator

The "Outdoor Investigator" section features a large circular diagram in the center representing the scientific method cycle. The steps are: Observe & Wonder, Research Question, Develop Hypothesis, Plan & Test, Analyze & Interpret, and Conclude & Report. Arrows indicate a clockwise flow between these steps. To the left, there's a smaller image of a person using binoculars and a question mark-shaped nest containing an egg. To the right, there are three smaller boxes: "View Intro Video", "Learn More", and a detailed diagram of the process cycle. The footer includes copyright information and links to About, Contact, and Terms, along with a navigation bar at the bottom.

Outdoor Investigator

Dive into your own real-world science investigation, guided through the process in six steps just like scientists use. From dreaming up and writing a research question, to developing a hypothesis, testing that hypothesis, and analyzing your results, you'll learn how to use science to collect data and share your findings online. Sign up for free and get started today!

GET STARTED

VIEW INTRO VIDEO

LEARN MORE

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## 2019 RAPTOR LAB Teacher Demonstrations

