ABSTRACT

PUBLIC-USE INTERNSHIP WITH PEA ISLAND NATIONAL WILDLIFE REFUGE
OUTER BANKS, NORTH CAROLINA

By Jennifer Eileen Weiskittle

My internship with Pea Island National Wildlife Refuge primarily focused on public-use activities. I presented and developed educational programs, lead tours, staffed special events, provided nature interpretation, and assisted with visitor center operations. In addition to public-use activities, I performed building, public-use area, and hurricane maintenance duties. I also participated in the turtle volunteer program, a black bear population study, and brown pelican banding. This internship has given me the opportunity to contribute to conservation efforts while expanding my interpretation skills and my love for the environment.
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OUTER BANKS, NORTH CAROLINA

An Internship Report

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CHAPTER I

INTRODUCTION

The Institute of Environmental Sciences, at Miami University in Oxford, Ohio requires students to fulfill a research requirement. This requirement can be a research thesis, a practicum, or a six-month internship. I chose to complete an internship in the field of environmental education. Since education plays a key role in the conservation process, I had hoped to find an internship that linked it with my Master's degree concentration in biological conservation.

I located an internship with the U.S. Fish and Wildlife Service which provides education to fulfill its mission of conserving, protecting, and enhancing wildlife and habitat. I was hired as a full-time public-use intern at Pea Island National Wildlife Refuge (PINWR) located on the Outer Banks of North Carolina. During my internship, I was able to contribute to various aspects of the public-use program and to the maintenance of refuge facilities. I spent six months at PINWR where I obtained valuable experience working with the public, working with refuge employees, and observing the unique ecological and historical environment of the Outer Banks.
CHAPTER II

IMPACT OF THE INSTITUTE OF ENVIRONMENTAL SCIENCES

The two years that I spent at Miami University fulfilling the Institute of Environmental Sciences (IES) Master’s program requirements positively contributed to my internship experience. A variety of classes prepared me for understanding refuge issues and allowed me to gain the general environmental and biological knowledge to assist with educational programming. Principles and Applications of Environmental Science gave me the general knowledge base for environmental issues and concerns. On top of that, Population and Community Ecology helped me to increase my undergraduate biological knowledge through building ecological connections and food chains.

Urban and Regional Planning and Watershed Management were two classes that I took during my last semester at Miami University. While taking these classes, I did not know how I was going to utilize the information that I was learning. However, both classes turned out to be beneficial for my internship. The planning material that I learned was able to give me insight on Outer Banks development and various management issues for the refuge. Watershed Management was helpful in understanding the movement of water from rivers through Pamlico Sound out to the ocean and general water management on the refuge.

After my first year of graduate class work, I traveled to Costa Rica and the Bahamas for two field classes where I experienced a variety of environments that were extremely dynamic and breathtaking. The exploration and research of these spectacular places increased my conviction of supporting the environment through education. Understanding that these foreign environmental issues were similar to those on the North Carolina coast allowed me to quickly embrace the issues associated with the refuge. This similarity of environmental issues was incorporated into the presentation of my public programs.

When working with public-use programs, the target audience is an important
component to disseminating information. This was one aspect that was repeatedly touched on in Advocacy in Contemporary America. Going over speeches in this class and discussing techniques to make the audience react was very helpful in leading programs, as well as developing new ones.

In addition to the class work, the graduate assistantships that I received through IES were very beneficial. My first year, I taught introductory biology labs through the zoology department which increased my teaching strength and speaking skills. These strengths and skills were used and built upon while leading refuge programs. My second year I worked with the Ecology Research Center, also through the zoology department, in developing outreach opportunities for local primary and secondary schools. Working with the Ecology Research Center increased my knowledge of contact letters, brochure development, and web site media. This new found knowledge was used when creating refuge fact sheets, writing press releases, and other office work.

While attending Miami University and becoming involved with IES, I found that teamwork was a strong component of the program. I received many chances to work on group projects, as well as the Public Service Project requirement in the first year, to improve my ability to be a strong team player. I am very thankful that IES focuses on teamwork because on PINWR teamwork is how the refuge is run. Without teamwork, the National Wildlife Refuge System would not be as successful as it has been over the last one hundred years.
CHAPTER III

THE NATIONAL WILDLIFE REFUGE SYSTEM

The U.S. government began wildlife protection efforts in 1871 by surveying commercial fish populations. The natural resource agencies reorganized several times and in 1974 the U.S. Fish and Wildlife Service was created (Dolin 1989). The mission of the U.S. Fish and Wildlife Service is presently stated as “working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people” (U.S. FWS 2003a).

The responsibilities of the U.S. Fish and Wildlife Service are placed into five categories: wildlife and fishery resources, habitat resources, federal aid, international affairs, and law enforcement. The management of the National Wildlife Refuge System is under wildlife and fishery resources. Dolin (1989) notes that the management of this system is the “largest single responsibility …Often described as the ‘backbone’ of the service…”.

The first government owned wildlife refuge, established in 1870, was located in a section of Oakland California that is today known as Lake Merrit. The idea for wildlife refuges started in California, but it was not until 1903 that wildlife protection became a federal concern. During his presidency, Theodore Roosevelt received a proposal to sell a known pelican breeding area off the coast of Florida for a bird sanctuary. President Roosevelt could not accept this proposal from his friend, Frank Chapman, because it was unlawful to sell federal property. However, Roosevelt proceeded in finding another means to preserve the island. On March 14, 1903, President Roosevelt issued an executive order to establish this island as the first federal wildlife refuge, Pelican Island. With this executive order, the National Wildlife Refuge System had begun (Dolin 1989). Currently, there are 540 refuges located across the United States totaling 95 million acres (Lordan 2003). PINWR, managed under Alligator River National Wildlife Refuge (ARNWR), is small, but contributes enormously to the mission of the U.S. Fish and Wildlife Service.
CHAPTER IV

PINWR AND ARNWR

PINWR History

Location

PINWR is located on the Outer Banks, which are a series of dynamic barrier islands originally located directly along the mainland portion of North Carolina. Currently, the Outer Banks are considered to be the most unique coastline in the world stretching from the border of Virginia to the south of Cape Lookout. The combination of sand, wind, and sea shapes these islands daily and determines each one’s size, shape, and movement. The constant tug of war between moving sand grains allows the Outer Banks to persevere as they slowly move westward to escape the rising sea level (Alexander and Lazell 1992).

Pea Island was named after a beach pea (*Strophostyles helvula*) (figure 1), which is fed upon by snow geese that migrate to the Outer Banks during the winter season. The flowers of these dune peas are small in size and are between pink and lavender in color. When the pea pods mature, they turn from bright green to dark brown which indicates edibility for the geese. Historically, the snow geese that visited the island during the winter months could always rely on dune peas for food. So, it has been said that the “refuge was literally the ‘pea island’ for snow geese”; hence the island found its name (PINWR 2002).
Figure 1. Beach pea (*Strophostyles helvula*) for which PINWR was named

Establishment

Under the direction of President Franklin Roosevelt, and the help of Congress, PINWR was established in 1937 with the ultimate intention of providing habitat for migratory waterfowl (PINWR 2002). The length of Pea Island is approximately 13 miles beginning at Oregon Inlet and extending south to the village of Rodanthe, North Carolina (figure 2). Along this 13 mile stretch, the elevation ranges from zero to ten feet above sea level, and the space between the Atlantic Ocean (figure 3) and the Pamlico Sound (figure 4) ranges from several hundred yards to one mile. In all, the refuge boundaries encompass approximately 5,000 land acres and 25,000 water acres to a sum of 30,000 acres for wildlife to enjoy (PINWR 2002 and 2003).
Figure 2. Pea Island National Wildlife Refuge (Source: PINWR)
Figure 3. Atlantic Ocean off the east side of PINWR

Figure 4. Pamlico Sound off the west side of PINWR
Colonization

Only one tribe of Native Americans, the Croatoans, lived permanently on the Outer Banks. Other tribes lived on the islands in the sound and areas on the mainland. In the late 1500’s, England sent out expeditions to establish a settlement on the Outer Banks. In 1590 that colony had disappeared. There are several theories about what happened, but no one knows for certain. The next time that England tried to establish a settlement they moved up the coast to the Chesapeake Bay and left the Outer Banks to the Native Americans (Stick 1958).

The next documented time that the Outer Banks received residents, in addition to the existing tribes, was 1664. Land grants were issued for farmers, whalers, and small landowners. Pirates were also well-known for living on the islands, the most famous being Blackbeard. After his death, Ocracoke Inlet became the port of entry because of the dangers other inlets were posing to ships. This opened up a new avenue for development along the Outer Banks (Stick 1958).

The land that has become PINWR was used for market waterfowl hunting, commercial fishing, farming, and livestock. Before its establishment the island was owned by members of private, waterfowl hunting clubs. Currently, wildlife can utilize and enjoy ocean, beach, dunes, fresh and brackish ponds, salt flats, and salt marsh areas. A documented species list boasts more than 265 bird species, 25 mammal species, 24 reptile species, and 5 amphibian species. This particular refuge is commonly referred to as a birders paradise and t-shirt slogans often read “It’s for the birds!”. Ducks, geese, swans, shorebirds, wading birds, raptors, and some neotropical migrants are commonly seen on Pea Island (PINWR 2002 and 2003). Examples of bird species that are documented on PINWR are found in Plates 1-4.
Plate 1. Brown pelican (*Pelecanus occidentalis californicus*)

Plate 2. White ibis (*Plegadis chihi*)

Plate 3. Rufous-sided towhee (*Pipilo erythrophthalmus*)

Plate 4. Laughing gull (*Larus atricilla*)
ARNWR History

Location

ARNWR, attached to the mainland of North Carolina, is located west of Roanoke Island. This refuge, approximately 35 miles from PINWR, is also a wetland, but is very different from PINWR in habitat and species. ARNWR is named after Alligator River,
which borders the refuge on the west side (figure 5). Even though this refuge is attached to the mainland, it touches water on all sides - Alligator River on the west, Albermarle Sound on the north, Pamlico Sound on the east, and Long Shoal River on the south. On the south edge of the refuge there is also farmland, which is where the refuge connects to the mainland (ARNWR 2003). Many times, after visitors hear the name of ARNWR, they ask if there are really alligators in the refuge and the answer is yes.

Establishment

In the 1970’s, biologists began to notice that many wetlands were being destroyed due to logging and the establishment of farms. At this time, wetlands were becoming known as important environments since they contain unique species and have a functional role in water quality. Local private conservation organizations, along with state and federal land management agencies, began campaigning to save the remaining wetland areas that had not yet been destroyed. As a result of this campaigning, ARNWR was established in 1984 by an 118,000 acre land donation from the Prudential Life Insurance Company. Since then, the refuge has acquired additional acres by Congressional appropriations to bring ARNWR to 152,000 acres of forested pocosin wetland. Pocosin is Native American for “swamp-on-a-hill” and is known for its poorly drained soil that is high in organic matter (ARNWR 2003). ARNWR pocosin wetland species and wetland functions are now being protected and maintained along a stretch of road that in the past many Outer Banks’ visitors thought to be a wasteland filled with unfriendly creatures. Today, the U.S Fish and Wildlife Service is able to share the enjoyment and importance of this area that was once thought of as a scary place (ARNWR 2002).
Colonization

The land that ARNWR currently occupies was originally inhabited by Native American Tribes. Small towns began as the English settled the area. The water level was lowered in order to establish logging and agriculture practices. If the rate at which this wetland was altered had continued the area could have easily been developed for residential and business. Presently, American Alligators, along with red wolves, red-cockaded woodpeckers, and a few other threatened and endangered species make ARNWR home. Even though PINWR claims to be a birder’s paradise, ARNWR is not far behind with approximately 200 documented bird species. In addition to the many birds that can be seen in the refuge, visitors always hope to see black bears and red wolves. Other mammals that reside in the refuge are white-tailed deer, raccoons, and river otters (ARNWR 2002 and 2003). For those visitors who enjoy reptiles, there is always hope to discover copperhead and cottonmouth snakes, as well as non-poisonous species like the smooth green snake.

Objectives

PINWR and ARNWR follow the U.S. Fish and Wildlife mission of “working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people” (U.S. FWS 2003). The objectives of PINWR and ARNWR (PINWR 2003 and ARNWR 2003) are these:

• providing resting, nesting, and wintering habitat for a variety of migratory birds and other native species
• providing habitat and protection for threatened and endangered species
• providing protection for wetland habitat and wetland species
• providing ways for the public to enjoy wildlife and wildlands resources on the refuge
Management Tools

Management tools are very important for maintenance and protection of wildlife and the land. PINWR and ARNWR incorporate many management tools to achieve refuge objectives. First, water management is extremely important for both refuges. There are three man-made ponds located on the western side of PINWR that comprise approximately 1000 water acres. The water level in these ponds can be regulated if need be to suit the types of birds that are on the refuge at a particular time. During the summer months the ponds are shallow to provide wading bird habitat and are deepened in the winter months to provide for waterfowl habitat. Water levels at ARNWR have been restored to a level that existed before logging and farming activities drained the area. This historic water level, along with soil moisture monitoring, helps lower the risk of fire outbreaks from dry, highly organic soils. Water and soil management also maintains refuge conditions for wildlife (PINWR2003 and ARNWR 2003).

Second, mechanized equipment, chemical control, prescribed burns (PINWR), and hunting (ARNWR permits hunting of deer, small game, and waterfowl) are used to control plant and animal populations (PINWR 2003 and ARNWR 2003). These populations are monitored by refuge biologists through wildlife and habitat surveys (third management tool). Bird and sea turtle populations are surveyed on PINWR. Bird counts are completed once a week along the beach and dune system and on the sound side of the refuge. Turtles are monitored through nesting sites along the beach. Hatchling numbers are documented, as well as the mortality of adult sea turtles as they wash up onto the beach (PINWR 2003).

The fourth management tool is public education and partnerships. Education benefits the refuge system by raising public awareness to gain refuge support for protection of wildlife on the refuge as well as in backyards (PINWR 2003 and ARNWR 2003). For example, in residential areas that are in close proximity to ARNWR, there is a big problem with black bears coming onto personal property. This trespassing makes
residents scared for themselves, their children and their pets. By working with the community, the refuge hopes that people will take alternative actions instead of shooting the bears.

Partnerships with the refuge make education stronger by increasing the information available to the public. The Coastal Wildlife Refuge Society (CWRS) is a non-profit friends of the refuge group that was founded in 1989 by local residents to help the National Wildlife Refuges in the area - Pocosin Lakes, Currituck, Mackay Island, Alligator River, and Pea Island. CWRS supports the refuges by gathering funds to help with programs and activities that are available for the public. Along with monetary aid, this non-profit organization helps find volunteers who can contribute to any aspect of the refuges from trimming weeds to leading public bird walks. It also helps support (with monthly stipends) the interns who spend anywhere from three to six months volunteering on the refuges (CWRS 2003).

PINWR and ARNWR have greatly benefited from CWRS contributions. PINWR has been able to construct a visitor center (containing animal exhibits and retail space for both PINWR and ARNWR), and received new canoes and paddles for public canoe programs. ARNWR has received refuge web page development and an expansion to the intern cabin. CWRS has many more projects planned for the future, including the construction of a visitor center and administration complex on Roanoke Island for ARNWR and PINWR (CWRS 2003).

The Red Wolf Coalition is another partner of ARNWR and contributes to the red wolf reintroduction and education program. With the coalition’s help, the endangered red wolf has been reintroduced to its historic range, which includes the refuge. From the fourteen remaining wolves, there are now approximately 100 in the wild. In addition to the coalition, thirty-three zoos around the country are participating in captive breeding programs to help restore the red wolf population (U.S. FWS 1997).
**Structure**

To achieve all of the above management tools, ARNWR employs 36 people, two of whom report full time to PINWR (appendix A). Employees of these two refuges report to their assigned locations on a daily basis, but depending on the current project, many find themselves traveling to the coast to spend the day working on PINWR or vice versa. The employee hierarchy has four main levels. Michael Bryant is the Refuge Manager at the first level, Kathy Whaley is the Deputy Refuge Manager at the second level, and Jim Wigginton is the Supervisory Assistant Refuge Manager at the third level. The fourth level contains heads of the five program areas: fire, red wolf, maintenance, biology, and public use. Underneath this fourth level many other employees can be found, including interns and volunteers.

The Public Use Program is headed by Bonnie Strawser, the Wildlife Interpretive Specialist. Ann Marie Salewski, an interpretive Park Ranger, is in charge of interpretive refuge programs and supervises interns and volunteers. The PINWR Visitor Center is placed within public use and run by Jenny Howard. In addition to her main job, she supervises visitor center volunteers.
CHAPTER V

INTERNERNSHIP RESPONSIBILITIES

Roles

Primary Role

I was hired as a six-month public-use intern for PINWR from May to November of 2003. My primary role as a full time public-use intern was to contribute to the running of the refuge in any aspect that dealt with the public. This ranged from leading education programs, helping out with area festivals, being available to answer questions on refuge grounds, manning the visitor center, and completing various office tasks.

Secondary Role

My secondary role involved contributions to facility maintenance and biological work when needed. During my six-month span of working at PINWR, I worked one maintenance day per week to help with the upkeep of the refuge. I was also called to work with the biology crew when extra hands were needed on projects.

Full Time Public Use Duties

Education Programs

One of my main jobs was to lead the summer educational programs. The programs that were offered, as well as the schedule (appendix B), was decided upon the previous winter by my supervisor. Visitors could choose to attend “Turtle Talk”, “Raptor Rapture”, “Sound Side Discovery“, or a more energetic canoe trip. “Turtle Talk“, and “Raptor Rapture” were set up as lecture programs, while “Sound Side Discovery” was half lecture and half hands-on activity. Canoe trips provided the opportunity for the
public to submerse themselves in the salt marsh environment of Pamlico Sound to see the flora and fauna of the area.

“Turtle Talk”

“Turtle Talk” allowed the public to learn about the natural history of the loggerhead sea turtle as well as what efforts PINWR was taking to help this troubled species. I enjoyed presenting this program to the public because sea creatures, such as turtles, are still very mysterious to some and the information that I gave was new to many participants. “Turtle Talk” was very successful and usually had the most attendance of all the programs.

Various props helped engage participants into conversation and questioning throughout the time that I spent with them. I was able to show them a hawksbill, green, and loggerhead shell for comparison between color, shape, and scute arrangement (plate 5). Everyone was amazed with the large loggerhead skull (plate 6). This helped them visualize where the turtle got its name. Some other exciting props included a loggerhead egg, a loggerhead baby sea turtle, and a ghost crab (plate 7), which is one of the many enemies of hatchlings as they hatch and make their way to the ocean.
Plate 5. Loggerhead, hawksbill, and green sea turtle shells

Plate 6. Loggerhead sea turtle skulls

Plate 7. Ghost crab specimen

Plate 8. Confiscated sea turtle items
Another area that I touched on during this program is the endangerment of species. This is an important issue to address since all six sea turtle species that enter U.S. waters are either threatened or endangered (U.S.FWS 2003b). For educational purposes, the refuge is allowed to have confiscated items that have been made from sea turtle parts or are parts of turtles themselves, like the shells. When I passed around the confiscated objects, many eyes lit up because they would have never dreamed that these items existed, such as turtle oil soap. Along with the soap, there was turtle soup, turtle-skin boot and wallet, and turtle-shell bracelets, earrings, and hair comb (plate 8).

“Raptor Rapture”

The “Raptor Rapture” program had a very rough start due to the lack of information that existed in the program folder. At the beginning of the program season, not very many people were attending. I am not sure if it was the lack of interest in the material or the time and day at which it was scheduled. Even though an unidentified obstacle was in the way, I began researching for new and interesting information on raptors, particularly ospreys. Many raptors pass through the Outer Banks, but the osprey is the most commonly seen raptor during the summer months and it helps to talk about species which tourists will most likely be able to observe.

Figure 6. "Raptor Rapture" props
The raptor program folder started growing slowly. This program was my least favorite because many times it was cancelled due to no one attending; therefore, I never really got comfortable with the material. In addition, the season started out with only one prop - a mounted osprey. The osprey worked for most of the talk when going over anatomical structure and function, but other than that, there was nothing to grab the attention of the participants. By the end of the program season, there was plenty of raptor information and a few more props (figure 6) and activities - for example, wing spans (figure 7) and a small feather/velcro activity. Over time, this program will gain in excitement with even more new ideas from future PINWR interns.

“Sound Side Discovery”

“Sound Side Discovery” was a unique program that I had fun leading for all age ranges. The first half of the program was an interactive talk about the different organisms that may be found within Pamlico Sound. Participants received the chance to pull an item from the mystery box and guess what it was and what type of adaptation it had for survival (figure 8). This was an excellent program for younger children. Even though some were scared that I had live organisms in the box (which they happily found to not
be true) they were eager to participate. After some adaptations were discussed, the group had the opportunity to use a seine net to drag the bottom of the sound to see what they could catch. Usually, we caught blue crab, small minnow-type fish, small flounders, empty shells, and pipe fish. After several collections with the seine net, the participants could then use dip nets to wade in the water and see what they could independently find.

Figure 8. "Sound Side Discovery" props

There was no existing written information for this program on file, so I took the initiative to begin the documentation. I was able to find a vast quantity of facts on most of the organisms in the box. All of the information that I was gathering did not have to be discussed within the time limit of the program. After I had read more information, it allowed me to gain the confidence needed to lead a high-quality program. My aim was met; hopefully future interns will be able to have a comfortable hold on the material and feel confident about leading “Sound Side Discovery“. 
Public Canoe Trips

Visitors to PINWR could choose between two canoe tours in Pamlico Sound depending on their need (figure 9). The first program was a general public canoe tour that lasted for approximately three hours. The second program was a family canoe tour that was an hour shorter than the general tour and allowed for the participants to stop along the canoe route, leave their boats, and explore the sound with dip nets. The family trip was designed with children in mind, but was not limited to families with children. The canoe tours were the only educational programs that charged a fee, but this did not hinder attendance, which was usually high. Each trip had a maximum of eight canoes and a minimum of four people in order to proceed.

The information that I used to lead the canoe tours came from a combination of material from “Turtle Talk“, “Raptor Rapture“, and “Sound Side Discovery“. I started the trip by introducing the participants to the area and giving some tips on canoeing for those inexperienced canoers. After all the boats were on the water, I chose several areas along the route to pause and talk more about the species found within Pamlico Sound and the management tools that PINWR uses to maintain the area for wildlife.

Figure 9. PINWR canoe trip on Pamlico Sound (Source: Sara Fegel)

For the most part, the canoe trips were enjoyable. Throughout the canoeing...
season, I received the chance to experience just about every kind of weather on the water. It was great when the sun would shine, the wind would be almost non-existent, and with one stroke of the paddle the boat would glide for quite a distance. On the other hand, when the wind was blowing, but not quite strong enough for a small-craft advisory (20mph or stronger), it took a lot of muscle power to get the boat to go anywhere. This type of weather was very difficult on the children who decided that they wanted to paddle for the duration of the trip. There were many times when I thought that my group was just not going to make it back to the boat launch area because the wind was too strong. I did my best to alter the route direction to paddle against the wind during the first part of the trip and then paddle with the wind at the end, but many times the wind seemed to change direction and we ended up paddling against the wind the whole time.

Every morning before a canoe trip, I would listen to the weather on 104.1FM, the local radio station, to make sure I knew the speed of the wind. During the event of a small-craft advisory all canoe trips scheduled that day on PINWR would be cancelled. I learned my lesson the hard way during one canoe trip. When I first arrived on the Outer Banks, I did not know how fast the wind could blow; I just knew that everyday it seemed to be very windy. I didn’t think about checking the speed of the wind before I took the canoes down to New Inlet, where the launch area was located. I got everyone into canoes, and we started around the first marsh island out in Pamlico Sound. We made it to the south edge of the island, but were paddling in one spot for about twenty minutes. My group ended up walking their canoes to the island for a rest; then we headed directly back to the parking lot without finishing the rest of the route. When I returned to the office, a fellow intern informed me of the small-craft advisory that had been issued that morning. From then on, I researched the weather either by listening to the radio or contacting ARNWR dispatch for a satellite update. I never wanted to be caught on the water again in such unfriendly weather.
Roving Interpretation

Another important duty that I had during my public-use internship was roving the North Pond Trail (figure 10). There was only one trail that was open to the public during daylight hours on PINWR. This four-mile trail goes around North Pond, one of the man-made water impoundments. Only the first mile of that trail was heavily traveled by visitors due to it being the only stretch that was well maintained. I was on the trail for three hours at a time to converse with people and answer any of their questions. This particular activity was fun because I had the chance to observe the many birds that were in North Pond and observe people’s reaction toward the refuge’s inhabitants. It was nice to see the variety of people who were utilizing the trail. On any given day, I would encounter families with children of all ages, older and younger adult couples, and individuals out for a relaxing walk. Once talking with these visitors, it was amazing that when they found out I was interning, they turned the conversation to me and wanted to know where I was from and what I did for the refuge. There was definitely an interest in people as well as in wildlife.

Figure 10. North Pond Trail
Visitor Center

Throughout my six months, I was responsible for opening, manning, and closing the PINWR Visitor Center once a week. This involved retail sales, pricing, restocking, and taking canoe reservations, as well as being able to answer questions for those interested in the refuge and in the surrounding areas (figures 11 and 12). At the beginning, working in the visitor center was very stressful since I have never worked in retail. Once I gained knowledge of how to work the cash register and credit card machine, it did get somewhat easier. However, I still had to try to answer all questions that would be thrown my way. By leading all four of the educational programs throughout the season, it made it really easy for me to answer questions relating to these programs concerning meeting areas and needed equipment. I also believe that traveling the area during non-work hours as a typical tourist helped me in answering a good number of questions about PINWR and the Outer Banks in general. By the end of my internship, after becoming more involved with the refuge, I was familiar with most of the answers that I would need to give.

Figure 11. Retail side of PINWR Visitor Center
Figure 12. Exhibit side of PINWR Visitor Center
Administrative/Office Work

New Program Development

The first new program that I developed for future summer sessions was a dragonfly program, called “The Mosquito Hawk” (appendix C). It consisted of a pre-visit insect bingo activity, on-site lecture, on-site nature walk, and a post activity, as well as dragonfly articles and coloring pages. This setup was targeted toward school groups, but could be segmented to fit the need of any group. The second new program that I developed was a wildlife observation program for PINWR (appendix D). I presented this program on-site for a Girl Scout troop, so the target audience was children. I developed a lecture portion involving the use of binoculars and wildlife-watching techniques. I created a wildlife-watching worksheet for the group to work on while walking North Pond Trail and I put together a wildlife-watching tip sheet to pass out at the end of the program.

Current Program Redevelopment

In addition to developing new programs, I updated the current refuge program files. Although “Turtle Talk” was organized fairly well, I did include natural history details, such as the swimming speed of the loggerhead sea turtle. “Raptor Rapture”, on the other hand, had to be redeveloped with more facts and an activity to keep the audience’s attention. Also “Sound Side Discovery” needed details. With more depth and a few more organisms in the mystery box a better program evolved. The canoe trips did not have an outline to follow, but this particular public program takes on the personality of the leader. By combining information from the other programs I was able to talk about the refuge and what was happening in Pamlico Sound, such as various processes and species. The more time that I spent on the refuge, the easier it became to present information to the canoe participants.
Writing, Research, and Databases

Press releases are a valuable tool in disseminating information for the refuge. I wrote five press releases for various programs/workshops that were being held for Wings Over Water festival, the biggest event of the year for PINWR and ARNWR (appendix: E). The time that the press releases were to be submitted into area papers coincided with Hurricane Isabel that swept up the coast of North Carolina, resulting in my press releases never being submitted. Several of the programs/workshops were cancelled due to the destruction caused by the category-two storm. The Wings Over Water festival continued on and I was selected to write thank you letters to all the festival sponsors and invite them to attend the keynote speaker (appendix: F).

In addition to my work for Wings Over Water, I contributed to writing a new kiosk panel (appendix G). The focus was on threatened and endangered species, the effort of PINWR, and how individuals can help. The images chosen were a loggerhead sea turtle and a piping plover, both of which are threatened and take advantage of PINWR.

I was able to work on my research skills while spending time in the office. I researched possible ashtrays that would be placed on the visitor center front porch. At a PINWR staff meeting, I put forth my observation of the number of cigarette butts on the grounds and of the need for an ashtray. My ashtray suggestion was given the okay and I was asked to research a type known as Smoker’s Outpost. During my time there, I also researched possible grants that CWRS could submit.

There were also several databases that needed to be updated. The first database contained media e-mail addresses to send out refuge press releases to radio stations, newspapers, and magazines. This involved calling these locations and verifying that the refuge had the correct e-mail address. The second database contained canoe/kayak club web sites. These web sites will eventually be contacted to ask if they will advertise for the Wings Over Water festival. The building of this database is still in progress. Although I worked only on the canoe/kayak clubs, the idea is to add outdoor photography groups,
bird clubs, archery clubs, natural history organizations, and any other outdoor oriented
groups that can be targeted for Wings Over Water.

Native Plant Garden

I was chosen to take care of the native plant garden located in front of the visitor
center. This entailed watering the garden when rain was insufficient and weeding.
Watering the garden proved to be not difficult, but weeding was a completely different
story. The main problem was the Bermuda grass (*Cynodon dactylon*) which was not a
native plant, but was a runner and strongly clung to the sandy soil. It would take several
hours just to weed one tiny part of the garden, but I remained diligent at taking care of the
wonderful native plants. As I was weeding, I took note one day that when people would
climb the ramp to enter the visitor center they would more than likely stop to ask what I
was doing and would ask questions about the plants in the garden. Just my presence
became an impromptu educational session. When working in the visitor center, I rarely
received questions about the garden. I decided to create a fact sheet on the native plant
garden that the visitor center could distribute if someone inquired about the garden
(appendix: H). Hopefully, this fact sheet will allow visitors to learn more about the native
plants of the Outer Banks.

Media Coverage

Press Tour

I felt very honored to have been chosen to lead a press tour that came to the Outer
Banks to visit several locations, one of them being PINWR. I was not sure want to expect
having never attended a press tour, but I was ready for the challenge. I contacted the
Outer Banks Visitor Center, which was arranging the tour, and made sure of what I had to
do and what I needed. I helped organize press tour packets that contained information on
PINWR, ARNWR, and other refuges in the area. I met the group at North Pond Trail and
learned that they were magazine journalists. I was nervous at the start not knowing what to expect, but I walked with them on North Pond Trail as I shared everything and anything I knew about the refuge. I also took them to see the visitor center and what it has to offer the public. This was the first event in which I noticed how much I can talk about a subject when I am familiar with the material. Hopefully I did not talk too much! Leading the press tour was really exhilarating and I would willingly do one again.

UNC-TV

The University of North Carolina Center for Public Television, UNC-TV, was on the refuge shooting footage for a series called *North Carolina Weekend*. This program explores recreational possibilities throughout the state. By chance the camera crew came along with me on one of my family canoe trips. They taped footage of the family and me catching blue crab with dip nets, interviewed the family, and had me explain the importance of education on the refuge. Before I arrived at New Inlet to meet the family, I was unaware that the camera crew would be filming my trip. I was lucky enough to have extra equipment for the two camera men to come along and adjusted quickly to the situation. I was not sure what footage would be used on the series, but I did end up making the cut. By the time I watched the show, I had forgotten exactly what I had said, but it ended up sounding professional.

Intern Training

Since I had been working at the refuge for three months already and was very familiar with the programs that were offered, I received the chance to train Oscar, an incoming undergraduate fall intern. Oscar attended “Turtle Talk” and several of my canoe tours to gain an understanding of the general format of the educational programs. Even though he never got to lead the lecture based programs due to season’s end, he did lead some canoe tours and developed his own personal program at the completion of his internship.
Special Public Use Events

Engelhard Seafood Festival

The first weekend after I had arrived on the Outer Banks, I chose to help with the Engelhard Seafood Festival in Engelhard, North Carolina. Various refuges from the area contributed to the event. PINWR was in charge of sea turtle information, animal calls, face painting, animal plaster tracks, and a bird activity. I spent the majority of the day helping children make plaster casts of various animal tracks. We used moist soil to form the track with a rubber mold, wrapped a section of cardboard around it, and then poured in the plaster. The children could come back in a half an hour to retrieve their cast.

In the afternoon I spent some time manning the sea turtle booth. Most people I met were genuinely interested in the topic of threatened and endangered sea turtles, but I also met a few fishermen who honestly believed the turtle populations were fine. They even told me they see them all the time. I have yet to come up with an effective way, other than higher profits, to educate some fisherman about ocean conservation. The day of this festival was cold and windy, but it still had a good turn out. The U.S. Fish and Wildlife Service booth was placed almost at the very end of the road, and it is believed that we may have not reached as many people as we could have if our booth would have been located in the middle of the festival. I believe even if we only educated a few, it was worthwhile.

North Carolina State Fair

The U.S. Fish and Wildlife Service had an informational booth at the State Fair, near the end of October. Each intern received the chance to attend the fair to help with the booth and to try our hand at a public-use event outside of the Outer Banks. The fair was a time of questions that I found difficult to answer. I think the reason for this difficulty was that the questions were too specific for my experience. I was able to learn as the day
progressed and if questions repeated themselves I was more than capable to supply an answer. The booth had mountings of a great blue heron, a pintail, a gadwall, and a small hawksbill sea turtle. There were also samples of native plants, including Venus Flytraps which became an interactive exhibit with the flies. In addition, there were plenty of brochures for passersby to pick up.

Our booth was located within a building that had several rows of tables. I believe that our particular location was an advantage as well as a disadvantage. Our table was in the very center row of the building that people who enter automatically walk. This position was beneficial because we received the chance to educate some who never would have walked around to see our exhibit elsewhere in the building. On the other hand, this position was not so wonderful because people were quickly filing through the aisle and those who wanted to talk with us were sometimes unable to stay long due to the crowd. But, we did get to hear our fair share of agreements and disagreements with the U.S. Fish and Wildlife Service’s management of wildlife and wildlands. It was also really exciting to talk with the children and watch them stare at the mounted animals. Many thought that they were alive, which scared a few. We could not allow them to touch the birds since they were very fragile, but the sea turtle was available to be touched and many children really enjoyed feeling its shell.

Wings Over Water

Wings Over Water is an annual celebration of wildlife and wild lands on the Outer Banks that allows people to experience a unique coastal and sound environment. This is the biggest event of the year for PINWR and ARNWR. For seven years, the Carolina Bird Club, Coastal Wildlife Refuge Society, National Park Service, Outer Banks Chamber of Commerce, U.S. Fish and Wildlife Service, and several other key supporters have provided citizens of the United States, as well as foreign citizens, six days of programs and workshops. These allow the amateur-to serious birder, nature enthusiast, wildlife photographer, angler, and paddler to come together to enjoy what nature has to
Before the event took place, I created five press releases, wrote thank you letters to the sponsors, and was able to sit in on a few organizational committee meetings. During the event, PINWR acted as the main headquarters for the festival. I was in the office most of the time throughout the six days, always available to participants for questions and other help. My other duties during the week were to pick up food donations for the trip leaders’ dinner and sell event merchandise at the keynote event. I was also chosen to lead a canoe trip and help out with the Refuge at Night program at ARNWR.

When I received the opportunity to lead a canoe tour in Kitty Hawk Woods for Wings Over Water, I was worried since I was not familiar with the area and was afraid that I would be unable to answer some questions. I came to find out that a local resident, John Roesgen, was going to help me lead the trip. This calmed my nerves. Having no minimum for the trip to proceed, I met the two people signed up for the trip and waited for John about 15 minutes, but he did not show. So, I decided to take one canoe for the three of us. The couple on my trip was really pleasant and told me that they were more than happy to have a quiet paddle than have a lecture the entire time. They really liked to sit and enjoy the peacefulness of nature. I answered their questions as well as I could, and there were times that we hypothesized together to form opinions on the natural history of the organisms we observed. We saw a good handful of species and the trip was worth leading, even if I had to lead it by myself.

Tidewater Council Camporall

Tidewater Council, serving Boy Scout troops from southeast Virginia and northeast North Carolina, held a camporall in October. A camporall is a weekend long camping trip with coordinated activities and competitions (BSA 2004). This event took place at the Dare County Regional Airport on Roanoke Island. The U.S. Fish and Wildlife Service was selected to set up a conservation trail for the boy scouts to complete.
in order for them to receive a patch documenting the centennial of flight and the centennial of the refuge system (figure 13). The organizations that contributed to the conservation trial were National Park Service, North Carolina Division of Marine Fisheries, 4-H Conference Center, North Carolina Aquarium, Frisco Native American Museum, CWRS, and U.S. Fish and Wildlife Service. The basic idea for the trail was for each organization to have an activity for each scout to complete. After each participant showed that he learned from the activity he earned a stamp on his conservation trail passport. At the end of the trail, passports were checked and a patch was then received.

I was in charge of a booth that mimicked PINWR’s “Sound Side Discovery” program. I had the mystery box and the boy scouts would select an item from the box, identify it, and give me one adaptation it had for survival in the coastal environment. The logistics of the trail were not well set up, and many times I would have about 30 boys at my table, all handing me the passport to be stamped without listening to what I had to say. With that many surrounding my table at once, it felt like the program that I was presenting did not work very well. I believe that this part of the camporall did not achieve its purpose of teaching the boy scouts conservation. The event was poorly planned in a short amount of time. The conservation trail is an excellent idea, but needs more thought and logistical coordination. It would have been more informative to have all the organizations contribute to one theme that would have allowed each scout to visit the
tables and learn about true conservation.
Other Festivals

There were three other festivals that PINWR was planning to attend: Kitty Hawk Heritage Day, Fun & Safety Day, and the Billy Mitchell Festival. However, the effects of Hurricane Isabel postponed them. I was unable to attend these festivals since they occurred after my internship with the refuge ended. I was able to contribute to the preparation of the Fun & Safety Day exhibit by helping choose pictures for the display board.

Maintenance Duties

Buildings

With the PINWR facilities being in close proximity to the ocean and its salt spray, maintenance of the buildings and surrounding areas needed to be repeated every summer. My duties varied each week and depended on the priority list, as well as what the other interns had not completed during their maintenance days. I was normally put on painting assignments. I successfully painted all the shop garage doors and most of the brown trim on the bio/oil shed (figure 14). I also experienced painting parking lot lines and curb stops at the visitor center and PINWR office complex. Painting became a fun and relaxing chore over the summer months. There was also a rotating weekly schedule for cleaning the inside of the office building.
Public Use Areas

Trail maintenance consisted of picking up litter, weed trimming, and mowing. Twice a week, trails and the three information kiosks had to be checked for litter and for sand buildup on the kiosk panels. I was assigned to this duty often, but it was not difficult to complete. Weed trimming took up most of my time while on trail maintenance. The first mile of the trail (constructed on top of a dike system separating North Pond from New Field Pond) needed to look clean and the platforms had to be free of plants coming through the boards. Along with weed trimming, mowing was done along the south side of North Pond to allow visitors a place to walk the pond. Sign maintenance was done along with trail maintenance and consisted of trimming around the sign posts along the trail and along Highway 12. In addition to trimming the weeds, if the sign was faded or defaced then it had to be replaced with a new sign.
Rainy Days

Most of the maintenance priorities for PINWR were outside, so there was always a concern with rainy weather. In the event that an intern was on maintenance during a storm there was a rainy day maintenance list posted in the office with a variety of tasks to chose from, such as cleaning the inside of refuge vehicles or painting the inside of the garage doors. The tasks were not priority, but needed to be completed.

Hurricane Isabel

After a regularly scheduled ARNWR and PINWR Monday staff meeting both refuges immediately started hurricane shutdown procedures. All interns were placed on maintenance to prepare the refuges for the storm. I reported to PINWR to assist with boarding up windows (figure 15), transferring computers and important files to ARNWR Headquarters, and moving all vehicles (including the canoe trail) to ARNWR. I was able to evacuate the Outer Banks Tuesday morning. Hurricane Isabel made a direct hit to the Outer Banks on Thursday, September 18th, and left the islands in a state of disaster (figure 16 and 17).

Figure 15. PINWR intern residence boarded for hurricane
Upon my return to the islands, interns were again placed on maintenance to restore the refuges for recreational use after Isabel made a visit. The majority of the damage on PINWR resulted from over wash across highway 12. The buildings had minor damages and the parking lots were filled with sand. I helped shovel sand and shuttle
vehicles back to the refuge. In addition to cleaning up at PINWR, I was called over to ARNWR to help clear fallen trees from the red wolf pen area (figure 18). All fourteen pens were damaged and needed to be repaired or replaced. I was able to see the four remaining captive red wolves while working at ARNWR. Usually only those associated with the red wolf reintroduction program enter this area, so I felt extremely lucky for this opportunity.

Figure 18. Red wolf pen clean up (Source: Sara Fegel)

Biological Duties

During sea turtle nesting season, biologists and volunteers monitor the mortality of adults, locate nests (turtle patrol), and assist hatchings to the ocean (turtle watch). I received the training to participate in these volunteer activities (figure 19) and the training to complete biological measurements and egg relocation (normally completed by the undergraduate intern) after a nest was located. I was never called upon for biological measurements or relocation, but I did participate in turtle watch. I was able to use the information obtained from this training for the sea turtle education program, as well as for visitor center questions.
Dead sea turtles washed up onto PINWR beaches frequently, which became another biological duty. A biologist or an intern would pull these turtles above high-tide line, smash the skull, and spray paint an orange line on the shell. These actions were to discourage people from taking turtle parts. Twice, I helped pull a loggerhead sea turtle above high tide line. I knew the range of loggerhead weight, but did not think much about it until I was moving one. It really is amazing that sea turtles are able to come onto the beach to make their nest.

Black Bear Population Study

Catherine Tredick, a Master’s student from Virginia Tech University, was completing field work for a black bear population study on ARNWR. She was setting up barbed wire hair traps and needed help in constructing the trail to each trap and setting up
the trap. I worked on this project twice and it was pretty rough work. The pocosin forest has a very thick understory and it took a while to cut trails 500 and 1000 meters in from the channel. Setting up the trap took no time at all in comparison to the trail work. Catherine baited the traps with donuts and berry extract in the center of the barbed wire trap to attract the bears and then hopefully they will either climb over or under the wire to get the food. In the process bear hair would be snagged on the wire. This hair was going to be taken back to the lab to run DNA samples and from this DNA the black bear population within ARNWR will be estimated.

Brown Pelican Banding

Figure 20. Pelican banding

Brown Pelican banding was a chance of a life time. We traveled by boat to a small island out in Pamlico Sound where pelicans were known to nest. There were four
people designated to band the birds and approximately 30 people, including me, to hold the pelicans while they were banded (figure 20). We were banding juvenile pelicans that were not able to fly yet, but they had to big enough for the band to go around their leg. Many of the recent chicks were still too little to receive a band. In one morning, we banded approximately 1500 pelicans! When we first arrived on the island, the pelicans were very adorable, but then as the morning proceeded many of them threw up their fish and were not so likable. Having that many pelicans in one location causes the odor to be horrendous. In combination with the extreme temperatures it was even worse. Regardless of the smell, it was an incredible experience that I will always cherish.
CHAPTER VI

ASSESSMENT AND RECOMMENDATIONS

Structure

The PINWR intern program was not as structured as I would have liked. Lack of structure can be good on one hand because it would allow for creativity within refuge programs. On the other hand, little structure leads to a protocol that lessens organization. I felt that the PINWR intern program was static. Because of this, I feel that my skills were not used to the fullest. The intern program is given high marks because it has been around for a long time. Longevity cannot replace structure. A foundation needs to be built for the program and improvements need to be made each year. The park ranger position has a moderate turn-over rate because moving from refuge to refuge is one way to increase government status and salary. However, the turn-over rate for this position should be one reason for the refuge to increase organization.

Training

Public Use

Training for my public-use internship fell short of my expectations. The only instruction that I received was observing my supervisor lead the four refuge programs and two programs off-site. Future training sessions should include tips on presentations, targeting the correct audience, correct paddling instruction, first aid/ CPR instruction, and identification of poisonous species. In addition to program training, I also feel that it would be beneficial for interns to attend the U.S. Fish and Wildlife’s National Conservation Training Center (NCTC) to learn about public-use services, since the public is an integral part of the refuge. I approached my supervisor with this idea, but was turned down since I was not an employee of PINWR. Hopefully, NCTC can eventually become part of the intern training because the contributions that can be made by the intern over a
six-month span could be significant.

Maintenance

The training that I received for maintenance was very thorough. Anthony Ralph (maintenance supervisor) always made sure that I understood my tasks and always went an extra step to make sure I was comfortable. If I was unsure and wanted more practice with a task, he would take the time to help. When learning to use tools and backing in trailers, Anthony watched me work on repeated occasions to assure himself that he could trust me in the completion of maintenance tasks.

Biology

Biology training was thorough as well. Sea turtle training sessions always included mock situations that allowed for practice. This permitted additional questions to surface about the duties involved with turtle patrol, turtle watch, nest measurements, and egg relocation. In addition to these mock situations, all-terrain-vehicle (ATV) training was mandatory for interns for biological duties, as well as for emergency situations, that could occur along the beach.

Communication

Between Program Areas

Communication needs to improve between the refuge program areas that involve interns. The interpretive park ranger was responsible for setting up intern work schedules. These schedules were not always received by the other program areas on time and created uncertainty. Initially, interns are placed under the supervision of the interpretive park ranger, who hires them. Once working on the refuge the intern acquires additional
supervisors for maintenance and biology. The interns rotate weekly between these three program areas. More timely communication would alleviate this issue between program areas. Rotation schedules could be created for the extent of each internship prior to the intern’s arrival. During the internship period, an e-mail sent out Friday mornings would remind interns, as well as supervisors, of the individuals’ upcoming duties.

Between Supervisors and Interns

Another area in which communication needs to improve is between supervisors and interns working public use. Eventually, my e-mail account was used to contact me when I was not in the office. This worked effectively, but problems could arise if an intern does not have an e-mail account. In addition to e-mail messages, I feel that the office could benefit from an office wall calendar. This would allow schedule changes, upcoming special events, and information to be visible and clearly updated.

Staff meetings

Every month, a PINWR and ARNWR staff meeting would be held at the Mann’s Harbor Community Center west of Roanoke Island. This was beneficial for me because I was able to learn about each program area’s achievements and plans for the following month. I was able to meet other refuge employees that I would have never come into contact with during my regular internship duties. I also participated in a defensive driving seminar, as well as mosquito and tick-born diseases seminar.

PINWR did not begin having staff meetings until the fourth month of my internship. Initially, it would have helped to have more PINWR staff meetings to check progress on tasks and see how the programs were running. The staff meetings that finally took place helped smooth out many issues. I hope that these staff meetings continue with each group of interns. I believe it would be beneficial to have the supervisors discuss their progress as well as concentrating on each intern. In addition, rotating interns to
facilitate the meetings would provide an opportunity to increase leadership skills.

Programming

Program Times

When introduced to the summer program schedule, I noticed that each program was only offered once a week, with the exception of canoe trips which were twice a week. At the beginning I did not see this schedule as a problem, but with the progression of the summer and as I led more programs, I began to notice the amount of visitors who did not have the opportunity to participate. The Outer Banks have much to offer visitors, but the locations are very spread out. Therefore, people who happen to be at the PINWR Visitor Center at the right time will stay for the upcoming program, or have to plan to attend programs at PINWR. I believe that if the refuge were to offer programs more than once a week then more people could be educated on the conservation efforts of the U.S. Fish and Wildlife Service.

Program Variety

Along with the weekly program presentations, the variety of programs that the refuge offered seemed low compared to like public-use sites. It appeared that the four refuge programs have been scheduled for many seasons, offering no new educational material for visitors who come to PINWR every year. This repetition could be remedied by innovative programs such as barrier islands, additional native species, management tools, and hurricanes.
Outreach

In addition to increasing the number and variety of programs, it would be beneficial to have more outreach with local school districts and groups in the Outer Banks area. At the end of the 2002-2003 school year, my supervisor had contacted schools, and several classes did invite the refuge to come and give presentations. I do feel the outlet for refuge programs is much larger. I think that it was beneficial for the refuge to contact the primary, secondary, and post-secondary schools in the area, but above that I think that it would be essential to designate days during the academic year for schools to come on-site. Then during the summer PINWR could set up a summer day camp that would provide local and visiting children with an in-depth ecological experience, thus learning in the field in addition to the classroom.

Evaluations

The public-use supervisor was only required to evaluate one program. Normally, a refuge program was evaluated at the end of the internship. However, instead of evaluating one of my refuge program presentations, my wildlife observation program I developed was critiqued. This feedback did not give me a chance to improve my refuge programs, but will be beneficial for future presentations. I believe that it would be more beneficial to critique a program near the beginning of the season to allow for improvements and then one near the end to comment on those improvements. In addition to the supervisor’s evaluation, it would be beneficial for interns to critique each other’s programs to discover ways to improve presentation skills.
CHAPTER VII

OVERALL EVALUATION OF INTERNSHIP

My internship with PINWR provided me with opportunities to grow in my presentation skills. In the past, I was accustomed to presenting material for a particular target audience. However, the on-site audience consisted of various ages, and I was able to reach a middle ground when explaining the material. When I asked questions, I attempted to keep them at a lower level, so children would be able to understand and hopefully supply an answer. To keep the audience’s attention, I also discovered first-hand the importance of visual aids and activities. Through this, my skill in delivering programs increased.

In addition to increasing my presentation skills, I quickly learned to adjust to changing situations. I became aware of the flexibility needed to perform the tasks at hand. Often times, my schedule was altered at a moment’s notice to reflect refuge priorities. I began to understand that refuge operations required employees to be prepared for sudden changes. Hurricane Isabel is a prime example.

While increasing my skills in leading presentations and in being flexible, I observed how challenging management positions can be. Excellent organization is required when encountering unanticipated problems, trying to reach optimum communication, and providing sufficient training.

Bird identification was another skill that I was able to improve upon. Working at a birder’s paradise gave me the opportunity to meet many local bird enthusiasts. My participation in bird walks, led by these locals, increased my identification skills, as well as added to my life-long bird list. This new-found knowledge was applied to my refuge presentations.

Along with public-use skills, I increased my knowledge of maintenance. At the start, I was not excited about the tasks, but my attitude changed when I discovered it
could be relaxing and rewarding. Through maintenance, I saw teamwork functioning at its highest to provide quality public-use areas that promote greater usage.

My overall internship was satisfactory. I would have liked a higher level of responsibility and experience with public-use operations and special-event planning. I know that I would have benefited from being incorporated more fully into the public-use program at PINWR. It could possibly take several more graduate level interns’ feedback to build a solid intern program. I have included a letter in appendix I addressed to future public-use interns who may have the opportunity to complete an internship such as the one I have described. Hopefully, future public-use interns will consider the points that I have made to ensure a quality internship experience.
CHAPTER VIII

CONCLUSION

The internship that I completed with the U.S. Fish and Wildlife Service on PINWR allowed me to increase my knowledge of the refuge system and the role they play in wildlife conservation. Through my primary duties, I was able to develop my skills associated with public education, as well as discover a joy of teaching conservation. Through my secondary duties, I was able to contribute to teamwork that maintained the refuge for wildlife and visitors. In this, I experienced first hand that the refuge system operates on the willingness of all employees to help on projects when needed, no matter if the task is what they were hired to perform. Even though I encountered several challenges along the way, I am very glad that I had the opportunity to intern at PINWR. It has opened my eyes to conservation issues in locations beyond my backyard, renewed my love of wildlife, and increased my desire to continue with a career in environmental education.
REFERENCES


APPENDICES

Appendix A: Alligator River National Wildlife Refuge Staff Sheet 2003
Appendix B: PINWR Program Schedule
Appendix C: Mosquito Hawk Program
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Appendix E: Wings Over Water Press Releases
Appendix F: Wings Over Water Thank You Letter
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Appendix H: Native Plant Garden Fact Sheet
Appendix I: Internship Letter
APPENDIX A. ARNWR STAFF SHEET 2003

Alligator River National Wildlife Refuge
Pea Island National Wildlife Refuge

Office Automation Assistant: Bernice Kitts
Office Assistant: Janice Lane
Office Assistant: Anicia Martinez

Refuge Manager: Michael Bryant
Deputy Refuge Manager: Kathy Whaley
Supervisory Assistant Refuge Manager: Jim Wooten

Public Use
- Wildlife Interpretive Specialist: Ionic
- Park Ranger: Ann Marie Salewski
- Park Ranger: Jenny Howard
- Forestry Technician: Brian VanDruten

Biological
- Wildlife Biologist: Dennis Stewart
- Biological Technician: Kate Fais
- Biological Technician: Jenny Marshall

Maintenance
- Supervisory Eng. Equip Operator: Bruce C. Everett
- Eng. Equip Operator: Judy Grubbs
- Eng. Equip Operator: Jeff Irwin
- Eng. Equip Operator: Jon F. Freitas
- Automotive Worker: Al Emery
- Maintenance Worker: Anthony Ralph
- Maintenance Worker: Jerry
- Maintenance Worker: Danny

Red Wolf Program
- Wildlife Biologist: Buddy Fazio
- Wildlife Biologist: Art Blevins
- Wildlife Biologist: Chris Lusado
- Wildlife Biologist: Mike Morse
- Wildlife Biologist: Leslie Schuhle
- Wildlife Biologist: Scott McLellan
- Biological Technician: Kathy Whidbee

Fire Program
- Forester: Tom Crews
- Forestry Technician: Kelly VanDruten
- Forestry Technician: Jim Beasley
- Eng. Equip Operator: Bobby Gun
- Eng. Equip Operator: Donnie Harris
- Forestry Technician: Amy Midgett
- Forestry Technician: Eric Merkins

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APPENDIX B. PINWR PROGRAM SCHEDULE

2003 Spring/Summer Interpretive Programs
Pea National Wildlife Refuge

Bird Walks
Pea Island is for the birds-literally! Pea Island National Wildlife Refuge is home to nearly 400 species of birds. Come out and meet our summer residents. We welcome all bird lovers on our walks. Whether you're a beginner or an expert, you'll enjoy this casual stroll around North Pond. Field guides, binoculars, sunscreen and insect repellent recommended.

Wednesdays, Thursdays and Fridays from April 2nd to October 10th
8-9:30am at Pea Island Visitor Center

Sound Side Discovery
What lived in those shells? What that slimy stuff? What's it like to be a crab? Kid's can discover the answers to these questions and many more, through hands-on exploration of the Pamlico Sound. Come help pull the seine net and see what we catch! Wading shoes, sunscreen and hats recommended for this wet and wondrous activity. Children must be accompanied by an adult.

Thursdays June 5th to August 28th.
10-11:30am at New Inlet; 2 miles south of Visitor Center.

Family Canoe Tour
Designed especially for kids, this tour includes lots of wading and hands-on exploration. $20 for adults and $10 for children 12 and under. Children must be accompanied by an adult. Wading shoes are required. Hats, sunscreen and drinking water are recommended. Reservations are required. Call 252-987-2394. Sponsored by the Coastal Wildlife Refuge Society.

Fridays May 2nd to October 10th
Wednesdays June 4th to August 27th
10am to 12pm at New Inlet; 2 miles south of Visitor Center

Raptor Rapture
Take a peek at various kinds of birds of prey that call the Outer Banks home. Depending on the season, we will be looking for osprey, hawks, peregrine falcon, and northern harriers. Throughout the summer, we'll be paying close attention to the mating, incubating, hatching and fledging of refuge osprey. A great opportunity to learn more about the Outer Banks most popular summer residents.

Wednesdays June 4th to August 27th
2:30-3:30pm Pea Island Visitor Center

Turtle Talk
Why are sea turtles endangered? What can you do to help save these gentle giants? Learn more about sea turtles conservation at this presentation for all ages.

Tuesdays June 3rd to August 26th
2:30-3:30pm Pea Island Visitor Center

Pea Island Canoe Tours
Visit the quiet side of Pea Island. Explore the marshes, islands and creeks of Pamlico Sound. Look for birds, crabs, terrapins, skates, and more!! $30 for adults and $15 for children 12 and under. Wading shoes are required. Hats, sunscreen and drinking water are recommended. Reservations are required. Call 252-987-2394. Sponsored by the Coastal Wildlife Refuge Society.

Thursdays May 1st to October 9th
Tuesdays June 3rd to August 26th
9am to 12pm at New Inlet; 2 miles south of Visitor Center.
Mosquito Hawk Program Outline

**Purpose:** To inform Pea Island visitors about dragonfly ecology and insect importance on the refuge.

**Objectives:**
- Discuss Pea Island National Wildlife Refuge
- Discuss Dragonfly natural history and ecology
- Discuss insect importance on the refuge
- Discuss threats to dragonflies and the refuge role
- Walk along North Pond Wildlife Trail for dragonfly observation

**Location:** Pea Island Visitor Center Front Porch and North Pond Trail

**Time:** 1 hour

**Activity Type:** lecture and dragonfly walk/catch/observation

**Materials:**

<table>
<thead>
<tr>
<th>Dragonfly Walk:</th>
<th>Other Activities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nets</td>
<td>Coloring Pages</td>
</tr>
<tr>
<td>Insets cages</td>
<td>How to Make a Net</td>
</tr>
<tr>
<td>Magnifying glasses</td>
<td>Bug-Go</td>
</tr>
<tr>
<td>Release Ceremony Poem</td>
<td>Post Lesson Evaluation</td>
</tr>
<tr>
<td></td>
<td>“Nature’s Darning Needles” article</td>
</tr>
</tbody>
</table>

**Information Outline:**

I. **Introduction**
   A. Who you are
   B. Your role with the refuge system

II. **Pea Island National Wildlife Refuge**
   A. Refuge system founded in 1903 by President Teddy Roosevelt (Pelican Island in Florida – first refuge)
   B. Park Service grounds vs. Refuge grounds
      1. Park service: services primarily for human recreation
      2. Refuge: services primarily for animal benefits
   C. Pea Island National Wildlife Refuge established in 1937 under President Franklin Roosevelt
      1. Important migratory fly through for birds (Atlantic Fly Way)
      2. Important beach area of nesting sea turtles
      3. Name from a high protein beach pea which birds eat while resting on the island during migration (can be seen along North Pond trail) (Beach Pea or Trailing Wild Bean (*Strophostyles helvula*))
III. General Insect Information
A. Approximately ¾ of all animals are insects
B. Insects have adapted to every habitat on land except for the polar regions (where it is impossible for them to survive, as only warm-blooded animals can withstand the cold)
C. Most successful class – over 75,000 species identified
D. Short life-span; large numbers of offspring
E. Three body segments
   a. one pair of antennae
   b. two compound eyes and one or more simple eyes
   c. three pairs of mouth parts
   d. a rudimentary brain

2. thorax
   a. Six legs (three pair)
   b. 0,1, or 2 pairs of wings

3. abdomen
   a. breathing apparatus
   b. digestive system
   c. reproductive organs
   d. heart

IV. Classification
A. Kingdom – Animal
B. Order – Odonata (means “toothed”)
C. Class – Insecta
   1. suborder 1: Anisoptera - dragonfly
   2. suborder 2: Zygoptera - damselfly
D. Family – various
E. Genus – various
F. Species – various

V. Odonata description
A. Age
   1. Fossils resemble dragonflies and damselflies
   2. Date back 300 million years
   3. Show wingspans of up to 24 inches (ruler visual)
B. size / body structure
   1. ¾ - 5 inches in length (ruler visual)
   2. Freely movable heads
   3. Large compound eyes
      a. Take up most of the head room
   4. 4 powerful wings
      a. two pair of wings
      b. elongate, membranous, many-veined wings (wing venation –principle character separating families)
      c. Move independently
      d. Fly forward and backward
      e. Cannot fold wings flat against body
      f. Dragonfly: extend them to the sides horizontally (at rest)
      g. Damselfly: hold them toward the rear vertically (at rest)
   5. long and slender abdomen
   6. Long legs
a. Unsuitable for walking
b. Used to capture prey in flight

C. Colors / patterns – darker in coloration, with some bright colors

D. Species numbers
   1. 5,000 species worldwide
   2. 450 species in North America
   3. 36 species documented in North Carolina

E. Two Suborders
   1. Differing in wing shape, position of wings at rest, appendages at end of abdomen, and nymphs characteristics
   2. Suborder: Anisoptera - Dragonflies
   3. Suborder: Zygoptera - Damselflies

F. Other names
   1. mosquito hawk

G. Common NC species (see printed species list)

VI. Odonata natural history

A. Range / distribution (see printed maps)
B. Active: April to October (generally speaking)
C. Habitat
   1. Adult
      a. Usually near water (in which nymphs live)
      b. Strong fliers can range many miles from water
      c. Life span – 6 months to 7 years (most spent in nymph stage, adult lives only a few weeks)

D. Diet (prey)
   1. Specialized hunters
   2. Sharp biting mouthparts
   3. Use long legs to capture prey in flight
   4. Mosquitoes!! , midges, moths, bees, butterflies, and other dragonflies (helps keep insect populations under control)
   5. Often eat while in flight
   6. Larger dragonflies hunt higher in the sky, while smaller dragonflies hunt lower near vegetation for protection

E. Behaviors
   1. Flight
      a. Fly in tandem
      b. Speed – approximately 20 mph
      c. 4 powerful wings
         i. Move independently
         ii. Fly forward and backward
         iii. Can stop on a dime
         iv. Flight generate large amounts of body heat (burn 50 times as much energy in flight than at rest)
         v. Cannot fold wings flat against body
         vi. Dragonfly: extend them to the sides horizontally
         vii. Damselfly: hold them toward the rear vertically
   2. Defending Territory by perching or patrolling in patterns at various heights (for mates and food)
   3. Mating
      a. Mate in flight
      b. Male: curls tip of abdomen to deposit sperm packet in chamber below second abdominal
segment; holds female by the neck with special claspers called cerci.

c. Female: picks up sperm packet using tip of her abdomen

F. Eggs/nymphs
  1. Hundreds of eggs are deposited in or close to water (in aquatic vegetation)
  2. Aquatic nymphs
     a. Dragonflies: gills located in rectum (take in water and expel it = breathing and locomotion)
     b. Damselflies: 3 leaflike gills at end of abdomen; move by undulations of body
  3. Nymphs feeding
     a. Aquatic predators
     b. Capture insects (mosquitoes!!, tadpoles, and small fish)
     c. Extends a lower lip very rapidly (when not in use it is folded under the head); sometimes as long as 1/3 of the body length
     d. Bristles (claw-like structures) on the tip of the lip grasp prey and pull it back to the mouth
     e. Molt several times during this stage to become larger

  4. Metamorphosis
     a. simple – egg to nymph to adult
     b. incomplete – nymph is aquatic
     c. Fully gown nymph crawls out of water and splits the skin along the middling of the thorax; this releases the adult most vulnerable at this moment (may take 3 months to 5 years to reach this stage depending on species)

G. Predators – adult: birds, amphibians, reptiles, and other dragonflies
   - nymph: birds, large fish, amphibians, and reptiles

H. Handling
  1. Adults attempt to bite when handled
  2. Only larger dragonflies can inflict a painful pinch
  3. They do not sting

VII. Odonata threats
A. Habitat destruction
  1. Lose number of water bodies
  2. Decrease size of water bodies

B. Water quality
  1. Decrease prey items
  2. Decrease aquatic vegetation for egg laying
  3. Toxins may harm development of nymph

C. Food supply
  1. Human control of insect populations (ie: mosquito spraying) may cause decrease in prey
  2. Food may carry transferable diseases

D. Vehicles

VIII. Conclusion
A. Ecosystem position –importance
   1. Consume insects which naturally helps keep insect populations under control
   2. Provide a food source for other organisms
B. Habitat/ Refuge importance
   1. provide water bodies for reproduction
   2. provide aquatic vegetation for laying eggs
   3. provide fair share of mosquitoes and other insects for consumption
PRE-VISIT ACTIVITY

Bug-Go Insect Teacher Information Sheet

**Bumble Bee** - (Order - Hymenoptera) Bumblebees are larger than most bees. They have a hairy abdomen with at least some yellow markings. They are very important pollinators. An elongated mouthpart enables them to pollinate red clover, which no other bee can. Bumble bees usually build their nests underground. During the winter, the queen survives alone in the nest and starts a new colony in the Spring. Bees can be easily distinguished from wasps by the pollen baskets on their legs and their hairy bodies.

**Flea** - (Order - Siphonoptera) Fleas are pests of dogs, cats, and livestock. With their piercing, sucking mouth parts, they will bite humans, too. The large hind legs are good for hopping on and off their animal meal. Their legs which can jump relatively long distances, are good for changing hosts, and the comblike appendages help the insects resist being brushed out of hair. Because their bodies are flattened, they can move easily between the animal's hairs.

Adult fleas lay all of their eggs (up to 50 per day) on pets or other animals. The immatures or larvae are very tiny wormlike creatures, and can be present on fabric, carpet, or outdoors. Fleas generally do not prefer humans, however they may try to feed on humans if they have been starved for a long period of time. Fleas have also been known to carry diseases such as black plague (from fleas that usually infest rats), although there is not a lot of risk of those diseases in the United States at this time.

**Chigger** -(Arachnid)) Chiggers are the larvae of a family of mites that are sometimes called red bugs. The adults are large, red mites often seen running over pavement and lawns. Chiggers are extremely small (0.5 mm) and are difficult to see without magnification. Adult chiggers have eight legs like spiders and other Arachnids. The six-legged larvae are hairy and yellow-orange or light red. They are usually found outdoors in low, damp places where vegetation is rank and grass and weeds are overgrown. Some species also infest drier areas, however, making it difficult to predict where an infestation will occur.

Chiggers overwinter as adults in the soil, becoming active in the spring. Eggs are laid on the soil. After hatching, the larvae crawl about until they locate and attach to a suitable host. The larvae do not burrow into the skin, but inject a salivary fluid which produces a hardened, raised area around them. Body fluids from the host are withdrawn through a feeding tube. Larvae feed for about 4 days and then drop off and molt to nonparasitic nymphs and adults. Chiggers feed on a variety of wild and domestic animals, as well as humans. The life cycle (from egg to egg) is completed in about 50 days. Most people react to chigger bites by developing reddish welts within 24 hours. Intense itching accompanies the welts, which may persist for a week or longer if not treated. Bites commonly occur around the ankles, waistline, armpits, or other areas where clothing fits tightly against the skin. Besides causing intense itching, chigger bites that are scratched may result in infection and sometimes fever. Chiggers in North America are not known to transmit disease.

Regular mowing and removal of weeds and brush make areas less suitable for chiggers and their wild hosts. (Information from University of Kentucky ENT- 58 Invisible Itches by Dr. M. Potter.)

**Velvet Ant** - (Order - Hymenoptera) The velvet ant is actually a medium-sized wasp that is often found in lawns or pastures. These solitary wasps, as the name implies, are densely covered with hair. Males have wings, but females are wingless, and are sometimes confused with ants. Ants, however, have elbowed antennae, and a "hump" in the constriction between the thorax and abdomen. Velvet ants are either shades of brown or red and black, and females will sting if encountered. These wasps are sometimes called "cow killers" because their sting is so painful that it seems powerful enough to kill a cow! Velvet Ants are parasites of other wasps and bees that develop in soil, or paper or wood nests. The female velvet ant will enter a nest, kill the owner by stinging her, and lay her eggs on the owners' larvae in the nest cells. The velvet ant egg will hatch into a larva and feed on the other (host) larvae.
Millipede - (Class -Diplopoda, not Insecta) Millipedes cannot hurt people. They do look similar to centipedes (their sometimes dangerous relatives), but with two big differences: millipedes have chewing mouthparts and they have two pairs of legs for each body segment (centipedes have only one pair of legs per segment). You should be careful if you choose to handle a centipede as their bite can be painful. Millipedes are scavengers, feeding on either living or decaying plant parts near the forest floor. Many species are able to give off a foul smelling fluid that is toxic to insects, but won't do any damage to humans.

Dragonfly - (Order - Odonata) Dragonflies are some of the largest insects. They are beneficial insects—predators of smaller insects such as mosquitoes and crop pests. Dragonflies knew about fast food long before humans: they hold their prey in their legs and munch while flying. Zipping along at speeds up to 35 miles per hour, dragonflies are often found near and over ponds or streams. The immature stage of this insect lives underwater in streams and lakes and feeds on aquatic insects and other arthropods. Immatures of some of the larger species even feed on small fish. The aquatic stage can't hurt humans either. Despite old folktales that claim they sew up your ears or your lips, they do not attack humans. If you happen to catch one (good luck!) and are holding onto it, it might pinch, but it can't break the skin.

Cockroaches - (Order - Blattodea) Cockroaches have been hated and feared for centuries. However, they do not have any biting or stinging ability. While historically they have been associated with dirty conditions, they can be found in any type of structure. Because cockroaches can be found in filthy areas as well as clean areas, they pose a threat to human health by carrying disease-causing bacteria onto surfaces or into food in the home when they move from one place to another. Roaches like to live in rooms of the home that have high humidity such as the bathroom and especially the kitchen where food crumbs maybe present. Roaches usually stay hidden during the day and come out at night in search of food. People may also develop increasingly severe allergies to cockroaches themselves with continued exposure.

Praying Mantis - (Order - Mantodea) Praying mantises are predators of several crop and garden pests. Although they look quite menacing, they do not have the ability to hurt humans. In fact, they may make good pets as long as they are well fed with smaller, soft-bodied insects, and water is available. Otherwise, they are best left in a garden, working at keeping pests away. Adult mantises and the nymphs will feed on aphids, beetles, bees, butterflies and even each other! Their excellent hunting ability may be helped by the fact that Praying mantises unlike other insects can turn their heads 180 degrees.

In the Fall, you can find their egg casing glued to sticks and sometimes on the sides of buildings. In the Spring, the eggs will hatch releasing the new baby praying mantises.

Lacewing - (Order - Neuroptera) Lacewings are interesting-looking insects which, as adults and larvae, are considered beneficial because they are predators of pest insects. Both adults and larvae will eat aphids, thrips and mites. Green lacewings are very common and can be found in most types of vegetation. They have large metallic yellow eyes and pale green iridescent wings. Lacewing eggs are laid at the end of very slender stalks, which makes them very easy to distinguish. They will not hurt humans. However when touched, they may release an unpleasant odor.

Walking stick - (Order - Orthoptera) Walking sticks are well named. That's exactly what they look like! They can be brown or dark green and are easily camouflaged in trees and on other plants. They are plant feeders, and have no ability to hurt humans. They make great pets. Be sure to provide them with plenty of plant material that they will eat. Don't worry if your walking stick should loose a leg, he can grow a new one!

Grasshopper - (Order - Orthoptera) Grasshoppers are grass feeders that normally want nothing to do with humans. When handled, they may regurgitate a brown liquid as a scare tactic, and may pinch with
their mandibles (jaws), but their jaws are not strong enough to do any damage. Other than that, they do not pose a threat but can cause damage to vegetable and field crops. Grasshoppers can usually be found feeding on the leaves and stems of plants during the day. In the fall, most grasshoppers lay their eggs in the soil. The eggs will hatch in the spring and nymphs immediately start feeding on plants.

The large back legs of the grasshopper are great for jumping and traveling. Grasshopper populations can grow to large numbers and can move long distances.

**Japanese Beetle** - (Order - Coleoptera) The Japanese beetle is often confused with the larger June beetle. Japanese beetles are metallic blue-green with copper colored wing covers. They can be identified by the tufts of white hair along their abdomen. These tufts of hair are not present on the June beetle. Japanese beetles were imported into the United States in 1913. The adult beetles and the grubs (an immature beetle found in the soil) are pests. Adults feed on almost everything from roses to fruit trees to soybeans. The immature stage or grubs can be in the soil feeding on plant roots.

May beetles, June beetles and Japanese beetles belong to a very closely related group of beetles called scarabs. People in Egypt thought scarabs were good luck. Beetles may fly into and land on people. They can't hurt humans, although if you catch them and won't let them get away, they may give a slight pinch.

**Cicada** - (Order - Hemiptera) Cicadas are large, distinctive creatures that are common in late summer and make very loud, unnerving noises, especially when disturbed. They do not feed as adults, and other than making noise, will not bother people. Cicadas lay their eggs in twigs or small branches of trees and shrubs. Once hatched the nymphs will drop to the ground and burrow into the soil. There they will molt several times before coming above the ground for their final molt. You can often find the skin of the final molt of the cicada attached to a tree or building. The two most common types of cicadas are the dogday cicadas which has a two or four year life cycle and the periodical cicadas that have either a 13 or 17 year life cycle.

**Centipede** - (Class - Chilopoda, not Insecta) Centipedes are not actually insects but are closely related to insects. They have long flattened bodies, with at least 15 pairs of legs, and fangs, which can inflict a painful bite.

Centipedes can be distinguished from the similar but harmless millipedes by having fangs (instead of chewing mouthparts), and one pair of legs per body segment (versus two pairs of legs per body segment in millipedes).

**Swallowtail butterfly** - (Order - Lepidoptera) Swallowtail butterflies can often be easily recognized by the small tails at the tips of their back wings. The Giant Swallowtail, which is black with a yellow markings, is the largest butterfly in the United States and Canada. There are over 500 species of the swallowtail worldwide.

Butterflies and moths are very beautiful and graceful creatures. When caught, they will probably put up a fight by fluttering their wings, which can be unnerving but isn't harmful. If a butterfly lands on a person, it is possible that it just wants a sip of sweat, which contains salts that butterflies need. Their mouthparts are only modified to suck nectar and other liquids, and they will not bite or sting.

**Tick** - (Class - Arachnida, not Insecta) Ticks are insect relatives, note that they have 4 pairs of legs. They can be found in wooded areas, or fields with tall grass. Ticks are very small, and many are hard to see. Ticks spend their time waiting for a mammal, such as a dog, deer or yourself to pass close enough for them to hitch a ride. Once on board, the female tick bites and buries her head in the flesh; they swell up with the blood of the host. When entering an area that may be infested with ticks, the best way to keep from getting bitten is to tuck pant legs into socks, and to wear loose-fitting clothing. Ticks are dangerous because of the
diseases (Lyme disease, Rocky Mountain spotted fever, etc.) they may carry. Ticks often do not attach immediately, but walk around over the skin until they come to a tight place, such as around the waist or wherever clothing is tight on the body. Check yourself or have someone else check you for ticks as often as you can, so you can remove them before they bite. If a tick does attach to the skin, do not try to pull it off with your fingers, because the mouthparts may break off underneath the skin. It is better to use a clean pair of tweezers, grasping the tick as close to the front of the head as possible, to pull the tick off with its mouthparts intact. For more information see Entfact 618, Ticks and Disease.

**Blister Beetle** (Order - Coleoptera). The name Blister Beetle come from the fact that this beetle's blood contains a substance called cantharadin which will cause blisters if it comes in contact with skin or is swallowed. You should always wear gloves if removing blister beetles from a plant by hand. They can be especially harmful, even fatal, if eaten by livestock.

Blister Beetles may be solid black or gray. They can also have yellow stripes. They feed on vegetable plants such as tomatoes, potatoes, beans and peppers. The female adult blister beetle lays her eggs in the ground. Once hatched the larvae will feed on the eggs of grasshoppers and bees.

**Mosquito** - (Order - Diptera) Mosquitoes are very well-known human pests. Only the females bite; they need blood to reproduce. Male mosquitoes feed on nectar. What actually itches when mosquitoes bite is the saliva that is injected while the mosquito inserts her mouthparts under the skin. In other parts of the world, mosquitos are a major problem because they spread diseases such as malaria and yellow fever. Mosquitoes are found most frequently near water, although they can travel a fair distance looking for hosts. Besides lakes and streams, mosquitoes breed in any pool of water, such as bird feeders, puddles and old tires.

Mosquitoes are eaten by birds, fish and dragonflies.

**Stinkbug** - (Order- Hemiptera) Stinkbugs are truly stinky. As a defense mechanism, they will secrete a fluid with a foul odor. This insect has stink glands on its underside. Stinkbugs are harmless but do cause considerable damage to flowers, trees and crops. With their piercing- sucking mouth parts, they suck liquid from plants. Some species however do feed on other insects such as beetles and caterpillars. The body of the stinkbug is shaped like a shield with a small head. The stink bug's head has antennae with five segments.

**Damselfly** - (Order - Odonata) Damselflies may often be mistaken for their larger relatives, dragonflies. Both of these insects are often found near water since they both lay their eggs in water and feed on aquatic insects. However, Damselflies are poor fliers compared to the Dragonfly. Damselflies also rest with their wings folded together above their body.

**Termites** - (Order - Isoptera) A colony of termites will include wingless workers, soldiers that have large heads and powerful jaws and reproductives, the queen and king. Hints to helping identify termites are that termites are virtually the same width from end to end and have straight antennae. If wings are present, they will have four wings of equal size and length.

To create new colonies, in the spring, winged males and females swarm from the colony. Termites are famous for the damage they can do to wood structures. The protozoa living in their digestive tract enables them to eat wood. Termites live in the soil and build tunnels to the wood above.

**Water strider** - (Order - Hemiptera) The water strider actually walks on water. This insect has two short front legs that are used for grasping prey. The longer middle and hind legs allow them to use the surface tension of the water as means of staying above the water. The water strider feeds on smaller insects and in turn, it is a food for fish and birds.
Leaf-footed Bug - (Order - Hemiptera) This insect's name may come from the shape of its back legs. The adults and nymphs can be found feeding on the foliage and fruits of plants such as peaches, beans, tomatoes and potatoes. When captured or threatened they will release an odor that helps protect them from their enemies. The leaf-footed bug is sometimes called a squash bug. The true squash bug however does not have the flattened leaf shaped legs and is a major pest of curcurbits such as cucumbers, squash and pumpkins.

Bedbug - (Order - Hemiptera) You don't want a bedbug in your bed! These oval-shaped insects want to suck your blood. Active only at night, both the males and females will bite, piercing the skin and injecting their saliva. The saliva will cause the bite to itch and/or swell. Once they are full of your blood, which takes only a few minutes, the bedbug crawls away to hide. Bedbugs not only feed on humans but also birds and other mammals. Bedbugs like many other insects can produce an odor that once you smell it, you will remember it.

Ground Beetle - (Order- Coleoptera) Where would you find a ground beetle? Running along the ground, of course. Ground beetles hide during the day under leaves, logs or stones and come out at night to feed. There are hundreds of species of ground beetles and they are of many different shapes, sizes and colors. Many ground beetles feed on other insects and are considered beneficial insects. Most of the ground beetles are flattened and will have grooves or small holes running down the hard front wing covers. You will have to look quickly to see the ground beetles as they are fast runners.

Weevil - (Order - Coleoptera) Weevils are easily recognized by their snouts. The snouts are an elongated portion of the weevil's head and his mouth is located at the tip of the snout. Weevils have a chewing mouth. The long snout allows weevils to puncture and feed beneath the surface of fruit. They also feed on leaves. The most famous weevil is probably the boll weevil which is a major pest of cotton. All weevils belong to the order of beetles.

House fly - (Order - Diptera) The House Fly and its relatives make up a very large and very diverse family of insects (Muscidae). The house fly is not only a pest but can spread diseases such as typhoid fever. Flies love to share your food. Since the house fly can only feed on liquids, it first salivates on the solid food then sucks up the food with its sponge-like mouth parts. It is difficult to swat the house fly because it can fly up to 30 miles per hour and can react to movement five times faster than we can. Flies are generally associated with being around garbage. This may be because they like to lay their eggs in rotting organic matter. If you look closely at rotting material you may see the larval stage of the fly, also called a maggot.

Syrphid fly - (Order - Diptera) The syrphid fly is also called the Flower fly. You may be able to recognize this insect on your card by the three large bands across its abdomen followed by smaller incomplete bands. The adult syrphid fly is metallic green with yellow abdominal bands. They are great fliers and can dart about quickly and stop on a dime. They are also often seen hovering in mid air. Adults can frequently be found around flowers feeding on pollen and nectar. The syrphid fly will not sting or harm humans. In fact, the larva stage of this insect is of great value in pest control. The larva look like a small blob, similar to a slug, and feeds on aphids, ants, and immature termites.

Colorado potato beetle - (Order - Coleoptera) The Colorado potato beetle has an oval-shaped body which is yellow with black stripes on the wing covers. There are dark dots just behind the head. The adult and larval stages of this insect feed on potatoes, tomatoes, peppers and eggplants. Potato beetle eggs are laid on the underside of leaves and resemble tiny orange footballs. The larva stage looks very different from the adult. They look like a small orange hump with a black head and legs. There are two rows of black spots on each side of the hump.
The adult beetles spend the winter in the soil and can be a major pest in a home garden.

**Grub** - (Order - Coleoptera) A grub is the larval stage of a beetle. The life cycle of beetles is complete metamorphosis - egg, larva, pupa and adult. Beetles lay their eggs which hatch into a larva called a grub. Looking like plump worms, grubs will have a visible head and three pairs of legs. The grub on your card resembles the larval stage of a June Beetle.

**Carpenter Ant** - (Order - Hymenoptera) Where do carpenter ants build their nests? In wood, of course. The carpenter ant builds a nest by hollowing out wood from dead trees, stumps or even an old house. The carpenter ant is about twice the size of the black ant. They also live in colonies complete with workers (all females), a few males and a queen. The queen, who is much bigger than a worker, produces all the young and can live for as long as 25 years. Carpenter ants feed on other insects and are attracted to sweets. They do bite but cannot sting. Do not confuse this ant with a termite. Ants have a thin waist and have elbowed antennae.

**Saturniid Moth** - (Order - Lepidoptera) Saturniid moths are large with thick bodies. Their wings are often colorful and strikingly marked. They are members of the family Saturniidae. The saturniid moth on your card is the Polyphemus moth. It has an eyespot marking on each wing. The adult moth is reddish brown and can be found in wooded areas.

Adult saturniid moths have non-functioning mouthparts and do not feed. The caterpillar stage feeds on trees and shrubs. Caterpillars of the Saturniidae family may burrow into the ground and form a pupa while others spin silk cocoons. The silk from the cocoons of some species is used commercially.

**Convergent Lady Beetle** - (Order - Coleoptera) Lady beetles are also called Ladybugs and their correct name is Ladybird beetle. The name can be traced to the Middle Ages when these beetles were dedicated to Our Lady the Virgin Mary. The ladybug on your card is the convergent lady beetle. Its hard front wings (elytra) are red with 12 spots, 6 on each. There are several other species of lady beetles present in Kentucky. They can be white, yellow, pink, orange, red or black, and usually have spots. The ladybug is widely used in biological pest control. Ladybug adults and larvae feed on the eggs of other insects and soft-bodied insects such as aphids, scales, whiteflies and caterpillars. Larvae do not resemble the adult ladybug. They look similar to tiny black alligators and are spiny, with bright spots. Although they look dangerous, ladybug larvae, like the adults, are harmless to humans. Their defense mechanism against predators is to secrete an odorous, distasteful fluid out of their joints when disturbed.

**Blue Goose** – (Family - Anatidae, Species – Chen caerulescens) The official symbol of the National Wildlife Refuge System. The blue goose is a color phase of the Snow Goose. President Teddy Roosevelt established the Refuge System in 1903 when he designated Pelican Island in Florida as a National Wildlife Refuge, due to pelican population drastically decreasing. As a result of his actions, pelican populations, which were threatened, began to increase. The refuge system provides needed habitat for flora and fauna, including insects, by establishing protected areas throughout the United States.
<table>
<thead>
<tr>
<th><strong>Termites</strong></th>
<th><strong>Colorado Potato Beetle</strong></th>
<th><strong>Carpenter Ant</strong></th>
<th><strong>Bumblebee</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grub</strong></td>
<td><strong>Flea</strong></td>
<td><strong>Cicada</strong></td>
<td><strong>House Fly</strong></td>
</tr>
<tr>
<td><strong>Cockroach</strong></td>
<td><strong>Convergent Lady Beetle</strong></td>
<td><strong>Grasshopper</strong></td>
<td><strong>Damselfly</strong></td>
</tr>
<tr>
<td><strong>Velvet Ant</strong></td>
<td><strong>Bed Bug</strong></td>
<td><strong>Chigger</strong></td>
<td><strong>Syrphid Fly</strong></td>
</tr>
</tbody>
</table>
SAMPLE BUG-GO PLAYING CARD

BUG-GO

Free Space
VISUAL AIDS

DRAGONFLY NYMPH
http://fluvarium.ca/dfly.gif

DAMSELFLY NYMPH
http://www.at-brisol.org.uk/sitemap.htm
Dragonflies Versus Damselflies

PARTS OF A DRAGONFLY

PARTS OF A DAMSELFLY

ANTERIOR

DORSAL

POSTERIOR

VENTRAL
# Comparison

<table>
<thead>
<tr>
<th>Dragonflies</th>
<th>Damselflies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generally strong fliers</td>
<td>A weak, fluttery flight</td>
</tr>
<tr>
<td>Eyes (apart from Gomphidae &amp; one or two others) touch on top of the head</td>
<td>Eyes are well separated</td>
</tr>
<tr>
<td>Fore- &amp; hindwings are of different shape</td>
<td>Fore- &amp; hindwings are of similar shape</td>
</tr>
<tr>
<td>At rest, the wings are held away from the body at an angle of approximately 180°</td>
<td>At rest, the wings (apart from Lestidae and one or two others) are held close to the body</td>
</tr>
</tbody>
</table>

http://powell.colgate.edu/wda/Beginners_Guide.htm
This map indicates known regions of highest biodiversity of dragonflies in the Lower 48 states. It must be understood that this picture is in part a consequence of sampling effort (more collecting always leads to larger county lists), but it is also a good indication that biodiversity is highest in the eastern part of the country and, perhaps surprisingly, as high in the Northeast as Southeast.

http://www.ups.edu/biology/museum/UScomaps.html

3-14-2003
The second map shows the regions of the Lower 48 that are most poorly sampled for Odonata, as indicated by those counties with fewer than 10 species recorded. This map indicates only sampling effort and is not meant to indicate regions of lower biodiversity, as all counties surely support more than 10 species of Odonata. This map was published in ARGIA, newsletter of the Dragonfly Society of the Americas, at a smaller scale.

http://www.ups.edu/biology/museum/UScomaps.html

3-14-2003
TAKE HOME HANDOUT

HOW TO MAKE A NET

**Materials**

- Hose clip
- Broomstick handle
- 1/8 gauge wire
- Muslin material
- Sheer curtain material
- Exact-o knife

**Getting Ready and Putting Together**

1. Cut broomstick in half to have two handles.
2. With exact-o knife, cut grooves in side of top part of the broomstick for the wire to snugly fit into place.
3. Bend wire into a circle to have a frame for your net, and fold ends down to a 90 degree angle.
4. With a piece of muslin cut to 22x36, fold in half long ways and cut material to have:
   - At the top, 18 inches across and 4 inches down
   - At the bottom, 11 inches across
   - In the middle, diagonally cut from the top portion to the bottom
5. With a piece of curtain sheer cut to 22x14, fold in half short ways and cut material to be:
   - At the top, 11 inches across
6. Gradually cut to the bottom to form the letter u
7. Sew the smaller edge of the muslin to the bigger edge of sheer material.
8. Sew the open end of the materials together
9. Fold the top portion of the muslin two times, approximately 2 inches for each fold, to make casing for the wire
10. Sew the final opening areas
11. Feed the wire through the net and place the ends of the wire in their proper grooves and clamp with the hose clip.
Release Ceremony

“Fly away, crawl away, run away, hop
You’re free to go -
I’m not going to stop You from living your life
Your deserve to be free
Thanks for sharing this time with me.”

1986 Vermont Institute of Natural Science
Hands-On Nature Information and Activities for Exploring the Environment with Children
POST-VISIT ACTIVITY

Odonates

NAME _______________________

1. Explain the difference between a National Park and a National Wildlife Refuge.
   ______________________________________________________________
   ______________________________________________________________
   ______________________________________________________________

2. What class does the dragonfly belong to? ___________________________

3. What are the two suborders of Odonata? ___________ ________________

4. Describe a visible difference between a dragonfly and damselfly.
   ______________________________________________________________
   ______________________________________________________________

5. Are the dragonfly/damselfly long legs used for walking? If so, how? If not, What are they used for?
   ______________________________________________________________
   ______________________________________________________________

6. What is another common name for a dragonfly? __________________________

7. Where are dragonfly eggs deposited? ___________________________

8. What is a baby dragonfly called? And where does it live?
   ______________________________________________________________

9. How many species of dragonfly are in North America? ______________
   ______________________________________________________________

10. Name and explain one environmental threat to the dragonfly.
    ______________________________________________________________
    ______________________________________________________________

11. Why is the dragonfly an important species for the refuge to have?
    ______________________________________________________________
    ______________________________________________________________
**Violet Tail (Argia violacea)**. The Violet Tail is one of several thousand species of damselsflies and their close relatives the dragonflies. This lovely insect, like its relatives, eats other insects, including many harmful ones such as mosquitoes.
Elisa Skimmer (Celithemis elisa). The Elisa Skimmer is the most broadly distributed dragonfly in the northern United States and adjacent Canada. Like other dragonflies, it is associated with bodies of water and eats insects.
The dragonfly has a divided life. Its youth is spent breathing through gills under water, and then in its last glorious weeks of existence it crawls out of the muddy depths, sprouts wings and flies. Of all the winged insects that flit from one grass stalk to another on a summer freshwater pond, the dragonflies are the largest. They are also the oldest. Huge insects with 2½-foot wingspans were around 300 million years ago. They looked on as the brontosaurus ate its last meal and were still around when two-legged mammals began sporting straw hats.

Life begins for the dragonfly when its egg hatches in a pond or stream. The nymph, or young aquatic dragonfly, will spend the next year eating and trying to avoid becoming a meal itself. Luckily it’s got the equipment to do both.

It breathes air through several internal gills located at the end of its digestive canal. By expanding and then contracting its body, the nymph draws water over its gills and extracts the oxygen. If the nymph needs to escape a giant water bug, it expels the water forcefully and propels itself forward.

Most of the time, however, the nymph hunts by ambush. It uses its large eyes and binocular vision to locate an approaching mayfly nymph or a small fish. The nymph flips forward a hinged lower lip equipped with hooks that grab its prey and pull it back to the jaws. (Did the producers of the film “Alien” read about dragonfly nymphs?) The dragonfly nymph is one of the most voracious pond predators, but it provides an important source of food for fish as well.

As time goes on, the nymph sheds its hard, external skeleton or molts several times in order to grow. Finally—a year for most species, three years for some—the nymph is ready to begin its metamorphosis into an adult dragonfly. One night in spring or summer, it climbs out of the water onto a stalk of
grass. Over a period of several hours it wriggles out of its larval form and emerges as a creature of the air, its wings folded on its back. Blood rushes into wings and organs, and a half hour after emerging, the dragonfly is airborne.

Between its maiden flight and a natural death, the average dragonfly has only about eight weeks to fulfill its chief purpose: mating and reproduction. Nature has equipped it well to keep alive until then. The dragonfly has two pairs of wings, each separately controlled, enabling it to swoop, hover, rise and dive quite fast. Its wings beat 25 to 40 times per second (compared to a mosquito’s wingbeat of 600 times per second), and it can fly up to 60 miles per hour when there’s something especially juicy to be eaten. The dragonfly’s head is almost all eyes and revolves on its thorax to see in all directions, up to 120 feet away, according to one estimate. Its six bristly legs form a basket for flying prey and the dragonfly eats its meals in midair.

The dragonfly has several mating procedures, depending on the species. One is especially curious. When the male has found a receptive female, it lands in front of her, and with a pair of pincers on the end of its long abdomen, it grasps the female behind the neck. In this position the two dragonflies take to the air. In mid-flight the female curves her abdomen under the male’s to a point where the sperm has been deposited. This “mating circle” is unique among animals. The two continue to fly together until the female begins to dip the fertilized eggs beneath the surface of the water below. The eggs fall to the bottom and the life cycle of another dragonfly generation begins again.

A dragonfly will not sting, although that is one of the enduring myths about it. It will not sew one’s ears together either, which is another myth that has given rise to one of the common dragonfly names, the “devil’s darning needle.” A dragonfly will eat mosquitoes, however, and with its flashing, gossamer wings and pastel colors, it brightens the ponds and streams where humans like to go.

One night the nymph crawled up a stalk of grass, shed its skin and flew away, an adult at last. This moment of metamorphosis is one of the most beautiful in nature.

A large dragonfly nymph escapes a giant water bug (Lethocerus americanus) by expelling water out of its ventilator gills and propelling itself forward.
APPENDIX D. WILDLIFE OBSERVATION PROGRAM

WILDLIFE OBSERVATION TECHNIQUES

Goal: To increase participants’ skills in observing wildlife

Objectives: Learn to use binoculars correctly
Learn how to describe the location of wildlife for others to view
Learn wildlife watching techniques
Learn wildlife watching ethics and responsibilities

Location: Pea Island National Wildlife Refuge Visitor Center Porch and North Pond Trail

Time: 1 Hour

Materials: Binoculars (1 per person or 1 per two people)
Sp otting scope (optional)
Wildlife guides (birds, mammals, insects, vegetation, etc.)
Bug repellent
Drinking water
Proper clothing for terrain and weather conditions

I. Introduction
   a. Who you are
   b. What is your role with the U.S. Fish and Wildlife Service

II. Pea Island National Wildlife Refuge
   a. Refuge system was established in 1903 by President Teddy Roosevelt
      i. Pelican Island in Florida – first NWR
      ii. Decline in pelican populations resulted in the NWR
   b. National Park versus National Wildlife Refuge
      i. National Park – services primarily for the human recreation
      ii. Refuge – services primarily for animal benefits
   c. Pea Island NWR was established in 1937 under President Franklin Roosevelt
      i. Migratory birds – Atlantic flyway – resting, nesting, and feeding
      ii. Threatened Loggerhead sea turtles – nesting on beaches
      iii. Other wildlife habitat

III. Some wildlife found on Pea Island
   i. Birds (herons, egrets, pelicans, terns, waterfowl, gulls, sandpipers)
   ii. Mammals (deer, raccoons, river otters, nutria)
   iii. Insects
   iv. Fish
   v. Reptiles & amphibians
   vi. Crustaceans

IV. Materials needed for wildlife observation
   a. Binoculars
   b. Spotting scope
   c. Field guides
   d. Journal
e. Proper clothing

V. **Using binoculars**
   a. Importance of a neck strap – prevents dropping and swinging
   b. Basic parts – eye pieces, focus wheel, eyecups, center hinge (eyeglasses = roll back eyecups)
   c. Find stationary object with eyes first
   d. Look through binoculars and close right eye – use focus wheel to make image clear
   e. Open right eye, close left eye – turn right eyepiece to make image clear

VI. **Description of wildlife locations**
   a. Be as specific as possible
   b. Using hours on a clock is helpful
   c. “The bird is in the tallest tree, about half-way up at 3 o’clock”

VII. **Various techniques to increase wildlife observation**
   a. Ranges – what species have been documented in the area
   b. Learn identification and calls (if observing birds)
   c. Locations
      i. Rural
         1. more natural environment
         2. more viewing opportunities
      ii. City
         1. more noise and development
         2. less viewing opportunities
   d. Weather conditions
   e. Use eyes as well as ears
   f. Need patience

VIII. **Wildlife viewing ethics and responsibilities**
   (http://www.wildlife.state.nh.us/Outdoor_Recreation/wildlife_watching.htm )
   a. Enjoy wildlife from a distance
   b. Don’t feed the animals
   c. Never chase or harass animals
   d. Don’t pick up orphaned or sick animals
   e. Honor the rights of private landowners
   f. Respect the rights of other visitors at the site
   g. Know the rules and regulations of the public area you visit

IX. **Pea Island NWR efforts in wildlife watching**
   a. Visitor center – spotting scope and information
   b. Wildlife education programs – including bird walks
   c. North pond trail - Viewing platforms, benches, and scopes

X. **NORTH POND TRAIL WILDLIFE WALK ACTIVITIES**
1. Partner up – find an animal with your binoculars and tell your partner where it is. Have your partner locate it with their binoculars. See if they come up with the same animal description and location. How would your partner have described the animal’s location? REVERSE ROLES.

______________________________________________________________________________

2. Checklist of animals that you may see:

- snapping turtle
- yellow-bellied slider turtle
- egret (great white, snowy)
- heron (great blue, tri-colored, little blue)
- swan (mute, tundra)
- snake
- duck (northern pintail, gadwall, widgeon, grebe, American coots, black duck)
- brown pelican
- raptors (osprey, hawks)
- raccoon
- nutria
- other (s)

- river otter
- butterfly
- dragonfly
- warbler
- mosquito
- sparrow
- fish
- sea gull
- white ibis
- blue crab
- crow
- red-winged blackbird

______________________________________________________________________________

3. How many different animals did you see? __________________

4. Who had the most animal observations (different species)? ______________

5. Take a minute and locate an animal using binoculars. In the space below, draw your observation of that animal you located using binoculars. Note shape, size, color, and any additional information that would help identify your animal. Also, try to describe in words the location of your animal.

______________________________________________________________________________

ADDITIONAL INFORMATION:

______________________________________________________________________________

LOCATION:
Ten Tips for Better Wildlife Watching

1. **Learn about the animal.** Know if the animal you hope to see is active during the day or throughout the evening. Know the habitat in which the animal thrives. Know the seasonal habits of the animal. Know what the animal eats.

2. **Learn about the place.** Research the ecosystems of the region you plan to visit. What food sources are in the locale? What species are native to this area? Is water available?

3. **Be in the right place at the right time.** Based on your knowledge of the animal and the place, plan your wildlife watching trip to coincide with animal, not necessarily human behavior. Many animals are most active in early morning and early evening hours - times we humans may sleep-in or eat out.

4. **If possible, make several trips.** Many animals migrate or move through areas. Your chance of spotting wildlife increases with the number of visits you make.

5. **Practice safe viewing techniques.** Many species of wildlife are dangerous. Learn safe viewing distances from park rangers and recommended wildlife watching literature.

6. **Bring the right gear/equipment.** Spotting scopes and binoculars are excellent tools for wildlife watchers. With a scope, you can get a great view of an animal at a safe distance. Telephoto lenses are essential for wildlife photography. Professional photographers use 400mm lenses and up for wildlife photography. If you have a shorter lens or a point-and-shoot camera, be creative. You can get some great photos of wildlife in incredibly scenic backgrounds. Do not place yourself in jeopardy by approaching animals too closely to get a better view or photograph.

7. **Ask park rangers and other visitors for information on recent sightings.** Animals often live in or return to specific areas. Park rangers and other visitors may be excellent sources of information regarding recent animal activity.

8. **Look for signs.** Animal tracks, trails and scat provide good clues as to what types of animals have been in an area.

9. **Use a blind.** Fortunately, most wild animals are not habituated to human presence. An animal is likely to flee if it sees a human walking near it. The same animal may continue its normal activity in the presence of cars and well-designed viewing blinds.

10. **Enjoy the adventure.** As with many things in life, attitude is everything. No matter where you go, no matter what you see, enjoy the time you spend in the great outdoors.

Don’t put your paddles away for the winter just yet. Set aside October 14th through October 19th 2003 to attend Wings Over Water. This 7th annual wildlife and wildlands festival is sponsored by the Carolina Bird Club, Coastal Wildlife Refuge Society, National Park Service, Outer Banks Chamber of Commerce, U.S. Fish and Wildlife, and other area organizations. This celebration offers several exciting paddling trips to choose from at a variety of locations. The following trips are sure to be fantastic for viewing wildlife and other components of the ecosystem that North Carolina has to offer.

**North of Oregon Inlet**
Kitty Hawk Woods Sunset by Kayak  
Kitty Hawk Woods Canoe Tour  
Trip Leader’s Choice  
Pine Island Audubon Sanctuary Kayak Tour

**South of Oregon Inlet**  
Ocracoke Island Kayak  
Pea Island Refuge Canoe and Kayak Trips

**Mainland**  
Alligator River Refuge Kayak Trip  
Alligator River Refuge Canoe Trip  
Alligator River Refuge Sunset Canoe Trip  
Indian Town Creek to North River Kayak Trip  
Lake Phelps Canoe Trip  
Laurel Bay Lake Kayak Tour  
Palmetto Peartree Preserve Kayak Tour  
Whipping Creek Canoe Trip

Contact the Outer Banks Chamber of Commerce at (252) 441-8144 or visit [www.wingsoverwater.org](http://www.wingsoverwater.org) for more information or to register for these paddling trips. Other Wings Over Water programs include birding trips, natural history trips, and outdoor recreation trips. This celebration is sponsored by the Carolina Bird Club, Coastal Wildlife Refuge Society, National Park Service, Outer Banks Chamber of Commerce, the U.S. Fish and Wildlife Service, and several other key supporters. Come paddle with the wildlife of North Carolina!
FERRY CROSSING BIRDING TRIP

The Outer Banks offers birders the chance of a lifetime to view resident birds or birds passing through along their migration route. Come join us for the 7th annual Wings Over Water Celebration October 14th through the 19th, 2003 sponsored by the Carolina Bird Club, Coastal Wildlife Refuge Society, National Park Service, Outer Banks Chamber of Commerce, the U.S. Fish and Wildlife Service, and several other key supporters. This may be the chance to check off more birds on your lifetime bird list! There are several birding trips available lead by experienced, local guides. Enjoy birds on the mainland, on the islands, and over the water.

The birding trip that is going to Ocracoke Island will be traveling by ferry across the Hatteras inlet. Not only will you get the chance to see birds on the island, you will also get the chance to see birds while crossing the inlet! On land and over water, this trip is sure to be exciting! Don’t miss this opportunity. Register now!

Contact the Outer Banks Chamber of Commerce at (252) 441-8144 or visit www.wingsoverwater.org for more information or to register for these fabulous trips. Hurry before all the spots are taken. Join us and come fly with the birds.
ARTIST MIKE SKAKUJ

Wings Over Water, an annual celebration of wildlife and wildlands in Eastern North Carolina, will be held October 14th through October 19th 2003. This festival is sponsored by the Carolina Bird Club, Coastal Wildlife Refuge Society, National Park Service, Outer Banks Chamber of Commerce, the U.S. Fish and Wildlife Service, and several other key supporters.

This year, for the first time, the Wings Over Water registration booklet contains art work by Dr. Michal Skakuj. Dr. Skakuj is an ornithologist adjunct professor at the University of Gdansk, Poland. At the University of Gdansk he taught lab and field classes in ornithology and has conducted avian studies in Northern Poland. Before he moved to Durham, North Carolina, he was on the Polish Rarities Committee and became experienced in banding shorebirds and waterfowl. His past research and illustrations have been published in journals and field guides in several European countries and the United States. Check out Dr. Skakuj’s wonderful illustrations in this year’s registration booklet and sign up for a trip or two.

The Wings Over Water festival includes birding trips, natural history trips, outdoor recreation trips, and paddling trips. If interested please contact the Outer Banks Chamber of Commerce at (252) 441-8144 or visit www.wingsoverwater.org for more information or to request a Wings Over Water registration booklet.
WOLF HOWLS

Come hear the red wolves howl at Alligator River National Wildlife Refuge on Thursday and Friday, October 16th and 17th at 6:30pm, at the Wings Over Water Festival. This is the 7th annual Wings Over Water hosted by the Carolina Bird Club, Coastal Wildlife Refuge Society, National Park Service, Outer Banks Chamber of Commerce, the U.S. Fish and Wildlife Service, and several other key supporters.

The Red Wolves are native to the southeastern portion of the United States, including North Carolina. The red wolf population reached an all time low of 14 placing this species on the endangered species list. In the 1970’s the U.S. Fish and Wildlife Service captured the remaining red wolves and declared the species extinct in the wild. A captive breeding program was set up to maintain the red wolf population while a suitable location was found to reestablish them back into the wild. This suitable location was Alligator River National Wildlife Refuge. Today, approximately 75 wolves are tracked using radio collars and the total wild population is estimated to be 100.

If interested in coming to hear the red wolves of Alligator River howl please contact the Outer Banks Chamber of Commerce at (252) 441-8144 or visit www.wingsoverwater.org to register or for more information about this upcoming event. Along with the wolf howling there are other programs including birding trips, natural history trips, outdoor recreation trips, and paddling trips. Sign up now before it fills up!
NATURAL HISTORY TRIPS

Wings Over Water festival will be celebrated from October 14th to October 19th, 2003 at various locations in Eastern North Carolina and the Outer Banks. This event includes programs for the amateur-to-serious birder, nature enthusiast, wildlife photographer, paddler, angler, and others who enjoy nature.

The natural history of several areas of the Outer Banks and the mainland will be explored during this festival. The 13 natural history programs that will be offered span a wide range of interests. Each trip is briefly described below. For more information or to register for any of these trips contact the Outer Banks Chamber of Commerce at (252) 441-8144 or visit www.wingsoverwater.org.

NORTH OF OREGON INLET

Nags Head Woods Ecological Preserve: A maritime deciduous forest awaits exploration of its towering dunes, dark swamps, and other ecological areas.

Roanoke Sound Salt Marsh Safari: Tour through Roanoke Sound waters and a backwater salt marsh with ninth-generation Captain Stuart Wescott on the Captain Johnny.

SOUTH OF OREGON INLET

Butterflies and Birds: Search for and identify butterflies while birding – learn about the lives of these beautiful insects.

Beach Ecology Walk: Take a beach walk along the Cape Hatteras National Seashore to learn about this special environment and how animals and plants have adapted to this ecosystem.

Buxton Woods Coastal Reserve Walk: Walk over a network of ancient dunes and swales while learning the history and ecology of this rare and unique maritime forest.

Coastal Geology: Learn how the barrier islands were formed and how the wind and sea shape and change the beaches.

ON THE MAINLAND

Big Tree Hike: Hike through Pettigrew State Park’s virgin forest and learn about the Park’s champion trees, some being over 6’ in diameter and others over 10’ in diameter.

Palmetto-Peartree Preserve: This preserve, managed by The Conservation Fund, was purchased to protect Red-cockaded Woodpecker habitat. Includes non-riverine swamp forest and 8 miles of Albemarle Sound shoreline.

Red Wolf Howling: Caravan into Alligator River National Wildlife Refuge to learn about the Red Wolf Recovery Program and “howl up” the wolves.

Swamp Sampler: Caravan to various wetlands including bald cypress swamp, Atlantic white cedar forest, bay forest, and pond pine pocosin to watch for birds and other wildlife.

Rose Bay Canal Walk: Visit North Carolina’s largest natural lake and also explore the impoundments at Mattamuskeet National Wildlife Refuge.

Refuge at Night: This is a rare opportunity to visit Alligator River National Wildlife Refuge at night to use spotlights to watch for deer, bear, birds and other wildlife.
Mammal Tracking: Alligator River National Wildlife Refuge is home to a variety of large mammals including black bear, red wolf, bobcat, white-tailed deer, beaver, river otter, and raccoon. Learn the techniques of identifying tracks and scat in the field.
September 30, 2003

On behalf of Coastal Wildlife Refuge Society, Carolina Bird Club, National Park Service, Outer Banks Chamber of Commerce, and U.S. Fish and Wildlife Service we would like to thank you for your generous contribution to the Wings Over Water festival.

As a token of our appreciation, we would like to invite you to attend “A Sense of Wonder” at Manteo Middle School on Saturday October 18th at 7pm. During the public performance, you will be seated in a premier seating area reserved exclusively for sponsors.

This keynote event is a two act play based on the life and works of Rachel Carson; written and preformed by Kailulani Lee. The first act will reflect upon Carson’s life as she prepares herself to face the controversies surrounding her book, Silent Spring. The second act revolves Carson thinking about the process of writing Silent Spring and the events that have come about as a result of her book.

We hope that you will be able to join us for this extraordinary keynote event. Again, we thank you for supporting Wings Over Water and helping to bring this festival to eastern North Carolina and the Outer Banks.

Sincerely,

Park Ranger
Pea Island National Wildlife Refuge
IN DANGER OF DISAPPEARING…

Over hundreds of species throughout the world are threatened and endangered. A species considered to be endangered is one which is in danger of extinction in all or a significant portion of its range. A threatened species is one which is in danger of extinction in the foreseeable future in all or a significant portion of its range if no protective measures are taken.

Common threats that result in a species becoming threatened or endangered are numerous. Such threats include habitat fragmentation and destruction due to development and human activities, beach erosion, ocean pollution, beach litter, and invasive and exotic species competition. In some instances only one threat may be problematic, but for many species multiple threats increase their susceptibility to becoming threatened or endangered.

Pea Island National Wildlife Refuge is a unique environment, which hosts a number of plant and animal species throughout the year including those which are threatened or endangered. The piping plover (Charadrius melodus), the loggerhead sea turtle (Caretta caretta), and the green sea turtle (Chelonia mydas) are all threatened species found at the refuge. In general, these species face multiple threats including recreational and commercial activities and habitat modification from both development and sand dune stabilization. The increase in visitors to the beach intensifies beach-front home development, foot traffic, and vehicle traffic. Such human disturbances can interfere with habitat availability, nesting behaviors and can crush eggs. Specifically with piping plovers, human interference can impede territory establishment, courtship, and incubation of eggs. Sea turtles are impacted by human interference through commercial fishing nets without TEDs (Turtle Excludar Devices), as well as bright lights from beach development. At night bright lights can interfere with a turtle’s sense of direction.

WHAT’S the PEA ISLAND NATIONAL WILDLIFE REFUGE DOING?
To help minimize threats to these valuable species, the refuge takes measures to manage vital habitat to ensure the success of the piping plovers and sea turtles. Driving is not allowed on refuge beaches, visitors are discouraged to walk on sand dunes where a path is not clearly marked, and enclosures are constructed around identified nesting sites. Sea turtles also benefit from refuge volunteer programs such as turtle patrol and turtle watch. These programs help identify nesting areas and also ensure that hatchlings get to the ocean successfully. Educational programs related to the turtles are also given as a means of increasing public awareness.

HOW YOU CAN HELP
As interested and concerned individuals, there are a number of ways you can help both piping plovers and sea turtles on coastal beaches as well as other species in jeopardy.
When beach walking avoid areas that are marked off. Minimize beach driving and do not disturb animals at night by walking up to them or using bright lights. If a light is absolutely necessary, use a red light as an alternative to a bright light. Also, participate in programs and organizations that work toward protecting plant and animal species. Write to your legislatures and representatives informing them of your position on protecting endangered species. Above all, be informed and aware of what is going on. Share your knowledge with others; awareness is the key to change.
AMERICAN BEACHGRASS (Ammophila brevigulata) is a cool-season dune grass native to the mid-Atlantic and Great Lakes. North Carolina is at the southern end of its natural range. It is a vigorous, upright grass that grows in dense clumps up to about 3 to 5 feet high and is capable of spreading rapidly. American beachgrass is used by conservation agencies, organizations and private landowners to build and stabilize dunes along the north and mid-Atlantic coast of the United States.

TRUMPET HONEYSUCKLE (Lonicera sempervirens) is a trailing woody vine with smooth leaves, 1 to 3 inches long and arranged opposite of each other along the stem. Trumpet honeysuckle receives its name from its 2-inch long, trumpet-shaped flowers that are coral red or bright orange on the outside and yellow on the inside. The shape of the flowers makes this plant an excellent source of food for hummingbirds.

POKEWEED (Phytolacca americana) is a smooth-stemmed perennial with a large, fleshy taproot that can grow to 10 feet in length. Stems are succulent and purplish, and bear alternate, lance-shaped, shiny leaves with smooth, curled margins. The small, white to greenish flowers hang in long, drooping, grapelike clusters. Pokeweed berries are greenish to dark purple in color and usually contain about ten seeds per cluster. Pokeweed berries are eaten by a variety of animals including bluebirds, waxwings, doves, raccoons, opossums, and foxes.

BEACH PEA OR TRAILING WILD BEAN (Strophostyles helvula) is an annual trailing vine that can grow along the ground or climb over grass clumps or into trees. This is the plant for which Pea Island National Wildlife Refuge was named. Beach pea bears ¼-inch diameter, lavender, pea-like flowers that mature into 2- to 3-inch black pods in October, as migrating waterfowl return to the refuge. This plant is a host for different species of butterflies and provides food for animals.

BITTER PANICUM (Panicum amarum) is a perennial warm-season grass that grows to a height of 3 to 6 feet. It grows throughout the southern Atlantic and Gulf of Mexico coasts. Leaves are smooth and bluish-green with narrowly compressed seed heads. This plant is used for coastal dune erosion control.

COASTAL PANICUM (Panicum amarum var. amarulum) is a somewhat dense, upright perennial bunchgrass that grows to a height of 3 to 6 feet. It is found throughout the southern Atlantic and Gulf of Mexico coasts. Stems are coarse, straight and stiff with partially compressed seed heads. Coastal Panicum functions as a secondary sand dune stabilizer and is a popular wildlife cover due to its hedge form and winter persistence.

SEAOATS (Uniola paniculata) is the most widespread grass on the southern Atlantic coast. This warm-season perennial has narrow pale green leaves with compressed spikelets at the end of its 4- to 6-feet high stiff stems. Sea oats are useful in building and stabilizing sand dunes.
SALTMEADOW CORDGRASS (*Spartina patens*) is a warm-season perennial that grows from 1 to 3 feet tall. This plant has dark green stems with rolled leaf blades that are typically 6 inches to 1 foot long. Leaves are wiry in appearance. Saltmeadow cordgrass is not a true dune grass, but often traps sand to help in shoreline protection. Also, it provides food and cover to a limited number of animals.

INDIAN BLANKET (*Gaillardia pulchella*) is an annual or biennial in warmer climates that grows to about 2 feet high. Flower heads are 1 to 2 inches across. The stem is usually highly-branched and woody. Each plant has 10-20 ray flowers, which are purplish-red or brownish and most have bright yellow on the tips of the rays. The blossom of the Indian Blanket attracts bees and other insects that feed on its nectar. The seed of this plant is a favorite of mourning doves and cardinals.

YAUPON HOLLY (*Ilex vomitoria*) is usually fewer than 10 feet tall. It has 1 inch-long evergreen leaves that are leathery and dark green. The flowers are barely noticeable, but the female yaupon produces an abundance of bright red berries. Berries are not edible by humans but are a choice food source for birds.

WAX MYRTLE (*Myrica cerifera*) is an evergreen that usually grows less than 10 feet tall. The leaves are leathery and yellowish green, with a fresh aromatic scent when crushed. Wax myrtle produce small, gray-white, wax-covered berries that are an excellent food source for birds. The denseness of the wax myrtle branches provides excellent cover for nesting birds.

EASTERN RED CEDAR (*Juniperus virginiana*) is a small evergreen that commonly grows to a height of 10 to 15 feet. This tree grows in a pyramid shape with two different shaped leaves. The top rounds off as it grows older. The older leaves are flat and scale-like and only about 1/16-inch long; younger leaves are sharp-pointed and may be up to 3/4 of an inch long, with whitish lines on top. In the summer, the leaves are bright green, but in the winter they can turn copper yellow to rusty brown. Male and female flowers grow on separate trees. The fruit of the eastern red cedar is a waxy, bluish berry about 1/4 of an inch in diameter. These trees provide food and cover for numerous birds and mammals.

DEVILWOOD (*Osmanthus americanus*) is a small evergreen tree that grows to a height of up to 25 feet. Leaves of the devilwood are 2 to 6 inches long with a lush olive-green color. Small white, sweetly fragranced flowers appear in early spring from the leaf axils in branched clusters. In the fall, small, dark blue drupes ripen that provide an excellent food source for wildlife.
IES student,

The Institute of Environmental Sciences (IES), at Miami University in Oxford, Ohio requires each graduate student to fulfill a research requirement. This requirement can be a research thesis, a practicum, or a six-month internship. In the event that you have arranged a public-use internship, there are several actions that can be taken to ensure a quality experience.

First, gather any background information that is available. This could include organizational history, natural history of the area, current biological work, current programming, and other information that may be relevant to your duties. By reading this material you should gain an understanding of the organization and its relation to the surrounding area. This knowledge will create a foundation that you can then build upon during the internship.

Second, before the internship starts talk with your supervisor concerning the details of the expected duties, as well as any major events that may be taking place during the internship. Discuss your interests and strengths with your supervisor in order for the organization to develop new project ideas for you or place you on existing projects in which you could contribute. Ask if there is a project requirement for the internship. In the event of a required project inquire about the details so you can brainstorm ideas and start researching ahead of time.

Third, throughout the course of the internship make sure that communication lines are always open to create a learning atmosphere. Meet with your supervisor on a regular basis to discuss accomplishments, smooth out problems, answer questions, and plan for future projects. Remember that independent projects, as well as collaborative projects are important. During this time continue to talk with your supervisor to clarify any new ideas for additional projects that may be of interest to you. Along with these meetings, designate a way to leave messages for one another. This can be in the form of e-mail messages or a visible wall calendar and bulletin board.

Fourth, training sessions and evaluations are needed. Whether these sessions include mock situations, practice, or hands-on lectures will depend on the type of duties required of you. If you feel that training would be beneficial to carrying out your duties ask your supervisor if these sessions would be possible. If safety is of concern, find out if safety training sessions are available. In addition to training, feedback from your supervisor will provide the opportunity for you to improve your skills while working for the organization. Do not be afraid to ask for constructive criticism to increase your existing skills, as well as developing new ones.

As you arrange your internship keep the above points in mind to attain the experience that you desire. Remember, all experiences will have negatives and positives. Take what you can from each experience and positively incorporate it into your career.