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# Threatened and Endangered Species

## Introduction

Biodiversity is a term used to describe the variety of living species and the ecosystems of which they are a part. Biodiversity includes all the animals, plants, habitats and genes that encompass life on Earth (Encyclopedia of Earth 2008). Food, shelter, medicines, oxygen, and protection from natural disasters, such as hurricanes and floods, are supported through a biologically diverse environment. Human actions have dramatically influenced the level of biodiversity on the planet. Habitat degradation, pollution, and global climate change all contribute to the loss of diverse ecosystems and the survival of organisms (Wilson 1988). Slowly diminishing the number of diverse plants and animals in these habitats is affecting the well-being of humans and other organisms. One consequence of biodiversity loss is the number of species that have been added to the threatened or endangered (T&E) species list. Government agencies recognized this biological decline and in 1973 the Endangered Species Act was established, which created federal and state government laws to protect T&E species and their habitats in an attempt to conserve biological diversity (Encyclopedia of Earth 2008). The Endangered Species Act defines endangered (E) species as any species that is likely to become extinct, and a threatened (T) species as one on the verge of becoming endangered. Species of special concern (SSC) are rare species that need protection but have not yet been listed as T or E (FWS 2003).

Why is it important to protect threatened and endangered species? One reason is the interconnectivity from one species to the next. The food web is an example of interconnectivity

because it circulates necessary energy and nutrients through the life cycle. Each species, intertwined in the food web, plays an important role in their particular habitat. Examples of this are maintaining the quality of water, soil, or atmosphere (Wilson 1988). A specific example of species interconnectivity is the sea otter, also known as a keystone species. Keystone species are defined as species that have a disproportionate effect on their environment relative to their biomass (Encyclopedia of Earth 2008). The sea otters main source of food is sea urchins which feed on kelp. Kelp is critical habitat for fish spawning. A drastic decline in sea otters causes an increase in sea urchins and a deterioration of the kelp beds. Declining kelp beds leads to a decline in fish. As fish numbers decrease there is a decrease in the amount of income for local fishermen (Encyclopedia of Earth 2008). This example illustrates the importance of protecting T&E species.

Where are T&E species found? T&E species can be found in a variety of habitats including habitats located at the University of Central Florida. The University of Central Florida's Orlando campus sits on 1,415 acres and 191 of these acres are dedicated to conservation easement (LNR 2011). There are a number of species found at UCF that provide educational opportunities to students and the public. UCF's natural lands are used to conduct research and enjoy native Florida habitats. Documenting T&E species on UCF's campus and studying present and historical land cover maps of the natural lands, will allow researchers to see changes and impacts to these areas. This particular study was conducted in the northwest parcel and the natural areas of the University of Central Florida's Orlando campus (Figure 1). During the study a survey was conducted for threatened (T), endangered (E), and species of special concern (SSC). This study compared lists of T&E species with vegetative community data acquired from the Florida Natural Areas Inventory (FNAI). Using this system it was predicted

that a number of T&E species would be found on the UCF campus. The purpose of this study was to document the listed T&E species found on the University of Central Florida's Orlando campus, allowing us to potentially conserve and protect critical habitat here. The predicted species, their status, and the vegetative community are listed in Tables 1 and 2.

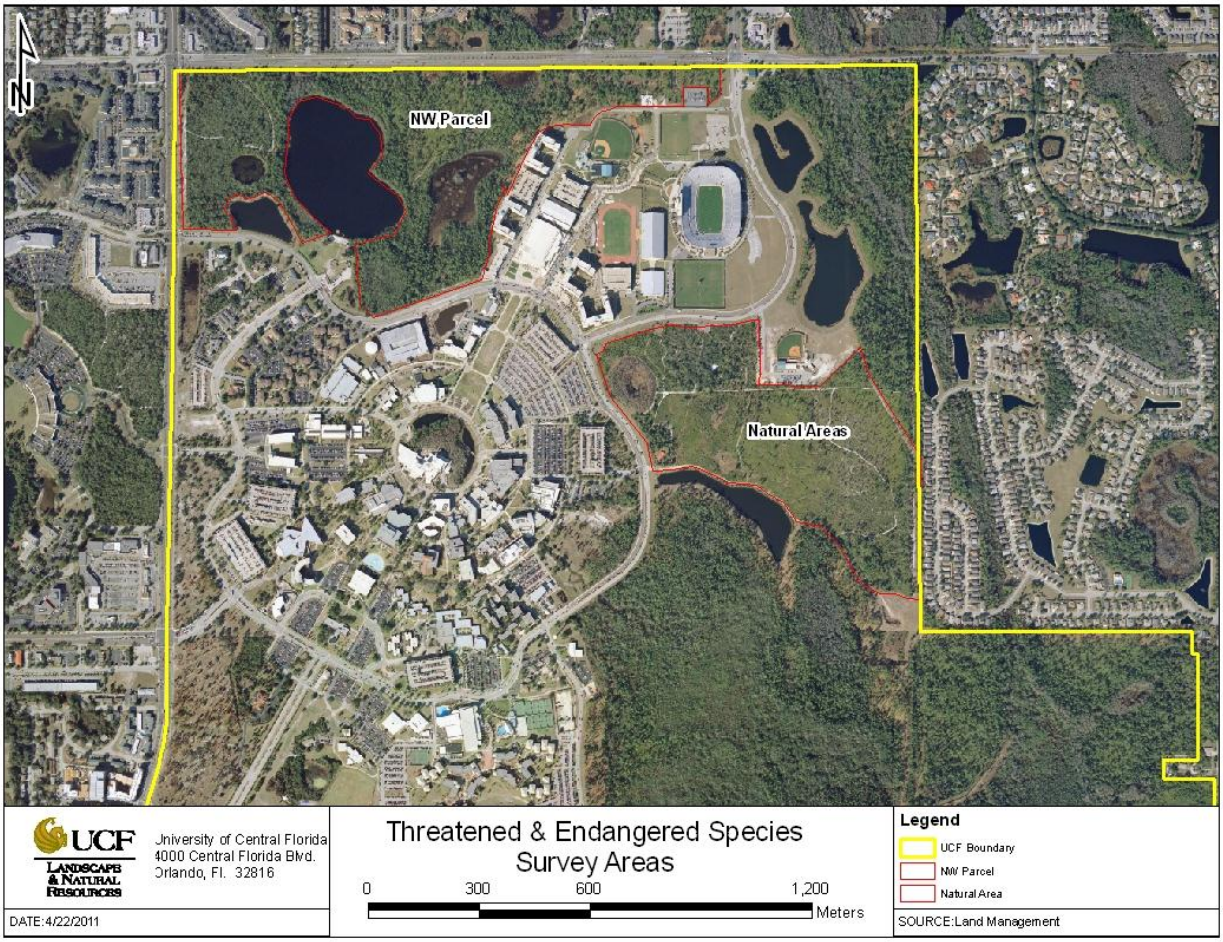


**Figure 1:** Survey Areas

**Table 1:** Bird, reptile, and amphibian species predicted to be found

| **Amphibians** | **Florida Status** | **Vegetative Community** |
|---|---|---|
| Frosted flatwoods salamander/*Ambystoma cingulatum* | SSC | Mesic Flatwoods |
| Gopher frog/*Rana capito* | SSC | Sandhill/Scrubby Flatwoods |
| **Reptiles** | | |
| American alligator/*Alligator mississippiensis* | SSC | Basin Marsh |
| Gopher Tortoise/*Gopherus polyphemus* | T | Scrub, Sandhill, or Scrubby Flatwoods |
| **Birds** | **Florida Status** | **Vegetative Community** |
| Florida sandhill crane/ *Grus Canadensis pratensis* | T | Basin Marsh |
| Wood Stork/ *Mycteria Americana* | E | Cypress Dome |
| Southern American kestrel/ *Falco sparverius pratensis* | | Sandhill |
| Crested caracara/ *Caracara cheirway* | T | Mesic Hammock |

**Table 2:** Plant species predicted to be found

| Scientific Name | Common Name | FL Status |
|---|---|---|
| *Garberia heterophylla* | Garberia | T |
| *Tillandsia fasciculata* | Wild Pine | E |
| *Tillandsia utriculata* | Giant Wild Pine | E |
| *Centrosema arenicola* | Pineland Butterfly Pea | E |
| *Warea carteri* | Carter's warea | E |
| *Polygala lewtonii* | Lewton's polygala | E |
| *Pinguicula caerulea* | Blue Butterwort | T |
| *Pinguicula lutea* | Yellow Butterwort | T |
| *Lilium catesbaei* | Pine Lily | T |
| *Lupinus aridorum* | Scrub lupine | E |
| *Macbridea alba* | White birds-in-a-nest | |
| *Nolina brittoniana* | Britton's beargrass | E |
| *Calopogon multiflorus* | Grass Pink | E |
| *Pogonia ophioglossoides* | Rose Pogonia | T |
| *Sarracenia minor* | Hooded Pitcher Plant | T |
| *Bonamia grandiflora* | Florida bonamia | T |
| *Eriogonum longifolium var. gnaphalifolium,* | Scrub buckwheat | T |
| *Deeringothamus pulchellus* | Beautiful paw paw | E |

**Materials/Methods**

- Binoculars
- Funnel Traps/Stakes
- Plant Field Guide
- Animal Field Guide
- Land cover map
- Species list

This study was conducted to document both plant and animal T&E species on the University of Central Florida's Orlando campus. It was conducted in the field from March 17th thru April 7, 2011. The study assessed habitats, surveyed specific areas, and documented the occurrence of T&E species in those areas. Vegetative land cover map of UCF was provided by Landscape and Natural Resources to show the habitat types surveyed. Examples of these habitat types include

basin marsh, mesic flatwoods, sandhill, dome swamp, wet prairie and scrubby flatwoods. The land cover map was created from FNAI files in ArcGIS, and is shown in Figure 2. The FNAI database provides records of rare plant and animal species, and the natural communities where they could be found throughout the state of Florida. After the habitat types to be surveyed were determined, a list of Florida's threatened and endangered species from the Florida Fish and Wildlife Conservation Commission was retrieved (FWC 2004). Additionally, lists were retrieved from the Florida Department of Agriculture & Consumer Services and the United States Department of Agriculture websites that provide lists of T&E plants in Florida. Each list categorizes the species as endangered, threatened, or species of special concern (FDACS 2011). These lists were compared with FNAI data to determine the type of species that could be found in the vegetation located in the natural lands on campus.

Next, various survey methods were examined. Common reptile and amphibian survey methods include funnel traps set parallel to the shoreline, and drift fences. Hipes et al (2002) recommends the construction of drift fences to ensure the capture of the amphibians or reptiles. The barriers provided by the drift fences help direct the species into the funnel traps. Based on the types of species that could potentially be found within the study area, and due to the extensive installation and maintenance procedures of the drift fences, funnel traps was the method chosen. Nine funnel traps were evenly placed around the sandhill upland lake in the northwest parcel. Approximately two inches of the traps were left above water to provide oxygen to the captured animals. The traps were left on the lake for two weeks and checked daily. Additionally, Crosswhite's time-constrained methods (1999) were used to locate and record the number of species. This survey method includes flipping over logs and rocks, and peeling bark from fallen trees to visually locate animals and plants (Crosswhite et. al. 1999).

The majority of bird species are most active during the early morning and just before dusk. Therefore, the study design of Biddy et. al. (1998) was followed, and surveys were conducted thirty minutes after dawn into mid-morning and just before dusk. A personal field guide was compiled of each bird species possibly sighted. The guide included the type of habitat the species could be found in, wings span and flight patterns, feeding habits, and nesting strategies.

Identification of plant species was accomplished with the help of the Field Guide to the Rare Plants of Florida (Chafain 2000). Once a T&E plant species was found, it was photographed and the location was recorded. Every plant or animal species found was recorded and photographed when possible.

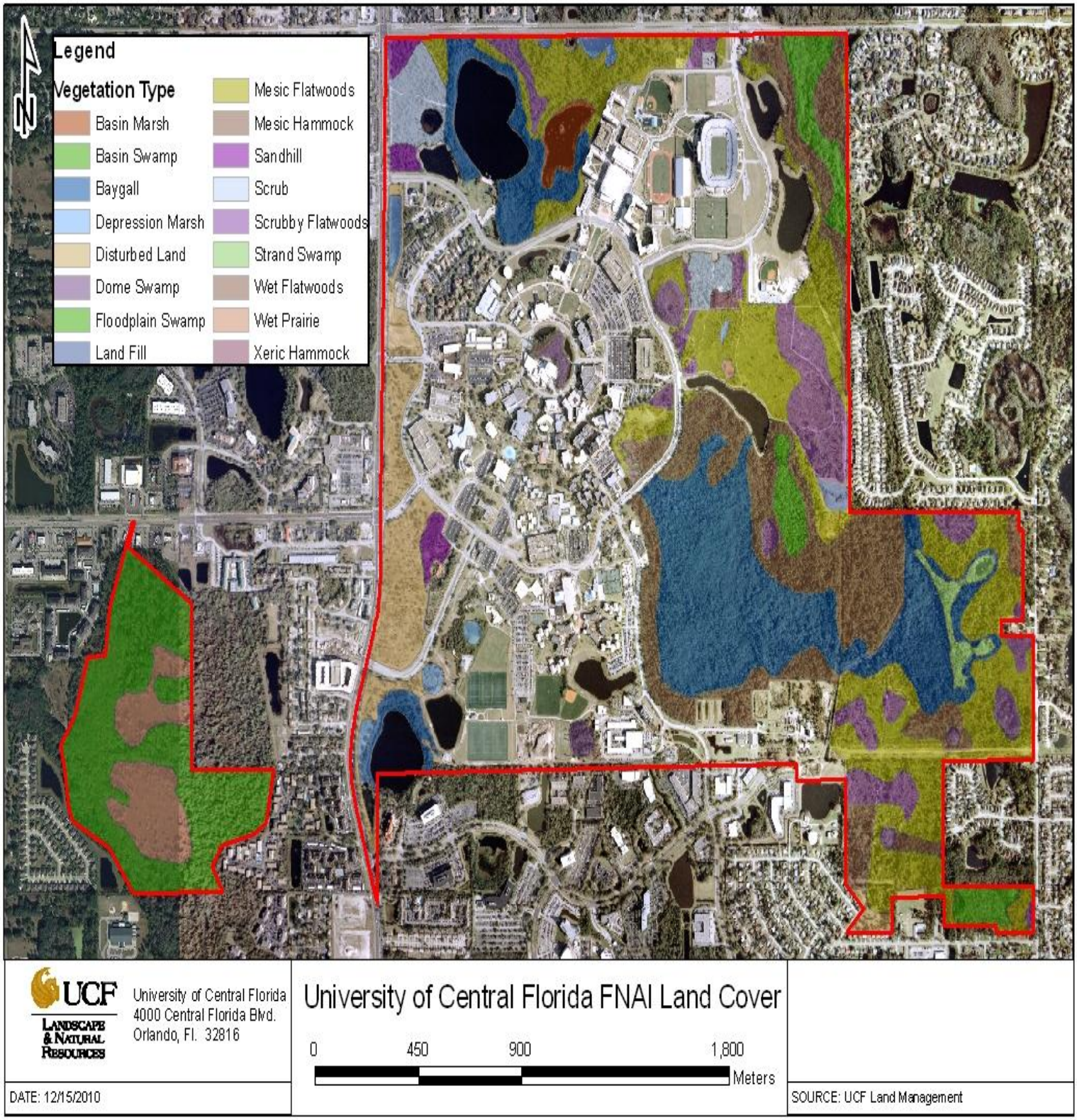


**Figure 2:** Land Cover Map

**Results**

The purpose of this study was to document the listed T&E species located on the University of Central Florida's Orlando campus. The survey documented three bird species: Wood Stork (*Mycteria Americana),* Sandhill Crane (*Grus canadensis pratensis),* and Little Blue Heron (*Egretta caerulea).* Three plant species: Hooded pitcher plant (*Sarracenia minor),* Beautiful paw paw *(Deeringothamus pulchellus),* and Pine Lily (*Lilium catesbaei)* were located during this survey. The Gopher Tortoise (*Gopherus polyphemus)* was the only reptile species documented. Past records indicate a number of T&E species that have been seen in the northwest parcel and natural areas of campus. Table 3 lists the species and locations of the animals and plants found during this survey. Table 4 lists the past documented T&E species and their location on the University of Central Florida's main campus. Additionally, these tables include vegetative community and listing status.

**Table 3:** Species found during survey

| **Scientific Name** | **Common Name** | **Area Found** | **Vegetative Community** | **Florida Status** | **U.S. Status** |
|---|---|---|---|---|---|
| *Grus canadensis pratensis* | Florida Sandhill Crane | NW parcel | Basin Marsh | T | E |
| *Mycteria americana* | Wood Stork | Natural Area | Dome Swamp | E | E |
| *Gopherus polyphemus* | Gopher tortoise | Natural Area | Mesic Flatwoods | T | None |
| *Sarracenia minor* | Hooded pitcher plant | NW parcel | Scrub | T | None |
| *Deeringothamus pulchellus* | Beautiful paw paw | NW parcel | Mesic Flatwoods | E | E |
| *Egretta caerulea* | Little Blue Heron | NW parcel | Baygall | SSC | None |
| *Lilium catesbaei* | Pine Lily | Natural Area | Mesic Flatwoods | T | None |

**Table 4**: Past documented species

| Scientific Name | Common Name | Area Found | Vegetative Community | Florida Status | U.S. Status |
|---|---|---|---|---|---|
| *Alligator mississippiensis* | American alligator | NW parcel | Basin Marsh | SSC | T |
| *Sciurus niger shermani* | Sherman's Fow Squirrel | Natural Area | Pond Pine | SSC | None |
| *Pituophis melanoleucus mugitus* | Florida Pine Snake | Natural Area | Sandhill | SSC | None |
| *Rana capito* | Gopher Frog | East Parcel | Scrubby Flatwoods | SSC | T |
| *Gopherus polyphemus* | Gopher Tortoise | Natural Area | | SSC | None |
| *Pandion haliateus* | Osprey | NW Parcel | Mesic Flatwoods | SSC | |
| *Falco sparverius Paulus* | Southern American Kestral | NW Parcel | Mesic Flatwoods | T | None |
| ***PLANTS*** | | | | | |
| *Garberua heterophylla* | Garberia | Unconfirmed | Unconfirmed | T | None |
| *Tillandsia fasciculata* | Wild Pine | Unconfirmed | Unconfirmed | E | None |
| *Tillandsia utriculata* | Giant Wild Pine | Unconfirmed | Unconfirmed | E | None |
| *Centrosema arenicola* | Pineland Butterfly Pea | Unconfirmed | Unconfirmed | E | None |
| *Dicerandra thinicola* | Titusville Balm | Unconfirmed | Unconfirmed | E | None |
| *Pinguicula caerulea* | Blue Butterwort | Unconfirmed | Unconfirmed | T | None |
| *Pinguicula lutea* | Yellow Butterwort | Unconfirmed | Unconfirmed | T | None |
| *Calopogon multiflorus* | Grass Pink | Unconfirmed | Unconfirmed | E | None |
| *Pogonia ophioglossoides* | Rose Pogonia | Unconfirmed | Unconfirmed | T | None |

**Discussion**

Documenting species for scientific research is a difficult process. Locating species whose numbers are minimal is even more difficult. Threatened and endangered species are protected

because their populations are drastically declining making it a challenge to observe these species in their natural habitats. It was predicted that at least a small number of reptiles and amphibians species in the study area would be documented. During this survey, none of those species were documented. Even though previous surveys have documented the presence of some of these species, this survey did not locate them. There are many factors that can effect the success rate of capturing T&E species. Seasonal activity and weather patterns, body size and habitat size, and the ability of the animals to avoid the traps are all variables that need to be considered. Weather and time of year, particularly, had an effect on this survey. According to Crosswhite et. al. (2002) the best time to capture an amphibian or reptile is after rain in June and July. This survey was conducted in the months of March and April, and would have been more successful if conducted in the summer months. Also, the funnel traps used could have a higher success rate if combined with multiple trapping methods. A study by Crosswhite et. al. (2002) compared the different methods of trapping reptiles and amphibians. The methods compared were drift fences with pitfall and double-ended funnel traps, double-ended funnel traps without drift fences, and time-constrained searching methods. Results showed that a comprehensive sampling design portrays the most accurate means of surveying amphibians and reptiles. Pitfall traps captured predominately frogs, salamanders, lizards, and small snakes. With the use of pitfall traps during this survey, there may have been a higher success rate in capturing the targeted species. This survey attempted to capture *Ambystoma cingulatum,* a species of salamanders which is best captured by hand. Salamanders are active during very specific environmental conditions which make them hard to locate. The activity of reptiles and amphibians is very irregular and relies on particular temperatures and varying amounts of precipitation. The specific environmental conditions and time of year provided a constraint for this survey. Overall, the study suggests that

using a combination of methods will provide the most adequate survey possible (Crosswhite et. al. 2002). Species that were captured during this study, but were not listed as threatened or endangered include the leopard frog (*Rana pipiens)*, the lesser siren (*Siren intermedia)*, and eleven crawdads (*Cambaridae spp).*

Three T&E bird species were documented during this survey .Those species were Wood Stork (*Mycteria Americana*), Florida Sandhill Crane (*Grus canadensis pratensis*), and Little Blue Heron (*Egretta caerulea*).There are numerous factors that could have affected the success rate of this bird survey. Information concerning the habitats, habits, nesting times, and flight patterns of each species is essential when searching for their presence. Prior literature research is necessary before surveying the species in the field. Weather, season, and species identification are all aspects that had an effect on these results. Unfavorable weather conditions such as rainfall, high winds, and high temperatures can effect bird activity directly which in turn would affect the efficiency of data collection (Biddy 1998). Conflicting weather patterns such as extreme heat, rain, or winds may have affected the ability to hear and see the bird activity, and the ability to pay attention (Biddy 1998). Being able to correctly identify bird species was the biggest challenge in this study. The difficulty of identifying bird species comes from the fact that most birds are recognized by their calls and sounds (Biddy 1998). A study conducted in Indonesian on an island of Sumba found that on average more bird species are found through calls rather than sightings (Biddy 1998). It takes extensive research and practice to be able to distinguish the differing calls of all the bird species. An expert spends a thorough amount of time learning the sounds of various bird species. If more time was allotted to memorize and study the sounds of the birds, the results of this study may have portrayed a more thorough result.

Bird habits change with the season which also makes them difficult to locate. The Crested Caracara (*Caracara cheirway)* breeds from December thru April, but their populations are continuing to decline in Florida. The habitat surveyed in this study is not the best place to find this species. The Crested Caracara *(Caracara cheirway)* prefers grasslands and pasture land which are suitable for foraging and nesting. In Florida the most suitable habitats for this species is being converted to urban or agricultural lands. Also, the unpredictable environmental conditions that occur in central Florida have an effect on the nesting success or indirectly affect the food supply of the Crested Caracara (*Caracara cheirway)* (Morrison 1999).

Plant identification was difficult because of the time of year. If the inflorence was not on the plant itself, it was hard to correctly identify the species. For example, a species of beargrass and scrub buckwheat were found but they were not flowering and it was difficult to identify these plant species. This study could be more successful if conducted for multiple months throughout the spring. Even though there are a number of plant species that are not found at the University of Central Florida any more, the main campus is still home to a large diversity of native plant species. In order for these species to survive, it is important to reduce the habitat impact in the areas containing threatened and endangered species. Property management along with preservation of the areas will assist in the survival of the plant and animals species listed as endangered, threatened, and species of special concern. An important habitat restoration strategy is the use of prescribed fires. Florida's habitat is adapted to periodic burns which promote a healthy ecosystem.

As part of UCF's land management plan prescribed fires are conducted throughout the main campus. The absence of these prescribed burns can negatively alter the habitat and harm the native plant and animals. In addition to maintaining a healthy ecosystem, prescribed fires

remove the unwanted invasive species from the habitat.  Currently, there are 47 known exotic species on UCF's main campus (LNR 2011). To control the invasive species, UCF has partnered with agencies to create the Central Florida Cooperative Species Management Ares (CF CISMA). The mission of CF CISMA is to create a partnership that develop resources, educate, and share information to manage invasive species in a specified area (LNR 2011). To continue educational and biological research at UCF, management tactics must be established to ensure the survival of the T&E species found here. Continued surveys, invasive species removal, restoration, and prescribed fires will preserve the habitat and establish biodiversity. It is critical to manage these natural plant and animal habitats to reduce the habitat degradation and protect threatened and endangered species from extinction.

**Work Citied**


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