Catherine "Cati" Gandolfi

John F. Kennedy Space Center

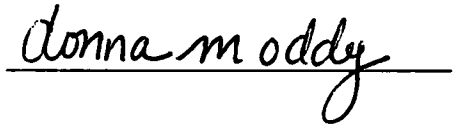
July 20, 2010

Reviewed by:

Name: Donna M. Oddy

Directorate: Innovative Health Application (IHA)

Signature



Throughout my internship, I assisted with the long-term monitoring of the Florida Scrub- Jay (*Aphelocoma coerulescens*), a threatened species endemic to Florida. The Florida Scrub Jay diet consists of insects and small vertebrates throughout most of the year; however, during the winter their primary diet is acorns because the insect population is low. Furthermore, the Florida Scrub-Jay is a habitat specialist that lives in a disappearing plant community called the scrub, which consists of sand live oak, myrtle oak and chapman oak. The Florida Scrub-Jay is considered threatened because its numbers are decreasing primarily due to the loss of habitat that it needs to survive. Scrub habitat is highly desirable for human development because it is high, dry, and sandy. Periodic controlled burns maintain the scrub in a low, open condition favored by Scrub-Jays. Florida Scrub-Jays build their nests approximately 3-5 feet (~1.5 m) above the ground in shrubby oaks (Breininger 153), mate for life and are cooperative breeders; which means that the young jays remain in their natal territory for at least a year to help their parents defend their territory, feed the young, and mob predators. (Breininger 152). I assisted in conducting monthly censuses at long-term monitoring sites and a juvenile in July survey to determine reproductive success for the year. In addition, to Scrub-Jay monitoring, I also had the opportunity to assist with some long term monitoring of ecosystem recovery. Scrub is a fire maintained system. Fire maintains the structure of scrub necessary for many of the threatened species that reside in the scrub habitat. However, fire suppression occurred on the land that is now KSC\MINWR until the 1980's. Since that time, prescribed burning and mechanical treatment have been used to return fire to scrub. Long-term monitoring follows the regrowth and recovery of scrub

after fires.

Five species of sea turtles are present in Florida waters, three of these come ashore to nest on MINWR beaches beginning as early as March. A female sea turtle can lay several nests during one season, but she will only nest every two or three years (Sea Stats). A sea turtle can travel up to, or more than a thousand miles to a favored nesting beach, where it then makes the laborious journey up on to the beach to a safe zone above the high tide line (Breininger 182). Turtles nest at night, depositing their eggs in the soft sand that they dig out with their rear flippers. They dig until they have created an egg chamber deep enough to accommodate their eggs (number of eggs vary depending upon the species). It takes awhile for the turtles to lay their eggs. Once done, the female covers her nest and returns to the ocean. The eggs face many challenges such as predation by crabs, feral pigs, raccoons, and domestic dogs (Breininger 182). A variety of methods are used to protect sea turtle nests from destruction by non-human predators, the most common is a wire-type screen, which is placed over the nest allowing the hatchings to emerge from the nest without harm. One of the most serious concerns of nesting females and hatchlings along nesting beaches is disorientation due to bright lights along beaches. Since hatchlings find their way to the ocean by crawling towards the brightest horizon, they can become disoriented on developed stretches of coastline. For instance, exterior lighting on the launch complexes can potentially interfere with the sea turtle hatchlings as they emerge from the nest and head to the ocean. Lighting restrictions can reduce or eliminate unnecessary lights from shining on the beach and disorienting hatchlings. Turtle-safe lighting uses red or amber LED lights which emit a long wave length, less

visible to sea turtles, in place of white light which can attract them (Carmichael 119). There are three species of sea turtles that nest along the beaches of the MINWR. One of the most endangered is the Leatherback (*Dermochelys coriacea*), which averages 6 feet in length. Nesting females are usually less than 1,000 pounds, but the males can reach 3,000 pounds (Carmichael 119).The primary difference between Leatherbacks and other sea turtles is that Leatherbacks have a leathery skin with seven ridges along their backs instead of a hard shell or carapace. They are capable of traveling hundreds of thousands of miles, and their primary source of food is jelly fish. One of the most common sea turtles who nest on the beach at KSC/MINWR is the threatened sea turtle, *Caretta Caretta*; otherwise known as the Loggerhead sea turtle. Loggerheads weigh about 250 pounds (Loggerhead Sea Turtles, Loggerhead Sea Turtle Pictures, Loggerhead Sea Turtle Facts - National Geographic). and do not have teeth; instead, they have powerful jaws that they use to feed on clams, crabs, and other crustaceans (Carmichael 116). The third species of sea turtle that nests on KSC/MINWR is the endangered Green Turtle; (*Chelonia mydas*). Green sea turtles are vegetarians, eating primarily sea grass and can weight about 350 pounds. Their habitat is rather unique since they live in sea grass meadows, rock ledges, oyster bars and coral reefs. During my internship I had the opportunity to assist in the monitoring of nests of these three species on KSC. We marked nests, located clutches, shielded nests potentially impacted by lights, recorded hatchling emergences and inventoried nests after hatching. This monitoring is done in compliance with the United States Fish and Wildlife Service's Biological Opinion in relation to the KSC light management plan. The federal property of KSC provides protection of vital sea

turtle nesting habitat by restricting public development and exploitation of the coastal ecosystem.

Southeastern beach mice are threatened due to habitat loss and beach erosion from development and tropical storms and hurricanes (Oddy). While they once ranged from Volusia down to Broward County they have experienced a reduction in range of approximately 79 % and only exist in sustainable numbers on KSC/MINWR and the federal lands surrounding it. Their natural habitat includes coastal dunes, strand, and scrub . Like the Florida Scrub-Jay, their habitat is highly prized by developers. I assisted in the trapping, monitoring and footprint collection of the southeastern beach mouse and other associated small mammals that reside with them. The process we use to capture and study these mammals consisted of setting Sherman live traps baited with sunflower seeds and cotton for nesting material. We collected and recorded the following data on all species captured: location, species, tag number, status (new capture or recapture), sex, reproductive condition, age, weight and general condition. We defined a recapture as any species caught more than two times. Reproductive condition in females was recorded as pregnant and or mammaries visible and enlarged. In males, the testes position was recorded as descended or abdominal. The age of southeastern beach mice was determined based on the color of their pelage or fur and by weight for the other small mammals. All small mammals were ear tagged and foot-printed for the purpose of tracking movement, determining reproduction, survival, mortality, and health of the population. After ear tagging we collected footprints on the animals in order to establish a baseline database which will hopefully be used to identify southeastern beach mice from

other small mammals on a larger geographic scale. All small mammals were released after being tagged and footprinted.

My favorite ecological project that I participated in was the research and tagging of Red Drum (*Sciaenops ocellatus*) and Lemon Sharks (*Negaprion brevirostris*). The technology of a Vemco Acoustic Transmitter enables scientist to passively monitor the general movements of tagged animals; for instance, the Acoustic Transmitter was employed to resolve seasonal and daily movement patterns of adult Red Drum in the Indian River Lagoon. Red Drum is a popular sport fish whose stock has declined in recent decades. I assisted in the monitoring of Red Drum to determine reproduction and movement rates during seasonal changes. The Red Drum were tagged to detect site fidelity during the season; unfortunately, angling mortality effects their growth and reproduction therefore, true data may be difficult due to the decrease in population (Reyier, personal communication).

The most challenging environmental study that I had the opportunity to participate in was data collection on the American alligator (*Alligator mississsippiensis*). As a species of special concern in the state of Florida, they are usually abundant in brackish water, canals, lakes, marshes, swamps, rivers creeks and ponds (American Alligator Fact Sheet - National Zoo| FONZ, 2010). They can live for 30-35 years in the wild, and more than 50 years in captivity (American Alligators, American Alligator Pictures, American Alligator Facts - National Geographic, 2010). Although they have extremely sharp teeth, they usually drown or crush their prey, they do not chew their food, instead, they rip, tear and swallow. They eat just about anything, including humans and other alligators (American Alligator Fact Sheet -

crush their prey, they do not chew their food, instead, they rip, tear and swallow. They eat just about anything, including humans and other alligators (American Alligator Fact Sheet - National Zoo| FONZ, 2010).

We tagged alligators to study their nesting and movement to determine the overall population and health. It is also important to determine their life history to learn if the population on KSC is growing. During the tagging process, blood, tissue and urine were collected and analyzed for hormones, gene expression, toxicology and heavy metals.

My experiences during this internship were certainly a unique and invaluable teaching tool. The mentors I worked closely with guided me into a new and exciting career path. Prior to this internship, I was undecided about a major and life career. My mentors and friends I met while working as an intern gave me a distinct direction in my life. After my experience with this internship, I plan to pursue a degree in Marine Biology. The work I did this summer made me aware of the importance of monitoring wildlife and the different ecosystems on KSC property. I worked at NASA last year as a lab intern, but this year was more fulfilling, because I learned the forms of wildlife and the dedication it takes to maintain and monitor these species and their habitats.

"American Alligators, American Alligator Pictures, American Alligator Facts - National Geographic." *Animals, Animal Pictures, Wild Animal Facts - National Geographic.*Web.26July2010.<http://animals.nationalgeographic.com>.

"American Alligator Fact Sheet - National Zoo| FONZ." *Welcome to the National Zoo| FONZ Website - National Zoo| FONZ.* Web. 26 July 2010. <http://nationalzoo.si.edu>.

Breininger, David R., Mary Jo Barkaszi, Rebecca B. Smith, Donna M. Oddy, and Jane A. Provancha. *Endangered and Potentially Endangered Wildlife on John F. Kennedy Space Center and Faunal Integrity as a Goal for Maintaining Biological Diversity.* NASA Technical Memorandum 109204. March 1994.

Carmichael, Pete, and Winston Williams. *Florida's Fabulous Reptiles and Amphibians.* Tampa, FL: World Publications, 1991.

"Loggerhead Sea Turtles, Loggerhead Sea Turtle Pictures, Loggerhead Sea Turtle Facts - National Geographic."*Animals, Animal Pictures, Wild Animal Facts - National Geographic.* Web. 27 July 2010. <http://animals.nationalgeographic.com/>.

"Merritt Island National Wildlife Refuge." *Fish and Wildlife Service.* 20 July 2010. Web. 20 July 2010. <http://www.fws.gov/merrittisland/>.

Oddy, D.M. 2000. Population estimate and demography of the Southeastern beach mouse (*Peromyscus polionotus niveiventris*) on Cape Canaveral Air Force Station, Florida. M.S. Thesis. University of Central Florida, Orlando. 94 pp.

Oddy, D.M. "Kennedy Space Center National Wildlife Refuge." 28 July 2010

Reyier, Eric A., Douglas M. Scheidt, Russell H. Lowers, and Douglas H. Adams. *Movement Patterns of Adult Red Drum, Sciaenops Ocellatus, in Shallow Florida Lagoons as Inferred through Autonomous Acoustic Telemetry.* Editorial Manager (tm) for Environmental Biology of Fishes Manuscript Draft.

Sea Stats. Florida Fish and Wildlife Conservation Commission, 2006.