ABSTRACT

AN INTERNSHIP WITH PROJECT DRAGONFLY

by Christina Lynn Funk

This paper reports on an internship with Project Dragonfly from May to December 2008. Project Dragonfly is a national and global learning initiative at Miami University that partners with formal and informal institutions to bring inquiry and the wonder of science to the public through innovative educational experiences. As an employee of Project Dragonfly, I participated in several different projects designed to reach the public through a variety of media, including designing a backpack that visitors can rent out to conduct investigations at the Cincinnati Zoo & Botanical Garden. Other projects included prototyping Wild Research stations in the Zoo’s Discovery Forest and co-instructing one week of Inquiry Camp, a summer camp at the Zoo. Other responsibilities included providing administrative support and assistance with any tasks that needed completion. My involvement with Project Dragonfly provided an excellent opportunity to experience many different aspects of environmental education programming including program development, implementation and evaluation.
AN INTERNSHIP WITH PROJECT DRAGONFLY

An Internship Report

Submitted to the

Faculty of Miami University

in partial fulfillment of

the requirements for the degree of

Master of Environmental Sciences

Institute of Environmental Sciences

by

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2010

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ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to all those who helped me throughout the master’s program and internship period. I am grateful to my internship committee, consisting of Drs. Chris Myers, Rick Lee, and Sandra Woy-Hazleton, for its continued support. I thank Dr. Chris Myers for providing guidance in pursuing an area of concentration in environmental education and for the opportunity to work with such an amazing organization. I thank Dr. Rick Lee for sharing his excitement and knowledge of the natural world with me as my professor for General Entomology and Winter Biology and for providing me with the opportunity to join him and a wonderful group of educators at Camp Ohio for Project Wild training in October 2008. I also want to thank Dr. Lee for accepting the responsibility of serving as a committee member on such late notice. I wish to thank Dr. Sandra Woy-Hazleton for her continued support and guidance throughout the entirety of the master’s program.

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Last but certainly not least, I would like to sincerely thank my family for their support and motivation. My husband and best friend, Brent, has always believed in my ability to pursue this degree and make a positive change in the world. He has been an inspiration to me as he works hard to complete his Doctoral degree in Clinical Psychology. My parents, Larry and Karen Pope, and my sister, Cheryl Konawicz, though far away, have always been right here for me providing the love and encouragement I needed to complete the Master of Environmental Sciences program. Thank you.
CHAPTER 1. INTRODUCTION

It is hard to believe that just four years ago I was in the last year of a Bachelor of Science degree in Elementary Education, working toward a Florida teaching certificate in Elementary Education for grades K through 6. I knew that I wanted to be an educator since I was a child. Until just four years ago, however, I wanted to teach in formal education as a school teacher. About the same time I was completing my Bachelor’s degree, I was working as a seasonal naturalist at a park, the Deering Estate at Cutler, in south Florida. I had been working there for over two years, starting as a camp counselor, then as Summer Camp Director for a summer, and later continuing to work as a seasonal naturalist. It was there that I discovered my love for educating children about and in the natural environment.

A quotation by Rachel Carson, cited in Richard Louv’s book Last Child in the Woods, expresses my passion for educating children about the environment: “If a child is to keep alive his inborn sense of wonder, he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement, and mystery of the world we live in” (Louv 2005, 164). Not only do I love connecting children to nature, but I strongly believe that it is of great importance if we wish to protect the environment for many future generations to come. Jacobson et al. (2006) discussed research that indicated “appropriate education and outreach can foster sustainable behavior, improve public support for conservation, reduce vandalism and poaching in protected areas, improve compliance with environmental regulations, increase recreation-carrying capacities, and influence policies and decisions that affect the environment and natural resources”. In this new age of a movement for restoring and protecting the natural environment, I believe that environmental education is the key to ensuring the health of the natural world as well as the physical and emotional health of the people that live in it.

This newfound passion for helping others connect to nature led me to apply to Master’s degree programs related to the fields of environmental sciences and environmental education, thus matriculating in the Master of Environmental Sciences program with the Institute of Environmental Sciences at Miami University in the fall of 2006. The Master’s of Environmental Sciences (M.En.) degree at Miami University requires that candidates complete an internship, practicum, or thesis to fulfill the
professional experience requirement. I chose to fulfill the professional experience requirement through an internship with Project Dragonfly, a national and global learning initiative at Miami University that partners with the Cincinnati Zoo & Botanical Garden (CZBG) to bring inquiry and the wonder of science to the public through entertaining and educational experiences. The internship option requires at least a six-month, full-time commitment between the student and the interning organization. I chose to complete an internship because I felt that it provided me the opportunity to gain valuable professional experiences in the field of environmental education, something that was important because most of my professional experiences before working at the Deering Estate at Cutler were in the field of formal education.

Over the course of my internship with Project Dragonfly, I had several areas of responsibility, as outlined in Table 1.

<table>
<thead>
<tr>
<th>Responsibility Areas</th>
<th>Responsibility Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backpack Project</td>
<td>• Assisted in creating summer piloting plan, backpack contents</td>
</tr>
<tr>
<td></td>
<td>• Piloted backpacks throughout summer/assessed potential for summer camp testing</td>
</tr>
<tr>
<td></td>
<td>• Compiled results and shared with team</td>
</tr>
<tr>
<td></td>
<td>• Assisted in purchasing backpacks and investigation tools to use at Zoo</td>
</tr>
<tr>
<td>Discovery Forest</td>
<td>• Assisted and managed volunteers prototyping the plant blindness public research interactive</td>
</tr>
<tr>
<td></td>
<td>• Created and made iterative changes to visitor signage/handouts from collected responses for plant blindness</td>
</tr>
<tr>
<td></td>
<td>• Prototyped sensitive plant core investigation</td>
</tr>
<tr>
<td>Inquiry Camp</td>
<td>• Shadowed Instructor for 2 days</td>
</tr>
<tr>
<td></td>
<td>• Co-instructed 1 week of inquiry camp in July</td>
</tr>
<tr>
<td>Other Dragonfly tasks as needed</td>
<td>• Assisted in recruitment of applicants/participants for summer 2009 Field Expeditions</td>
</tr>
<tr>
<td></td>
<td>• Evaluated visitor use of Wild Research (WR) exhibits (gorilla and ant); compiled and shared results</td>
</tr>
<tr>
<td></td>
<td>• Assisted volunteers with station facilitation techniques</td>
</tr>
</tbody>
</table>

Table 1. Outline of internship areas of responsibility.
CHAPTER 2. INSIDE PROJECT DRAGONFLY

Founded in 1994 by Dr. Chris Myers and Lynne Born Myers with the creation of the award-winning Dragonfly magazine, Project Dragonfly was created “on the premise that the most powerful way to engage children in learning is to celebrate their voices, to invite them into the community of discovery, and to allow them to see themselves as agents of science” (Myers 2009). Created by a group of faculty, staff, and students at Miami University, published by the National Science Teachers Association (NSTA), and funded by the National Science Foundation (NSF), Dragonfly magazine “was the first national publication to feature the questions and discoveries of children” (Project Dragonfly Executive Summary). Winning awards such as a Parent’s Choice Award, three Ed Press awards, and a gold medal from the Society of National Association of Publishers, Dragonfly magazine was the seed that allowed Project Dragonfly to grow into the far-reaching and influential organization that it is today. Figure 1 is a graphic representation of Project Dragonfly’s development over time, beginning with Dragonfly magazine.

*Figure 1. Phylogeny of Project Dragonfly (taken from the presentation “Advanced Inquiry: Deepening Engagement in Science and Conservation at Zoos & Aquariums” by Chris Myers, David Jenike, Ricardo Stanoss, and Stephanie Stowell, 2009)*
**Dragonfly QUEST**

Building on *Dragonfly* Magazine, *Dragonfly* QUEST is a small group program originally designed for the Boys & Girls Clubs of America to encourage collaborative investigation. *Dragonfly* QUEST utilizes a method of investigating questions to solve real-life problems using inquiry. Designed to help educators and anyone who works with youth, *Dragonfly* QUEST provides a detailed process to help young investigators conduct their own research about topics of their interest. The *Dragonfly* QUEST Leader’s Guide suggests the following steps for conducting successful investigations:

- Question and observe
- Uncover comparative questions
- Explore predictions
- Start action plan and gather data
- Think hard about findings and share discoveries

**DragonflyTV**

With the success of *Dragonfly* magazine, Project *Dragonfly* premiered the Emmy award-winning PBS children’s series *DragonflyTV* (www.pbskids.org/dragonflytv) in January 2002. With more than 190 PBS stations airing the show, *DragonflyTV* “broadcasts investigations by youth to a national audience” (Myers, 2009). By the third show of the season, about one million viewers were watching *DragonflyTV* (Project *Dragonfly*) every week. *DragonflyTV* eventually led to the creation of the PBS children’s series *SciGirls*.

**Earth Expeditions**

Following *DragonflyTV*, Project *Dragonfly* initiated Earth Expeditions (www.earthexpeditions.org), “a graduate-credit program that brings teachers, scientists, and community leaders together at conservation hotspots worldwide” in 2004 (Myers 2009). Jointly offered by Project *Dragonfly*, the CZBG, and partners worldwide, the mission of Earth Expeditions is to build an alliance of educators with firsthand knowledge of inquiry-driven, community-based learning for the benefit of ecological communities, student achievement, and global understanding.
Earth Expeditions offers two sister programs: Zoo Expeditions and Field Expeditions. Zoo Expeditions offers educators the opportunity to investigate exciting topics in three different subject areas: primate behavior, habitats, and plants and people. Each participant receives three graduate credits from Miami University upon completion of the course. Field Expeditions offers educators the opportunity to “travel to pivotal hotspots in Africa, Asia, and the Americas to engage in inquiry and action projects on vital issues in conservation” (Project Dragonfly 2009). Selected participants receive seven graduate credits from Miami University upon completion of the course.

In both Zoo and Field Expeditions courses, graduate students complete a semester-long research project that incorporates key course topics and utilizes the extensive plant and animal resources of the Cincinnati Zoo. Participants stay connected and discuss the topics of inquiry-based learning, conservation, and topics specifically related to the course through the web-based platform, Dragonfly Workshops (www.dragonflyworkshops.org). Earth Expeditions was also the basis for a major public engagement initiative, known as Wild Research, as well as several new master’s degree programs offered at Miami University through Project Dragonfly.

Wild Research

In 2007, Project Dragonfly, the CZBG, and partner institutions nationwide created the National Science Foundation (NSF)-funded Wild Research project. Building upon the “real kids doing real science” approach started by Project Dragonfly through Dragonfly magazine and DragonflyTV, Wild Research (www.wildresearch.org) is designed to “involve families in the excitement of science investigation and conservation action at zoos and aquariums nationwide” (Myers et al. 2007, 18). Sixteen institutions from the Association of Zoos and Aquariums (AZA) currently form the Wild Research Consortium (Table 2) with the mission of deepening public engagement in science and conservation.
Wild Research Consortium: 2009 Member Institutions

<table>
<thead>
<tr>
<th>Brookfield Zoo</th>
<th>Pittsburgh Zoo</th>
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<tbody>
<tr>
<td>Cincinnati Zoo &amp; Botanical Garden</td>
<td>Riverbanks Zoo &amp; Garden</td>
</tr>
<tr>
<td>Cleveland Metroparks Zoo</td>
<td>Santa Barbara Zoological Gardens</td>
</tr>
<tr>
<td>Columbus Zoo &amp; Aquarium</td>
<td>John G. Shedd Aquarium</td>
</tr>
<tr>
<td>Denver Zoo</td>
<td>Toledo Zoo</td>
</tr>
<tr>
<td>Louisville Zoological Garden</td>
<td>The Wilds</td>
</tr>
<tr>
<td>New York State Zoo</td>
<td>Woodland Park Zoo</td>
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<tr>
<td>Oregon Zoo</td>
<td>Zoo Atlanta</td>
</tr>
</tbody>
</table>

Table 2. 2009 Wild Research Consortium Member Institutions

Wild Research seeks to encourage visitors, especially families, to move past being spectators and become active investigators and conservationists. Wild Research revolves around the premise that “the most powerful way to engage families is to invite them into the community of science and conservation” (Myers et al. 2007, 18). In order to accomplish the mission set forth by the Wild Research project, the CZBG has served as a testing location for Wild Research exhibits that invite Zoo visitors to actively participate in research by observing animals and plants in various exhibits throughout the Zoo. Currently, Wild Research exhibits have been integrated into *Gorilla World*, *Discovery Forest*, and *Insect World* at the CZBG, with more sites in development (see Appendix A for a map of stations at the CZBG). Through the use of inquiry tools, current Wild Research stations ask visitors to participate in inquiry by investigating topics such as which plants leaf-cutter ants prefer and where gorillas like to hang-out in the exhibit. At these stations, visitors use touch screens to guide them through the investigations and to record their findings where they can compare their results with the results of other visitors. More recently Wild Research created the Wild Pack, a mobile inquiry pack that Zoo visitors can rent out while visiting the CZBG. In the near future, Wild Research stations will be located in *Manatee Springs*.

Wild Research, in conjunction with Earth Expeditions, also offers Global Leadership Workshops to professionals from the Wild Research Consortium. These
workshops are designed to bring Wild Research Consortium members “together with conservation scientists and educators for direct research experiences at key conservation sites in Africa, Asia, and the Americas” (Myers et al. 2007, 18). Along with Field Expeditions participants, professionals from the Wild Research Consortium spend more than 100 hours at a field conservation site during the summer, attend follow-up workshops at the CZBG, and participate in research projects throughout the course.

**Master’s Degree Programs**

In the summer of 2009, Project *Dragonfly* launched its first two Master’s degree programs, the Global Field Program (GFP) and the Integrative Science Program (ISP) ([www.projectdragonfly.org/masters/index.php](http://www.projectdragonfly.org/masters/index.php)), in an overhaul of the MAT in the Biological sciences (offered jointly by the departments of Botany, Microbiology, and Zoology at Miami University) and the MA in Zoology. In 2010, Project *Dragonfly* will be offering a third Master’s degree program, the Advanced Inquiry Program. With Chris Myers as the director and Richard Lee as co-Director, the GFP and ISP programs build on the graduate courses of Earth Expeditions and Wild Research. The MAT degree option is designed for applicants that: 1) are certified to teach, 2) have an academic degree in education or education related field, or 3) have taught or currently teach in a K – 12 school. The MA degree option is for any applicant with a bachelor’s degree interested in career advancement through global leadership, community engagement, and environmental stewardship. The GFP program combines summer field courses worldwide with web learning communities via Dragonfly Workshops, allowing students to complete the degree part-time from anywhere in the U.S. or abroad. The ISP program allows students to experience cutting-edge research while communicating via web-based learning communities. Students in the ISP program also have the option of taking at least one field course in the US or overseas. Current field sites are in Kenya, Mongolia, Borneo, Thailand, Belize, Trinidad, Namibia, the Amazon Rainforest, Baja, and Costa Rica with future conservation and education partnerships anticipated in the Galapagos Islands and Australia.
CHAPTER 3. THE BACKPACK PROJECT

Building off of the Wild Research stations at the CZBG, the vision behind the Backpack Project was to create a mobile inquiry pack that would deepen engagement in science and conservation at zoos, explore investigation techniques, and provide a financial foundation for Wild Research longevity. Currently, the backpack is called the Wild Pack at the CZBG. The Backpack Project team was directed by Lynne Born Myers and included staff from both Project Dragonfly and the CZBG. Table 3 is a listing of Backpack Project team members and their positions at Project Dragonfly and the CZBG.

<table>
<thead>
<tr>
<th>Project Dragonfly Team Members</th>
<th>CZBG Team Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Chris Myers, Director of Project Dragonfly</td>
<td>• Dave Jenike, Chief Operating Officer</td>
</tr>
<tr>
<td>• Lynne Born Myers, Director of Learning Media</td>
<td>• Rhiannon Hoeweler, Project Coordinator – Visitor Engagement Initiative</td>
</tr>
<tr>
<td>• Jill Korach, Program Manager for Wild Research/Assistant Director of Field Expeditions</td>
<td>• Caitlin Reynolds, Wild Research Project Coordinator</td>
</tr>
<tr>
<td>• Christina Funk, Intern/Research Assistant</td>
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</tr>
</tbody>
</table>

Table 3. Backpack Project team members.

Research and Planning

The initial stages of the Backpack Project included researching other venues that offered similar mobile inquiry packs to guide the team in developing a backpack that is unique. Other venues that offered self-guided backpack tours included the Fort Worth Zoo, Detroit Zoological Institute, San Diego Zoo, Boise Zoo, North Carolina Museum of Art, Dallas Zoo, Lichterman Nature Center in Memphis, and the Sedgwick County Zoo. Our research of backpacks offered at other venues included comparing rental costs, billing processes, target audiences, tools offered in the backpack, bag set-up, bag maintenance, and themes/program ideas.
After researching other venues, the project team proceeded to conduct a backpack tool sort. The purpose of the tool sort was to identify a set of tools, which could be included in the backpack, to test with visitors at the CZBG. The team identified a set of tools that would: enhance viewing experience, bring meaning to actual experiences and resonate with the person afterwards, and is consistent with conservation efforts. The team also identified some questions to ask the visitors as they used the tools (see Appendix B). The tools that were used in the backpack tool sort were the following:

- Binoculars
- Stop watches
- Compass
- Thermometer
- Spray/Water Bottle
- Disposable Camera
- Magnifying glass
- Measuring Tape
- Recording device
- Flashlight
- Click Counter
- Walkie Talkies
- Wild Pencil (a pencil with a Wild Research sticker on it)
- Wild Pad of Paper (a pad of paper with a Wild Research sticker on it)
- Ruler

Rhiannon and I conducted the backpack tool sort in June of 2009 at the CZBG’s giraffe exhibit. We prepared a table with all of the tools laid out for visitors to see and access easily. We did not provide any guidance or instructions on how to use the tools. We wanted to see how visitors would use the tools independently. As visitors came to the table to “play” with the tools, we asked them the pre-defined questions and recorded our observations (see Appendix C for summary of visitor responses and observations). As a result of the backpack tool sort, the team made the following conclusions:

- Visitors needed more guidance to obtain useful feedback about how to use the tools as part of a mobile inquiry pack.
• When they were not guided, visitors were using the tools for play and not necessarily investigation.

• Many children wanted to stay engaged with tools; however, chaperones or parents were tired of waiting. The amount of time children stayed engaged with tools ranged from 30 seconds to five to 10 minutes.

• Tools that were not used very often included the metal ruler, compass, thermometer, note pads, and spray bottle.

The next step in the research and planning process for the backpack project was conducting brainstorming sessions with four focus groups. Jacobson et al. argues that focus groups “are a useful data collection tool to explore general attitudes, motivations, and behaviors of your audience”. Focus groups “are often used during the planning (formative) stage of a program to receive feedback from a specific target audience about ideas and educational approaches” (2006, 31). The backpack project focus group brainstorming sessions were held on four occasions throughout the months of July and August of 2008. All focus groups consisted of 7 to 12 individuals from a variety of backgrounds. The first three focus groups consisted of staff from different CZBG departments, Project Dragonfly staff, families (representing general Zoo visitors), and CZBG volunteers. The fourth focus group consisted of educators from a variety of institutions and grade levels. Each focus group brainstorming session began with a presentation which introduced the backpack project, explained project goals, and gave examples of ideas for the development of the backpack (Appendix D). After the presentation, participants reflected and shared their ideas for backpack themes and methods. All ideas and comments made by participants were recorded for further review with the Backpack Project team. Ideas from all focus group brainstorming sessions were summarized and a list was made of possible backpack themes and ideas (see Appendix E). The top take-home lessons from the focus groups included the following:

• Animal behavior (ranging from animal calls to adaptations) was a popular topic for use as a backpack theme

• If animal behavior is to be used as a backpack theme for conducting investigations, the behaviors need to be easily observable by zoo visitors.
• Tying backpack themes to real research and Zoo keepers was mentioned in several of the focus groups. For example, it was suggested to have a “Keeper Pack” or a “Keeper Encounters” backpack where investigations were tied to real research occurring in the field. This also included the idea of a Career Pack where investigations were tied to the different roles of Zoo staff.

The Backpack Project team then reduced the list of ideas and themes for further development and research based on four goals: 1) social inquiry aspect, 2) feasibility of themes, 3) participatory media/story of science and conservation, and 4) take home message, or what people can do at home to take action or personal steps.

Development

The Backpack Project team also reduced the ideas and themes from the focus group brainstorming sessions to four themes for further research and development: 1) free-roaming animals at the Zoo (specifically chipmunks, squirrels, peacocks, and insects), 2) body parts, 3) puffins, penguins, and auklets, and 4) vigilance in giraffes.

Rhiannon and I conducted a review of current scientific studies for each theme in order to connect the backpack investigations to “real-world” research. This research aided us in creating concept outlines for each theme (Appendix F). In addition to acquiring a solid base of scientific articles, I spent time at the CZBG observing the animals involved in each theme to aid in concept creation. Observing the animals at the CZBG also guided us in creating investigations that were feasible for zoo visitors to conduct while spending time at the Zoo. As a result of the observations at the Zoo, it was decided to create concept outlines for three out of the four themes; the free-roaming animals theme was not included. The observations of the free-roaming animals at the Zoo demonstrated that it would be difficult for Zoo visitors to conduct investigations on these animals due to numerous factors: 1) no guarantee that Zoo visitors would be able to observe free-roaming animals since they are not in controlled exhibits, 2) time of year can make it difficult to observe some free-roaming animals, 3) lack of connection to real scientific research that can be incorporated into visitor investigations. The concept outlines and observation notes were then sent on to the Backpack Project team for review and investigation development. At this point, Lynne Myers took over the role of developing
the investigations for the prototyping phase of the Backpack Project. As the investigations were developed, the project team provided feedback before investigations were finalized for prototyping.

**Prototyping**

The investigations in the backpack were developed in the form of “Quest Cards”, or challenge packets, with each card containing instructions, lists of tools, and details needed for Zoo visitors to conduct the investigation. Each backpack contained challenge packets with different investigations centered around a theme (i.e. anatomy and adaptations). Three central themes/challenge packets were developed: 1) Anatomy and Adaptations, 2) Gorilla, and 3) Vigilance. Each challenge packet contained one to three inquiries (Table 4). In order to provide different levels of difficulty to prototype, each theme had at least one “simple” investigation and one “complex” investigation.

<table>
<thead>
<tr>
<th>Backpack Challenge Packet Themes</th>
<th>Investigations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy and Adaptations</td>
<td>• Gibbons: Left or Right Handed? (Simple)</td>
</tr>
<tr>
<td></td>
<td>• Primates: Left or Right Handed? (Complex)</td>
</tr>
<tr>
<td>Gorilla</td>
<td>• Which Gorilla Are You? (Simple I)</td>
</tr>
<tr>
<td></td>
<td>• Hoot Like a Gorilla (Simple II )</td>
</tr>
<tr>
<td></td>
<td>• What am I Saying? (Complex)</td>
</tr>
<tr>
<td>Vigilance</td>
<td>• Who Looks First? (Simple)</td>
</tr>
<tr>
<td></td>
<td>• Giraffe Lookouts (Complex)</td>
</tr>
</tbody>
</table>

Table 4. Themes and titles of investigations used in backpack prototyping (See Appendix G for instructions and data sheets used for backpack prototyping per theme.)

Even though the Gorilla theme was not originally part of the concept outlines, the project team decided that using existing Wild Research stations as part of the backpack investigations provided easy access to previously tested inquiries.

In addition to the challenge packets, data sheets and the tools needed to conduct each investigation were provided in the backpack (see Appendix G for the instructions and data sheets provided during prototyping for each investigation and Appendix H for
list of supplies used per theme and investigation). All data sheets were created and printed by Project Dragonfly staff at Miami University. The tools were either borrowed from the CZBG and Project Dragonfly or purchased for the purpose of prototyping.

Backpack prototyping consisted of three phases: 1) Phase I – invited families to test, 2) Phase II – on-site random ask, and 3) Phase III – invited family testing out three investigations. Data collection techniques included: 1) written observations of each families’ backpack usage and interactions during their experiences, 2) an oral interview administered to each family after their experiences were completed to determine likes, dislikes, and clarifications on actions observed during experiences, and 3) a survey completed by each family at the end (see Appendix I for observation sheets and observation instructions). Each phase was designed to test the challenge packets with a different type of group with slightly different formats.

**Phase I Prototyping**

Phase I backpack prototyping, which occurred on October 23 – 25 and 27 of 2008, was designed to test each of the three challenge packets with at least two families. For the purpose of Phase I prototyping, families were contacted from the Wild Research family contact list. Wild Research families are families that are familiar with Wild Research and have participated in other studies pertaining to Wild Research. Six Wild Research families, for a total of 22 individuals, were invited to come to the CZBG to test the Backpack challenge packets. Each family tested two investigations, one simple and one complex, from two different challenge packets, (i.e., Anatomy and Adaptations Simple and Gorilla Complex). After each family tested out two investigations from two different challenge packets, they participated in a brief oral interview and were asked to fill out a post-experience survey (see Appendix J for Phase I compiled survey results). As compensation for participating, each family received one pass to participate in a free family program at the CZBG.

In order to determine the level of guidance needed for each backpack investigation, the challenge packets were tested using a facilitated approach with three families and a non-facilitated approach with the other three families. The facilitated approach required the presence of one facilitator and one observer with each family.
Representing Project Dragonfly, Lynne Myers and I acted as both facilitators and observers. From the CZBG, Caitlin Reynolds, Bernadette Plair (Neotropical Conservation Program Manager at the Center for Conservation and Research of Endangered Wildlife (CREW)), and Mary Dimitrijeska (Volunteer Education Coordinator) acted as facilitators and observers. The facilitator provided an overview of the backpack and the experience to the family. The facilitator then walked with the family, giving only a few instructions regarding the use of the backpack, its contents, and the challenge packets at each site. The observer only observed and took notes on the entire experience. The entire experience, including the overview, took approximately 50 to 70 minutes for each family.

The non-facilitated approach required the presence of one individual serving as both the facilitator and the observer. The facilitator/observer, who was focused on observing rather than facilitating, provided a brief overview of the backpack experience with each family. The facilitator/observer then traveled around the Zoo with each family collecting only written observations with no additional explanation/facilitation during the remainder of the experience. The entire experience, including the overview, took approximately 50 to 70 minutes for each family.

Phase II Prototyping

Phase II backpack prototyping, which occurred between October 30 – 31 of 2008, was designed to test the investigations with families that were not previously invited to the CZBG. This was accomplished by approaching zoo visitors on grounds at the CZBG in various locations and inviting them to try the backpack (with one investigation in it). The goal was to test each investigation with at least two different families. As a compensation for their participation, each family received either food vouchers or ride passes for the train or carousel.

All experiences for Phase II prototyping were non-facilitated, with an observer taking notes while each family completed the investigation. Observers for Phase II were Mary Dimitrijeska, Rhiannon Hoeweler, Lynne Myers, Bernadette Plair, Caitlin Reynolds, and I. In order to increase the likelihood of families testing out the investigations, visitors were approached who were already located at the exhibit related to each challenge packet. The Anatomy and Adaptations challenge packet was tested at
Jungle Trails, the Gorilla challenge packet was tested at Gorilla World, and the Vigilance challenge packet was tested at Giraffe Ridge. After each family tested an investigation, they participated in a brief oral interview and were asked to complete a post-experience survey (see Appendix K for Phase II compiled survey results). During this process, all of the investigations were tested with 14 total families and a total of 59 individuals.

**Phase III Prototyping**

Phase III backpack prototyping, which occurred on November 6, 2008, was designed to determine if a family presented with a backpack containing three investigations would complete more than one investigation if not all three. Again one family from the Wild Research family list was invited to visit the CZBG and test out a backpack with the following three investigations: 1) Vigilance Complex (Giraffe Lookouts), 2) Anatomy and Adaptations (Gibbons: Left or Right handed?), and 3) Gorilla Complex (What am I Saying?). The family consisted of five children and one adult. The entire experience with the family was non-facilitated, and I served as the observer for this final phase of prototyping. The family was given a backpack with the three investigations inside and was told to go about their normal zoo visit while taking me along with them. As the observer, I took notes on the family’s entire experience. After the family finished testing the backpack, they participated in a brief oral interview and were asked to complete a post-experience survey (see Appendix L for Phase III compiled survey results). As a reward for their participation, the family was given a free family program pass for any family program at the CZBG.

**Prototyping Outcomes**

After the all three of the backpacking prototyping phases were completed in November of 2008, the data was condensed and summarized from the written observations, oral interviews, and family evaluations/surveys. Overall, the backpack experiences were well received and enjoyed by the families that tested them in all three phases. The backpack team also learned much about the improvements that needed to be made and what to keep. The following are some of the things the backpack team discovered from the surveys administered in all three phases of prototyping:
• When each family was asked to rate their overall experience on the survey, most people rated it in the 5 to 7 range on a scale of 1 (just ok) to 7 (awesome!) with a total of 17 5’s, 17 6’s, and 24 7’s. The lowest rating, given by only one person, was a 3.

• When asked “If this experience was available on-going at the Zoo, would your family participate again?” There were 23 “Yes” responses, 1 “No” response, and 5 “Maybe” responses.

• Most users preferred the messenger-style bag over the traditional backpack.

• Participants’ favorite tools in the bag were: 14 people said binoculars, the timer/sandglass, stamps, and giraffe puppet had 5 people each, and 4 people said gorilla stickers.

• When asked “What was the best part of your Family Explorer experience?” participant responses included the following:
  “Working together”
  “Kids got to feel they were doing an experiment”
  “We were learning as a family”
  “Looking more closely at primates”
  “Stamping – observing the animals”
  “Sticker IDs to put on card” [gorilla stickers]
  “What we learned about right and left hands”
  “Discovering the different behaviors we never noticed before”
  “Finding out what gorilla we are (referring to “Which Gorilla R U” activity)”
  “Taking the time to explore the zoo in a more detailed way. It helps the children to expand on how naturalists may do observations in the wild”

Because the six-month time period for my internship ended just after backpack prototyping, my participation on the backpack project ended with the compilation of the data and information collected during prototyping. The information obtained from all three phases of backpack prototyping was used by the backpack team to continue in the development of the backpack after I finished my internship with Project Dragonfly. My final role in the backpack project was to research and begin the purchasing of tools and
items to use in the real backpacks at the CZBG. Currently referred to as the “Wild Pack”, the backpacks are available for rental for $5 at the CZBG by visitors (see Figure 2 for the finished Wild Pack, Figure 3 for the Wild Pack sign at the Zoo, and Figures 4 and 5 for a sample activity in the Wild Pack).

Figure 2. Finished Wild Pack bag along with sample tools (used with permission by Project Dragonfly).

Figure 3. Wild Pack sign at the CZBG (used with permission by Project Dragonfly).
Figure 4. Example Full Investigation Trifold in the Primate Pack, Side 1 (used with permission by Project Dragonfly).

Figure 5. Example Full Investigation Trifold in the Primate Pack, Side 2 (used with permission by Project Dragonfly).
CHAPTER 4. WILD RESEARCH IN THE DISCOVERY FOREST

The Discovery Forest is a permanent, 4,500-square-foot exhibit attached to the Education Building at the CZBG. The glass-enclosed, three-story building showcases a Neotropical rainforest habitat with palms, ferns, blue-and-gold macaws, a toucan, and a sloth among other plants and animals. The Discovery Forest was designed with Wild Research in mind to serve as a place where visitors can use inquiry to conduct hands-on, fun scientific investigations for the entire family.

Station Prototyping

During the summer of 2008, I participated on a team of Project Dragonfly staff, CZBG staff, and volunteers to prototype and adapt two different Wild Research stations for permanent implementation into the Discovery Forest. The volunteers that helped in prototyping the stations were trained by staff members, including me, on Wild Research and how to observe and record observations without facilitating the experiences. The two Wild Research stations that were prototyped were the Sensitive Plant investigation and the Plant Blindness Quiz. Each station was designed to support independent activities that did not need facilitation by anyone outside of the family that was participating in the investigations.

The goal in prototyping the two stations was to see how effective the stations were in promoting inquiry and conducting investigations without the assistance of a trained staff member or volunteer to guide them. Each staff member and volunteer that observed families using the stations were given a set of instructions and observation sheets to record their observations of visitor usage. As families came through the Discovery Forest, observers waited to see if visitors would approach the stations independently and complete the investigations, or they asked visitors if they would like to participate in the investigation and then step back to let them follow the instructions on independently. Observers recorded the following information on the observation sheets: name of observer, date, day of the week, time, which station/element was being observed, audience demographics (number of people in family, ages, gender, and ethnicity), comments and actions made by the participants during the investigation, and comments and actions made by the participants after they completed the investigation. Throughout
prototyping, the feedback was used to make changes and test different formats using different visual displays and formats to determine what was most effective and user-friendly for permanent implementation.

**Sensitive Plant Investigations**

The Sensitive Plant core investigation asked visitors to explore and learn about what makes the Sensitive Plant, *Mimosa pudica*, fold in its leaves using the process of inquiry. Visitors chose between two methods: 1) determining if the Sensitive Plant will fold in its leaves faster with a light touch using a feather or a heavy touch using their fingertips to pinch the leaves or 2) determining if the Sensitive Plant will fold in its leaves faster with wind by using their mouth to blow on it or with water by using a spray bottle to lightly mist the plant. Visitors were asked to time each method using a stopwatch to determine how long each method took to elicit the Sensitive Plant to fold its leaves. Visitors recorded the time for each method on a data sheet. The tools to conduct each investigation and the data sheets were provided at a table that was placed in the Discovery Forest.

The instructions for the Sensitive Plant investigation originally took the form of PowerPoint slides that were printed out and made into a booklet that participants flipped through to see the next step (see Appendix M). Each slide was a different page in the booklet. Early in the prototyping stage, the instructions were taken out of booklet format and instead laid out on the table in order, by step, due to observations that visitors were not using the entire booklet to see what the next steps were before continuing on with the investigation (see Figure 6).
Eventually, the slides were placed on a poster at the table to determine whether that format was more effective in prompting visitors to work through all of the steps in the instructions (see Figure 7).
The Sensitive Plant investigations are currently permanent exhibits in the Discovery Forest at the CZBG in the form of carts that are staffed at different times throughout the week. When the cart is not staffed, all materials are locked away in the cart.

**Plant Blindness Quiz**

The Plant Blindness Quiz station, entitled “Do You See Green?”, was designed as a tool for visitors to complete independently to determine how “plant blind” they are, or how well they notice plants (see Appendix N for the plant blindness quiz that was used in prototyping). The quiz was on sheets of paper that visitors could fill out and take with them and were on a table with a sign that displayed the point system. The quiz consisted of nine questions with multiple choice answers. Each choice was given a different point value. At the end of the quiz, visitors added their scores, based on the point system assigned to the answers, to determine how well they notice plants and their level of knowledge about plants. Using the same observation sheets that were used to record the observations of the Sensitive Plant station, we observed visitor interactions at this station for the purpose of changing, adapting, and implementing the changes based on visitor and volunteer feedback. Based on the data collected during prototyping and throughout the course of my internship, the Plant Blindness quiz has evolved into a touch screen station in the Discovery Forest that is now called “Shaman’s Quest”. Visitors are given quests that require plant observation skills to find different wood-carved “shaman” hidden in the Discovery Forest.

**Visitor Tracking**

In addition to prototyping the two stations, I assisted as a researcher in tracking visitors through the Discovery Forest to determine how they used the exhibit before the Wild Research stations were implemented permanently. The Discovery Forest Wild Research station prototyping was not occurring while visitor tracking was taking place. When tracking visitors through an exhibit, the researcher used a tracking instrument in which the visitor’s path is drawn on a floor plan of the exhibit (see Appendix O for the Discovery Forest tracking tool). For the purposes of tracking visitors for Wild Research, only families with more than one age group present were tracked. One individual in each
family group was selected by the researcher to track and record their movements on the tracking tool. The family was not told by the researcher that they were being followed. Each researcher wore a tag identifying who they are and that they are a Zoo Researcher. When tracking a family, however, the researcher attempted to make it appear as if they were observing something else so as not to influence the actions and conversations of those being tracked. On the tracking tool, the researcher typically recorded the following: date, time of day, family demographics (age, gender, ethnicity), the demographics of the individual being tracked, how crowded the exhibit is at the time the researcher is tracking that particular family, and the total time the family spends in the exhibit. Also recorded on the floor plan were the times at certain checkpoints which were selected before tracking began. These checkpoints were designed to reveal how much time was spent in certain sections, or areas of interest, in the exhibit.

In addition to recording information about where the visitor went throughout the exhibit, the researcher recorded the actions the visitor took while in the exhibit (i.e., looking at an exhibit, reading a sign, manipulating something in the exhibit, etc.) as well as comments and conversations they had while in the exhibit. All of this data provided Wild Research station developers with important information related to how the exhibits were used before the stations were implemented, where the best locations were to place a station within the exhibit, what visitors were already interested in at the exhibit, along with other information. After Wild Research stations were prototyped and implemented at an exhibit, another phase of visitor tracking was completed to determine how the exhibit was used after station implementation, to determine if any changes needed to be made to the stations, and to compare exhibit usage with the data collected from visitor tracking prior to station implementation. I was unable to assist with the post-Wild Research station visitor tracking in the Discovery Forest as this occurred after the end of my Internship period with Project Dragonfly.
CHAPTER 5. WILD RESEARCH INQUIRY CAMP

The CZBG offers week-long, full day, and half day summer camps for four to fourteen year olds. A variety of topics, such as animal tracking and learning about the senses, are available depending on the age range and week of summer camp. During July of 2008, I participated in one of the week-long inquiry camps, Nature Quest, for 12 to 14 year olds based on the topic of inquiry and stemming from Wild Research. After shadowing the instructor during the previous week’s summer camp, I co-instructed one week of “Nature Quest” camp. Based on the theme that “the zoo is a great place to investigate questions about nature, plants, and animals”, the objectives for the Nature Quest summer camp were:

- Students will develop skills in problem solving, reading, writing, and math.
- Students will learn practical methods for observing and recording animal behavior.
- Students will learn about inquiry and Wild Research and, independently or with a team, develop/investigate their own inquiry project.
- Students will build on interpersonal skills and public speaking skills.

Nature Quest Daily Schedule and Goals

The summer camp was a five-day camp designed to expose participants to inquiry and conducting investigations. An inquiry project in which the students designed and carried out the project in teams was used to accomplish these goals. Each day of camp included a variety of activities to get the students to explore the Zoo while also giving them time to learn about and actively engage in inquiry. On the fifth and final day of camp, the students’ parents were invited to the Zoo to watch their children present their inquiry projects. The following were the goals for each day of Nature Quest camp:

Day 1: Finding a QUESTion everywhere
- Become familiar with classmates, instructor, volunteer(s), and expectations for the week.
- Learn about QUEST and inquiry.
- Participate in a pre-set inquiry
- Learn about some of the different exhibits at the Zoo
• Learn why observation is important and how to be a better observer.

**Day 2: Do you have a QUESTion in mind?**

• Gain a better understanding of why inquiry is important to keepers and how we are using it throughout the Zoo
• Learn about the Wild Research stations at the Zoo
• Start to think about forming their own questions.

**Day 3: Beginning the QUESTs**

• To begin to form comparative questions
• To begin collecting data on their own inquiry projects

**Day 4: Continuing the QUESTs**

• Continue to collect data on inquiry projects
• Collaborate with team – groups discuss findings, tweak techniques if necessary, and come up with a plan for the next day

**Day 5: What Did We Discover?**

• Find out what all of their data means
• Find out what other questions each inquiry has raised
• Present inquiry projects

**Inquiry Camp: Some Final Thoughts**

Overall, the design and scheduling for the five-day Nature Quest inquiry camp was effective in getting children excited about the Zoo and actively involved in conducting their own investigations. Not only did participants have the opportunity to explore the zoo, but they also had the ability to act as though they were researchers and scientists and to experience what it is like to observe and investigate animals through their own questions. The children seemed to enjoy inquiry camp while learning about the exhibits at the Zoo and how they can use inquiry to investigate questions that were self-inspired and designed. The only recommendation that I have for future inquiry camps is to offer it over a two-week period rather than one week. With all of the activities that occurred during the week, a two-week period may offer more of an opportunity for the children to get even deeper into their projects.
CHAPTER 6. SECONDARY INTERNSHIP RESPONSIBILITIES

In addition to the primary projects outlined in the previous chapters, I had a variety of secondary responsibilities that were assigned as the need arose. These responsibilities included tasks related to exhibit evaluation and volunteer support as well as other administrative support tasks.

Exhibit Evaluation and Volunteer Support

Throughout the course of my internship with Project *Dragonfly*, I assisted in evaluating visitor use of Wild Research exhibits at Gorilla World, the leaf-cutter ant exhibit in World of the Insect, and Manatee Springs. At the Gorilla World and World of the Insect, we tracked visitors to evaluate post-station use of the Wild Research stations at those exhibits. The tracking instruments and methods used at Gorilla and Leaf-cutter Ant were similar to that of the Discovery Forest. The visitor tracking done at Manatee Springs was conducted pre-Wild Research station implementation to gather information on how visitors used the exhibit before the stations are permanently installed. I also assisted in the compilation and sharing of the visitor tracking data. We also asked Zoo visitors to complete questionnaires for feedback on what they were interested in when visiting the CZBG. In addition to visitor tracking, I assisted volunteers as they were learning and improving their Wild Research station facilitation techniques.

Administrative Support

When not working on the primary projects I was assigned to for my internship or assisting with exhibit valuation and volunteer support, I provided administrative support. These tasks included the following:

- Recruitment of applicants for Earth Expeditions and the new Master’s programs by sending out announcements and flyers to organizations and school districts.
- Conducting research for scientific papers, books, and articles related to topics of interest to include in the reading assignments and course readers for Earth Expeditions courses
- Researching flight information (costs, dates, times) for Earth Expeditions courses
- Making phone calls and sending out e-mails as needed.
CHAPTER 7. CONCLUSIONS

Jacobson, McDuff, and Monroe, in *Conservation Education and Outreach Techniques*, contended that “the fate of our ecosystems and the plants, animals, and people that depend on them lies with our ability to educate children and adults, in settings as diverse as schools, communities, farms, and forests” (Jacobson et al. 2006, 1). I strongly agree with Jacobson et al., which is why I have chosen the field of environmental education for my career. I also firmly believe that environmental education in and among the community and schools is important for the growth and overall health for our children. Louv stated “environment-based education produces student gains in social studies, science, language arts, and math; improves standardized test scores and grade point averages; and develops skills and problem-solving, critical thinking, and decision making,” clearly implicating that environmental education has a heavy stake in the future of our society as a whole (2005, 204).

In my pursuit of a career in environmental education, an internship with Project Dragonfly has been a valuable and rewarding experience. I have learned much about myself and about the field of environmental education throughout the time I spent working with Project Dragonfly. In participating on several Wild Research project teams, I learned about the process of program development from concept creation, to program design, implementation, and finally evaluation. Each step in creating and implementing a new program is as equally important as the next. Importantly, I was exposed to the importance and necessity of the evaluation phase of program development. I discovered, through my participation on the Backpack Project team, how much we can learn from evaluating potential programs before and after implementation. The information we received greatly helped the Backpack Project team in adapting and changing the investigations to better reach zoo visitors. Feedback from program participants and stakeholders, such as zoo visitors, was invaluable. I also learned how important it is to have teams of several individuals with varying backgrounds and experiences when developing an educational program or tool. Never have I worked with an organization that involves so many people from many different professional backgrounds and life experiences.
As I move forward in my career, everything I have learned and experienced at Project Dragonfly will come with me and impact what I do in environmental education. Project Dragonfly, and everyone involved with it, has been an inspiration to me. I now have even more passion for exposing others to the natural world and everything it has to offer. The skills I have learned throughout my internship with Dragonfly will prove useful as I strive to develop and implement environmental education programming in any setting that I end up, whether that is at a nature center, zoo, school, or park. I now feel confident that I can effectively design, implement, and evaluate educational programs. My experiences at Project Dragonfly have, without a doubt, better prepared me for a career in environmental education and beyond.
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Project Dragonfly, Miami University. Executive Summary.


APPENDIX A

MAP OF WILD RESEARCH STATIONS AT THE CZBG
Wild Research Stations

Gorilla
Leaf Cutter Ant
Manatee
Discovery Forest
Polar Bear
Wild Pack

(Taken from the presentation “Advanced Inquiry: Deepening Engagement in Science and Conservation at Zoos & Aquariums” by Chris Myers, David Jenike, Ricardo Stanoss, and Stephanie Stowell, 2009. Used with permission by Project Dragonfly.)

Current Stations: Gorilla, Leaf Cutter Ant, Discovery Forest, and Wild Pack
Future Stations: Manatee and Polar Bear
Backpack Tool Sort Questions

1) Which animals/exhibits are you interested in learning more about?

2) If you were able to rent a backpack with the tools we have available here to learn more about the animals/exhibits in the zoo, would you rent the backpack? Why or why not?

3) If you were given a backpack with these tools, which exhibits/animals would you use the tools in the backpack to learn more about?

4) What would you use each tool for?

5) What questions do you come up with about any of the exhibits/animals in the Zoo that you would use these tools to answer?

6) Which of the tools here would you like to use in the Zoo?

7) Are there any tools that are not here that you would be interested in using at the Zoo to learn more about the animals? If so, what tools and how would you use them?
APPENDIX C

SUMMARY OF VISITOR RESPONSES AND OBSERVATIONS FROM BACKPACK TOOL SORT
What tools were used most frequently and for what purpose?

Walkie Talkie’s- used to play with across from one another at GR. Someone suggested using the walkie talkies like a game – one person can watch an animal and describe it to another person, then the other person who is not looking at the animal has to guess what animal it is.

Camera- used to take pictures of one another, the giraffes, and Christina.

The count clicker was a huge hit- Young to old were interested in playing with the counter. Thoughts & suggestions: used to count people coming in to the zoo, animals in an exhibit, # of animals in the zoo, steps taken throughout the zoo (pedometer), how long it takes a giraffe to get up off the ground from a laying position and eat one of the leaves on the tree, count different behaviors an animal exhibits such as putting its head up and down

The voice recorder was used to record background noise but also to record voices and then replay. One girl suggested using the voice recorder to record what animal is doing, then give the recorder to another person and have them see if the animal is doing the same thing as recorded.

Binoculars- used to look in to the windows, at the giraffes in the exhibit, one girl suggested using binoculars to count spots on the giraffes

Magnifying glass to look in the window, putting them up to their eyes and not down at the object they were trying to magnify.

Measuring tape: How wide table was, measure how tall and wide giraffes are.

Hour glass: Timing device to complete a task!

Compass – One girl suggested using the compass for a scavenger hunt. Another girl suggested using the compass to see which way the animal is facing.

Thermometer – One person suggested using the thermometer to see what the temperature is in the animal’s habitat.

Stopwatch – Several people suggested using this to time how fast an animal runs.

General comments:
Both Christina and Rhiannon feel a little guidance is needed. 99% of reactions when asked how they would use the tools were basic responses. If left to their own devices they were using the tools for play not necessarily investigation. Next time out we will provide slight guidance and see how that alters activity.

Were they used in conjunction with one another or independently?

All the tools were used independently.

How long did the visitor stay engaged?

Caveat: Many children wanted to stay but chaperones or parents were tired of waiting. However, many children stayed engaged longer than I expected. Ranged from 30 seconds to 5-10 minutes.

Were there any problems that occurred associated with the tools chosen?

Ruler got hot! Timer also got hot in sun and we lost the screen.

What tools weren’t used very often?

Ruler, compass, thermometer, note pads, we didn’t use spray bottle- so that we didn’t ruin the other materials (need to think about future incorporation). Flashlights- can’t think of a use when in broad daylight maybe need to reevaluate this as well.

Why?

Very few people picked them up to use them. Christina is looking in to a different thermometer. Several people picked up the flashlights and said they could use it to see animals in the dark indoor exhibits, but that would not be a good use of the flashlight (not good for the animals.) The other tools we are going to get rid of.

Are there other tools the visitor would like to see put on the table?

AvPin for your nose cat house!
APPENDIX D
BACKPACK PROJECT
FOCUS GROUP POWER POINT PRESENTATION
Public Engagement in Science and Conservation at Zoos and Aquaria

A Whole-Zoo Exhibit

Science

From Spectators

Visitor Experience

To Investigators

Conservation

Media

Backpack Project

Science Media Conservation Visitor Experience A Whole-Zoo Exhibit From Spectators To Investigators

Backpack Project
The Vision

- To Deepen Engagement in Science and Conservation at Zoos
- Explore Investigation Techniques
- Provide a financial foundation for Wild Research longevity

Development Plan

- Conduct brainstorming sessions to gain insight on ideas, new research, references, & interests from internal/external stakeholders.
- Conduct research on knowledge gained from brainstorming sessions.
- Refine tactics – Backpack framework that meets goals and budget.
Questions
- Is there potential to inspire inquiry?
- What do visitors do at this plant or animal exhibit?
- What do visitors learn?
- Who studies this plant or animal?
- What questions or issues do they study?
- What ideas or inquiries will engage visitors?
- How does media deepen engagement?
- Is the audience authoring knowledge?
- Where is the community of investigation?
- How can social interaction be increased?
- Does the web or other media add value?
- Can staff support social inquiry?

Design/Prototype Phase
Schedule: 12 weeks (August thru November)
Development Plan

Discovery / Concept Phase
Design / Prototype Phase
Production / Implementation

Production/Implementation Phase
Schedule: TBD

Sensitive Plant Inquiry
IDEAS

Is a Quest Card Approach a Possibility?
What is a Quest Card?

- A card that defines a theme, states a challenge, and defines a role! – Serengeti Game Scout

- Each card could include:
  - Questions/activities
  - Social inquiry connection
  - Animal connection
  - Connection to home (website etc).
  - Investigation Tool list

QUEST Card Approach

**Serengeti Game Scout**

Who is more vigilant: a male or female giraffe?
A male or female human?

**TOOL LIST:***
- Stopwatch
- Binoculars
- Pencil/Paper
- ID for each giraffe (to indicate sex)
- Flypen – download results

Are giraffes or humans more vigilant?
More Questions!

– Who’s more independent you or a peachick?

– How old are you in peachick years?

– What attracts the peahen more: the call of the peacock and the shake of his tail or the length/quality of his train?

Investigation Tool Set

- Binoculars
- Stop watches
- Compass
- Thermometer
- Spray/Water Bottle
- Camera
- Magnifying glass
- Personality test
- Cellophane red/green (eye cut outs on challenge card with red/green cellophane to look through)
- Peacock caller
- Recording Device
- Flippen
- Walkie Talkie
- Click Counter
- Measuring Tape
- Pencil & Pad of Paper
Can you add to our Investigation Tool List?
APPENDIX E

THEMES AND IDEAS DRAWN FROM BACKPACK FOCUS GROUP BRAINSTORMING SESSIONS
Ideas Drawn from Backpack Brainstorming Sessions: (7/24, 7/29, & 7/30)

1. Peacocks, Squirrels, Chipmunks (any free roaming animal)
2. Camera Traps
3. Facial Recognition (shapes, blow-up figures, colors, binocular vision), create art?
4. Penguins (spatial pattern, in/out of water)
5. Wild Birds @ Zoo (concern how do you know what’s wild?)
6. People watching
7. Keeper Pack
8. Keeper Encounters- tied to real research occurring in field
9. Calls of animals (either recording them internally and having people try and identify calls or having the visitors record and then try and decipher emotion behind call) Ex: lemurs
10. Pavlov behaviors- rattle keys animals look at door not at individual rattling keys
11. Human behaviors and their similarity to animal behaviors – dominance hierarchies and family groups (baby fruit bats, lemurs, vampire bats), vigilance studies (giraffe)
12. Spacial proximities of animals – lemurs and fruit bats, gorilla, can be used across the Zoo
13. Checklist/scavenger hunt/treasure hunt
14. Locomotion (different types of movement among primates)/dexterity feet and hands (tying shoes without thumb)
15. Themes- African, AM, PM, age appropriate, hoofstock, frogs, scavenger
16. Plants- look at pieces leaf, nut, paper birch, etc.
17. 1m plots to identify plants, birds, butterflies, pollinators.
18. Bee pollination – identify bee’s through photos and then what they are pollinating.
19. A did you know backpack?  Secrets of the Zoo!
20. Project Budburst- When are blooms blooming relative to historic data/relative to blooms at home and zoo.
21. Smells around the zoo! – Scent marking (Cats and lemurs). Why some animals stinkier, use of smells as communication, nocturnal animals, tracking
22. Behavior time studies of animals
23. Nutrition and food- tie into keeper encounters which food will animal choose (3 options and vote). Enrichment item in pack which will kea, lorikeet. What does animal eat in wild/captivity? Why is it altered? Compare different times of year and compare to humans and families
24. Connect wildlife to home- add to your yard, how affects animals in the wild (dolphins and gorillas) how to reduce impact at home.
25. Point counts- investigations dedicated to that point.
26. Body Parts- Tails (small, medium large, long or short, prehensile, do they have one?) eyes- (small, large, side of head, in front) bird beaks (tools in pack to investigate them – nutcracker)
27. Adaptations – polar bear skin, giraffe tongue, lorikeet nectar feeding, compare to humans
29. Temperature gradients affect spatial pattern, eating habits, etc. during different times of year and animal patterns
30. Zoo Careers and Zoo life – Career pack, talks about different roles of Zoo staff (nursery, vet, keeper, massage therapist, nutritionist. Observe keepers and what they do.
31. What is a home?
32. Animal ID – through paw prints, coloring patterns, butts (Ex: bonobos), scent, animal tracks
33. Rhino research and LEWA

Exhibits of interest:
- Manatees (because they are constantly moving around)
- Giant Anteater
- Lorikeets- interactive
- Gorilla World
- Bonobos (family groups change constantly grooming very sexually oriented, how they sit, where they sit, who is dominant, lots of social interaction inside/outside exhibit, dominance)
- penguins
- lemurs (lots of interaction)
- polar bears
APPENDIX F
BACKPACK PROJECT
CONCEPT OUTLINES
Wild Research – Backpack
Anatomy and Adaptations Preliminary Concept Outline

**Purpose:** Deepen family engagement in science and conservation through a mobile inquiry experience.

**Central Theme:** Ambidextrous, right or left persuasion? Are animals dominant on one side? Does dominance on one side or the other benefit the animal for survivorship? Is right/left dominance determined by genetics or is it a learned behavior? What are the benefits of having a right/left body part preference for an animal?

**Sub Themes:**
How do you determine if an animal shows preference for the use of one side of the body or the other?
- Food reaching
- Initiate movement
- What effects left or right side preference?
- Age
- Sex
- Parental preference for one side or the other
- Captive born or wild born
- What other body parts show preference?
- Trunk persuasion
- Tail
- Paw
- Fins
- Feet
- Eyes
- Do the above mentioned features all show the same right or left preference across all body parts?

**Role:** Become a Zoo Keeper. Observe your animal so that you know it inside and out! This will ensure you can take the very best care of him/her.

**Possible Core Investigation:**
Do animals show a preference for the use of their right or left body parts?

**Quest Card Activity A:**
Skills: observation, prediction
How would you tell if a primate is left or right handed?

- Provide them with information on previous methods of delineating whether a primate is left or right handed. TUBE example, brachiation, feeding, holding on to parents.
Make a prediction: Are primates prone to be right handed or left handed? Right tailed or left tailed?

**Quest Card Activity B:**
Skills: Observation, comparison, data collection, discussion
In Jungle Trails – pick 4 or 5 species and determine if the animal is right or left handed. Out of 10 possible times how many times do they use their left hand? Right hand? Grooming, initiating brachiation, touching themselves, feeding, etc. If they are feeding and using 2 hands which hand do they use to hold the tree and which hand do they use to pull the leaves off? What does that imply?

Tools: pad with left/right written at top along with species name and paw stamp used to record number of times each is used. Try and stamp the pad with your weak hand.

Make a comparison: 85-90% of humans report themselves as being right handed. Are you right or left handed? Are your family members right or left handed? How does that compare to the data you collected on primates? In a circle take the bean bag out of the bag and throw the bean bag to both hands and see if the participant catches it w/ the same hand over and over again. Throw it to their weak side and determine whether they catch it w/ the weak hand or move to catch with their dominant hand.

**Quest Card Activity C:**
Skills: Observation, comparison, data collection
Looking at the same group of primates (or different species) determine whether there is a preference to use tail on the right or left hand side of the body? How would you determine if the primates favored their tales on the right or left hand side of their body? Provide research previously conducted to determine tail preference: obtaining food with tail, wrapping tail around body for sleeping/snuggling behavior does it wrap to left or right, etc. Document the number of times out of 10 that the primate uses it’s tail on the left or right hand side of its’ body.

Tools: Use the same method/tools described above to document data.

Make a comparison: Does tail preference line up with hand preference in the primates assessed? Does it differ? What might be the reasoning behind that?

**Quest Card Activity D (if applicable):**
Skills: observation, comparison, discussion, data collection, Does sex, age, parental preference, captive/collected born, posture, sitting, eating/playing, etc. make a difference to either the primates tail or hand preference? For all of these individuals, backgrounds would have to be provided, to measure the effects each variable has on the primates preference for the right or left hand tail/hand.

**Quest Card Activity E:**
Skills: observing, comparing, predicting, data collecting and discussing
Take your investigations across Zoo grounds: do other animals have right or left bodied tendencies?
As a family, come up with a list of 3 other animal groupings at the Zoo that might have a right or left preference when using a body part?
Take that list and head to the keeper talks and discuss with keeper whether their animals have a preference for using a right or left body part. Also head to the Cat Show and determine if our Cheetahs and Serval are right or left pawed?
During the cheetah run watch to see if the Cheetah swipes at it’s prey with it’s right or left paw. Document the information. When the Serval jumps for the lure in the air does it bat at the prey with it’s left or right paw?
When the Serval reaches for the rodent in the tube does it do so with it’s right or left paw?
If you have time to go to both shows there will be more data!!!
Document your findings!
Head to the lemur talk and the Gorilla talk and decide which hand they catch or reach for their food from the keepers!

**Quest Card Activity F:**
Skills: observation
Head to the Elephant Reserve and see if elephants swipe up food by rounding it up by swooping right with their trunk or swooping left with their trunk (if hay is in the yard you can tell). Does Sabu also have a dominant tusk?

**Quest Card Activity G:**
Now that you are well on your way to conquering one of the largest pieces of a Zoo keeper’s job, continue your adventure through the park and investigate other species and whether they display a natural preference for one side or the other.

Hoofstock do they stomp with left or right foot?

**Quest Card Activity H:**
Skills: discussion, take home component, comparison, prediction
Do you think your family pet has a paw preference? Does your cat or dog prefer to shake hands with it’s left or right paw? Does your cat paw at it’s toy with it’s left or right paw?

For the family cat: How does that relate/compare to the Cheetah and Serval’s preference?

**Conservation Action Behavior:**
Angel Fund – People will save what they know is the motto. If they become more intimate with the knowledge of individual cats here at the Zoo then they will be more inclined to contribute.
International Elephant Foundation – tie in the mahouts and their observational role in dealing with Asian Elephants. They need to know their animal intimately to ensure they can be effective in patrolling and also take care of their animals.

Make sure there is a presence at every exhibit where investigations are occurring with a coin collection/visual representation of contribution and also comparison (whether it be a wooden nickel thrown in the collector or people throwing coins into a holder). Similar to the discussion in vigilance with the wooden nickels that are in tubes and you can see what other people are predicting (idea came from bins at Wild Oats/Whole Foods). This should increase the rental price of bag so that people can then contribute (take action) right here at the Zoo while participating in WR and also get others interested and involved even if they don’t have a backpack. There might be a need to plan for this in the financial model.

**GIVE Model:**
What are the reasons behind right or left sided dominance in animals?

**Investigation Tools:**
- Binoculars
- Paw print stamp
- Stamp pad with or without species names and two columns labeled left and right
- Possible Identification chart for primates (age, sex, parent if within group, etc.)
- Bean bag

**Thoughts and Comments:**
- Could be used on elephants, monkeys, humans, cheetahs, possibly birds.
- There are a lot of possibilities for this with lots of different animals. Of course with the Cheetahs and Serval there is a need for food to be involved. However, with the cheetah encounter if you go to both shows you get 6-8 data points alone.
- For Cheetahs and elephants there has to be some food that goes into studying whether they are left or right trunked or pawed.
- Nocturnal House - Black-headed Southern Douroucolli – holding food with it’s right paw.
- Gorillas/Lemurs during keeper talks may reach out to catch or take food. It is a possibility for incorporating keeper talks and interaction with keepers by the WR group.
- Nocturnal House- Bats hold on when upside down with only one foot.
- “They rest with just one leg. Never thought about preference of footedness. Special tendons and muscles enable them to hang without getting tired. If there is pressure on their toes, their foot pulls shut” details from Mike Guilfoyle.
Wild Research – Backpack
Vigilance Preliminary Concept Outline

**Purpose:** Deepen family engagement in science and conservation through a mobile inquiry experience.

**Central Theme:** Vigilance; Why are animals vigilant?; Does vigilance help an animal survive? Does vigilance increase survivorship? What would the world become without predators? Can predators and people live together? How do animals “see” their environment?

**Sub Themes:**
What determines vigilance behavior in various animals?
- Sex of the animal
- Proximity to others in group
- Group size
- Weather
- Group make-up (homogenous/heterogeneous)

Does vigilance occur across species boundaries mammals, birds, reptiles, amphibians, humans, etc?

**Role:** Become a Serengeti Game Scout. Help the Serengeti Game scouts track the interactions of animals in their community, including the people.

**Possible Core Investigation:**
Are male or female animals more vigilant? (giraffe and human comparison)

**Quest Card Activity A:**
Skills: Observation
How would you tell a male from a female giraffe? How would you identify individual giraffes? Provide them with binoculars and ask them to determine how they would differentiate sex among giraffe herd.

- Eventually introduce them to our giraffe IDs and have them differentiate between male and females. Provide a chest shot of each giraffe along with highlighting differentiation in color on a quest card.

**Quest Card Activity B:**
(Skills: Comparison and Data Collection)
Define vigilance- the process of paying close and continuous attention; watchful; alert;
Define four different states of being:
1. vigilant- alert/staring/watchful
2. rest/calm
3. eating/browsing/feeding
4. social – interacting and close to other giraffe
Watch each giraffe for 2 minutes: Does each giraffe spend more time in state 1 or in states 2-4?
Tools: 2 stopwatches (one to count time to complete inventory on each giraffe and the other to keep track of how much time was spent vigilant), pencil-pad of grid paper w/each giraffe chest by name.

**Quest Card Activity C:**
Skills: observing, comparing, predicting, data collecting and discussing

Make a prediction: who is more vigilant male or female giraffes? Conduct “core investigation.” Once complete, participants could communicate their findings by placing wooden nickels (provided in backpack) in a collection device at the WR Post. Over time the data would begin to reveal patterns of vigilance between males and female giraffe. The visual depiction could illustrate the prediction or the actual data. Possibly connect funding from each wooden nickel to African Conservation Centre.

Using the chart/card that indicates which giraffe is female or male decide:
Who spends more time being vigilant male or female giraffes? How does that compare to what you expected? Then similar activity with wooden nickels to record what actually occurred.

**Quest Card Activity D:**
Skills: observing, comparing, predicting, data collecting and discussing

Compare the vigilance of the members of your group. Each individual in the group can take a blank card and write down who they think is the most vigilant. Flip card around so that each person in the group can see your response. Discuss the results with families and maybe provide some follow-up questions.

**Quest Card Activity E:**
Skills: observing, comparing, predicting, data collecting and discussing

Follow-up question: what other variables effect vigilance?
- **Proximity observation**
- Does proximity b/w giraffes effect vigilance behavior?
- Proximity measurements –
  - Touching
  - ½ giraffe length away
  - 1 giraffe length away
  - 2 giraffes length away
  - Many feet away from one another
- Proximity to the deck: Using the perimeter poles as a standard measurement in the yard whether giraffes are more or less vigilant when closer/further away from the deck.
**Quest Card Activity F:**
Skills: observing, comparing, predicting, data collecting and discussing

Take your investigation across Zoo grounds - What animal spends the most time being vigilant? If applicable what is the sex of that animal? Studies have been conducted on mammals and birds. Is there possibility for inclusion of reptiles/amphibians? List a number of species for participant and ask them to rank the species according to increasing/decreasing vigilance. Or allow them to independently choose other species they feel might be vigilant. Conduct your study as you tour the Zoo.

**Quest Card Activity G:**
Exploratory Play

Sharp Eyes - 2 parties facing one another and observing behavior how many times other party is distracted. Possibly have distractions built in to see if that alters sense of concentration. (lights, air, people, etc)

**Quest Card Activity H:**
Sentinels of the Serengeti Story

**Conservation Action/Behavior:** African Conservation Centre – donation of bicycles and gps units for game scouts.

Coin collection at Giraffe Ridge for our partner the African Conservation Centre (which can be broken into 3 different areas).

Wooden nickels placed in backpack that measure prediction who do you think is more vigilant male/female giraffe and then wooden nickel for outcome.

**GIVE Model:**
Does this come with investigation of theme (as ant nest did). Do juicy questions come from further investigation once the initial question has been asked?

Why are males more vigilant? Is it b/c they are taking care of babies, looking for a mate, for mate guarding? Why are females more vigilant? Is it because males are larger and therefore need more food and spend more time grazing as opposed to females, do they have less energy invested in biological reproduction and therefore need to concentrate energy on other activities? These are not necessarily inquiry questions that can be answered at the Zoo but could be asked once involved in investigation.

**Investigation Tools:**
Stopwatch
Binoculars
Click-counter to tally number of vigilant instances in 3 minute period
Definition of vigilance and/or specifics on what vigilance would look like.
Identification chart for giraffes (female/male)
Thoughts and Comments:
Vigilance must be defined well or no one will know whether giraffes or other animals are vigilant or not.
Primates- walked through and they appear to be very vigilant, aware of noise, movement, and are interested in a lot of what is going on in their surroundings.
Zebra- paid no attention and continued to graze.
Flamingoes might be a possibility from a bird standpoint. I included an article relating to flamingoes and vigilance.
Eye size and distance from individuals watching may have some impact.
Will people be able to determine whether an animal is vigilant?
Vigilant is not a great term – scanning; watchful; alert
There was some interesting information regarding weather patterns, vigilance, and penguins that might be of note, (Mori, Yoshishisa article).
If there are heterogeneous groups together (need to look into that) here at the Zoo looking at how that effects vigilance could be important. I am thinking of the birds that could potentially be in the giraffe yard or the birds that perch on the backs of rhinos, etc.
Looking at the lack of predator/prey relationship at the zoo and how that effects vigilance – does it become more of mate vigilance, adult parenting vigilance, mate guarding, etc? (Dunbar article)
Possibility of greater interest in human vigilance and what it relates to. (Wirtz article)
Interesting possibilities for alpha animals in a group and how that plays out (Gould article). Possibility of looking at some animals that have matriarchal and patriarchal elements and how those play out in vigilance in that group.
Wild Research – Backpack
Preliminary Concept Outline: Puffins, Penguins, and Auklets

**Purpose:** Deepen family engagement in science and conservation through a mobile inquiry experience.

**Central Theme:** Puffins, Penguins, and Auklets – Behaviors and adaptations of aquatic/marine birds. Why do some birds swim? How do birds swim? How are the feathers, feet and wings of non-aquatic birds different from aquatic birds such as puffins, penguins, and auklets?

**Sub Themes:**
How are the various species of puffins, penguins, and auklets different from one another?
- Location (including geographic and climatic differences)
- Locomotion (diving and swimming techniques)
- Foraging techniques
- Odors and scents
- Calls (types of vocalizations, length, purpose)
- Plumage (colors, ornamentation, molt patterns)
- Grouping (social vs. non-social, mixed species groupings)
- Activity patterns (time spent on land, in water, swimming, diving, foraging, sleeping)

**Role:** Become a Marine Ornithologist! Assist other Marine Ornithologists in their quest to study and understand the behavior and adaptations of penguins, puffins, and auklets.

**Possible Core Investigation:** Are penguins, puffins, or auklets better swimmers? (Somehow make a comparison/connection to humans). OR Who spends more time in the water? Puffins, penguins, or auklets?

**Quest Card Activity A:**
Skills: Observing and comparing

How would you identify and differentiate between a penguin, puffin, and auklet? How would you identify and differentiate between the different species of penguins, puffins, and auklets? First have them think about how the birds in the different exhibits look different from one another and how they might go about telling them apart. Then provide them with bird guides and binoculars and ask them to look at the following when differentiating between the species: colors, feet, beaks, head shapes, size, location, eyes, feathers, etc.

**Quest Card Activity B:**
Skills: Observing, comparing, predicting, and discussing

What adaptations do auklets, penguins, and puffins have to live in the water environment? Before the participants go to the exhibits to observe the birds, have them
discuss and predict what adaptations they think auklets, penguins, and puffins might have. After discussing and predicting, the participants can go to the exhibits and observe. Provide them with binoculars and bird guides to aid them in their discovery and have them observe penguins, puffins, and auklets and a bird that does not swim so they can compare the two. Lorikeets might be a good bird to compare them to since people can go into the exhibit with them and get a close look at their feet.

After observing the birds for a short time, have them think about the following questions: How are their feathers and wings different from other birds that do not swim? How do they use their wings in the water environment? Do they use them to fly? How are the feet of puffins, auklets, and penguins different from other birds that do not swim (such as Lorikeets)? How are they different from humans? Look at their feet and watch them use their feet when they walk and swim. How does the adaptation to their feet help them in the water environment? Are their feet well suited for land environments? Why or why not?

**Quest Card Activity C:**
Skills: observing, comparing, predicting, data collecting and discussing.

Make a prediction: Who spends more time in the water? Penguins, puffins, or auklets? Conduct “core investigation” using stopwatches and bird guides. Use the bird guides to identify each species and the stopwatch to time how long each are in the water. How do the findings compare to your prediction? Was your prediction correct? If one spent more time in the water than the others, why do you think that is? Think about their location, habitat, climate, etc. (we can either provide them with some of this information or they can read about it on the fact sheets they have up at each exhibit).

**Quest Card Activity D:**
Skills: observing, comparing, predicting, data collecting and discussing

Make a prediction: What type of call will do Little Penguins engage in more frequently: overlapping calls or individual calls? OR Which type of call do Little Penguins engage in for longer periods of time. Overlapping calls occur when more than one penguin is vocalizing at the same time (kind of like humans when they interrupt each other). Individual calls occur when only one individual penguin is vocalizing. We can provide an audio recording of what overlapping calls sound like and what individual calls sound like. They can use a click counter if keeping track of how many times the penguins engage in each type of call or they can use a stopwatch if they are keeping track of how long they engage in each type of call.

After observing and collecting the data, participants can discuss their findings. Was your prediction correct? Why do you think the penguins engaged more often or longer to one type of call than the other? (research has shown overlapping calls could either be for sexual/mate selection or to avoid predation). When you talk with others, for example with your family members, do you ever overlap or interrupt someone else? If so, does this type of conversation occur more often or longer than not overlapping?
**Quest Card Activity E:**
Skills: observing, predicting, data collecting, and discussing

Make a prediction: Do penguins spend more time in the water with other penguins or by themselves? Observe the Little Penguins, King Penguins, Magellanic Penguins, and Southern Rockhopper Penguin exhibits and use a stopwatch to record the amount of time they spend together versus alone in the water.

Was your prediction correct? If they spend more time together in the water than alone, why do you think that is? When you go swimming, do you prefer to be with someone else or by yourself?

* See #7 under Thoughts and Comments

**Quest Card Activity F:**
Skills: observing, predicting, and discussing

Why do Magellanic penguins dive? Discuss and make a prediction on why you think Magellanic penguins dive when they go swimming. Observe the Magellanic penguins when they are in the water and when they are diving. What are they doing when they are diving and swimming? What is happening at that time? Provide them with bird guides to identify the Magellanic penguins.

- Research shows that Magellanic penguins (in the wild) typically dive when they are foraging. Their dive depths and patterns typically follow the patterns and depths of their prey (such as Anchovy). When I observed the Magellanic penguins at the exhibit, they dove when the keeper was feeding them.

*See #5 under Thoughts and Comments.

**Quest Card Activity G:**
Skills: observing, comparing, predicting, data collecting, and discussing

Make a prediction: Which of the following exhibits do you think will be the coldest and which will be the warmest: 1) Little Penguins and African Penguin exhibit, 2) Auklet exhibit, 3) Puffin exhibit, 4) King, Magellanic, and Southern Rockhopper Penguin exhibit? Think about their location and habitat when making the prediction. Then record temperatures shown on thermometers at exhibits and compare them. Which exhibit was the coolest and which was the warmest? Why? Was your prediction correct?

* See #6 under Thoughts and Comments.

**Quest Card Activity H:**
Skills: observing, comparing, predicting, data collecting, and discussing
Make a prediction: Who is a better swimmer? Penguins, puffins, or auklets? Observe, discuss, and report findings.

* This idea needs to be flushed out more because of several things: how do we define “better swimming”, do we look at diving, speed, distance, how long they are in the water? Is this even an observable trait? From my observations, it seems that it would be difficult because each exhibit appears to have different water depths and lengths, and they swim so quickly that it might be difficult to try and measure how far they swam. In addition, as mentioned for previous investigations, it is hard to catch some of them when they are swimming. I have never seen the King Penguin swim, the Magellanic and the Southern Rockhopper Penguins only swam when they were being fed, and the Puffin I saw swim once out of the 3 observations I did. The auklets and the Little Penguins swam periodically. In addition, we would need to find an objective way of comparing the swimming of these birds to humans. This would definitely be a neat investigation if we can come up with a good way to do this!

**Quest Card Activity I:**
Exploratory Play

Maybe this can be an experiment to see who in the group/family can eat a piece of food the fastest without using their hands since penguins, puffins, and auklets only have their wings and don’t have hands to eat their food with. How have they adapted to deal with this issue? OR

We can have the group mimic the care of a King Penguin egg the way King Penguins do. We can provide them with something round and they have to balance the object between their feet and walk around with it to see who in the group does a better job of taking care of it (who goes the longest time without losing the egg from their feet).

**Conservation Action/Behavior:**
Calculate your carbon footprint and make a change! Several of these bird species are highly affected by global warming. Measures that visitors can take to reduce their impact on global warming and reduce carbon emissions would benefit these species. Visitors can measure their carbon footprint online and then take actions to reduce it. They can go to: www.climatefriendly.com (World Wildlife Federation) or to www.carbonfootprint.com to calculate their carbon footprint and buy carbon offsets.

A couple of other websites they could visit to calculate their carbon footprint are: http://www.nature.org/initiatives/climatechange/calculator/ and http://www.carbonfund.org/site/. This website has information for kids about how they can reduce carbon emissions: http://epa.gov/climatechange/kids/difference.html.

Seafood Watch (Monterey Bay Aquarium pamphlet). We can give people this guide (the one that is currently available at the King Penguin exhibit) for making better seafood choices for healthier oceans, which would in turn help birds that depend on seafood.
Some other websites that deal with penguin conservation and the various species are:

**GIVE Model:**

Participants use this opportunity to create questions/investigations on a topic related to penguins, puffins, and auklets that they are interested in. Either they can develop a question from scratch or maybe they can create questions based off of another investigation that we provided.

**Investigation Tools:**
- Bird identification guides
- Binoculars
- Stopwatches
- Click counters
- Audio/voice recording device to play calls.
- Identification guide to individual birds using band colors.
- Thermometers (either in backpack for outdoor exhibit or in the exhibit itself for indoor exhibit).
- Pencil and paper

**Thoughts and Comments:**
1. This theme can be taken even farther by comparing seabirds/aquatic birds with birds that do not swim. It can also be taken in the direction of comparing birds that swim with mammals and reptiles that swim. There could be an “aquatic” or “marine” inquiry pack. For example, if comparing to other animals that swim, you could investigate and compare to manatees, alligators, otters, sea lions/seals, fish, turtles, etc. The issue would be, for example, comparing them to the alligators because they don’t swim around in the exhibit that often.

2. Diving and swimming are of the most interest to visitors and have much research to back it up, however, when I observed the penguins, they only got in the water when the keeper went in to throw them fish. As for the auklets, they spent a little more time swimming, but over the period of an hour, they were probably in the water for 1/3 of that time. So, it depends on how long we are expecting people to spend observing and how long they actually will observe for. The puffin never got in to the water over the hour that I watched them.

3. If there is any way to find out which penguins, puffins, and auklets are males or females based on the color of their bands, we could do something related to the sex of each.

4. Conducting investigations on calls and odors would be really neat, especially since there is research out there to back it up. The Crested Auklets, for example, are supposed
to have a really strong Citrus odor that is very distinct. They are researching the purpose of it. It obviously will be difficult to do this, however, with the penguins, puffins, and auklets that are indoors because they are behind glass, unless there were some way to put up speakers that display their calls, etc.

5. When I observed the Magellanic penguins, they only went diving during and right after they were fed fish (thrown in the water). So, this could be an interesting investigation for visitors to conduct because it could help them understand why some penguins swim and dive rather than fly. It is also a limitation, however, because they are only fed at certain times. If it is possible to obtain the schedule for when they are fed, then this can be investigation that is conducted at those times (we would guide the visitors to do observe this at the times they are being fed – give them a list of times).

6. This investigation (on temperatures) can only be done if there is some way we can have a thermometer put inside the indoor exhibits behind the glass where visitors can see them. The outdoor exhibit can either have a thermometer permanently there or there can be one in the backpack that visitors use to take the temperature at the Little and African Penguin outdoor exhibit. Also, need to ask keeper if the Little and African Penguins are kept outside at the exhibit when it gets colder outside.

7. A study conducted by Yoshihisa Mori showed that captive African Penguins at the Ueno Zoo synchronized the timing of swimming with each other under cloudy conditions. It was explained that since cloudy weather can reduce the visual ability of penguins in water, and consequently, increase the predation risk, it is suggested that group size covaries with predation risk and that this grouping behavior while swimming can serve as an antipredator response in the wild. From what I observed at our Little and African Penguin exhibit at the Zoo, however, there is only one African Penguin which would make it impossible to observe the African Penguin in groups. When I observed the Magellanic penguins and the Little Penguins, however, I noticed that they too went swimming when others were swimming. Typically one Little Penguin would start their way into the water, then several others would follow. I’m not sure if it is possible to connect this to the weather (cloudy vs. not cloudy) because that would probably require the participant to observe them for a much longer period of time, unless this could be an investigation that can continue on when they come to visit the Zoo another time.

8. Something important to consider when developing these investigations is that several of these bird species, such as the auklets, the African Penguin, and sometimes the Puffin, spend much of their time behind or in rocks where they can’t be seen from the visitor standpoint. This could be an issue at times if we are sending people to investigate some of these bird species and they are nowhere to be found.
APPENDIX G

BACKPACK PROTOTYPING INVESTIGATION
INSTRUCTIONS AND DATA SHEETS
Anatomy and Adaptations - Gibbons: Left or Right? (Simple) Instructions

Are you left or right handed? What about your family and friends?

Do you think gibbons can be left or right handed too?

Like humans, gibbons are primates and they use their hands for lots of things: picking up food, eating, throwing, scratching themselves, picking up and playing with toys, hanging from things.

What Do You Think Will Happen Today?
Decide as a group or each person can make their own prediction!

Most gibbons will be left handed. OR Most gibbons will be right handed.

Tools:
- Sand glass: for timing 1 minute
- Hand Stamp: to stamp on data sheet every time a gibbon uses its left or right hand
- Left/Right Data Sheet (see back)
- Primate Guide

How To Do It!

1. Find the gibbons at Jungle Trails!

2. Watch ALL the gibbons in the exhibit for 1 minute (use sand glass for timing).

3. Every time a gibbon uses its left or right hand, stamp it on the data sheet.

4. When 1 minute is over, count the stamps in the LEFT and the RIGHT columns.

What Did You Discover?
Did more gibbons use their left hands or their right hands? Did that match your prediction?

What’s Next?
Try the same experiment with other primates like gorillas, lemurs, or orangutans! Are most primates left or right handed?

Do you think animals that aren’t primates can be right or left handed? Try the same experiment with tigers, cougars, and lions.

You can test dogs, cats, and squirrels, too!
<table>
<thead>
<tr>
<th>LEFT</th>
<th>RIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Left Hand Icon]</td>
<td>![Right Hand Icon]</td>
</tr>
</tbody>
</table>

How many LEFT? ______  How many RIGHT? ______
Anatomy and Adaptations - Primates: Left or Right Handed (Complex)

Instructions?

Are you left or right handed? What about your family and friends? Do you think apes, monkeys, and lemurs can be left or right handed too?

Like humans, these animals are primates and they use their hands for lots of things: picking up food, eating, throwing, scratching themselves, picking up and playing with toys, hanging from things.

What Do You Think Will Happen Today?

Decide as a group or each person can make their own prediction!

Most primates will be left handed. OR Most primates will be right handed.

What You’ll Do:
Count the number of times different species of primates use their left and right hands.

Tools:

- Sand glass: for timing 1 minute
- Hand Stamp: to stamp on data sheet every time primates use their left or right hands
- Left/Right Data Sheet
- Primate Guide

How To Do It!

1. Pick two or three of your favorite kinds of primates. (See Primate Guide.)

2. Go to your first primate, for example, orangutans.

3. Watch ALL the orangutans in the exhibit for 1 minute.

4. Every time any of the orangutans uses its left or right hand, stamp it on the data sheet.

5. When 1 minute is up, count the stamps in the LEFT and the RIGHT columns.

6. Do the same thing for each primate you picked.

7. When you’re finished, count up ALL of the lefts and ALL of the rights.

What Did You Discover?

Did more primates use their left hands or right hands? Did that match your prediction?

What’s Next?

Do you think other animals are right or left handed? Try the same experiment with tigers, cougars, and lions. You can test dogs, cats, and squirrels, too!
Anatomy and Adaptations - Primates: Left or Right Handed (Complex) Data Sheet

<table>
<thead>
<tr>
<th>Primate 1:</th>
<th>(name)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEFT</td>
<td></td>
</tr>
<tr>
<td>RIGHT</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
</tr>
</tbody>
</table>
**Everybody take the personality quiz at the Wild Research Station!**

When you find out who you are, place the matching gorilla sticker by your name!

Do your friends or family agree with your gorilla personality? Have them take the quiz for you. Did you get the same gorilla?

<table>
<thead>
<tr>
<th>People in Group</th>
<th>Their Gorilla Match</th>
<th>People in Group</th>
<th>Their Gorilla Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>Place Sticker Here</td>
<td>Name:</td>
<td>Place Sticker Here</td>
</tr>
<tr>
<td>Name:</td>
<td>Place Sticker Here</td>
<td>Name:</td>
<td>Place Sticker Here</td>
</tr>
<tr>
<td>Name:</td>
<td>Place Sticker Here</td>
<td>Name:</td>
<td>Place Sticker Here</td>
</tr>
</tbody>
</table>
**Gorilla - Hoot Like A Gorilla (Simple II) Instructions and Data Sheet**

<table>
<thead>
<tr>
<th>Player 1</th>
<th>Player 2</th>
<th>Player 3</th>
<th>Player 4</th>
<th>Player 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(name)</td>
<td>(name)</td>
<td>(name)</td>
<td>(name)</td>
<td>(name)</td>
</tr>
</tbody>
</table>

**Context Rules**

1. All players begin by calling a gorilla call at the same time.
2. Each player gets 1 turn to sound like a gorilla.
3. The first player to call a gorilla call gets 3 points. Each player votes on who made the best call by placing 1-5 tokens in the 'Hoot' box. (You cannot vote for yourself.)
4. Follow Steps 1-3 for each gorilla call.
5. Person who last the most votes is Top Banana.

<table>
<thead>
<tr>
<th>Hoot</th>
<th>Screan</th>
<th>Rumble</th>
<th>Pig Grunt</th>
<th>Belch</th>
</tr>
</thead>
</table>

**Total Votes**
Gorilla - What Am I Saying? (Complex) Instructions

How To Play

- Take turns being the gorilla.
- The gorilla takes one Calling Card from the envelope.
- Don’t show the card to anyone!
- Make the gorilla call on the card.
- Read aloud the “What am I saying?” list on the back of the card. (careful not to show the front of the card!)
- Whoever guesses correctly gets to be the gorilla next.

Calling Cards
[Cards are about the size of a business card. Kept in a decorated envelope.]

Card One: Hoot

Side 1:
Hoot

Sounds like: hoo hoo hoo hoo hoo hoo hoo

Side 2:
What am I saying?
a. I’m hungry.
b. Where are you?
c. How old are you?
(Answer: Where are you?)

Card Two: Scream

Side 1:
Scream

Sounds like: wrAAAH! wrAAAH wrAAAH wrAAAH wrAAAH
Side 2:
What am I saying?
  a. That hurt.
  b. Let’s order pizza.
  c. I’m scared!
   (Answer: I’m scared!)

Card Three: Rumble
Side 1:

Rumble

Sounds like:  UU-UUUUU-UUUU-UU-UU-UU

Side 2:
What am I saying?
  a. I’m sorry.
  b. Toss me a banana.
  c. I’m really happy.
   (Answer: I’m really happy.)

Card Four: Pig Grunt
Side 1:

Pig Grunt

Sounds like:  O – O – O – O – O

Side 2:
What am I saying?
  a. Scratch my back.
  b. I’m grouchy.
  c. Pass the celery.
   (Answer: I’m grouchy.)

Card Five: Belch
Side 1:

Belch

Sounds like:  uuhhh-ummm  uuhhh-ummm

Side 2:
What am I saying?
  a. Tickle me.
  b. I need a nap.
  c. Everything’s okay.
   (Answer: Everything’s okay.)
Vigilance - Who Looks First? (Simple) Instructions

In the wild, giraffes watch for signs of danger and other giraffes trying to raid their food. Being a good lookout is a vital survival skill.

What Do You Think Will Happen Today?
Decide as a group or each person can make their own prediction!

Male giraffe will look first. OR Female giraffe will look first.

How to Do It!
1. Unfold the ruler until it’s about 3 feet long.
2. Slip the giraffe neck over ruler.
3. Attach giraffe head.
4. Hold up your giraffe puppet.
5. Watch the giraffes!

!!! Be careful: Keep puppet STRAIGHT UP so it does not hit anyone or lean into the exhibit!

Who Looked First?
Circle one:
[used graphics from Giraffe Exhibit ID sign at the Zoo]

Tessa Mtembei Kimba Akilah

What’s Next?
• Try the giraffe puppet on humans, maybe at the Rhino Café. Do boys or girls look first? Moms or dads?
• Try it on other animals at the zoo. Who looks first?
Vigilance - Giraffe Lookouts (Complex) Instructions

In the wild, giraffes watch for signs of danger and other giraffes trying to raid their food. Being a good lookout is a vital survival skill.

**What do you think will happen today?**
*Decide as a group or each person can make their own prediction!*

**Male** giraffes will be most watchful.  
**OR**  
**Female** giraffes will be most watchful.

**What You’ll Do:**
Use giraffe puppet to get the attention of the real giraffes. Time when each giraffe first looks at the puppet and when it stops looking at it.

**Jobs:**
Mix and match to best fit your group!

*Puppeteer*: Holds up puppet (can also be a Spotter at the same time)

*Spotters*: Watch the giraffes and call out when a giraffe first looks (“Looked!”) and when a giraffe stops looking (“Stopped!”). It’s easier if there is more than one spotter.

*Timer*: Starts stopwatch and calls out the time when each giraffe Looked and Stopped.  
(Timer could also be the Recorder.)

*Recorder*: Writes down the times for each giraffe.

**How to Do It!**
*First*, use the chart to figure out who’s who by their spot patterns. Binoculars can help.

*Now* make your giraffe puppet:
6. Unfold ruler until it’s about 3 feet long.
7. Slip giraffe neck over ruler.
8. Attach giraffe head.

**Go!**
1. Hold up puppet and START STOPWATCH!
2. Watch the giraffes!
3. Write down times and observations on the data sheet.

**!! Be careful:** Keep puppet STRAIGHT UP so it does not hit anyone or lean into the exhibit!

**What Did You Discover?**
Did the giraffe that looked first also watch the longest?

Who’s the most watchful: males or females? Does that match your predictions?

There’s no “right” answer. Many things can change a giraffe’s behavior – time of day, weather, feeding times. Try again another day and see what happens!
# Vigilance - Giraffe Lookouts (Complex) Data Sheet

<table>
<thead>
<tr>
<th>Giraffes</th>
<th>Time FIRST Looked</th>
<th>Time STOPPED Looking</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKILAH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTEMBEI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KIMBA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TESSA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Who looked first?  
Who looked longest?  

---

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APPENDIX H

BACKPACK PROTOTYPING
LIST OF SUPPLIES PER THEME AND INVESTIGATION
Backpack Supply Lists Per Theme and Investigation
Prototyping
Oct/Nov 2008

VIGILANCE

Simple: Who Looks First?

Backpack Supplies needed:
- Giraffe puppet (head, neck, ruler)
- Giraffe ID (full) laminated
- Instructions/Data sheet (all in one) laminated
- Dry erase marker
- Cloth (for erasing)
- 1 pair binocs
- Zoo map

Complex: Giraffe Lookouts

Backpack Supplies needed:
- Giraffe puppet (head, neck, ruler)
- Giraffe ID (full) laminated
- Instructions (laminated)
- Data Sheet (laminated)
- Stopwatch
- Dry erase marker
- Cloth (for erasing)
- 1 pair binocs
- Zoo map

BODY PARTS

Simple: Gibbons: Left or Right? (focus on only one primate)

Backpack Supplies needed:
- Sand glass (1 min)
- Hand stamp
- Stamp pad
- Instructions (laminated)
- Data Sheet (NOT laminated – so stamp will work)
- Clipboard for Data Sheet
- Primate Guide (laminated)
- Pencil or marker
- 1 pair binocs
- Zoo map
**BODY PARTS**

*Complex: Left or Right? (compare 2 - 3 primates)*

**Backpack** Supplies needed:
- Sand glass (1 min)
- Hand stamp
- Stamp pad
- Instructions (laminated)
- Data Sheet (NOT laminated - so stamp will work)
- Clipboard for Data Sheet
- Primate Guide (laminated)
- Pencil or marker
- 1 pair binocs
- Zoo map

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**GORILLAS** (building off existing WR stations)

**NOTE:** There are 2 simples; rotate them.

*Simple I: Which Gorilla Are YOU? (stickers by each group members name)*

**Backpack** Supplies needed:
- Data sheet + instructions (all in one) – NOT laminated
- Clipboard for Data Sheet
- Gorilla stickers (1 strip of each gorilla per family)
- Pencil or marker
- 1 pair binocs
- Zoo map

*Simple II: Hoot Like a Gorilla! (group voting on who makes best calls)*

**Backpack** Supplies needed:
- Data sheet + instructions (all in one) – NOT laminated
- Clipboard for Data Sheet
- Star stickers
- Pencil or marker
- 1 pair binocs
- Zoo map

*Complex: What Am I Saying? (group game based on Hoot)*

**Backpack** Supplies needed:
- Decorated Envelope to hold Calling Cards
- Calling Cards (laminated)
- Instructions (laminated)
- 1 pair binocs
- Zoo map
APPENDIX I

BACKPACK PROTOTYPING OBSERVATION SHEET AND OBSERVER INSTRUCTIONS
# Wild Research Backpack Prototyping Observation Sheet

<table>
<thead>
<tr>
<th>Observer Name:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Name:</td>
<td>Audience:</td>
</tr>
<tr>
<td>Start Time:</td>
<td>M = Adult Male, b = Young Boy</td>
</tr>
<tr>
<td>End Time:</td>
<td>F = Adult Female, g = Young Girl</td>
</tr>
<tr>
<td>Total Time:</td>
<td>Which Experience:</td>
</tr>
<tr>
<td>Experience Start Time:</td>
<td>Experience End Time:</td>
</tr>
<tr>
<td>What type of bag:</td>
<td></td>
</tr>
</tbody>
</table>

---

**Observations/Notes about Experience:**

(Please use this space to record observations/notes about the experience and the family’s comments during the experience. Use the back side if you need more space.)

**Backpack Contents and Usage**

**Family Interactions**

**Family Demographics**

(which which age groups used backpack and for how long)

**Family’s Comments – Likes/Dislikes**

**Exhibit Details**

**Other Comments**

---

**Oral Interview and Discussion Notes**

Use the time after the family completes the backpack experience to discuss and record the following:
- Their likes and dislikes (see Family Likes/Dislikes in the focus points)
- Elaborate on any actions during the experience that might need further explanation.
  (For example, if the family argues over the backpack and/or its’ contents, ask them if they think there needs to be more than 1 bag or more than 1 of each tool.)
Wild Research Backpack Prototyping Observation Instructions
Data Collection Overview and Focus Points

Directions:
- When you fill out the audience section of the worksheet, please record how many individuals are in the following categories using the letters designated for each:

  M = Adult Male
  F = Adult Female
  b = Young Boy (Please record estimated age)
  g = Young Girl (Please record estimated age)

- Please record the actual time of day for the Start Time and the End Time
- Please record comments and actions during the experience
- Please ask and record’s family’s opinion after the experience

When Prototyping, please make sure you pay close attention to the following points:
FAMILY INTERACTIONS
  - Are there family discussions happening?
  - Are family members working together or separately to complete the investigations?
  - Are family members sharing the tools and the backpack or are they arguing over its’ usage.

BACKPACK CONTENTS
  - Is one of each tool enough for the entire family to be engaged in the experience?
  - How did the family use the equipment?
  - Did they use the equipment correctly and for the purpose of conducting the investigation or did they use it for other things?
  - Did the family put the equipment back inside the backpack when they were done using it or did they leave it anywhere?
  - How long did each person hold the bag (estimate)

FAMILY DEMOGRAPHICS
  - What age groups used the backpack?
  - Did certain age groups use the backpack longer than others?

FAMILY LIKES/DISLIKES
  - Did the family like the type of backpack provided?
  - Did the type and size of the backpack meet the needs of the experience?
  - Did the participants understand the instructions and complete the investigations?
  - Did the participants have questions about the instructions and the investigations themselves?

EXHIBIT DETAILS
  - How crowded is each exhibit?
  - How visible is each animal you are trying to observe?
APPENDIX J

PHASE I BACKPACK PROTOTYPING
COMPILED SURVEY RESULTS
Wild Research Backpack: Family Evaluation
Phase 1 – invited families

Total # of families that tested it: 6
Total # of: M- 2, F- 7, b- 7, g- 6 (M = Adult Male, F = Adult Female, b = Young Boy, g = Young girl)
Total # of participants: 22

* Note: Red text = Observer’s Comments

Legend: VIG Sim = Vigilance, Simple (Giraffe)
VIG Com = Vigilance, Complex (Giraffe)
BOD Sim = Body Parts, Simple (Gibbons, L/R hand use)
BOD Com = Body Parts, Complex (Compare 2 or 3 primates, L/R hand use)
GOR Sim #1 = Gorilla, Simple (Which GRU? - gorilla stickers by group members’ name)
GOR Sim #2 = Gorilla, Simple (Hoot - group voting on best calls)
GOR Com = Gorilla, Complex (Hoot - take turns making calls, others guess meaning)

OVERALL
1. How would you rate your family’s **overall** experience? (Circle one)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Awesome!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Just OK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 – 4’s
2 – 5’s
3 – 6’s
3 – 7’s
Average: 5.7

2. How would you rate your family’s **first experience** today?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Awesome!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Just OK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GOR Sim #1: 2-5’s, 6.5, 2-7’s
BOD Com: 6 (because it was cold)
VIG Sim: 6
BOD Sim: 7

3. How would you rate your family’s **second experience** today?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Awesome!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Just OK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GOR Sim #2: 5 (because of the smell), Awesome
GOR Com: 2-5’s
BOD Com: 3-5’s, 1-7
4. Please share your family’s **comments** here.
   - Stephen (b) thought it was pretty cool. The activities were fun and not restricted to any particular age level - all in family (2 for us today) could participate! I think my 26-year-old son would have fun with Hoot. (Kathy (F) didn’t think she would like doing “Hoot Like a Gorilla”. When it was competitive, she wanted to do it. Stephen (b) thought it was fun. Both would have done it even if there were other people there)
   - It was cold! Limits outdoor time. Needs more music in indoor exhibits. Terrible smell in Gorilla area (Suggested several times to provide hot chocolate to families. Many of their comments were about the exhibits and not about the backpacks: Music inside JT, Backgrounds in the exhibits were nice)
   - We liked the Giraffe head. A telescoping pole would have been better. More interaction with the Zoo’s actual gorillas would have been better. (F said she wants to be able to come to the Zoo to see the animals but also wants to learn something while at the Zoo. M said we should have a telescoping pole for puppet -kind of like a car antenna)
   - We had a great time observing the animals.
   - Gibbons awesome. Giraffes frustrating. Can’t really tell gender. (g said she liked Giraffe but not what they did. F said “Giraffes frustrating because they wouldn’t turn around” in order to identify them.)
   - Lauren (g) liked the baby gibbon. Paige (g) liked the female bonobo watching us watch her.

3. What was the **best part** of your Family Explorer experience?
   - Hoot!
   - The plants were awesome! The monkeys were totally adorable! (Their favorite thing about the zoo was being outside among greenery. When asked what was their favorite thing, there originally answer was the bag.)
   - The animals physical response to the giraffe head.
   - Observing the Gibbons.
   - Gibbons because there was more action. (F said “You can get up closer to the Gibbons so that probably made a difference” when talking about why they liked the Gibbons activity better.)
   - Mom liked the family working together to figure things out.

4. What did **you** like the most about this experience?
   - Kathy (F) thought it was fun not only to hear how close/far the human sound was to the gorilla sound, but we could see the voice print also.
   - The lovely plants that are surviving the cold
   - Identifying the giraffes. (F said she liked the Giraffe one because it was more interactive with the animal while Gorilla they didn’t actually do anything with the Gorillas – said it could be why she didn’t like the Gorilla activity as much. F said it was interesting to get animal to interact with you rather than just being an observer. M said he liked identifying the Giraffes by their chests. F said “The thing I liked best about it was that you guys (the boys) liked it.”)
- Discovering the different behaviors we never noticed before. (F said that they really liked it because it allowed them to look at them in a different light; they said they never watched them that closely before.)
- The activity was easier and you got to use stamps. (F asked the children which activity they liked better – Gibbons because they were more interactive, more involvement for everyone (several people could do stamps while others watched Gibbons), and it was easier than the vigilance activity. F said that they liked to learn the Giraffes’ names.)
- Dad liked the stamping. (M: "cute - cool idea")

5. What did your child/children like most about this experience?
- Stephen (b): Winning! And the "Hoot" was the best - the other were kinda hard.
- Themes, eg. India/Asia
- The giraffe head. (Younger b said he liked the Giraffe better – said Gorilla was kind of weird – would probably be better for younger people.)
- Watching the Gibbons. They are cool. (They said they would really enjoy doing the Gibbon activity with other Primates.)
- The stamps (g said that it would be “cool” to have “Trading cards” with animal pictures, names, height, weight, etc. about the animals. g said the stamps were the most fun part of the activity.)
- Lauren (g) & Paige (g) liked answering the questions to see which gorilla they were like. (g= binocs)

6. What did you/your family like the least?
- We did have to wait for a few people to do "Which GRU?" before we could. On a busy day (today was not), it could be quite a wait to do either activity.
- Not being able to see some animals due to the cold (eg giraffes).
- The gorilla calling card (M said he didn’t like making the animal noises at Gorilla but it definitely helped you learn it - was just awkward and embarrassing.)
- Not really anything.
- The puppet (They said that it was hard to tell the Giraffes apart.)
- There wasn't anything we didn't like. (g: "I really liked everything").

7. If this experience was available on-going at the Zoo, would your family participate again?
- 3 Yes
- 3 Maybe
Comments by families to Observers:
- Don’t know if she would rent bag if she didn’t know anything about it. Smells (at the Zoo) easier to take when it’s not hot. Like to come during week or off days – not crowded.
- A family said they really enjoyed the whole experience and said that they would definitely rent it as a bag.
- F said that she liked the idea of having something interactive such as the bag at the Zoo. F recommended something more like a scavenger hunt for backpack.
Fs recommended a little prize at the end like a plastic animal, passport books, trading cards, etc. for more incentive.

8. If you were to rent this Family Explorer bag to enhance your Zoo visit, how much would you be willing to pay?

<table>
<thead>
<tr>
<th>Range</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5-10</td>
<td>3</td>
</tr>
<tr>
<td>$11-15</td>
<td>3</td>
</tr>
<tr>
<td>$16-20</td>
<td>2</td>
</tr>
<tr>
<td>$21-25</td>
<td>2</td>
</tr>
<tr>
<td>$26-30</td>
<td>1</td>
</tr>
<tr>
<td>$31-35</td>
<td>1</td>
</tr>
<tr>
<td>$35 or more</td>
<td>1</td>
</tr>
</tbody>
</table>

- 3 - $5-10 (and hopefully it would have activities for other animals too) (One F said she wouldn’t pay more than $5 or $10 for backpack with a reward at the end)
- 2 - $11-15 (When discussing cost of backpack, F said that you need to consider that a family has to already pay to get in to the Zoo and also needs to pay for food, etc.)
- 2 said “None” (F said she wouldn’t pay anything for a bag)
- One F said that having themes would be more motivating if it fit with the school curriculum. Other F said she would more interested in having packs themed by location at Zoo (African, Jungle Trails, etc.) so you wouldn’t have to go very far for the activities in backpack.

CONTENTS OF THE BAG

1. What was most useful?
- 3 said binoculars (one said “a good idea!”)
- 1 said Instruction sheet and Primate Sheet.
- 1 said The instruction
- 1 said Hourglass
- 1 said Stamp pad
- 1 Family Left it Blank

2. Which was your favorite?
- The personality quiz & chart of gorillas by pix & description. (If we had more time and the gorillas were out more, I’d have tried to identify each)
- 3 said Binoculars
- 2 said Stamps (one said “cute…cool idea”)
- 1 said touch pad

3. Which was your child/children’s favorite?
- The personality quiz & chart of gorillas by pix & description. (If we had more time and the gorillas were out more, I’d have tried to identify each)
- The stickers and the bag.
- Giraffe head
- 2 said Binoculars
- Stamps (Girls said “got to play with ink”)
- Timer
4. Was there something you wished you had that was not in the bag?
   - A timer that sounds at the end of one minute! (They wish they had flashlights at JT so they could read the instructions)
   - Audio device with gorilla calls/card with more gorilla info specific to the Zoo. (b recommended having a recorder in backpack that they could listen to Gorilla sounds on rather than waiting for “Hoot Like A Gorilla” touch screen - F said it was hard to hear sounds at Hoot station)
   - Snacks (g said animal toy)
   - 3 said “None” or “Not really” or “Can’t think of anything off the top of our heads”.

5. Is there anything that you would add to the bag?
   - 2 said “No” or “Can’t come up with anything”
   - More versatile activities
   - Stopwatch
   - 2 Left it blank (One family verbally suggested adding gloves to the bags if doing this in the winter)

6. Any other thoughts?
   - Maybe have activities for other stations in the exhibit so while waiting, people could have more to do - so lines might not be so long. (F gave observer verbal suggestion: State that there will be several stations at the exhibit – May not have activities for all stations in the bag.)
   - 3 Left it blank
   - b said “Giraffe was good, but it wasn’t perfect”. M Said if there were more activities to do. b said Gorilla instructions were a bit confusing because it didn’t say what to do 1st (touch-screen or cards). F said it should say something on Calling Card envelope about doing the Hoot station.
   - Tradeing cards! Have different age group bags. (F recommended personalizing animals. g recommended a Clipboard for items in bag. b recommended having 2 pairs of binoculars in bag instead of one. b said they would have liked to feed the Giraffes. g said that she likes the Lorikeets)
   - No

HELP US NAME THIS NEW EXPERIENCE! What do you think we should call this?
   - Safari Pack, Discovery Bag
   - Expedition Jungle
   - Adventure Pak (spelled without a c on purpose)
   - Wild Experience, Explorer bag
   - Family Expedition
   - 1 Left it Blank

Would it be okay if we called you to follow up on your responses?
   - All families provided contact information.
**Bag Style Preferences (when asked Verbally)**
- Messenger bag – preference – easier to get into and out – more accessible (Stephen said (b)). Found bag contents to be sufficient.
- Both bs said that they like the Messenger Bags better. F said she thinks young people would like Messenger Bags better than Backpack (reminds them too much of school)
- b liked Messenger bag better – said he uses one for school. F also liked Messenger bag better – suggested having different sizes available for different age groups.
- They didn’t like the messenger bags – strap was too long/low. Messenger bag – the Clip on the Vigilance bag was uncomfortable and that bag was also too heavy. They had to take the bag off every time they did something with it.(F said)
- Used both backpack & messenger bag. Liked the messenger better (MF), easier to get things out, don’t have to take it off (kids did not carry or use bag - parents had it whole time).

**Other Observer’s Comments**
- Directions clear – activities simple. Stephen (b) thinks it would be cool to do this both with family and friends.
- Mom explained that if just the 2 of them were playing the Hoot game with their backpack alone at the Zoo (without me there), she would have asked another visitor to be the judge for them so they could still play.
- Mom explained that the reason she was confused about going to the “Which Gorilla Are You” station to take the Personality Quiz first was because of the Zoo Map. She showed us that on the back of the Zoo map it says “Discover our new Wild Research stations!: Hoot with Gorillas”, so she thought that meant there was only station at Gorilla and since we walked in on the side where we saw the Hoot station first, she thought that maybe she misunderstood the directions for the Hoot game or that there was a mistake. That is why she suggested putting a statement somewhere with the Gorilla pack that there are 5 stations at Gorilla and that the visitor would be using one of them for the activity, so they know to look for more than 1.
- Older b said that he didn’t think the options on the back of the card should be there – said that since they did the touch screen first, it was too easy to have options on back of card.
- M said he would like it if there were different activities stationed around the Zoo and could do it as an all-day backpack experience.
- F said that we should probably advise people to not visit exhibits during feeding time or Keeper talks because it would make it harder to do investigations with crowds.
- Gorilla Calling Cards: F said that it would be better to have all of the information on the front (even the choices). - F said the Calling Cards were fun but would be better with a larger group of people and with younger ages.
APPENDIX K

PHASE II BACKPACK PROTOTYPING
COMPILED SURVEY RESULTS
Wild Research Explorer: Family Evaluation
Phase 2 – Random ask families on site

* Note: Red text = Observer’s Comments

**Total # of families that tested it:** 14
**Total # of:** M - 5, F - 20, b - 12, g - 22 (M = Adult Male, F = Adult Female, b = Young Boy, g = Young girl)
**Total # of participants:** 59

Legend:
- **VIG Sim** = Vigilance, Simple (Giraffe)
- **VIG Com** = Vigilance, Complex (Giraffe)
- **BOD Sim** = Body Parts, Simple (Gibbons, L/R hand use)
- **BOD Com** = Body Parts, Complex (Compare 2 or 3 primates, L/R hand use)
- **GOR Sim #1** = Gorilla, Simple (Which GRU? - gorilla stickers by group members’ name)
- **GOR Sim #2** = Gorilla, Simple (Hoot - group voting on best calls)
- **GOR Com** = Gorilla, Complex (Hoot - take turns making calls, others guess meaning)

1. Rate your **overall** Explorer experience. Each family member circles their own number.

   
   *Just OK*  1  2  3  4  5  6  7  **Awesome!**

   - **VIG Sim**: 4, 6, 2 - 7’s, 2 – Awesome!
   - **VIG Com**: 3, 4, 5, 6
   - **BOD Sim**: 2 – 5’s, 6, 7
   - **BOD Com**: 5 – 6’s, 7
   - **GOR Sim #1**: 2 – 5’s, 2 – 6’s, 4 – 7’s
   - **GOR Sim #2**: 5, 7
   - **GOR Com**: 5, 6

2. What was the **best part** of your family’s experience with this Explorer bag?
   - Getting giraffe's attention. 2 said Working together (b said “The giraffes looking at me was kind of funny.”)
   - The kids got to feel as if they were doing an experiment.
   - See if animals look. Monkeys watching the best.
   - Having the giraffe come up to the "fake" one. Getting to feed it. (F: “It was worth it to have her [giraffe] come up and notice. She wouldn’t notice me but she was definitely noticing the puppet.”)
   - Binoculars
   - What we learned about right and left hands
   - Watching the baby and mother together (referring to Buff-cheeked Gibbons)
   - Stamping. Observing the animals
   - Looking more closely at the primates
   - Touch screen stations
- Sticker ID's to put on card. Using computer to ID Gorillas. (they really liked the ID chart, finding out which gorilla they are like)
- Giving Calls (referring to Calling Cards)
- Belch - liked to hear yourself and the animals
- Using the binoculars to see the gorillas. Microphone/recording

3. Was there anything you/your family did not like?
   - 5 – No’s
   - 1 put N/A
   - Holding the puppet the whole time. Identifying each giraffe – 2 said that
   - Crowd made it difficult to use the puppet by the giraffes. We had to wait longer than I would have liked.
   - Pretty cool
   - Losing the head into giraffe den. If it drops into the den. (F: About the puppet “It’s cute. It would work if the head was bigger & maybe more realistic. Make sure the head is more secure -- I was worried it would fall into the exhibit.”)
   - Not a place to put stamp pad and stamps. Trying to hold everything!
   - Short set of Muke stickers. Some computer questions were difficult for 5-7 year-olds.
   - the other kids behind you making noise & trying to do the exhibit during our turn. (they were bothered by the other kids running up and using the mic)
   - technical glitches (referring to touch screen at Gorilla)

4. If the Family Explorer bag was available on-going at the Zoo, would your family participate again?
   - 19 – Yes’
   - 1 – No
   - 2 – Maybe’s

5. If you rented this Family Explorer bag for a day, how much would you be willing to pay?

   Daily Bag Rental
   $5  $6  $7  $8  $9  $10
   $11 or more

   - 12 - $5 (one said if there was a Single experience in the bag)
   - 2 - $6
   - 4 - $7
   - 1 - $8
   - 1 said between $8 and $9
   - 4 - $10 (one said if there were Multiple experiences in a bag, one said If bag had 10-15 activities)

Comments on pricing:
- F: “The price I’d be willing to pay depends on how many experiences are inside the bag . . . if it’s just one, I’d pay less but if there are 2 – 4 experiences in the bag, I’d pay more. Can’t afford to rent multiple bags.”
- One family asked “would there be more stuff in it?” --price of bag

6. If you could get a Wild Research membership that let your family choose backpacks with different themes at no cost any time they visited the zoo, how much would you be willing to pay for the membership?

| Wild Research Membership (membership includes free use of Family Explorer bags) |
|---------------------------------|-----|-----|-----|-----|-----|-----|
| $15                             | $18 | $20 | $22 | $25 | $30 |
| $31 or more                     |     |     |     |     |     |

- 8 - $15
- 1 - $18
- 5 - $20 (One said IF, the goals/outcomes were different. Hands on stuff is great when the Zoo is empty.)
- 2 - $22
- 2 - $25
- 2 - $30
- Comment by Observer: When read about the WR membership, mom said “oh that would be fun”!

7. What was you/your family’s favorite thing in the bag?
- 8 said Binoculars
- 2 said Timer
- 1 said Hourglass
- 2 said Stamps
- 3 said Stickers (one said Stickers with Tally Sheet)
- 4 said Giraffe Puppet/fake giraffe
- Identification Card (F said “Even though I wasn't very good at it.”)
- Getting to see a giraffe with the binocular
- Record info. On clipboard
- Facts
- 1 family Left it Blank

Help Us Name This New Attraction! What do you think we should call this?
- Africah animal safari!, Family Learning Bag
- Explorer Kit, "Zoofari", Zoo packs
- Animal Searching (Bag), Animal Adventures
- Gibbons Experience
- Backpack Explorer
- Extraordinary Experience
- Which Hand Experiment, Hands on Primates
- Explorer Bag
- Fun Facts
- Family Fun Pack
- Jr. ZooKeeper and give Jr. Zookeeper badge (like they do for Jr. Rangers at the National Parks) (F said it would be neat to give children “Junior Zookeeper” badges when they complete bags and activities like they do in the National Parks.)
- Adventure Pack (M said because kids would like it better)

Bag Style Preferences (when asked verbally)
- F said that her favorite type of bag would be a Sling Pack.
- F said she would like a bag that has a Zoo logo on it so it doesn’t get lost with other bags that she would bring to the Zoo.
- They said that they liked the backpack style – “good for kids to carry”.
- F on bag type preference: “doesn’t really matter … needs a zipper so you don’t lose stuff, messenger bags may not have zippers … backpack is easy, everyone knows how to use it”

Other Observer’s Comments
- F said she didn’t like that you had to flip over the page to read all of the directions.
- F said that maybe the directions were a little out of order and that the steps need to be numbered.
- F said it would good to put all of the papers on a ring because she was dropping stuff.
- F said that they still enjoyed the activity despite having trouble IDing the Giraffes.
- g said “It would be a good learning experience for little kids.”
- F said that they get a chance to really stand here and look at them (Giraffes)
- g said that you should have to check out the backpacks.
- They said that the directions made sense.
- g said “It was fun.”
- Family said they enjoyed the Zoo – was their favorite place.
- Dad looks for least expensive options. Mom points this out laughing.
APPENDIX L

PHASE III BACKPACK PROTOTYPING
COMPiled SURVEY RESULTS
Wild Research Explorer: Family Evaluation
Phase 3 – invited family using 3 investigations in one backpack

Total # of families that tested it: 1
Total # of: M - 0, F - 1, b - 3, g - 2 (M = Adult Male, F = Adult Female, b = Young Boy, g = Young girl)
Total # of participants: 6

* Note: Red text = Observer’s Comments

Legend: VIG Sim = Vigilance, Simple (Giraffe)
VIG Com = Vigilance, Complex (Giraffe)
BOD Sim = Body Parts, Simple (Gibbons, L/R hand use)
BOD Com = Body Parts, Complex (Compare 2 or 3 primates, L/R hand use)
GOR Sim #1 = Gorilla, Simple (Which GRU? - gorilla stickers by group members’ name)
GOR Sim #2 = Gorilla, Simple (Hoot - group voting on best calls)
GOR Com = Gorilla, Complex (Hoot - take turns making calls, others guess meaning)

OVERALL
1. How would you rate your family’s overall experience? (Circle one)
   
   Just OK  1  2  3  4  5  6  7  Awesome!
   
   - Rated it a 7

2. How would you rate your family’s first experience today? NAME VIG Com (Circle one)
   
   Just OK  1  2  3  4  5  6  7  Awesome!
   
   - 4 – 4’s
   - 1 – 6

3. How would you rate your family’s second experience today? NAME GOR Com (Circle one)
   
   Just OK  1  2  3  4  5  6  7  Awesome!
   
   - 1 – 6
   - 4 – 7’s

4. How would you rate your family’s third experience today? NAME BOD Sim (Circle one)
   
   Just OK  1  2  3  4  5  6  7  Awesome!
5. Please share your family’s comments here.
   - They left it blank but told me the following: F said that it would be good to have a note about doing the Gibbon activity throughout the Zoo somewhere at the top of the sheet so they could have done that while they were walking around the Zoo before they got to Gibbon

6. What was the best part of your Family Explorer experience?
   - Gibbons because it was fun, need to concentrate to do it. We were learning as a family. My son liked the Gorillas in making the sounds and guessing.

7. What did you like the most about this experience?
   - I enjoyed taking the time to explore the zoo in a more detailed way. It helps the children to expand on how naturalist may do observations in the wild.

8. What did your child/children like most about this experience?
   - The bag is a good size and slips well on to a stroller.

9. What did you/your family like the least?
   - They left it blank but told me the following: b said that he didn’t like the Giraffe puppet; he didn’t like holding it

10. If this experience was available on-going at the Zoo, would your family participate again?
    - Yes (F said that they would have done up to maybe 5 activities in a bag depending on simplicity of the bag if they were to rent out the back for a day. She said definitely not as many as 10 activities (when one of the children suggested that) because they like doing other things while they are at the Zoo too.)

11. If you were to rent this Family Explorer bag to enhance your Zoo visit, how much would you be willing to pay?
    - They said $5 - 10

    $5-10       $11-15       $16-20       $21-25       $26-30       $31-35
    $35 or more

12. What was most useful?
    - marker (b said binoculars)

13. Which was your favorite?
    - giraffe ID’s
14. Which was your child/children’s favorite?
   - binoculars and sand timer

15. Was there something you wished you had that was not in the bag?
   - They left this blank

16. Is there anything that you would add to the bag?
   - directions on how to work stop watch

17. Any other thoughts?
   - Animal Hunt Game (b said to have a list of animals and exhibits that you can check off as they go to each.)

HELP US NAME THIS NEW EXPERIENCE! What do you think we should call this?
- Backpack Adventure, Explorer's World, Backpack Safari, Animal Safari, Cincinnati Safari

Would it be okay if we called you to follow up on your responses?
   - She provided her contact information.

**Bag Style Preferences (When asked Verbally)**
- F likes the messenger bag style because you can put it on the stroller.
- The children all said they liked the messenger bag too better than a regular backpack.
APPENDIX M

DISCOVERY FOREST: SENSITIVE PLANT INVESTIGATION
POWER POINT SLIDES
Sensitive Plant: Light vs. Heavy Touch Investigation Instructions

**SENSITIVE PLANT**
Mimosa pudica

**Light or Heavy Touch?**

---

**TIME TO FIND OUT!**

**STEP 1 - How to do it:**

1. **START** stopwatch.
2. Tickle leaf with feather.
3. **STOP** watch when leaf **STARTS TO FOLD.**
4. Record time on data sheet.

---

**PREDICT**
What you think will happen!

- Choose one and circle it on the light / heavy data sheet
- Leaf will fold faster when I touch it with a feather.
- Leaf will fold faster when I press it with my fingers.

---

**TIME TO FIND OUT!**

**STEP 1 - How to do it:**

1. **START** stopwatch.
2. Tickle leaf with feather.
3. **STOP** watch when leaf **STARTS TO FOLD.**
4. Record time on data sheet.
**TIME TO FIND OUT!**

**STEP 2 - How to do it:**

CHOOSE ANOTHER LEAF.

1. **START** stopwatch.
2. Press leaf with finger and thumb and let go.
3. **STOP** watch when leaf folds.
4. Record time on data sheet.

**WHICH WAS FASTER???

- Light Touch with a feather?
- or
- Heavy Touch with our fingers?

**NOW WHAT DO YOU THINK?**

- Will leaf fold faster if a **butterfly** lands on it or if a **rabbit** hops on it?
- Why does the **SENSITIVE** plant fold its leaves?

*Thanks for investigating sensitive plants with Wild Research!*
**SENSITIVE PLANT**

*Mimosa pudica*

Wind or Water?

---

**TIME TO FIND OUT!**

**STEP 1 - How to do it:**

1. Choose a leaf.
2. **START** stopwatch.
3. **Blow** on the leaf.
4. **STOP** watch when leaf folds.
5. Record time on data sheet.

---

**PREDICT**

*What you think will happen!*

- Choose one and circle it on the **Wind / Water** Data Sheet
- Leaf will fold faster when I blow on it.
- Leaf will fold faster when I spray it with water.

---

[Image of a sensitive plant]

[Image of a stopwatch]

[Image of a leaf being blown]

[Image of a leaf being sprayed]

---

[Caption: Sensitive Plant: Wind vs. Water Touch Investigation Instructions]
**TIME TO FIND OUT!**

**STEP 2 - How to do it:**

1. Choose **ANOTHER LEAF**.
2. Hold water bottle close to leaf.
3. **START** stopwatch.
4. Spray leaf with water.
5. **STOP** watch when leaf folds.
6. Record time on data sheet.

---

**WHICH WAS FASTER???

- Wind ?
- or
- Water ?

---

**NOW WHAT DO YOU THINK?**

- Will the leaf fold faster in a **wind storm** or **rain storm**?
- Why does the **SENSITIVE** plant fold its leaves?

*Thanks for investigating sensitive plants with Wild Research!*
APPENDIX N

DISCOVERY FOREST: PLANT BLINDNESS QUIZ
DO YOU SEE GREEN?
QUIZ YOURSELF AND SEE HOW WELL YOU NOTICE PLANTS.

1. On a WEEKLY basis, how often do you notice plants?
   a. Never  
   b. Once or twice a week  
   c. Every other day  
   d. Every day

2. I would like to study plants.
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

3. I would like to learn the names of different types of flowers.
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

4. Plants are very interesting
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

MORE ON BACK >>>

Scoring Your Quiz:
1. For Questions 1 to 8, score as follows:
   a = 0 points  
   b = 1 point  
   c = 2 points  
   d = 3 points

2. For question 9, give yourself 1 point for each letter that you circled.
3. Total your score and put quiz in the box.
   Total Points: __________

If you scored:
0 – 8 you are a plant novice - you hardly notice plants
9 – 15 you are plant aware – you notice plants sometimes
16 – 20 you are clear-eyed - you like & know plants
21 – 25 you see green – you have good knowledge of plants
26 – 30 your green vision is strong – you’re a plant friend and a champion of the green world

5. Even plants that are not used by humans play an important role
   on the planet.
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

6. Children should be taught as much about plants as about
   animals in school.
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

7. There are plants that I am afraid of.
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

8. I think plants could be “smart.”
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

9. Circle ALL THAT APPLY:
   a. I own or have owned a houseplant  
   b. I have grown a garden  
   c. I learned about plants at school  
   d. I learned about plants from a family member  
   e. I planted a tree  
   f. I visited a botanical garden
APPENDIX O

DISCOVERY FOREST: VISITOR TRACKING TOOL
Use space to write down everything your trackee says, who they said it to, and where they said it. Write other conversations if you can.
Point-Specific Conversation, Discovery Forest

Observer Name: ____________________________
Date: ____________________________
Time of Day: ____________________________
Time spent at exhibit: ____________________________

Exhibit (Check One)
☐ Macaw  ☐ Wheel  ☐ Sloth  ☐
In forest near Classrooms

Crowd
☐ 1 not crowded, mostly empty
☐ 2 slight crowd, one or two other groups
☐ 3 crowded, several other groups
☐ 4 very crowded, several groups, difficult to maneuver

Trackee  Family (incl. Trackee)
☐ F = adult Female  Total # F in group: ________ Observable family culture/ethnicity:
☐ M = adult Male  Total # M in group: ________
☐ f = adolescent female  Total # f in group: ________
☐ m = adolescent male  Total # m in group: ________
☐ g = small girl  Total # g in group: ________
☐ b = small boy  Total # b in group: ________

Trackee Actions. Use following abbreviations as you write conversation below.
LE - look exhibit  CG - comment graphic  MAN - manipulate
LL - look label  QE - question exhibit  T - talk to person
CE - comment, exhibit  RLA - read label aloud  TNE - talk, not exhibit related

Write ALL Trackee's comments/conversation. Abbreviate words where possible. If conversation is too fast, paraphrase but use parentheses for paraphrased text. We need to know what was verbatim vs. paraphrased.
Trackee comments/conversation and Responses to Trackee:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________