

A white egret is perched on a dark tree branch in the center-left of the frame. The background is a bright, hazy sky with soft, golden light, suggesting a sunset or sunrise. The foreground and midground are filled with dark, silhouetted foliage and branches, creating a sense of depth and a natural habitat.

Wading Bird Conservation: Engaging zookeepers and guests

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As zookeepers, we want to fit conservation research and guest education into our daily routines but it can be difficult. In addition to creating these experiences around collection animals, guests need to be educated about the animals that they encounter every day. Native wading birds have long been associated with the many waterways of Florida and can be observed daily around the Walt Disney World Resort (WDW). In 2016, I was tasked with being the zookeeper liaison for a wild ibis study at Disney's Animal Kingdom®. I had worked with our avian collection for the past two years and am passionate about bird conservation. Over the past three years, this study has evolved from a count of birds to a breakdown by species of the seasonal shifts in population of American white ibis and great egrets at this roost location. I was able to use my experience with designing and leading the research study to create a guest interaction that teaches guests about research methods, threats to wading birds, and avian conservation.

WDW has a total size of 10360 hectares and supports both non-breeding roosts and rookeries of wading birds in the undeveloped areas of the resort. Disney's Animal Kingdom® occupies 2.3% of that space and has the only ibis and egret roost that is located on the developed portion of WDW. Beginning in March 2016, native wading birds (primarily white ibis and great egrets) from this roost were monitored to determine the value of Disney's Animal Kingdom® as habitat for wading birds and how these birds would respond to increased

Great egret. (left)
Photo by A. Rogerson

nocturnal human activity due to the construction of Pandora - The World of Avatar.

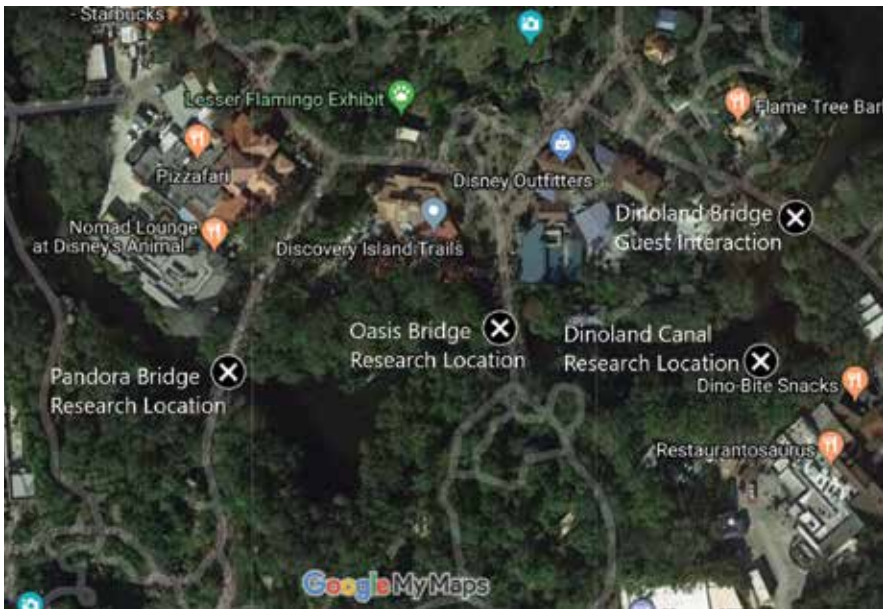
The American white ibis (*Eudocimus albus*) is a medium-sized white bird with dark wing tips and a pink face, legs, and bill. Great egrets (*Ardea alba*) are all-white birds with long black legs and feet; they have a long neck and a yellow bill. Both species use a variety of freshwater and marine environments. The ibis has a long decurved bill which it uses to probe for aquatic crustaceans, insects, and fish in shallow water. Great egrets hunt by bill thrusting and eat fish, invertebrates, amphibians, reptiles, birds, and small mammals. In North America, ibis can be found from coastal Virginia through Louisiana and Texas and inland from the coast of South Carolina through Florida (Kushlan & Bildstein, 2009) while great egrets are found throughout most of the country. White ibis are more often found traveling and foraging in groups than great egrets, but both species will land near other wading birds at foraging sites (Smith, 1995).

Colonial waterbirds serve as indicators of habitat suitability (Gawlik, Slack, Thomas, & Harpole, 1998), which is one reason it is important to study native wading birds at Disney's Animal Kingdom®. The American white ibis (*Eudocimus albus*), in particular, has become a symbol for wetland conservation and restoration (Kushlan & Bildstein, 2009). Large flocks of white wading birds are an indicator to visitors that they have arrived in Florida. Ibis are gregarious and roost together, usually in the tops of dead trees, and often are found in close proximity to other wading birds like great egrets



White ibis. Photo by G. Mueller.

(Smith, 1995). They are nomadic with frequent shifts in roost and rookery sites. They also exhibit a variable breeding season in response to fluctuating water levels and prey availability, with colonies disbanding and reforming in less than a year (Frederick, Bildstein, Fleury, & Ogden, 1996; Frederick & Ogden, 1997; Kushlan, 1986; Kushlan & Bildstein, 2009). Nest building is usually seen in late February to June when large numbers of ibis gather to form colonial nesting rookeries (Kushlan & Bildstein, 2009; Rumbold, Morrison, & Bruner, 2009). Egrets are migratory with a breeding season lasting from December through September (McCrimmon Jr, Ogden, & Bancroft, 2011); they are also colonial nesters and are often observed nesting with other species of waterbirds. Since white ibis respond quickly to changes in water levels and are also nomadic, they are excellent indicators of habitat quality and ideal for monitoring the effects of restoration attempts (Frederick, Gawlik, Ogden, Cook, & Lusk, 2009; Gawlik et al., 1998; Melvin, Gawlik, & Scharff, 1999). Studying the population dynamics of birds like these helps to inform conservation strategies for long-



A non-breeding roost at Disney's Animal Kingdom® was historically found on the canal system directly next to where Pandora was being built, but after construction began the birds moved closer to Dinoland.

lived, nomadic, and far-ranging species (Frederick & Ogden, 1997).

Threats to the white ibis include land development, water management issues, and water contaminants (Kushlan & Bildstein, 2009). In fact, the ibis population in Florida declined by over 50% between the late 1970s and late 1980s due to loss of habitat (Frederick et al., 1996; Frederick & Ogden, 1997). Current threats to the great egret include habitat loss and degradation, pesticide exposure, and ingestion of mercury (McCrimmon Jr. et al., 2011). Development continues to be common throughout the state of Florida, including theme park improvements, which highlights the importance of designing developments in a manner that supports wading bird habitat if their populations are to be conserved in the long-term.

This non-breeding roost at Disney's Animal Kingdom® was historically found on the canal system directly next to where Pandora was being built, but after construction began the birds moved closer to Dinoland; construction took place from February 2014 through May 2017. From February 2014 until April 2016, retail employees counted the number of wading birds that landed in the roosting area from the Dinoland bridge; they were doing this on behalf

of the Conservation team. They only recorded the number of birds without a subdivision into species. Although this location gave an estimate of the birds coming to roost each night, a significant portion of the canal was not visible. In March of 2016, keepers from the Night team were asked to take over the survey. This team has more access to the canal bank where there is better visibility of the roost; they are also able to identify birds by species to provide more comprehensive data.

Twice a month (15th and 30th), one or more keepers heads to the canal to record the current roost population of ibis and great egrets. The study time starts at 30 minutes before sunset and ends at 15 minutes post-sunset. We include any birds already roosted when we arrive then add in all those who fly in. I was trained on bird identification and study protocols by a member of the Conservation team. I then facilitated the training of the other researchers using a bird identification PowerPoint, practice studies, and direct observation. We focus specifically on white ibis, great egrets, and little blue herons but record all avian species. We occasionally see anhingas, hawks, owls, ducks, cattle egrets, green herons, and snowy egrets. Many of the zookeepers have a favorite among the rarer species; mine is the cattle egret. I am drawn to the mix of

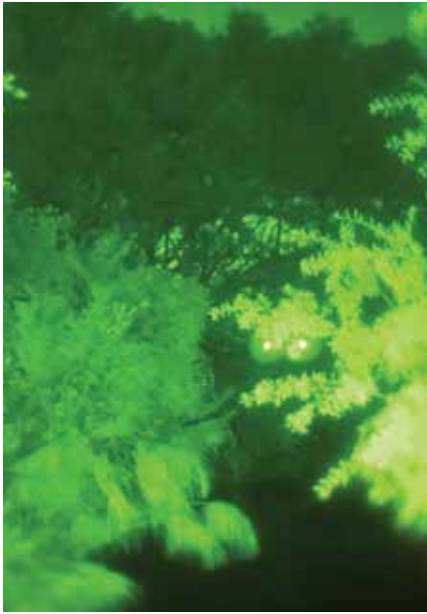


Researcher in action. Photo by M. Johnson.

white and golden feathers and I like that they are often found in proximity to bovids, which is my other favorite group of animals. The study site has changed locations a few times. After the Pandora construction was complete, the majority of the birds moved back to the original roost site for a short time. Due to visibility issues, two keepers were needed for each study time frame. The best visibility for this location was on the two bridges going into the Oasis area and Pandora but each only afforded a view of half the roosting area.



Guest interaction supplies. Photo by M. Johnson



Night vision picture of the roost.
Photo by M. Johnson.

While the Dinoland canal bank is tucked down in the trees, these bridge locations were in guest areas. This is where the idea of teaching guests about our study was born as there was a lot of interest in what we were doing on the bridges with our binoculars. After five months in this location, the ibis returned to the Dinoland location.

We recorded anywhere from 0 to a high of 949 white ibis and 107 great egrets. The lowest days were attributable to cold or inclement weather. This same pattern was observed while monitoring a roost at another location; the ibis failed to show up during unusually cold or rainy weather. The ebb and flow of the population matches up with the breeding season for each species. The roost at Disney's Animal Kingdom® has persisted for over five years which is unusual for such a nomadic species. This may be related to the constant water levels in the canal as Beerens, Gawlik, Herring, and Cook (2011) showed that habitat selection is heavily predicted by water depth and Bancroft, Gawlik, and Rutchey (2002) found that water depth and vegetation community affects the abundance of wading birds. Less than 30% of ibis colonies are active for more than five years, due to the food supply, habitat degradation, and predation risk (Frederick & Ogden, 1997; Rumbold et al., 2009). Another reason for the consistent presence of these wading birds

is the year-round availability of food from theme park guests and animal exhibits. In the absence of humans, food availability (consisting primarily of freshwater crustaceans) is driven by short-term rainfall events and the seasonal wet and dry periods (Beerens et al., 2011) but food is always available to birds which are willing to scavenge, beg, or steal food from other animals or humans. Also, there is an absence of large mammalian predators at Disney's Animal Kingdom® as these animals are prevented from entering the park by an electric fence system. There are ibis at the roost year-round, though it is unknown whether the same individuals are present throughout the year. Additionally, large numbers of juvenile ibis are observed coming in after the breeding season which points to the suitability and security that this location provides.

I want to share the enthusiasm my team has for these birds with guests by involving them in our research and sharing our personal history with the roost. I designed a presentation in Keynote - that uses an iPad - along with binoculars, a laminated study sheet, and a dry erase marker. My goal is to show that science is not hard and can be accessible to everyone. We engage guests on the Dinoland bridge because it affords the closest view of the birds coming in to roost. Zookeepers highlight the physical differences between the white ibis and the great egret. Then they talk about how we count birds of various sized groups using the sampling method. Guests are given the survey sheet and writing implement and allowed to participate as long as they are interested. When time is a constraint, we take our night vision unit to the bridge location and allow guests to view the roost in a different way. I've noticed that adults are more likely to engage with keepers while they are doing research on the bridges. This is an interesting observation because many of our other guest interactions are geared at children. It is an important reminder to make sure the conservation messages appeal to a broad audience. The takeaway conservation message is that we do not know where these birds feed during the day or where their breeding location is so it is important to conserve all types of habitats.

The persistence of this roost is unusual for a nomadic species like the white ibis. However, food availability, consistent water levels, and absence of predators all likely play a role in the stability of the roost. Even though the numbers of birds fluctuates, the fact that both species are present throughout the year make it ideal for guest interactions. I have turned my passion for birds and my commitment to this research study into an activity that engages both zookeepers and guests in wading bird conservation. 🦩

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