

## **2014 Project Abstract**

For the Period Ending June 30, 2016

### **PROJECT TITLE: Raptor Lab Integrating Online and Outdoor Learning Environments**

**PROJECT MANAGER:** Julia Ponder

**AFFILIATION:** University of Minnesota dba The Raptor Center

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**WEBSITE:** www.TheRaptorCenter.org

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

**LEGAL CITATION:** M.L. 2014, Chp. 226, Sec. 2, Subd. 09h

**APPROPRIATION AMOUNT:** \$ 186,000

### **Overall Project Outcomes and Results**

*The Raptor Lab* is a resource for teaching students science-based research through wildlife issues and outdoor exploration of their local environment. The goal was to link outdoor experiential learning with a STEM-focused classroom curriculum. The Raptor Lab curriculum addresses the urgent need to connect students with the natural world and inspire them to participate in solving challenging environmental problems.

Major goals for the project are to:

- Instill in students an action-based conservation ethic through outdoor exploration
- Expand access to an effective environmental education curriculum to middle school teachers and students throughout the state of Minnesota
- Engage students in solving environmental issues through experiential learning and scientific investigation
- Develop skills of critical thinking, collaboration and communication in middle school students

The Raptor Lab online environment has been designed, developed, built, and piloted. It consists of three parts: (1) Wildlife Veterinarian in Training; (2) Wildlife Researcher; and (3) Share Your Work. Part 1 has 6 videos and 5 activities to simulate training students to role play being a wildlife vet in training. Part 2 has eleven videos and two activities walking students through conducting a scientific research report on an environmental issue. Part 3 is an online environment where students can apply their learning by conducting their own outdoor field investigation. Students upload images, maps, sounds, data, and video to present their findings.

The Raptor Lab was piloted by 14 teachers in eight school districts (four metro and four outstate) reaching 1,010 students. Online assessment tools were created to assess student learning. The pre-assessment was taken by 911 students and the post by 652 (one pilot site dropped out mid-year and another did not administer final assessment due to schedule conflict). Pilot teachers took part in two workshops, receiving training and providing feedback and evaluation of the curriculum.

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

*The Raptor Lab* has been presented at several conferences: the National Association of Environmental Educators, the Minnesota Naturalist Association, the Minnesota Science Teacher's Association, and the University of Minnesota's Grand Challenges Conference. In the fall of 2016, TRC staff will present at the Minnesota Education Association (MEA) Conference and the National Science Teacher's Association Regional Conference. The Raptor Lab was also promoted at the Minnesota Alliance of Geographic Education's

workshops held at the LT Media Lab and the Minnesota Alliance of Geographic Education annual meeting. In addition, social media has been used to highlight the development of the Raptor Lab. Raptor Center Staff will also use their large database of schools currently engaged with their program to market the Raptor Lab to schools around the state.

*The Raptor Lab* is currently in use by last year's pilot teachers and has already begun to be expanded to other schools. Raptor Lab should reach between 1,000 – 1,500 students this school year. Teachers in Prior Lake middle schools are replacing sections of their curriculum with Raptor Lab to teach the scientific method and teachers at Rockford Middle School are integrating the Raptor Lab across subject fields to use in STEM, science, math, language arts, and social studies.



# Environment and Natural Resources Trust Fund (ENRTF) M.L. 2014 Work Plan

**Date of Report:** August 15, 2016  
**Date of Next Status Update Report:**  
**Date of Work Plan Approval:** June 4, 2014  
**Project Completion Date:** June 20, 2016  
**Does this submission include an amendment request?** Yes

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**PROJECT TITLE: Raptor Lab Integrating Online and Outdoor Learning Environments**

**Project Manager:** Julia Ponder  
**Organization:** University of Minnesota dba The Raptor Center  
**Mailing Address:** 1920 Fitch Avenue  
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**Location:** Statewide

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<b>Total ENRTF Project Budget:</b>	<b>ENRTF Appropriation:</b>	<b>\$186,000</b>
	<b>Amount Spent:</b>	<b>\$186,000</b>
	<b>Balance:</b>	<b>\$0</b>

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**Legal Citation:** M.L. 2014, Chp. 226, Sec. 2, Subd. 09h

**Appropriation Language:**

\$186,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota for the Raptor Center to develop an environmental education program on raptors for middle schools that integrates outdoor experiences with technology and scientific investigation.

## I. PROJECT TITLE: Raptor Lab Integrating Online and Outdoor Learning Environments

### II. PROJECT STATEMENT:

We propose to integrate 7<sup>th</sup> and 8<sup>th</sup> grade students in the design and execution of student-based research projects that focus on outdoor exploration of their local environment. We will achieve this by building *The Raptor Lab*, an online learning environment that will link outdoor experiential learning with a STEM-focused classroom curriculum. The STEM curriculum will use raptors as a lens to teach about the environment and its sustaining systems; while demonstrating how we can use the process of scientific investigation to assess human impact on those systems. Students will chart, graph, and analyze real-world data from raptors admitted sick or injured to TRC's rehabilitation clinic. As they gather this data, students will participate step-by-step in the scientific method modeled by TRC veterinarians, culminating in a mock scientific research paper. Students will then utilize a module within *The Raptor Lab*, WeExplore (software already created by the Learning Technologies Media Lab at the University of Minnesota) to directly apply what they have learned by conducting their own outdoor research projects. WeExplore will act as an expedition center providing an online platform for students to use images, videos, maps, charts, and graphs to present their research projects and results to teachers, fellow classmates, students in other schools, and to people within their community.

*The Raptor Lab* will allow students throughout the state access to an environmental education program developed, piloted and evaluated by The Raptor Center in partnership with three metro-area schools (Rockford Middle School Center for Environmental Studies, Twin Oaks Middle School, and Hidden Oaks Middle School serving nearly 750 students) over the past two years. Aspects of this curriculum that were successfully implemented focused on the real world problem of raptors and environmental toxins. The curriculum focus was specifically designed to meet state standards in both science and math. Assessments have shown this to be an effective way of building knowledge and engagement in students; evaluation has shown student learning increasing by 25% in two of the pilot schools (Twin Oaks and Hidden Oaks). The resource heavy nature of bringing live-birds and experts into the classroom severely limits the ability to integrate this highly innovative program into other schools around the state. *The Raptor Lab* overcomes this challenge by using multimedia technologies to bridge this physical distance allowing all students access to this curriculum, and TRC experts, within this strategically designed online learning environment. Students are brought virtually into the clinic using video conferencing and other technologies to personally experience the care involved with the treatment and rehabilitation of a wild raptor. This would not be possible without digital technologies.

This curriculum was created to address the urgent need to connect students with the natural world and inspire them to participate in solving the challenging environmental problems our world faces. To do this, they need critical thinking skills, strong backgrounds in science and technology, and exposure to impactful environmental experiences. Each of these themes will be a fundamental component of *The Raptor Lab*. Critical to be able to understanding these challenges and their potential solutions is to be literate in science. Today, nearly 50% of Minnesota students are not proficient in science. This curriculum is designed to directly meet this need by modeling the process of scientific investigation using the engaging nature of raptors, technology, and real-world problems. In addition, it provides an opportunity for students to directly apply what they have learned through their own outdoor research projects connecting them in authentic ways to their local natural environments.

Our goals for this project are to:

- Instill in students an action-based conservation ethic through outdoor, student-centered exploration
- Expand access to an effective environmental education curriculum to middle school teachers and students throughout the state of Minnesota

- Engage students in solving environmental issues through experiential learning and scientific investigation
- Develop leadership skills of critical thinking, collaboration and communication in middle school students

The Raptor Center will partner with the Learning Technologies Media Lab (University of Minnesota, College of Education and Human Development) to develop *The Raptor Lab* that will serve as a platform for distance learning. The Media Lab has a strong history in building teaching modules that use technology to connect students with outdoor learning adventures, such as Geothentic, North of 60, Earthducation, and WeExplore. North of 60 for example connected Dr. Aaron Doering's expedition to the arctic with 14 million students around the country.

Though *The Raptor Lab* is an online learning environment, it will focus on providing students with experiential learning in three important ways:

- Through student projects analyzing real-world data from TRC's clinic
- Through video conferencing allowing students to go into the clinic to learn directly from TRC vets in the clinic
- And through student outdoor research projects.

During their capstone projects students will actively apply their learning as they explore their local environment, participate in citizen science efforts and using technology to share their discoveries with teachers, classmates, other schools and communities. Ultimately, this project will work to instill in students a long-lasting and action-based conservation ethic in their local community through outdoor, student-centered exploration.

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

#### **Project Status as of 31 December 2014:**

Efforts to date have focused on the development of a design for the on-line learning platform and the creation of content for curriculum. We have identified the software that will run the on-line environment and developed initial mock-ups of the cover page, logo and application icon. A preliminary draft layout and site map of the learning environment has been prepared based on curriculum pieces composed to date. The online curriculum concept has been partitioned into three modules, each of which has been identified and had learning objectives developed for it. As these components are developed, their links to the Minnesota state science standards (7<sup>th</sup> grade) are being documented. A curriculum content outline has been prepared for each of the modules and we are currently identifying the multimedia needs required to support each component. One challenge we have addressed is the need for the services of a videographer to capture and edit some of the multi-media pieces. The assessment tools incorporated into this project are in the very early stages of planning. Working with classroom educators, our efforts are focused on creating tools that will inform the future of The Raptor Lab while at the same time provide teachers with the information they need. It has also been determined that two teacher workshops will be adequate for the needs of this project; the first will focus on training teachers on how to use the learning environment and the second will focus on evaluation of the curriculum and learning environment.

#### **Amendment Request (12/31/2014)**

*Activity 1:* We are requesting to move \$600 budgeted in this activity to activity 2 to support videographer needs. The purchase of FlipGrid licenses is no longer needed for the project to utilize this resource.

*Activity 2:* Budget for laboratory analysis of toxin panels is no longer required as all the data needed will be captured from The Raptor Center's historical and on-going clinical diagnostic panels, done on admission of all eagles. We are requesting the money identified for the analysis (\$8,439) be moved to cover videographer needs in this activity (2).

We are requesting budget adjustments to allow contracting with a videographer (new line item) to capture and edit multi-media components of the curriculum. The contract will cover ten hours of onsite video-capture in The Raptor Center's clinic as well as editing time, equaling a budget total of \$13,539 for this service. To offset this item, we propose to re-purpose monies originally designated for: FlipGrid licenses (\$600 – Activity 1), laboratory analysis of samples (\$8439 – Activity 2) and the third teacher workshop (\$4,500 – Activity 3).

*Activity 3:* As the decision was made to reduce the number of teacher workshops to two, we request that the monies budgeted for the third workshop (\$4,500) be moved to activity 2 to cover costs associated with contracting a videographer.

**Amendment Approved: 12/29/14**

**Project Status as of 30 June 2015:**

Curriculums for two of the three modules of The Raptor Lab are complete, as are designs for the online learning environment pages and the project logo. The online site is currently under development, to be ready for teacher use at the first teacher workshop on July 13. The WeExplore environment has been redesigned to match the design of The Raptor Lab site, and is being integrated seamlessly within the site. Video-capture and editing of the videos being used in The Raptor Lab are complete, and the videographer is in the process of final cleanup of the videos, to incorporate the project logo and make captions and titling consistent across content. Fourteen middle school teachers have been identified and confirmed for piloting the Raptor Lab in their classroom for the 2015-2016 school year.

**Project Status as of 31 December 2015:**

Pilot testing for The Raptor Lab curriculum began in September 2015 and will be on-going throughout the school year with over 1,000 students in eight middle schools participating. The online learning environment has been developed and populated with a multi-media based curriculum that engages students in science and the scientific process through modeling of real-world problems. The first two curriculum modules are complete with videos, student activities, teacher instructions and learning outcomes. Module 3 (WeExplore) is an interactive component for engaging students. In addition to three modules, an on-line resource center is in the process of being developed to house supplemental materials for teachers. Most of these supplemental materials have been gathered and/or identified. Documentation of the curriculum's link to state science standards has been done (math and language arts standards still to be done). Assessment surveys for students and program evaluation surveys for teachers are being used during the pilot year to inform final edits to the curriculum, as well as to document learning achievement.

Images of the Raptor Lab learning environment are attached at the end of this report.

**Overall Project Outcomes and Results:**

The Raptor Lab is a resource for teaching students science-based research through wildlife issues and outdoor exploration of their local environment. The goal was to link outdoor experiential learning with a STEM-focused classroom curriculum. The Raptor Lab curriculum addresses the urgent need to connect students with the natural world and inspire them to participate in solving challenging environmental problems.

Major goals for the project are to:

- Instill in students an action-based conservation ethic through outdoor exploration
- Expand access to an effective environmental education curriculum to middle school teachers and students throughout the state of Minnesota
- Engage students in solving environmental issues through experiential learning and scientific investigation
- Develop skills of critical thinking, collaboration and communication in middle school students

The Raptor Lab online environment has been designed, developed, built, and piloted. It consists of three parts: (1) Wildlife Veterinarian in Training; (2) Wildlife Researcher; and (3) Share Your Work. Part 1 has 6 videos and 5 activities to simulate training students to role play being a wildlife vet in training. Part 2 has eleven videos and two activities walking students through conducting a scientific research report on an environmental issue. Part 3 is an online environment where students can apply their learning by conducting their own outdoor field investigation. Students upload images, maps, sounds, data, and video to present their findings.

The Raptor Lab was piloted by 14 teachers in eight school districts (four metro and four outstate) reaching 1,010 students. Online assessment tools were created to assess student learning. The pre-assessment was taken by 911 students and the post by 652 (one pilot site dropped out mid-year and another did not administer final assessment due to schedule conflict). Pilot teachers took part in two workshops, receiving training and providing feedback and evaluation of the curriculum.

**Amendment Request (15 August 2016):**

As part of budget close-out, we are requesting to shift \$521 of funding from Professional Services (Activity 2) to personnel wages and benefits (Activity 2) as the final expenditures for the professional videographer came in \$521 under budget. In addition, we are requesting to shift \$720 from Other (Activity 3 – teacher stipends) to personnel wages and benefits as one teacher dropped out of the program midway due to inability to meet the obligations.

**IV. PROJECT ACTIVITIES AND OUTCOMES:**

**ACTIVITY 1:** Technology Development and Software Modification

**Description:** *The Raptor Lab* will be designed and developed by the Learning Technologies Media Lab (LTML) based on the past successes of over a decade of delivering adventure learning (AL) programs while engaging millions of online users. Specifically, the online learning environment will feature all facets of the AL approach encompassing the *principles, practice* and *community*. We will integrate the following *principles* of a successful AL program: (a) the identification of an issue and respective location of exploration; (b) a researched curriculum grounded in problem-solving that guides the progression and evolution of the AL program; (c) collaboration and interaction opportunities between students, experts, peers, explorers, and content; (d) education that is adventure-based; (e) exploration of the issue, environment, local population, culture, and additional relevant factors that provide an authentic narrative for students and teachers to follow; (f) design and utilization of an Internet-driven learning environment for curricular organization, collaboration, and media delivery; (g) enhancement of the curriculum with media (e.g., photos, video, audio, etc.) and text delivered from the field in a timely manner; (h) synched learning opportunities with the AL curriculum and online learning environment; and (i) pedagogical integration guidelines and strategies for the curriculum and online learning environment. These principles will be implemented within the online learning environment through the lens of the Raptor Center. To further the *Raptor Lab* AL environment and to build upon learners putting their knowledge into *practice*, learners will utilize LTML's user-driven AL environment WeExplore. WeExplore provides learners with the opportunity to become their own researchers and explorers pursuing answers to their own questions, and to then share their findings with the world. This custom-designed environment scaffolds learners through the process of creating their *own* AL project, allowing them to contribute to world knowledge about contemporary issues through a personal lens. Learners can follow along with other teams whose projects interest them even as they share their own project online. We're certain they will also have lots of fun while learning! Finally, to build the *community* that is required in an AL environment, LTML's collaboration environment, Flipgrid, will be utilized. Flipgrid allows all users to share their own unique perspectives on learning through video as a community of learners is developed. As mentioned, *The Raptor Lab* AL environment will be designed, developed, and hosted at the LTML. This will afford the opportunity for scaling and improvements of the environment throughout the life of the project and beyond.

**Summary Budget Information for Activity 1:**

**ENRTF Budget: \$74,070**  
**Amount Spent: \$74,070**  
**Balance: \$ 0**

**Activity Completion Date:** 31 December 2015

<b>Outcome</b>	<b>Completion Date</b>	<b>Budget</b>
<b>1. Online learning platform – The Raptor Lab (Teacher &amp; Student Modules)</b>	30 June 2015	\$59,256
<b>2. Project specific software modifications – WeExplore &amp; Flipgrid</b>	31 Dec 2015	\$15,414

**Activity Status as of 31 December 2014:**

Development of online learning platform: We have identified WordPress and its customizable templates as the software that will be used to build and run the Raptor Lab on-line environment. Draft layouts of the environment have been developed and are undergoing review for usability. Once the layout of the environment is finalized, a template will be selected and customized to best achieve our layout goals. Initial graphic mock-ups have been created for the cover page, logo and application icons. Incorporating these into the templates is an iterative process and they will be adjusted as needed as the templates and color schemes are finalized. Curriculum sequencing is driving the development of the on-line learning environment layout. An outline of the curriculum sequence has been drafted with three primary modules being identified. Wireframes and rough sketches of the layout have been created. The online learning environment’s menu bar with headings has also been identified.

Project specific software modifications: The modifications to WeExplore and FlipGrid have not yet been started. This step is sequential to the establishment of the online learning platform. Once the templates and schemes have been finalized for the online environment, modifications will be made to FlipGrid and WeExplore for incorporation into the Raptor Lab.

**Amendment Request (12/31/2014)**

We are requesting to move \$600 budgeted in this activity to activity 2 to support videographer needs. The purchase of FlipGrid licenses is no longer needed for the project to utilize this resource.

**Amendment Approved: 12/29/14**

**Activity Status as of 30 June 2015:**

The initial design and development of the online learning environment of the Raptor Lab has focused on the layout, color scheme, thoughtful usability, and functionality of the website’s homepage and each video page within module 1. Detailed drafts of each page have been created and given to programmers at the LT Media Lab for coding. LT Media lab has begun development of Raptor Lab branding graphics, icons and logos to be used with the on-line environment and all supporting materials. Mock-ups are being created for the Raptor Lab’s teacher resource center, which will be called the Teacher Toolkit. It will house tutorials, written curriculum with activities, Raptor Lab objectives and learning outcomes, and links to the Minnesota Science Standards.

Initial modifications of WeExplore have begun in preparation for inclusion with learning module 3. WeExplore has been redesigned to match the Raptor Lab environment. WeExplore titles and headings are being also being modified to fit seamlessly with the Raptor Lab environment.

Since Flipgrid is no longer owned by LT Media Lab, it cannot be modified. It will, however, still be available to be used by classrooms within the learning environment.

**Activity Status as of 31 December 2015:**

The online learning platform has been developed and is currently housing components of Module 1, Module 2 and the Teacher Resource Center for The Raptor Lab. Module 1 (Student) is complete with learning outcomes,



activities, background resources and foundational teaching media, seven coordinating videos that bring the student into the work space of The Raptor Center's clinic and set the stage for their learning activities. This module is currently being implemented by the pilot teachers and has been used to date by teachers at:

- Grand Rapids - Robert J. Elkington Middle School: 30 students
- Prior Lake - Twin Oaks Middle School: 300 students
- Proctor - Proctor Middle School: 150 students
- St. Paul - Murray Middle School: 20 students
- Bloomington - Olson Middle School: 140 students

The design and development for Module 2 (Student) has also been completed, involving the production, editing and transcription (for curriculum) of 13 coordinating videos, student learning activities and additional resources. Pilot implementation of Module 2 is just beginning.

The Teacher Resource Center is in production. It will house the Raptor Lab curriculum (including transcription of all video material) with learning outcomes, links to state standards, student activities with answers or explanations and appropriate background resources. The video transcriptions and student activities are complete, and many of the background resources have been collected.

Modification of project specific software is also completed. Module 3 of The Raptor Lab is housed within WeExplore, which has been redesigned to be a standalone Module within the on-line learning environment. It has been reskinned, rebranded and reformatted to seamlessly integrate with Modules 1 and 2. FlipGrid has been linked to the online environment and has been used by students after completing Module 1. To date, 467 students have been recorded reflection videos with 5,205 views from students or teachers.

#### **Final Report Summary:**

The Raptor Lab online environment is complete and available for teachers to use. The Raptor Lab is made up of three modules. Module 1 and 2 consist of 17 videos professionally filmed and designed to integrate with the Raptor Lab curriculum and its supporting activities. Activities include having students do online research about raptors; collecting and documenting data to complete a model patient medical record as they watch the videos of their patient being assessed, treated, and rehabilitated; and writing a model scientific research report on an environmental issue. Online resources are integrated throughout the curriculum to support student learning and provide efficient teaching for teachers.

A Teacher Toolbox is available to house the curriculum, teacher resources, and tutorial videos. It is separate from the Raptor Lab website so students do not have access to activities with model answers. Teachers go to the About page of the Raptor Lab where they can sign up to get access to the Teacher Toolbox. The WeExplore online learning environment was modified and integrated as the module 3 of the Raptor Lab. Its aim is to provide a platform for students to engage in their own outdoor investigation and then present their findings within the Module 3 environment.

The final numbers for teachers and students that piloted the Raptor Lab are:

- Olson Middle School in Bloomington Minnesota: 300 students
- Murray Middle School in St. Paul Minnesota (serving a high free and reduced lunch population): 20 students
- Twin Oaks Middle School in Prior Lake MN: 300 students
- Rockford Middle School Center for Environmental Studies in Rockford Minnesota: 150 students
- Robert J. Elkington Middle School in Grand Rapids Minnesota: 30 students
- Caledonia High School in Caledonia Minnesota: 60 Students
- A. I. Jedlicka Middle School in Proctor Minnesota: 150 students

FlipGrid was a popular part of the Raptor Lab. Students recorded 467 videos with 5,205 views

**ACTIVITY 2: Curriculum Formalization and Publication**

**Description:** The curriculum piloted during the past two years will be adapted for distance learning, formalized, published online and housed within The Raptor Lab learning platform. Documentation of how it meets state standards in science, math and language arts will be developed for teachers. An online resource and integration area for teachers will provide a program curriculum calendar with suggested projects and learning timelines, as well as guides for successful integration through three areas of knowledge: technological, pedagogical and content.

**Summary Budget Information for Activity 2:**

**ENRTF Budget: \$ 41,760**  
**Amount Spent: \$ 41,760**  
**Balance: \$ 0**

**Activity Completion Date:** 30 June 2016

<b>Outcome</b>	<b>Completion Date</b>	<b>Budget</b>
<b>1. Formalized and published curriculum with online resource center</b>	30 June 2016	\$27,495
<b>2. State standards benchmarks for science, math, and language arts</b>	30 June 2016	\$ 9,165

**Activity Status as of 31 December 2014:**

A draft curriculum has been outlined with 3 primary modules identified: (1) Experience Being a Raptor Center Veterinarian, (2) Explore Being a Wildlife Investigator, and (3) Expand Being a Field Researcher. Each module has been outlined for content and multimedia requirements. A list of videos and multi-media components needed to support the curriculum has been created and sample storyboards are being created to make sure videos match curriculum needs for seamless integration. The need for professional shooting and editing of some videos to be captured in The Raptor Center’s medical and surgical clinic was identified as a budget requirement. As the curriculum is being developed, links to state standards are being documented. An initial review of state standards in science for 7<sup>th</sup> grade has begun and the information is being incorporated into the curriculum as it is developed.

**Amendment Request (12/31/2014)**

Budget for laboratory analysis of toxin panels is no longer required as all the data needed will be captured from The Raptor Center’s historical and on-going clinical diagnostic panels, done on admission of all eagles. We are requesting the money identified for the analysis (\$8,439) be moved to cover videographer needs in this activity (2).

We are requesting budget adjustments to allow contracting with a videographer (new line item) to capture and edit multi-media components of the curriculum. The contract will cover ten hours of onsite video-capture in The Raptor Center’s clinic as well as editing time, equaling a budget total of \$13,539 for this service. To offset this item, we propose to re-purpose monies originally designated for: FlipGrid licenses (\$600 – Activity 1), laboratory analysis of samples (\$8439 – Activity 2) and the third teacher workshop (\$4,500 – Activity 3).

**Amendment Approved: 12/29/14**

**Activity Status as of 30 June 2015:**

The development of module 1, which focuses on students *Experiencing Being a Clinical Wildlife Veterinarian*, has focused on writing the curriculum, designing and developing student activities throughout curriculum, writing scripts, storyboarding each video that will drive the curriculum within the module, organizing staff for filming, organizing raptor treatment schedules for filming, filming in the clinic for three days with full camera crew, video editing, and voice overs. In addition to module 1 development, the beginning stages of developing module 2 have also begun. Module 2 will focus on students *Exploring Being a Wildlife Researcher*. Initial themes have been identified and linked with module 1’s curriculum. Drafts and digital mockups of the environment have been given to the programmers at the LT Media Lab to begin building in the online learning environment.

Raptor Lab primary objectives and learning outcomes, module lesson plans, activity explanations have been drafted are beginning to be linked to Minnesota Science standards. These resources will be housed in the Teacher Toolkit.

Module 2 (Explore Being a Wildlife Researcher) curriculum has started to be designed and developed. Drafts of the curriculum layout and design will be presented to pilot teachers at the July 13 workshop for review and comments.

Module 3 is the WeExplore component of the environment. Scaffolds, tutorials, and samples projects are being developed to include in the environment, and the WeExplore site has been redesigned and is currently being integrated within the new Raptor Lab online environment.

#### **Activity Status as of 31 December 2015:**

The Raptor Lab curriculum for Modules 1 and 2 has been fully drafted. A walkthrough description of each video has been written along with instructions on how they connect to the curriculum (seven videos for Module 1 and 13 for Module 2). Accompanying student activities have been developed; both student versions and teacher versions (with answers) have been created. Module 1 has six supporting resources identified and links provided for easy access while Module 2 has twelve supporting resources. Concepts and student learning outcomes have been identified for each video in Module 1 and are drafted for Module 2. The online Resource Center is in development with many materials developed or identified and others still being completed.

The process of identifying and linking the Raptor Lab curriculum to state standard benchmarks is in process. Consideration of state standards was integral to development of Modules 1 and 2, and ways to connect to them are continuing to be identified and documented during the pilot testing period. State standards in science have been identified and documented for each video section in Module 1 and are in process of documentation for Module 2 videos and activities. State standards in math and language arts for both modules will be identified in the spring semester.

#### **Final Report Summary:**

The Raptor Lab curriculum has been written and copy edited and is available to teachers in the Teacher Toolkit. Instructions on how to access the Teacher Toolkit are provided on the About page of the Raptor Lab. The Curriculum breaks down for teachers how to use the Raptor Lab, provides descriptions of each of the videos with learning objectives and concepts highlighted for each video. State Minnesota Science Standards are benchmarked within the curriculum to point teachers to the standards the Raptor Lab curriculum meets. In addition, pedagogy notes are provided highlighting tips and tricks that worked for pilot teachers using the Raptor Lab in their classrooms helping empower new teachers to use the curriculum. In addition, different teaching schedules were included so teachers have an idea of how long each part of the Raptor Lab takes and approximately how many class periods should be planned to complete it. All activities were created to integrate into the Raptor Lab curriculum. Some activities are core activities needed to complete the curriculum, while others are supplementary and up to the choice of the teachers. All activities have thorough answer keys.

Throughout the piloting process of the Raptor Lab it was apparent that the Raptor Lab fit best within the science standards. Many of the pilot teachers naturally taught science because of the Raptor Labs excellent fit with science standards. Math standards were also included in the curriculum, but challenges arose with teachers in Language Arts and Social studies that limited their involvement and, in turn, the curriculum's integration into those subject areas. It is the hope that future iterations of the Raptor Lab will be able to include standards that integrate social studies and language arts.

#### **ACTIVITY 3: Program Integration and Implementation**

**Description:** Five schools will integrate the program over a school year reaching demographics in rural outstate, suburban, and urban areas with the goal of reaching a minimum of 900 students. Teachers and curriculum

integration coordinators will also participate in three full-day workshops throughout the funding period. During those workshops, teachers will help plan and design particular curriculum components of the online learning environment; they will be trained on how to implement finalized components in their classrooms; they will provide feedback in regards to its functionality and utility; and they will administer assessments to gauge student learning throughout the implementation process. Evaluating student learning will be a major component of this program. Classroom pre and post assessments, along with FlipGrid reflections and other assessment tools will be designed and integrated throughout the curriculum to provide formative evaluation in regards to the overall project goals and objectives.

**Summary Budget Information for Activity 3:**

**ENRTF Budget: \$ 70,170**  
**Amount Spent: \$ 70,170**  
**Balance: \$ 0**

**Activity Completion Date:** 30 June 2016

<b>Outcome</b>	<b>Completion Date</b>	<b>Budget</b>
<b>1. Digital pre and post assessment tools</b>	30 June 2015	\$29,868
<b>2. Teacher training and planning workshops (2 workshops)</b>	30 June 2016	\$44,802

**Activity Status as of 31 December 2014:**

The development of the digital pre and post assessment tools is in initial planning stages. Several formats have been explored and evaluated for utility that will meet both project evaluation needs and provide classroom teachers with useful information. Google forms and Survey Monkey are the current technologies being considered for assessments. Assessment data will be analyzed in part using Google analytics. WeExplore’s current learner management system will be used for the Raptor Lab as an interface with the classroom. It has been decided to eliminate one of the teacher workshops to more efficiently use participating teachers’ time. The first workshop will be held in the summer of 2015 and will focus on training teachers how to use the environment. We will also look for their feedback on the environment: its usability, its curriculum layout and scope, and functionality. After teachers have piloted the program for the 2015-2016 school year, a second workshop will be held in late spring 2016 for a thorough evaluation of the online environment and the curriculum. This feedback will inform final modifications to the environment in preparation for its release in the summer of 2016.

**Amendment Request (12/31/2014)**

As the decision was made to reduce the number of teacher workshops to two, we request that the monies budgeted for the third workshop (\$4,500) be moved to activity 2 to cover costs associated with contracting a videographer.

**Amendment Approved: 12/29/14**

**Activity Status as of 30 June 2015:**

We have identified and confirmed the participation of fourteen middle school teachers that will pilot the Raptor Lab in their classrooms for the 2015-2016 school year. Teachers represent eight different school districts serving over 1,200 students. Eleven teachers are from the metro area, serving both urban and suburban communities and three are from outstate Minnesota, serving Caledonia, Proctor and Grand Rapids areas. The Raptor Lab will be incorporated into a variety of subjects: general science, life science, math, social studies, language arts, and agriculture. Pilot teacher roles, participation expectations and stipends have been finalized and communicated to participating teachers. During the pilot year teachers and students will provide feedback to inform adaptations for usability and effectiveness. The first teacher workshop has been scheduled for 13 July. Logistics are currently being finalized for this workshop.

During late summer, after the full Raptor Lab curriculum is finalized, digital pre-assessments will be developed to be given to students at the start of the school year in September.

**Activity Status as of 31 December 2015:**

Digital pre- and post-assessment tools have been developed for both students and teachers. The new student assessment was given to students prior to the use of Raptor Lab in the pilot classrooms; 911 students participated in the pre-assessment. Post assessment has been scheduled to be given after the implementation of Module 3 in the classrooms this spring. Survey Monkey (an online tool) was used to administer the assessment and capture student responses.

A survey to the pilot teachers for evaluation of Module 1 was developed and delivered. To date, seven pilot teachers have responded. The Module 2 teacher evaluation has been drafted and will be given to teachers in late winter. The Module 3 teacher evaluation has also been drafted and will be given to the teachers near the end of the school year for response. The pilot teachers are also expected to provide an overall assessment which has been drafted and will be sent out at the end of the school year, prior to the teacher training and planning workshop. Survey Monkey has been used (or will be used) for all teacher evaluations.

The second teacher training and planning workshop has been scheduled for June 2016, upon completion of the complete pilot year. It will focus on evaluating and improving key student activities, functionality and use of the online environment, and the teacher toolbox resource center.

**Final Report Summary:**

Pre- and post- assessments were created and given to students to assess student learning. The pre-assessment had 911 students submit responses, while the post-assessment had 652. The decrease in responses was largely due to one pilot teacher having to drop out of the pilot program and one other teacher unable to administer the assessment due to scheduling conflicts. Assessment results showed increases in scores on the understanding of the process of scientific investigation, understanding the role raptors as sentinels in the ecosystem, and how exposure to toxins can occur when they enter the food web.

All but one pilot teacher attended the summer 2015 teacher training workshop at the University of Minnesota. Teachers learned about the Raptor Lab, their role as a pilot teacher, and trained on how to use Module 3. Teachers were given participation due dates, contact sheet for their fellow pilot teachers, and instructions on completing online teacher evaluations. Of the nine core pilot teachers, seven were able to make the summer 2016 teacher workshop where in small groups teachers went through each video and activity where they reviewed and gave feedback for improvements. This feedback was use for the final modifications to the Raptor Lab environment and curriculum. It was important this educational initiative was informed by teachers for teachers. Overall feedback from teachers was very positive, most really liking the curriculum. Their feedback on student responses was also overwhelmingly positive. Students particularly liked the videos and feeling like they were learning from real scientists in the field.

In addition to teacher workshop, in depth teacher evaluations were given on each module of the Raptor Lab. Designed to be completed as soon after competition of the module as possible. This feedback was also used to guide the development of the Raptor Lab, its curriculum, and the activities.

**V. DISSEMINATION:**

**Description:** TRC will disseminate information about *The Raptor Lab* by contacting hundreds of middle schools on its database of schools that have taken part in its programming in the past. Email advertisements and other forms of communication will also be generated to contact middle schools not in TRC's database. TRC will present *The Raptor Lab* at middle school science teacher's conferences, Education Minnesota conference, and other relevant teacher/principal conferences in the state. Lastly, *The Raptor Lab* will be presented at professional conferences within the fields of education, environmental education, and learning technologies to help advance the field.

**Status as of 31 December 2014:**

In October 2014, Jeni Henrickson presented two papers (*WeExplore: Promoting environmental action through technology-enhanced student adventure learning* and *North of Sixty: Mobilizing student-captured stories of a changing arctic*) at the North American Association for Environmental Education in Ontario, Canada where she discussed the Raptor Lab in each presentation.

In November of 2014, Mike Billington presented *The Raptor Lab* at the Minnesota Naturalist Association Conference “Plugging into Nature.”

**Status as of 30 June 2015:**

We have begun mentioning the Raptor Lab in social media as appropriate (Twitter and Facebook), and will be including posts about the forthcoming teacher workshop on July 13 in social media and in the LT Media Lab and Raptor Center blogs. The Raptor Lab was also promoted to educators during a meeting of the Minnesota Alliance of Geographic Education in May 2015, as well as at MAGE workshops being held at the LT Media Lab in June and July 2015.

**Status as of 31 December 2015:**

We continue to promote Raptor Lab on social media, including Facebook and blogs for both The Raptor Center and LT Media Lab. The summer workshop was a blog highlight (<http://lt.umn.edu/news/raptor-lab/>). In addition, pilot schools are posting updates on their social media (ex: <https://www.facebook.com/TwinOaksPLS/posts/757029984401491>). Plans are being made for attending teacher conferences in the spring/summer to promote Raptor Lab.

**Final Report Summary:**

The Raptor Lab has been presented at several conferences: the National Association of Environmental Educators, the Minnesota Naturalist Association, the Minnesota Science Teacher’s Association, and the University of Minnesota’s Grand Challenges Conference. In the fall of 2016, TRC staff will present at the Minnesota Education Association (MEA) Conference and the National Science Teacher’s Association Regional Conference. The Raptor Lab was also promoted at the Mage workshops being held at the LT Media Lab and the Minnesota Alliance of Geographic Education meeting. In addition, social media has been used to highlight the development of the Raptor Lab. Now that the Raptor Lab is complete, TRC staff will begin to develop a marketing plan to connect the Raptor Lab with teachers. Part of the marketing plan will include using TRC’s vast database on schools around the state that have taken part in TRC programs to get the word out about the Raptor Lab. A list of interested educators is also being tallied and updated to contact in mid-August as teachers begin preparing for the up-coming school year.

**VI. PROJECT BUDGET SUMMARY:**

**A. ENRTF Budget Overview:**

Budget Category	\$ Amount	Explanation
Personnel:	\$ 158,961	1 principal investigator at 5% FTE for 2 years (scientific oversight; project oversight, reporting). 2 Co-principal investigators at 18% FTE for 2 years (design and development of components, scientific oversight of educational components); 1 software programmer at 25% FTE for 2 years; 1 project manager/naturalist at 48% FTE for 2 years.
Professional/Technical/Service Contracts:	\$ 18,039	1 contract for naturalist/curriculum writer TBD

		through competitive bid. 1 contract for a videographer TBD through competitive bid.
Other: Teacher Stipends	\$ 9,000	9 middle school teachers participating in 3 2 training and planning workshops.
<b>TOTAL ENRTF BUDGET:</b>	<b>\$ 186,000</b>	

Add or remove rows as needed

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

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

**Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation:** 1.92

**Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:** 0.25

**B. Other Funds:**

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
<b>Non-state</b>			
In-kind services during project period	\$ 3,600	\$ 2,700	Two years online hosting and support on LT Media Lab servers (\$1,800 per year x 2 years)
<b>TOTAL OTHER FUNDS:</b>	<b>\$ 3,600</b>	<b>\$ 2,700</b>	

Add or remove rows as needed

**VII. PROJECT STRATEGY:**

**A. Project Partners:**

Project Partners Receiving Funds:

- Dr. Julia Ponder, The Raptor Center, University of Minnesota: \$15,825 principal investigator responsible for scientific oversight of curriculum content, management of Raptor Center proposed outcomes, and sponsor reporting.
- Dr. Charles Miller, LT Media Lab, University of Minnesota: \$6,522 co-principal investigator responsible for the overall design and development of the online learning environment and scientific oversight of educational components.
- Dr. Aaron Doering, LT Media Lab, University of Minnesota: \$33,785 co-principal investigator responsible for the design and implementation of the online learning environment and overall integration into partner schools.
- Jeni Henrickson, LT Media Lab, University of Minnesota: \$53,947 lead developer responsible for programming and building online learning components.
- Michael Billington, The Raptor Center, University of Minnesota: \$48,886 project manager and naturalist responsible for adaptation of curriculum content to online format, day-to-day logistics, interdepartmental communication and team planning.
- TDB through competitive bid: \$4,500 naturalist/curriculum writer consultant to assist in content development for online educational environment. \$13,539 for videographer to create multi-media components.
- Partner school teachers: \$9,000 training and planning workshops for integration into middle school classrooms.

**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 raptors 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.

The Raptor Center (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 will provide the curriculum foundation for *The Raptor Lab* learning environment.

By expanding this curriculum into an online learning environment allows:

- Students and schools 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

Once fully developed, *The Raptor Lab* will be financially sustained through subscriptions, with reduced or free access provided to schools that qualify, utilizing free and reduced lunch program data as the metric for need.

**C. Spending History:**

<b>Funding Source</b>	<b>M.L. 2010 or FY11</b>	<b>M.L. 2011 or FY12-13</b>	<b>M.L. 2013 or FY14</b>
The Raptor Center	\$ 7,200	\$ 7,200	\$ 7,200
Rockford Middle School	\$ 3,500	\$ 3,500	\$ 3,500
Prior Lake Middle School		\$ 4,100	\$ 4,100

**VIII. ACQUISITION/RESTORATION LIST:** N/A

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

**X. ACQUISITION/RESTORATION REQUIREMENTS WORKSHEET:** N/A

**XI. RESEARCH ADDENDUM:** N/A

**XII. REPORTING REQUIREMENTS:**

Periodic work plan status update reports will be submitted no later than 31 December 2014, 30 June 2015, and 31 December 2015. A final report and associated products will be submitted between June 30 and August 15, 2016.



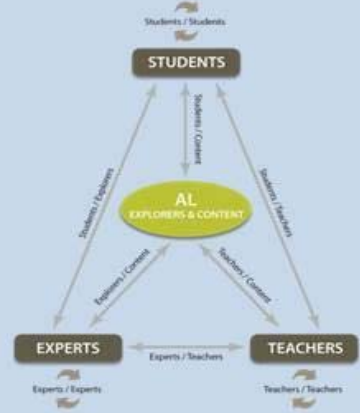


# The Raptor Lab (Online Learning Environment)



## Research Based Educational Framework

- DEFINE** the issue or problem that you and your students wish to investigate
- IDENTIFY** the geographic location, institutions, and experts that relate to understanding the issue or problem
- DEVELOP** a curriculum and design an online environment for media delivery and collaborative interaction
- EXPLORE** the geographic locale with an organized process to collect data that support the curriculum
- SHARE** the collected data within the online environment while addressing relationships with curricular goals
- COLLABORATE** with students in the classroom and around the world to explore and learn about the AL experience



PRINCIPLES

PRACTICE

COMMUNITY

### Raptor Classroom Curriculum (Studying the Process of Scientific Investigation)

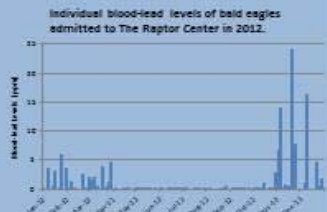
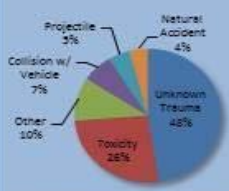
Students investigate, alongside TRC veterinarians, causes for raptor injuries and illnesses.



Students are transported into TRC's clinic with technology.



Students chart, graph, and analyze real world data.



### Outdoor Student Research Projects (Applying the Process of Scientific Investigation)

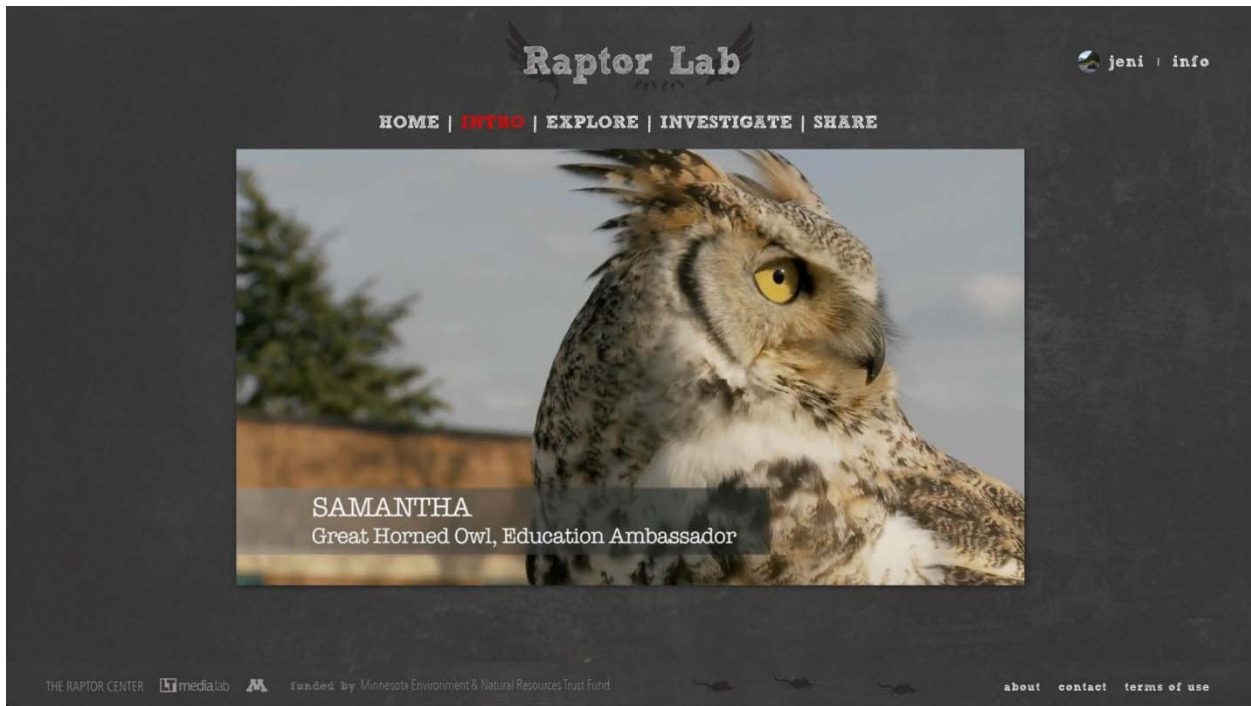
Students conduct their own outdoor research projects.



Students apply the process of scientific investigation they learned investigating causes for raptor admission to TRC.

WeExplore provides an online platform for students to organize, collaborate, and present their research project data, images, videos, and maps.







## Your Mission

- video
- activities
- resources

admission & exam

diagnosis & treatment

conditioning & release



Your Mission



Admission



Rehabilitation Process



Physical Exam



Diagnosis & Treatment



Conditioning & Release



## Your Mission

- video
- activities
- resources



Intro to Wildlife Research



Your Mission



The Problem



Background



Question & Hypothesis



Materials & Methods



Results



Discussion



Wrap-up

## FEATURED EXPEDITIONS

SEARCH ALL EXPEDITIONS



**OSPREY MIGRATION**  
Oak Grove, Mn



**PEREGRINE FALCON MIGRATION**  
St.Paul, MN



**GOLDEN EAGLE MIGRATION**  
St. Paul, Minnesota



**TRC'S REHABILITATION PROCESS**  
St. Paul, MN



**ADVENTURE LEARNING IN ACTION**  
Minneapolis, Minnesota

## OAK GROVE, MN OSPREY MIGRATION



### EXPEDITION OVERVIEW

**MISSION**

Explore the migration patterns of east coast Osprey with GPS satellite telemetry.

**QUESTION**

What migration trends can be seen from the tracking data?

### EXPEDITION LOCATION



OAK GROVE, MN  
47.293805-94.48405, -94.4250625

## ABOUT THE RAPTOR LAB

Raptor Lab is an interactive online learning environment that models the process of scientific investigation in real-world settings through the active role-play of different scientific careers involved in wildlife rehabilitation, and then provides a platform for students to team up and share their own inquiry-based investigations online. This educational initiative was designed and developed in partnership between **The Raptor Center** and the **Learning Technologies Media Lab** at the University of Minnesota. Funding for this project was provided by the **Minnesota Environment and Natural Resources Trust Fund** as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR).

### RAPTOR LAB PROJECT GOALS

- Increase student interest in science, scientific careers, higher education, and the environment.
- Engage students in timely environmental issues through experiential learning and scientific investigation.
- Teach the process of scientific investigation by modeling its application within different real-world contexts.
- Authentically model careers in science and the environment.
- Develop leadership skills of critical thinking, systems thinking, collaboration, and communication.
- Instill in students an action-based conservation ethic through outdoor, student-centered exploration.



*Raptor Lab is a unique adventure learning environment that provides learners with the opportunity to become scientific investigators pursuing answers to their own questions, and to then share their findings with the world.*

### WHY PARTICIPATE IN RAPTOR LAB?

Environment and Natural Resources Trust Fund  
M.L. 2014 Project Budget



Project Title: Raptor Lab integrating Online and Outdoor Learning Environments  
 Legal Citation: M.L. 2014, Chp. 226, Sec. 2, Subd. 09h  
 Project Manager: Julia Ponder  
 Organization: University of Minnesota dba The Raptor Center  
 M.L. 2014 ENRTF Appropriation: \$ 186,000  
 Project Length and Completion Date: 2 years, June 30, 2016  
 Date of Report: 15 August 2016

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Revised Activity 1 Budget (12/31/14)	Amount Spent	Activity 1 Balance	Revised Activity 2 Budget (12/31/14)	Revised Activity 2 Budget (8/15/16)	Amount Spent	Activity 2 Balance	Revised Activity 3 Budget (8/15/16)	Revised Activity 3 Budget (12/31/14)	Amount Spent	Activity 3 Balance	TOTAL BUDGET	TOTAL BALANCE
<b>BUDGET ITEM</b>	<b>Technology Development and Software Modification</b>			<b>Curriculum Formalization and Publication</b>				<b>Pilot Program and Integration</b>					
<b>Personnel (Wages and Benefits)</b>	\$74,070.00	\$74,070	\$0.00	\$23,721.00	\$24,242.00	\$24,242	\$0.00	\$61,890.00	\$61,170.00	\$61,890	\$0.00	\$158,961	\$0
Dr. Julia Ponder, Principal Investigator: \$15,825 (y1 36% salary/12% fringe; y2 37% salary/12% fringe); 5% FTE for 2 years													
Dr. Charles Miller, Co-Principle Investigator: \$2,162 (y1 53% salary/18% fringe; y2 21% salary/7% fringe) 1% FTE Y1, 1% FTE Y2													
Dr. Aaron Doering, Co-Principle Investigator: \$33,785 (y1 20% salary/6% fringe; y2 54% salary/18% fringe)-26% FTE Y1, 4% FTE Y2													
Jeni Henrickson, Lead Developer: \$53,947 (y1 36% salary/12% fringe; y2 37%/12% fringe) 25% FTE for 2 years													
Michael Billington, Program Manager: \$53,774 (y1 36% salary/13% fringe; y2 37% salary/13% fringe) 48% FTE for 2 years													
<b>Professional/Technical/Service Contracts</b>													
Videographer: Erik Klang				\$13,539	\$13,018	\$13,018	\$0					\$13,539	\$0
TBD (competitive bid): Naturalist/Curriculum Writer				\$4,500	\$4,500	\$4,500	\$0					\$4,500	\$0
<b>Equipment/Tools/Supplies</b>													
10 Licenses per year for Flipgrid software @\$60 per license	\$0	\$0	\$0									\$0	\$0
<b>Other</b>													
Stipends for teachers participating in workshops (\$500/per workshop, 3 workshops, 9 participants).								\$8,280	\$9,000	\$8,280	\$0	\$9,000	\$0
Laboratory analysis of toxin panels on eagle blood samples				\$0	\$0	\$0	\$0					\$0	\$0
<b>COLUMN TOTAL</b>	<b>\$74,070</b>	<b>\$74,070</b>	<b>\$0</b>	<b>\$41,760</b>	<b>\$41,760</b>	<b>\$41,760</b>	<b>\$0</b>	<b>\$70,170</b>	<b>\$70,170</b>	<b>\$70,170</b>	<b>\$0</b>	<b>\$186,000</b>	<b>\$0</b>