Group 3

Photograph and Record Wildlife

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INTRODUCTION

Florida is composed of some of the most diverse ecosystems in the country. Throughout the state there are dry mesic uplands, wet flatlands, cypress domes, mangroves, marshes, coasts, and lakes, just to name a few (Florida Native Plant Society, 2004). These systems may seem dissimilar when viewed individually, but they are all interconnected and each plays an essential role in maintaining the state's species and habitat composition. As urban development continues to extend into these sensitive systems, it becomes more and more critical to educate residents and developers about how they impact their surroundings, and how they can utilize the environment in a healthy and sustainable manner.

The UCF campus is a perfect example of urban development attempting to coexist alongside functioning natural habitats. According to the UCF Landscape and Natural resources website, the UCF campus is comprised of 1,415 acres, of which over 500 are forested conservation areas. Within these 500 acres are at least fifteen distinct natural communities. A natural community, defined by the Florida Natural Areas Inventory (FNAI), is "a distinct and recurring assemblage of populations of plants, animals, fungi and microorganisms naturally associated with each other and their physical environment (FNAI, 1990)." Of the fifteen natural communities on campus (Fig. 2), at least ten can be observed from the five nature trails (Fig. 1) available to UCF students and the public. The ecosystems that surround these trails support a wide range of wildlife, many of which have already been spotted. Figure 3 shows a list of species that are known to inhabit the type of natural communities found in the UCF natural communities. These species not only depend on their surrounding ecosystems, but also uniquely support it.

The "triple bottom line" model of sustainability represents an expanded scale that interconnects the criteria of environmental, economic and social values. Using this model we will educate the student body and surrounding community about the importance of the native and non-native fauna living in the UCF natural communities, and increase awareness and responsible use of the campus natural lands.

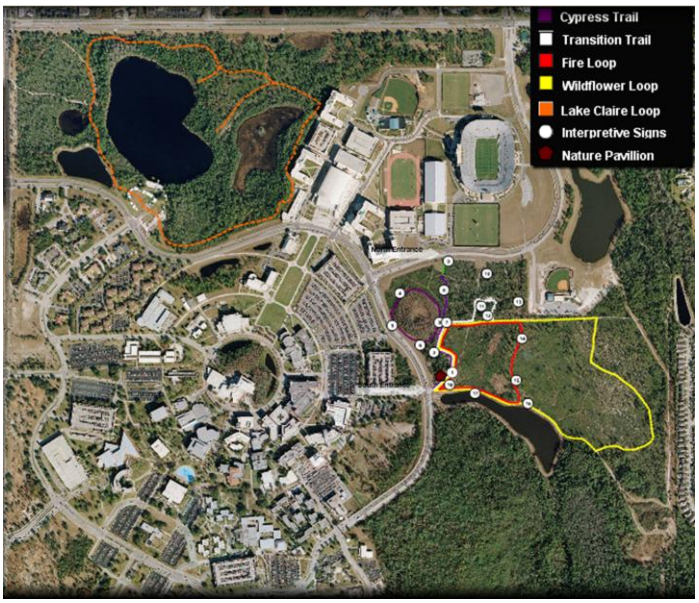
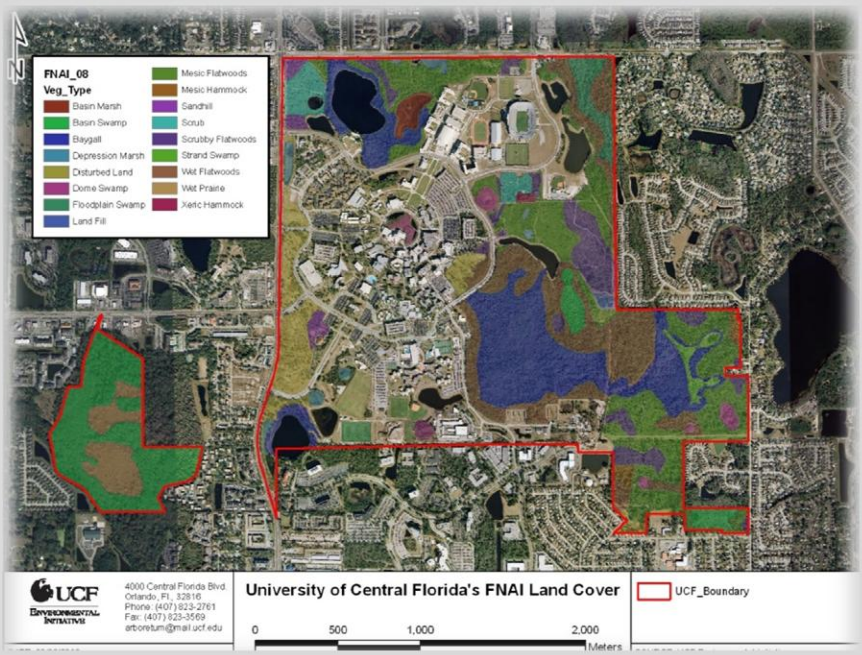


FIGURE 1: MAP OF CAMPUS NATURE TRAILS



Mesic Hammock: well-developed evergreen hardwood and/or palm forest on soils that are rarely inundated

Xeric Hammock: evergreen forest on well-drained sandy soils.

Sandhill: characterized by widely spaced pine trees with a sparse midstory of deciduous oaks and a moderate to dense groundcover of grasses, herbs and low shrubs.

Scrub: a community composed of evergreen shrubs, with or without a canopy of pines, and is found on dry, infertile, sandy ridges.

Wet Flatwoods: pine forests with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs and low shrubs.

Mesic Flatwoods: characterized by an open canopy of tall pines and a dense, low ground layer of low shrubs, grasses and forbs

Scrubby Flatwoods: have an open canopy of widely spaced pine trees and a low shrubby understory dominated by scrub oaks and saw palmetto, often interspersed with areas of barren white sand.

Wet Prairie: an herbaceous community found on continuously wet, but not inundated, soils on somewhat flat or gentle slopes between lower lying depression marshes, shrub bogs, or dome swamps and slightly higher wet or mesic flatwoods, or dry prairie.

Basin Marsh: regularly inundated freshwater herbaceous wetlands that may occur in a variety of situations but, in contrast to depression marshes, are not small or shallow inclusions within a fire-maintained matrix community.

Dome Swamp: an isolated, forested, depression wetland occurring within a fire-maintained community such as mesic flatwoods.

Basin Swamp: a basin wetland vegetated with hydrophytic trees and shrubs that can withstand an extended hydro-period.

Strand Swamp: a shallow forested, usually elongated depression or channel situated in a trough within a flat limestone plain, and dominated primarily by bald cypress *(Taxodium distichum).*

Floodplain Swamp: a closed-canopy forest of hydrophytic trees occurring on frequently or permanently flooded hydric soils adjacent to stream and river channels and in depressions and oxbows within floodplains.

Baygall: an evergreen forested wetland of bay species situated at the base of a slope or in a depression.

Sinkhole Lake: occur typically in deep, funnel-shaped depressions in a limestone base.

(http://www.fnai.org/descriptions.cfm)

FIGURE 2: MAP OF THE NATURAL COMMUNITIES ON UCF CAMPUS

Native wildlife species are socially important because they contribute to the healthy biodiversity of the ecosystems on which we are dependent for things such as medication, water, energy, recreational opportunities, and aesthetics. Biodiversity is defined as the variability of genes, species, and ecosystems, or the degree of variation of life forms within a given area (Feest et al, 2010). Degradation of the ecosystem leads to a decrease in biodiversity which in turn negatively affects humans on both the global and local scale.

The World Health Organization estimates that 80 percent of the global population relies on medicines from nature as their primary source of health care (Herndon and Butler, 2010). Some of the

most important pharmaceuticals used every day are produced from plants, many of which rely on animals for their survival and reproduction. A decrease in biodiversity can also result in the development of new diseases. Through loss of habitat, ecosystems become less resilient and are unable to fight off disease as efficiently. Some of the most aggressive diseases acquired by humans have originated through crossover from animals during the process of forest development (Herndon and Butler, 2010). In Florida, the most rapidly diminishing ecosystem type is the scrub habitat. Scrub, which is one of the natural communities found on the UCF campus, has a sandy soil bottom that doesn't absorb large quantities of moisture. Instead, water from rainfall or runoff percolates through the sand into the water table, replenishing the aquifer below (UF School of Forest Resources and Conservation, 2010). Because of this soil type, and the fact that scrub is an upland ecosystem, it has been extensively developed for both urban and agricultural use. With less scrub available to supply water to the aquifer, and toxic runoff from urban development and the agricultural industry, the availability and contamination of drinking water in Florida could become significant issues if the scrub habitat is not preserved

Streams and other water sources are also very sensitive to impacts from urbanization, deforestation, and agriculture, and these impacts can lead to a decrease in biodiversity due to decreased water quality (Palmer et al, 2002). Toxins from the water supply can affect an animal not only through direct ingestion, but also through a process known as bioaccumulation, whereby the amount of a substance in an organism progressively increases because the rate of intake exceeds the organism's ability to remove the substance (International Union of Pure and Applied Chemistry, 1993). In other words, a larger predator who drinks from a contaminated water source also feeds on animals that drank contaminated water and so on up the food chain. This buildup of toxins can affect the health and survival of all species involved, including humans. Locally, UCF's pond pine community provides an example of how one small system can affect ecosystems many miles away. This community filters water from campus that makes its way into the Little Econ River which flows into the Big Econ River, where it eventually meets up with the St. John's River. Any toxins that flow into the system locally end up flowing through a waterway that spans throughout the state of Florida. The connectivity of these systems demonstrates how the management of wetlands on campus can affect others who use the water that travels to off campus sites.

Recreational use of a healthy ecosystem can provide both physical and mental health benefits. Studies have shown that exposure to "green nature" can reduce stress, boost immunity, reduce crime, and contribute to psychological well-being, among many other health benefits (Maller et al, 2002). The loss of visible wildlife and plant species may decrease the aesthetic quality of a natural area, while water

contamination and other health concerns, such as mosquito-borne illnesses, may make an area unsafe for human recreation. Protecting these areas and encouraging involvement in recreational activities creates awareness, which in turn instigates change. At UCF the majority of the student body is unaware of the outdoor recreational activities available on campus. Promoting awareness of these opportunities will in turn promote education and preservation.

Overall, biodiversity affects our health directly through diseases, contamination of food and water sources, and availability of medicinal resources, and indirectly through aesthetics and recreation. A healthy ecosystem serves as mankind's resource bank, making it essential to educate and promote sustainable use practices of the natural lands on UCF's main campus.

Our natural lands not only affect our health, but also our economy. Many countries' economies depend heavily on nature based tourism. For example, southern Africa receives the same revenue from nature based tourism as it does from farming, forestry, and fishing combined (Balmford et al, 2009). Florida is also heavily dependent on nature based tourism, with an overall economic impact of over $1 billion annually, the highest in the nation (Florida Fish and Wildlife Conservation Commission, 2010). With a decrease in biodiversity, these natural lands suffer and in turn could be lost permanently, having detrimental effects on the economies they help support. While UCF is not necessarily dependent on its natural lands as a major source of income, the land management techniques employed therein can affect the Floridian ecosystem as a whole, thereby impacting the overall economic value of Florida's lands.

Additional economic benefits of nature based tourism come from the awareness created by those who visit these natural lands. A positive first-hand experience may create a better awareness of a place's beauty and importance and inspire a stronger desire to protect it. Additionally, in order to protect these natural lands, jobs are created to educate visitors, maintain the ecosystem, and enforce the rules and regulations set to help preserve it. These positions benefit the economy by increasing employment opportunities as well as protecting and sustaining the environment for continued use. Educational programs in a community are also very important to create jobs and spread awareness to the youth. Maintaining a healthy biodiversity in our natural lands is essential to the economies that depend on the revenue and jobs created for their use and maintenance.

In order to prevent the social and economic concerns associated with a decrease in biodiversity, an emphasis must be placed on environmental sustainability. Environmental sustainability, defined by the United Nations World Commission on Environment and Development (1987), is "development that meets the needs of the present generation without compromising the ability of future generations to meet their

own needs." Speaking in terms of ecosystems, this is the maintenance of ecosystem components and functions for future generations. When attempting to achieve a high level of sustainability, there are many topics that must be considered, including ecosystem conservation, environmental restoration, recycling and waste management, enforcing environmental laws, and urban planning. In recent years, there have been great steps taken to increase environmental sustainability, resulting in increases in green technology, public awareness, and biodiversity. These are important steps, but there are still significant barriers to achieving an ideal level of sustainability, the most significant of which is a lack of awareness. Many people are undereducated on this subject and are generally unaware of the damage they can cause to their environment and what alternatives are available.

Education is a major component in environmental protection. When people become aware of how their individual actions affect the status of their environment, which in turn affects their lives both socially and economically, they begin to see the importance of environmental sustainability. Education using the triple bottom line model of sustainability is the starting point in protecting our environment and maintaining it for future generations. As part of a university campus, the UCF natural lands provide a perfect setting for promoting sustainability through research and education.

This study sought to determine which species of fauna might reside within the natural communities on UCF's main campus, which species are actually present and most easily observed, and how this information can be used to educate UCF students and the surrounding community about the sustainable use of these areas. Using the native wildlife to draw attention to the natural lands, the ultimate goal is to promote the triple bottom line model of sustainability through education, and to make understanding sustainable practices easier for those without a background in science.

Birds		
Common Name	**Scientific Name**	**Sighted?**
American Goldfinch	*Carduelis tristis*	Yes
American Kestrel	*Falco sparverius*	Yes
Anhinga	*Anhinga anhinga*	Yes
Bachman's Sparrow	*Aimophila aestivalis*	
Bald Eagle	*Haliaeetus leucocephalus*	Yes
Barred Owl	*Strix varia*	Yes
Belted Kingfisher	*Ceryle alcyon*	Yes
Chipping Sparrow	*Spizella passerina*	Yes
Common Moorhen	*Gallinula chloropus*	Yes
Common Nighthawk	*Chordeiles minor*	Yes
Cooper's Hawk	*Accipiter cooperii*	
Common Quail	*Cotumix cotumix*	
Crested Caracara	*Caracara cheriway*	
Double-crested Cormorant	*Phalacrocorax auritus*	Yes
Eastern Towhee	*Pipilo erythrophthalmus*	Yes
FL Burrowing Owl	*Athene cunicularia floridana*	Yes
Florida Sandhill Crane	*Grus canadensis pratensis*	Yes
Florida Scrub Jay	*Aphelocoma coerulescens*	
Florida Turkey	*Meleagris gallopavo osceola*	Yes
Glossy Ibis	*Plegadis falcinellus*	Yes
Gray Catbird	*Dumetella carolinensis*	Yes
Great Blue Heron	*Ardea herodias*	Yes
Great Egret	*Ardea alba*	Yes
Hooded Merganser	*Lophodytes cucullatus*	Yes
Killdeer	*Charadrius vociferus*	Yes
Little Blue Heron	*Egretta caerulea*	Yes
Northern Bobwhite	*Colinus virginianus*	Yes
Northern Cardinal	*Cardinalis cardinalis*	Yes
Osprey	*Pandion haliateus*	Yes
Red-bellied Woodpecker	*Melanerpes carolinus*	Yes
Red-Cockaded Woodpecker	*Picoides borealis*	
Red-shoulder Hawk	*Buteo lineatus*	Yes
Ring-necked Duck	*Aythya collaris*	Yes
SE American Kestrel	*Falco sparverius paulus*	Yes
Short Tailed Hawk	*Buteo brachyurus*	
Snail Kite	*Rostrhamus sociabilis plumbeus*	
Snowy Egret	*Egretta thula*	
Swallow-tailed kite	*Elanoides forficatus*	
Tricolored Heron	*Egretta tricolor*	Yes
White Ibis	*Eudocimus albus*	
Wood Stork	*Mycteria americana*	Yes

Mammals		
Common Name	**Scientific Name**	**Sighted?**
Big Brown Bat	*Eptesicus fuscus*	
Eastern Gray Squirrel	*Sciurus carlinensis*	Yes
Florida Black Bear	*Ursus americanus floridanus*	
Florida Mouse	*Podomys floridanus*	
Florida long-tailed weasel	*Mustela frenata peninsulae*	
Florida Panther	*Puma concolor coryi*	
Gray Bat	*Myotis grisescens*	
Gray Fox	*Urocyon cinereoargenteus*	Yes
Nine-banded Armadillo	*Dasypus novemcinctus*	Yes
Northern River Otter	*Lontra canadensis*	Yes
Raccoon	*Procyon lotor*	Yes
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	
Round-tailed Muskrat	*Neofiber alleni*	Yes
Southeastern Bat	*Myotis austroriparius*	
Southeastern Fox Squirrel	*Sciurus niger niger*	
Tufted Titmouse	*Baeolophus bicolor*	Yes
White-tailed Deer	*Odocoileus virginianus*	Yes
Sherman's Fox Squirrel	*Sciurus niger shermani*	
Southeastern Weasel	*Mustela frenata olivacea*	

Amphibians		
Common Name	**Scientific Name**	**Sighted?**
Barking Treefrog	*Hyla gratiosa*	
Bull Frog	*Rana catesbeiana*	
Carpenter Frog	*Rana virgatipes*	
Cuban Treefrog	*Osteopilus septentrionalis*	
Dusky Salamander	*Desmognathus auriculatus*	
Eastern Narrowmouth Toad	*Gastrophryne carolinensis*	
Frosted Flatwoods Salamander	*Ambystoma cingulatum*	
Greater Siren	*Siren lacertina*	
Green Frog	*Rana clamitans*	
Green Treefrog	*Hyla cinerea*	
Ground Skink	*Scincella lateralis*	Yes
Lesser Siren	*Siren intermedia*	
Little Grass Frog	*Pseudacris ocularis*	
Many-lined Salamander	*Stereochilus marginatus*	
Oak Toad	*Bufo quercicus*	
One-toed Amphiuma	*Amphiuma pholeter*	
Pig Frog	*Rana grylio*	
Pinewoods Treefrog	*Hyla femoralis*	
Reticulated Flatwoods Salamander	*Ambystoma bishopi*	
Sand Skink	*Neoseps reynoldsi*	
Southern Cricket Frog	*Acris gryllus*	
Southern Leopard Frog	*Rana sphenocephala utricularia*	Yes
Southern Toad	*Bufo terrestris*	
Squirrel Treefrog	*Hyla squirella*	
Striped Newt	*Notophthalmus perstriatus*	
Two-Toed Amphiuma	*Amphiuma means*	Yes

Reptiles		
Common Name	**Scientific Name**	**Sighted?**
American Alligator	*Alligator mississippiensis*	
Black Racer	*Coluber constricter priapus*	Yes
Brown Anole	*Anolis sagrei*	
Coral Snake	*Micrurus fulvius fulvius*	Yes
Eastern Diamondback Rattlesnake	*Crotalus adamanteus*	Yes
Eastern Fence Lizard	*Sceloporus undulatus*	
Eastern Gater Snake	*Thamnophis sirtalis sirtalis*	Yes
Florida Box Turtle	*Terrapene carolina bauri*	Yes
Florida Pine Snake	*Pituophis melanoleucus mugitus*	Yes
Florida Red-Bellied Cooter	*Pseudemys nelsoni*	
Florida Scrub Lizard	*Sceloporus woodi*	
Gopher Frog	*Rana capito*	
Gopher Tortoise	*Gopherus polyphemus*	Yes
Green Anole	*Anolis carolinensis*	
Hognose Snake	*Heterodon simus*	
Indigo Snake	*Drymarchon corais couperi*	
Short Tailed Snake	*Stilosoma extenuatum*	
Six-lined Racerunner	*Cnemidophorus sexlineatus sexlineatus*	Yes
Spotted Turtle	*Clemmys guttata*	
Striped Mud Turtle	*Kinosternon baurii*	Yes
Timber Rattlesnake	*Crotalus horridus*	
Yellow Ratsnake	*Coelognathus flavolineatus*	Yes

Figure 3: List of possible species found in the natural communities on the UCF campus

METHODS

In order to accomplish the proposed goals, it was first necessary to determine which species of birds, mammals, amphibians, and reptiles were likely to be spotted based on the habitats surrounding the trails. This was accomplished using a map of the UCF natural communities (Fig. 2) and the Florida Natural Areas Inventory (FNAI) website (http://www.fnai.org/descriptions.cfm) as a guide. By considering the typical habitat, most active time of day, feeding and social habits, and camouflaging techniques of the documented species, the most effective observation methods were determined, and a field work schedule was created with 16 work dates (4 days a week for each of the 4 weeks). Each work date had two scheduled observation times, one in the morning and one in the afternoon or evening. The morning times were daily from 7:30 am - 8:30 am and the afternoon times were from 12:00 pm - 1:00 pm on Tuesday and Thursday. The evening times were on Monday and Wednesday from 6:00 pm - 7:00 pm before daylight savings time, and from 5:00 pm - 6:00 pm after the time change. Monday and Tuesday times were spent on the Lake Claire trail, and Wednesday and Thursday times were spent on the Wildflower Loop. For each hour of observation, two or three group members walked the trail, photographing and documenting any wildlife observed, and recording the time, the number of individuals seen, trail and habitat in which it was spotted (photographs were taken on basic point-and-shoot digital cameras). Additionally, any evidence of the earlier presence of animals (footprints, remains, etc.) was photographed and documented.

In the third week of the study two stealth cameras, a bird feeder, and five minnow traps were acquired. One of the cameras was used to photograph mammal traffic near the ground, while the other was placed in front of a birdfeeder suspended from a tree. The mammal camera was affixed approximately 3 feet off the ground to a tree for five days at each of three separate locations on the Lake Claire Trail. The birdfeeder and the second camera were hung from trees (~5-7ft. off the ground) near the Lake Claire Trail for 7 days and near the Wildflower Loop for 7 days. The photographs were obtained at the end of each time period.

The five minnow traps were placed in a small creek that runs from pond 2-H near the softball field for five days (after the first day, one of the traps was missing). Each trap was checked twice daily, once in the morning and once in the afternoon, and any wildlife caught was photographed and released. On the fifth afternoon, the traps were collected for the weekend. The following week, an additional 10 traps were acquired. The 14 traps were split between two locations. Seven were placed on the edge of a pond near Lake Claire, and seven were placed in a small marsh near pond 2-H. The traps were checked

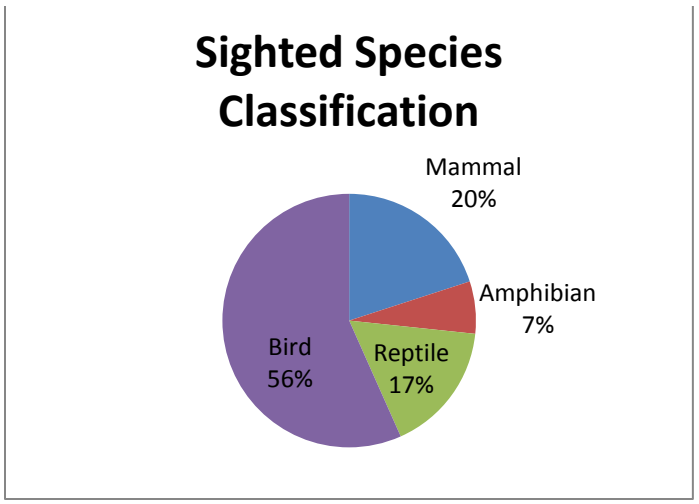
twice daily (once in the morning, and once in the afternoon) for five days, and collected on the fifth afternoon. Any animal caught was photographed and released.

When the field study was complete, all of the photographs and data were compiled, and each photographed species was identified and catalogued with their common and scientific names, as well as a "fun fact" about each animal. A pie chart was created demonstrating the proportions of each taxon (bird, mammal, reptile, and amphibian) spotted. Additionally, the data was analyzed to determine the frequency of instances in which each species was observed, the time at which each individual was spotted, and the type of habitat in which each individual was seen. This information was used to create charts demonstrating which species visitors are more likely to see, during which time of day, and in which habitat.

OUTCOMES AND RESULTS

Throughout this study, 30 different species of fauna were successfully spotted (Table 1). Of the animals observed, 56% were birds, 20% were mammals, 17% were reptiles, and 7% were amphibians (Graph 1). The number of different species spotted in each ecosystem was counted (Graph 2 and Table 2), and the data show that the mesic flatwoods ecosystem on campus displays the highest amount of biodiversity, with 21 species spotted. In fact, 70% of the species sighted during fieldwork were spotted at least once in a mesic flatwoods ecosystem (Table 3), and 57% of the species spotted were most commonly sighted in a mesic flatwoods ecosystem (Graph 3 and Table 4). The depression marsh and scrub habitats show the lowest biodiversities, with only one individual of one species spotted in each ecosystem throughout the observation period. The data also revealed that sunrise is the time most likely to display the largest diversity of animals, with 70% of the species identified being most commonly seen at sunrise (Graph 4 and Table 5). The species most commonly spotted at sunrise was the Northern Mockingbird with 25 sightings, the two species most commonly spotted at noon were the American White Ibis and the Black Vulture with 14 and 12 sightings respectively, and the species most commonly spotted at sunset was the mourning dove with 6 sightings (Table 5).

GRAPH 1: CLASSIFICATION OF SPECIES SPOTTED



GRAPH 2: TOTAL NUMBER OF SPECIES SPOTTED IN EACH ECOSYSTEM

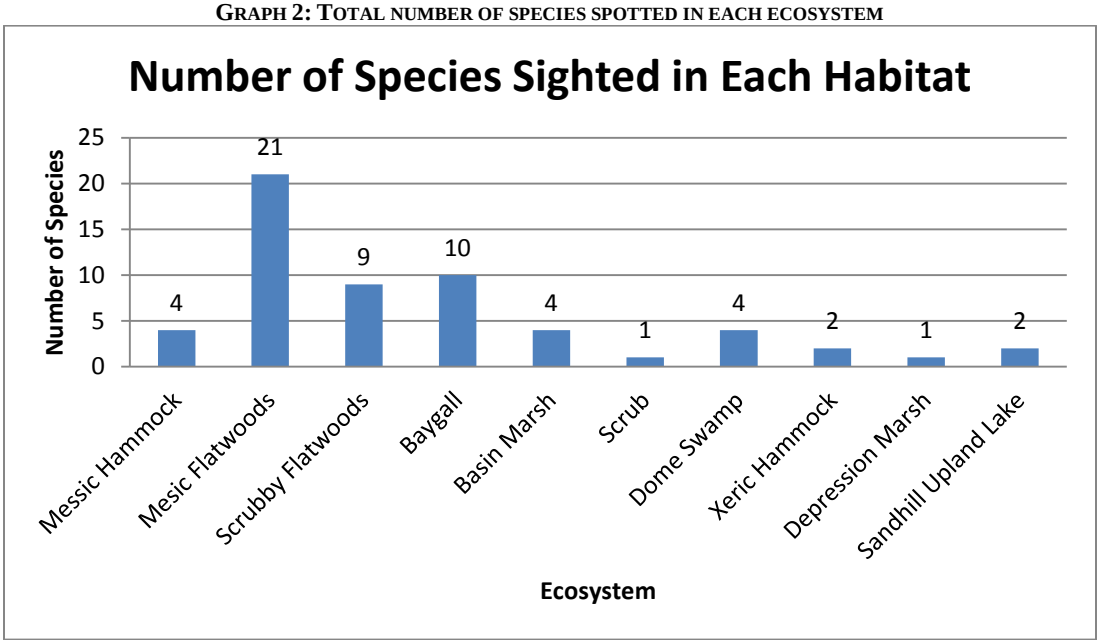


TABLE 1: LIST OF SPECIES IDENTIFIED DURING FIELD WORK

1) **Northern Mockingbird**, *Mimus polyglottos*	16) **Barred Owl,** *Strix varia*
2) **Black Vulture**, *Coragyps atratus*	17) **Carolina Anole,** *Anolis carolinensis*
3) **Eastern Gray squirrel**, *Sciurus carolinensis*	18) **Brown Anole**, *Anolis sagrei* (or *Norops sagrei*)
4) **Common Cardinal,** *Cardinalis cardinalis*	19) **Southern Black Racer,** *Coluber constrictor priapus*
5) **Gray Catbird,** *Dumetella carolinensis*	20) **Anhinga,** *Anhinga anhinga*
6) **Boat-tailed Grackle,** *Quiscalus major*	21) **Nine-Banded Armadillo,** *Dasypus novemcinctus*
7) **Red-bellied Woodpecker**, *Melanerpes carolinus*	22) **Marsh Rabbit,** *Sylvilagus palustris*
8) **Mourning Dove,** *Zenaida macroura*	23) **Oak Toad,** *Anaxyrus quercicus*
9) **Great Egret,** *Ardea alba*	24) **Common Moorhen**, *Gallinula chloropus*
10) **Wood Stork,** *Mycteria americana*	25) **Florida Box Turtle**, *Terrapene carolina bauri*
11) **Mallard Duck,** *Anas platyrhynchos*	26) **Cricket Frog**, *Acris gryllus*
12) **American Crow,** *Corvus brachyrhynchos*	27) **Gopher Tortoise**, *Gopherus polyphemus*
13) **Little Blue Heron**, *Egretta caerulea*	28) **Feral Dog,** *Canis lupus familiaris*
14) **Raccoon,** *Procyon lotor*	29) **White-Tailed Deer,** Odocoileus virgiinianus
15) **American White Ibis,** *Eudocimus albus*	30) **Pileated Woodpecker**, *Dryocopus pileatus*

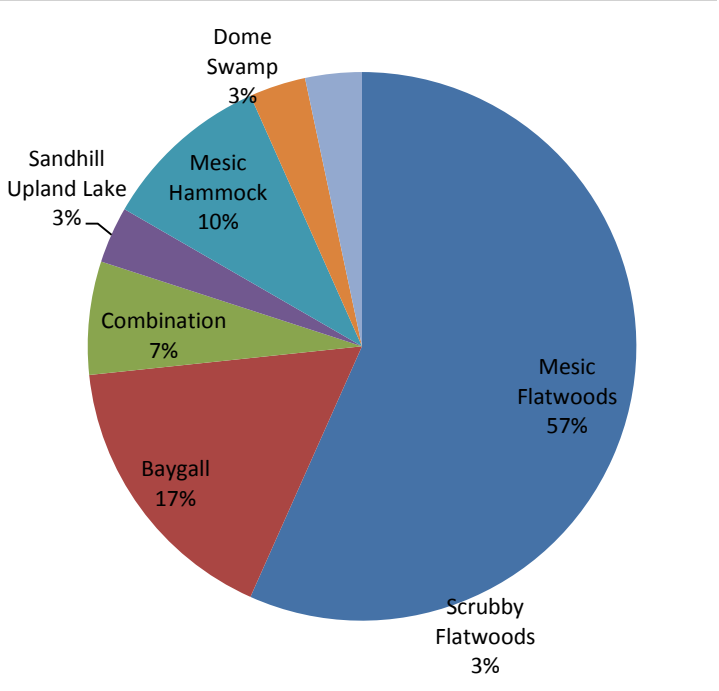
TABLE 2: TOTAL NUMBER OF INDIVIDUALS OF EACH SPECIES OBSERVED IN EACH ECOSYSTEM

Messic Hammock	Mesic Flatwoods	Scrubby Flatwoods	Baygall	Basin Marsh	Scrub	Dome Swamp	Xeric Hammock	Depression Marsh	Sandhill Upland Lake
1 White Tailed Deer	19 White Ibis	6 Northern Mockingbird	1 Anhinga	1 Oak Toad	1 Common Cardinal	6 Mourning Dove	2 Boat-Tailed Grackle	1 Great Egret	1 Great Egret
1 Marsh Rabbit	8 Eastern Grey Squirrel	2 Boat-Tailed Grackle	1 Green Anole	1 Great Egret		4 Cricket Frog	1 Red-Bellied Woodpecker		2 Raccoon
1 Nine Banded Armadillo	7 Great Egret	1 Eastern Grey Squirrel	3 Eastern Grey Squirrel	1 Wood Stork		1 Boat-Tailed Grackle			
1 Brown Anole	2 Common Cardinal	1 Mourning Dove	3 Mourning Dove	1 Eastern Grey Squirrel		1 Red-Bellied Woodpecker			
	2 Boat-Tailed Grackle	1 Oak Toad	5 Common Cardinal						
	3 Common Moorhen	1 Feral Dog	1 Barred Owl						
	19 Northern Mockingbird	4 Common Cardinal	1 Mallard Duck						
	8 Mourning Dove	2 Red-Bellied Woodpeckers	2 Northern Mockingbird						
	1 Great Blue Heron	7 Black Vulture	4 Gray Catbird						
	6 Red-Bellied Woodpecker		1 Black Vulture						
	9 Black Vulture								
	3 Brown Anole								
	1 Green Anole								
	3 Wood Stork								
	1 Southern Black Racer								
	1 Little Blue Heron								
	3 American Crow								
	2 Gray Catbird								
	1 Pileated Woodpecker								
	1 Florida Box Turtle								
	1 Gopher Tortoise								

TABLE 3: NUMBER OF SPECIES SPOTTED IN EACH ECOSYSTEM EXPRESSED AS A PERCENTAGE OF THE TOTAL NUMBER OF SPECIES SPOTTED.

Habitat	Number of Species Sighted	Total Species	% of Species Sighted
Mesic Flatwoods	21	30	70%
Baygall	10	30	33.33%
Scrubby Flatwoods	9	30	30%
Messic Hammock	4	30	13.33%
Basin Marsh	4	30	13.33%
Dome Swamp	4	30	13.33%
Xeric Hammock	2	30	6.66%
Sandhill Upland Lake	2	30	6.66%
Scrub	1	30	3.33%
Depression Marsh	1	30	3.33%

GRAPH 3: THE NUMBER OF SPECIES MOST COMMONLY SPOTTED IN EACH ECOSYSTEM EXPRESSED AS A PERCENT OF



GRAPH 4: NUMBER OF SPECIES MOST COMMONLY SPOTTED DURING EACH TIME BRACKET AS A PERCENTAGE OF THE TOTAL NUMBER OF

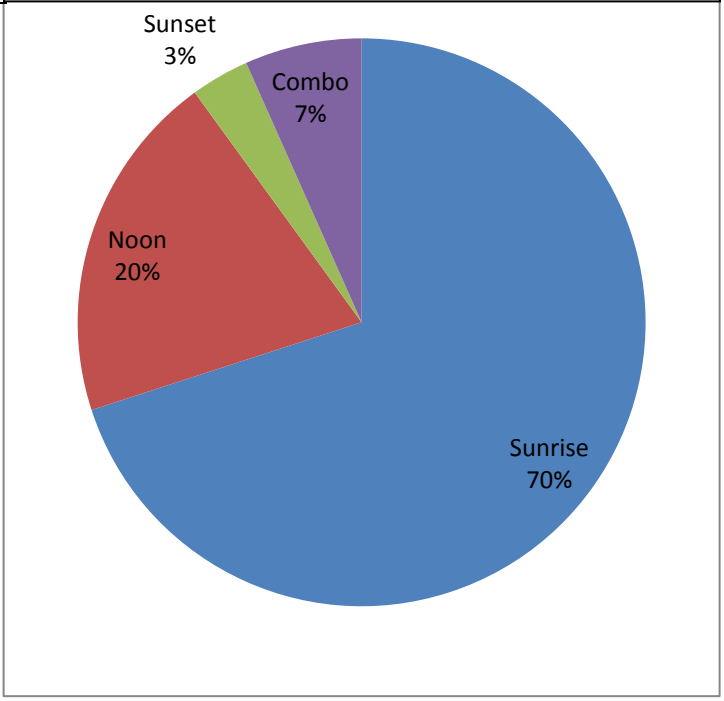


TABLE 4: ECOSYSTEM EACH SPECIES WAS SPOTTED IN THE MOST FREQUENTLY.	
Species	**Habitat Spotted in Most Often**
1) Northern Mockingbird, *Mimus polyglottos*	Mesic Flatwoods
2) Black Vulture, *Coragyps atratus*	Mesic Flatwoods
3) Eastern Gray squirrel, *Sciurus carolinensis*	Mesic Flatwoods
4) Common Cardinal, *Cardinalis cardinalis*	Baygall
5) Gray Catbird, *Dumetella carolinensis*	Baygall
6) Boat-tailed Grackle, *Quiscalus major*	Mesic Flatwoods, Scrubby Flatwoods, and Xeric Hammock
7) Red-bellied Woodpecker, *Melanerpes carolinus*	Mesic Flatwoods
8) Mourning Dove, *Zenaida macroura*	Mesic Flatwoods
9) Great Egret, *Ardea alba*	Mesic Flatwoods
10) Wood Stork, *Mycteria americana*	Mesic Flatwoods
11) Mallard Duck, *Anas platyrhynchos*	Baygall
12) American Crow, *Corvus brachyrhynchos*	Mesic Flatwoods
13) Little Blue Heron, *Egretta caerulea*	Mesic Flatwoods
14) Raccoon, *Procyon lotor*	Sandhill Upland Lake
15) American White Ibis, *Eudocimus albus*	Mesic Flatwoods
16) Barred Owl, *Strix varia*	Baygall
17) Carolina Anole, *Anolis carolinensis*	Mesic Flatwoods
18) Brown Anole, *Anolis sagrei* (or *Norops sagrei*)	Mesic Flatwoods
19) Southern Black Racer, *Coluber constrictor priapus*	Mesic Flatwoods
20) Anhinga, *Anhinga anhinga*	Baygall
21) Nine-Banded Armadillo, *Dasypus novemcinctus*	Mesic Hammock
22) Marsh Rabbit, *Sylvilagus palustris*	Mesic Hammock
23) Oak Toad, *Anaxyrus quercicus*	Basin Marsh and Scrubby Flatwoods
24) Common Moorhen, *Gallinula chloropus*	Mesic Flatwoods
25) Florida Box Turtle, *Terrapene carolina bauri*	Mesic Flatwoods
26) Cricket Frog, *Acris gryllus*	Dome Swamp
27) Gopher Tortoise, *Gopherus polyphemus*	Mesic Flatwoods
28) Feral Dog, *Canis lupus familiaris*	Scrubby Flatwoods
29) White-Tailed Deer, Odocoileus virgiinianus	Mesic Hammock
30) Pileated Woodpecker, *Dryocopus pileatus*	Mesic Flatwoods

TABLE 5: THE TOTAL NUMBER OF TIMES EACH SPECIES WAS SPOTTED DURING EACH TIME BRACKET.

	Sunrise	**Noon**	**Sunset**	
Sighted Species	7:30am-8:30am	12pm-1pm	5pm-6pm	Most Likely to See
American Crow, *Corvus brachyrhynchos*	3			AM
American White Ibis, *Eudocimus albus*	5	14		NOON
Anhinga, *Anhinga anhinga*	1			AM
Barred Owl, *Strix varia*	1			AM
Black Vulture, *Coragyps atratus*		12	3	NOON
Boat-tailed Grackle, *Quiscalus major*	3	3	1	AM/NOON
Brown Anole, *Anolis sagrei* (or *Norops sagrei*)		3	1	NOON
Carolina Anole, *Anolis carolinensis*	1	1		AM/NOON
Common Cardinal, *Cardinalis cardinalis*	11	2	4	AM
Common Moorhen, *Gallinula chloropus*	3			AM
Cricket Frog, *Acris gryllus*	4			AM
Eastern Gray squirrel, *Sciurus carolinensis*	11	2		AM
Feral Dog, *Canis lupus familiaris*	1			AM
Florida Box Turtle, *Terrapene carolina bauri*		1		NOON
Gopher Tortoise, *Gopherus polyphemus*		1		NOON
Gray Catbird, *Dumetella carolinensis*	5		1	AM
Great Egret, *Ardea alba*	7	2	1	AM
Little Blue Heron, *Egretta caerulea*			1	PM
Mallard Duck, *Anas platyrhynchos*	1			AM
Marsh Rabbit, *Sylvilagus palustris*	1			AM
Mourning Dove, *Zenaida macroura*	11	1	6	AM
Nine-Banded Armadillo, *Dasypus novemcinctus*			1	PM
Northern Mockingbird, *Mimus polyglottos*	25	1	4	AM
Oak Toad, *Anaxyrus quercicus*	2	1		AM
Pileated Woodpecker, *Dryocopus pileatus*	1			AM
Raccoon, *Procyon lotor*	2			AM
Red-bellied Woodpecker, *Melanerpes carolinus*	7	1	2	AM
Southern Black Racer, *Coluber constrictor priapus*		1		NOON
White-Tailed Deer, Odocoileus virgiinianus	1			AM
Wood Stork, *Mycteria americana*	3	1		AM

CHANGES FROM PROPOSAL

Throughout the progression of this study, obstacles were encountered that required that some of the originally proposed goals and methods be altered. Most notably, the proposal stated that vocalizations would be collected for use in the UCF Landscape and Natural Resources website. However, the recording of vocalizations on the trails was dismissed, due to the difficulty of accurate identification of bird and amphibian species based on calls alone. Additionally, because the bird mating season was over and migration had begun, species were also unavailable to record in captivity (at the proposed wildlife rehabilitation centers). Only one vocal amphibious species was caught in the traps, and it made no audible vocalizations at the time of observation/release. Furthermore, without the use of a directional microphone, the few vocalizations that were recorded were of insufficient quality for use on the website.

Another of the goals stated in the proposal was to develop new ways to draw attention to the existence and location of the campus trails and educate students about their sustainable use. Because so much time was required for the proper collection and analysis of data, there wasn't enough time left to fully develop and implement these plans. However, ideas and suggestions were formulated for possible use and implementation within future projects.

The methods originally proposed were slightly altered on several occasions. The original plans called for two to three group members to be out at designated times on a specific trail, and only collecting data during that time. It was later determined that one person would be in charge of setting and checking the cameras and traps, and would be on a different schedule in order to check the traps twice daily. Because it was impossible to set the traps and cameras directly on the designated trails, locations were chosen that were either close to the trails or in the same type of habitat. Additionally, any wildlife that was spotted outside of the scheduled observation times/areas was recorded in an attempt to document as many species on campus as possible. These observations were used as sightings, but were not used in the charts and graphs due to their lack of specificity. Also, while some of the photographs presented in the "fun facts" and for use on the website were collected from off-campus locations for better quality, photos were only used for species that were observed on campus, and were only taken by members of the group.

BARRIERS ENCOUNTERED AND SOLUTIONS

The primary barrier encountered throughout field study was simply visualizing species. Despite a range of surveying times throughout the day (including dawn and dusk to increase chances of sighting

crepuscular species), there were many days in which only one or a few animals were encountered. Frequently, it was difficult to distinguish the species of a visualized animal, due either to lack of familiarity with the organism or to visual and photographic barriers such as low light, fog, or foliage. A possible solution to these issues would be for future groups to have a strong prior knowledge of species identification, or to study the morphology of probable species in detail beforehand. The use of binoculars and cameras with a good zoom lens might also help with visual identification. It is also highly possible that the low numbers of species spotted was a result of the cooler weather of fall and early winter. Surveying throughout the seasons would probably produce more well-rounded results.

Flight distance (the distance at which one can approach an animal before it flees) became a significant issue, as many animals fled at such a great distance that identification was frequently impossible. A likely contributor to this was the "group scare factor", as most surveying trips included multiple group members "walking the trails" in order to match more precisely what a hiker might actually see. A solution to this issue is difficult however. Although having only one person on the trail might reduce the chances of scaring wildlife, having multiple sets of eyes to spot and identify species can be very useful. One possible solution is to designate certain points along the trails as "stop points", at which group members would remain stationary and quietly observe for 10-15 minutes, allowing wildlife to acclimate to their presence.

One of the main aspects of this project, in the beginning, was to capture bird and frog calls to use as media examples for the UCF Landscape and Natural Resources website. However, because of the lack of species producing clear, highly audible vocalizations, the group's inexperience in identifying wild calls, and an inability to record isolated ("noise-free") sound with the available equipment, this goal was unattainable. One potential solution to this would be to plan the project at a time of year when many bird and amphibian species breed allowing for more potential sighting and recording opportunities, both in the wild and in captivity. Another possible (but expensive) solution is to acquire a directional microphone for high quality recording. The most plausible solution, however, is to obtain previously recorded calls to use on the website (with proper credit given and/or permission received from the source)

There were some minor issues with the wildlife cameras and minnow traps, the most significant one being time. More trial and error time in order to determine the best locations for the cameras and traps would almost certainly allow for more successful capture. Additionally, the birdfeeder blowing in the wind caused the camera to be tripped very frequently and drained the batteries. This is easily solved by a simple adjustment of the camera settings (for a longer "hibernation" between activations), or by finding a way to anchor the feeder. To improve the number of bird species photographed, it may be

beneficial in the future to try a different type of feeder (to attract larger birds), or leave the feeder out longer to acclimate the birds to its presence.

Because of habitat saturation along the trails and other underlying factors that could have created aberrations, the data analysis results may be partially skewed. The data revealed that the "mesic flatwoods" ecosystem on campus shows the highest biodiversity. This result could be an anomaly, as mesic flatwoods are the most highly represented natural community along the trails surveyed. Also, analysis revealed that the "scrub" and "depression marsh" ecosystems had the lowest biodiversity of the campus ecosystems. However, since they are the least represented systems along the trails, this may not be an accurate result. Other limiting factors could be that species along these trails were less visible because of camouflage techniques, their feeding and social habits, or the time of day at which they are most active. Further study is required to determine the accuracy of these results.

SUGGESTIONS FOR PROJECT IMPROVEMENT

Because this was a project that had not been previously attempted, there were many directions that could have been taken. With few guidelines and restrictions, the group decided on an ambitious project to catalogue species on campus and use the wildlife to promote sustainable use of the natural lands. Since the species had not been previously catalogued, the observation and identification of species took up a majority of the allotted time. In the future, it might be easier to split the project back into two topics, allowing one group to focus solely on the biodiversity of species on campus, and another to work on raising awareness about the campus natural lands.

Some ideas to improve the species identification portion of the project include acquiring mammal and reptile traps, in order to capture some of the more evasive members of those groups. Setting up multiple bird feeders and bird houses of different sizes and varieties with more cameras and binoculars might help to more easily identify bird species. Additionally, collaborating with other classes in the biology department would help to collect much larger amounts of information with the help of more people and more equipment. Most importantly, more time needs to be spent observing and documenting the wildlife on campus, so that the data include all times of day, and all seasons of the year (or as many as possible).

In order to draw attention to the natural lands and promote their sustainable use, the most unanimous suggestion was to make the trails more visible and keep them clean. In order to accomplish

this, larger signs could be placed at the trailheads, with the name of the trail and its distance from start to finish. Creating programs such as “adopt-a-trail”, and advertising trail clean-up days to clubs, fraternities, and sororities could help with trail maintenance. UCF could also offer trail maintenance duties as community service to volunteers or those required to perform community service. Also, collaboration with other departments to design contests or assignments would help members of the student body to become aware of the natural lands while completing projects to improve them. Some ideas include projects by art students to create attractive signs, wildlife photography contests to add quality photos to the website, or having graphic design and programming students create web sites or mobile applications. Also, future groups could consider doing surveys around campus to find out what students already know about sustainability and the natural lands, and to find out what they think should be done.

With a few minor exceptions, most of the goals initially proposed for this project were either met or started. A solid foundation was laid for future projects to continue to catalogue UCF’s native species of fauna, and use them as a medium to promote the triple bottom line model of sustainability.

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