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

Date of Report:	January 15, 2014
Date of Next Status Update Report:	December 31, 2014
Date of Work Plan Approval:	
Project Completion Date:	June 20, 2016
Does this submission include an amendment request?	No

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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Web Address:	www.TheRaptorCenter.org

Location: Statewide

Total ENRTF Project Budget:		**ENRTF Appropriation:**	**$186,000**
		Amount Spent:	**$0**
		Balance:	**$186,000**

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 7th and 8th 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 it's 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

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- 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:

Project Status as of 30 June 2015:

Project Status as of 31 December 2015:

Overall Project Outcomes and Results:

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

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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:** **$ 74,670**
     Amount Spent: **$ 0**
     Balance: **$ 74,670**

Activity Completion Date: 31 December 2015

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

Activity Status as of 31 December 2014:

Activity Status as of 30 June 2015:

Activity Status as of 31 December 2015:

Final Report Summary:

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:** **$ 36,660**
     Amount Spent: **$ 0**
     Balance: **$ 36,660**

Activity Completion Date: 30 June 2016

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

Activity Status as of 31 December 2014:

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Activity Status as of 30 June 2015:

Activity Status as of 31 December 2015:

Final Report Summary:

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 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: $ 74,670**
	Amount Spent: $ 0
	Balance: $74,670

Activity Completion Date: 31 December 2015

Outcome	Completion Date	Budget
1. *Digital pre and post assessment tools*	30 June 2015	$29,868
2. *Teacher training and planning workshops (3 workshops)*	30 June 2016	$44,802

Activity Status as of 31 December 2014:

Activity Status as of 30 June 2015:

Activity Status as of 31 December 2015:

Final Report Summary:

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:

Status as of 30 June 2015:

Status as of 31 December 2015:

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Final Report Summary:

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:	$ 4,500	1 contract for naturalist/curriculum writer TBD through competitive bid.
Equipment/Tools/Supplies:	$ 600	10 Licenses per year for Flipgrid software @$60 per license.
Other: Teacher Stipends	$ 13,500	9 middle school teachers participating in 3 training and planning workshops.
Other:	$ 8,439	Laboratory analysis of toxin panels – raptor blood samples.
TOTAL ENRTF BUDGET:	**$ 186,000**	

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: .09

B. Other Funds:

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

Add or remove rows as needed

VII. PROJECT STRATEGY:

A. Project Partners:

Project Partners Receiving Funds:

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- 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.
- Partner school teachers: $13,500 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.

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C. Spending History:

Funding Source	M.L. 2010 or FY11	M.L. 2011 or FY12-13	M.L. 2013 or FY14
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, 31 July 2015, and 31 December 2015. A final report and associated products will be submitted between June 30 and August 15, 2016.
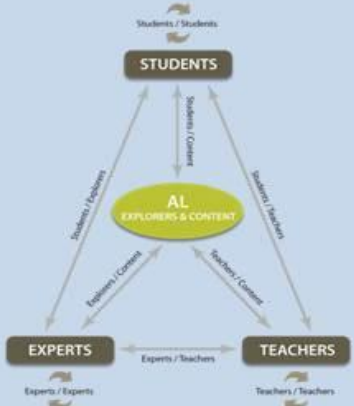
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The Raptor Lab
(Online Learning Environment)

LT media.lab

UNIVERSITY OF MINNESOTA
THE RAPTOR CENTER

Research Based Educational Framework

SYNCHED LEARNING OPPORTUNITIES
ADVENTURE-BASED
CURRICULUM
ISSUE & PLACE
COLLABORATION & INTERACTION
AUTHENTIC NARRATIVE
INTERNET-DRIVEN
MEDIA ARTIFACTS
PEDAGOGICAL INTEGRATION

DEFINE — the issue or problem that you and your students wish to investigate

IDENTIFY — the geographic location, populations, and experts that relate to understanding the issue or problem

DEVELOP — a curriculum and design an online environment for media delivery and collaboration/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

STUDENTS
AL EXPLORERS & CONTENT
EXPERTS
TEACHERS

PRINCIPLES   PRACTICE   COMMUNITY

Raptor Classroom Curriculum
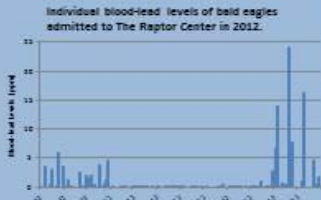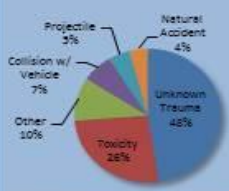(Studying the Process of Scientific Investigation)

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.

Individual blood-lead levels of bald eagles admitted to The Raptor Center in 2012.

Projectile 5%
Natural Accident 4%
Collision w/ Vehicle 7%
Unknown Trauma 48%
Other 10%
Toxicity 26%

Primary and Secondary Causes for Bald Eagle Admission from 2010 - 2012.

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.

WeEXPLORE

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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 January 2014

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	Activity 3 Budget	Amount Spent	Activity 3 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	**Technology Development and Software Modification**			**Curriculum Formalization and Publication**			**Pilot Program and Integration**				
Personnel (Wages and Benefits)	$74,070.00	$0	$74,070.00	$23,721.00	$0	$23,721.00	$61,170.00	$0	$61,170.00	$158,961	$158,961
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: $6,522 (y1 53% salary/18% fringe; y2 21% salary/7% fringe) 3% FTE Y1, 3% FTE Y2											
Dr. Aaron Doering, Co-Principle Investigator: $33,785 (y1 20% salary/6% fringe; y2 54% salary/18% fringe) 15% FTE Y1, 15% 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: $48,886 (y1 36% salary/13% fringe; y2 37% salary/13% fringe) 48% FTE for 2 years											
Professional/Technical/Service Contracts											
TBD (competitive bid): Naturalist/Curriculum Writer				$4,500	$0	$4,500				$4,500	$4,500
Equipment/Tools/Supplies											
10 Licenses per year for Flipgrid software @$60 per license	$600	$0	$600							$600	$600
Other											
Stipends for teachers participating in workshops ($500/per workshop, 3 workshops, 9 participants)							$13,500	$0	$13,500	$13,500	$13,500
Laboratory analysis of toxin panels on eagle blood samples				$8,439	$0	$8,439				$8,439	$8,439
COLUMN TOTAL	**$74,670**	**$0**	**$74,670**	**$36,660**	**$0**	**$36,660**	**$74,670**	**$0**	**$74,670**	**$186,000**	**$186,000**

The Raptor Lab
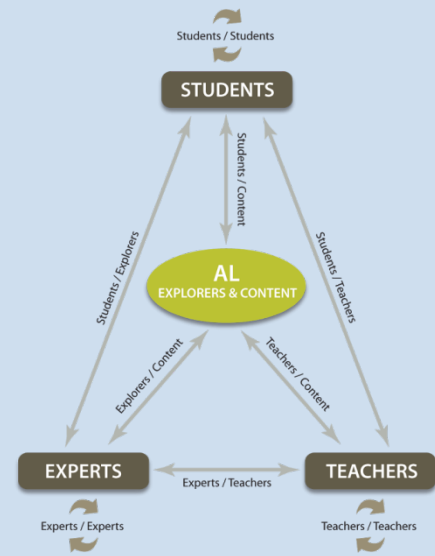### (Online Learning Environment)

LT media.lab

UNIVERSITY OF MINNESOTA — THE RAPTOR CENTER

Research Based Educational Framework

DEFINE the issue or problem that you and your students wish to investigate

IDENTIFY the geographic location, populations, and experts that relate to understanding the issue or problem

DEVELOP a curriculum and design an online environment for media delivery and collaboration/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

SYNCHED LEARNING OPPORTUNITIES · ADVENTURE-BASED · CURRICULUM · ISSUE & PLACE · COLLABORATION & INTERACTION · AUTHENTIC NARRATIVE · INTERNET-DRIVEN · MEDIA ARTIFACTS · PEDAGOGICAL INTEGRATION

PRINCIPLES — **PRACTICE** — **COMMUNITY**

Students / Students · STUDENTS · Students / Content · Students / Explorers · Students / Teachers · AL EXPLORERS & CONTENT · Explorers / Content · Teachers / Content · EXPERTS · Experts / Teachers · TEACHERS · Experts / Experts · Teachers / Teachers

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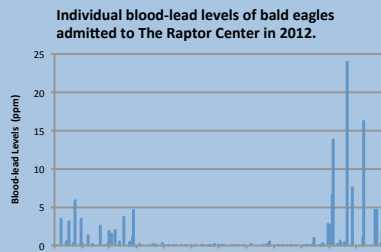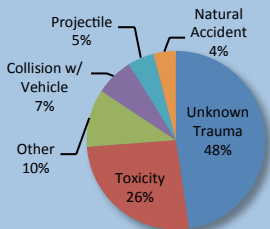### (Studying the Process of Scientific Investigation)

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

Students are transported into TRC's clinic with technology.

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Primary and Secondary Causes for Bald Eagle Admission from 2010 - 2012.

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- Natural Accident 4%
- Collision w/ Vehicle 7%
- Unknown Trauma 48%
- Other 10%
- Toxicity 26%

Individual blood-lead levels of bald eagles admitted to The Raptor Center in 2012.

(y-axis: Blood-lead Levels (ppm), scale 0–25; x-axis: 01-Jan-12 through 01-Dec-12)

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.

weEXPLORE