THE CREATION AND EVALUATION OF A NATURAL HISTORY WEBSITE, ENTITLED THE CWES NATURE NAVIGATOR, AS A RESOURCE FOR UNIVERSITY PRACTICUM STUDENTS AT THE CENTRAL WISCONSIN ENVIRONMENTAL STATION

by

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ABSTRACT

While the number of Internet adept college students in America is increasing, the number of students with interest and knowledge of natural history is decreasing. This suggests that a number of audiences could benefit from a blend of familiar Internet technology with perhaps less familiar natural history information. One such audience is the NRES 482 and 376/576 Environmental Education Practicum course within the University of Wisconsin-Stevens Point's College of Natural Resources. This course provides University students with practical experience delivering environmental education programming to K-12 school groups. Students enrolled in this course learn and teach at the Central Wisconsin Environmental Station (CWES), a place rich in plant and animal life. In this course, University practicum students who lack natural history and phenology knowledge can be at a disadvantage when teaching natural history rich courses and using the outdoors as a classroom.

The purpose of this study was to create and then evaluate a natural history Website, the CWES Nature Navigator, as a resource for University practicum students at CWES. The Website was designed to provide these students with further interest and information in local natural history and phenology, in an effort to enhance the environmental education lessons they taught to visiting school groups. During each week of their practicum course, students accessed local phenology articles from the Website and then took a short quiz on that information. These students then provided feedback on the use of the Website within the practicum course through surveys and focus groups. These instruments found that the use of the CWES Nature Navigator Website had many

beneficial impacts on the University practicum students at CWES. University practicum students attributed an increased interest and awareness in local natural history and phenology to their use of the Website. It was also found that students were all able to use information from the Website in some way while teaching, and that all recommended that future University practicum students continue to use the Website as a part of the practicum course. Recommendations for the Website's future use at CWES and other similar facilities were also generated as a result of the study.

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CHAPTER ONE
INTRODUCTION OF THE PROBLEM

I. Importance of the Study

The Millennial generation is now entering the realm of higher education. As with each generation before them, they possess unique characteristics gained from the times in which they were raised. For the Millennial students entering college, a defining quality is a natural aptitude and comfort with gaining information from the World Wide Web (the Web). In fact, a study by Jones (2002) found that 73% of college students use the Web more often than the library to search for information. Web resources allow students to learn at their own pace in a way that tends to be more engaging than standard textbooks. Because of such advantages, many teaching and learning facilities have begun to utilize the Web as a medium with which to inform and interest their particular audiences.

One such facility is the Central Wisconsin Environmental Station (CWES), who serves undergraduate students in the field of Environmental Education and Interpretation. These students participate in a University practicum program at CWES in which they learn and then teach environmental education programming to visiting K-12 students. Recent advances and innovations in Web-based learning led CWES staff to propose the creation of a Web resource to help remedy a natural history deficiency that was noticed in the students enrolling in this course.

CWES staff had begun to notice that enrolling University practicum students had less and less knowledge of natural history. This was a concern because the lessons that University practicum students taught to K-12 groups included a great deal of natural

history content. While the University practicum students were provided with detailed lesson plans that included relevant information about the topics they taught, this was only basic knowledge and did not give them an awareness of the many natural occurrences they could encounter while outdoors with children. It was therefore determined that these students should be provided with a natural history Website containing information specific to the natural area surrounding CWES.

It was hoped that the use of this Website, the CWES Nature Navigator, would help University practicum students take better advantage of teachable moments outdoors, enhance the lessons they taught with additional natural history information, be more aware of local phenology, and be better able to answer students' questions about nature. Such outcomes would promote greater awareness and knowledge of the local environment in both the University practicum students and the K-12 groups they taught. Environmental awareness and knowledge are the first two steps in creating dedicated environmental stewards, which is the end goal of environmental education according to the Tbilisi Declaration (Engleson and Yockers, 1994). At the same time that the Website would aid in reaching this worthy goal, it would also provide CWES with a more informed seasonal teaching staff and enhance the quality of educational service the facility is capable of providing.

II. Statement of the Problem

The purpose of this study is to create, evaluate, and develop recommendations for the use of a natural history Website, the CWES Nature Navigator, as a resource with

which University practicum students may acquire natural history knowledge specific to the Central Wisconsin Environmental Station's property.

III. Subproblems

1. Create the CWES Nature Navigator Website.
2. Conduct formative evaluation of a preliminary version of the Website.
3. Collect feedback on the content, layout, navigation, and use of the Website from a group of professionals in the environmental education field.
4. Conduct summative evaluation of a final version of the Website.
5. Create a list of recommendations for the future use of the Website in the University practicum program.

IV. Assumptions

1. University practicum students will participate in the study by using the CWES Nature Navigator.
2. University practicum students will have access to the Internet either at CWES, the University of Wisconsin Stevens Point, or their homes.
3. University practicum students will have the desire and need to acquire further natural history knowledge, and are not already experts in the field.
4. University practicum students who will participate in the study will represent a typical group of such students in their majors and natural history knowledge levels.

5. University practicum students will accurately fill out questionnaires.

V. Delimitations

1. This study will not attempt to determine whether learning through Web-based tools is more effective than other methods.
2. This study is limited to NRES 482, NRES 376/ 576 University practicum students during the spring and fall of 2007 terms.
3. The CWES Nature Navigator will be specific to the land surrounding CWES, not the entire state of Wisconsin.
4. The University practicum students' natural history knowledge will be self-reported.

VI. Definition of Terms

CWES. CWES is the abbreviation for the Central Wisconsin Environmental Station, a 200-acre teaching and learning center located 17 miles east of Stevens Point. CWES is a field station of the University of Wisconsin-Stevens Point's College of Natural Resources. During the school year, K-12 school groups come to CWES to receive environmental education programming during 1 to 3 day field trips. The majority of this programming is taught by University practicum students.

CNR Summer Camp. CNR Summer Camp is a required and combined set of courses for Environmental Education and Interpretation majors. University of Wisconsin-Stevens Point students take CNR Summer Camp as either a six-week course held at Treehaven in

Tomahawk, WI, or an eight-week course that begins at CWES and ends in several countries throughout Europe. This course is offered to undergraduate students after their sophomore year. The intensive course provides hands-on fieldwork in forestry, soils, water, and wildlife.

D2L. D2L is the abbreviation for Desire 2 Learn, an online learning management system designed to deliver an entire course, or components of a course, over the Internet. CWES uses D2L to enhance their University practicum program by providing lesson plans, campfire songs, and Power Point programs over the Internet to students 24 hours a day.

Internet. The Internet is a large network composed of smaller networks that connect millions of computers globally, and allows them to share information with one another.

Natural History. Natural history is the study of elements found in nature, such as plants, animals, geologic features, insects, habitat types, etc.

CWES Nature Navigator. The CWES Nature Navigator is a Web resource designed for the University practicum students at CWES. It includes information on weekly phenology occurrences, an identification guide for local flora and fauna, a guide to additional Web resources, and information on local lake formations and cycles.

Phenology. Phenology is the study of when, chronologically, natural events occur. For example, when the first leaves begin to fall or the first robin returns in spring.

University Practicum Students. University practicum students are University of Wisconsin-Stevens Point students enrolled in Natural Resource courses 482 or 376/576. These are semester-long courses in which they spend either one (376/576) or two days (482) a week learning and teaching environmental education programming at CWES. Most of these students are Environmental Education and Interpretation majors or minors.

Website. A Website is a location on the World Wide Web. It typically contains a home page and links to additional documents or files. Each site is owned and managed by an individual, company, or organization.

World Wide Web. The World Wide Web is a system of Internet servers that support specially formatted documents. The documents are formatted in HyperText Markup Language (HTML) and support links to other documents, graphics, and audio and visual files.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

I. Introduction

The purpose of this literature review is to provide relevant information regarding the use of the Internet as an educational tool. This review will begin by exploring the ways in which the Internet is used in general education, and then focus specifically on its use within environmental education. The goals of environmental education will then be investigated. Next, the current state of natural history within education will be outlined, as well as the ways in which the Internet may be applied to the field of natural history. Information about CWES and the University practicum program and how both currently use the Internet will be examined. The review will end with an explanation of evaluative tools and a brief summary of the entire literature review.

II. The Internet and Education

The Internet is a large network composed of smaller networks that connect millions of computers globally and allow them to share information with one another. The World Wide Web (also called the Web) is a system of Internet servers that support links to other documents, graphics, and audio and visual files. The widespread use of this technology is fairly recent, but has been expanding rapidly in many fields. One such field is that of education, which is currently integrating and utilizing Internet and Web tools in a myriad of ways. The process of learning from an Internet or Web source has been

labeled e-learning. The opportunities that e-learning provides for enhancing learner experiences have led to its widespread use within the United States. In fact, the United States Department of Education identified the use of computer technology, such as the Internet, as beneficial in promoting the role of active participation in a student's education process (Thomas, 2000). In 2003, a study by the National Center for Education Statistics found that almost one hundred percent of our country's public schools had some form of internet access, over double the amount with access in 1993 (USDE, 2003).

E-learning holds several advantages over text-based learning. The Internet and the Web offer an extremely diverse range of resources to learners. Web-based activities allow students to learn independently of a teacher, and encourage them to think about their learning as they search for answers. The Web also promotes a range of learning styles through instructional resources such as: scientific visualizations or representations that present relationships in a visual manner; simulations or interactivities that investigate in-depth concepts; virtual reality for interacting with and exploring a spatial environment through a computer; and animations and video clips that demonstrate concepts and processes (Bodzin, 2002).

Other advantages that e-learning has over text-based learning include: up to date information, large amounts of accessible data from a variety of sources, access to scientific experts through Web-based discussions, an engaging presentation style, the opportunity to communicate with a wide audience, and simulated explorations of remote areas that students otherwise could not visit (Bodzin, 2002). In addition, e-learning offers its users cost effectiveness, self-paced learning, easy access, a large knowledge database, and the capacity for life-long learning (Ram & Ashwani, 2006).

Because of these benefits, Web use in college courses has become very popular. University courses may utilize the Web for student instruction in four different ways. One type of incorporation is Web-enhancement, which combines traditional classroom instruction with Web technology. Web-enhanced courses can provide students with preparation before class and remediation for difficult concepts. This style is popular and widely used in higher learning due to its low financial cost and high pay-off in knowledge gain. Another type of incorporation is a Web-managed course, which tracks a learner's performance and actions as they navigate through instructional materials over the Internet. Instructor support is required, but he/she may assist a greater number of students than through an in-person course. This style also offers password protection and test-delivery possibilities. Web-delivered courses, in which all materials are delivered through the Web, is another style. Such a course provides interactivity and real-time (individuals communicating with one another at the same time) collaboration between students and instructors, but can also be time-consuming and costly. The last type of incorporation is hybrid-delivery, in which the course is taught through both the Web and a CD-ROM. A course designed in this way offers more security, but can be costly. All four types of courses may be delivered either in a synchronistic or asynchronistic manner. Synchronistic use allows students and instructors to communicate and collaborate over the Internet in real-time. Asynchronistic use involves communication between students and instructors at different relative times (Belanger & Jordan, 2000).

Web-based university courses appear to be, at the very least, equivalent to in-person instruction at most institutions (Allen and Seaman, 2006). In some instances, online learners have higher test scores than those in traditional classrooms. One possible

reason is that e-learning is able to utilize computer-based multi-media visuals that can facilitate the learning of difficult concepts for students (Fifield & Peifer, 1994). These simulations and interactive models can also enhance college students' motivation to study (Yehudit, et al, 2002).

Another reason for the popularity of Web courses is that relevant readings are made available online and take the place of textbooks. In a study that analyzed the replacement of higher education textbooks with more flexible online materials, 89% of students would have recommended taking a course with only online materials to a friend. Several benefits of online materials over textbooks were extrapolated from the study. The cost savings, ease of access, and the more concise nature of the online text versus a textbook were mentioned (Simon, 2001).

III. Utilizing the Internet for Environmental Education

Formal education is not the only field to utilize the Internet for learning, environmental education is finding applications for it as well. In fact, a study of environmental educators found that 81% used the Internet for their work. The majority of their use was for communication and resource/information gathering purposes (Heimlich, 2004). The Internet is not only a helpful tool for environmental educators, but it is also used by the audiences whom they serve. The Internet has the potential to support and aid in environmental learning by providing information, curriculum, games, and activity guides to a variety of audiences. Moore and Huber (2001) found that, "the Internet can be used to implement the *National Science Education Standards* in ways that also promote

the goals of EE, and that the EE community has a vital interest in pursuing those goals" (p. 1).

Studies of Web-based environmental education programs have produced positive results. In a comparison between Web-based and traditional versions of an environmental program in Greece, it was shown that students given a Web-based version scored higher in post-tests than their peers given the traditional version (Coonstantine, et. el., 2006). Another application of the Internet in environmental education is student use of organizational (such as a natural history museum or aquarium) Web resources before a field trip. It was found that this pre-visit use helped prepare students for their trip, and increased their learning capabilities during such experiences (Cox-Petersen & Melber, 2001).

Organizational Websites can also provide a rich source of current information to the public. For example, the Environmental Protection Agency's Website devotes several pages to answering questions about endangered species, habitat loss, pollution, and pesticides. Such sites are vital because they offer up-to-date answers to questions that could not be found in an encyclopedia or a general reference (Timmons, 2001).

Along with the benefits of relying on the Internet as a tool for environmental learning, there are also possible pitfalls. One concern is that the Internet could replace the outdoor world, and that our society would be familiar with natural elements only in relation to their pixilated versions on a computer screen. According to Colwell (1997), we must, "maintain a balance between the tools used to represent the world and the direct experiences of the world itself" (p. 7).

Beyond this larger concern are also several smaller ones. For environmental educators and the public, the use of the Web as a research tool is not always dependable. One problem is that the amount of information available on the Web can be overwhelming, making it difficult for a user to locate specific information. Additionally, the amount of time it takes a user to locate specific knowledge within all that is available is not always efficient. Lastly, there is no filter in the Web to separate reliable and authentic information from other less trustworthy data, and users may be misinformed if they are not discerning (Sridharan, et al., 2002).

IV. The Goals of Environmental Education

The Wisconsin Department of Public Instruction (Engleson and Yockers, 1994) uses the Tbilisi Declaration to define the goal and sub-goals of environmental education. The goal is to, "help students become environmentally aware, knowledgeable, skilled, dedicated citizens who are motivated, individually and collectively, to defend, improve, and sustain the quality of the environment on behalf of the present and future generations of all living things" (p. 14).

In order to attain this goal, the Wisconsin Department of Public Instruction (Engleson and Yockers, 1994) also follows the five sub-goals identified at the Tbilisi Conference:

1. Perceptual Awareness: to help students develop the ability to perceive and discriminate among stimuli; to process, refine, and extend those perceptions;

and to concurrently acquire an aesthetic sensitivity to both natural and built environments.

2. Knowledge: to help students acquire the basic understanding of how the natural environment functions, how its functioning is affected by human activity, and how the harmony between human activity and the natural environment may be achieved.
3. Environmental Ethic: to help students develop the universal ethic on which they may act to defend, improve, and sustain the quality of the environment.
4. Citizen Action Skills: to help students develop the skills needed to identify, investigate, and take action toward the prevention and resolution of environmental issues.
5. Citizen Action Experience: to help students gain experience in applying acquired perceptual awareness, knowledge, environmental ethic, and citizen action skills in working toward the prevention and resolution of environmental issues at all levels, local through universal (p.14).

An important part of environmental education is the study of nature or natural history. Some knowledge of natural history is necessary in each of the five sub-goals of environmental education, and is therefore critical in fulfilling its ultimate goal of creating citizens that will protect and preserve the environment.

V. The Status of Natural History

Natural history is the study of plants, animals, and minerals and their individual life histories, evolutions, and interrelationships. This particular field has become neglected in recent years, and consequently many college students are deficient in it. According to Richard Louv (2005), the field of natural history in higher education is beginning to sputter and die as the emphasis in the sciences is placed upon microbiology and cellular level courses. The number of experts who are trained to observe, identify, describe, and classify the world's diverse forms of life is shrinking (Hawkey, 2004). According to Dayton (2003):

> It seems unlikely that meaningful conservation and restoration can be accomplished unless we recover the tradition of supporting research in and the teaching of natural history. We must reinstate natural science courses in all our academic institutions to insure that students experience nature first-hand and are instructed in the fundamentals of the natural sciences. (p. 12)

The scientific field is becoming more theoretical, pushing natural history to the outskirts of academe (Wilcove & Eisner, 2000). This creates a concern that future generations will lack a basic understanding of natural history, which could have negative repercussions for the biodiversity of our planet. If we know nothing about a plant or animal, it is difficult to convince others to save it. According to Robert Pyle (2001), "Ecological ignorance breeds indifference: what we know, we may choose to care for. What we fail to recognize, we certainly won't" (p. 18). Additionally, natural history is the

base upon which all other scientific fields balance; without an understanding of it a person's view of the natural world shrinks and becomes fragmented (Krupa, 2000).

Wilcove and Eisner (2000) state that, "…natural history is often the path to finding something strange and wonderful" (p. 1). Exploration of the subject involves careful observation of the outdoors, the impetus for inquiry, and a sense of wonder in the natural world's inner workings. Without a basis in natural history, students will most likely have difficulty understanding ecology and their own place within the natural world (Dayton & Sala, 2001). According to Thomas Huxley, "To a person uninstructed in natural history, a country or seaside stroll is a walk through a gallery filled with wonderful works of art, nine-tenths of which have their faces turned to the wall." Natural history illuminates the wonder of the world around us, and if only for that, it must be preserved and promoted.

VI. Natural History Websites

The availability of natural history resources on the Web is quickly growing to the benefit of both teachers and learners. Such resources are able to deliver life and earth science concepts to a larger, more diverse audience (Hawkey, 2004). The Web hosts an overwhelming array of natural history related Websites created by natural history museums, herbariums, nature preserves, zoos, national parks, schools, and non-profit organizations across the country.

Natural history Websites target audiences ranging from university students and adults to elementary school children. Some sites are developed by professional educators for the public, while others are designed by research scientists as a way to share and access data

globally (Hawkey, 2004). Websites range in design from highly interactive with audio, animation, and virtual field trip capabilities, to designs that most resemble an online textbook (Anderson, 2005). From this array of Websites, educators are often able to download free natural history curriculum, worksheets, and projects, as well as engage their students with interactive games and information (Simpson, 2006).

Some organizations, such as the American Museum of Natural History, cover an impressively broad range of topics on their Websites, including: an accessible catalog of collections, exhibitions, research and fieldwork, pages about the natural world for kids, online professional development courses, and science bulletins. These Web pages include such interactive components as virtual tours, videos, image galleries, and hands-on activities (Applewhite, 2004). The Smithsonian Museum of Natural History is also available on the Web, complete with virtual fieldtrips, interactive bulletin boards, and portals or connections to other Websites (Heyman, 1995).

National parks are also utilizing the Web to inform and inspire the public about natural history topics. Many national park Websites offer information about flora and fauna and some have virtual tours, games, activities, and lesson plans that incorporate that knowledge (Byerly, 2003). One example of this is the Redwoods National Forest Website, which includes interactive information about redwoods, as well as a multi-media quiz about the trees and the wildlife that use them. Yellowstone National Park's Website includes a virtual fieldtrip of the site, information on natural history, audio descriptions of hot spots, and an interactive section on Old Faithful which users can make erupt with a single mouse click (Nauman, 2001).

Parks on the state level are utilizing this media as well. To encourage public interest in geology, a virtual geologic fieldtrip of the Harriman-Bear Mountain-Sterling Forest State Park in Hudson Highlands, New York has been developed (Gates, et al, 2004). Another example is California's Ano Nuevo State Reserve, which, in addition to several other organizations across the country, is utilizing a webcam to teach the public. Their cameras allow the public to access and view the everyday lives of seals through the Web (Sostek, 2001). These various Websites provide a wide range of interesting and interactive pages to the public, with the goal of informing and interesting their audience in some aspect of natural history.

VII. The Central Wisconsin Environmental Station and the University practicum Program

The Central Wisconsin Environmental Station (CWES) is a 200-acre field station of the University of Wisconsin – Stevens Point, College of Natural Resources. It became a non-formal residential environmental education facility in 1975. The 2005 mission of the facility correlates closely with the overarching goal of environmental education, and is, "to foster in adults and youth the appreciation, understanding, skill development, and motivation needed to help them build a sustainable balance between environment, economy, and community" (Central Wisconsin Environmental Station, retrieved 2007).

In order to fulfill this mission, CWES provides environmental education programming to thousands of visiting schoolchildren each year. These students range in grades from kindergarten to high school. The lengths of their visits are variable and last anywhere from less than a day to four days. These K-12 groups are taught by UW-SP

students enrolled in semester-long Natural Resource courses 482 Environmental Education and Interpretation practicum and 376/576 Environmental Education practicum. These University students typically have an Environmental Education and Interpretation major, or an Education or Youth Programming and Camp Management major with a minor in Environmental Education.

Prior to the University practicum students teaching the K-12 students that visit the facility, they undergo an intensive, three-day training at CWES to orient them to the site and the educational content of lessons. After this training, University practicum students then have an additional week of training in which they teach a lesson to their peers to receive feedback before they teach incoming school groups. The University practicum students then teach at CWES either one (students in 376/576) or two (students in 482) days a week. Before teaching a lesson, the University practicum students are responsible for accessing a provided lesson plan that details the content and procedure for each lesson. Using this information, students then submit a lesson prep for the lesson they are assigned to teach during the week. This prep is a written document that details how they plan to organize and teach their upcoming lessons and is graded by CWES staff. The University practicum students are also graded on their written evaluations of both their own and their peers' teaching.

The lessons that CWES provides are focused upon the environment and often incorporate natural history. The lessons last between forty-five and ninety minutes, and often include short hikes and explorations into the local forest and shoreline. CWES is located on a piece of lushly forested property that borders two lakes. This provides

University practicum students with many trails to use when teaching lessons, and also gives them the opportunity to encounter a great number of flora and fauna.

VIII. The Central Wisconsin Environmental Station and the Internet

CWES has increased their use of Internet tools in order to remain current and promote their mission. Presently, CWES maintains a Website that contains the following headings: Directions, School Programs, Summer Camps, Cabin and Lodge Rental, and About Us. These headings include information about CWES lesson plans, current events, seasonal programming, and pre and post-visit activity guides for teachers (Central Wisconsin Environmental Station, retrieved 2007). As of January 2007, CWES also began using D2L to provide the following information for University practicum students over the Internet: grades, lesson plans, pictures of available lesson materials, campfire songs, and evening Power Point presentations. This easily accessed information provided tools to better prepare University practicum students for the lessons that they taught.

IX. Evaluation

Evaluation is a method of determining if an approach is effective or not, and what must be changed to make it so (Bloom, et al., 1971). In the field of instructional development, formative evaluation is used while a tool is being created. It is utilized to test-run materials before they are fully implemented, and to address aspects of a tool that need improvement and to offer suggestions for that improvement (Belanger and Jordan, 2000). The second type of evaluation is summative evaluation, which is used to

determine the overall extent to which a learning product meets the standards of both its creators and its learners. Summative evaluation allows a resource's creator to modify and update the resource in order to best meet the needs of its users (Beyer, 1995). Both summative and formative evaluations use a number of methods to collect feedback about a product, one of these is the survey.

"Surveys are systems for collecting information from or about people to describe, compare or explain their knowledge, attitudes, and behavior" (Fink, 2003. p. 1). Surveys are designed in many ways, depending upon the available sample group and time. Surveys may encounter several biases. The first is that participants may become excited about participating in the study, which may influence results. The second is that external events may occur during the length of the study that could bias results (Fink, 2003).

Surveys use tools called questionnaires to collect information. Questionnaires contain a series of specifically crafted questions relating to the elements of a new product, and can produce extremely helpful feedback for improvement (Beyer, 1995). Questionnaires should be easy to read, and as brief and unbiased as possible. They should also be composed of clear questions that will be interpreted in the same way by all participants. Questionnaires should be pre-tested on a group of participants that are similar to those that will participate in the final study. Any questions that are unreliable or not valid should be altered before the actual study. An external panel of peers should also evaluate the questionnaire to determine necessary edits.

According to Peterson (2000) most questionnaires contain two basic types of questions: open-ended and close-ended. Open-ended questions do not include pre-written answers, and therefore have highly variable responses. This type of question allows the

researcher to probe deeper into a topic. While these questions are easier to write, they require a large amount of time to analyze. The second type of question is the close-ended. These questions have pre-written answers, and the participant must choose the option that best suits their thoughts or feelings. These questions require more thought to construct, but ultimately necessitate less effort from the participant to answer and are easier to analyze. This type of questioning often utilizes ranking continuums. These built-in scoring systems provide a set scale of options concerning attitude or opinion for a participant to choose from. The scales are divided into equal intervals that are each assigned a value. A common example of this scale is a Likert Scale, which ranges across five points, typically from "Strongly Disagree" to "Strongly Agree." Participants then select the most appropriate answer from the five options (Peterson, 2000).

Because of an increase in the use of computers and the Internet, many self-administered questionnaires can now be completed online. This new application allows for more creative layout and a greater ease of question comprehension for participants, as well as a faster response time (Dillman, 2000).

A focus group is another form of evaluation. It is similar to an interview with several (7-10) people simultaneously, in which the researcher typically plays the role of moderator and asks questions about a predetermined topic (Leedy and Ormrod 2005). According to the National Science Federation, "The hallmark of focus groups is the explicit use of the group interaction to generate data and insights that would be unlikely to emerge without the interaction found in the group" (1997). Krueger acknowledged that there are several advantages and disadvantages to the use of a focus group (1988):

Advantages:

- A researcher is able to learn how people feel about a particular topic and why.
- There is an opportunity for discussion among participants, which may help them form opinions at the time.
- The moderator is able to probe for further answers and clarification to questions.
- Focus groups are relatively inexpensive and time efficient.

Disadvantages:

- Data can be difficult to analyze.
- The quality of the moderator plays a large role in the outcome of the focus group.
- Groups are not always easily assembled due to time constraints and ease of meeting location.
- Because of variable group dynamics, some focus groups produce more valuable data than others.

X. Summary

The Internet is currently a valuable resource in the field of education. Its potential for facilitating the learning of elementary students through adults is great. The fields of environmental education and natural history also utilize the tools the Internet contains to attract and inform a wide variety of audiences.

The number of people utilizing the Internet as a factual source is increasing. The current generation of University practicum students is no exception, and is adept at gaining knowledge from online resources (Cetron, 2003). One advantage that the Internet

has over physical reference books is its capability to provide stimulating, interactive features. Internet tools provide color, sound, motion, search engines, and interaction through quizzes, games, and match-ups that exceed what ink and paper can provide. Because of these benefits, University practicum students are more likely to be engaged by online references than textbooks (Bodzin, 2002). A Website could prove to be a beneficial tool for teaching University practicum students about the natural history on the CWES property. The benefits that the University practicum students received from their new knowledge could then be passed down to those they teach. To evaluate such a resource, instruments such as questionnaires and focus groups would be appropriate choices.

CHAPTER THREE
METHODS

I. Introduction

The purpose of this study was to create and evaluate the CWES Nature Navigator Website as a resource for University students enrolled in an environmental education practicum course. The Website was designed to be used as an online tool through which University practicum students could gain knowledge of the flora, fauna, and phenological occurrences that they might encounter while teaching K-12 students on the CWES property. This chapter will describe the methodology used to address each of the five subproblems associated with the study. Because the research methods for this study included the use of human subjects, a research protocol including all instruments and methods was submitted to and approved by the Internal Review Board at UW-SP before research began. This study's IRB Proposal and Informed Consent Form can be found in Appendices A and B.

II. Subproblem 1. Create the CWES Nature Navigator Website

To address the first subproblem, the researcher created the CWES Nature Navigator according to a general Website development plan that included: 1) site definition and planning 2) structuring information 3) site design 4) site construction and 5) site evaluation and maintenance (Lynch and Horton, 2002). The site definition and plan were developed through discussions with CWES staff and University practicum students. The Website design template was created by Denise Deering and her staff in the

Communication Arts Center on the UW-Stevens Point campus. After several revisions, the template was approved by the researcher and she then used a computer program called Adobe Dreamweaver to create and insert necessary text and graphics into the Website. The text was a compilation of the researcher's personal knowledge, as well as information from outside sources such as reference books and Websites. Graphics were either created by the researcher or taken from Public Domain images on the Internet. Graphics were edited in Adobe Photoshop so that they were seventy-two pixels per inch, as this would allow them to load quickly on a computer while still maintaining their quality. Based on the projected needs of the University practicum students, the CWES Nature Navigator was divided into four main sections: "What's Happening at CWES?", "What Did I See?", "Want to Know More?", and "CWES Essentials." The researcher visited and explored a range of natural history Websites to gain ideas for the best way to structure each of these sections.

The "What's Happening at CWES?" section of the Website was partitioned first by month and then by individual weeks, with each week containing three to five phenology topics with text, photographs, and links to additional information. In order to determine what natural history information should be included in this section, the researcher kept a record of the natural events occurring on the CWES property. She also used numerous Wisconsin-specific, phenology reference books and calendars to extrapolate topics that would enhance the Website. Information included in the Website related either to things commonly seen at CWES or to information that could be utilized in the lessons that University practicum students taught. The "What Did I See?" section of the Website was sub-divided into smaller sections by topic: birds, mammals, pond

critters, trees, amphibians and reptiles, and plants. Each of these sections was then structured similarly to an identification guide, with pictures of each species common to CWES. Each picture was then linked to an external Website containing further natural history data. The "CWES Essentials" section included information about the formation and processes of the lakes on the CWES property, and included both text and images. The "Want to Know More?" section contained links to external Web-based resources sub-divided by topic.

As the initial draft of the Website was being created in February of 2007, the researcher asked ten past University practicum students from the fall 2006 semester to review it and answer several open-ended questions on its layout, use, and content. She offered an incentive of food and refreshments, as well as a chance to win $25 in a drawing. Two students responded to her questions through e-mails, and two students met with her in person to answer the same questions. The meeting that occurred with the two students in person was audio-recorded and occurred with a computer connected to the Website in the room. Verbal feedback from this meeting, as well as responses received through e-mail, were reviewed and used to make minor changes to the Website before the spring 2007 University practicum students formally evaluated it during a pilot study.

III. Subproblem 2. Conduct formative evaluation of a preliminary version of the Website

Background: Spring 2007 Pilot Study

Formative evaluation occurred during a month-long pilot study with University practicum students from the spring of 2007. The pilot study allowed the researcher to test

the validity and reliability of her instruments before they were used in the final field study, as well as to determine how to best improve the initial version of the Website.

Sample: Spring 2007 Pilot Study

This sample consisted of ten undergraduate and one graduate student from UWSP, enrolled in either Natural Resource courses 482, 376, or 576 during the spring 2007 semester. The sample included five Environmental Education/Interpretation majors and six minors. The sample size was small, but included all University practicum students at CWES during that semester. Students were asked to participate in the study as part of their practicum experience.

Instruments: Spring 2007 Pilot Study

The pilot study utilized two questionnaires as its instruments: a pre-use and a post-use questionnaire. The pre-use questionnaire contained ten questions designed to determine the natural history coursework, experience, and self-rated knowledge of participants before they used the CWES Nature Navigator Website. The questions were open-ended, multiple choice, categorical, and Likert scale. The post-use questionnaire contained twelve questions and was designed to provide the researcher with feedback on the Website's effectiveness and usability, as well as the participants' self-rated natural history knowledge after using the CWES Nature Navigator Website. These questions were also open-ended, multiple choice, categorical, and Likert scale. Both questionnaires were administered online. The online format included drop-down menus for multiple choice, Likert scale, and categorical questions, and provided text area boxes for open-

ended questions. Both of these instruments were reviewed by the researcher's graduate committee members and a small group of graduate students, and revised as needed.

A question guide for focus groups was also created. This guide included eight questions related to the navigation, layout, content, and use of the Website. This instrument was designed to obtain more detailed responses regarding students' use of the Website, and was reviewed by the researcher's graduate committee prior to its use.

Procedure: Spring 2007 Pilot Study

The pilot study began the last week of March in the spring 2007 semester and ended the first week of May in the same semester. During the last week of March, participants were informed of the purpose of the study, given an "Informed Consent to Participate in Human Subject Research" form, and asked to complete an online pre-use questionnaire. Please see Appendix C for the introductory e-mail that was sent to participants. Participants were then asked to use the Website once a week and to read the weekly phenology information provided there. University practicum students were also asked to complete an un-graded quiz each week on D2L in order to gain one extra credit point per week. The quiz consisted of five matching or multiple-choice questions about aspects of natural history that the participants should have read about on the Website that week (see Appendix D). The quiz was utilized in order to help students rehearse the information that they had read and in doing so, move it from their short-term to their long-term memories. This idea was based on the concept of information processing models (Huitt, 2003). The rehearsal of the natural history information was also designed to help make it more meaningful and relevant to the students. The researcher then

monitored quiz participation and scores to ensure that all students were using the Website. During the first week of May, the students were asked to complete a post-questionnaire online.

To collect additional information, two follow-up focus groups were conducted the first week of May, 2007. The focus groups were held at CWES during scheduled University practicum time. Each University practicum student from that semester participated in one of the two focus groups and was asked the same questions. The focus group in which they participated was dependent upon when they were scheduled to be at CWES that week. Students' responses were audio-recorded and then typed and compiled. The focus group guide and participant responses may be found in Appendix E. The data was then analyzed and necessary improvements to the instruments and CWES Nature Navigator Website were made in order to create a final draft of the Website that would undergo summative evaluation the following semester.

Data Analysis: Spring 2007 Pilot Study

Student responses from the pre/post questionnaires were analyzed as follows. Multiple choice, Likert scale, and categorical answers were summarized using Microsoft Excel and were used to calculate the percentage of response type for each individual question. Responses to the open-ended questions were categorized and summarized. Student responses from the focus groups were also categorized and summarized. All feedback was then used to create changes to the format, content, and use of the CWES Nature Navigator Website. Necessary edits were also made to the researcher's instruments before the field study was conducted.

IV. Subproblem 3. Collect feedback on the content, layout, navigation, and use of the Website from a group of professionals in the environmental education field

Background: Environmental Education Professionals

To ascertain the applicability of the CWES Nature Navigator Website to other similar institutions across the country, as well as to gain further evaluation of the layout, navigation, content, and use of the initial draft of the Website, a group of professionals in the field of Environmental Education were asked to participate in this study.

Sample: Environmental Education Professionals

The sample was a group of three environmental education professionals from other universities and a group of six environmental education professionals within the University of Wisconsin-Stevens Point (UW-SP). The researcher initially identified six professionals in the field of environmental education at other universities who worked with programs that were similar to the UW-SP's University practicum course. Three of the six professionals agreed to complete an online questionnaire. The six environmental educators from the UW-SP were all individuals who were familiar with the CWES University practicum program. Several of the individuals had at one point served in a leadership role at CWES or had participated in the University practicum program as a student. These individuals were currently employed at UW-SP in a variety of roles within the realm of environmental education.

Instruments: Environmental Education Professionals

Two separate, but similar, online questionnaires were created: one for the UW-SP professionals and one for the non-UW-SP professionals. These questionnaires may be found in Appendices F and G. The questionnaires contained fifteen multiple choice, Likert scale, categorical, and open-ended questions. The online format included drop-down menus for multiple choice, Likert scale, and categorical questions, and provided text area boxes for open-ended questions. These instruments were used to gather feedback and suggestions on the use of the CWES Nature Navigator Website as a tool for the University practicum program, as well as information about the general layout, content, and navigability of the Website. The instruments were reviewed by the researcher's graduate committee and edited as needed before they were utilized.

Procedure: Environmental Education Professionals

In early May of 2007, the researcher identified six universities with programs similar to UW-SP's practicum program and obtained contact information for the professionals involved with those programs. Six environmental education professionals from UW-SP, with knowledge of the University practicum program, were also identified. In mid-May of 2007, after the desired individuals were identified and selected, they were sent an introductory e-mail explaining the research and asking them to participate in the study (see Appendices H and I). The professors from other universities were offered a $15 gift certificate to Acorn Naturalists as an incentive for completing the on-line questionnaire. The professionals from UW-SP were not offered the incentive. If the individuals agreed to participate, a second e-mail was sent which contained instructions

and links to the CWES Nature Navigator Website and the online questionnaire (see Appendix J). A reminder e-mail was then sent two weeks later to those who had not yet sent in their completed questionnaire. All participants were then sent an e-mail thanking them for their help, and the professionals from other universities were sent a gift certificate.

Data Analysis: Environmental Education Professionals

Responses from questionnaires were analyzed as follows. Multiple choice, Likert scale, and categorical answers were summarized using Microsoft Excel and were used to calculate the percentage of response type for each individual question. Responses to the open-ended questions were categorized and summarized (see Appendix K). Feedback on the format, content, and use of the "CWES Nature Navigator" Website was then used to make necessary edits to the resource.

V. Subproblem 4. Conduct summative evaluation of a completed version of the Website

Background: Fall 2007 Field Study

After edits were made to the Website based upon feedback from University practicum students and the professionals in the field, a final version of the Website was created. The study then entered the summative evaluation phase, in which University practicum students would use the Website over the span of the entire fall 2007 semester as a required and integrated element of the course. Summative evaluation was used to ascertain the overall effectiveness of the Website in its real-world setting.

Sample: Fall 2007 Field Study

The participants in this study consisted of 11 undergraduate students from UW-SP, enrolled in either Natural Resource course 482 or 376/576. The sample contained seven Environmental Education/Interpretation majors and four minors. The sample size was small, but included all University practicum students at CWES during the fall 2007 semester. University practicum students were asked to participate in the study as part of their University practicum experience.

Instruments: Fall 2007 Field Study

This study utilized two questionnaires, a pre-use and a post-use questionnaire, as its instruments. These instruments were similar to those used in the Spring 2007 pilot study, but had been edited and improved by an additional panel of experts from the NRES 610-Applied Environmental Education Program Evaluation course at UW-Stevens Point during the summer of 2007. Please see Appendices L and M to view the pre and post-use questionnaires in their revised form. The pre-use questionnaire contained ten questions designed to determine the natural history coursework, experience, and self-rated knowledge of participants before they used the CWES Nature Navigator Website. The questions were open-ended, multiple choice, categorical, and Likert scale. The post-use questionnaire contained twelve questions designed to provide the researcher with feedback regarding the Website's effectiveness and usability within the University practicum program. The questions were open-ended, multiple choice, categorical, and Likert scale. Both questionnaires were administered online. The online format included

drop-down menus for multiple choice, Likert scale, and categorical questions, and provided text area boxes for open-ended questions.

Procedure: Fall 2007 Field Study

Before they attended University practicum training in August of 2007, participants were sent an e-mail informing them of the study's purpose, containing an "Informed Consent to Participate in Human Subject Research" form, and asking them to complete the online pre-use questionnaire. This introductory e-mail may be found in Appendix N. After University practicum training, participants were required to access weekly phenology information from the CWES Nature Navigator Website, and to complete a short quiz each week through D2L. The quiz was five True/False or multiple-choice questions about an aspect of natural history that the participants should have read about on the Website that week. The quizzes were graded and the resulting scores composed 5% of their total grade in the course. The researcher monitored quiz participation and scores to ensure that all students were using the Website. A phenology section was also added to the lesson prep forms that students turned in to CWES staff each week before teaching. This section required students to fill in information about the phenology that they might encounter that week while teaching. During the second week of December in 2007, participants were administered an online post-use questionnaire.

To collect additional information, two follow-up focus groups were conducted during the second week of December in 2007. The focus groups were held at CWES during scheduled University practicum time. All but one of the University practicum students from that semester was able to participate in one of the two focus groups. The

focus group in which students participated was dependent upon when they were scheduled to be at CWES that week, and each group was asked the same questions. Students' responses were video-recorded and then typed and compiled. The field study focus group guide and participant responses may be found in Appendix O.

Data Analysis: Fall 2007 Field Study

Student responses from the pre and post questionnaires were analyzed as follows. Multiple choice, Likert scale, and categorical answers were summarized using Microsoft Excel and were used to calculate the percentage of response type for each individual question. These percentages were then used to create representative graphs. Responses to open-ended questions were categorized and summarized. Student feedback from the focus groups was categorized and summarized. The resulting data was then used to create recommendations for the future use of the Website.

VI. Subproblem 5. Create a list of recommendations for the use of the Website within the University practicum course

After all data was collected and analyzed, the researcher created a list of recommendations to direct the future use of the Website, as well as provide guidance for other facilities interested in utilizing such a resource.

VII. Study Timeline

Task	Time Needed	Date Completed
Create instruments	6 hrs	12/17/06
Write first draft of proposal	25 hrs	12/17/06
Visit and evaluate current natural history Websites	4 hrs	12/30/06
Receive and review Website design from Denise Deering and staff	1 hr	01/30/07
Meet with graduate committee to review proposal and instruments	2 hrs	01/30/07
Submit proposal to IRB	3 hrs	02/01/07
Finish complete initial draft of Website	Countless hrs	02/28/07
Put instruments and quizzes on D2L	10 hrs	03/28/07
Meet with Fall 2006 University practicum students to collect their feedback	1 hr	03/28/07
Send out Informed Consent forms and pre-questionnaires to Spring 2007 University practicum students	1 hr	03/28/07
Begin pilot study	4 hrs	04/2/07
Present study during graduate seminar	4 hrs	02/27/07
End pilot study, send out post-questionnaires, and conduct focus groups	2 hrs	05/03/07
Send out questionnaires to professionals in the field	1 hr	05/15/07
Analyze data from pilot study	20 hrs	05/30/07
Run all instruments through Applied Environmental Education Program Evaluation course	10 hrs	08/10/07
Make needed adjustments to Website and instruments	30 hrs	08/15/07
Put edited instruments and quizzes on D2L	7 hrs	08/16/07
Send out Informed Consent forms and pre-questionnaires to Fall 2007 University practicum students	1 hr	08/20/07

Begin field study	4 hrs	08/23/07
End field study, send out post-questionnaires, and conduct focus groups	4 hrs	12/09/07
Analyze data	20 hrs	January, 2008
Make suggested improvements to the Website and add additional phenology information	20 hrs	01/31/08
Present research results during graduate seminar	4 hrs	03/27/08
Complete thesis writing	30 hrs	04/20/08

CHAPTER 4
RESULTS

I. Introduction

This chapter provides information about the results of each of the study's five subproblems. The first section details the creation of the CWES Nature Navigator Website. The second section describes the results of the month-long pilot study. The third section reveals the feedback gained from professionals in the environmental education field. The fourth section describes the results of the semester-long field study. The chapter concludes with information about how the results were utilized.

II. Subproblem 1. Create the CWES Nature Navigator Website

After the researcher outlined a rough layout of the CWES Nature Navigator Website, Denise Deering and her staff in the Communicative Arts Center on the UW-Stevens Point campus created a design template for the Website. This included creating the main page, as well as the color schemes and title bar for subsequent pages. After several rounds of edits, the design was approved by the researcher and she began adding information to each of the four sections within the Website.

To create the "Want to Know More?" reference section of the Website, the researcher explored a number of online natural history resources before selecting those to include. She selected those that she thought would be most valuable to the University practicum students based upon depth and breadth of content, reliability of information, and overall quality of graphics and writing. The researcher spent approximately five

hours researching and adding the Web resources to this particular page. To create the "CWES Essentials" section of the Website the researcher gathered information on local geology and lake cycles from online resources, and requested applicable graphics from the Schmeeckle Reserve. This took the researcher approximately ten hours. The creation of the "What Did I See?" local flora and fauna guide section required approximately twenty-five hours of work. In this section, flora and fauna were sub-divided into topics such as mammals, reptiles and amphibians, birds, trees, wildflowers, and aquatic creatures. Each of these topics was then linked to an internal Web page with pictures of the common species found at CWES. Each species was then linked to further information in an external Web page from another organization. Before this section could be created the researcher had to identify the common species at CWES. This was done by searching for information on the Web, utilizing past botanical and herpetological surveys of the area, and speaking with CWES staff. The researcher also had to acquire photographs of each species, either from public domain images found on the Web or from her personal collection. Each image then had to be formatted in Adobe Photoshop so that it would best suit the Website.

The development of the 'What's Happening at CWES?" section of the Website required a large and varied amount of time. When the researcher first began the creation of this section, she was still learning the Adobe Dreamweaver program, as well as experimenting with Web page layout and design. Creating the first month of articles in this section took the researcher approximately forty hours. After the articles and Web page for the first month were created, the researcher was able to create pages for subsequent months in less time: approximately fifteen hours per month. To develop this

section, common local phenology had to be determined. This was accomplished through the use of personal observations, field guides, reference books, and various nature Websites. The researcher also had to organize these topics so that there were three to five assigned to each week of the semester. Each week consistently had information about the seasonal behaviors of a particular bird and a mammal. The other topics varied greatly from week to week and were seasonally dependent. Each topic for a given week included at least one photograph, a one to two paragraph written article, a "Did You Know?" quick and fun fact, and a link to further resources. Photographs were taken either from Public Domain images on the Web or from the researcher's personal collection. These pictures were then formatted using Adobe Photoshop so that they would load quickly on a user's computer. The information for the written articles was taken from natural history field guides, personal observations, and relevant and reputable Websites. The researcher spent almost as much time finding and formatting photographs as she did collecting information and writing the articles.

After several rounds of edits based upon feedback from CWES staff, the researcher's graduate committee, past practicum students, the pilot study, and evaluations from professionals in the field, a final version of the Website was completed. The format of the finished Website was quite similar to the initial version. Minor edits to picture quality, text color, links, and organization of the weekly phenology section were made based upon received feedback. At the end of the study, the Website contained two complete semesters of weekly phenology information. See Appendix P and Q for a Website Map and sample Web pages from each section of the CWES Nature Navigator.

III. Subproblem 2. Conduct formative evaluation of a preliminary version of the Website during a month-long pilot study

University practicum students participated in a one-month pilot study during the spring of 2007. These students used the Website on a weekly basis and also took a weekly quiz on the information they read. During the pilot study, the "What's happening at CWES?" phenology section had only the information for that month completed. The goal of the pilot study was to test the researcher's instruments, as well as to gain feedback on an initial version of the Website.

Participant Demographics

General background information regarding University practicum students' natural history schooling, knowledge, and information sources was collected through the pre-study questionnaire. This was administered the last week of March during the spring 2007 semester. The eleven participants from UW-SP were in the following years of schooling: Junior (2), Senior (5), Second Year Senior (3), and Graduate Student (1). They had the following majors: Wildlife Education (1), Elementary Education (5), and Environmental Education and Interpretation (5). The variation in the number of natural history courses each individual had previously taken was as follows: one course (6), two courses (1), three courses (1), six courses (2), and ten courses (1). Nine participants had taken the CNR Summer Camp course, and three had not. When asked to select the resources they used most often to acquire natural history information, the top sources were Websites (27.2%), coursework (27.2%), and personal observations (18.1%).

Participant Pre-Study Interest and Knowledge in Natural History and Phenology

The pre-study questionnaire collected data regarding the University practicum students' self-rated interest in natural history and phenology on a Likert-scale of "1" (None) to "5" (Very High). The mean score for the natural history interest of the eleven participants was 3.9, and for phenology was 4.09. Participants were also asked to identify which of eight natural history topics they would like to learn more about by marking check boxes. The percentage of participant interest in each natural history topic was as follows: Insects 27.3%, Amphibians 36.4%, Reptiles 36.4%, Geology 36.4%, Wildflowers 45.5%, Trees 45.5%, Mammals 72.7%, and Birds 81.8%. Finally, participants were asked to self-report their knowledge of nine natural history topics using a Likert-scale of "1" (Very Low) to "5" (Very High). The mean response for each topic was as follows: Amphibians 1.81, Reptiles 1.90, Wildflowers 1.90, Insects 2.36, Phenology 2.64, Trees 2.90, Birds 3.00, Geology 3.00, and Mammals 3.36.

Post-Study Interest and Knowledge

After utilizing the CWES Nature Navigator Website for one month during the pilot study, University practicum students were asked to complete a post-use questionnaire online. With this instrument they were asked to rate their post-study interest in natural history and phenology on a Likert-scale of "1" (None) to "5" (Very High). The mean rating for both was 4.09 (n=11). A Likert-scale question regarding the participants' post-study knowledge of a variety of natural history topics was also given. Responses ranged from "1" (Very Low) to "5" (Very High). The mean response for participant post-knowledge in each of the following topics was: Amphibians 2.27,

Reptiles 2.27, Insects 2.45, Wildflowers 2.45, Geology 2.63, Phenology 2.64, Trees 2.72, Birds 3.36, and Mammals 3.54. Another question asked participants to rate the amount of knowledge that they had gained directly from the CWES Nature Navigator Website on a Likert-scale from "1" (None) to "5" (A Great Amount). The mean amount of knowledge that participants felt they had gained from the Website was: Geology 2.27, Reptiles 2.54, Wildflowers 2.63, Trees 2.63, Insects 2.72, Amphibians 3.09, Mammals 3.36, Birds 3.36, and Phenology 3.72.

Participant Use of Website

Through the post-study questionnaire, the eleven participants were asked to identify how many minutes per week they had spent using the Website. Forty-five percent of participants reported spending 0-10 minutes per week using the Website, 36% spent 11-20 minutes, and 18% spent 21-30 minutes. When asked to select how many times they had shared information gained from the Website over the course of the past month, 63.6% shared the information with others 1-3 times and 36.4% shared the information 4-6 times with others.

Website Content, Impact, and Applicability

Through the post-study questionnaire, participants were asked to answer a series of Likert-type questions that had drop-down menus with ratings of "Strongly Disagree," "Disagree," "Agree," and "Strongly Agree." One participant failed to complete this section, so that n=10. Five of the questions in this category regarded the format of the Website. All (100%) of participants responded with "Agree" to statements that the

Website was easy to navigate, had an appealing design, and easy to read text. Ninety percent of participants responded with “Agree” to statements that the Website presented information in an interesting manner and that it contained helpful links to additional Websites, while 10% of participants responded with “Disagree” to the two statements.

Additional Likert-type questions were asked in this section. They focused upon the Website’s impact on participant awareness and interest in natural history and phenology. Again, one participant did not complete this section of the questionnaire, making n=10. All (100%) of participants responded with “Agree” to the statement that the Website had increased their awareness of Wisconsin natural history. Ninety percent of participants responded with “Agree” to statements that use of the Website had increased both their interest in natural history and phenology, and 10% responded with “Disagree” to these two statements.

The final Likert-type questions in this section centered on the applicability of the Website to the Environmental Education Practicum course. One participant did not complete this section, making n=10. When asked if using the Website had helped them answer the questions of K-12 students, 10% of participants responded with “Strongly Disagree,” 20% with “Disagree,” and 70% with “Agree.” When asked if the Website contained information that could be incorporated into the lessons that they taught, all (100%) selected “Agree.” All (100%) of the participants also responded with “Agree” to statements that the use of the Website had helped them take advantage of teachable moments, and contained information that they would otherwise not have received from the Environmental Education Practicum course at CWES.

Overall Rating of the Website

The post-study questionnaire contained a question which asked the University practicum students to identify how useful the Website was to them in learning about natural history over the course of the past month on a scale of "1" (Not Useful) to "5" (Extremely Useful). Responses ranged from "2" to "4," with a mean response of 3.23.

Evaluation of Future Use

The post-study questionnaire also asked participants to evaluate if they would use the Website even after they had completed the Environmental Education Practicum course. Of the eleven participants 9.0% chose "Definitely No," 72.2% chose "Maybe," and 18.1% chose "Definitely Yes." Participants were then asked to explain their answer in an open text field. The participant that answered "Definitely No," stated that he would no longer be teaching and so would have no reason to use the site. The participants who responded "Maybe," reasoned that their use would be dependent upon their future locations and careers. The three participants who responded "Definitely Yes," cited three different reasons. One planned to use the Website to enhance her summer teaching at CWES summer camps, another liked that the site was more "naturalist-friendly" than other options, and the third thought it was a good tool to have in her "back-pocket."

Participants were also asked if they would recommend that future practicum students use the Website. All eleven (100%) participants responded "Definitely Yes" to this categorical question. Participants were then asked to explain their answer in an open text field. Five of the participants believed the Website would help future University practicum students take advantage of teachable moments. Three participants believed that the information from the Website could be incorporated into the lessons that future

University practicum students taught. Three participants stated that they thought it was important for educators to have natural history knowledge.

Participant Likes and Dislikes

When asked to share what they liked most about the CWES Nature Navigator Website in an open text field within the post-study questionnaire, several answers were provided: three participants mentioned that the site was easy to use; three participants stated that they liked being able to use the information in their lessons; three participants liked the design of the Website and its inclusion of pictures and animal calls; and two participants liked the variety of information the site contained.

When then asked to share what they liked least about the Website: three participants wanted more information on each phenology topic; four participants would have liked the phenology section to be organized more conveniently; one participant stated that they knew most of the information already; one participant thought that the addition of an interactive blog page would have been beneficial; one participant thought some of the text in the weekly articles for the phenology section was too long and could be broken up; and one participant was not sure what they liked least.

Focus Groups

To gather more in-depth responses to questions about the Website, two focus groups were utilized. The two sessions were the same, but half of the University practicum students went to one and half to the other. Feedback gained during the two sessions was combined.

When asked at these focus groups if they had had any technical difficulties with the Website, eight participants had not. However, three participants were confused by the navigation within the main page of the “What’s Happening at CWES?” section. When asked if the information on the Website was new to them, six participants responded that it was, three said that it was a mix of new and old, and one (a wildlife education major) said that it was repetitive information. When asked if the information contained in the Website was interesting to them, six participants responded that it was. Examples of representative responses were: "Things you wouldn't think to look up, cool and random facts," and “There aren’t many websites that give you information from an educator or naturalist’s point of view.”

When asked if they were able to use information from the Website in the past month, half cited specific uses of the Website and the other half did not. Participants were then asked if they thought that taking the weekly phenology quizzes encouraged them to read the Website information more thoroughly. Seven said yes and four were unsure. When asked if the quizzes were at an appropriate difficulty level, the majority of students agreed that they were.

When asked what improvements could be made to the Website, participants had several suggestions. Two participants suggested reducing the number of steps needed to access sound files, two suggested additional links for further information, two wanted a search option or to have the phenology information also organized by topic, two suggested tying the Website information more clearly to lessons, and one suggested including more pictures.

When asked for suggestions for the Website's use during the following semester of the practicum course at CWES, the following were mentioned:

- "Have next year's practicum do it."
- "Make quizzes worth real points."
- "Use in lesson preps, because then they have to read it. It was helpful to read info. before you came out."
- "Do both quizzes and use in lesson preps."
- "Connect to CWES homepage, to make it more easily accessible."

Revision of Instruments

After the pilot-study was completed, revisions were made to the post-study questionnaire to insure that it would be as valid and reliable an instrument as possible for use in the field study. After use in the pilot-study, several questions within the post-questionnaire were not found to be as reliable as desired. One of these questions was designed to compare participants' pre and post-study interest and knowledge of natural history and phenology. At the end of the pilot-study, it was found that several participants had reported that their knowledge of natural history topics had decreased over the course of the study, while simultaneously reporting that they had also learned new information from the Website. Similarly, some participants' self-reported interest in natural history and phenology decreased over the course of the study, though they had also reported that the Website increased their interest in such topics. These problems had to be dealt with before the field study began. The main goal of the study was to evaluate participants' perceived value and usefulness of the Website within the University practicum program,

and not to measure the specific amount of new knowledge they had gained. Therefore, it was determined that the post-study ratings of participant knowledge and interest would be removed from the post-questionnaire, while the Likert-type scales evaluating participants' perceived changes in knowledge and interest would remain.

Two of the questions in the post-study questionnaire were found to produce identical and repetitive data. One of these questions asked participants what they liked least about the Website and the other asked them what they thought could be improved in the Website. To make the questionnaire more efficient, the question regarding Website improvement was removed.

The natural history topics that participants rated their new knowledge in were also changed. They were restructured to more clearly reflect the content of the completed version of the Website. In order to gather a broader range of responses, several questions were also added to the revised post-questionnaire. These questions asked participants to rate the Website's effect on their awareness of Wisconsin phenology, how applicable the Website was to their University practicum experience, and if the information within the Website was a helpful review of information they already learned elsewhere.

While the focus group guides for the pilot and field studies were quite similar, some edits were made to the field study focus group guide so that it could better meet the goals of that phase of the study. The pilot study guide contained more questions regarding areas for improvement within the Website, while the field study focused more closely on how students were actually able to use the Website.

The revised questionnaire and focus group guide were both reviewed by a panel of experts through an NRES 610-Applied Environmental Education Program Evaluation

course at UW-Stevens Point before they were used in the field study. These revisions were also reviewed by the researcher's graduate committee.

Revision of Website

Since all participants in the pilot study recommended that the next semester of practicum students use the Website and had provided generally positive feedback on the use of the Website in the course, it was determined that the CWES Nature Navigator Website had strong potential to become a valuable addition to the University practicum course. Therefore, the study moved forward with integrating the use of the Website into the University practicum course and entered the field study phase.

Before the field study occurred, feedback gathered from both the pilot study questionnaires and focus groups was used to make improvements to the Website. The number of steps needed to access sound files from the Website was shortened. The navigation within the main page of the "What's Happening at CWES?" section was simplified to make it easier to use. Several changes to the use of the Website within the practicum course were also made. CWES staff determined that University practicum students would be required to fill out a section on phenology in the weekly, graded lesson preps they turned in. Quizzes continued to be used, but the time allowed for them was shortened from fifteen minutes to five, and they became a graded component of the University practicum course. The researcher did not have the resources to create a search engine for the Website, so this was not undertaken. Because of the amount of maintenance that an online discussion board would have required, it was also not deemed feasible for the Website.

IV. Subproblem 3. Collect feedback on the content, layout, navigation, and use of the Website from a group of professionals in the environmental education field

Environmental Education Professionals

The researcher identified six separate universities with programs similar to the Environmental Education Practicum course at UW-SP. She then contacted professionals involved with these programs by e-mail to ask them to participate in the study. Three agreed to fill out the questionnaire. One of these professionals was a naturalist at the Wolf Ridge Environmental Learning Center in Finland, Minnesota. He works with the graduate students who undertake an intensive, semester-long Naturalist Training Program. During this program the graduate students learn about nature and then teach related lessons to the K-12 students visiting the facility. This naturalist was also involved in developing a phenology-based Website for the facility. Another professional participant was the Program Director of the Recreation, Park, and Tourism Management Block course for undergraduate students at Shaver's Creek Environmental Center in Petersburg, PA. This hands-on course allows Penn State University students to teach and learn about the outdoors while at the facility. The third professional was an Assistant Professor of Environmental Education and Outdoor Education at Northland College in Ashland, WI. He works with the undergraduate students involved in the Outdoor Education Professional Development Block courses that occur at The Audubon Center of the Northwoods in Sandstone, MN. These Block courses intensively train Northland College students in natural history and outdoor education.

The professional participants within the UW-Stevens Point included an Associate Professor of Environmental Education (with past involvement in the University

practicum program), an Assistant Professor of Environmental Education and Interpretation (with current involvement in the University practicum program), the Assistant Director of the Schmeeckle Reserve (who went through the University practicum program), and the International Programs Coordinator for the College of Natural Resources at UW-SP (who served as an interim Director at CWES).

Evaluation by All Participants

The two sets of professionals were given very similar questionnaires in an online format. All seven professionals were asked a series of four-point Likert-type questions about basic elements of the Website. For example, when asked to rate the Website's ease of navigation on a four-point scale that ranged from "Very Difficult" to "Very Easy," one professional found the Website's navigation to be "Difficult", four found it to be "Easy," and two found it to be "Very Easy." When asked to rate the overall design of the Website, one professional found it "Very Unappealing," three found it to be "Appealing," and three found it "Very Appealing." When asked to rate if the information on the Website was presented in an interesting manner, one professional found it to be 'Uninteresting" and six found it to be "Interesting." When the professionals from UW-Stevens Point were asked how appropriate the information on the website was for students enrolled in the Environmental Education Practicum course at CWES, two rated the Website as "Appropriate" and two rated it as "Very Appropriate." When the professionals from other institutions were asked how appropriate the information on the Website was for undergraduate college students in the field of environmental education, one rated it as "Inappropriate" and two rated it as "Appropriate" (Table 4.1).

Table 4.1 Environmental education professionals' ratings of the Website's content, navigation, design, and applicability (n=7)

	Very Difficult	**Difficult**	**Easy**	**Very Easy**
How easy was the Website to navigate?	---	1 professional	4 professionals	2 professionals
	Very Unapppealing	**Unappealing**	**Appealing**	**Very Appealing**
How appealing was the overall design of the Website?	---	1 professional	3 professionals	3 professionals
	Very Uninteresting	**Uninteresting**	**Interesting**	**Very Interesting**
Was information presented in an interesting manner within the Website?	---	1 professional	6 professionals	---
	Very Inappropriate	**Inappropriate**	**Appropriate**	**Very Appropriate**
How appropriate is the information on the Website for college students in the field of environmental education?	---	1 professional	4 professionals	2 professionals

When asked what they liked most about the design of the Website in an open-ended question, most responses mentioned the "fun" and colorful main page and the use of pictures. When asked what they liked least about the design of the Website, responses were extremely varied: one professional couldn't think of anything she disliked; one thought that maintaining the links to other Websites could be challenging; one recommended changing the background and text colors in the phenology section to make them more readable; one disliked that they had to scroll from one week to another to access information in the phenology section; one wanted the weekly articles to be more

clearly separated from one another; and one thought the site was too easy to access and should have a login.

When asked what they liked most about the content of the Website in another open-ended question, the professor at Northland disagreed with the entire premise of using a Website to teach about natural history, saying, “In this day and age we need more outdoor time, not another reason to turn on the computer and use electricity.” The other professionals mentioned liking the additional links to outside Websites, the simplicity of the writing, the photographs and drawings, and the basic background information contained within the Website. When asked what they least liked about the content of the Website, two professionals would have liked more links to additional information, one thought the addition of an interactive board for phenology happenings would have been beneficial, and one recommended increasing article margins so that text was easier to read.

When asked how information on the Website could be presented in a more interesting manner responses were again quite varied: one participant advised keeping things simple; another re-mentioned the use of an interactive board for phenology happenings; another said that video clips would be interesting; one advised making some of the text larger and easier to read; one recommended continuing the theme of the main page throughout the rest of the Website; and another thought that the information was too simplistic for undergraduate students.

When given the opportunity to share additional comments, the following were provided:

- A few picky ideas. For the "Got Questions?" page, I would make every link open in a new window. That way you always have the original page still. Also, under the "Essentials" page, I would make certain items clickable. For example, when talking about the fish in Sunset Lake (blue gills, brook trout), link the fish to the ID page in case a user doesn't know what they are. You could also link other terms (like Kettle Lake) to an outside website that provides more technical details... for those who really wanted them. Layered information is really the power of the Internet. This is an excellent website, well designed and easy to use! What an amazing addition to the CWES digital library.

- Great project! I like the direct links to Cornell for bird information -- no sense duplicating what is already well done.

Evaluation by Professionals from UW-Stevens Point

One set of open-ended questions specifically regarding the University practicum program was given only to the professionals from UW-Stevens Point. These individuals were asked what could be added or improved to make the Website a more optimal resource for students enrolled in the University practicum course at CWES. Suggestions included simply adding more information or adding an interactive blog or data page. When asked what methods they would use to integrate the Website into the University practicum program, a Webquest assignment, journaling, interactive blogging, and utilizing hands-on outdoor exploration were suggested. When asked if they thought using the Website would benefit the undergraduate students in the University practicum program, all four agreed that it would. The following were the explanations for their answers:

- It will probably benefit those students with weak natural history backgrounds. Those with a stronger natural history background, though, may also find it helpful to fill in gaps in their knowledge or double check their information.

- Students in the EE/Interp. major NEED a strong natural history background to develop effective educational and interpretive programs. This is one of the main areas that I have seen lacking in recent years. The website will be an invaluable tool for identifying species and understanding phenology. Hopefully, the Practicum students can add information to the website as well!

- It should be mandatory for them to look at it. I feel it would give them all a great sense of confidence in knowing the material before showing up to orientation.

- Because of the media being so easy to access, and because of the practical nature of the website, students should quickly realize that this is an added tool to enhance their CWES lessons.

Evaluation by Professionals from Other Facilities

One set of open-ended questions specifically regarding how Web tools might be used in other programs was given only to the professionals from other facilities. When asked how they did or might incorporate a similar Website into their own program, the following were their responses:

- Interestingly enough, Wolf Ridge is already doing this very thing. We are beginning new curriculum based on three main points - phenology, global warming and energy production. We have a database that we have been working on for 3 years already that is usable by both adults and grade school children. I really enjoy the phenology aspect of it - let's learn what is most applicable to the current season. We also use something called Tracker and Peter Harris is responsible for most of the work on it here at Wolf Ridge. We will be using this with weekly quizzes and nature journaling.

- Yes, as a model as I have been thinking of a similar project with Penn State students. Also, an easy site to find information on phenology and journaling.

- I would not assign a site like this to my students.

When asked if a similar Website would be beneficial to college students in the field of Environmental Education and Interpretation, two participants agreed and one disagreed. The participants that agreed cited reasons such as the "user-friendly" format and "place-based approach." The participant that disagreed believed that students should be going outside to learn, and be getting their information from texts and regional naturalists.

Revision of Website

The comments and suggestions provided by all professionals were used to make necessary changes to the Website during the summer of 2007. The color scheme of the weekly articles was changed so that text was easier to read. The way that links to other Web pages opened was also altered to make the process more convenient for users. More information was added to the Website as a whole, and the weekly phenology articles for August through December were completed. Though many suggestions for including an interactive blog area on the Website were shared, it was determined that the maintenance of such a component would be beyond the means of CWES staff who would take over the responsibility of the Website when the researcher left.

V. Subproblem 4. Conduct summative evaluation of a completed version of the Website during a semester-long field study

Participant Demographics

General background information regarding University practicum students' natural history schooling, knowledge, and information sources was collected through the pre-study questionnaire, which was administered the last week of August during the fall 2007 semester. The eleven participants were in their following years of undergraduate work at UW-SP: Junior (1), Senior (3), and Second Year Seniors (7). They had the following majors: Family Life Education (1), Youth Programming and Camp Management (1), Elementary Education (2), and Environmental Education and Interpretation (7). The variation in the number of natural history courses each individual had previously taken was as follows: no courses (1), one course (3), two courses (1), five courses (1), six courses (2), seven courses (1), eight courses (1), and eleven courses (1). Nine students had taken the CNR Summer Camp course, and three had not. When asked to select the top three resources they used to acquire natural history information, the top sources were: field guides (27.3%), coursework (27.3%), and reference books (18.2%).

Participant Pre-Study Interest and Knowledge in Natural History and Phenology

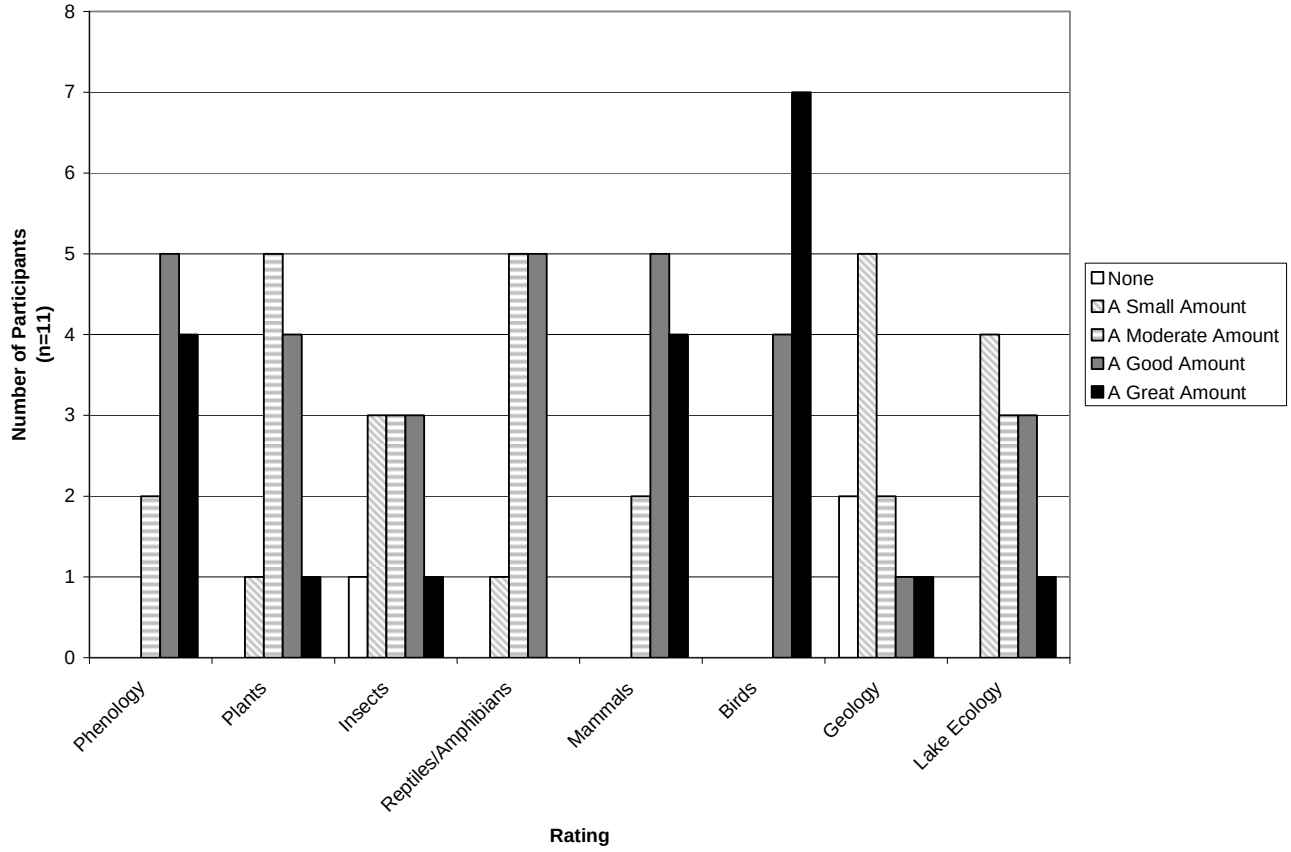
The pre-study questionnaire also collected data regarding the University practicum students' self-rated interest in natural history and phenology on a Likert-scale of "1" (None) to "5" (Very High). The mean score for the eleven participants' interest in natural history was 3.6, and in phenology was 2.5. Participants were also asked to

identify which of eight natural history topics they would like to learn more about by marking check boxes. The percentage of participant interest in each topic was as follows: Insects 63.6%, Wildflowers 72.7%, Reptiles 72.7%, Geology 72.7%, Mammals 81.8%, Birds 81.8%, Amphibians 81.8%, and Trees 90.9%. Finally, participants were asked to self-report their knowledge of nine natural history related topics using a Likert-scale of "1" (Very Low) to "5" (Very High). The mean response for each topic was as follows: Insects 1.90, Reptiles 2.18, Amphibians 2.36, Geology 2.45, Phenology 2.64, Wildflowers 2.90, Birds 3.09, Trees 3.18, and Mammals 3.36.

Post-Study Interest and Knowledge

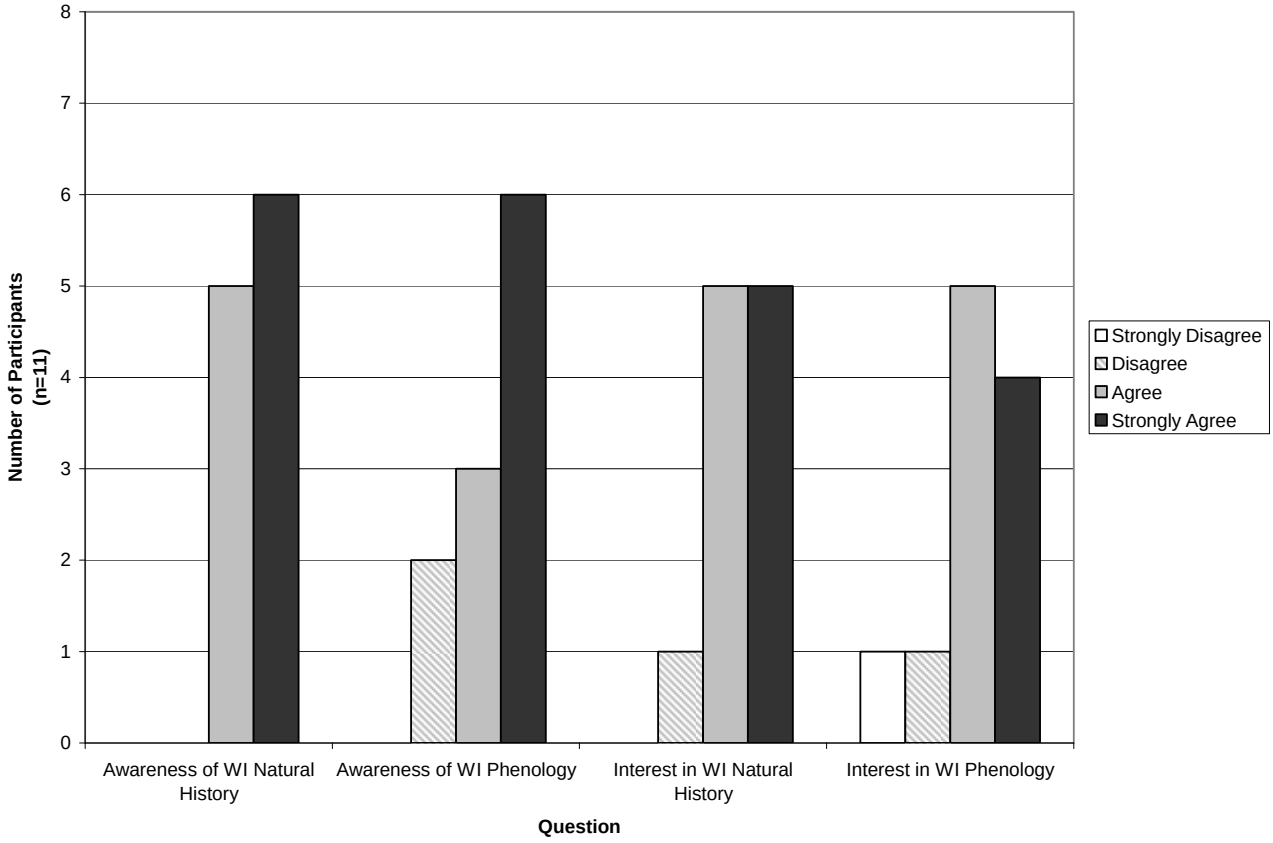
After utilizing the CWES Nature Navigator Website for one semester during the field study, practicum students were asked to complete a post-use questionnaire online. Through the post-study questionnaire, participants were asked to rate the amount of new knowledge they had gained directly from using the CWES Nature Navigator Website. A Likert-scale from "1" (None) to "5" (A Great Amount) was used to report this information. The mean amount of new knowledge the eleven participants felt they had gained in each of eight specific areas was: Geology 2.45, Insects 3.00, Lake Ecology 3.09, Amphibians/Reptiles 3.36, Plants 3.45, Mammals 4.18, Phenology 4.18, and Birds 4.64 (Figure 4.1).

Figure 4.1 Participant ratings of amount of topic-specific knowledge gained from the Website



Students were also asked to use a four-point scale, ranging from "Strongly Disagree" to "Strongly Agree," to evaluate if use of the Website had increased their awareness of Wisconsin natural history. Results showed that 45.5% selected "Agree" and 54.5% selected "Strongly Agree." When asked if use of the Website increased their awareness of Wisconsin phenology, 18.2% selected "Disagree," 27.3% selected "Agree," and 54.5% selected "Strongly Agree." When asked if using the Website increased their interest in Wisconsin natural history, 9.0% selected "Disagree," 45.5% selected "Agree," and 45.5% selected "Strongly Agree." When asked the same question regarding Wisconsin phenology, 9.0% selected "Strongly Disagree," 9.0% selected "Disagree," 45.5% selected "Agree," and 36.4% selected "Strongly Agree" (Figure 4.2).

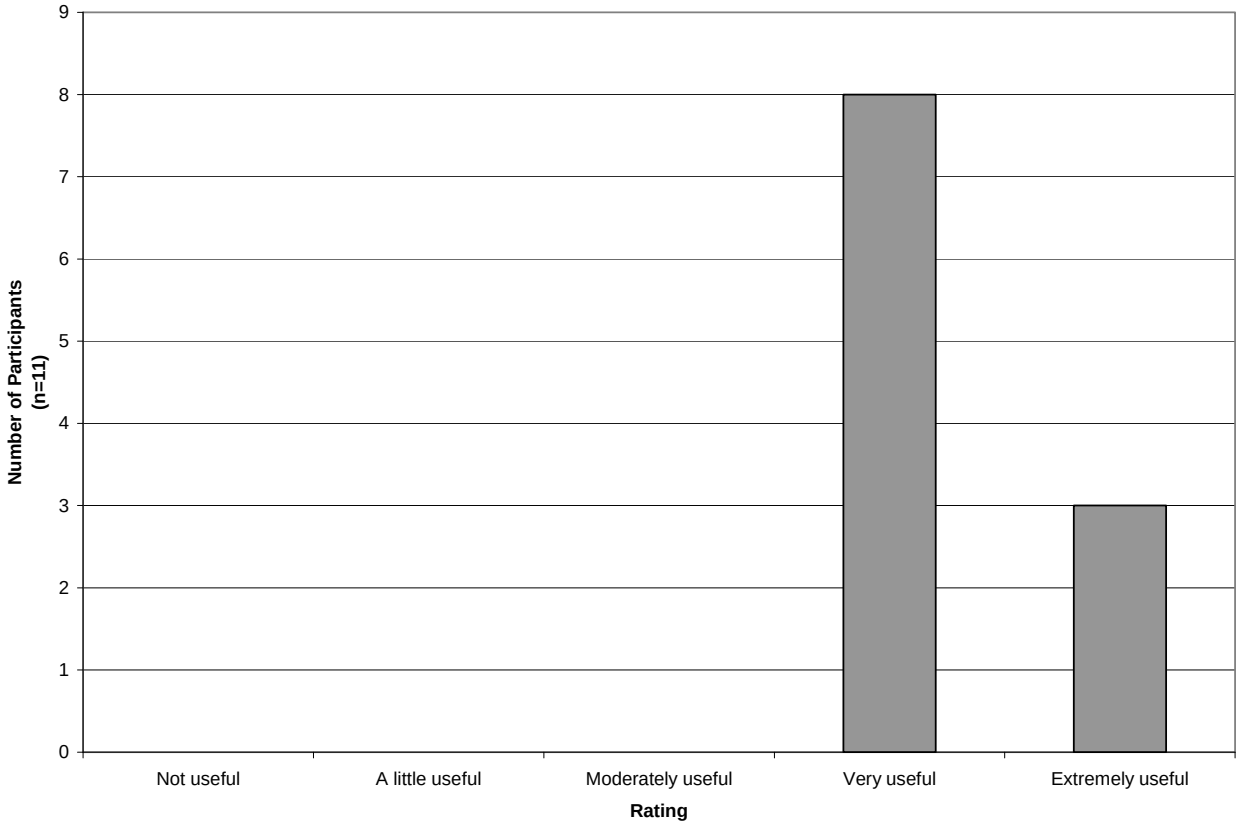
Figure 4.2 Participant responses to questions regarding their interest and awareness of Wisconsin natural history and phenology



Overall Rating of Website

Participants were asked to identify how useful the Website was to them in learning about local natural history over the course of the entire semester. Ratings were on a Likert-scale of "1" (Not Useful) to "5" (Extremely Useful). The mean response was 4.27 (Figure 4.3).

Figure 4.3 Participant ratings of the Website's overall usefulness in learning about natural history

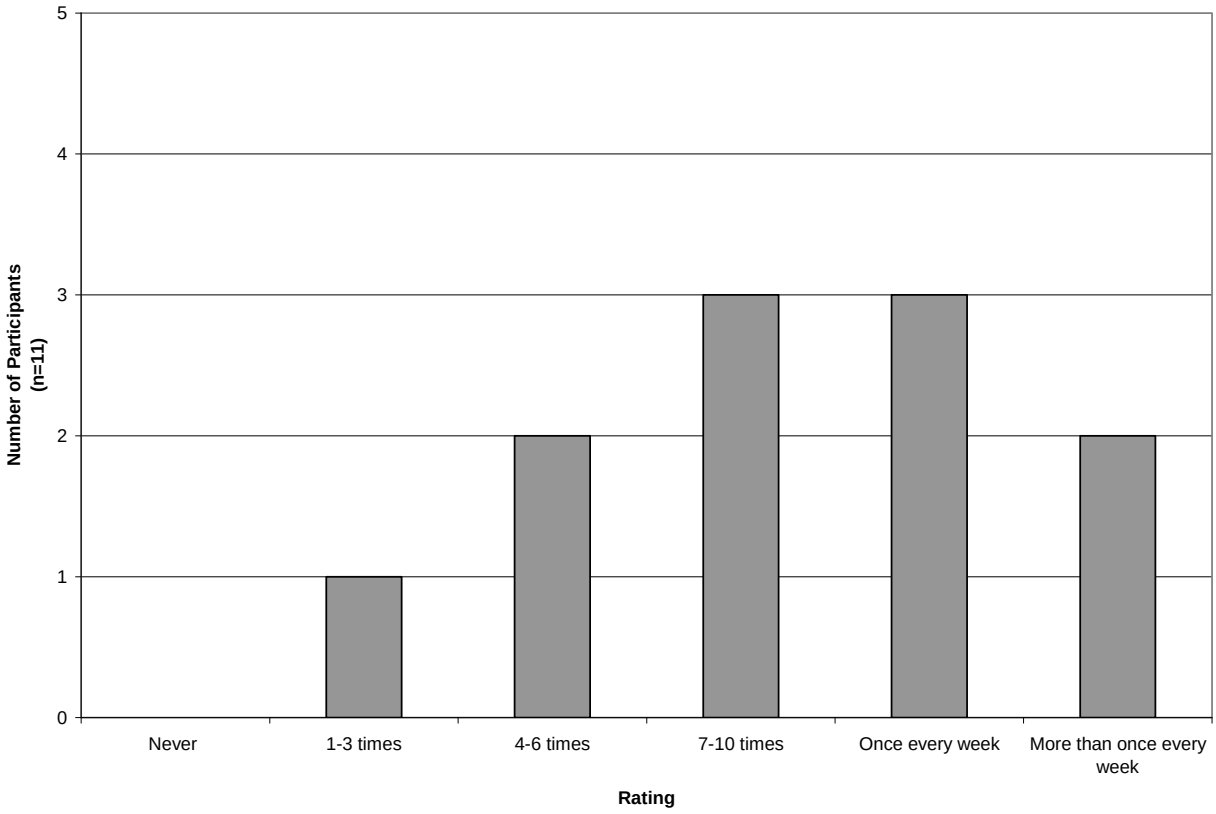


There was a very slight difference between the ratings selected by Environmental Education and Interpretation majors versus minors. All seven majors rated the overall usefulness of the Website as "Very Useful," while three of the four minors rated it "Extremely Useful" and the other rated it "Very Useful." Environmental Education and Interpretation majors are required to take more natural history course than minors. In this study, the majors had taken between three and eleven natural history courses, while the minors had taken zero to one. No links were observed between participant pre-study interest in natural history and phenology and their rating of the Website's overall usefulness.

Participant Use of Website

Participants were also asked to identify how many minutes per week they spent using the Website from a series of four options. The majority of the participants (54.5%) spent 0-15 minutes per week using the Website and 44.5% spent 16-30 minutes using it. When asked to select how many times they shared information gained from the Website with the K-12 students that they taught over the course of the past semester, 9.0% shared the information with others 1-3 times, 18.1% shared 4-6 times, 27.3% shared 7-10 times, 27.3% shared once a week, and 18.1% shared more than once a week (Figure 4.4).

Figure 4.4 Number of times participants shared information from the Website with the K-12 students that they taught

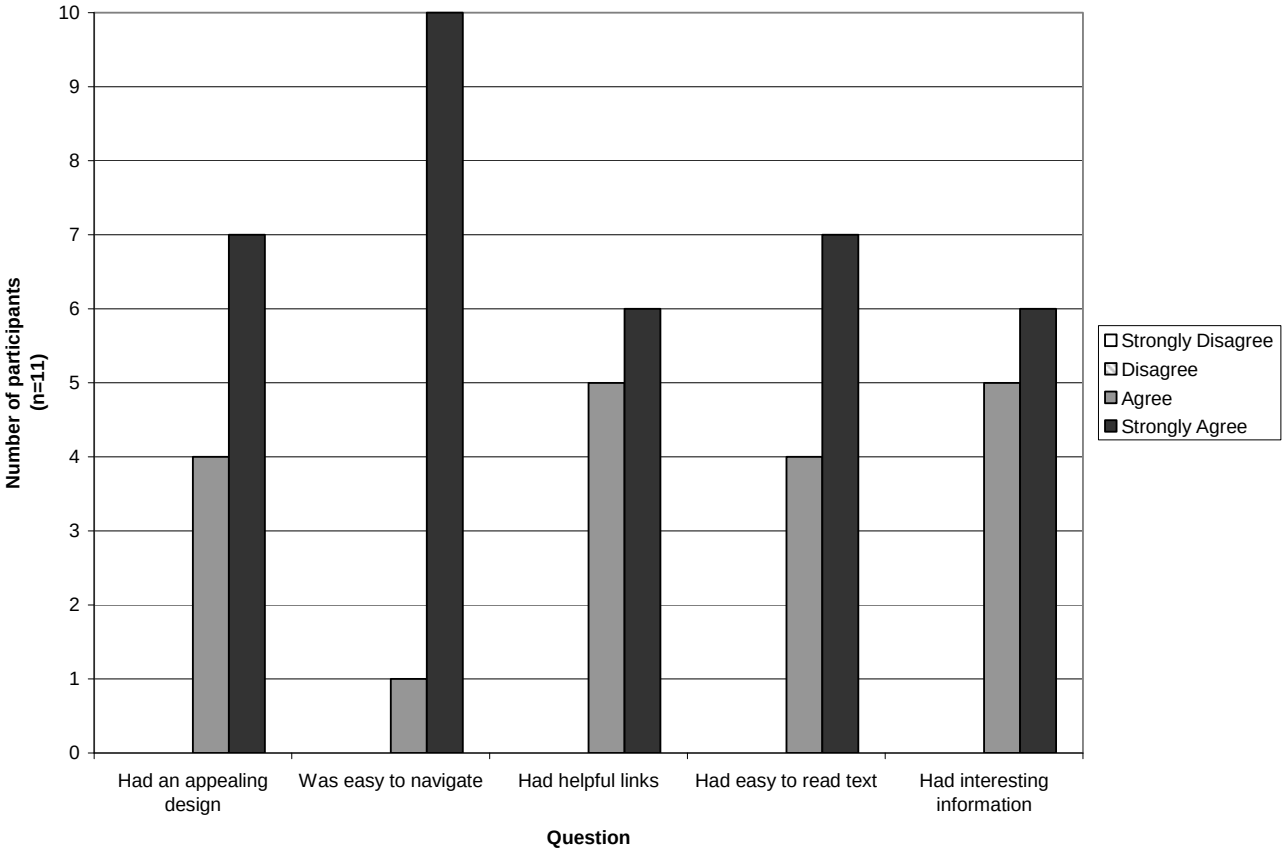


When asked to explain specifically how they shared information with others in an open-ended question, numerous uses were supplied. Two participants said they had used the information while researching the interpretive programs that they presented at the Schmeeckle Reserve. Nine of the participants used the information for teachable moments while on hikes with K-12 students. A representative example of this was, “I used the Navigator mainly for teachable moments and phenology taking place throughout the changing seasons.” Five students mentioned that they had shared the information while teaching their lessons and in their lesson preps. A representative example of this was, “Used during walks during lessons, teaching night lessons, "teachable moments," and in the section of lesson plan information.”

Evaluation of Website Content, Impact, and Applicability

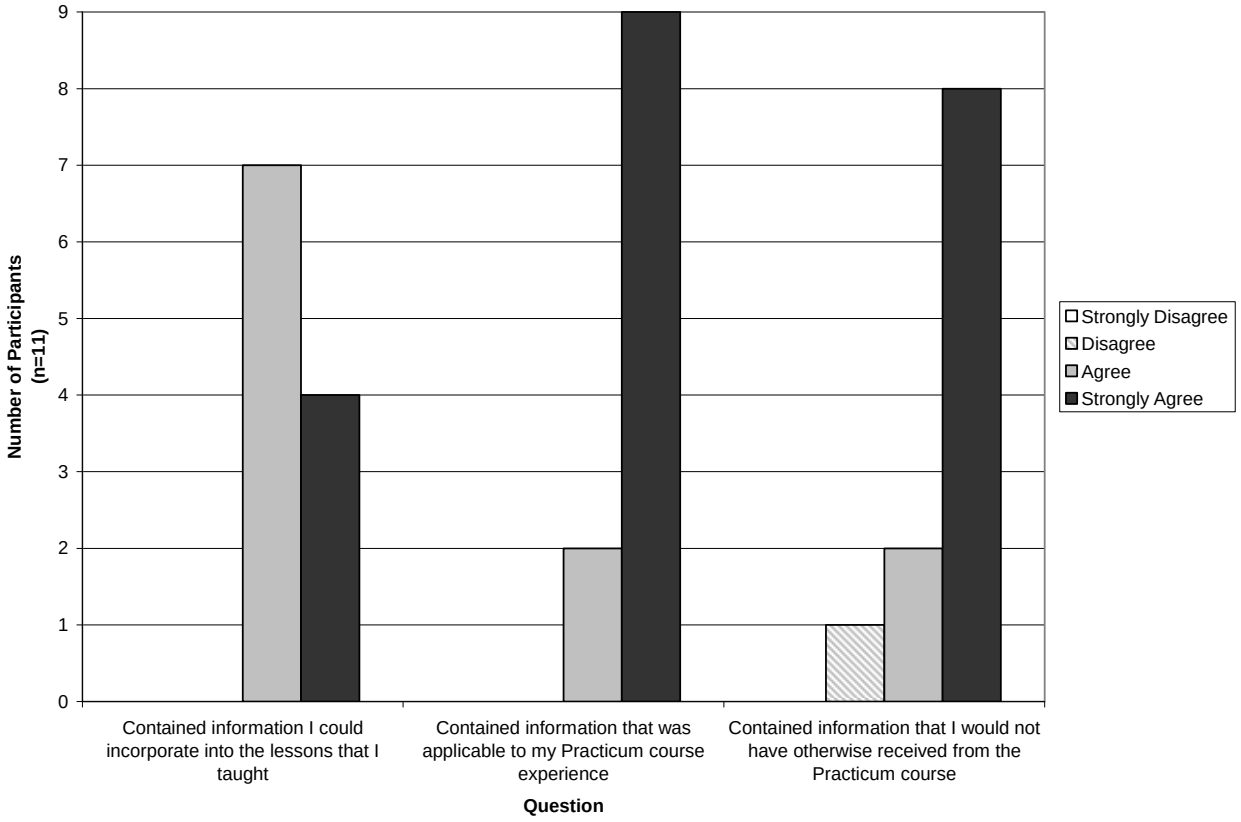
The eleven participants were then asked to answer a series of Likert-type questions that had drop-down menus with four-point ratings of “Strongly Disagree,” “Disagree,” “Agree,” and “Strongly Agree.” Five of these questions regarded the format of the Website. When asked if the Website was easy to navigate 9.0% selected “Agree” and 90.9% selected “Strongly Agree.” When asked if the Website had an appealing design 36.4% selected “Agree” and 63.6% selected “Strongly Agree.” When asked if the Website had easy to read text 36.4% selected “Agree” and 63.6% selected “Strongly Agree.” When asked if the Website presented information in an interesting manner 45.5% selected “Agree” and 54.5% selected “Strongly Agree.” When asked if the Website contained helpful links to additional Websites 45.5% selected “Agree” and 54.5% selected “Strongly Agree” (Figure 4.5).

Figure 4.5 Participant response to questions regarding Website content



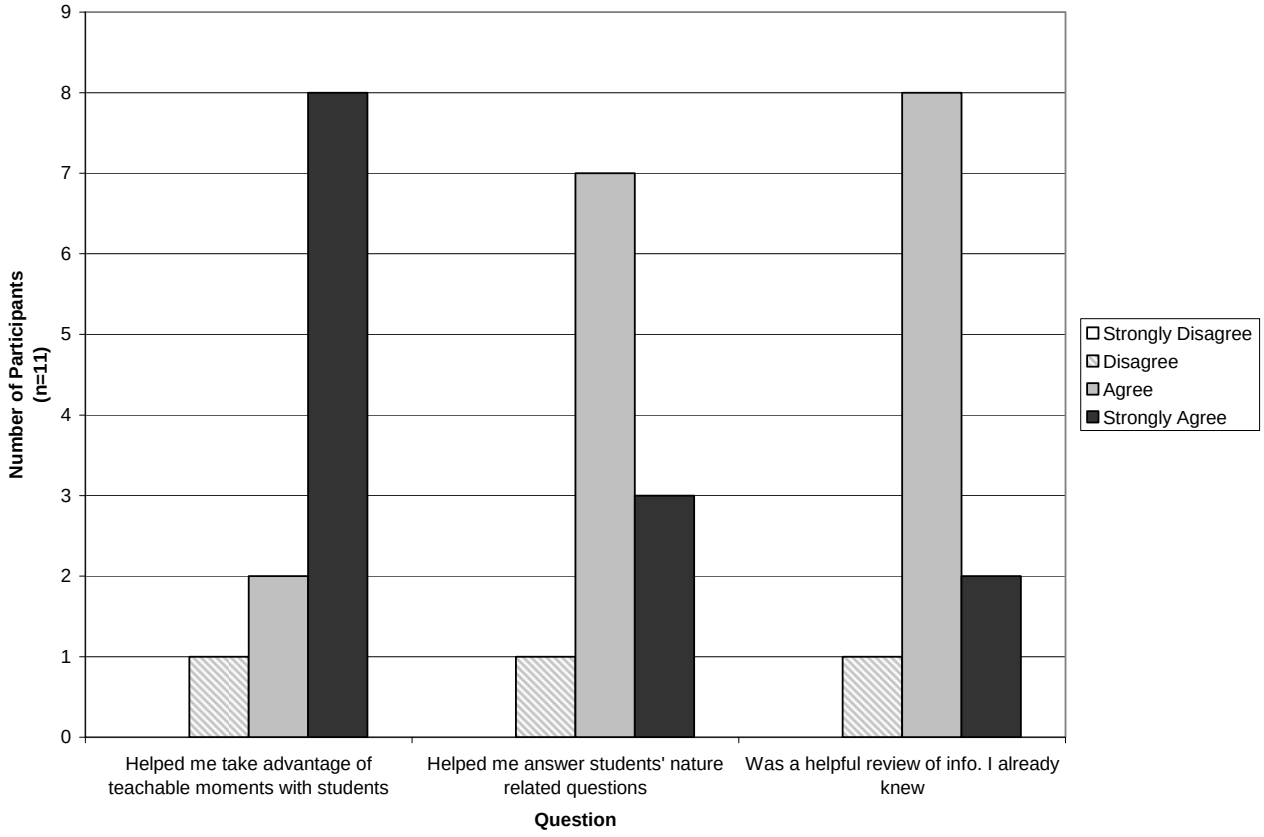
The final Likert-type questions in this section regarded the applicability of the Website to the Environmental Education Practicum course. When asked if the Website contained information that was applicable to their Environmental Education Practicum course 18.2% selected "Agree" and 81.8% selected "Strongly Agree." When asked if the Website gave them information that could be incorporated into the lessons that they taught, 63.6% of participants selected "Agree" and 36.4% selected "Strongly Agree." When asked if the Website contained information that they would otherwise not have received from the Environmental Education Practicum course at CWES, 9.1% selected "Disagree," 18.2% selected "Agree," and 72.7% selected "Strongly Agree" (Figure 4.6).

Figure 4.6 Participant ratings of the Website's applicability to practicum course



When asked if the Website helped them take advantage of teachable moments, 9.0% of participants selected "Disagree," 18.2% selected "Agree," and 72.7% selected "Strongly Agree." When asked if the information contained in the Website was a helpful review of information that participants already knew 9.0% selected "Disagree," 72.7% selected "Agree," and 18.2% selected "Strongly Agree." When asked if the use of the Website helped them answer the natural history questions of K-12 students, 9.0% of participants selected "Disagree," 63.6% selected "Agree," and 27.3% selected "Strongly Agree" (Figure 4.7).

Figure 4.7 Participant rating of the Website's usability within the practicum course



Evaluation of Future Use

Participants were then asked in a Likert-type question with options of "Definitely No," "Maybe," and "Definitely Yes," if they would recommend that future practicum students use the Website. All eleven participants (100%) responded "Definitely Yes" to this categorical question. Participants were asked to explain their answer to this question in a provided open text field. Five students mentioned in their response that the information from the Website was helpful to them when teaching. A representative response was, "You could use the info. for time fillers during lessons or "teachable moments" which really seemed to impress school teachers and made you sound like you

knew your stuff." Six students mentioned that the Website provided them with a basic understanding of natural history. A representative response was, "The information is great and it is what every environmental educator and interpreter should end practicum with, a basic understanding of phenology/natural history." Another was, "Not everyone has a solid base of nature knowledge in all areas which is natural. Thus, by using this tool they can be prepared to stretch out of their comfort zones and learn and teach new things." Two students mentioned that the information on the Website was a good refresher for them. A representative response was, "I think it is a nice refresher on some natural history that many of us know about but forget."

Participants were also asked to evaluate, if they remained in the area, would they use the Website even after they were done with the Environmental Education Practicum course. The question was Likert-type with options of "Definitely No, "Maybe," and "Definitely Yes." The majority responded "Definitely Yes" (81.8%) with the remainder of participants responding "Maybe" (18.2%).

Participants were asked to explain their answer in an open text field. Of the nine students who answered that they would definitely use the Website again, six explained that they would use it when they taught or created educational programming in the future. A representative statement was, "It's a great tool. If I was teaching lessons like this in the area, I would be stupid not to use this resource." Two of the nine stated that they would use the Website again because it had useful information. One of the two students who responded "Maybe" said she might use the Website again because it was a familiar resource. The other student who responded "Maybe" did so because he was not sure what future career he might have.

Participant Likes and Dislikes

When asked to share what they liked most about the CWES Nature Navigator Website in a provided open text field on the online questionnaire, five participants liked the Website organization and layout best. A representative statement was, “I really liked the website itself. It is very well laid out with the use of colors, fonts, and high quality graphics. It is easy to navigate, even a child wouldn't get lost. If you go into the “What's Happening at CWES?” page, the layout is great.” Three participants mentioned that they liked the interesting facts the Website contained. A representative statement was, “I liked the quick fun facts that I could share with kids. They always seemed to be "wowed" by these simple, yet informative facts. It made the lesson more interesting sometimes.” Four participants liked that the Website was easy to use and understand. A representative statement was, “It was very easy to use, great visuals, and had more places to find information on the subject. It was all presented in a very friendly way.”

When then asked to share what they liked least about the Website in an open text field, three participants could not think of anything they disliked. Two participants disliked clicking on the links to outside Websites for more information, while one wanted more outside links. Two participants would have liked more information on the Website in general. One participant found that the timing of some phenology events were off. One participant felt that the information on the Website did not always tie into the lessons he taught. One participant found that taking the weekly quiz on the Website information was inconvenient.

When asked if they had any other comments that they wished to share, participants had a wide range of remarks:

- "My lesson that I learned was try it out, BEFORE you knock it! I found it to be very useful to me with providing "on the spot" information about the natural world. Not only does this website serve a purpose for the Environmental Educators out there, it is a great resource for the interpreters. Good work, may children go away with a better understanding of the phenology and natural history of Wisconsin."
- "I thought it was a very useful tool when teaching. It connected us more to CWES and the environment around it. GOOD JOB!"
- "The multitude of information, and how it is presented, suggests the site requires a lot of time to maintain. Hats-off to whomever maintains the site!"
- "I think it's a fantastic resource and is very well put together!"
- "It is a great tool to use. It is very helpful. In trying to find things to teach the students about, I learned a lot myself."

Field Study Focus Group

Ten of the eleven participants were able to meet for the two focus groups. Three students attended one session, and seven students attended the other. The questions asked in each session were identical and all responses were compiled. These sessions took place at CWES during the students' workday, and lasted approximately fifteen minutes.

During the focus groups, when participants were asked if they liked getting their information from a Web-based resource as opposed to a hard copy, all said that they did. The convenience of the Website and its appealing format were mentioned reasons. When asked if they found the links to additional Web resources within the phenology section of the CWES Nature Navigator useful, half of the participants said that they had used them

and half said that they had not. One participant said that she had added many of the links to her "favorites" in her Web browser. Students were also asked if they had used the three other sections of the Website in addition to the required weekly phenology section. Half said that they had used the other sections occasionally, while the other half said that they had not accessed them.

Participants also reported that they had had no technical difficulties with the Website. When asked if the weekly phenology articles on the Website were the appropriate length, all participants agreed that they were. A representative response was, "There was a good amount of information, it wasn't over the top, but it wasn't too short." When asked how effective they found taking the weekly quiz was in checking their use of the Website, all participants felt the weekly quiz was a good way to check their knowledge. Several students mentioned that the quiz was a good way to encourage their use of the Website, and they may not have been so motivated to use the site without them. For example, one student said, "I think the quiz was good. When things are optional sometimes I don't use them."

When asked if they found the information on the Website interesting, the majority of participants replied that they did. A few examples of participant statements were:

- "It depended on what the topic was."
- "I liked the fun, random facts that we could throw out there."
- "I'd say overall they were good facts. Especially the gross ones, like the turkey vulture pooping on its legs."

When asked if anything else should be added to the Website, there was a range of responses. Suggestions included adding more information about plants, mammals,

geology, insects, and specifically aquatic insects. Students also would have liked an updatable bulletin within the Website that could record current observations. They also suggested having a navigation bar in the phenology section with links to week one, two, three, and four so that it would be easier to get to each individual week. Putting the specific dates for each of these weeks was also recommended. One participant mentioned that tying lesson content more clearly to the Website would also have been beneficial.

Participants were then asked if most of the information on the Website was new to them, or if it was repeating what they had already acquired in other places. Responses were equally split between participants reading largely new information and participants reading half new and half repeated information. Environmental Education and Interpretation majors primarily mentioned reading half new and half old information. Participants with other majors primarily responded that the information was new to them. Most participants mentioned that the repeated information was a good refresher for them. For example: “Some of it (the information) was repeated, but it was nice to get a refresher on it. Like some of the fun random facts, such as a chipmunk can fit nine nuts in its mouth. Those were just fun random facts that were good to have.”

When asked if they felt that using the Website had increased their awareness or understanding of the plants and wildlife at CWES, the majority responded that it had. Responses ranged from “I think it helped me a lot,” to “It depended on the topic, some things I knew more about already than others.” Participants were also asked to share a specific example of their use of information from the Website if they had one. All participants had at least one example. Information on bald-faced hornets, oak apple galls, and chickadee calls were popular responses. Six of the participants reported using

information from the Website when researching facts for their interpretive programs at the Schmeeckle Reserve.

Final edits to Website

Based on the feedback from the field study, the researcher made a final round of edits to the Website. She added an upper navigation bar to every Web page as suggested during the focus group, as well as a weekly navigation bar so that users could more quickly find information in the phenology section. She then created the final semester of phenology content for the Website.

VI. Subproblem 5. Create a list of recommendations for the future use of the Website in the University practicum course

Based on the results of the study, the researcher was able to construct recommendations for the future use of the Website in the Environmental Education Practicum course. She also created general suggestions for ways that similar facilities could utilize a Website to train their staff, volunteers, or interns. These recommendations and suggestions are detailed in Chapter Five.

CHAPTER FIVE
CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

I. Introduction

The purpose of this study was to create, implement, and evaluate a natural history Website, the CWES Nature Navigator, as a resource for the University practicum students at CWES. The Website was evaluated by three separate groups over the course of the study. These groups included a pilot group of University practicum students from the spring 2007 semester, professionals in the field of environmental education, and a field group of University practicum students from the fall 2007 semester. Collected data was used to further improve the Website and to create recommendations for its future use. This chapter will outline the conclusions and recommendations generated by the study.

II. Subproblem 1. Create the CWES Nature Navigator Website

The final version of the CWES Nature Navigator Website was completed in the winter of 2008, and now includes phenology information for all the weeks in which practicum students are at CWES. The process of creating the entire Website took the researcher approximately three hundred hours. This time included researching information, writing phenology articles, and putting text and pictures on the actual Website. The steps that were taken to create the Website were to:

1. Construct a rough plan of Website layout and desired components
2. Research local natural history and phenology

3. Locate pictures and write text for Website
4. Put information into Website
5. Pilot Website and collect feedback
6. Revise Website based upon recommendations
7. Create final version of Website

Recommendations Regarding Website Creation

Because the creation of the Website required such a large time input, if another facility were to undertake the creation of a similar Website, *it is recommended that this task be given to interns or volunteers and not to full-time staff with larger demands and responsibilities. It is also recommended that a small group of individuals share in the work needed to complete such a Website.* One member of the group could research phenology and natural history, another convert that information into short articles, and a third put everything onto the Website. The division of these roles would make the creation of a natural history Website much more manageable and efficient.

III. Subproblem 2. Conduct formative evaluation of a preliminary version of the Website

During the spring 2007 semester, eleven University students enrolled in the practicum course at CWES participated in a month-long pilot study that evaluated an initial version of the CWES Nature Navigator Website. The results of this study showed that all eleven participants thought the Website should continue to be used within the

practicum program. The top reasons for continued use were that it could help future students take advantage of teachable natural history or phenology moments, add additional information to their lessons, and overall increase their knowledge of natural history. Overall ratings of the Website's navigation, design, text, applicability to the practicum course, and impact on personal awareness and interest in natural history and phenology were very positive. This feedback encouraged the continued use of the Website within the program and gave the researcher specific ideas for improvements to the resource.

Recommendations Regarding the Pilot Study

Using some type of pilot study to collect feedback with which to edit a Web resource is highly recommended. This process allows the resource's creator to customize the final product to suit a particular audience's needs. It also allows them to work out any glitches before a final version is utilized within their program.

IV. Subproblem 3. Collect feedback on the content, layout, navigation, and use of the Website from a group of professionals in the environmental education field

Seven professionals in the field of environmental education, both from within and outside of UW-SP, were asked to evaluate an initial version of the CWES Nature Navigator Website through an on-line questionnaire. Their feedback showed that overall the Website was easy to navigate, had an appealing design, presented information in an interesting manner, and contained information that was appropriate for those studying environmental education. Overall, it was also reported that the Website would be a

beneficial resource for either University practicum students or college students in the field of Environmental Education in general. The feedback gained from these individuals provided additional encouragement for the continued use of the Website within the University practicum course. The professionals also offered extremely helpful suggestions for improvements to the initial version of the Website.

Recommendations Regarding Evaluations by Professionals

It is highly recommended to have experts familiar with one's target audience evaluate a new resource. Their feedback and advice is invaluable and can help make important improvements. In particular, the professionals from this study had several suggestions for ways that a natural history Website might be integrated into a natural history training program. These suggestions could be helpful to another facility desiring to create their own natural history Website. *These recommendations included accompanying Website use with either a Webquest assignment, nature journaling, hands-on exploration, or interactive phenology blogging.*

V. Subproblem 4. Conduct summative evaluation of a completed version of the Website during a semester-long field study

During the fall of 2007, a semester-long field study occurred which collected feedback on how the CWES Nature Navigator Website functioned as an integrated component of the practicum course at CWES. Eleven University practicum students participated in this study by completing a pre-questionnaire before the semester began.

When analyzing the collected data, it was determined that the students had a wide range of previous natural history coursework, spanning between zero and eleven courses. This variation was primarily due to the fact that students had different majors and minors, which required varying levels of natural history courses. When asked to identify which of eight different natural history topics students were interested in learning more about, percent of interest in individual topics was quite high and ranged from 62.6% to 90.0% of the eleven individuals interested in a particular topic. When asked to self-report their knowledge of nine different natural history topics, with "1" being very low and "5" being very high, the mean knowledge for each topic ranged from 1.9 to 3.36. It can be concluded that these University practicum students had a high interest in natural history and a moderate knowledge of it.

The University practicum students then used the Website on a weekly basis and completed a weekly quiz on the information found there. At the end of the semester, they evaluated the Website through a post-questionnaire and focus group. These instruments found that student ratings of the layout and content of the Website were extremely positive. Students indicated that the Website had an appealing design, easy to read text, helpful links to other Websites, was easy to navigate, and presented information in an interesting manner. A strong majority (90.1%) of students also reported that the Website contained natural history/phenology information they would otherwise not have received from the practicum course.

As in the pilot study, all participants in the field study responded that the Website should continue to be used in the practicum program because it was helpful to them while teaching, provided them with a basic understanding of natural history, and refreshed their

previous knowledge of natural history information. Students also found the Website to be very useful to them in learning about natural history over the course of the semester, giving it a mean rating of 4.27 on a scale of "1" (Not useful) to "5" (Extremely Useful). Additionally, students who were Environmental Education minors, and had therefore taken fewer natural history courses, found the Website to be slightly more useful than those who had majored in Environmental Education and Interpretation and therefore taken more natural history courses. This shows that while individuals with little natural history experience may find the Website to be most useful, a variety of experience levels may gain benefits from its use.

While students spent a relatively short period of time (0-15 or 16-30 minutes) using the Website each week, all reported using the information they had gained from it. All students were able to incorporate information from the Website into their lesson plans, and found the information to be applicable to their practicum coursework. University practicum students either used information from the Website during teachable moments, to help them answer the K-12 students' questions, or as a review of information they already knew. Some students also used information from the Website for the interpretive programs they presented at the Schmeeckle Reserve. A majority of the students indicated that use of the Website had increased both their interest and awareness of Wisconsin natural history and phenology. Of the eleven practicum students participating in the study, all eleven indicated that use of the Website had increased their awareness of Wisconsin natural history and nine reported that it had increased their awareness of Wisconsin phenology. Ten of the eleven practicum students also indicated that use of the Website had increased their interest in Wisconsin natural history and nine

reported that it had increased their interest in Wisconsin phenology. Because of the extremely positive feedback gained during this study, it can be concluded that the use of the CWES Nature Navigator Website as a resource within the practicum course at CWES had a beneficial impact on University practicum students.

Recommendations Regarding the Field Study

Because University practicum students found the CWES Nature Navigator Website to be a useful resource within the practicum program, *it is strongly recommended that it continue to be used as an integrated component within the course.* Based upon feedback from University practicum students, key components within the "What's Happening at CWES?" section of the Website were identified. These elements were quite successful and should remain even as the site continues to be added to and revised. One such component is the inclusion of a short "Did you know?" section within each phenology article that shares quick, fun facts. Students enjoyed reading these facts and often used them while teaching. Another component is the current length of the phenology articles, which students found to be very appropriate for their busy schedules. In addition to these strengths, students also identified areas of weakness, such as the natural history topics of geology, insects, and lake ecology. These topics could be strengthened as future information is added to the site.

VI. Subproblem 5. Create a list of recommendations for the future use of the Website within the University practicum course

Based upon the feedback collected at all stages of research, *it is recommended that the CWES Nature Navigator Website continue to be used within the practicum course at CWES.* Even with the minimal time requirement, students still perceived benefits from the Website's use. These benefits not only increased University students' awareness and interest in natural history and phenology, but also provided them with information they could share with visiting K-12 students during their lessons and teachable moments.

As the Website continues to be used within the practicum course at CWES, it will require some maintenance and additional information. Necessary maintenance will primarily include checking the external links to other Websites to make sure they are still working properly and replacing them as needed. CWES staff are extremely busy individuals, and *it is therefore recommended that University practicum students or volunteers be the ones to check the links.* This should be done once a semester. Currently, the Website contains only phenology articles for the weeks in which the practicum program occurs at CWES; this excludes the weeks of the University's winter break and the months of June, July, and August. Therefore, *it is recommended that University practicum students or volunteers add phenology information to the remaining weeks* so that local residents may utilize the Website year-round and summer staff may use it to enhance their programming.

Several other important suggestions were gathered from University practicum students. One of these was that the use of weekly D2L quizzes was an appropriate way to

grade student use of the Website. This grading system was relatively low-maintenance for CWES staff, and therefore it is recommended that it continue to be used. Practicum students also suggested integrating the Website with lesson plans more thoroughly. *It is therefore recommended that links to applicable information on the CWES Nature Navigator Website be included within the lesson plans provided to practicum students.* Also, practicum students shared that they primarily used only the required section of the Website, the "What's Happening at CWES?" section. *To encourage students to utilize the other resources within the Website, a Webquest assignment is recommended.* This could be done during the first week of the course in place of a weekly quiz. The Webquest assignment would require students to find answers to a series of natural history/phenology questions by exploring all sections of the Website for information. Students may then be more aware of what resources were available to them within the entire Website, which might encourage them to utilize more when looking for natural history information to add to their lessons.

In addition to its use within the practicum program, CWES should also use the Website as a resource for visiting K-12 school groups. While the Website is currently available to the public, few visiting schools are aware of its existence. *It is recommended that the Website be promoted to these schools through the development of a flier included in pre-visit packets*. This form of marketing may increase outside awareness and utilization of the Website. *Pre or post-visit activities that integrate the use of the Website and relate to phenology/ natural history should also be created and offered to visiting schools.* These activities could include an online Webquest that teachers could assign to their students before they visited CWES so that they would be aware of local plants and

animals during their stay. Activities could also include the use of a nature journal in which K-12 students would collect information about local phenology as part of a class assignment. Student observations could later be compared to seasonal observations recorded at CWES. Teachers might also have their students create a class calendar, booklet, or school Web page centered on local phenology and natural history. This activity could be a one-time project or a year-round one. Pre and post activities should be created by University practicum students or volunteers, and then placed on the CWES Website for easy access.

VII. Further Recommendations and Implications

This study has shown that a Website can be a valuable tool for sharing local phenology/natural history information. Because of this, *it is recommended that other environmental education facilities create a similar resource to help train their seasonal staff or volunteers.* The use of such a Website could increase natural history knowledge within a facility, and produce staff and volunteers who are better equipped to answer visitors' nature-related questions. After the initial input of time required to create such a Website, its use could save staff time in training new recruits or volunteers about natural history, or offer this type of training if not originally provided. *To ensure that staff or volunteers utilize the resource, it is recommended that they be responsible for taking a short quiz, completing a Webquest, starting a nature journal, or conducting hands-on exploration in conjunction with reading the information on the Website.* These activities would encourage use of a natural history Website, as well as require users to immediately use the knowledge they had gathered there.

Creating a natural history Website requires a large amount of time, and *it is therefore recommended that the work be split between several individuals, preferably interns or volunteers. It is also recommended that the Website have a simple layout with clear navigation and include colorful graphics and photographs, as these were often listed as strengths of the CWES Nature Navigator.* When completed, a Website could provide a facility with both a training tool and a resource for visiting students or adults to learn from.

VIII. Recommendations for Future Research

There are many opportunities to build upon and further the research completed in this study. *It is recommended that the long-term effects of using the CWES Nature Navigator Website be analyzed by surveying University practicum students six-months to a year after they had used the Website within the program.* Such a survey would include questions about individuals' current interest or awareness of local natural history and phenology, as well as how they would now rate the usefulness of the Website within the University practicum course. It would also be valuable to *repeat this study over the course of many semesters to create a larger pool of data with which statistical analysis would be possible and generalizations could be made from.* Future research could also include comparing the post natural history knowledge of University practicum students who had used the Website over a semester with those who had not. This would help ascertain and quantify the amount of natural history knowledge students gained from the Website.

IX. Conclusion

The number of people utilizing the Internet as an information source is increasing. The current generation of college students is no exception and is adept at gaining knowledge from online resources. Unfortunately, while the number of Internet savvy individuals is rising, the number of people with interest and knowledge of natural history is declining.

This research has shown that using familiar computer technology to share less familiar local natural history/phenology information can benefit University students. The CWES Nature Navigator Website provided University practicum students with a weekly update of what local plants and animals were doing, which then became knowledge that they could apply to the environmental education programs they taught. Their new natural history/phenology knowledge was used to enhance their lessons, take advantage of teachable moments, and answer visiting K-12 students' natural history questions. In this way, the benefits that the University students received from the Website were likely passed on to the K-12 groups they interacted with. This would have ultimately provided CWES with more informed and knowledgeable educators, as well as furthered customer service at the facility.

It is important to note that not only were students able to apply the information that they had gained from the Website, but its use also increased their personal awareness and interest in the natural world. This is something that these University practicum students may carry with them into their future roles as interpreters, environmental educators, classroom educators, and camp staff. Awareness of and interest in nature is a valuable trait that offers students a lifetime of wonder.

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APPENDIX A: IRB PROPOSAL

University of Wisconsin-Stevens Point
Institutional Review Board for the Protection of Human Subjects

Protocol for Original Submissions

A complete protocol must be submitted to the IRB for approval prior to the initiation of any investigations involving human subjects or human materials, including studies in the behavioral and social sciences.

Send: 11 copies of (1) the completed protocol; (2) project abstract; and (3) samples of informed consent forms to the IRB chairperson. PROTOCOLS LACKING ANY ONE OF THESE THREE ELEMENTS WILL NOT BE APPROVED. In addition, copies of questionnaires or interview questions MUST be attached.

PLEASE TYPE

Project Title: Creation and Evaluation of a Natural History Website for Practicum Students at the Central Wisconsin Environmental Station

Principal Investigator: Jennifer Webster

Department: Natural Resources Rank: Graduate Student

Campus Mailing Address: CNR

Telephone: (715) 252-4296 E-mail address: jwebs373@uwsp.edu

Faculty Sponsor (if required): Dr. Yockers

(Faculty sponsor required if investigator is below rank of instructor.)

Expected Starting Date: March, 2007 Expected Completion Date: May, 2008

Are you applying for funding of this research? Yes _____ No X

Please indicate the categories of subjects to be included in this project. Please check all that apply.

X Normal adult volunteers _____ Minors (under 18 years of age)
_____ Incarcerated individuals _____ Mentally Disabled

_____ Pregnant women _____ Other _____ (specify)

(**Faculty Member**) I have completed the "Human Subjects Protection Training" (available at http://www.uwsp.edu/special/irb/start.htm) and agree to accept responsibility for conducting or directing this research in accordance with the guidelines.

_____

(Signature of Faculty Member responsible for research)

(**Department Chair or equivalent**) I have reviewed this research proposal and, to the best of my knowledge, believe that it meets the ethical standards of the discipline.

_____

(Signature of Department Chair or equivalent)

********** **Do not write below this line – for IRB use only**

IRB approval_____
Date_____

(Signature of IRB Chair)

Approval for this research expires one year from the above date. If research is not completed by this date, a request for continuation must be filed and approved before continuing. Revised form: January 2001

Proposal Abstract

Write a brief description of the purpose of the proposed research project. (100-200 words)

The purpose of the proposed research project is to create and evaluate the effectiveness of a natural history Web site, the Central Wisconsin Environmental Station (CWES) Nature Navigator, as a learning tool for practicum students to acquire natural history knowledge specific to the CWES property. This will be done in an effort to better train and prepare practicum students to teach and answer school groups' questions about the natural phenomena occurring at CWES. Through the practicum students' use and evaluation of the Web site, the researcher may learn what changes and edits should be made to improve the site's navigability, content, and visual design. These improvements may then enhance the experiences of future practicum students that use the Web site to gain knowledge.

Please complete the following questions for all research.

1. Describe the characteristics of the subjects, including gender, age ranges, ethnic background, health/treatment status and approximate number.

   There will be two groups of approximately ten subjects. It is expected that most will be Caucasian, in their early twenties and in normal health. There will be a mix of male and female subjects. All subjects will be enrolled in NRES 482, 576, or 376 Environmental Education Practicum.

2. Indicate how and where your subjects will be obtained. Describe the method you will use to contact subjects.

   All students enrolled in NRES 482,576, or 376 during the Spring and Fall semesters of 2007, will be asked to participate in the study as part of their coursework. All subjects will be contacted by e-mail with information about the study and a request to participate.

3. What are you going to ask your subjects to do (be explicit) and where will your interaction with the subjects take place?

   There will be two groups, a pilot study in the Spring of 2007, and a field study in the following Fall. Both will have the same protocols, but the pilot study will last two months and the field study will last three. At the start of the study, students will be asked to complete a pre-questionnaire on D2L regarding their self-rated knowledge, interest levels, and background in natural history. This questionnaire will be submitted by the students to the researcher's D2L drop box, which may only be accessed by CWES administrative staff. During the study, students will access information from the CWES Natural History Navigator Web site each week for at least 15 minutes. Each week, they will also complete an un-graded multiple choice or matching quiz on the information they accessed. These quizzes will be administered through D2L. During the study, students will be asked to use the Web site to answer any nature related questions they may have. At the end of the study, students will take a post-questionnaire regarding self-rated knowledge and interest in natural history and evaluation of the Web site. The questionnaire will again be submitted to the researcher's dropbox on D2L.

4. Will deception be used in gathering data? Yes No X

5. Are there any risks to subjects? Yes No X

If yes, describe the risks (consider physical, psychological, social, economic, and legal risks) and include this description on the informed consent form.

6. What safeguards will be provided for subjects in case of harm or distress? (Examples of safeguards include having a counselor/therapist on call, an emergency plan in place for seeking medical assistance, assuring editorial rights to data prior to publication or release where appropriate.)

   The researcher will be available to answer any questions or concerns the subjects might have about using the Web site. The subjects will have the researcher's e-mail address.

7. What are the benefits of participation/involvement in this research to subjects? (Examples include obtaining knowledge of discipline, experiencing research in a discipline, obtaining course credit, getting paid, or contributing to general welfare/knowledge.) Be sure to include this description on the informed consent form.

Subjects may gain knowledge about the flora and fauna of the CWES property. They may also help shape the Web site for future practicum students,

8. Will this research involve conducting surveys or interviews? Yes X No

If yes, please attach copies of all instruments or include a list of interview questions.

If electronic equipment is used with subjects, it is the investigator's responsibility to determine that it is safe, either by virtue of his or her own experience or through consultation with qualified technical personnel. The investigator is further responsible for carrying out continuing safety checks, as appropriate, during the course of the research. If electronic equipment is used, have appropriate measures been taken to ensure safety? Yes X No

Computers and the Internet are accepted as safe.

9. During this research, what precautions will be taken to protect the identify of subjects and the confidentiality of the data?

The data will be stored on a password protected computer, and only subjects' first names will be used when gathering and compiling the data. After the data has been gathered and compiled, the subjects' names will be replaced with identifying numbers to protect their anonymity.

10. Where will the data be kept throughout the course of the study? What provisions will be taken to keep it confidential or safe?

Completed questionnaires will be sent to the researcher's mailbox in D2L, which only CWES administrative staff may access. Data will then be moved and stored on the researcher's personal computer, which will be password-protected.

11. Describe the intended use of the data by yourself and others.

The data will be used to measure the effectiveness of the Website as a learning tool, and determine what measures should be taken for the future improvement of the Web site.

12. Will the results of the study be published or presented in a public or professional setting?

Yes X No

If yes, what precautions will be taken to protect the identity of your participants? **State whether or not subjects will be identifiable directly or through identifying information linked to the subjects.**

If results of the study are presented, the subjects will remain anonymous and identifying information will not be shared.

13. State how and where you will store the data upon completion of your study as well as who will have access to it? What will be done with audio/video data upon completion of the study?

Upon completion of the study, data will be made available to the public in the form of a bound thesis, which will be stored in the UW-SP library. The data will also remain on the researcher's private computer. This data will contain the subjects' anonymous information.

APPENDIX B. INFORMED CONSENT TO PARTICIPATE IN HUMAN SUBJECT RESEARCH

Jennifer Webster, a graduate student pursuing a Masters in Environmental Education and Interpretation at the University of Wisconsin-Stevens Point would appreciate your participation in a research study designed to evaluate the Central Wisconsin Environmental Station's (CWES) Nature Navigator Website as a learning tool. You are being asked to complete a survey that should take approximately 15 minutes of your time. There is no anticipated risk associated with your participation in this study other than the inconvenience of the time needed to complete the survey.

Your participation in the study will help shape the CWES Nature Navigator Web site, and may increase your knowledge of the plants and animals found on the CWES property.

The information that you provide in this questionnaire will be kept confidential. All completed surveys will be stored in a private, password-protected computer and will not be available to anyone not directly involved in this study.

Once the study is completed, I would be happy to send you a digital copy of the results. In the meantime, if you have any questions, please contact:

Jenni Webster
School of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 252-4296

If you have any complaints about your treatment as participant in this study, please call or write:

Dr. Karlene Ferrante, Chair
Institutional Review Board for the Protection of Human Subjects
Academic Affairs Office
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-3712

Although Dr. Ferrante will ask your name, all complaints are kept in confidence.

Your completion and submission of the survey to the researchers represents your consent to serve as a subject in this research.

This research project has been approved by the UWSP Institutional Review Board for the Protection of Human Subjects.

APPENDIX C. INTRODUCTORY LETTER TO PILOT STUDY PARTICIPANTS

Hello Everyone,

If you didn't already know, Jenni Webster has been putting together a "Nature Navigator" Website as part of her thesis project for her Masters in EE. The Website is designed specifically for practicum students as a medium to see what is happening in natural history phenology at CWES, to give you some geologic and landscape background of the area, to help you key out animal and plant species that you see at CWES, and to help you add some natural history into the lessons that you teach.

Jenni has already done a focus group study with former practicum students and will be using the fall 2007 practicum students as her final sample. You, the Spring 2007 practicum students, will be her pilot study group. Over the month of April, we ask you to visit the Website each week and look at the "monthly phenology" link to see what is happening in nature. The other links are also available for you and are amazing resources for further study. It should take less than 15 minutes each week to look over the phenology for the upcoming week, after which you will take a short quiz on D2L. The 5 question multiple choice quiz is on D2L under "quizzes" and a new one will be posted each week.

Before you visit the site the first time, Jenni has requested that you fill out an online questionnaire that she will use to learn about her sample. It should take less than 10 minutes to fill out the online survey. Jenni will forward you an IRB consent form to look over. It is a document that everyone must look over before taking part in the study.

As part of the study, you will receive extra credit points that will be added to your lesson prep totals. For participating in the 4 weeks, you will earn up to 4 additional points.

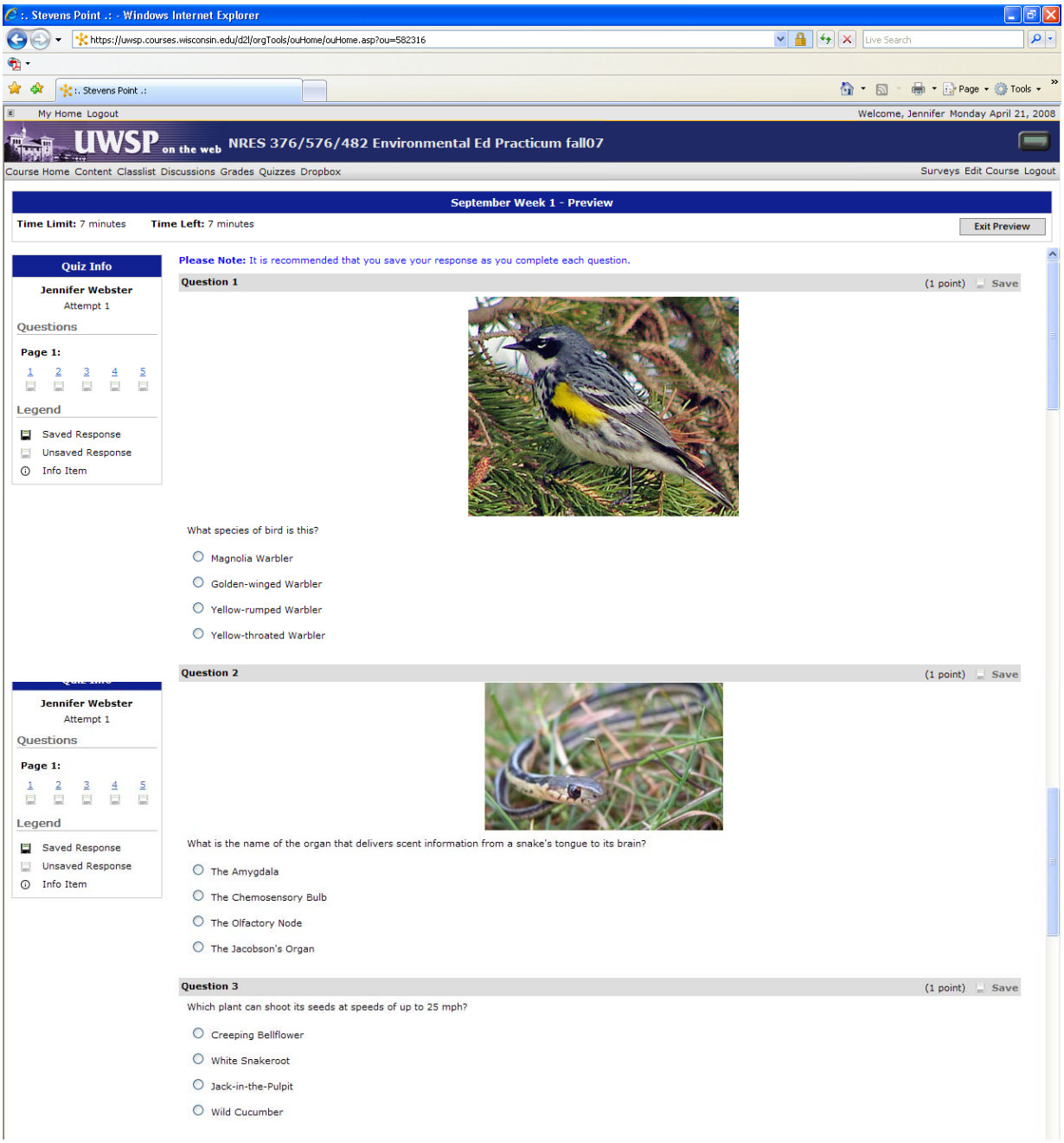
Here is a breakdown of what we need for you to do:

1. Review the IRB consent form Jenni will forward you
2. Fill out the online questionnaire at http://www.uwsp.edu/cnr/cwes/naturalhistory/form3.htm (If possible, please fill out before Tuesday of next week April 3.)
3. Visit the "Nature Navigator" Website at http://www.uwsp.edu/cnr/cwes/naturalhistory/ and click on the monthly phenology link to see what is happening at CWES next week. (Please visit the site before you prepare your lesson preps for next week. Everyone should take a look at it by April 6.)
4. On D2L, go to the "Quizzes" page and take the quiz for the first week

On successive weeks, you just need to visit the "Nature Navigator" Website and then take the quiz sometime before you are assigned to come to CWES.I hope this will be of benefit to you and your teaching at CWES during your second half of the semester. If you have any questions related to this email, please let me know. If you have any trouble with forms or with the "Nature Navigator" Website, please email Jenni at jwebs373@uwsp.edu. Both Jenni and I appreciate your participation in the study.

Tom Quinn
Program Manager
Central Wisconsin Environmental Station
10186 County MM
Amherst Junction, WI 54407

APPENDIX D. SAMPLE D2L WEEKLY NATURAL HISTORY QUIZ



Legend

Quiz Info

Jennifer Webster
Attempt 1

Questions

Page 1:

1 2 3 4 5

Legend

Saved Response
Unsaved Response
Info Item

Question 4 (1 point) Save

Which of the following is a special characteristic of this plant?

- Highly palatable berries
- The plant can change sex from year to year
- Evergreen vegetation
- Hydrostatic pressure

Question 5 (1 point) Save

What is the name of this plant, which can cause milk sickness?

- Aster
- Creeping bellflower
- White snakeroot
- White baneberry

Quiz Status

Quiz Started

Save All Responses

Go to Submit Quiz

APPENDIX E: PILOT STUDY FOCUS GROUP GUIDE AND RESPONSES (N=11)

1. Did you have any technical/layout problems with the Website?

- No (Eight agreed)
- The rollover image on the main calendar page of the phenology section was confusing (Three agreed).

2. Was most of the information new to you, or was it mostly repeating information you already knew?

- Information was primarily new (Six agreed).
- Information was a mix (Four agreed)
- "Basic information was old, but details were new"
- "For the most part new info. about old subjects"
- "The repetition was good"
- "There aren't many Websites that give you information from an educator' or naturalist's point of view. There are webpages where you can get lot more information, but this one is kind of unique I think."
- "As a wildlife major, I knew most of it already. Frog info was new. For education majors and environmental educators, I think it will be perfect. It gives them hints for teachable moments."

3. Were you able to use the information from the Web site? In what way?

- "Used for teachable moments, space fillers, and hiking."
- "Used to share turtle info with kids."
- "Thought about using it for lesson, but didn't."
- "Good for teachable moments."
- "If used for longer I may have used."
- "Including info in lesson preps might be nice."
- "Not that much, but good info for a naturalist or educator to know."
- "Depended upon the lesson, can use better for unstructured lessons."
- "A harder requirement would make me remember the info. for teachable moments."
- "Could require incorporation into lesson plans, would rather do that than take a quiz. Would make it easier to remember info."

4. Was the information interesting to you?

- Yes (Six agreed)
- "Things you wouldn't think to look up, cool and random facts."
- "There aren't many Websites that give you information from an educator's or naturalist's point of view."

5. Do you have any suggestions for improving the Web site?

- Reduce the links needed to access sound files (Two agreed)
- "Revolve around lessons, so that they can add that info. to lessons."
- "I think it would be helpful to have next to the facts and pictures the name of the actual lesson that they could be tied to. Indicating possible ties to lessons, to help practicum students identify information that they can include.
- "Extra links would be more efficient." (Two agreed)
- "Would like more calls for birds."
- "More info would be nice to know."
- "More photos for plants."
- "Put more pictures to show different life stages and possible colors."
- "It would be nice to know the exact locations of things, more specific. Add info about current weather situations."
- "Not all of sound bytes worked."
- "Hard for me to do sound on university computers."
- "Information was interesting, it was the perfect length and style."
- "Grouping things together by plants and animals for each month, would be easier to access later on, but leave the weeks organized as they are."
- "It's nice when other Web pages have all the info. on one page so that you can scroll through it."

6. Did you find the quizzes to be too difficult, just right, or too easy for you?

- "Some was too hard, and I had to go back to look at."
- "Too easy."
- "Make the multiple choice harder."
- "If you read every word of it, it's pretty easy."
- "Could be a little more challenging, so you can't just skim through it."

7. Did the quizzes encourage you to read the Website more thoroughly?

- Yes (Seven agreed)
- Not sure (Three agreed)

8. Do you have any suggestions for the use of the Website for next year's practicum?

- "Have next year's practicum do it."
- "Make quizzes worth real points."
- "Use in lesson preps, because then they have to read it. It was helpful to read info before you came out."
- "Do both quizzes and use in lesson preps."
- "Connect to CWES homepage, to make it more easily accessible."

APPENDIX F: QUESTIONNAIRE FOR PROFESSIONALS FROM OTHER FACILITIES

Please review the "Nature Navigator" Website and then fill out this form to the best of your ability. Your answers are much appreciated and will help evaluate and shape the Website.

1. Name of your facility:

May we mention your name and your facility's name in written publications for this research:

☉ Yes ☐ No

Website Design

2. Please rate the navigational ease of the Website:

☐ Very Difficult to Navigate
☐ Difficult to Navigate
☐ Easy to Navigate
☐ Very Easy to Navigate

3. Please rate the overall design of the Website:

☐ Very unappealing
☐ Unappealing
☐ Appealing
☐ Very Appealing

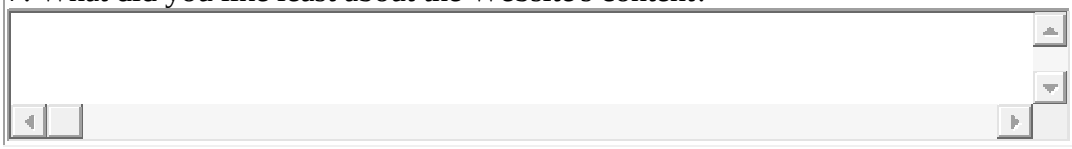
4. What did you like most about the Website's design?

5. What did you like least about the Website's design?

Content

6. What did you like most about the Website's content?

7. What did you like least about the Website's content?



8. Please rate how appropriate the information on the Website is for undergraduate level college students:

- ☐ Very Inappropriate
- ☐ Inappropriate
- ☐ Appropriate
- ☐ Very Appropriate

9. Information on the Website was presented in a manner that made it:

- ☐ Very Uninteresting
- ☐ Uninteresting
- ☐ Interesting
- ☐ Very Interesting

How might information have been presented in a more interesting manner?

10. If you learned anything new from the Website, please mention it below:

Applicability

11. Would you use this site if you needed to find information about central Wisconsin flora and fauna?

- No
- Maybe
- Yes

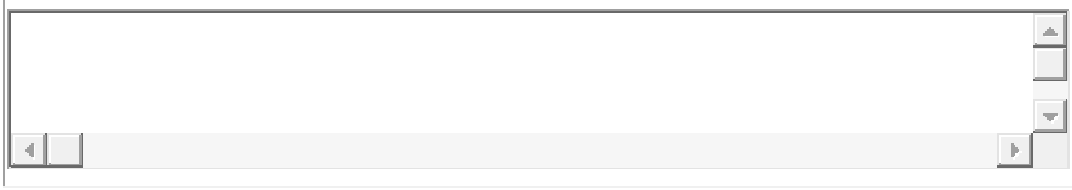
Why or why not?

12. Would a similar Website be a helpful resource for your students? Why or why not?

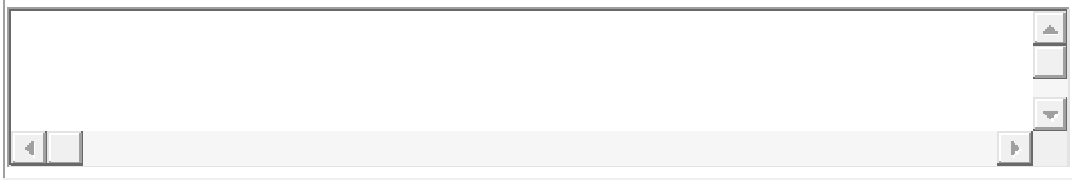
13. If you already use a similar resource for your courses, please describe it and its use here:

If you do not, how would you integrate the use of such a Website into the courses you teach (would you use weekly quizzes, blogging, nature journals, incorporation into student-teaching, etc.):

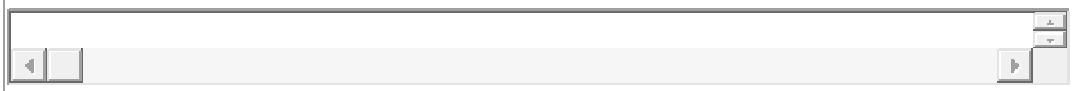
14. Do you think that using the "Nature Navigator" Website would be beneficial to students in the Environmental Education and Interpretation field? Why or why not?



15. Do you have any other comments that you would like to share?



16. What name and address would you like your $15 gift certificate to Acorn Naturalists to be sent?



Thank you for your time and thoughts

Submit

APPENDIX G. QUESTIONNAIRE FOR PROFESSIONALS FROM OTHER FACILITIES

Please review the "Nature Navigator" website and then fill out this form to the best of your ability. Your answers are much appreciated and will help evaluate and shape the Website.

1. Name of your facility:

May we mention your name and your facility's name in written publications for this research:

☑ Yes ☐ No

Website Design

2. Please rate the navigational ease of the website:

☐ Very Difficult to Navigate
☐ Difficult to Navigate
☐ Easy to Navigate
☐ Very Easy to Navigate

3. Please rate the overall design of the website:

☐ Very unappealing
☐ Unappealing
☐ Appealing
☐ Very Appealing

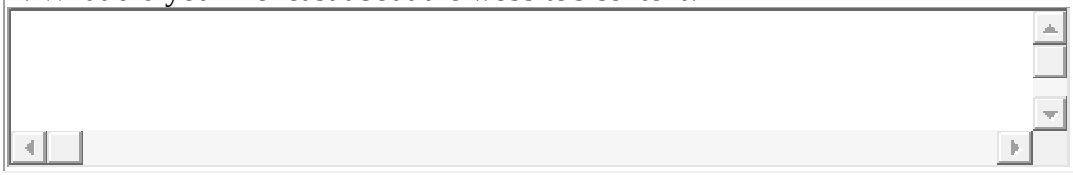
4. What did you like most about the website's design?

5. What did you like least about the website's design?

Content

6. What did you like most about the website's content?

7. What did you like least about the website's content?



8. Please rate how appropriate the information on the website is for undergraduate level college students:

- ☐ Very Inappropriate
- ☐ Inappropriate
- ☐ Appropriate
- ☐ Very Appropriate

9. Information on the website was presented in a manner that made it:

- ☐ Very Uninteresting
- ☐ Uninteresting
- ☐ Interesting
- ☐ Very Interesting

How might information have been presented in a more interesting manner?

10. If you learned anything new from the website, please mention it below:

Applicability

11. Would you use this site if you needed to find information about central Wisconsin flora and fauna?

- No
- Maybe
- Yes

Why or why not?

12. Would a similar website be a helpful resource for your students? Why or why not?

13. If you already use a similar resource for your courses, please describe it and its use here:

If you do not, how would you integrate the use of such a website into the courses you teach (would you use weekly quizzes, blogging, nature journals, incorporation into student-teaching, etc.):

14. Do you think that using the "Nature Navigator" website would be beneficial to students in the Environmental Education and Interpretation field? Why or why not?

15. Do you have any other comments that you would like to share?

16. What name and address would you like your $15 gift certificate to Acorn Naturalists to be sent?

Thank you for your time and thoughts

Submit

APPENDIX H: INTRODUCTORY LETTER TO PROFESSIONALS AT UW-SP

May 16, 2007

Dear _____,

Because of your knowledge of the Practicum Program at CWES, I am writing to see if you would be interested in filling out a short questionnaire for my thesis in the next two weeks. The completed questionnaire would help me evaluate the natural history/phenology Website I created for students in the Environmental Education Practicum program at the Central Wisconsin Environmental Station. The Website has been designed to give these students weekly, applicable natural history and phenology information to increase their knowledge and awareness of the outdoors. The hope is that this will then be passed on to the grade school students with whom they interact.

This semester's practicum students used the Website during a month-long pilot study, and gave me initial feedback about the site. This fall, the incoming practicum students will use the Website weekly, and I will collect their feedback about this particular method of gaining nature information. In an effort to best evaluate and edit this site for future use, I am also collecting feedback about the Website from professionals, such as yourself, who are familiar with the Practicum Program.

Accessing the Website and filling out the questionnaire will take less than half an hour of your time, and would be hugely appreciated. If you are willing to participate, please send me an e-mail. Thank you for your time and have a wonderful day!

Sincerely,

Jennifer Webster
CWES Graduate Assistant

APPENDIX I: INTRODUCTORY LETTER TO PROFESSIONALS FROM OTHER FACILITIES

May 16, 2007

Dear _____,
I am an Environmental Education and Interpretation graduate student at the University of Wisconsin-Stevens Point. My advisor, Dr. Dennis Yockers, suggested that I write to ask if you would be interested in participating in my thesis by filling out a short questionnaire in the next two weeks. The completed questionnaire would help me evaluate a natural history/phenology Website I have created for undergraduate students in the Environmental Education Practicum program at the Central Wisconsin Environmental Station (CWES). This program is similar to the practical course at your facility, and provides undergraduate students an opportunity to learn and then teach environmental programming to grade school students in an outdoor setting. The Website has been designed to give these college students weekly, applicable natural history and phenology information to increase their knowledge and awareness of the outdoors. The hope is that this will then be passed on to the grade school students with whom they interact.

This fall, a group of undergraduate students at CWES will use the Website weekly, and I will collect their feedback about this particular method of gaining nature information. In an effort to best evaluate and edit this site for future use, I am also collecting feedback about the Website from professionals, such as yourself, who lead similar programs at other universities.

Accessing the Website and filling out the questionnaire will take less than half an hour of your time, and you would receive a $15 gift certificate for Acorn Naturalists in appreciation. If you are willing to participate, please send me an e-mail. Thank you for your time and have a wonderful day!

Sincerely,

Jennifer Webster
CWES Graduate Assistant

APPENDIX J: FOLLOW-UP LETTER TO ALL PROFESSIONALS

Hello _____,
Thank you for participating in this survey, your insights will be greatly appreciated! This e-mail contains information about completing the survey, background information about the Website, and informed consent information. If you have any questions or concerns, please contact me by e-mail. I'd like to have the questionnaires collected by **May 22nd.** Thank you again for all your help and have a wonderful day-Jenni Webster

To complete the survey, please access the "Nature Navigator" Website and navigate through its four main sections. Because the Website is currently a rough draft, the "What's Happening at CWES?" section only has information for the month of April. The Website's address is
http://www.uwsp.edu/cnr/cwes/naturalhistory/

After you have looked through the information from the Website, please fill out the online questionnaire located at
http://www.uwsp.edu/cnr/cwes/naturalhistory/form.htm

The following is background information about the Website which may help you complete the survey:

The natural history Website is specific to the flora and fauna of the Central Wisconsin Environmental Station (CWES), an extension of the University of Wisconsin-Stevens Point. The purpose of this Website is to provide undergraduate students enrolled in an Environmental Education Practicum program at CWES with basic knowledge of the natural history at their teaching site. These practicum students are primarily Environmental Education and Education majors and minors, who teach outdoor related lessons to visiting school groups at CWES 1-2 days a week. The teaching often focuses on wildlife, ecosystems, and outdoor skills. Several of the programs also involve short hikes on the CWES property. A desired outcome of the Website is for practicum students to gain basic knowledge about natural history at CWES which can be utilized during their teaching and hikes.

This Website will be incorporated into the Practicum program at CWES. It is designed to be used as both a reference for identifying local flora and fauna, and a weekly guide for natural history that may be encountered while teaching. Students will be asked to read the weekly guide (located in the "What's Happening at CWES?" section) before they come to CWES to teach each week, and to then take a short quiz regarding that information. They will also be encouraged to weave this knowledge into the lessons that they teach.

Please find a consent form for participating in research associated with the University of Wisconsin-Stevens Point attached to this e-mail.

Appendix K:
ONLINE QUESTIONNAIRE RESPONSES FOR PROFESSIONALS IN THE FIELD OF ENVIRONMENTAL EDUCATION BOTH AT UW-STEVENS POINT AND OTHER INSTITUTIONS (N=7)

What did you like most about the Website's design?

- "The Nature Navigator home page is very attractive, as are the green background and the numerous photographs."
- "The site is visually appealing and draws me in. The graphics are clear with useful resource information. The initial appearance is not text heavy, so I want to continue digging in deeper."
- "The Website is very well designed for its purpose. The simple green-tone color scheme accented with bright illustrations and photographs is very attractive and easy to use. I love the fun, "informal" appearance... rounded corners, tilted boxes, green dots, and background color splashes."
- "Flows easy, very eye-catching and appealing. Fun!"
- "The first page - it is graphically interesting and extremely simple. I am frustrated by the sites that give dozens of options right from the start. Keep it simple."
- "Use of photos and large text makes it easy to use and find what you are looking for."

What did you like least about the Website's design?

- "I would possibly change the background color of the tables to better differentiate various sections. For example, under the April Phenology-Week 1, the "Bald Eagles Lay Eggs" table could be a lighter green (or other color) in the background. The thin white borders are a bit weak... somewhat difficult to know where the "Eagle" section stops and the "Canada Goose" section begins. In addition, most research shows that dark writing on a light background is easier to read for multiple lines of text... but incorporating a light background on the tables, dark text could be used to enhance readability. I would still keep the headlines ("April," "Week One," etc.) a light color."
- "In the phenology section, the weekly information blends together a bit too much (visually). The entire page is green and it could be as simply as changing the color scheme for each event or maybe making a broad band to discern each event.."
- "To navigate, one had to repeatedly scroll up or down to get to the link. Only thing, and it is not a dislike but more of a maintenance issue, is the links to outside sites. These can change and someone has to update them or double check the site on a regular basis."
- "That it is so easy to access. You should have to log on with your own phenological data/observations. Resources from California! How about listing all

nature centers and museums in the region, state, midwest, then national. Geology section seems very incomplete."

- "I honestly like what I saw and can't think of a useful "least" answer. There is so many different ways to present natural history, and I like your take on how you have organized the site."

What did you like most about the Website's content?

- "I most liked the fact that the level of information was good for a basic introduction to the topic, while the links (where there were links as on the ID pages) allowed one to quickly go to a page with more information."
- "I enjoy phenology and so I was drawn immediately to that. I like that kind of information. I also enjoyed that the wildflower section took us to the herbarium sight - that is a very credible way to present the information."
- "It provided a great deal of basic information essential for understanding the educational programs of CWES. The multiple photographs and illustrations help to tell the story, and the text is written concisely... very easy to understand."
- "Thorough, interesting and, of course, educational!"
- "The writing is interesting and maintains my attention as I learn about new species or geology of the area, etc. The related links are appropriate and detailed for those who want to search further about a topic. The content should be very helpful for on site reference at CWES."
- "I don't think this is how we want to teach children natural history or phenology. Let's get back to field trips and field guides. When the power goes down how will we learn constellations unless we have been outside. In this day and age we need more outdoor time, not another reason to turn on the computer and use electricity. Let's exercise our bodies and our minds."
- "I liked the place based approach that also ties the site to national and state sites with more information (nice work on the web links -- good sites to refer folks to)."

What did you like least about the Website's content?

- "Some text (for example, on the Essentials page) runs very close to the border of the tables. Adjusting the interior margins will give the text more breathing room and enhance its appearance. In addition, I would also make all of the pictures that have a link underneath clickable as well. For example, under "What Did I See" the word "Birds" is clickable, but the photo of the goldfinch is not. Making the pictures clickable will enhance usability."
- "The lack of links to more information on some pages, e.g., "Central WI essentials.""
- "As I wrote above, the herbarium connection is great. Perhaps the same could be done in the phenology section. When I look at the ferns (for example) why not have a direct connection to the herbarium pages? Other appropriate interpretation could and should remain on the page."

- "Again, nothing. Maybe try to include some of the insects under "What did I see" or have a page where the students can add phenological data themselves. It would be fun to have a data tracking page where student/school group information could be added on a yearly basis and charts kept. This would be a great place as then schools could even go in and check the date before coming...i.e. what birds did we see last year? Will they be there this year or is it too cold yet??? That type of thing."
- "I think it is appropriate."

How might information have been presented in a more interesting manner?

- "I think the layout of the content could be more attractive. For example the font for the URL links for animal ID are too small. There's also a lot of print and images on every page."
- "Hmmmm... Less is always more. Keep just the most intriguing points on one screen. If I have to scroll down, then it is probably more than I want at that very moment. But if there is an intriguing point with a connection to more somewhere else, I will likely advance on my own. Keep it simple."
- "Continuing the informal look of tilted boxes and rounded corners throughout the Website (unifying the design with the home page) would add a sense of discovery. This would also increase the workload drastically! There will have to be a balance between fun design and maintenance."
- "Again, maybe make it interactive where students can add or give the webmaster data to add (I know, a big task)."
- "Actual video footage to make things "come alive" would add interest, but I don't think it is necessary due to various computer operating systems."
- "For college students it is overly simplistic. This is about a sixth grade level isn't it?"
- "An appropriate follow up might be to link species to research conducted in WI (pdf. of thesis work, etc.)"

How do you/ might you incorporate such a Website into your own program (weekly quizzes, blogging, nature journals, creating information to add to the site, incorporating into lesson plans, etc.)? *Only from professionals at other institutions.*

- "Interestingly enough, Wolf Ridge is already doing this very thing. We are beginning new curriculum based on three main points - phenology, global warming and energy production. We have a database that we have been working on for 3 years already that is usable by both adults and gradeschool children. I really enjoy the phenology aspect of it - let's learn what is most applicable to the current season. Good work. We also use something called Tracker and Peter Harris is responsible for most of the work on it here at Wolf Ridge. We will be using this with weekly quizzes and nature journaling."
- "Yes, as a model as I have been thinking of a similar project with Penn State students. Also an easy site to find information on phenology and journaling."

- "I would not assign a site like this to my students."

What could be added or improved to make the Website a more optimal resource for students enrolled in the Practicum course at CWES? *Only from professionals at UW-Stevens Point.*

- "Obviously, you've got more information to fill in and I think for now that's what's needed most, e.g., more on Central WI essentials."
- "Working from the last question, perhaps some sort of Blog or database resource would keep the site fresh and interactive. If a student sees a baby robin on April 27, for example, they could jump onto the Website and record their observation. This could be automatically posted on the Website (or reviewed first) to expand the phenology year after year. I've been hoping to do something similar on our Schmeeckle Website."
- "Again, just interactive component and perhaps adding student group data to keep a record of findings from year to year."

What methods would you use to integrate such a Website into the Practicum course (weekly quizzes, blogging, nature journals, creating information to add to the site, incorporating into lesson plans, etc.)? *Only from professionals at UW-Stevens Point.*

- "It seems the intent is for the Website to supplement the Practicum, not the reverse. However, to encourage students to see its value and use it, I think a webquest assignment would be useful. It could also be a requirement to refer to it in journals."
- "I think the CWES staff will need to decide what the best way would be. Nature journaling is a must, and is a current requirement of the Practicum course. It fits in naturally with this, but students may be tempted to copy information off the Website into their journals. Again, a Blog/database resource would be an ideal interactive device."
- "Nature journals could go hand in hand well with this. This is already included in the Schmeeckle part of practicum and could easily be a combined assignment. Giving students a chance to research additional links would be useful as well. This is a great resource for people in Central Wisconsin in general, not just at CWES."
- "See above, but also I think using it as an educational tool during training would be enough. This is a resource for the students to get information from. I think we have a tendency to try to get people in front of the computer too much because there is such good information - yet the best way to learn is hands-on. Maybe one thing to try is to have the students pick out a few new flowers or birds, etc... they don't know well each week and try to incorporate it in the lesson plan. In other words, as they are hiking out to the forestry plots say, they have the students look for the spotted willy wink or whatever!"

Do you think that using this Website would benefit students enrolled in the Practicum course at CWES? If yes, in what ways would it benefit them? *Only from professionals at UW-Stevens Point.*

- "It will probably benefit those students with weak natural history background. Those with a stronger natural history background, through, may also find it helpful to fill in gaps in their knowledge or double check their information."
- "Yes. Students in the EE/Interp. major NEED a strong natural history background to develop effective educational and interpretive programs. This is one of the main areas that I have seen lacking in recent years. The Website will be an invaluable tool for identifying species and understanding phenology. Hopefully, the Practicum students can add information to the Website as well!"
- "Yes, it should be mandatory for them to look at it. I feel it would give them all a great sense of confidence in knowing the material before showing up to orientation. We would sometimes use Eric Anderson's disk of CWES Natural History (http://www.uwsp.edu/wildlife/eanderso/cwes/NaturalHistoryofCWES/cwesnaturalhistoryguide.htm) - have you looked at this? But what you have is really great and accessible. Perhaps, if you haven't already you could look at Eric's Website and incorporate some things if they are different.."
- "Yes, because of the media being so easy to access, and because of the practical nature of the Website. Students should quickly realize that this is an added tool to enhance their CWES lessons."

Do you think that using such a resource would be beneficial to students in the Environmental Education and Interpretation field? Why or why not? *Only from professionals at other institutions.*

- "Absolutely... for the reasons I mention above. I am pleased to see that we are following similar paths. I view this as a way to give more credence to the work that we are doing here. Great minds think alike - right?"
- "Yes, very appropriate. I like the user friendly and placed based approach."
- "No, get outside. Learn the significant texts and get to know the regional naturalists and DNR Ecologists. Join the Audubon winter bird counts."

Do you have any other comments that you would like to share?

- "A few picky ideas. For the "Got Questions?" page, I would make every link open in a new window. That way you always have the original page still. Also, for some reason when I look at the April phenology, I can't use the Back button to get back to the "Select a Month" page. Must be the way that it's linked (?). I actually had to go back to the Home Page (link on the bottom) and then click "Monthly Phenology." Also, under the "Essentials" page, I would make certain items clickable. For example, when talking about the fish in Sunset Lake (blue gills, brook trout), link the fish to the ID page in case a user doesn't know what they are. You could also link other terms (like Kettle Lake) to an outside Website that provides more technical details... for those who really wanted them. Layered

information is really the power of the Internet. This is an excellent Website, well designed and easy to use! What an amazing addition to the CWES digital library."

- "Great project! I like the direct links to Cornell for bird information -- no sense duplicating what is already well done."

Appendix L. Pre-Questionnaire for Pilot and Field Studies

Please fill out this form to the best of your ability. Your answers will be kept anonymous, and will be used to determine individual backgrounds in natural history and phenology. Since a very small number of individuals are being surveyed, your honest answers are very important to us. When you have answered all questions, please select the "submit" button at the end of the form to send it to the researcher. Thank you.

1. First Name:

2. Current standing at UWSP:

3. Current major

minor

4. When learning about nature, my top 3 sources of information are… (label these 1-3, with 1 being the most used)

Reference Books		Field Guides	
Magazines		Websites	
Television		Coursework	
My Peers		Personal Observation	
Other (please describe)			

5. Please rate your level of knowledge in the following areas:

WI Wildflowers	WI Trees	WI Amphibians
1 -Very Low	1 -Very Low	1 -Very Low
2 -Low	2 -Low	2 -Low
3 -Moderate	3 -Moderate	3 -Moderate
4 -High	4 -High	4 -High
5 -Very High	5 -Very High	5 -Very High

WI Reptiles	WI Mammals	WI Birds
☐ 1 -Very Low ☐ 2 -Low ☐ 3 -Moderate ☐ 4 -High ☐ 5 -Very High	☐ 1 -Very Low ☐ 2 -Low ☐ 3 -Moderate ☐ 4 -High ☐ 5 -Very High	☐ 1 -Very Low ☐ 2 -Low ☐ 3 -Moderate ☐ 4 -High ☐ 5 -Very High
WI Insects	WI Geology/Physical Geography	WI Phenology
☐ 1 -Very Low ☐ 2 -Low ☐ 3 -Moderate ☐ 4 -High ☐ 5 -Very High	☐ 1 -Very Low ☐ 2 -Low ☐ 3 -Moderate ☐ 4 -High ☐ 5 -Very High	☐ 1 -Very Low ☐ 2 -Low ☐ 3 -Moderate ☐ 4 -High ☐ 5 -Very High

6. Please place a check by any of the following topics that you would like to learn more about:

- ☐ WI Wildflowers
- ☐ WI Trees
- ☐ WI Mammals
- ☐ WI Birds
- ☐ WI Amphibians
- ☐ WI Reptiles
- ☐ WI Insects
- ☐ WI Geology/Physical Geography

7. Please list any natural science courses you intend to take this semester:

8. Please select all courses that you have taken at UWSP from the following lists (use the control key to select multiple courses):

Plant Courses
- BIOL 130. Introduction to Plant Biology
- BIOL 308/508. Plant Communities of the Upper Midwest
- BIOL 331/531. Plant Anatomy

Animal Courses
- BIOL 160. Introduction to Animal Biology
- BIOL 281. Animal Physiology
- BIOL 374/574. Ichthyology

Insect Courses
- FOR 426/626. Forest Entomology
- BIOLOGY 567/367 GENERAL ENTOMOLOGY

Geology/Physical Geography Courses
- GEOL 100. Geology and Science
- GEOL 104. Physical Geology
- GEOL 330/530. Environmental Geology

If you have taken any nature-related courses at another college, please list them here:

9. Have you taken CNR Summer Camp? ◉ Yes ○ No

Thank you for your time and thoughts!

Submit

APPENDIX M: POST-QUESTIONNAIRE FOR PILOT AND FIELD STUDIES

Please fill out this form to the best of your ability. Your answers will be kept anonymous, and will be used to evaluate and shape the Nature Navigator for future Practicum students. Since a very small number of individuals are being surveyed, your honest answers are very important to us. When you have completed the questionnaire, please select the "submit" button to send it to the researcher. Thank you.

1. First Name:

2. Please rate how useful the Nature Navigator was to you in learning about the natural history at CWES this semester:

- ☐ 1 -Not useful
- ☐ 2 -A little useful
- ☐ 3 -Moderately useful
- ☐ 4 -Very useful
- ☐ 5 -Extremely useful

3. Please circle the number that best describes the amount of <u>new</u> knowledge the Nature Navigator provided you with for the following:

WI Phenology	WI Plants	WI Insects
☐ 1 -None ☐ 2 -A small amount ☐ 3 - A moderate amount ☐ 4 -A good amount ☐ 5 -A great amount	☐ 1 -None ☐ 2 -A small amount ☐ 3 - A moderate amount ☐ 4 -A good amount ☐ 5 -A great amount	☐ 1 -None ☐ 2 -A small amount ☐ 3 - A moderate amount ☐ 4 -A good amount ☐ 5 -A great amount
WI Reptiles and Amphibians	**WI Mammals**	**WI Birds**
☐ 1 -None ☐ 2 -A small amount ☐ 3 - A moderate amount ☐ 4 -A good amount ☐ 5 -A great amount	☐ 1 -None ☐ 2 -A small amount ☐ 3 - A moderate amount ☐ 4 -A good amount ☐ 5 -A great amount	☐ 1 -None ☐ 2 -A small amount ☐ 3 - A moderate amount ☐ 4 -A good amount ☐ 5 -A great amount

Geology	Lake Ecology	
☐ 1 -None ☐ 2 -A small amount ☐ 3 - A moderate amount ☐ 4 -A good amount ☐ 5 -A great amount	☐ 1 -None ☐ 2 -A small amount ☐ 3 - A moderate amount ☐ 4 -A good amount ☐ 5 -A great amount	

4. Please select the response from each dropbox that best describes your thoughts about the following statements:

The Nature Navigator…

Was easy to navigate	Strongly Disagree
Had an appealing design	Disagree
Had easy to read text	Agree
Presented information in an interesting way	Strongly Agree
Included helpful links to other Web sites	Strongly Disagree
Increased my awareness of WI natural history	Disagree
Increased my interest in WI natural history	Agree
*Increased my awareness of WI phenology	Strongly Agree
Increased my interest in WI phenology	Strongly Disagree
*Was a helpful review of natural history information I already knew	Disagree
Gave me information I would not otherwise have received from my experience at CWES	Disagree
*Contained information that was applicable to my experience at CWES	Agree
Helped me answer students' natural history questions	Strongly Agree

Gave me information that I could incorporate into the lessons I taught at CWES	Strongly Disagree
Gave me information that allowed me to take better advantage of teachable moments	Disagree

5. Approximately how many minutes <u>per week</u> did you spend using the Nature Navigator Website (not including time spent taking the quiz)?

- 0-15 minutes
- 16-30 minutes
- 31-45 minutes
- 46-60 minutes
- 60+ minutes

6. Over the past semester, about how often did you share information from the Nature Navigator with the K-12 students at CWES?

- Never
- I shared the information 1-3 times
- I shared the information 4-6 times
- I shared the information 7-10 times
- I shared the information once every week
- I shared the information more than once every week

7. Were you able to use the information from the Nature Navigator? If yes, please provide a brief description of the ways in which you were able to use it.

8. Would you recommend that future practicum students use the Nature Navigator?

- Definitely Not
- Maybe
- Definitely Yes

Please briefly explain your answer to the above question:

9. Would you continue to use the Nature Navigator as a resource after practicum is over (assuming you stayed in the area)?

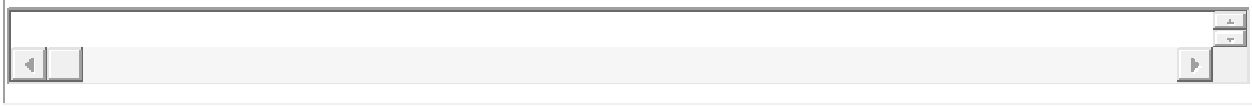
- Definitely Not
- Maybe
- Definitely Yes

Please briefly explain your answer to the above question:

10. Please describe what you liked <u>most</u> about the Nature Navigator:

11. Please describe what you liked <u>least</u> about the Nature Navigator:

12. Any other comments or suggestions you would like to make about the Nature Navigator:



Thank you for your time and thoughts!

Submit

In this appendix, items with a * next to them indicate a question that was added to the questionnaire after the pilot study.

APPENDIX N. INTRODUCTORY LETTER TO FIELD STUDY PARTICIPANTS

Hello everyone,

I hope you are all having a wonderful summer. As practicum training approaches, I wanted to let you know about a new tool that will be used within the program. Jenni Webster has been putting together a "Nature Navigator" Website as part of her thesis project for her Masters in EE. The Website is designed specifically for practicum students as a medium to see what is happening in natural history phenology at CWES, to give you some geologic and landscape background of the area, to help you key out animal and plant species that you see at CWES, and to help you add some natural history into the lessons that you teach.

Jenni has already done a focus group study with former practicum students and will be using the fall 2007 practicum students as her final sample. Over the course of the semester, we ask you to visit the Website each week and look at the "monthly phenology" link to see what is happening in nature. The other links are also available for you and are amazing resources for further study. It should take less than 15 minutes each week to look over the phenology for the upcoming week, after which you will take a short quiz on D2L. The 5 question multiple choice quiz is on D2L under "quizzes" and a new one will be posted each week.

Before you visit the site for the first time, Jenni has requested that you fill out an online questionnaire that she will use to learn about her sample. If you have any concerns or questions about participating in the study, please contact Jenni. It should take less than 10 minutes to fill out the online survey. Jenni will forward you an IRB consent form to look over. It is a document that everyone must look over before taking part in the study.

Here is a breakdown of what we need for you to do:

- Review the IRB consent form Jenni will forward you
- Fill out the online questionnaire at http://www.uwsp.edu/cnr/cwes/naturalhistory/form3.htm **(Please fill out this form before August 26th!)**

On successive weeks, you just need to visit the "Nature Navigator" Website and then take the quiz sometime before you are assigned to come to CWES.I hope this will be of benefit to you and your teaching at CWES during your semester. If you have any questions related to this email, please let me know. If you have any trouble with forms or with the "Nature Navigator" Website, please email Jenni at jwebs373@uwsp.edu.

Both Jenni and I appreciate your participation in the study.

Tom Quinn
Program Manager
Central Wisconsin Environmental Station
10186 County MM
Amherst Junction, WI 54407

APPENDIX O: FIELD STUDY FOCUS GROUP GUIDE AND RESPONSES (N=10)

1. Were Nature Navigator articles the appropriate length?
(All nodded)

- "I thought that is was perfect."
- "There was a good amount of information, it wasn't over the top, but it wasn't too short. "
- "I think they were a good length, you could sit down and read them in about ten minutes."
- "I think if you had much more in there it would be too much at once."
- "There were a good length for each week. It wasn't too much, but it also wasn't so sparse that you couldn't understand things."

2. Did you find the links helpful?

- "I liked the links that were included, I found them helpful. I used them later on for other projects. I gave the bat link to someone else for a project as well. I added those links to "my favorites"."
- "I could see myself going back and using them instead of "googling" a topic."
- "I used them."
- Three people said that they didn't access them.

3. Did you like getting this information from a web-based resource as opposed to a bound copy?

- All agreed that web-based was better
- "It was very convenient. I could go home and look at it on my computer."
- "I liked the format of it, it was very colorful and appealing to the eye."
- "I like using the online resources. You can scroll back and forth through the information quickly as opposed to bookmarking things in an actual book."

4. How often did you use the other sections of the Website?

- Two used the bottom's up information and found it helpful.
- Two used the ID portion a few times.
- Five never used them.
- One used links to other sections for a project in another course. "I looked through some of it, but not as in-depth as I'd like to someday."

5. How effective was the weekly quiz?

- "The quiz was a good way to do it. It wasn't overwhelming or anything."(Everyone else nodded)
- "I can't think of a more efficient way."
- "I shared some information from the quizzes."
- "If we didn't have a quiz, I probably wouldn't have read the phenology."

- "I think it was good because it made us go through and read the information and then try to remember it. It was also nice that we included the information in our lesson preps, because it helped double-checked things. "
- "I think the quiz was good. When things are optional sometimes I don't use them."

6. Did you have any technical problems?

- "No" (Everyone agreed)
- "I thought it was all well organized."

7. Did you find the phenology information interesting?

- "It depended on what the topic was."
- "I'd say overall they were good facts. Especially the gross ones, like the turkey vulture pooping on its legs."
- "I liked the fun, random facts that we could throw out there.."
- "It was neat to know what would be happening each week. When you looked around you could see some of these things and think "I read about this." I'd know what things were. It was a heads-up about what was around me when I was teaching, and helped me point out things. "

8. Anything that should be added to the Website?

- "Maybe more plant info."
- "More mammals."
- "Maybe insects. Especially aquatic creatures, because we do Pond Power (a K-12 lesson) quite a bit. I would find things there and know what it was, but that was it. Knowing more facts about them would be helpful." (Another student agreed)
- "Some of the natural phenomena didn't happen the same week as the Website mentioned them, such as geese migrating, check on that."

9. Was most of the info. new, or was some of it repeating what you already acquired it in other places?

- "Half and half" (two others agreed)
- "Some of it was repeated, but it was nice to get a refresher on it. Like some of the fun random facts like a chipmunk can fit nine nuts in its mouth, those were just fun random facts that were good to have." (three others agreed)
- "There were a lot of new things for me."
- "There was quite a bit of new stuff, but there were some things that I already knew."

10. For the information that was a repeat, was it helpful to have a review of it?

- "I think so." (Four others nodded heads)
- "Some things that are so basic that you know them but without a remembering them and bringing them to the forefront of your mind you're not going to remember to say it because it's something so basic but it might be good for the kids to know.

11. Do you feel like using the Website increased your awareness or understanding of the plants and wildlife at CWES?

- "I think it helped me a lot."
- "It depended on the topic, some things I knew more about already than others."
- "I think it reminded me again."
- "A lot of it was a reminder, but again a reminder is good."
- "Yes."
- "Greatly."
- "I liked it."
- "It's one of my favorites on my homepage."

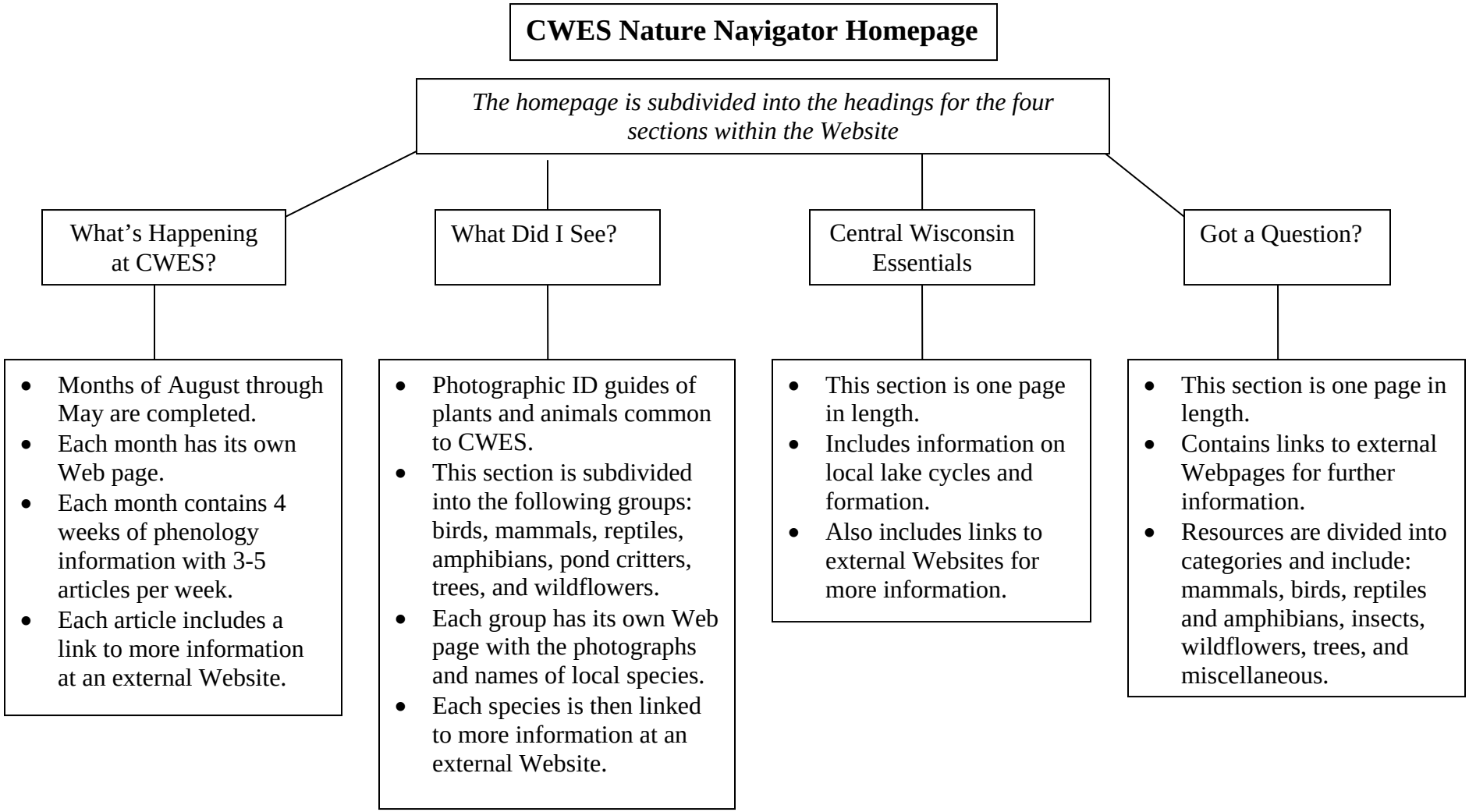
12. If you were able to use the information from the Website, do you have any specific examples of when you were able to use it?

- Info. on the chipmunks
- Used it during "How birds make a living" (Two others agreed)
- The chickadee call info. (Three other agreed)
- Information on woodpeckers
- Used percent of body fat for several animals.
- Used leaf information for a forestry lesson.
- Animal tracks.
- Bald-faced hornets (Three others agreed)
- Oak apple galls (Four others agreed)
- Why woodpeckers don't get headaches (Two others agreed)
- Used the information for the interpretive component of their course at Schmeeckle (Six agreed)
- "I gave it to my roommate to use."
- "I pointed out berries in the fall to students as I was walking. It made you more aware to pay attention and see what you could see out there to point out to the students."
- "I used the information about migration when I saw geese at Minister lake with students."
- "I saw Jack-in-the Pulpit in the fall."

13. Would you like anything changed about the Website?

- "I'd like more geology."
- "Maybe put an updatable bulletin on the Website to record current observations."
- "Tie more lesson content into the Website content."
- "A navigation bar in the phenology section with week one, two, three, and four so that it is easier to get to each individual week."
- "Having the dates for each individual week."

APPENDIX P. CWES NATURE NAVIGATOR WEBSITE MAP



APPENDIX Q. SAMPLE CWES NATURE NAVIGATOR WEB PAGES

CWES Nature Navigator

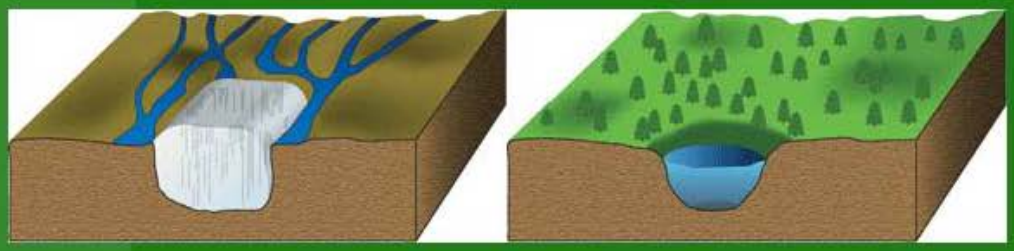
Home | Calendar | Plant & Animal Guide | Learn More | Central WI Essentials

Central Wisconsin Essentials

The Basics of Geology and Natural Landscapes

Sunset Lake

Sunset Lake, the second deepest lake in Portage County, is a kettle lake. Kettle lakes are formed when enormous glaciers begin to melt and crumble. Large chunks of ice tumble off and are then buried beneath sand and gravel debris. As the buried ice melts, it leaves behind deep depressions, or kettles. This kettle lake is home to bluegill, brook trout, and large mouth bass.

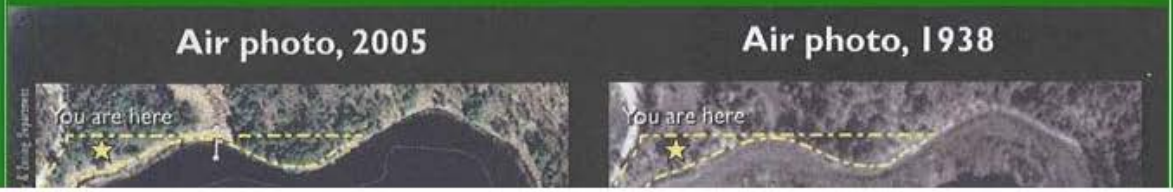


Blocks of ice from glaciers that were present 10,000 years ago melt and form kettle lakes.

Learn More: http://en.wikipedia.org/wiki/Kettle_(geology)

Minister Lake

Minister Lake averages about 16 square acres and 9 feet in depth. It is home to beavers, waterfowl, amphibians, and many macroinvertebrates. The water levels in Minister Lake fluctuate from year to year.



Home | Calendar | Plant & Animal Guide | Learn More | Central WI Essentials

Got a Questions?

Extra resources to Satisfy Your Curiosity

Websites About Mammals

Smithsonian National Museum of Natural History
Info on the life histories, habitats, and skulls of North American mammals

Wisconsin DNR's EEK Critter Corner
Great basic info about some of Wisconsin's mammals

National Wildlife Federation's eNature
An online field guide to mammals found in North America

UWSP Mammals of Wisconsin
In-depth info about the mammals found in Wisconsin

Websites About Birds

Cornell Lab of Ornithology
Neat info on the birds of North America, inlcuding their calls and songs

Wisconsin Society for Ornithology
Updates on birding events, news, and research in Wisconsin

Wisconsin DNR's EEK Critter Corner
Great basic backgrounds on some of the common birds of Wisconsin

Natural History Museum of Los Angeles County
Really interesting info on bird bones, feathers, flight, songs, and many other adaptations

Websites About Reptiles and Amphibians

CWES Nature Navigator

Home | Calendar | Plant & Animal Guide | Learn More | Central WI Essentials

What Did I See?

Identification Guides for the Plants and Animals of CWES

Click below to learn more about the common species found at CWES!

Birds

Mammals

Reptiles

Amphibians

Trees

Wildflowers

Pond Critters

Nature Navigator Home | CWES Home | CNR Home

10186 County Road MM Amherst Junction, WI 54407 - Phone: 715-824-2428

Direct comments to webmaster

CWES Nature Navigator

Home | Calendar | Plant & Animal Guide | Learn More | Central WI Essentials

Common Birds Seen at CWES

(All photographs were taken by Laura Erickson, unless otherwise noted)

(Selecting a bird's name will take you to information from the Cornell Lab of Ornithology's Webpage)

Black-capped Chickadee

Dark-eyed Junco

White-breasted Nuthatch

Red-breasted Nuthatch

Hairy Woodpecker

Downy Woodpecker

CORNELL LAB of ORNITHOLOGY

All About Birds

Birding 123 | Bird Guide | Gear Guide | Attracting Birds | Conservation | Learn About Birds

Conservation

Bird Guide

Species Accounts

Video Gallery

Black-capped Chickadee

Poecile atricapilla Order PASSERIFORMES - Family PARIDAE

Summary Page

For complete Life History Information on this species, visit Birds of North America Online.

Menu

1. Description
2. Sound
3. Conservation Status
4. Other Names
5. Cool Facts
6. Full detailed species account

One of the most familiar and beloved birds in northern North America, the Black-capped Chickadee is a frequent visitor to bird feeders. Its apparently cheerful activity throughout the harshest winters has won it the admiration of many people.

Black-capped Chickadee
adult
About the photographs

About the map

Description

top

- Small, short-billed bird.
- Black cap.
- Black bib.
- White cheeks.

- Size: 12-15 cm (5-6 in)
- Wingspan: 16-21 cm (6-8 in)
- Weight: 9-14 g (0.32-0.49 ounces)

Sex Differences

Sexes look alike.

Sound

Song: two or three notes whistled, with first higher in pitch, "fee-bee-ee." Call: suggests name "chick-a-dee-dee."


CWES Nature Navigator
Home
Calendar
Plant & Animal Guide
Learn More
Central WI Essentials
What's happening at CWES?
Monthly Phenolcgy
Select a Month
September
October
November
December
January
February
March
April
May
Nature Navigator Home | CWES Home | CNR Home
10186 County Road MM Amherst Junction, WI 54407 - Phone: 715-824-2428
Direct comments to webmaster

CWES Nature Navigator

Home | Calendar | Plant & Animal Guide | Learn More | Central WI Essentials

September

Week 1 | Week 2 | Week 3 | Week 4

Week One

What's Blooming?

Many different aster and goldenrod species bloom in the woods and near the lakeshore at CWES during September. There are 24 different species of goldenrods in Wisconsin and 30 aster species, many of which can be tricky to distinguish from one another.

Creeping bellflowers are also blooming near the road to Minister Lake. These tall plants have tiers of purple, bell-shaped flowers and are originally from Europe. Along the hillsides of Minister Lake, you're likely to find white snakeroot blooming. Early settlers used to believe that the roots of this plant cured snakebites. Unfortunately, the plant is actually toxic and can cause "milk sickness." This occurs when the plant's toxins pass through the milk of cows into humans!

Learn more about goldenrod:
http://www.uwgb.edu/biodiversity/herbarium/Vascular_plants/Solidago/solidago01.htm
Learn more about
asters:http://www.uwgb.edu/biodiversity/herbarium/Vascular_plants/Aster/aster_intro01.htm

Asters, like the ones above, have the greek name for starry.

Goldenrod species are a great source of food for many insects.

Wild Cucumber

What is That Strange Looking Fruit?

The Latin name for the wild cucumber, *Echinocystis lobata*, means hedgehog bladder and perfectly describes the strange fruit of this plant.

Inside the fruit are 4 brown or black seeds that are eventually shot out of the plant by hydrostatic pressure at speeds up to 25 mph!

This viney plant is a member of the gourd family and has tiny, white flowers from July to late August. It's found in moist soils near the trails at CWES.

Jack in the Pulpit

When the pulpit of jack-in-the-pulpit withers away in fall, a red cluster of berries is seen. These berries are best avoided, as they create an intense burning in the mouth if eaten.

This odd plant blooms from April to June in the shade of woods and forests, and can actually change sex from one year to the next! If it is a plentiful year and the plant has stored lots of food, the next year it will produce female flowers and two sets of leaves. If the plant has not had a good growing season, the next year it will produce male flowers and one set of leaves. The female plants produce the stalk of red berries that we see in the fall.

White Baneberry

Photo by Emmet Judziewicz

All images were taken from the Robert W. Freckmann Herbarium

White baneberry is also called doll's eyes because of the strange and poisonous berries it produces. The word "bane" actually means to cause death.

This plant likes the damp, shaded woods of CWES, and produces a stalk with a cluster of tiny white flowers from May to June.

The Common Garter Snake Gives Birth!

The Common Garter Snake Gives Birth!

Garter snakes mate in early spring in a huge mass, usually one larger female with dozens of smaller males-only one of which will successfully breed. By late August and early September, garter snakes give live birth. A single female may produce up to seventy young!

As the temperatures cool, these creatures look for good places to hibernate. Sometimes they are found in our basements and garages as they search for ideal spots.

Common garter snakes are found in every county of Wisconsin. They eat frogs, toads, salamanders, fish, earthworms, and insects. They can bite, but have no fangs or poison. Instead, they protect themselves by producing a very stinky musk to deter predators. If they can evade their enemies, they may live up to ten years!

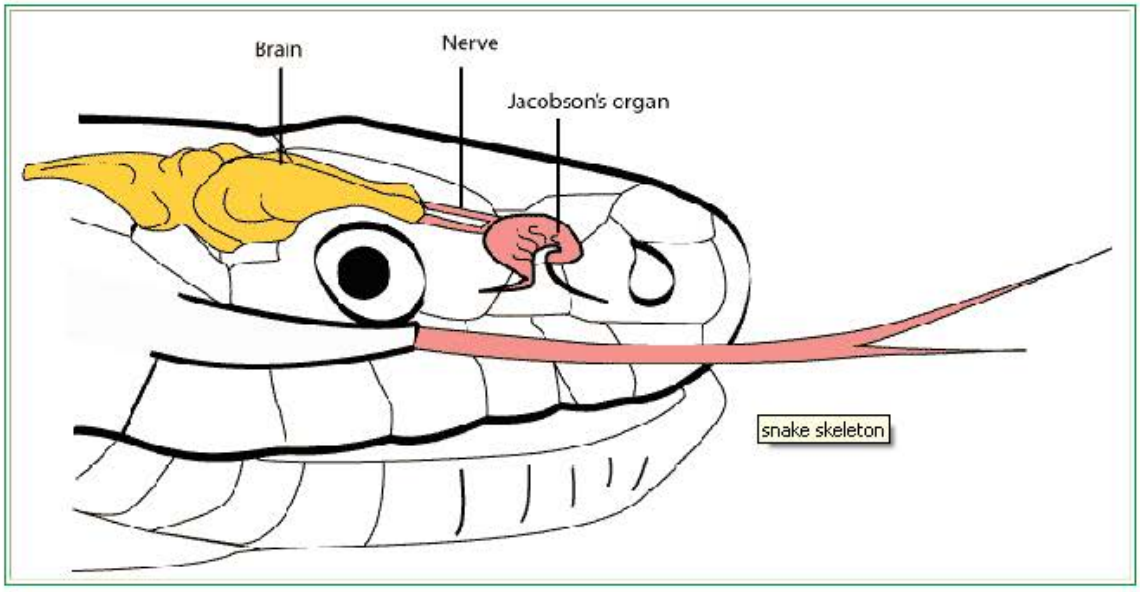
Learn more:
http://animaldiversity.ummz.umich.edu/site/accounts/information/Thamnophis_sirtalis.html

Super Snakes

EYES: Did you know that snakes have no eyelids? Instead they have clear scales that cover their eyes. These scales are shed along with the other scales on the snake's body. A good way to tell when a snake is about to shed is to look at their eyes, if the scales covering them are a cloudy color they will shed soon.

EARS: Snakes have no ears, instead they hear by feeling vibrations on the ground. This is similar to the way that humans can "feel" music when we are near a speaker that is turned up.

TONGUE: Have you ever noticed that snakes often stick out their tongues? They do this to pick up scent molecules from the air on their tongue which get transferred to an organ on the roof of their mouth called the Jacobson's organ. This special organ then delivers information to their brain and tells the snake what is around them.



Yellow-rumped warbler photo by Laura Erickson

The Yellow-rumped warbler is moving

From early August until mid-October, warbler species are in migration mode. Like most small songbirds, warblers usually migrate at night. Most of these birds are smaller than a black-capped chickadee. They usually flit quickly among the trees in groups and can be tricky to identify in fall when they have molted from their bright breeding plumage into drab fall colors.

This week there is a good chance that you will see a mixed flock of several species of warblers in the woods at CWES. The one that you are most likely to see is the yellow-rumped warbler, who will be working its way toward Mexico and Central America for the winter. The yellow-rumped warblers will be searching for insects and fruit to fuel them on their journey.

Learn More:
http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/Yellow-rumped_Warbler.html

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Week Two

Bittersweet nightshade photo from the Robert W. Freckmann Herbarium

Nightshade Fruit Ripens

Bittersweet nightshade is a viney plant which winds its way along the wooded edges of CWES (especially near the driveways). Most of the nightshade species in Wisconsin are exotics, and all produce toxic berries. Bittersweet nightshade is the most commonly found invasive nightshade in Wisconsin.

Did You Know? The term nightshade comes from Renaissance Italy, where noblewomen put a drop of the plant's juice in their eyes to dilate their pupils and make them look more attractive.

Learn more:
http://wisplants.uwsp.edu/scripts/detail.asp?SpCode=SOLDUL

Giant Puffballs Appear at CWES

The g[illegible] is the largest of the sixteen speci[illegible] Wisconsin, and is edible when

Puffballs like damp soils in forests and grassy fields, and you may find some at CWES near the cabin bathrooms. Never eat a mushroom unless you are certain of its identification!

Giant Puffballs Appear at CWES

The giant puffball is the largest of the sixteen species found in Wisconsin, and is edible when fresh and solid. These fungi can reach the size of volleyballs, and weigh up to 40 pounds! The large puffballs that we see above ground are only the fruiting bodies of the fungus (much like a plant's flowers). The rest of the fungus is growing hidden below it and looks like a mass of tiny tangled threads. These masses are called mycelium and are often found beneath the bark of rotting logs.

Eventually, the puffball's outer skin dries out and cracks, puffing out the 7 trillion tiny spores found inside. The spores are just slightly smaller than a human red blood cell. If you were to line them all up, they would wrap around the earth's equator!

Learn more:
http://botit.botany.wisc.edu/toms_fungi/aug98.html

Hummingbird Migration

Hummingbirds begin to slowly leave after Labor Day, with the males taking off first and the females and juveniles following later. Hummers from Wisconsin will fly all the way to Central America to overwinter. The little birds will put on a whole gram of additional fat before they set out on their long journey. That's a lot of weight for a bird that weighs less than two pennies (about 4 grams) to start off with!

Did you know? Hummingbirds are the only bird that can fly both backward and forward. Their wings beat an amazing 53 times per second and can propel them at speeds of 50 mph. To fuel their fast pace, the birds consume about twice their weight in nectar and insects a day. We'd need to eat over 200 cheeseburgers each day to do the same!

Learn More:
http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/Ruby-throated_Hummingbird.html

Dragonflies and Damselflies Abound

Most of Wisconsin's dragonflies overwinter in the mucky bottoms of ponds as a nymph or egg... but not all! Populations of adult green darner dragonflies migrate south in the fall, with their mature offspring returning to us in the spring. These three-inch long blue and green dragonflies feed on prey as large as other dragonflies! If you keep your eyes open you may see one or two by Minister Lake.

Flying about the boardwalk at Minister Lake you will also see meadowhawk dragonflies, a species common in the late summer and early fall. This type of dragonfly can be identified by the way that it holds its wings slightly forward when still, and by its small size (about 1.5 inches long).

If you're lucky, you may also see a few damselflies. These delicate cousins of the dragonfly typically rest with their wings tightly closed, while dragonflies rest with their wings spread. They also have much thinner and smaller bodies than dragonflies.

Learn more:
http://www.wisconsinbutterflies.org/dragonflies/

http://animaldiversity.ummz.umich.edu/site/accounts/information/Anax_junius.html

Neat Nymph Adaptations

You will find aquatic nymphs (young) of both dragon and damselflies in Minister Lake at this time of year. Once a dragonfly nymph emerges from its egg, it may stay in the nymph stage anywhere from a few weeks to several years depending upon the species and conditions. Dragonfly nymphs breathe through gills on their abdomen, while damselflies get their oxygen through three "tails" located on their rear.

Damselfly (left) and dragonfly nymph (right)

These nymphs are ferocious predators and will consume anything they can capture: other nymphs, fly [illegible] oles, and even small fish!

These nymphs are ferocious predators and will consume anything they can capture: other nymphs, fly larvae, tadpoles, and even small fish! They also have a unique hunting adaptation: their long lower jaw is extendable and can shoot forward to nab food. When not hunting, the hinged jaw folds flat against the nymph's body.

Nymphs shed their exoskeletons as their grow, eventually shedding one last time to emerge as a winged adult. Their leftover skins are called exuviae, and they sometimes find their way into D-nets.

Learn more:
http://www.bugsurvey.nsw.gov.au/html/popups/bpedia_08_tol_dr-ny-a.html

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Week Three

Flocking waterfowl

Fall Equinox and Flocking Birds

With the fall equinox this week, the days will begin to grow shorter. Birds get ready to migrate when shortening days and changing weather conditions trigger internal hormone responses. They then begin to eat great amounts of food in order to store fat for their long journeys. Keep an eye out as waterfowl begin to flock together and stopover at Sunset and Minister Lake. You're likely to see sandhill cranes, geese, mallards, loons, and maybe even trumpeter swans.

Why do birds migrate? Birds that rely on such food as aquatic creatures, insects, or mammals that hibernate must move further south to find prey as winter approaches.

Migratio Most small insect-eating birds like sparrows,

A resting Cooper's hawk

A soaring broad-winged hawk

A diving American kestrel

Migration operations: Most small insect-eating birds like sparrows, warblers, wrens, thrushes, and vireos migrate at night using circumpolar (visible year-round) constellations to guide them. Flying at night reduces the threat of predation and overheating for these avians. Herons, gulls, waterfowl, and hawks migrate during the day and use the position of the sun to direct them.

High-flying hawks: The second week of August is the peak migration time for many raptor species. Keep an eye toward the skies and you might be lucky enough to see one of these graceful birds:

Accipiters: hawks with short wings and long tails that hunt between trees and shrubs, such as sharp-shinned and Cooper's hawks.

Buteos: hawks with wide wings designed for soaring, such as the broad-winged hawk.

Falcons: raptors with slim tapered wings meant for speed, like the American kestrel and the merlin.

Fast Food: Scientists have noticed that American kestrels tend to migrate at the same time as green darner dragonflies. These clever falcons snack on a moving insect feast as they travel.

Kettles of Birds: Broad-winged hawks often migrate in groups called kettles. These groups soar on high wind currents, expending as little energy as possible.

Learn More: http://www.hawkridge.org/education/raptors.html

Wild Grapes are Ripe

This week at CWES look for the fruit of wild grape vines in wooded areas, as well as near the shores of Sunset and Minister Lakes. These creeping vines are capable of covering trees and shrubs, blocking their light, and killing them. However, the plant also has many good qualities. Small bees and flies visit its tiny white flowers early in summer,and several moths feed on its leaves. Its fruit is a favorite of both birds and mammals, who disperse the 2-6 oval seeds found within it.

Learn more:

http://www.uwgb.edu/biodiversity/herbarium/shrubs/vitrip01.htm

Gray squirrels weigh about a pound.

An acorn eaten by a squirrel

Gray Squirrels Stockpile Food

These crafty critters bury their food in the fall, typically one nut at a time. They then find their buried treasure in the winter and spring by smell, sometimes digging through a foot of snow to get to it. The acorns that are overlooked will grow into new oak trees, a benefit for both parties. Besides nuts, gray squirrels eat tree buds, fruit, mushrooms, insects, and sometimes even bird nestlings.

These familiar creatures use their multi-purpose tails for rudders when climbing, insulation when tucked around them in the winter, or as an umbrella from falling rain and snow. In the approaching cold months they will search for a tree cavity in which to shelter. If one isn't found, they will build leafy nests, called **drays**, that we often see high in bare trees. These nests provide protection from harsh winter elements.

Learn more and view pictures of skulls and tracks:
http://animaldiversity.ummz.umich.edu/site/accounts/information/Sciurus_carolinensis.htm

Amazing Acorns

Acorns are an important crop for many creatures. Squirrels, blue jays, woodpeckers, and insects love to eat the protein-rich morsels. One creature even lays its eggs inside acorns: the acorn weevil. A few days after the eggs are laid, grub-like larvae emerge and feed on the acorn meat. When fall arrives, they chew their way out of the acorn by creating a small circular hole. Then, they burrow into the soil to pupate (similar to a butterfly's chrysalis stage) over the winter. In summer the adults will emerge from the pupae and begin the whole process over again. After the acorn weevils are done with the nut, other insects may make it their winter home. Look for these tiny shelters strewn along the trails at CWES.

An acorn weevil grub (left) and adult (above).

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Week Four

This little brown bat could crawl through a hole 1 cm wide!

A bat's toes relax in a curled position, helping them to hang upside-down.

Bats Get Ready for Winter

During this week, the eight species of bats in Wisconsin begin preparing for winter in different ways. Big and little brown bats are gathering together in abandoned mines and caves and getting ready to hibernate. They are full hibernators and will keep their body temperatures just high enough to keep them alive. These bats will lose 1/4 -1/2 of their weight over the course of the winter. Even while hibernating the bats must briefly wake to urinate and drink moisture from cave walls. Hibernation sites are crucial to the bats' survival. If disturbed often while hibernating, a bat may not retain enough energy to make it through the rest of the winter.

Not all Wisconsin bats will hibernate here. Red, silver-haired, and hoary bats will journey to southern states in search of warmer places in which to hibernate. Sometimes these bats are found migrating along with flocks of small birds.

Did you know? When bats hang upside-down their toes lock in place with special tendons so that they don't have to use any energy to stay put. And...

- Big brown bats sometimes hibernate in our attics and walls, because their bodies are able to withstand sub-zero temperatures.
- The oldest bat on record was a 33 year old little brown bat.
- Bats are in a family called chiroptera which means "hand wing" in Greek. This refers to the thin membrane of skin stretched across a bat's finger bones which lets them fly.

Learn more:: http://www.batcow.org/

For pictures of bat skulls go to:
http://animaldiversity.ummz.umich.edu/site/accounts/specimens/Myotis_lucifugus.html

Woolly Bear Caterpillars Abound

Keep an eye out for woolly bear caterpillars at this time of year. They are the larvae of the Isabella tiger moth. According to folklore, the longer the caterpillar's reddish brown bands the shorter and milder the coming winter will be. Unfortunately, the myth isn't true. As woolly bears grow and molt their old tight skin, their new skin has more brown and less black fuzz.

After a season of feeding on dandelions, asters, birches, clovers, and maples, woolly bears begin to search for overwintering sites under bark, rocks, and logs. Caterpillars hibernate there in often sub-freezing temperatures. When spring arrives, the woolly bears awaken and create fuzzy cocoons [illegible] ransform into moths.

Caterpillars and adult Isabella tiger moth

Did you know? Woolly bear caterpillars have a wonderful defense mechanism. The tiny, sharp hairs that cover the caterpillar's body can detach and cause irritation. This works especially well when a predator has already put the caterpillar into its mouth-ouch! Some people are also sensitive to the woolly bear's hairs, so be careful when handling them.

Learn more: http://www.enature.com/fieldguides/detail.asp?recnum=BU0165

A large paper nest made by the bald-faced hornet.

An inside view of a nest. At one point these tiny cells each held a developing hornet egg.

Bald-faced Hornets Prepare for Winter

Bald-faced hornets create the paper nests that we see hanging from trees at CWES. These nests were made by many female workers who chewed up wood fibers and then added a secret ingredient- their own spit -to stick things together. With the first frost these workers die, leaving behind a paper nest that won't be used again.

Just before her workers die, the queen hornet lays eggs containing new queens and drones (males). After these hornets mate, the new queens hide from the approaching cold in crevices and under tree bark. The only surviving members of their colony, they will hibernate through the winter. Come spring, they will begin to build new nests and lay their first eggs. These will hatch into sterile females that will continue building the nest and care for new eggs. These colonies may hold as many as 400 hornets which mainly eat other insects.

Did you know? Paper wasps create the small honeycombed nests that hang underneath the eaves of buildings. They have a very similar lifecyle to the bald-faced hornet. Bees, however, have a very different winter routine from both hornets and wasps. Bee hives remain active through the winter, using honey stores for fuel. The worker bees surround the queen and shiver to generate enough heat for survival.

Learn more:
http://www.uky.edu/Ag/CritterFiles/casefile/insects/wasps/hivewasps/hivewasps.htm

Turkey Vultures Migrate

These amazing birds are beginning to stretch out their 6 foot wingspans and head south. You can tell a soaring vulture from other birds by the way that they hold their wings in a strong V-shape and tend to rock in flight. Bald eagles hold their wings level with their bodies when they fly. If the wind is right, a vulture can soar for 6 hours without flapping its wings. Look for them high above Sunset or Minister Lake.

Vultures eat mostly carrion (dead animals) and some plant material. They play an important role in cleaning up waste that might otherwise spread disease. To help them locate their pungent meals, these birds have an excellent sense of smell. They also have ver[illegible] nach acid that kills the bacteria and viruses often fc[illegible] food

Photo by Laura Erickson

Notice the V-shape of this turkey vulture in flight. This shaps is called a dihedral.

Check out the large nostrils and featherless head of this vulture. The lack of feathers helps it stay clean after eating decaying matter.

might otherwise spread disease. To help them locate their pungent meals, these birds have an excellent sense of smell. They also have very strong stomach acid that kills the bacteria and viruses often found in their food.

Though the vulture doesn't have many natural predators, it does have some pretty clever (and gross) defenses. If a turkey vulture has been feeding on carrion and is approached by a predator, it will vomit as a defense strategy! The smelly substance deters the predator and can even sting its eyes, plus the vulture has lightened its load and may take off more quickly.

The vulture has another cool adaptation-literally! On hot days, vultures will urinate on their legs to cool them off. The strong acid in their urine also kills bacteria on their legs and feet, and helps keep them healthy.

Did You Know? According to DNA evidence, vultures are actually a member of the stork family. Their weak feet aren't built for grasping and piercing prey like those of the raptors. Also, a vulture is not actually a buzzard. Buzzard is the British word for hawk.

Learn more:
http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/Turkey_Vulture.html

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