

# Florida Cooperative Fish & Wildlife Research Unit

## *Annual Report for January – December 2006*



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In Tribute: Tommy C. Hines received a BS with a double major in Biology and Agriculture (Western Kentucky 1965) and a MS in Wildlife Management in 1967. Tommy was Kentucky's State Apiculturists in the early 1960's and has worked in wildlife research and management in Louisiana, Oklahoma, Tennessee, and Florida. He is a consummate applied wildlife researcher. Despite his own personal desire to just keep bees and work with alligators and quail, he has been embroiled in many large and contentious conservation issues. He has been a steadfast supporter and contributor to the notion of cooperative wildlife research units in general and the Florida Unit in particular. We all have Tommy stories, but the associated pictures are vivid only in our minds. The cover photo is a collection of some of Tommy's favorite pictures.

COOPERATORS:  
FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION  
UNIVERSITY OF FLORIDA  
U.S. FISH & WILDLIFE SERVICE  
U.S. GEOLOGICAL SURVEY  
WILDLIFE MANAGEMENT INSTITUTE



*The Foundation for The Gator Nation*



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# **FLORIDA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT INTRODUCTION**

*Picture taken by Brian Jeffrey*

*Off-road Vehicle Impact in Big Cypress National Preserve*

The Florida Cooperative Fish and Wildlife Research Unit was established in 1979 as one of the first combined units. The purpose of the Florida Unit is to provide for active cooperation in the advancement, organization, and conduct of scholarly research and training in the field of fish and wildlife sciences, principally through graduate education and research at the University of Florida. The Florida Unit has the mission to study wetland ecosystems within the state. Florida is a low relief, sub-tropical peninsula that is ecologically fragile. Though abundant, Florida's water resources are under increasing pressure from a burgeoning human population. Domestic, recreational, and development needs threaten Florida's water / wetland resources. In following its program directive, the Florida Unit has developed a research program that addresses management issues with approaches spanning species to ecosystem perspectives. Specifically, this Unit conducts detailed investigations of aquatic-terrestrial ecosystem interfaces and their component fish and wildlife resources.

Between 1979 and 2006, over 262 projects totaling more than \$36.3 million were funded through the Unit. These projects covered a wide variety of fish, wildlife, and ecosystem subjects and have involved 49 line, affiliate, and adjunct faculty members as principal and co-principal investigators. Unit staff have their own research projects which accounted for about 1/3 of the total effort. Projects associated with the Unit have resulted in 2 theses and dissertations, 8 publications, 22 presentation, and 2 technical reports during 2006.

Cooperation has been the Florida Unit's strength. Now, in its new capacity as a Cooperative Unit of the U.S. Geological Survey, it serves as a bridge among the principal cooperators, such as the University of Florida, the Florida Fish and Wildlife Conservation Commission (FFWCC), the U.S. Geological Survey (USGS), the U.S. Fish and Wildlife Service (FWS) and the community of state and federal conservation agencies and non-governmental organizations. Evidence of this role is the Unit's funding which has included contributions from FFWCC, 12 BRD research labs and centers, 12 offices within the USFWS Southeast Region, the University of Florida, U.S. Army Corps of Engineers, U.S. Navy, U.S. Department of Agriculture, U.S. Air Force, U.S. National Park Service, Environmental Protection Agency, St. Johns River Water Management District, South Florida Water Management District, U.S. AID, World Wildlife Fund, The Nature Conservancy, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, BRD, Florida Wildlife Federation, National Audubon Society, Florida Alligator Farmers' Association, American Alligator Farmers' Association, Florida Fur Trappers' Association, and other private contributions. Many Unit projects involve multiple investigators from several agencies. This cooperative interaction stimulates continuing involvement of funding sources, provides for student contacts with potential employers and agency perspectives, and directs transfer and application of research results.





*Picture taken by Hardin Waddle  
This calling male Southern Toad (Bufo terrestris) was photographed during an inventory of amphibians in Big Cypress National Preserve.*

## ***RESEARCH MISSION STATEMENT***

*The mission of the Florida Cooperative Fish and Wildlife Research Unit is to conduct detailed investigations of wetlands and their component fish and wildlife resources, emphasizing the linkages with both aquatic and terrestrial ecosystems. This charge will include research at a range of levels including population, community, and ecosystems, and will emphasize the interaction of biological populations with features of their habitat, both natural and those impacted by human activities.*

## **COORDINATING COMMITTEE**

<b>Jimmy G. Cheek</b>	Vice President for Agriculture and Natural Resources - Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL.
<b>Ken D. Haddad</b>	Executive Director – Florida Fish and Wildlife Conservation Commission, Tallahassee, FL.
<b>Michael J. Van Den Avyle</b>	Southern Supervisor - Cooperative Research Units, U.S. Geological Survey, Biological Resources Division, Atlanta, GA.
<b>Emily Jo Williams</b>	Assistant Regional Director Migratory Birds and State Programs – Region 4, U.S. Fish and Wildlife Service, Atlanta, GA.

## **BIOGRAPHICAL PROFILES OF UNIT PERSONNEL**

**H. Franklin Percival** - Unit Leader, Courtesy Associate Professor-Department of Wildlife Ecology and Conservation and College of Natural Resources and the Environment. His research interests lie in wetland wildlife, particularly waterfowl and alligators. He is conducting long term cooperative projects on various aspects of alligator biology. He also is involved in research on development of an unmanned aerial vehicle for wildlife and habitat surveys and adaptive management. He has a special interest in wildlife administration and champions multidisciplinary and interagency research programs.

**Raymond R. Carthy** - Assistant Unit Leader-Wildlife, Courtesy Assistant Professor-Department of Wildlife Ecology and Conservation and College of Natural Resources and the Environment. His research centers on ecology of endangered species. His research interests involve reproductive ecology and physiology of coastal and wetland herpetofauna, with a current focus on marine and freshwater turtles. He is also involved in research on threatened upland species and in conservation management oriented studies

**Wiley M. Kitchens** - Research Ecologist, Courtesy Professor- Department of Wildlife Ecology and Conservation, Fisheries and Aquatic Sciences, and College of Natural Resources and the Environment, Adjunct Professor-Biology Department, University of Miami. His research centers on restoration and conservation of wetland ecosystems. The focus involves resolving complex gradients of community structure and function in perturbed wetland ecosystems. He currently is examining habitat relationships and hydrology induced changes in a variety of wetland ecosystems in Georgia and Florida. Simulation modeling in conjunction with GIS techniques form the basic approach of his current studies.

**Donna C. Roberts** – Office Manager, Florida Cooperative Fish and Wildlife Research Unit, Department of Wildlife Ecology and Conservation, University of Florida. She is responsible for the administrative details of a \$3.2M annual research program. She supervises student assistants. Her responsibilities include budgets, research work orders, contracts & grants, fiscal reports, travel, purchasing, personnel, arranging meetings, and other related administrative functions.

**Amanda Burnett** – Student Assistant, Florida Cooperative Fish and Wildlife Research Unit. She helps with filing, organizing the property and publications, managing office supplies and inventory, managing personnel files and information, and general office procedures.

**Tisha Stockton** – Student Assistant, Florida Cooperative Fish and Wildlife Research Unit. She helps with filing, organizing the property and publications, managing office supplies and inventory, managing personnel files and information, and general office procedures.

## **AGENCY PERSONNEL CO-LOCATED WITHIN THE FLORIDA UNIT**

**Elizabeth Martin** - NBII Bird Conservation Node Manager, National Biological Information Infrastructure (NBII), U.S. Geological Survey, and Ph.D. student, Department of Wildlife Ecology and Conservation, University of Florida. Her principal responsibility with NBII is management of the NBII Bird Conservation Node and coordination with partners to support development of web-based information products useful in management and conservation of North American birds. Her interests include the application of information technologies to avian conservation, and research on behavioral ecology of birds to understand tradeoffs in resource use.

**Fred A. Johnson** - Senior Wildlife Biologist, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, and the Florida Caribbean Science Center. His interests include modeling the dynamics of wildlife populations, the design of wildlife monitoring programs, and the application of decision theory to conservation practices. His principal responsibility is to develop and implement an inter-agency program to promote an adaptive approach to natural resource management, particularly for wetlands and associated avifauna.

**Robert M. Dorazio** - Research Statistician, Florida Integrated Science Center, USGS and Courtesy Associate Professor, Department of Statistics, University of Florida. He conducts scholarly research in the general areas of quantitative population dynamics, community ecology, and conservation biology. He develops and applies novel sampling designs and novel statistical models in quantitative investigations of exploited or imperiled fauna. He is also responsible for developing both the theory and practice of adaptive natural resource management.



## **COOPERATORS**

### ***University of Florida***

Michael S. Allen	Michael Kane
Karen A. Bjorndal	Paul A. Klein
Alan B. Bolten	Ramon Littel
Meghan Brennan	Frank Mazzotti
Mary Christman	Martha C. Monroe
Robert M. Cubert	Madan Oli
Bon A. Dewitt	Leonard Pearlstine
Peter C. Frederick	Bill Pine
Bill Guiliano	Brett Presnell
Jeff Hostetler	Carlos H. Romero
Peter G. Ifju	J. Perran Ross
Elliott R. Jacobson	Scot E. Smith
Susan Jacobson	Marilyn G. Spalding
Steven Johnson	William R. Wise
Linda Young	

### ***St. Johns Water Management District***

Roxanne Conrow  
Mike Coveney  
Steve J. Miller

### ***Florida Fish and Wildlife Conservation Commission***

Joe Benedict  
Joan Berish  
Tim Breault  
Larry Campbell  
Dwayne A. Carbonneau  
Harry J. Dutton  
Jim Estes  
Chris Fonnesbeck  
Tommy C. Hines  
Richard Kiltie  
Paul Kubilis  
Henry Norris  
Tim O'Meara  
Stephen W. Rockwood  
Scott Sanders  
Lawson Snyder  
Nick Wiley  
Blair Witherington  
Allan R. Woodward

### ***U.S. Geological Survey***

Beverly Arnold	Suzette Kimball
G. Ronnie Best	Lynn W. Lefebvre
Jaime A. Collazo	Cynthia S. Loftin
Paul Conrads	Elizabeth Martin
Michael Conroy	Kelly McDonald
Donald L. DeAngelis	James D. Nichols
Robert M. Dorazio	Kenneth G. Rice
Russell J. Hall	Michael Runge
Tara Y. Henrichon	John Sauer
James Hines	Daniel Slone
Jeff Keay	James Williams
William Kendall	Kenneth Williams

### ***U.S. Fish and Wildlife Service***

Jon Andrew  
Robert Blohm  
Laura Brandt  
Tylan Dean  
Ed Eudaly  
Chuck Hunter  
Mark D. Koneff  
Mike Legare  
Fred Martin  
Mark Musaus  
Lorna Patrick  
John Robinette  
Russell Webb  
Kathy Whaley

### ***Wofford College***

Clarence L. Abercrombie

### ***U.S. Air Force***

Bruce Hagedorn  
Bob Miller  
Jack Mobley

### ***University of Central Florida***

Llewellyn M. Ehrhart

***University of West Florida***

Philip C. Darby

***Hidden Harbor Marine Environmental Project***

Ritchie H. Moretti  
Sue A. Schaf

***Florida Department of Environmental Protection***

William E. Caton

***Tall Timbers Research Station***

William Palmer

***University of New Orleans***

Julie Whitbeck

***U.S. Army Corps of Engineers***

William D. Meyer  
Jonathan Moulding

***Dynamac Corp***

Eric D. Stolen

***Other***

Howard K. Suzuki  
Lovett E. Williams  
John Wooding

## RESEARCH PERSONNEL

### *Post-doctorate Associates*

Margaret Lamont  
Mark Miller  
Paul Wetzel

### *Ph.D. Students*

Sadie S. Coberley	Joyce L. Merritt
Kathryn A. Garland	Mario Mota
Sara R. Gonzalez	Francesco C. Origgi
Julie A. Heath	Eric D. Stolen
Holly J. Johnson	J. Hardin Waddle
Taewoo Kim	Zachariah C. Welch
Elizabeth Martin	Christa Zweig
Julien Martin	

### *M.S. Students*

Gregory A. Babbitt	Linda K. Dance
William J. Barichivich	Rachel Hirschman
James J. Berg	Thea Hotaling
Lori A. Brinn	Brian M. Jeffery
Janell Brush	Jenny Ketterlin
Christopher Bugbee	Kristianna Lindgren
Kristen Candelora	Martha L. Maglothlin (Pridgeon)
Cameron Carter	Aletris Neils
Michelle Casler	Russell Scarpino
Christopher Cattau	John D. Semones
Melanie A. Craig	

### *Biological Scientists and Temporary, Full Time & Part Time Personnel*

Burnie Brinn	Kristin Miller
Erin Cantwell	Allison Pevler
Cameron Carter	Brian Reichert
Patty Castillo-Trenn	Aimee Reiss
Jonathan Chandler	Jonathan Saunders
Carolyn Enloe	Brad Shoger
Simon Fitz-William	Sara Stocco
Daniel Grant	Tisha Stockton
Meg Lamont	Maena Voigt
Shuntice McBurrows	Adam Watts
Orlin Meritt	Marcia Yeguez

## Personnel & Students

**Full Name:** Matthew Brein

**Degree sought:** Wildlife Biologist (work title)

**Graduation Date (actual):**

**Research Blurb:** Collects morphometric data on the American Crocodile, conducts nesting surveys, and collects data on juvenile growth and survival for the American Crocodile monitoring and assessment program (MAP).

~~~~~  
**Full Name:** Lori Brinn

**Degree sought:** Interdisciplinary Ecology

**Graduation Date (actual):** 2008

**Research Blurb:** Assessment of beach compaction and associated effects on loggerhead sea turtle ( *Caretta caretta*) nesting on natural and nourished beaches in northwest Florida

~~~~~  
**Full Name:** Andrea C. Bowling

**Degree sought:** MS Wildlife Ecology and Conservation

**Graduation Date (actual):** December 2008

**Research Blurb:** Home range of the snail kite is an important piece of information not yet known. The purpose of my study will be to determine the home range of snail kites, and identify factors that influence kite distributions within and among wetlands.

~~~~~  
**Full Name:** Christopher D. Bugbee

**Degree sought:** MS Interdisciplinary Ecology

**Graduation Date (actual):** August 2007

**Research Blurb:** Chris is conducting research on alligator amphibious behavior as it relates to a variety of physical and environmental variables. This information will help improve the accuracy of alligator surveys in south Florida as it will provide an index of alligator detectability during these surveys.

~~~~~  
**Full Name:** Amanda S. Burnett

**Degree sought:** Bachelors in Wildlife Ecology, minor in Spanish

**Graduation Date (actual):** 2012

**Research Blurb:** Currently assists the Florida Unit's Administrative Assistant in data management and other administrative processes.

~~~~~  
**Full Name:** Jemeema Carrigan

**Degree sought:** Wildlife Biologist (work title)

**Graduation Date (actual):**

**Research Blurb:** Collects morphometric data on the American Crocodile, conducts nesting surveys, and collects data on juvenile growth and survival for the American Crocodile monitoring and assessment program (MAP).

~~~~~  
**Full Name:** Cameron Carter

**Degree sought:** MS interdisciplinary ecology

**Graduation Date (actual):** August 2007

**Research Blurb:** The Effect of Habitat Type, Habitat Structure, and Water Level on Alligator Detection Probabilities during Night-Light Counts  
Franklin Percival, advisor

~~~~~  
**Full Name:** Christopher Cattau

**Degree sought:** MS Wildlife Ecology and Conservation

**Graduation Date (actual):** December 2007

**Research Blurp:** The snail kite is an extreme dietary specialist, feeding almost exclusively on a single species of apple snail (*Pomacea paludosa*) native to Florida. The presence of the exotic apple snail within its range (and which are now dominant in Lake Toho) may have negative consequences to snail kite foraging. Elucidating the effects exotic apple snails have on snail kites will have applications in many management and conservation contexts.

~~~~~  
**Full Name:** Michelle L. Casler

**Degree sought:** Master's degree in Interdisciplinary Ecology

**Graduation Date (actual):** August 2007

**Research Blurp:** My thesis project is determining the effects of hydroperiod on individual anuran species and anuran species richness in Everglades National Park and Big Cypress National Preserve.

~~~~~  
**Full Name:** Mike Cherkiss

**Degree sought:** Wildlife Biologist (work title)

**Graduation Date (actual):**

**Research Blurp:** Project manager for the American Crocodile monitoring and assessment program, collects morphometric data on the American Crocodile, conducts nesting surveys, and collects data on juvenile growth and survival (MAP).

~~~~~  
**Full Name:** Melissa A. DeSa

**Degree sought:** MS Interdisciplinary Ecology

**Graduation Date (actual):** December 2009

**Research Blurp:** In 2002/2003 habitat modification, Ann Marie Muench characterized aquatic vertebrate communities that occupied the pickerel weed (*Pontedaria cordata*) zone which was destined for removal. The post-lake modification study began in 2005 and is still underway.

~~~~~  
**Full Name:** Carolyn Marie Enloe:

**Degree sought:** Staff (Project Leader)

**Graduation Date (actual):**

**Research Blurp:** Wildlife Usage of Spoil Islands on Lake Tohopekaliga: studying the wildlife value of artificially created islands to improve lake management techniques.

**Email:** [carolyn78y@yahoo.com](mailto:carolyn78y@yahoo.com)

~~~~~  
**Full Name:** Ikuko Fujisaki

**Degree sought:** Statistician (work title)

**Graduation Date (actual):**

**Research Blurp:** Analyzes American Alligator body condition for the American Alligator monitoring and assessment program (MAP)



~~~~~  
**Full Name:** Kathryn Garland

**Degree sought:** PhD Wildlife Ecology and Conservation - Human Dimensions focus

**Graduation Date (actual):** Spring 2010

**Research Blurp:** Title of Dissertation Research -

A Taste for Turtles: Green Turtle (*Chelonia mydas*) Consumption in Caribbean Nicaragua and Baja California, Mexico

This study is mostly qualitative social research looking at the conditions behind sea turtle consumptive use in Latin America.  
~~~~~

**Full Name:** Wellington Guzman

**Degree sought:** Wildlife Biologist (work title)

**Graduation Date (actual):**

**Research Blurp:** Collects morphometric data on the American Alligator for the American Alligator monitoring and assessment program (MAP).  
~~~~~

**Full Name:** Althea S. Hotaling

**Degree sought:** MS in Interdisciplinary Ecology

**Graduation Date (actual):** August 2008

**Research Blurp:** Determine the drivers and spatial extent of wet prairie conversion in WCA 3A.  
~~~~~

**Full Name:** Brian Jeffrey

**Degree sought:** MS in Interdisciplinary Ecology

**Graduation Date (actual):** August 2007

**Research Blurp:** Looking at the impact of off-road vehicle on the small mammal populations in Big Cypress National Preserve.  
~~~~~

**Full Name:** Fred Allan Johnson

**Degree sought:** Wildlife Ecology & Conservation

**Graduation Date (actual):** Anticipated graduation date - 2009

**Research Blurp:** We are developing a decision-theoretic framework for the prescribed burning of Florida scrub-jay habitat on Merritt Island NWT refuge. The goal is to ensure persistence of the scrub-jay population by optimizing decisions in the face of uncertainty in system dynamics, uncontrolled environmental effects, constraints on burning, and limitations in population and habitat monitoring programs.  
~~~~~

**Full Name:** Margaret Lamont

**Degree sought:** PhD

**Graduation Date (actual):** Post-Doctoral Associate with Dr. Carthy

**Research Blurp:** My research involves examining how coastal species, such as sea turtles and shorebirds, are affected by natural and anthropogenic dynamics of barrier island systems.  
~~~~~

**Full Name:** Elizabeth Martin

**Degree sought:** PhD Wildlife Ecology and Conservation

**Graduation Date (actual):** Anticipated graduation date: December 2008

**Research Blurp:** Predation risk from diurnal raptors and effects on habitat use and foraging behavior of wintering Dunlin (*Calidris alpina*) at Merritt Island National Wildlife Refuge in Florida.  
~~~~~

~~~~~  
**Full Name:** Julien Martin  
**Degree sought:** PhD Wildlife Ecology and Conservation  
**Graduation Date (actual):** May 2007  
**Research Blurb:** Population ecology and conservation of the Snail Kite.  
~~~~~

**Full Name:** Mark Miller  
**Degree sought:** Post Doc  
**Graduation Date (actual):**  
**Research Blurb:** Analyzes juvenile American Crocodile growth and survival data for the American Crocodile monitoring and assessment program (MAP)  
~~~~~

**Full Name:** Mark Parry  
**Degree sought:** Wildlife Biologist (work title)  
**Graduation Date (actual):**  
**Research Blurb:** Collects morphometric data on the American Crocodile, conducts nesting surveys, and collects data on juvenile growth and survival for the American Crocodile monitoring and assessment program (MAP).  
~~~~~

**Full Name:** Danielle Ogurcak  
**Degree sought:** Wildlife Biologist (work title)  
**Graduation Date (actual):**  
**Research Blurb:** Collects vegetative data for the American Alligator hole, distribution, and occupancy project.  
~~~~~

**Full Name:** Mike Rochford  
**Degree sought:** Wildlife Biologist (work title)  
**Graduation Date (actual):**  
**Research Blurb:** Collects morphometric data on the American Alligator for the American Alligator monitoring and assessment program (MAP).  
~~~~~

**Full Name:** Amy Schwarzer  
**Degree sought:** Field Technician  
**Graduation Date (actual):**  
**Research Blurb:** Projects: Lake Tohopekaliga, Gant Lake  
Amy is a biological technician working on two projects which examine the effects of lake enhancement on the vegetation, bird and herpetofaunal communities in two different lakes (Lake Tohopekaliga in Kissimmee and Gant Lake in Sumter County).  
~~~~~

**Full Name:** Brad Shoger  
**Degree sought:** Field Technician  
**Graduation Date (actual):**  
**Research Blurb:** Projects: Lake Tohopekaliga, Gant Lake  
Amy is a biological technician working on two projects which examine the effects of lake enhancement on the vegetation, bird and herpetofaunal communities in two different lakes (Lake Tohopekaliga in Kissimmee and Gant Lake in Sumter County).  
~~~~~

~~~~~  
**Full Name:** Scott L. Stewart

**Degree sought:** PhD candidate in Environmental Horticulture

**Graduation Date (actual):** August 2007

**Research Blurp:** Scott is conducting research aimed at the development of species-level integrated conservation methods for Florida's native orchids. While his research is focusing on Florida native orchids, the methods being developed are applicable to orchids worldwide.

~~~~~  
**Full Name:** Tisha Stockton

**Degree sought:** Health Science Education

**Graduation Date (actual):** May 2008

**Research Blurp:** Currently assists the Florida Unit's Administrative Assistant in data management and other administrative processes.

~~~~~  
**Full Name:** J. Hardin Waddle

**Degree sought:** PhD in Wildlife Ecology

**Graduation Date (actual):** December 2006

**Research Blurp:** I conducted research on using amphibians as ecosystem indicator species in the Everglades of south Florida in support of management and restoration activities. This mainly involved using various sampling and estimation techniques, such as mark-recapture and site occupancy estimation, to determine the response of amphibian populations to natural and anthropogenic changes in hydrology.

~~~~~  
**Full Name:** Adam C. Watts

**Degree sought:** Scientist, UAS Program Coordinator

**Graduation Date (actual):** N/A (although, if you want it, here it is: M.S. Interdisciplinary Ecology 2002, UF College of Natural Resources and Environment)

**Research Blurp:** The Florida Co-Op Unit, in collaboration with the Department of Mechanical and Aerospace Engineering and the Geomatics Program, have developed an autonomous unmanned aerial vehicle system (UAS) for ecological research and natural resource monitoring. Beginning in 2007, the University and the US Army Corps of Engineers will utilize the UAS for aerial monitoring of levees in south Florida using a thermal infrared camera, while continuing the development of this on-demand, remote-sensing tool. Additional applications include surveys to detect and measure animal and plant populations, habitat condition, and vegetation cover; invasive plant presence and coverage; fire detection and measurement of severity and extent; monitoring of restoration progress; rapid measurement of post-storm damage; and coastal surveys.

~~~~~  
**Full Name:** Zachariah C. Welch

**Degree sought:** PhD Wildlife Ecology and Conservation

**Graduation Date (actual):** May 2009

**Research Blurp:** Modeling plant community succession in the lower Savannah River tidal marsh complexes.

~~~~~  
**Full Name:** Kate Williams

**Degree sought:** MS Wildlife Ecology and Conservation

**Graduation Date (actual):** August 2007

**Research Blurp:** Development of new techniques to estimate breeding population size and other demographic parameters for wading birds in the Everglades

**Email:** [katew@ufl.edu](mailto:katew@ufl.edu)

~~~~~  
**Full Name:** Christa Zweig

**Degree sought:** PhD Wildlife Ecology and Conservation

**Graduation Date (actual):** May 2008

**Research Blurp:** Sampling vegetation in the Everglades as input for predictive models.  
~~~~~

## 2006 Project Descriptions



## ***Snail Kite Population Studies: Demography, Population Trends, and Dispersal Relative to Environmental Correlates, and Habitat Studies***

### **Overview:**

The snail kite (*Rostrhamus sociabilis*) is an endangered raptor whose distribution in the United States is restricted to the South Florida Ecosystem including watersheds of the Everglades, Lake Okeechobee, Kissimmee River, and Upper St. Johns River. Because snail kites feed almost exclusively on one species of aquatic snail, their survival depends directly on the hydrologic functioning of the wetlands associated with these watersheds. Although other endangered species



occur within this ecosystem, snail kites probably are the only species whose range both encompasses and is exclusively restricted to this ecosystem. Its population viability is therefore directly dependent on the hydrological/ecological condition and functioning of the entire network of wetlands within this ecosystem. Current data indicate the population is again in a steep decline. Estimates indicate the population has decreased by one-half (3400 to 1700 birds) in the past 4 years (since 1999). Aside from the studies that follow, there currently are no other systematic monitoring of snail kites in Florida.

Most researchers suggest declines in kite populations in the past several decades are correlated with changes in hydrology directly or indirectly. These include loss of habitat, both in terms of quality and spatial extent. These include changes in foraging and nesting habitat; effects on reproduction parameters; and adult and juvenile survival of snail kites. Population and survival responses to restoration activities will reflect the success of recovering the quality and spatial extent of the wetland ecosystem to the conditions required to support a viable snail kite population.

The current and future efforts will remain based on mark-re-sighting techniques. In contrast to the annual survey previously used, this technique has a long and solid statistical foundation for estimating survival and population size. However, given the declining numbers of birds banded, it has become critical to augment the mark-resight with radio-telemetry approaches to maintain integrity and robustness of statistical analyses. Given the very low reproductive rate observed in the recent years, the sample size of young birds marked is largely decreasing which is weakening our capacity to provide precise survival estimates. It is consequently essential to increase the probability of detection (by using radio telemetry), in order to compensate for this loss in precision.

The following projects all involve snail kite research, but are funded by different sources.



### ***Surveys of Snail Kite Breeding and Habitat Use in the Upper St. Johns River Basin***

*Principal Investigator:* Wiley M Kitchens

*Funding Agency:* St. Johns River Water Management District

*Expected Completion:* 2/28/2008

*Graduate Students:* Julien Martin, Chris Cattau, Andrea Bowling

*Field Technicians:* Sara Stocco, Brian Reichert

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### ***Radio Telemetry Snail Kites***

*Principal Investigator:* Wiley M Kitchens

*Funding Agency:* Florida Fish and Wildlife Conservation Commission

*Expected Completion:* 6/30/2007

*Graduate Students:* Julien Martin, Chris Cattau, Andrea Bowling

*Field Technicians:* Sara Stocco, Brian Reichert

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### ***Continued Snail Kite Monitoring Studies: Demographic, Population Growth, Extinction, and Movement Parameters***

*Principal Investigator:* Wiley M Kitchens

*Funding Agency:* U.S. Fish and Wildlife Service

*Expected Completion:* 12/31/2007

*Graduate Students:* Julien Martin, Chris Cattau, Andrea Bowling

*Field Technicians:* Sara Stocco, Brian Reichert

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### ***Radio Telemetry and Mark–Recapture Studies of Demographic, Movement and Population Dynamics of the Endangered Snail Kite***

*Principal Investigator:* Wiley M Kitchens

*Funding Agency:* U.S. Army Corps of Engineers / U.S. Geological Survey

*Expected Completion:* 3/31/2007

*Graduate Students:* Julien Martin, Chris Cattau, Andrea Bowling

*Field Technicians:* Sara Stocco, Brian Reichert

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## ***Floral and Faunal Succession Following Alternative Habitat Restoration Techniques in a Large Central Florida Lake***

*Principal Investigator:* Wiley M Kitchens

*Funding Agency:* Florida Fish and Wildlife Conservation Commission

*Expected Completion:* 6/30/2007

*Graduate Students:* Melissa DeSa

*Field Technicians:* Carolyn Enloe, Brad Shoger, Amy Schwarzer

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To enhance/restore fishery production in Florida lakes with documented declining fishery habitat, the Florida Fish and Wildlife Conservation Commission (FWC) recently embarked on an initiative to identify those resources which would best respond to restorative treatments. The goal of this effort is to recover the habitat quality and fishery production of the littoral reaches of approximately 30 lakes over the next 20 years. The resulting enhancement projects would typically include: extreme drawdowns, organic sediment removal, minimization of cattail and tussock habitats, creation of upland and in-lake spoil deposits, reestablishment of desirable native aquatic vegetation, and aggressive vegetation management.

While the benefits to Florida fishery resources associated with periodic extreme drawdowns have been documented for more than 30 years, it is known that accrued benefits are time-limited, generally less than 10 years. In an attempt to hasten habitat enhancement and extend the time periods between requisite drawdowns, the FWC initiated a program of mechanically removing tussocks and associated organics during planned drawdown periods as well as fortuitous unscheduled natural drawdowns. The apparent success of this combined drawdown and muck removal procedure for fishery habitat enhancement in demonstration projects has made this technique the preferred enhancement alternative. While these projects have unquestionably resulted in immediate and dramatic increases in short-term fish production, impacts on other resources are less well documented. Only cursory or speculative information is available regarding long-term effectiveness or overall impacts of current restoration techniques on wildlife resources. To date, there have been too few experimental trials to properly evaluate various vegetation responses to mechanical bottom scraping. Questions remain regarding the means and degree of removal required. For example, what are the minimal levels of scraping required to provide target enhancement levels while minimizing potential negative impacts to wildlife and other ecological resources? Are there cost effective configurations of scraped areas and non-scraped areas that meet the same criteria as current techniques? Resolution of these concerns is critical to the continued success and public support of the lake restoration program. This large scale, long term study will help address these and other strategic information needs to sustain the success of large-scale, extreme drawdowns, and muck removal/redeposition projects.

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## ***Wildlife Usage and Habitat Development on Spoil Islands in Lake Tohopekaliga, FL***

*Principal Investigator:* Wiley M Kitchens

*Funding Agency:* Florida Fish and Wildlife Conservation Commission

*Expected Completion:* 8/1/2009

*Field Technicians:* Melissa DeSa, Carolyn Enloe, Brad Shoger, Amy Schwarzer, Jonathan Chandler, Aimee Reiss

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In 2004, Lake Tohopekaliga in Kissimmee, FL was drawn down to extremely low water levels, and massive amounts of littoral vegetation and “muck” were removed from the shorelines. Twenty-four in-lake spoil islands were created using the scraped materials. The islands were randomly stockpiled, and as a result they all exhibit different physical characteristics. These include shape, size, grazing and proximity to shore. We anticipate that these attributes will affect the plant communities that colonize the islands, and the animals that use them. By monitoring and documenting the dynamics of the floral and faunal communities present on these islands, we anticipate being able to relate island characteristics with wildlife usage and habitat development through time. The protocol involves intensive sampling for birds, herpetofauna and vegetation communities throughout the year. The intent is to make inferences on what particular island attributes are attractive to wildlife. This will help lake managers make more informed decisions on where and how to deposit scraped material in the future.

Objective of Project Include:

- 1) Document and describe wildlife occurrence and associated activities on select spoil islands in Lake Tohopekaliga.
- 2) Document and describe vegetation present on select islands and follow succession throughout the study period.
- 3) Relate wildlife occurrence to various island characteristics and attempt to elucidate associations. Avian, herpetofauanal and vegetation surveys will be conducted on all islands.



## ***Vegetative Habitat Responses to Hydrologic Regimes in Everglades Water Conservation Area 3A***

*Principal Investigator:* Wiley M. Kitchens

*Co-Principal Investigator:* Christa Zweig

*Funding Agency:* U.S. Army Corps of Engineers

*Expected Completion:* 9/30/2006

*Graduate Students:* Christa Zweig, Erik Powers, Thea Hotaling

*Post-doctorate:* Paul Wetzel

*Field Technicians:* Patty Castillo-Trenn, Allison Pevler, Orlin Merrit, Simon Fitz-Williams

This project is intended to address concerns expressed by the U.S. Fish and Wildlife Service regarding the proposed action of the U.S. Army Corps of Engineers (Corps) to implement Alternative 7R (IOP-Alt.7R) under the Interim Operational Plan for Protection of the Cape Sable Seaside Sparrow, Everglades National Park. Specifically, it addresses the concern that IOP-Alt.7R could adversely affect snail kites and designated habitat in WCA-3A, portions of which are designated critical habitat of the endangered snail kite (*Rostrhamus sociabilis*). The principal concern is that the carrying capacity (habitat quality) of WCA 3A, the largest and most consistently utilized (as measured by numbers of birds observed during 1970-



1994 during annual surveys) of the designated critical habitat is currently seriously degraded. ). Bennetts and Kitchens (1997) documented that snail kites have increasingly moved their nesting activity to areas of higher elevations in WCA 3A over the past two decades presumably as the traditional nesting regions have been degraded by high water levels sustained by current water management practices. Zaffke (1983), Wood and Tanner (1990), and David (1996) all have documented the conversion of wet prairies (preferred foraging habitat, Kitchens et al. (2002)) to aquatic sloughs in that area along with losses of interspersed herbaceous and woody species essential for nesting habitat. Analysis of hydrological predictions for IOP-Alt.7R indicate that implementing the project could result in excessive ponding and extended hydroperiods of the type that could further degrade nesting and foraging habitat as described by Kitchens et al. (2002).

The principal objective and challenge is to separate plant community responses due to typical seasonal and year-to-year variances from effects due to new and /or predicted hydrologic regimes. The vegetative community structure of these sites is an expression of the *both* the recent past and current hydrological conditions. Therefore, it is critically important to determine how the species associations within these communities respond differentially to changes in hydrology through time and over space.



We intend to generate hydroperiods and depth duration data for twenty plots within the study site for the measured (as well as predicted) period of record. The products generated by this task are the pseudotopographic database and site specific hydrologic history or characterization for the plant community types comprising each plot. The latter information is vital to determining the differential rate responses for the individual species comprising each plant community type when used in conjunction with species association data through monitoring the current vegetative structure in Indicator Areas. The vegetative monitoring effort is designed to detect mesoscale to small scale annual/interannual changes, and small scale within-year (seasonal) variations in response to hydrology. Additionally, we shall determine the relationships between plant species distributions and the associated environment variables regulating distributions.





## ***Cost and Accuracy Analysis of Gopher Tortoise Population Estimation Techniques***

*Principal Investigator:* Raymond R. Carthy

*Co-Principal Investigator:* Madan K. Oli

*Funding Agency:* U.S. Army Corps of Engineers / U.S. Geological Survey

*Expected Completion:* 5/21/06

*Biologists:* Esther Langan, John Wooding

*Graduate Students:* Saif Nomani

*Field Technicians:* Erin Cantwell, Kristin Miller, Maena Voigt

The U.S. Army Construction Engineering Research Laboratory (USA CERL) in Champaign, IL, is engaged in research to examine threatened and endangered species population estimation techniques for accuracy and cost. Estimating TES population trends is essential to be able to remove a species from being listed as threatened and endangered. Yet for many TES species this continues to be a difficult problem due to the wide variety of survey and monitoring methods employed for this purpose with little knowledge toward their cost and accuracy. This is especially true on military installations. The varying degrees of expertise at different installations can lead installation personnel to select techniques that fit best within their knowledge framework when there may be better techniques that the individual is just unaware of. Human and equipment resources vary according to the installation, as do available funds for studies. In order for installations to be able to make an informed choice about which technique to best apply they need information regarding the accuracy and cost of population estimation techniques. To develop this information the gopher tortoise (*Gopherus polyphemus*) was selected as the test case species. The gopher tortoise is a terrestrial reptile that was once found throughout the Southeastern United States from North Carolina into Texas. However, due to numerous factors including human and animal predation and habitat loss they have been in decline for the past several decades. In addition to population decline throughout its range, the tortoise has been extirpated from Texas to North Carolina, and has a limited, precarious existence in South Carolina and Louisiana. Populations often occur on military bases, where they have largely been protected from disturbance. Tortoises prefer open-canopied habitats with ample herbaceous ground vegetation for forage. Clearing trees to make openings at tank firing points and understory removal to facilitate maneuver training has created good habitat, and the tortoises have moved in which presents a conflict with the training mission thereby making the gopher tortoise an important mitigation priority. This project evaluates population inventory techniques for the gopher tortoise.



We field-tested the cost and efficacy of line transect, total count, sample count, and double observer methods for estimating abundance of gopher tortoise burrows at the Ordway-Swisher Biological Station in north-central Florida.



In the dense vegetation stratum, the density of burrows estimated using the line transect method ( $8.58 \pm 0.94$  burrows ha<sup>-1</sup>) was lower than that obtained from total count method (11.33 burrows ha<sup>-1</sup>), and the overall detectability using the double observer method was 1.0. In the sparse vegetation stratum, the estimated burrow density using the line transect method ( $11.32 \pm 1.19$  burrows ha<sup>-1</sup>) was closer to the burrow density using the total count method (13.00 burrows ha<sup>-1</sup>), and the overall detectability using the double observer method was  $0.997 \pm 0.003$ . Using the sample count method, in the dense vegetation stratum, when 50%, 66%, and 83% of the plots were sampled, the extrapolated number of burrows in the sampling area ranged from 48 to 88, 54 to 81, and 60 to 74 burrows, respectively, and in the sparse vegetation stratum, the extrapolated number of burrows in the sampling area ranged from 64 to 92, 69 to 87, and 73 to 83 burrows, respectively.

The cost of sampling as well as our estimates of burrow density varied with habitat type and burn frequency. The line transect method was the least costly of the methods, and we were able to sample a larger effective area with the same effort. Using burrow cameras and patch occupancy modeling approach, we also estimated the probability of burrow occupancy by gopher tortoises (active:  $0.50 \pm 0.09$ ; inactive:  $0.04 \pm 0.04$ ), and used these estimates to estimate abundance of gopher tortoises in the study area.

We recommended that gopher tortoise monitoring programs should consider using rigorous methods for estimating abundance of burrows (e.g., line transect methods) and the probability of burrow occupancy by gopher tortoises (e.g., patch occupancy modeling approach).

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## ***Assessing the Effects of Coastline Alteration on Sea Turtle Nesting and Faunal Assemblages at Cape San Blas, Florida***

*Principal Investigator:* Raymond R. Carthy

*Co-Principal Investigator:* Margaret Lamont

*Funding Agency:* U.S. Department of Defense / Eglin Air Force Base

*Expected Completion:* 10/31/2008

*Graduate Students:* Russell Scarpino

*Field Technicians:* Celeste Warner, Lori Brinn, Burnie Brinn, Scott Warner



The beaches along Eglin Air Force Base property on Cape San Blas, Florida are extremely dynamic; however they also support significant groups of nesting sea turtles and foraging shorebirds. The eastern beach of Cape San Blas undergoes accretion, whereas the western coast experiences some of the greatest erosional rates in Florida. From June 1994 to September 1995, approximately 10 m of sediment was eroded from west beach (Lamont et al., 1997). Frequent hurricanes in this area also cause severe coastline alteration in a short amount of time thereby forcing coastal species to quickly adapt. In addition to

natural erosion, the coast of Cape San Blas is becoming increasingly influenced by man-made changes. Beach nourishment, rock abutments, and sea walls all help protect beach-front homes but also alter sand movement and offshore current patterns, which may greatly affect coastal species, such as nesting sea turtles and foraging shorebirds.

Genetic studies have indicated loggerhead turtles nesting along the northern Gulf of Mexico represent a unique stock (Encalada et al., 1998), and the greatest density of loggerhead turtle (*Caretta caretta*) nesting in this region occurs along 5-km of beach owned by the US Air Force on Cape San Blas. Researchers at the Florida Cooperative Fish and Wildlife Research Unit have been monitoring loggerhead turtle on EAFB along Cape San Blas since 1993. This information has provided valuable information on sea turtle nesting density, population size, species composition, and site fidelity. In addition, it has been suggested that loggerhead turtle nesting numbers throughout Florida are declining.

Continued monitoring of this unique loggerhead turtle nesting group will help determine whether long-term trends are declining and assist in evaluating management plans to reverse these trends.

In addition to supporting nesting sea turtles, Cape San Blas also supports a large number and wide variety of shorebirds, including many threatened and endangered species. Piping plovers (*Charadrius melodus*) forage along these beaches and snowy plovers (*Charadrius alexandrinus*) nest on Cape San Blas. The consistent pattern of erosion and accretion influence the food supply for shorebirds and pressure from human activities alter their nesting substrate. Nesting sea turtles and foraging shorebirds face many natural and man made threats along EAFB property on Cape San Blas, Florida. The Florida Coop Unit's 13 years of monitoring these species in this area provides a unique opportunity to assess population characteristics that require long-term datasets. Increases in sea level and human activities along coastal regions will greatly impact those species trying to adapt to the ever-changing conditions. Information gathered during this study will help better understand this habitat and the species that rely on it for survival.

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***Assessment of Beach Compaction and Associated Effects on Loggerhead Sea Turtle (*Caretta caretta*) Nesting on Natural and Nourished Beaches in Northwest Florida***

*Principal Investigator:* Raymond R. Carthy

*Co-Principal Investigator:* Lori A. Brinn

*Funding Agency:* U.S. Fish and Wildlife Service

*Expected Completion:* 9/30/2008

*Graduate Students:* Lori A. Brinn

*Field Technicians:* Burnie B. Brinn

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Beach nourishment is important for protecting Florida's coastline. However, if nourished sand has different properties than natural sand, then the beach ecosystem may suffer. Of particular interest is the effect of nourishment on loggerhead sea turtle nesting. To preserve the beaches of northwest Florida, the U.S. Army Corps of Engineers has placed large quantities of sand over time using various nourishment methods. Our objective was to determine if physical properties of sand used for nourishment differed from those of natural beach sands, and if any differences observed caused a negative impact on nesting sea turtles and their hatchlings. Specifically, compaction, bulk density, gravimetric and volumetric water content, color (chroma and value), and grain size distribution were analyzed on eight pairs of nourished beaches and corresponding natural beaches in close proximity. We hypothesized that any differences in these physical properties on nourished versus natural beaches could have a negative impact on loggerhead sea turtle nesting and hatchling success. 432 core sand samples were taken from the 16 beach sites in summer 2006. Core samples were collected at depths of 0-6in, 6-12in, and 12-18in and analyzed for differences in water content, bulk density, color, and grain size distribution. Compaction measurements were also taken at all sampling locations on each



beach. Trends in physical properties differed from beach to beach depending on the location and type of nourishment strategy. Our results will be integrated with sea turtle nesting statistics to provide insight on whether any differences in these physical properties affect nesting patterns. In summer 2007, nest morphology will be analyzed on nourished and natural beaches in close proximity. All of the data from this study will be integrated to form recommendations to improve the U.S. Fish and Wildlife Service's management practices in northwest Florida.

Color (chroma and value) and grain size distribution analyses were completed in fall 2006 on all 432 samples collected from the Florida Panhandle. Statistical analyses will be completed in the spring pending the release of 2006 turtle nesting data from the Florida Fish and Wildlife Research Institute. During the second summer of this assessment, compaction and associated physical properties of sand will continue to be measured on natural and nourished beaches along the Florida panhandle. Attention will be given to shear resistance as a potentially influential physical property separate from compaction. Shear resistance will be measured with an apparatus constructed to look and behave similarly to a loggerhead sea turtle's rear flipper pushing sand in a sideways motion across the surface of the beach. The goal of conducting these shear resistance procedures is to determine the shear strength of cohesionless soil (beach sand), which will provide insight into the difficulty for nesting females of clearing sand away in preparation for digging a nest chamber. Soil data will again be correlated with data from Florida Panhandle Marine Turtle Permit Holders to assess the effects of compaction and, more broadly, beach nourishment, on the nesting and hatching success of loggerhead sea turtles. In addition to compaction measurements, which were also taken in 2006, nest casting and shear resistance procedures will be conducted in 2007.



## ***Adaptive Habitat Management for Florida Scrub-Jays at Merritt Island National Wildlife Refuge***

*Principal Investigator:* H. Franklin Percival

*Co-Principal Investigator:* Fred Johnson & Talia Beech

*Funding Agency:* U.S. Geological Survey

*Expected Completion:* 4/30/07

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Prescribed burning is the primary management tool for scrub-jays at MINWR, but managers face constraints on the timing and location of burns due to the associated fire and smoke hazard to Kennedy Space Center facilities. Within these constraints, managers must decide what frequency and intensity of fire in a collection of management units will best ensure the long-term persistence of the refuge's scrub-jay population. These decisions are difficult because of an incomplete understanding of fire dynamics, plant community succession, and the demographic responses of scrub-jays to both controlled and uncontrolled environmental factors. Additionally, decisions about prescribed burns (and the associated actions) take place on a variety of spatial and temporal scales, which remains a central question in this project. We propose to develop key components of a formal decision-making framework for the prescribed burning of scrub-jay habitat on MINWR. The ultimate goal is to make better management decisions by accounting for uncertainty in scrub-jay and habitat dynamics, for uncontrolled environmental effects, for imprecision in habitat and population monitoring programs, and for constraints on management actions. We also propose to develop methods that can reduce the uncertainty in predicting management outcomes, so that management performance can be improved over time.

We use Bayesian inference and decision theory:

- a) to develop predictive models of scrub-jay population dynamics; and
- b) to explore methods for calculating optimal management decisions, as well as adapting those decisions based on what is learned from their application.





## ***Assessing the Role of Avian Predators on Shorebird Foraging Efficiency and Impoundment Use at Merritt Island National Wildlife Refuge***

*Principal Investigator:* H. Franklin Percival

*Co-Principal Investigator:* Elizabeth Martin & Jaime Collazo

*Funding Agency:* U.S. Geological Survey / U.S. Fish and Wildlife Service

*Expected Completion:* 12/30/2006

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There is vast literature that indicates predation and non-lethal effects of predators on their prey can play a significant role in regulating distribution and abundance of prey populations. Therefore understanding the circumstances and mechanisms by which habitat quality and subsequently habitat use is influenced by predation risk has conservation implications. Although it is known that diurnal raptors that prey on shorebirds do occur throughout the southeast region of the United States and Merritt Island National Wildlife Refuge (MINWR) in Florida, no information is available on shorebird-raptor interactions or predation risk during winter or spring migration for this region of North America.

The primary goal of this project is to begin to understand the role that raptors and predation risk may play on Dunlin (*Calidris alpina*) foraging behavior and wetland use at MINWR, one of the primary wintering sites for Dunlin in Florida. Activities to be conducted to reach this goal include identifying which species of raptors co-occur with shorebirds during winter and spring, identifying the level of raptor presence, attacks or predation on shorebirds in impoundments at MINWR, and examining behavior of Dunlin in response to potential presence of raptors or other indicators of predation risk. Information resulting from this project will be used as the pilot phase of an in-depth study of predation risk and habitat use to be conducted in 2007 and 2008 at MINWR. Results from this project and the larger study to be conducted in subsequent years will contribute to increasing our understanding of wintering shorebird ecology and provide baseline information that will enhance the capacity of land managers to incorporate predation risk into planning and evaluation of wetland management interventions that provide quality habitat for shorebirds.



## ***Development of Unmanned Aerial Vehicles for Assessment of Wildlife Populations and Habitats: Phase 2***

*Principal Investigator:* H. Franklin Percival  
*Co-Principal Investigator:* Leonard G. Pearlstine,  
Bon A. Dewitt, Peter Ifju  
*Funding Agency:* U.S. Geological Survey  
*Expected Completion:* 12/31/2006  
*Aeronautical Engineer:* Kyuho Lee  
*Biological Scientist:* Adam Watts



Aerial surveys are commonly used methods for scientific research, especially wildlife management. However, problems with safety, cost, statistical integrity, and logistics plague aerial surveys taken from single-engine, manned aircraft. Small, unmanned aerial vehicles (UAVs) offer promise for addressing these problems and developing into a useful tool for many wildlife research applications. This past year, the Florida Coop's 1.5-m-wingspan UAV, dubbed the "Tadpole" by its designer Kyuho Lee, was flown on several missions at various spots in the United States. Equipped with autonomous control and a small progressive scan video camera, the Tadpole flew missions over sage grouse in Idaho, various mixes of vegetation in south Florida, gallinule nests in south Florida, and bison in Montana. Although the UAV captured usable video footage for some applications, other applications have aspects that will require more refinement of the UAV components.



In previous years, the UAV program experienced excellent and relatively rapid progress in airframe development but no changes in the imaging platform, which consisted of the aging Canon Elura 20MC. High weight and low resolution, combined with low availability on the second-hand market, proved increasingly to be an area in need of improvement. Beginning in May 2006 the Tadpole flies a Canon SD600 Digital Elph, offering similar video capability and still-image resolution nearly 9 times greater than the Elura offered. This platform offers great potential to be used with a gimbal mount.

The UAV program experienced two major events in early 2006. First, the coordinator role unfilled since Jamie Duberstein's departure was assumed by Adam Watts. Second, a significant budget shortfall was discovered. These two events were completely unrelated, but occurred nearly simultaneously. Thus, progress which could have been expected to be slow in the first weeks of a new project director was additionally hampered by a critical funding shortfall.



#### Objectives:

- Develop techniques to discern and estimate populations of white ibises, egrets, wood storks, manatees and alligators using geo-coded videography in an UAV.
- Develop techniques to define vegetation by species and extent in aquatic and terrestrial habitats using geo-coded videography in an UAV.

### ***Southeastern Adaptive Management Group (SEAMG)***

*Principal Investigator:* H. Franklin Percival

*Co-Principal Investigators:* Robert .M. Dorazio, Fred A. Johnson

*Funding Agencies:* Florida Fish & Wildlife Conservation Commission / U.S. Geological Survey / U.S. Fish & Wildlife Service

*Expected Completion:* 6/30/06

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The Southeastern Adaptive Management Group (SEAMG) was created in 2001 for the purpose of achieving a better science-based approach to wildlife conservation and management. The principal **mission** of the group is “***To better integrate research and management for the purpose of improving how natural resource management decisions are made.***” As part of this mission, the SEAMG is responsible for exploring and developing quantitative tools that improve and facilitate the integration of research and management. A distinguishing feature of the SEAMG is that it seeks ways to achieve a heightened level of integration between researchers and managers. At this level of integration, management actions themselves are viewed as opportunities for learning through experimentation, and the selection of management actions generally includes compromises between the (possibly) long-term value of learning and the short-term value of achieving more immediate management objectives. However, practical considerations also are expected to constrain the selection of management actions in most, if not all, resource management problems. A truly integrated program of research and management potentially offers great rewards; however, it is far more difficult and more costly to achieve than the more common situation where research is conducted *in support of* management without any direct involvement in the selection of alternative management actions. The SEAMG is interested in finding ways to achieve higher levels of integration in the activities researchers and managers to improve the decisions in problems of natural resource management and conservation. Institutional arrangements for establishment and operation of the SEAMG are described in a formal Cooperative Agreement among signatories of the U.S. Geological Survey (USGS), the U.S. Fish and Wildlife Service (USFWS), and the Florida Fish and Wildlife Conservation Commission (FFWCC). It is guided by a Steering Committee comprised of representative of the signatory agencies. The SEAMG is housed within IFAS Statistics and the Program for Environmental Statistics at the University of Florida. SEAMG scientists interact closely with scientists and managers of cooperating organizations to solve problems of natural resource management.

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***American Alligator Distribution, Size, and Hole Occupancy and American Crocodile  
Juvenile Growth and Survival***

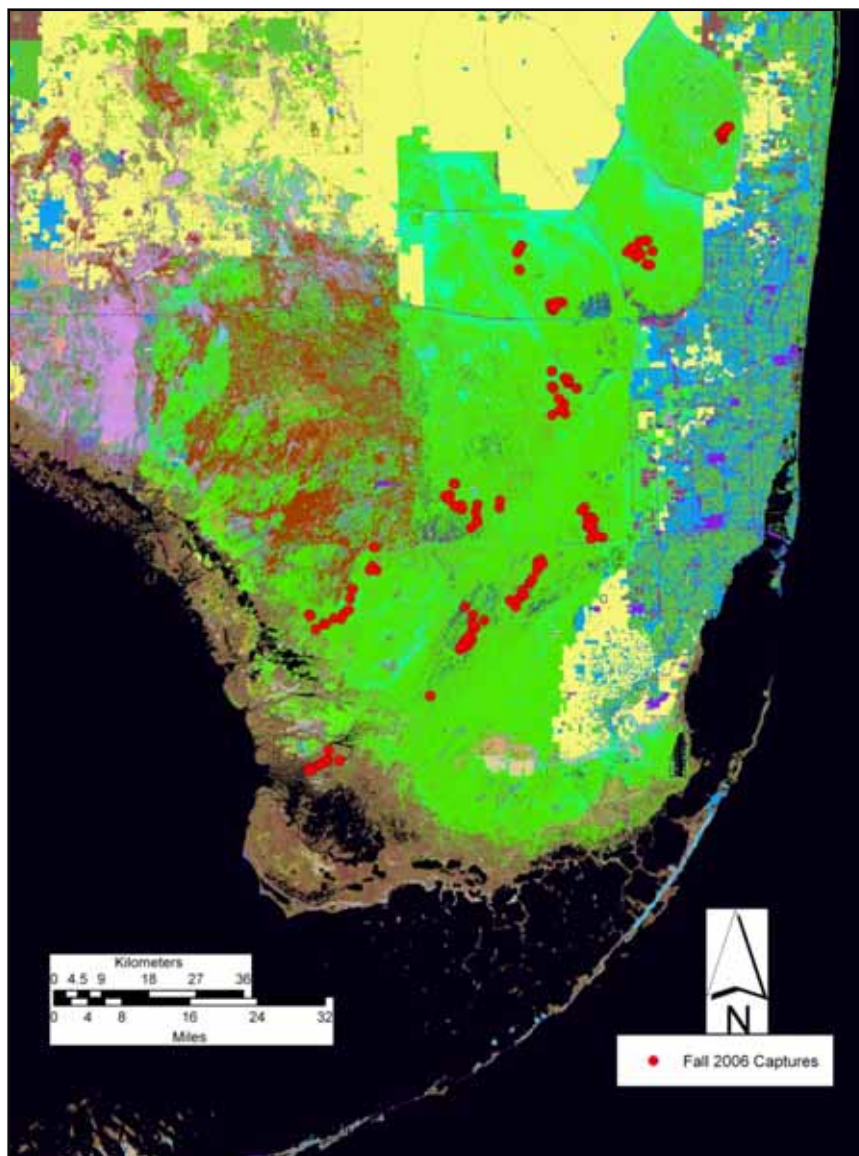
*Principal Investigator:* H. Franklin Percival  
*Co-Principal Investigators:* Frank J. Mazzotti  
*Funding Agencies:* U. S. Army Corps of Engineers  
*Expected Completion:* 6/30/2007



The Water Resources Development Act (WRDA) of 2000 authorized the Comprehensive Everglades Restoration Plan (CERP) as a framework for modifications and operational changes to the Central and Southern Florida Project needed to restore the south Florida ecosystem. Provisions within WRDA 2000 provide for specific authorization of an adaptive assessment and monitoring program. A Monitoring and Assessment Plan (MAP) has been developed as the primary tool to assess the system-wide performance of the CERP by the REstoration, COordination and VERification (RECOVER) program. The MAP presents the monitoring and supporting enhancement of scientific information and technology needed to measure the responses of the South Florida ecosystem. This project proposes to: 1) design and develop a monitoring program for relative distribution, size (condition), nesting and hole occupancy rates of the American alligator in response to CERP projects as specified in the MAP; 2) monitor changes in alligator populations throughout Greater Everglades ecosystems due to restoration over short (body condition), medium (distribution, hole occupancy) and long (nesting) temporal scales; 3) design and develop a monitoring program for growth and survival of crocodiles in areas that will be affected by CERP projects; and 4) conduct crocodile surveys as expressed in the MAP based on geographic area and including nesting effort and success and juvenile growth and survival.



Photo by Ralph Arwood



Objectives:

#### Alligators

- Design and develop a monitoring program for relative distribution, size (condition), nesting and hole occupancy rates of the American alligator in response to CERP projects as specified in the MAP. The monitoring program and procedures developed will provide the baseline for future comparisons and an effective means for evaluating restoration success for the American alligator in the Greater Everglades ecosystem.
- Monitor changes in alligator populations due to restoration over short (body condition), medium (distribution, hole occupancy) and long (nesting) temporal and spatial scales.

#### Crocodiles

- Design and develop a monitoring program for growth and survival of crocodiles in areas that will be affected by CERP projects.
- Surveys for crocodiles will be conducted as expressed in the RECOVER MAP. Monitoring surveys will be separated into subtasks based on geographic area. In all areas, crocodile surveys and monitoring will include nesting effort and success and will focus on growth and survival of juvenile crocodiles.

## ***Experimental Evaluation of a Habitat Enhancement Project for Fish and Wildlife at Gant Lake, Florida***

*Principal Investigator:* Mike S. Allen, Wiley M. Kitchens, H. Franklin Percival

*Funding Agencies:* Florida Fish and Wildlife Conservation Commission

*Expected Completion:* 12/20/2013

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Many Florida lakes have experienced altered hydrologic regimes due to channelization and water control structures for flood control, agriculture, and water supply activities. Altered hydrology has resulted in stabilized water levels compared to historical regimes and modified temporal (i.e., within and among year) patterns in water levels. Stabilized water levels allow dense emergent plants to flourish in the narrow zone of lake fluctuation, which leads to excessive deposition of organic matter and eventual loss of littoral habitat for fish, including recreationally important sport fish (Moyer et al. 1995; Allen and Tugend 2002). These degraded vegetation communities have been characterized as dense (percent-area coverages of 90-100%), with extremely high plant biomass ( $> 50 \text{ kg/m}^2$ ) and poor habitat for fish (e.g., low dissolved oxygen) (Moyer et al. 1995; Allen and Tugend 2002).

To mitigate the influence of altered hydrology on fish habitat, The Florida Fish and Wildlife Conservation Commission (FWC) has conducted some of the world's largest lake habitat enhancement projects. Enhancement efforts have focused on lake drawdowns and muck (i.e., organic plant material and sediment) removals, with the goal of improving sport fish populations, angler access, and fishing quality. Although habitat enhancements improve fish habitat in the treated areas (Allen and Tugend 2002), these efforts do not always cause significant lake-wide increases in the population abundance and angler catch rates of sport fish such as largemouth bass *Micropterus salmoides* (Allen et al. 2003).

Minns et al. (1996) argued that freshwater habitat enhancement efforts should focus on ecosystem and multi-species benefits rather than benefits to a single species or group. Lake habitat enhancement projects have the potential to benefit all components of lake ecosystems including wildlife (e.g., amphibians, reptiles, birds) and fisheries resources. However, work is needed to understand the collective wildlife and fish community responses and processes, which can then be used to maximize the benefits of habitat enhancement efforts on lake ecosystems.

We propose to evaluate the wildlife and fish community responses to a habitat enhancement project at Gant Lake, Florida. Our approach will measure habitat characteristics and fish and wildlife community composition and abundance at Gant Lake and two control lakes before and after the habitat enhancement effort. Results of this project will aid resource managers in designing habitat enhancement projects in the future to maximize benefits to wildlife and fisheries resources.

Gant Lake is a 93-acre natural lake located in Sumter County, Florida. The lake hydrologic regime has been modified via a system of canals, with two incoming canals from the east and an outflow canal that discharges to the east. The lake is eutrophic and in 2006 contained abundant aquatic plants including coontail *Ceratophyllum demersum*, spatterdock *Nuphar advena*, cattail *Typha* spp., and willow *Salix caroliniana*. Gant Lake is shallow with a maximum depth of about two meters (SWFWMD 2005). Evidence suggests that the lake has undergone a large amount of sedimentation following the channelization and modified hydrologic regime.



The habitat enhancement project will include suction dredging and a partial drawdown to reduce the amount of flocculent sediment, deepen the lake, and improve the habitat conditions for fish and wildlife. Gant Lake will be sampled along with two control lakes, Lake Lindsey and Lake Johnson. The control lakes were carefully chosen to approximate the size, watersheds, and locations of Gant Lake. The intent is to use these control lakes as reference systems subject to the same general local climatic conditions (including droughts and storms) and physiographic influences as Gant Lake. The intent is to be able to attribute or distinguish the measured responses in Gant Lake to the restoration activities as opposed to other environmental influences in the region. Control lakes will truly be sampled in the same manner as Gant Lake for all portions of this study.

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## ***Effects of Environmental Mercury Exposure on Development and Reproduction in White Ibises***

*Principal Investigator:* Peter Frederick

*Funding Agencies:* U. S. Army Corps of Engineers

*Expected Completion:* 9/30/2006

*Graduate Students:* Nilmini Jayasena, Evan Adams

*Bird Keepers:* Leslie Straub, Bobbie Jo Sampson

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The South Florida environment has been highly contaminated with methylated mercury, but the effects of this contamination on animals at top trophic levels is impossible to project from existing information. The role of mercury in determining reproduction and survival of fish eating birds is of particular importance, since these parameters are also considered to be key to achieving a restored Everglades. This project is designed to understand the potential effects of environmentally relevant methylmercury exposure on the development, behavior, reproduction, health and endocrine function of a representative long-legged wading bird, the White Ibis. Young birds will be raised from a young age in a large free-flight aviary, and maintained on diets with 0, 0.3, 0.1 and 0.05 mg methylmercury/kg food. Effects will be examined by measuring growth parameters, health parameters, behavior, fecal hormone levels, and reproduction.

### **Objectives:**

- establish a captive population of ibises and develop methods to maintain them on predetermined levels of dietary mercury.
  - examine the effect of methylmercury in a controlled environment on behavior, endocrine function, health, growth and reproduction.
  - relate any effects to the wild state by modeling effects at the population level.
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## ***Monitoring of Wading Bird Reproduction in WCAS 1, 2, and 3 of the Everglades***

*Principal Investigator:* Peter Frederick

*Funding Agencies:* U. S. Army Corps of Engineers

*Expected Completion:* 3/30/2009

*Graduate Students:* Rena Borkhataria, Kate Williams

*Research Coordinator:* John Simon

*Field Technicians:* Sam Edmonds, Andrew Spees, Becky Smith, Elizabeth Kreakie

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The proposed work is to continue a long-term monitoring project that annually measures responses of breeding wading birds to hydrological conditions in the water conservation areas of the Everglades. This project is compatible and integrated with a larger effort designed to monitor reproductive responses of wading birds to Everglades water management and restoration activities, from Lake Okeechobee to Florida Bay. Responses monitored will be numbers of nesting pairs of 8 species (nesting effort) and reproductive success and productivity of selected species (White Ibises, Wood Storks, Great Egrets, Snowy Egrets) in large and regionally significant colonies.

### **Objectives:**

- Annually document numbers of nesting pairs in WCAs 1, 2, and 3 of the Everglades through the use of aerial and ground survey techniques.
- Develop new methods for estimating numbers of nests, particularly in large colonies.

Wading bird nesting responses (timing, location, numbers of nests) are an important variable in evaluating the success of the Comprehensive Everglades Restoration Plan (CERP). Although records of nesting wading birds go back to the late 1800's and the coverage has been thorough in some parts of the Everglades for a decade, there are several parts of the south Florida ecosystem that have not been surveyed at all, or have not been surveyed regularly or systematically. The purpose of this CERP-funded MAP project is to expand coverage of the surveys to give a comprehensive picture of nesting in the south Florida ecosystem, including Lake Okeechobee, the Water Conservation Areas, Big Cypress National Preserve, Holey Land and Rotenberger, Everglades National Park and Florida Bay. Not all species of wading birds are considered of equal importance in monitoring the success of CERP, and the focus is now on large white species, especially Wood Storks, White Ibises, Snowy Egrets, and Roseate Spoonbills. Four entities were involved in the systematic surveys – University of Florida (BICY and WCAs), Florida International University (Lake Okeechobee), National Audubon Society (Florida Bay) and Everglades National Park (ENP).

During the reporting period we have been accomplishing two things – maintaining and repairing equipment, and analyzing the data from the 2006 breeding season.

The hull of one of the airboats has finally (after 14 years) been declared unusable, and we have been working to find an appropriate and cost effective replacement. We anticipate delivery of the repaired boat in January 2007.

The analysis of nest longevity has taken much longer than expected. This is partially because the work is quite tedious (comparing individual nests from among thousands in digital photos of

varying quality and angle), but also because we have had one colony counted by three different individuals. The counts are within about 5% of one another, suggesting that we do have a repeatable technique. In addition, it has taken quite a bit of back and forth between Patuxent Wildlife Research Center and Gainesville to make the superpopulation perform with the data we have. Now that the technique has been worked out, however, things should go more smoothly.

Our results indicate that modeling numbers of nest starts using the superpopulation approach does indeed yield estimates that are considerably higher than the peak count method that has been used previously. When the visibility bias from vegetative occlusion is taken into account, the peak count estimates are 30 – 60% lower than our best estimate using the superpopulation approach. So the technique seems to work, and the differences are large and significant.

We have presented two papers stemming from this project at the largest ornithological scientific meeting in the world (NAOC, Veracruz Mexico August 2006). The first was on the use of the superpopulation approach, and the second was on the correlates of nesting effort in the Everglades. The latter study suggests that much of the variation in nesting is due to annual drying rate, and mercury contamination rate.

On December 5, 2006 we held a meeting in West Palm Beach to coordinate nesting wading bird surveys during the 2007 spring season. Representatives from National Audubon Society, Florida Atlantic University, University of Florida, the South Florida Water Management District, and Everglades National Park attended. While much of the information exchange was routine, we realized that through a semantic misunderstanding, mainland Everglades National Park has been covered only through point to point surveys, and not by systematic surveys during the last two years. We are currently working on a plan to ensure systematic coverage through a combination of ENP and UF surveys in 2007. In addition, we further discussed the probable need for ground surveys in ENP during spring 2007 at major colonies in the mainland. In Florida Bay, we agreed that detection of colonies via aerial surveys for Bald Eagles can be coupled with ground visits by National Audubon Society staff.

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### ***Wading Bird Colony Location, Size, Timing and Wood Stork Nesting Success***

*Principal Investigator:* Peter Frederick

*Funding Agencies:* U. S. Army Corps of Engineers

*Expected Completion:* 10/30/2006

*Research Staff:* John Simon, Kate Williams

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The proposed work is to continue a long-term monitoring project that annually monitors responses of breeding wading birds to hydrological conditions in the water conservation areas of the Everglades, and to monitor reactions of Wood Storks (*Mycteria americana*) to hydrological change. While this work continues the work carried out over the past decade, this project expands the area covered to include nesting in Big Cypress National Preserve and Everglades National Park, and to facilitate and standardize surveys occurring in Florida Bay and Lake Okeechobee.

This work is to continue a long-term monitoring project that annually documents responses of breeding wading birds to hydrological conditions and restoration efforts, and to expand the coverage of these surveys to include Everglades National Park and Big Cypress National Preserve. In addition, we hope to document specific responses of Wood Storks to restoration activities. A final goal is to ensure coordination and standardization of breeding wading bird surveys in the entire watershed, from Lake Okeechobee to Florida Bay. This will greatly enhance our ability to detect both system-wide responses, and to compare responses in different parts of the ecosystem.

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## ***Historic Pond Restoration in the Florida Panther National Wildlife Refuge***

*Principal Investigator:* Carrie Reinhardt Adams

*Co-Principal Investigator:* Michael Kane

*Funding Agencies:* U. S. Fish and Wildlife Service

*Expected Completion:* 4/1/2007

*Graduate Students:* Scott Stewart, Danielle Watts

*Research Staff:* Nancy Steigerwalt, Christine Wiese, Stacy McCauley

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In the Comprehensive Conservation Plan for Florida National Panther National Wildlife Refuge, the U.S. Fish and Wildlife Service (USFWS) identifies the restoration of the historical ponds and wetlands on the refuge as critical for development of wading bird and epiphytic orchid habitats, and ensuring ecological diversity. As a consequence of both natural and man-made impacts on hydrologic regimes, many ponds and wetlands found in the Refuge have experienced deterioration in both their function and biodiversity. This is especially important since 26% of the plants and 45% of the animals listed as threatened or endangered are directly or indirectly dependent on these habitat types for survival. To mitigate further degradation, the USFWS have developed the following priorities:

- Protect, restore, and manage candidate, threatened and endangered species and their habitats.
- Protect, restore, and manage migratory birds and protect, restore and manage their habitats.
- Protect, restore, and manage wetlands and other freshwater habitats.
- Protect, restore, and manage for biodiversity.

### Excavation

Several of the original pond sites will be excavated to historic depths (approx. 3-4 ft.). Over the past 50+ years, alterations in hydroperiod and fire regime have allowed ponds to fill in with unnatural vegetation and to preclude the existence of open water habitat and associated aquatic plants and animals. These ponds will, by design, be incorporated within suitable surrounding excavation to provide water storage, fish habitat and a littoral zone. This habitat will support aquatic and wetland plants.

### Floristic List Development and Traditional Plant Propagation

A floristic list of the native aquatic and emergent wetland and other plant species common to the pond habitats will be compiled. Propagules of selected species, including seed (when available), above ground stem and rhizome cuttings, will be collected onsite and transported to the University of Florida, Gainesville. When available, seeds will be germinated in plug trays in a controlled environment glasshouse. Stem cuttings and/or rhizome cuttings will be propagated in plug trays and placed under intermittent mist until shoot development and rooting is achieved. For some species, the propagation method called micropropagation will be used (see below). Regardless of propagation method, plantlets will be hardened off under reduced misting and increased light. Prior to pond revegetation, plugs will be transported to Florida National Panther National Wildlife Refuge for further growth and acclimatization in the greenhouse facility.

### Plant Micropropagation Procedures

Micropropagation is defined as the rapid clonal production of plants on a sterile culture medium under controlled conditions of light and temperature. The technology has been applied to the commercial production of horticultural crops for more than 50 years. With respect to habitat restoration, the technology provides the opportunity to select, store and mass produce many aquatic/wetland plant genotypes for pond/wetland restoration. Production of multiple clones of different genotypes of the same species also allows for the selection of genotypes with phenotypic characteristics which enhance restoration. The plant culture facility at the Florida National Panther National Wildlife Refuge will be used to maintain some of the aquatic/wetland plant cultures. The ultimate product will be acclimatized plants in plug trays. Prior to use in the pond restoration projects, plug trays will be further acclimated in the Florida National Panther National Wildlife Refuge greenhouse.

### Historic Pond Restoration Studies

Studies will be conducted in degraded ponds that had been excavated and contoured to provide littoral planting shelves of various sizes and slopes. Plant species will be planted in littoral zones similar to those observed in existing ponds. For each species, the effects of plant genotype, planting density and water depth on plant establishment, growth and cover will be examined over multiple growing seasons. Effects of different planting designs on requirements for post-planting maintenance will be assessed.

### Objectives:

The overall goal of the proposed research is to develop best management practices for efficient and ecologically-sound pond restoration procedures which will ensure reestablishment of habitats critical to threatened and endangered flora and fauna. The specific objectives of the project are to:

- Excavate a minimum of three historic ponds on the Refuge;
  - Develop a floristic list of the aquatic/wetland species associated with the historic ponds on the Refuge;
  - Collect aquatic and wetland plant propagules (seed, stem and rhizome cuttings) from numerous on-site genotypes for propagation by greenhouse seed/cutting propagation and micropropagation;
  - Provide ecologically focused input into the elevation and contour design and resultant hydrologic regime of the excavated ponds which will ensure long-term sustainability and decreased post-planting maintenance;
  - Evaluate effects of genotype, planting density and elevation on establishment of propagated aquatic and wetland species over numerous growing seasons;
  - Evaluate post-planting maintenance practices which promote long-term sustainability of the plant community in the restored ponds.
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## ***Rapid Delineation of Provenance for Florida Sea Oats Used for Beach and Dune Stabilization***

*Principal Investigator:* Michael Kane

*Funding Agencies:* U. S. Department of the Interior

*Expected Completion:* 9/18/2006

*Research Staff:* Nancy Philman, Pete Sleszynski, Scott Stewart, Daniela Dutra

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Florida's coastal dune system not only provides unique wildlife habitats, it also serves as a natural defense system against erosion resulting from hurricanes and human activity. The extremely active 2004 and 2005 hurricane seasons has resulted in 365 of the 825 miles of Florida's sandy beach shoreline now been assessed as critically eroded. Beach and dune restoration typically involves beach renourishment followed by planting of native species for stabilization. The most effective species planted for dune stabilization and building are perennial grasses including Sea oats (*Uniola paniculata*). Nursery-grown sea oats propagated from seed as liners or containerized plants have planting sites. One major ecological concern is the planting of non-adapted sea oats genotypes geographic source of sea oats plants. The overall goal of the project is to develop a reliable genetic database used to delineate and determine the source of sea oats to ensure ecologically sound beach and dune restoration. Ultimately, plant micropropagation technology and cryopreservation will be used to create a germplasm library of multiple genotypes from each major sea oats population. This both ensures a long-term reserve of population specific genotypes for beach and dune restoration.

### Objectives:

- To establish a germplasm library of sea oats genotypes from all major populations along Florida's Atlantic and Gulf coasts.
  - To determine the genetic diversity and distance of seedlings collected from the major sea oats populations along the Florida Gulf and Atlantic coasts using AFLP fingerprinting procedures.
  - To evaluate use of the sea oats diversity genetic database as a tool to delineate sea oats provenance distance along Florida's Atlantic and Gulf coasts.
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## **Status, Ecology, and Conservation of Rare and Endangered Florida Orchidaceae-*Bletia purpurea***

*Principal Investigator:* Michael Kane

*Funding Agencies:* U. S. Fish and Wildlife Service

*Expected Completion:* 8/2007

*Research Staff:* Scott Stewart, Tim Johnson, Daniela Dutra, Philip Kauth

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The continuing loss of native orchid habitat throughout the world has lead to an increased emphasis on species-level orchid conservation through comprehensive methods. Orchids cannot be considered independent organisms within their habitats—they are integrally connected to their habitats through mycorrhizae, pollination specialization, and a host of other biotic factors. An integrated view of conservation is critical if orchid species are to be conserved within their natural habitats. The current project will demonstrate the effectiveness of an integrated conservation approach to species-level conservation of the Florida terrestrial orchid *Bletia purpurea*. In its first phase, this study will examine aspects of both the asymbiotic and symbiotic seed germination of *B. purpurea*. A preliminary asymbiotic seed germination protocol has been determined and will be used to further examine biotic and abiotic factors effecting the growth and development of this native orchid species. The determination of a symbiotic seed germination protocol for *B. purpurea* is currently being planned and will examine not only the physiological role of a mycobiont during germination, but also explore the role of photoperiod during symbiotic germination. All propagation studies will lead to the greenhouse establishment of plants of *B. purpurea*. These greenhouse plants will eventually be used in translocation and reintroduction studies at the Florida Panther National Wildlife Refuge.

### Objectives:

- Collect and store naturally-pollinated mature seed of *B. purpurea* for use in later seed germination experiments.
- Isolate and identify mycobionts of *B. purpurea* from southwest Florida, and store these mycobionts for use in later experiments.
- Determine the asymbiotic and symbiotic seed germination requirements for *B. purpurea*, examining seed germination rates and *in vitro* development.
- Develop greenhouse acclimatization procedures for both asymbiotic and symbiotic seedlings of *B. purpurea*.
- Suggest an integrated conservation and recovery plan for *B. purpurea* based on the results of the aforementioned studies.



**Conservation, Ecology and Propagation of Florida  
Orchidaceae-*Eulophia alta* and *Cyrtopodium  
punctatum***

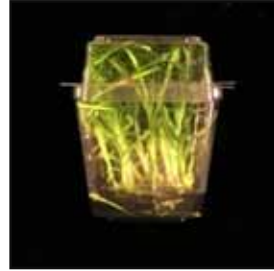
*Principal Investigator:* Michael Kane

*Co-Principal Investigator:* Scott Stewart

*Funding Agencies:* U. S. Fish and Wildlife Service

*Expected Completion:* 2/2007

*Research Staff:* Tim Johnson, Daniela Dutra

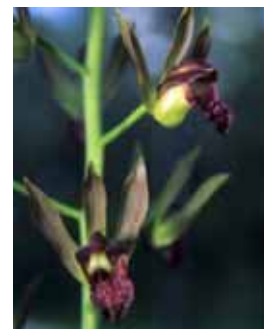


Continuing loss of native orchid habitat has led to an increased emphasis on orchid conservation. Classic views of independent species acting in only superficial interactions within a particular ecosystem or landscape are no longer applicable to the conservation of either individual species or entire landscapes. An integrated view of conservation is critical, especially on the species level. The current project will demonstrate the effectiveness of an integrated conservation approach in the species-level conservation of two Florida native orchids—*Eulophia alta* and *Cyrtopodium punctatum*.

Aspects of both the asymbiotic and symbiotic seed germination of *E. alta* are being studied. Preliminary asymbiotic seed germination experiments have been successfully completed and refined experiments examining the roles of photoperiod and medium mineral nutrition are in progress. Eleven fungal mycobionts have been isolated from the roots of *E. alta*, and have been used in successful preliminary symbiotic seed germination studies. The pollination and reproductive biology of this species is also being studied. Preliminary observations indicate that both induced autogamy and artificial geitonogamy are possible pollination mechanisms of *E. alta*. Field studies on the pollination mechanism of this species are currently being conducted. An epiphytic orchid reintroduction method has been developed and is currently being tested in preliminary plant reintroductions (*C. punctatum*) within the Florida Panther National Wildlife Refuge. More widespread and comprehensive reintroduction studies using *C. punctatum* are currently being planned.

**Objectives:**

- Collect and store mature seeds of *E. alta*.
- Isolate and identify fungal mycobionts of *E. alta*.
- Determine symbiotic and asymbiotic seed germination requirements for *E. alta*.
- Produce seedlings of *C. punctatum*.
- Develop plant translocation method for *C. punctatum*.
- Develop reliable AFLP technique applicable to Florida native Orchidaceae.
- Refine integrated conservation methods for Florida native Orchidaceae.



***Factors Affecting Population Density and Harvest of Northern Bobwhite (Colinus virginianus) on Babcock/Webb Wildlife Management Area, Charlotte County, Florida***

*Principal Investigator:* Ralph W. Dimmick

*Co-Principal Investigator:* Madan Oli

*Funding Agencies:* Florida Fish and Wildlife Conservation Commission

*Expected Completion:* 6/30/2009

*Research Staff:* Susan Dimmick, Steven Brinkley, Jeff Hostetler

*Field Technicians:* Gerald Coker, Amy Brinkley, Chris Jones

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Babcock/Webb WMA has been an important recreational resource in south Florida since at least the early 1940's, with quail hunting being a particularly significant activity on the area for more than a half-century. Bobwhite populations have varied widely over time, as have the annual harvest and hunting pressure. Since 1981, the annual harvest has declined to a persistently low level, and the population has not produced summer gains comparable to those experienced prior to 1981. Hunting effort remained relatively constant at less than 2000 hunter-days until 1988. Following that season hunting pressure increased markedly, peaking at 4000 hunter-days in 1992. A decline in harvest and productivity preceded the increase in hunting pressure by 7 or 8 years. Available data suggest that neither harvest nor hunting pressure may be the dominant factor suppressing population recovery, but neither do the data imply that hunting pressure and/or harvest may not be contributing factors.

Other environmental and demographic factors may be interacting to influence population behavior. Such factors may include non-hunting mortality of adults and chicks, nesting effort and success rates, habitat quality and availability, and catastrophic events such as hurricanes or extended drought.

The basic hypotheses to be tested are that neither harvest nor hunting pressure influences bobwhite population demographics significantly on Babcock/Webb WMA. Three levels of hunting pressure and harvest have been established by regulation on the WMA. Zones A-D permit hunting 4 days per week for 6 consecutive weeks beginning in November. Zones A and B each admit 10 hunters per day, providing a hunting opportunity for 240 hunter-days and a potential seasonal harvest of 1440 birds in each zone. Zones C and D allow unlimited hunter access with equivalent daily bag limits, but a potential harvest limited only by the total number of hunters who choose to hunt there.

The Field Trial Course permits 2 days hunting for 25 hunters in January with a potential harvest of 600 bobwhites.

Other data to be obtained and evaluated will include spring call counts of territorial males, fall covey counts, and survival rates, nest success rates, home range size, and habitat use as determined by radio-telemetry techniques. Weather information from regional weather stations will be evaluated to detect patterns or unusual events that may impact elements of bobwhite survival or ecology on the WMA.

Objectives:

- To determine if annual survival rates of bobwhites on the three experimental hunt units are related to hunting pressure.
  - To determine if survival rates are related to annual harvest.
  - To determine if productivity is influenced by harvest and /or hunting pressure.
  - To delineate nest success rates and factors influencing nest success including predation and weather.
  - To identify and quantify non-hunting mortality factors affecting bobwhite survival.
  - To identify habitats utilized and preferred by bobwhites seasonally.
  - To delineate home range size and movement patterns related to habitat, disturbance, and weather events.
  - To chronicle hunter perceptions and behavior related to hunter access and harvest regulations.
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## COMPLETED PROJECTS

<b>WINTERING FEEDING ECOLOGY OF BLACK SKIMMERS ON THE FLORIDA GULF COAST</b>	Personnel: R. Conrow
Investigator: L. D. Harris	Completion Date: December 1984
Personnel: B. Black	
Completion Date: 1981	
<b>WINTER FOOD HABITS AND FACTORS INFLUENCING THE WINTER DIET OF RIVER OTTER IN NORTH FLORIDA</b>	<b>NEST SITE SELECTION AND HABITAT USE BY LARGEMOUTH BASS</b>
Investigator: L. Cooley	Investigator: R. W. Gregory
Completion Date: 1983	Personnel: N. A. Bruno
	Completion Date: December 1984
<b>FEEDING ECOLOGY OF THE COMMON MOORHEN (GALLINULA CHLOROPUS) AND PURPLE GALLINULE (PORPHYRULA MARTINICA) ON ORANGE LAKE, FLORIDA</b>	<b>SITE-SPECIFIC REDUCTION OF MANATEE BOAT/BARGE MORTALITIES IN FLORIDA</b>
Investigator: R. Mulholland	Investigators: H. F. Percival
Completion Date: 1983	R. W. Gregory
	Personnel: M. F. Kinnaird
	Completion Date: May 1984
<b>MONITORING RIVER OTTER POPULATION: SCENT STATIONS VS. SIGN INDICES</b>	<b>MITIGATION OF FISH AND WILDLIFE VALUES IN ROCK-MINED AREAS OF SOUTH FLORIDA</b>
Investigator: M. Robson	Investigators: R. W. Gregory
Completion Date: 1983	H. F. Percival
	Personnel: R. W. Repenning
	Completion Date: August 1984
<b>ASPECTS OF THE THERMAL BIOLOGY AND ECOLOGICAL CONSIDERATIONS OF THE BLUE TILAPIA</b>	<b>WILDLIFE VALUES OF SOUTHEASTERN BOTTOMLAND FORESTS</b>
Investigator: J. A. McCann	Investigator: L. D. Harris
Personnel: A. V. Zale	Completion Date: September 1984
Completion Date: December 1984	
<b>WINTER FOOD HABITS AND FACTORS INFLUENCING THE WINTER DIET OF RIVER OTTERS IN NORTH FLORIDA</b>	<b>THE STATE OF KNOWLEDGE OF GRAY FOX HARVEST MANAGEMENT</b>
Investigator: H.F. Percival	Investigators: R. F. Labisky
Personnel: L.S. Cooley	S. R. Humphrey
	H. F. Percival
	Personnel: J. A. Hovis
	Completion Date: January 1984
<b>HABITAT PREFERENCE OF EARLY LIFE STAGES OF FISHES IN ORANGE LAKE, FLORIDA WITH AN EVALUATION OF SAMPLING METHODS</b>	<b>WINTER ECOLOGY OF RING-NECKED DUCKS IN NORTH-CENTRAL FLORIDA</b>
Investigator: W. Gregory	Investigators: H. F. Percival
	J. Thul
	Personnel: C. W. Jeske
	Completion Date: August 1985

**REPRODUCTIVE BEHAVIOR AND  
PERFORMANCE OF THE FEMALE  
FLORIDA WILD TURKEY (MELEAGRIS  
GALLOPAVO OSCEOLA, NESTING)**

Investigator: L. Williams  
Completion Date: 1985

**EVALUATION OF ALLIGATOR  
HATCHLING REMOVAL FROM WILD  
POPULATIONS IN FLORIDA**

Investigator: H. F. Percival  
Personnel: M. L. Jennings  
Completion Date: March 1986

**BIOMETRICAL SUPPORT FOR GFC'S  
GAINESVILLE RESEARCH  
LABORATORY**

Investigator: H. F. Percival  
Personnel: C. L. Abercrombie  
T. O'Brien  
Completion Date: June 1985

**EVALUATION OF CAPTIVE BREEDING  
AND REINTRODUCTION OF THE  
FLORIDA PANTHER**

Investigator: J. F. Eisenberg  
Completion Date: December 1985

**MOVEMENT AND SURVIVAL OF  
CAPTIVE-REARED GHARIALS IN THE  
NARAYANI RIVER, NEPAL**

Investigator: H. F. Percival  
Personnel: T. M. Maskey  
Completion Date: December 1988

**BLACK BEAR HABITAT VARIABLES**

Investigators: L. H. Harris  
D. Maehr  
Personnel: C. W. Jeske  
Completion Date: July 1985

**EVALUATION OF ALLIGATOR EGG  
VIABILITY FROM FOUR WETLANDS IN  
FLORIDA**

Investigators: H. F. Percival  
A. R. Woodward  
Personnel: M. L. Jennings  
Completion Date: April 1988

**HABITAT USE, MOVEMENTS,  
MIGRATION PATTERNS, AND  
SURVIVAL RATES OF SUBADULT BALD  
EAGLES IN NORTH FLORIDA**

Investigator: M. W. Collopy  
Personnel: P. B. Wood  
Completion Date: December 1991

**EFFECTIVENESS OF WILDLIFE  
CROSSING STRUCTURES ON  
ALLIGATOR ALLEY (I-75) FOR  
REDUCING ANIMAL/AUTO COLLISIONS**

Investigator: S. R. Humphrey  
Personnel: M. L. Foster  
Completion Date: December 1991

**USE OF CORTICAL BONE  
STRATIFICATION TO DETERMINE AGE  
IN AMERICAN ALLIGATORS**

Investigators: A. R. Woodward  
C. Woodard  
Completion Date: June 1991

**RESEARCH/MANAGEMENT PLAN FOR  
THE CRYSTAL RIVER WEST INDIAN  
MANATEE POPULATION, LEVY AND  
CITRUS COUNTIES, FLORIDA (RWO 1)**

Investigators: R. W. Gregory  
H. F. Percival  
Personnel: J. M. Packard  
Completion Date: December 1983

**POPULATION INDEX AND  
MARK/RECAPTURE METHODOLOGY  
FOR THE WEST INDIAN MANATEE IN  
FLORIDA (RWO 2)**

Investigators: H. F. Percival  
R.W. Gregory  
Personnel: J. M. Packard  
Completion Date: August 1985

**FORAGING HABITAT REQUIREMENTS  
OF THE RED-COCKADED  
WOODPECKER IN PINE HABITATS OF  
NORTH FLORIDA (RWO 4)**

Investigator: R. F. Labisky  
Personnel: M. L. Porter  
Completion Date: September 1984



**EFFECTS OF LOW ALTITUDE TRAINING  
FLIGHTS ON FLORIDA'S BROWN  
PELICAN AND WADING BIRD COLONIES  
(RWO 5)**

Investigator: M. W. Collopy  
Personnel: B. B. Black  
P. G. Bohall  
T. C. Edwards  
Completion Date: January 1985

**HABITAT SUITABILITY INDEX MODELS  
FOR GULF OF MEXICO COASTAL  
HABITATS (RWO 7)**

Investigators: R. W. Gregory  
H. F. Percival  
Personnel: R. Mulholland  
Completion Date: November 1984

**HABITAT USE AND MANAGEMENT OF  
SHERMAN'S FOX SQUIRREL (*Sciurus  
niger shermani*) (RWO 9)**

Investigator: S. R. Humphrey  
Personnel: A. T. Kantola  
Completion Date: 1986

**EFFECT OF NUTRIENT LEACHING ON  
FISH SPAWNING AND NURSERY  
HABITAT IN GREAT LAKES  
NEARSHORE WATER (RWO 11)**

Investigator: R. W. Gregory  
H. F. Percival  
Personnel: L. C. Brasel  
Completion Date: November 1984

**DEVELOPMENT OF HYBRID GRASS  
CARP PRODUCTION TECHNIQUES  
(RWO 12)**

Investigator: J. V. Shireman  
Completion Date: September 1984

**STUDIES OF GRASS CARP IN AQUATIC  
WEED CONTROL (RWO 13)**

Investigator: J. V. Shireman  
Completion Date: October 1984

**STATUS SURVEY OF THE FLORIDA  
GRASSHOPPER SPARROW (RWO 14)**

Investigators: M. L. Delany

Personnel: H. F. Percival  
J. Cox  
Completion Date: March 1985

**CONCEPTUAL MODEL OF SALT MARSH  
MANAGEMENT ON MERRITT ISLAND,  
FLORIDA (RWO 15)**

Investigators: C. L. Montague  
H. F. Percival  
Personnel: A. V. Zale  
Completion Date: December 1984

**STATUS SURVEY OF FIVE MAMMALS:  
SHERMAN'S SHORT-TAILED SHREW,  
PINE ISLAND RICE RAT, SANIBEL  
ISLAND RICE RAT, CHADWICK BEACH  
COTTON MOUSE, AND HOMOSASSA  
SHREW (RWO 16)**

Investigator: S. R. Humphrey  
Personnel: R. W. Repenning  
Completion Date: January 1986

**PANCREATIC NECROSIS VIRUS AS A  
PATHOGEN OF STRIPED BASS (RWO  
17)**

Investigators: R. W. Gregory  
W. M. Kitchens  
J. V. Shireman  
Personnel: S. Wechsler  
Completion Date: May 1987

**STATUS SURVEY OF THE SCHAUS'  
SWALLOWTAIL IN FLORIDA (RWO 18)**

Investigator: T. C. Emmel  
Completion Date: March 1985

**ECOLOGY AND MANAGEMENT OF  
IMPOUNDED COASTAL WETLANDS OF  
THE GEORGIA BIGHT (RWO 19)**

Investigators: C. L. Montague  
H. F. Percival  
Personnel: A. V. Zale  
Completion Date: June 1985

**FACTORS AFFECTING REPRODUCTIVE  
SUCCESS OF SEA TURTLES ON CAPE  
CANAVERAL AIR FORCE BASE (RWO 20  
AND 25)**

Investigator: R. F. Labisky  
Completion: September 1984

**STATUS SURVEY OF THE ROSEMARY  
WOLF SPIDER IN FLORIDA (RWO 21)**

Investigator: J. Reiskind  
Completion Date: April 1985

**DETERMINATION OF THE FOOD HABITS  
OF MANATEES (RWO 22)**

Investigators: G. B. Rathbun  
H. F. Percival  
Personnel: L. A. Hurst  
Completion Date: August 1985

**POPULATION ANALYSIS AND  
ROOSTING AND FEEDING FLOCK  
BEHAVIOR OF BLACKBIRDS  
DAMAGING SPROUTING RICE IN  
SOUTHWESTERN LOUISIANA (RWO 23)**

Investigators: R. F. Labisky  
N. R. Holler  
Personnel: K. Brugger  
Completion Date: September 1989

**THE ECOLOGY AND MANAGEMENT OF  
HYDRIC HAMMOCKS (RWO 24)**

Investigator: S. R. Humphrey  
Personnel: S. Vince  
Completion Date: July 1988

**PRODUCTION, STERILITY AND FOOD  
HABITS OF BIGHEAD CARP (RWO 26)**

Investigators: J. V. Shireman  
J. R. Clugston  
Completion Date: July 1987

**EVALUATION OF POPULATION  
PARAMETERS OF THE BLACK DUCK  
(RWO 27)**

Investigators: H. F. Percival  
M. J. Conroy  
M. Haramis  
Personnel: D. G. Krementz  
B. R. Charest  
M. L. Jennings  
Completion Date: July 1987

**STATUS OF THE CAPE SABLE SEASIDE  
SPARROW IN EAST EVERGLADES  
(RWO 28)**

Investigator: W. R. Marion

Personnel: T. O'Meara  
Completion Date: September 1987

**EVALUATION OF ELECTROFISHING  
SYSTEMS FOR QUANTITATIVE  
SAMPLING OF BLUE TILAPIA (RWO 29)**

Investigator: H. Schramm  
Completion Date: May 1986

**A COMPARISON OF PASSERINE  
FEEDING HABITS IN TWO TIDAL MARSH  
COMMUNITIES (RWO 30)**

Investigators: G. W. Tanner  
W. M. Kitchens  
Personnel: L. Peterson  
Completion Date: January 1989

**EVALUATION AND CONTROL OF BIRD  
DAMAGE TO RICE (RWO 31)**

Investigators: M. Avery  
H. F. Percival  
P. Lefebvre  
Personnel: D. Daneke  
Completion Date: December 1987

**THE ECOLOGY AND MANAGEMENT OF  
IMPOUNDED COASTAL WETLANDS OF  
THE GEORGIA BIGHT: A WORKSHOP  
(RWO 33)**

Investigators: C. L. Montague  
H. F. Percival  
Personnel: A. V. Zale  
Completion Date: September 1987

**IMPACT ASSESSMENT OF GRASS CARP  
(RWO 34)**

Investigators: J. V. Shireman  
W. M. Kitchens  
Completion Date: September 1989

**STATUS SURVEY OF THREE FLORIDA  
LIZARDS (RWO 35)**

Investigators: P. Moler  
H. F. Percival  
R. F. Labisky  
Personnel: K. Enge  
Completion Date: October 1986

**VEGETATION MANAGEMENT FOR THE  
KEY DEER (RWO 36)**

Investigators: S. R. Humphrey  
G. W. Tanner  
D. Holle  
Personnel: J. Wood  
P. Carlson  
Completion Date: December 1989

**STATUS SURVEY OF SEVEN FLORIDA  
MAMMALS: MICRO COTTONTAIL  
RABBIT, MICRO COTTON RAT,  
SOUTHEASTERN BEACH MOUSE,  
GOFF'S POCKET GOPHER, ANASTASIA  
ISLAND COTTON MOUSE, ANASTASIA  
ISLAND BEACH MOUSE (RWO 37)**

Investigators: S. R. Humphrey  
M. Bentzien  
Completion Date: July 1987

**RELATIVE ABUNDANCE, SIZE CLASS  
COMPOSITION, AND GROWTH  
PATTERNS OF WILD GREEN TURTLES  
AT THE CULEBRA ARCHIPELAGO,  
PUERTO RICO (RWO 38)**

Investigators: J. A. Collazo  
H. F. Percival  
Personnel: T. Tallevast  
Completion Date: December 1989

**EFFECTS OF THE MODIFIED WATER  
DELIVERY PROGRAM ON WADING BIRD  
NESTING SUCCESS AND FORAGING  
DISPERSION IN WATER  
CONSERVATION AREA 3A AND  
EVERGLADES NATIONAL PARK (RWO  
39)**

Investigator: M. W. Collopy  
Personnel: P. C. Frederick  
Completion Date: April 1988

**EFFECTS OF THE MODIFIED WATER  
DELIVERY PROGRAM ON THE NEST  
SITE SELECTION AND NESTING  
SUCCESS OF SNAIL KITES IN WATER  
CONSERVATION AREA 3A (RWO 40)**

Investigators: M. W. Collopy  
S. Beissinger  
Personnel: R. Bennetts  
Completion Date: February 1988

**COMPARATIVE GRAMINOID  
COMMUNITY COMPOSITION AND  
STRUCTURE WITHIN THE NORTHERN  
PORTION OF EVERGLADES NATIONAL  
PARK, NORTHEAST SHARK RIVER  
SLOUGH, WATER CONSERVATION  
AREA 3A AND WATER CONSERVATION  
AREA 3B (RWO 41)**

Investigator: G. W. Tanner  
Personnel: J. M. Wood  
Completion Date: November 1986

**HUMAN/WILDLIFE INTERACTION ON J.  
N. "DING" DARLING NATIONAL  
WILDLIFE REFUGE (RWO 42)**

Investigator: S. R. Humphrey  
H. F. Percival  
Personnel: M. V. Klein  
Completion Date: June 1989

**STATUS SURVEY OF TWO FLORIDA  
SEASIDE SPARROWS (RWO 43)**

Investigator: K. McNab  
V. MacDonald  
Completion Date: October 1988

**REPRODUCTIVE CYCLES IN STRIPED  
BASS MAINTAINED IN RECIRCULATION  
SILOS: HISTOLOGICAL ANALYSIS  
(RWO 44)**

Investigator: L. J. Guillette, Jr.  
Personnel: C. A. Goudie  
Completion Date: October 1986

**SOIL/PLANT CORRELATION STUDIES IN  
FLORIDA (RWO 46)**

Investigator: G. R. Best  
W. M. Kitchens  
Completion Date: March 1987

**AQUATIC PLANT MANAGEMENT  
TECHNOLOGY IMPROVEMENT (RWO 47)**

Investigators: J. C. Joyce  
W. T. Haller  
Personnel: V. Ramey  
T. Willard  
A. Stoddard  
Completion Date: April 1988

**FACTORS AFFECTING PRODUCTIVITY  
AND HABITAT USE OF FLORIDA  
SANDHILL CRANES: AN EVALUATION  
OF THREE AREAS IN CENTRAL  
FLORIDA AS POTENTIAL  
REINTRODUCTION SITES FOR A  
NONMIGRATORY POPULATION OF  
WHOOPIING CRANES (RWO 49)**

Investigator: M. W. Collopy  
Personnel: M. Bishop  
Completion Date: October 1988

**EFFECTS OF GROUND WATER LEVELS  
UPON REPRODUCTION SUCCESS OF  
AMERICAN CROCODILES IN  
EVERGLADES NATIONAL PARK (RWO  
50)**

Investigator: F. J. Mazzotti  
Completion Date: April 1989

**MANATEE PROTECTION PROJECT:  
SURVEY OF BOAT USAGE PATTERNS  
(RWO 51)**

Investigators: J. W. Hutchinson  
J. W. Alba  
Completion Date: September 1988

**AN EVALUATION OF MANATEE  
DISTRIBUTION PATTERNS IN  
RESPONSE TO PUBLIC USE ACTIVITIES,  
CRYSTAL RIVER, FLORIDA (RWO 52)**

Investigator: W. M. Kitchens  
Personnel: C. Buckingham  
L. G. Pearlstine  
Completion Date: December 1989

**AN EVALUATION OF CUMULATIVE  
IMPACTS TO THE HABITAT OF THE  
WEST INDIAN MANATEE, CRYSTAL  
RIVER NATIONAL WILDLIFE REFUGE  
(RWO 53)**

Investigator: W. M. Kitchens  
Personnel: L. G. Pearlstine  
C. Buckingham  
Completion Date: December 1989

**STATUS SURVEY OF THE FLORIDA  
SALTMARSH VOLE (RWO 54)**

Investigator: C. A. Woods  
Personnel: L. Hay-Smith  
Completion Date: September 1988

**IMPACT OF MOSQUITO CONTROL  
PESTICIDES ON THE ENDANGERED  
SCHAUS SWALLOWTAIL AND RELATED  
INSECTS IN THE FLORIDA KEYS (RWO  
56)**

Investigator: T. C. Emmel  
Personnel: P. Eliazar  
J. Mation  
Completion Date: January 1989

**THE EFFECTS OF MOSQUITO CONTROL  
PESTICIDES ON NON-TARGET  
ORGANISMS IN THE FLORIDA KEYS  
(RWO 57)**

Investigator: D. H. Habeck  
Personnel: M. Hennessey  
Completion Date: October 1989

**DEVELOPMENT OF GUIDANCE MANUAL  
FOR MONITORING WATER QUALITY  
AND VEGETATIVE CHANGES ON  
NATIONAL WILDLIFE REFUGES (RWO  
58)**

Investigator: W. M. Kitchens  
Completion Date: December 1988

**APPLICABILITY AND COMPARISON OF  
SATELLITE IMAGE DATA TO  
DELINEATION OF COVER TYPE IN THE  
LOWER SUWANNEE RIVER REGION  
(RWO 60)**

Investigator: W. M. Kitchens  
Personnel: L. G. Pearlstine  
Completion Date: December 1988

**DISTRIBUTION AND POPULATION  
STRUCTURE OF SEA TURTLES  
INHABITING THE CAPE CANAVERAL  
ENTRANCE CHANNEL (RWO 62)**

Investigators: A. B. Bolten  
K. A. Bjorndal  
Completion Date: December 1991

**DETERMINATION OF THE CAUSES OF  
LOW RESPONSE WITH THE  
WATERFOWL HUNTER  
QUESTIONNAIRE AND ESTIMATION OF  
THE RESULTANT BIASES (RWO 76)**

Investigator: H. F. Percival  
Personnel: R. J. Barker  
P. H. Geissler  
B. A. Hoover  
Completion Date: September 1990

**THE ECOLOGY OF MANATEES IN  
GEORGIA WITH EMPHASIS ON  
CUMBERLAND SOUND (RWO 65)**

Investigator: H. F. Percival  
Personnel: B. J. Zoodsma  
L. W. Lefebvre  
Completion Date: December 1990

**SCIENTIFIC REVIEW OF ALLIGATOR  
EXPORT PROPOSALS TO USFWS (RWO  
69)**

Investigator: H. F. Percival  
Personnel: P. N. Gray  
F. Nunez-Garcia  
Completion Date: July 1990

**FISH COMMUNITY STRUCTURE IN  
NATURALLY ACID FLORIDA LAKES  
(RWO 73)**

Investigator: W. M. Kitchens  
Personnel: C A. Jennings  
D. E. Canfield, Jr.  
D. E. Colle  
Completion Date: July 1990

**DEVELOPMENT AND APPLICATION OF  
A HABITAT SUCCESSION MODEL FOR  
THE WETLAND COMPLEX OF THE  
SAVANNAH RIVER NATIONAL WILDLIFE  
REFUGE (RWO 30)**

Investigator: W. M. Kitchens  
Personnel: L. G. Pearlstine  
P. Latham  
L. Peterson  
G. Tanner  
Completion Date: December 1990

**PLANT SPECIES ASSOCIATION  
CHANGES AND INTERACTIONS  
ACROSS A GRADIENT OF FRESH,**

**OLIGOHALINE, AND MESOHALINE  
TIDAL MARSHES OF THE LOWER  
SAVANNAH RIVER (RWO 30)**

Investigator: W. M. Kitchens  
Personnel: P. J. Latham  
Completion Date: December 1990

**BIOLOGY OF FLORIDA'S MOTTLED  
DUCK**

Investigator: H. F. Percival  
Personnel: P. N. Gray  
Completion Date: May 1992

**MODELING WATERFOWL HARVEST  
AND THE EFFECTS OF QUESTIONNAIRE  
NONRESPONSE ON HARVEST  
ESTIMATES (RWO 83)**

Investigator: H. F. Percival  
Personnel: R. J. Barker  
J. D. Nichols  
Completion Date: May 1992

**ENVIRONMENTAL INFLUENCES ON  
REPRODUCTIVE POTENTIAL AND  
CLUTCH VIABILITY OF THE AMERICAN  
ALLIGATOR FROM SEVEN STUDY SITES  
IN FLORIDA**

Investigator: H. F. Percival  
Personnel: G. R. Masson  
K. G. Rice  
Completion Date: July 1992

**NESTING BIOLOGY OF THE AMERICAN  
ALLIGATOR IN FLORIDA**

Investigator: H. F. Percival  
Personnel: K. G. Rice  
G. R. Masson  
Completion Date: September 1992

**ALLIGATOR EGG VIABILITY AND  
POPULATION TRENDS ON LAKE  
APOPKA, FLORIDA**

Investigator: H. F. Percival  
Personnel: L. J. Guillette, Jr.  
G. R. Masson  
K. G. Rice  
Completion Date: June 1993

**ALLIGATOR NEST PRODUCTION  
ESTIMATION IN FLORIDA**

Investigator: H. F. Percival  
Personnel: K. G. Rice  
A. R. Woodward  
Completion Date: August 1992

**HABITAT USE BY MIGRATORY  
SHOREBIRDS AT THE CABO ROJO  
SALT FLATS, PUERTO RICO (RWO 78)**

Investigator: J. A. Collazo  
H. F. Percival  
Personnel: J. S. Grear  
Completion Date: August 1992

**WADING BIRD USE OF WASTEWATER  
TREATMENT WETLANDS IN CENTRAL  
FLORIDA (RWO 85)**

Investigator: P. C. Frederick  
Completion Date: December 1992

**EVALUATING THE REGIONAL EFFECTS  
OF CITRUS DEVELOPMENT ON THE  
ECOLOGICAL INTEGRITY OF  
SOUTHWEST FLORIDA**

Investigator: F. J. Mazzotti  
W. M. Kitchens  
Personnel: L. A. Brandt  
L. G. Pearlstine  
T. A. Obreza  
C. E. Arnold  
C. N. Huegel  
Completion Date: May 1992

**WORKSHOP ON FLORIDA MANATEE  
(*TRICHECHUS MANATUS*) POPULATION  
BIOLOGY (RWO 88)**

Investigator: T. J. O'Shea  
H. F. Percival  
Personnel: B. B. Ackerman  
Completion Date: October 1993

**ISSUES AND OPTIONS RELATED TO  
MANAGEMENT OF SILVER SPRINGS  
RHESUS MACAQUES**

Investigator: C. L. Montague  
S. V. Colwell  
H. F. Percival  
Personnel: J. F. Gottgens  
Completion Date: December 1993

**SEA TURTLES INHABITATING THE  
KINGS BAY - ST. MARY'S ENTRANCE  
CHANNEL: DISTRIBUTION AND  
POPULATION STRUCTURE (RWO 72)**

Investigator: K. A. Bjorndal  
A. B. Bolten  
Completion Date: September 1993

**WADING BIRD NESTING SUCCESS  
STUDIES IN THE EVERGLADES (RWO  
110)**

Investigator: P. C. Frederick  
Completion Date: December 1993

**CAPTIVE PROPAGATION AND  
RESTORATION ECOLOGY OF THE  
ENDANGERED STOCK ISLAND TREE  
SNAIL (RWO 94)**

Investigator: T. C. Emmel  
Completion Date: October 1993

**STATUS MONITORING AND  
EXPERIMENTAL REINTRODUCTION OF  
THE ENDANGERED SCHAUS  
SWALLOWTAIL (RWO 84)**

Investigator: T. C. Emmel  
Personnel: P. J. Eliazar  
M. C. Minno  
J. C. Daniels  
S. D. Larson  
J. A. Sarvis  
Completion Date: September 1993

**CONSERVATION STATUS OF THE  
FRESHWATER MUSSELS OF THE  
APALACHICOLA RIVER BASIN (RWO 86)**

Investigator: J. D. Williams  
Personnel: J. C. Brim-Box  
Completion Date: October 1993

**STATISTICAL ASPECTS OF LINE  
TRANSECT SAMPLING (RWO 68)**

Investigator: K. M. Portier  
Completion Date: June 1993

**A GEOGRAPHIC INFORMATION SYSTEM  
MODEL OF FIRE DAMAGE AND  
VEGETATION RECOVERY IN THE  
LOXAHATCHEE NATIONAL WILDLIFE  
REFUGE**

Investigator: W. M. Kitchens  
Personnel: J. E. Silveira  
J. R. Richardson  
Completion Date: December 1993

**MERCURY CONCENTRATIONS IN  
BLOOD AND FEATHERS OF NESTLING  
BALD EAGLES (RWO 108)**

Investigator: P. B. Wood  
Personnel: J. H. White  
A. Steffer  
J. M. Wood  
H. F. Percival  
Completion Date: December 1994

**EFFECTS OF ARTIFICIAL LIGHTING ON  
NESTING ADULT AND HATCHLING SEA  
TURTLES (RWO 75)**

Investigator: K. A. Bjorndal  
A. B. Bolten  
Personnel: B. E. Witherington  
Completion Date: September 1994

**SUMMARY REPORT OF AIR QUALITY  
STUDIES DONE AT CHASSAHOWITZKA  
NATIONAL WILDLIFE REFUGE (RWO  
102)**

Investigator: E. R. Allen  
Personnel: R. Venuto  
Completion Date: June 1994

**EVALUATIONS OF THE EFFICACY OF  
EXOTICS AS AQUACULTURE AND  
MANAGEMENT SPECIES IN FLORIDA  
(RWO 109)**

Investigator: J. V. Shireman  
Personnel: J. E. Weaver  
K. Opusbynski  
Completion Date: February 1994

**ASSESSING THE IMPACT OF  
VEHICULAR TRAFFIC ON BEACH  
HABITAT AND WILDLIFE, CAPE SAN  
BLAS (RWO 121)**

Investigator: H. F. Percival  
Personnel: J. H. Cox, Jr.

Completion Date: S. V. Colwell  
June 1994

**EFFECTS OF EXPLOITATION ON PIG  
FROG POPULATION DYNAMICS: AN  
EXPERIMENTAL APPROACH (RWO 79)**

Investigator: H. F. Percival  
Personnel: K. V. Wood  
Completion Date: August 1994

**EARLY LIFE HISTORY AND RELATIVE  
ABUNDANCE OF STURGEON IN THE  
SUWANNEE RIVER (RWO 61)**

Investigator: J. V. Shireman  
Personnel: J. P. Clugston  
A.M. Foster  
Completion Date: October 1994

**DISTRIBUTION, POPULATION  
STRUCTURE AND EXPLOITATION OF  
SEA TURTLES IN THE BAHAMAS (RWO  
67)**

Investigator: K. A. Bjorndal  
A. B. Bolten  
Completion Date: September 1994

**SEA TURTLE POPULATIONS IN THE  
EASTERN GULF OF MEXICO: BIOLOGY,  
DISTRIBUTION AND POPULATION  
STRUCTURE (RWO 77)**

Investigator: K. A. Bjorndal  
A. B. Bolten  
Personnel: J. R. Schmid  
Completion Date: September 1994

**DISTRIBUTION AND STATUS OF THE  
RED-COCKADED WOODPECKER ON  
EGLIN AIR FORCE BASE, FLORIDA  
(RWO 80)**

Investigator: H. F. Percival  
Personnel: Ruthe J. Smith  
Jeffrey L. Hardesty  
Completion Date: March 1994



**FACTORS AFFECTING ABUNDANCE OF SPOTTED SEATROUT AND YEAR-CLASS STRENGTH (RWO 81)**

Investigator: N. A. Funicelli  
Personnel: J. V. Shireman  
J. P. Clugston  
S. A. Zengel  
Completion Date: June 1994

**RE-ESTABLISHMENT OF THE ANASTASIA ISLAND BEACH MOUSE (PEROMYSCUS POLIONOTUS PHASMA) (RWO 100)**

Investigator: S. Humphrey  
Personnel: P. A. Frank  
Completion Date: January 1994

**CAPTIVE PROPAGATION AND HABITAT REINTRODUCTION FOR THE SCHAUS SWALLOWTAIL FOLLOWING HURRICANE ANDREW (RWO 113)**

Investigator: T. C. Emmel  
Personnel: J. C. Daniels  
A. Sourakov  
P. J. Eliazar  
M. C. Minno  
S. D. Larson  
L. L. Groce  
J. A. Fletcher  
J. L. Nation, Jr.  
R. A. Worth  
K. A. Schwarz  
Completion Date: September 1994

**DEVELOPMENT ABNORMALITIES OF THE REPRODUCTIVE SYSTEM OF ALLIGATORS (*ALLIGATOR MISSISSIPPIENSIS*) FROM CONTAMINATED AND CONTROL LAKES IN FLORIDA**

Investigator: H. F. Percival  
Completion Date: May 1994

**LAND MANAGEMENT PRACTICES IN THE MOUNTAIN REGION OF PUERTO RICO: MONITORING BIRD REPRODUCTIVITY IN CARITE STATE FOREST 1993 (RWO 71)**

Investigator: H. F. Percival  
J. A. Collazo  
Personnel: F. Nunez-Garcia

Completion Date: December 1995

**METHODS FOR DETERMINING CHANGE IN WETLAND HABITATS IN FLORIDA (RWO 95)**

Investigator: W. M. Kitchens  
Personnel: J. Silveira  
W. Bryant  
Completion Date: September 1995

**POPULATION ECOLOGY OF BARTRAM'S IXIA (*Calydorea coelestina*) (Bartr.) (RWO 101)**

Investigator: G. W. Tanner  
Personnel: A. Miller  
Completion Date: October 1995

**MAINTENANCE, PROPAGATION, AND RESTORATION OF THE ENDANGERED STOCK ISLAND TREE SNAIL, FOLLOWING HURRICANE ANDREW (RWO 106)**

Investigator: T. C. Emmel  
Personnel: P. J. Eliazer  
J. C. Daniels  
N. D. Eliazer  
R. A. Worth  
K. A. Schwarz  
Completion Date: October 1995

**CHANGES IN SALINITY AND VEGETATION FOLLOWING RE-ESTABLISHMENT OF NATURAL HYDROLOGY ON THE LOWER SAVANNAH RIVER (RWO 117)**

Investigator: W. M. Kitchens  
Personnel: P. J. Latham  
L. P. Peterson  
B. Mace  
Completion Date: March 1995

**FOLLOW-UP OF A 14 YEAR OLD CRESTED WETLAND/UPLAND LANDSCAPE ON PHOSPHATE-MINED LAND IN CENTRAL FLORIDA (RWO 120)**

Investigator: G. R. Best  
W. M. Kitchens  
Completion Date: March 1995

**TRENDS, STATUS AND ASPECTS OF  
DEMOGRAPHY OF THE RED-  
COCKADED WOODPECKER IN THE  
SANDHILLS OF FLORIDA'S PANHANDLE  
(RWO 124)**

Investigator: H. F. Percival  
Personnel: J. L. Hardesty  
R. J. Smith  
K. E. Gault  
M. E. Gatlin  
L. F. Phillips  
Completion Date: March 1995

**STATUS AND DISTRIBUTION OF THE  
FLORIDA SCRUB JAY (*Aphelocoma  
coerulescens*) ON CAPE CANAVERAL,  
FLORIDA (RWO 127)**

Investigator: H. F. Percival  
Personnel: J. L. Hardesty  
D. B. McDonald  
Completion Date: May 1995

**MERCURY CONTAMINATION IN GREAT  
EGRETS (*Casmerodius albus*) IN  
SOUTHERN FLORIDA (RWO 132)**

Investigator: P. C. Frederick  
Personnel: M. G. Spaulding  
M. S. Sepulveda  
G. E. Williams  
K. Golden  
C. Gill  
Completion Date: September 1995

**THE ACUTE TOXICITY OF MALATHION  
TO GLOCHIDIA AND FRESHWATER  
MUSSELS (RWO 133)**

Investigator: E. J. Philips  
Personnel: A. E. Keller  
Completion Date: March 1995

**THE ROLE OF ENVIRONMENTAL  
CONTAMINANTS IN THE PREVALENCE  
OF FISH INFECTED WITH A WADING  
BIRD PARASITE (*Eustrongylides  
ignotus*) (RWO 134)**

Investigator: D. J. Forrester  
Personnel: M. G. Spaulding  
D. Morrison  
D. F. Coyner  
T. M. Miller  
Completion Date: September 1995

**DEVELOPMENT OF AN ECOLOGICALLY  
STABLE COST EFFICIENT BIOLOGICAL  
WATER TREATMENT SYSTEM AND  
TECHNOLOGY TRANSFER SYSTEM  
(RWO 135)**

Investigator: J. V. Shireman  
Personnel: N. A. Funicelli  
Completion Date: September 1995

**STATUS AND DISTRIBUTION OF THE  
FLORIDA SCRUB JAY (*Aphelocoma  
coerulescens*) ON CAPE CANAVERAL,  
FLORIDA (RWO 136)**

Investigator: H. F. Percival  
Personnel: D. B. McDonald  
J. L. Hardesty  
Completion Date: October 1995

**DISRUPTION OF ENDOCRINE FUNCTION  
AND REPRODUCTIVE POTENTIAL BY  
ENVIRONMENTAL CONTAMINANTS ON  
LAKE APOPKA'S ALLIGATORS AND  
OTHER TAXA (RWO 137)**

Investigator: H. F. Percival  
Personnel: L. J. Guillette  
T. S. Gross  
K. G. Rice  
C. L. Abercrombie  
A. R. Woodward  
Completion Date: October 1995

**THE EPIDEMIOLOGY OF UPPER  
RESPIRATORY TRACT DISEASE  
(*Mycoplasma agassizii*) IN DESERT  
TORTOISES AT THREE SITES IN THE  
CALIFORNIA DESERTS (RWO 138)**

Investigator: M. Brown  
Personnel: I. M. Schumacher  
P. A. Klein  
D. Dukes  
B. Crenshaw  
K. Berry  
Completion Date: April 1995

**THE RELATIONSHIPS BETWEEN HOST  
PLANT AND HABITAT FOR THE  
DISTRIBUTION OF THREE  
POTENTIALLY ENDANGERED SOUTH  
FLORIDA BUTTERFLY SPECIES (RWO  
145)**

Investigator: T. C. Emmel  
Personnel: R. A. Worth  
K. A. Schwarz  
Completion Date: September 1995

**SNAIL KITE CENSUS**

Investigator: W. M. Kitchens  
R. E. Bennetts  
Completion Date: December 1995

**EGG VIABILITY, SEXUAL  
DEVELOPMENT, HATCHLING VIABILITY,  
AND GROWTH IN ALLIGATORS FROM  
LAKE APOPKA AND LAKE BEAUCLAIR**

Investigator: H. F. Percival  
Personnel: L. J. Guillette  
T. S. Gross  
K. G. Rice  
A. R. Woodward  
C. L. Abercrombie  
Completion Date: July 1995

**REFINEMENT OF POPULATION  
ESTIMATION TECHNIQUES FOR WILD  
TURKEYS-YEAR 3**

Investigator: G. W. Tanner  
Personnel: J. L. Kalso  
Completion Date: June 1995

**MINERAL INTERACTIONS BETWEEN  
EMBRYO, EGGSHELL, AND SUBSTRATE  
IN DEVELOPING SEA TURTLES (RWO  
92)**

Investigator: K. A. Bjorndal  
Personnel: A. B. Bolten  
R. R. Carthy  
Completion Date: August 1996

**ECOLOGICAL CORRELATES OF RED-  
COCKADED WOODPECKER FORAGING  
PREFERENCE, HABITAT USE, AND  
HOME RANGE AREA ON EGLIN AIR  
FORCE BASE, FLORIDA (RWO 99)**

Investigator: H. F. Percival  
Personnel: J. L. Hardesty

R. J. Smith  
K. E. Lucas  
J. B. Jensen  
P. R. Gault  
J. Cartwright  
Completion Date: March 1996

**UNDERSTORY RESPONSE TO  
LONGLEAF PINE-SANDHILL  
RESTORATION TECHNIQUES (RWO 111)**

Investigator: G. W. Tanner  
Personnel: J. L. Hardesty  
S. J. Berish  
Completion Date: March 1996

**HABITAT ASSOCIATIONS,  
REPRODUCTION, AND FORAGING  
ECOLOGY OF AUDUBON'S CRESTED  
CARACARA IN SOUTH-CENTRAL  
FLORIDA (RWO 114)**

Investigator: S. R. Humphrey  
Personnel: J. L. Morrison  
S. M. McGehee  
L. D. Todd  
Completion Date: May 1996

**LANDSCAPE DYNAMICS OF SCRUB  
LIZARDS ON AVON PARK AIR FORCE  
RANGE (RWO 122)**

Investigator: Lyn C. Branch  
Personnel: D. G. Hokit  
B. M. Stith  
Completion Date: September 1996

**POST HURRICANE DENSITY AND  
RECOVERY STATUS OF THE KEY  
LARGO WOODRAT AND COTTON  
MOUSE (RWO 123)**

Investigator: H. F. Percival  
Personnel: K. Miller  
B. W. Keith  
Completion Date: August 1996

**EVALUATION OF SAMPLING AND  
ANALYTICAL PROTOCOLS FOR  
MANATEE CAPTURE-RECAPTURE AND  
TELEMETRY DATA (RWO 125)**

Investigator: H. F. Percival  
Personnel: L. W. Lefebvre  
C. J. Deutsch  
Completion Date: July 1996

**COMMUNITY RESPONSE TO  
RESTORATION TECHNIQUES IN  
DEGRADED FLORIDA SANDHILL  
SYSTEMS (RWO 128, 147, 162)**

Investigator: G. W. Tanner  
Personnel: D. R. Gordon  
H. F. Percival  
Completion Date: March 1996

**MARINE TURTLE NESTING BIOLOGY  
AND ASSESSMENT OF  
ANTHROPOGENIC DISTURBANCES TO  
HATCHLING ORIENTATION AT EGLIN  
AIR FORCE BASE ON SANTA ROSA  
ISLAND AND CAPE SAN BLAS (RWO  
129)**

Investigator: H. F. Percival  
Personnel: L. G. Pearlstine  
S. V. Colwell  
Completion Date: April 1996

**NECROPSIES OF ILL AND DYING  
DESERT TORTOISES FROM  
CALIFORNIA AND ELSEWHERE IN THE  
SOUTHWESTERN UNITED STATES  
(RWO 131)**

Investigator: B. L. Homer  
Personnel: E. R. Jacobson  
K. H. Berry  
Completion Date: March 1996

**POTENTIAL EFFECTS OF ENDOCRINE-  
DISRUPTING CONTAMINANTS (RWO  
140)**

Investigator: T. S. Gross  
Personnel: H. F. Percival  
K. G. Rice  
A. R. Woodward  
C. L. Abercrombie  
Completion Date: June 1996

**INTERACTIONS AMONG CAVITY-  
DEPENDENT SPECIES IN LONGLEAF  
PINE FORESTS: THE ROLES OF SNAGS  
AND RED-CKOADED WOODPECKER  
CAVITIES (RWO 143)**

Investigator: J. D. Harris  
Personnel: R. Costa  
J. J. Kappes, Jr.  
Completion Date: August 1996

**HABITAT ASSESSMENT IN A  
LANDSCAPE CONTEXT: ANALYSIS OF  
THE FACTORS AFFECTING THE  
DISTRIBUTION AND ABUNDANCE OF  
THE FLORIDA SCRUB LIZARD (RWO  
156)**

Investigator: L. C. Branch  
Personnel: D. G. Hokit  
Completion Date: April 1996

**ESTIMATION AND ENVIRONMENTAL  
CORRELATES OF SURVIVAL AND  
DISPERSAL OF SNAIL KITES IN  
FLORIDA**

Investigator: W. M. Kitchens  
Personnel: P. C. Darby  
P. V. Darby  
Completion Date: February 1996

**EGG VIABILITY AND POPULATION  
TRENDS OF LAKE APOPKA  
ALLIGATORS: RELATIONSHIPS AMONG  
POPULATIONS AND BIOGRAPHICAL  
PARAMETERS**

Investigator: H. F. Percival  
Personnel: K. G. Rice  
Completion Date: July 1996

**EVALUATION OF S.R. 46 WILDLIFE  
CROSSING**

Investigator: H. F. Percival  
Personnel: J. C. Roof  
J. B. Wooding  
Completion Date: May 1996

**AN ECOSYSTEM APPROACH TO  
PUBLIC EDUCATION AND  
INFORMATION AT EGLIN AIR FORCE  
BASE (RWO 107)**

Investigator: S. K. Jacobson  
Personnel: S. B. Marynowski  
Completion Date: September 1997

**GENETIC ANALYSIS OF SEA TURTLE POPULATIONS IN THE WESTERN ATLANTIC OCEAN WITH EMPHASIS ON THE SOUTHEAST UNITED STATES (RWO 115)**

Investigator: B. W. Bowen  
A. B. Bolten  
K. A. Bjorndal  
Completion Date: June 1997

**CAPE SAN BLAS ECOLOGICAL STUDY (RWO 126)**

Investigator: W. M. Kitchens  
H. F. Percival  
R. R. Carthy  
L. G. Pearlstine  
Personnel: S. V. Colwell  
M. M. Lamont  
Completion Date: August 1997

**ENHANCEMENT AND EVALUATION OF A DESIGNATED WATCHABLE WILDLIFE SITE (RWO 130)**

Investigator: J. M. Schaefer  
S. K. Jacobson  
Completion Date: January 1997

**RESEARCH OBJECTIVES TO SUPPORT THE SOUTH FLORIDA ECOSYSTEM INITIATIVE - WATER CONSERVATION AREAS, LAKE OKEECHOBEE AND THE EAST-WEST WATERWAYS (RWO 139)**

Investigator: W. M. Kitchens  
Completion Date: September 1997

**TRENDS, STATUS, AND ASPECTS OF DEMOGRAPHY OF THE RED-COCKADED WOODPECKER IN THE SANDHILLS OF FLORIDA'S PANHANDLE, PART II (RWO 146)**

Investigator: H. F. Percival  
J. L. Hardesty  
Personnel: K. E. Gault  
L. F. Phillips  
J. B. Jensen  
J. Tomcho  
Completion Date: March 1997

**USE OF UNIONID MUSSELS AS BIOINDICATORS OF WATER QUALITY IN**

**ESCAMBIA CONECUH RIVER SYSTEM (RWO 149)**

Investigator: E. Philips  
Personnel: A. Keller  
Completion Date: June 1997

**CAPTIVE PROPAGATION AND EXPERIMENTAL REINTRODUCTION OF FLORIDA'S SCHAU'S SWALLOWTAIL (RWO 151)**

Investigator: T. C. Emmel  
Personnel: J. C. Daniels  
A. Sourakov  
P. J. Eliazar  
V. Kroutov  
J. P. Hall  
K. M. Wilmott  
S. D. Schlachta  
J. B. Schlachta  
N. D. Eliazar  
Completion Date: December 1997

**TESTING AND IMPLEMENTATION OF SELECTED AQUATIC ECOSYSTEM INDICATORS IN THE MISSISSIPPI RIVER SYSTEM, 1995: POTENTIAL EFFECTS OF ENDOCRINE-DISRUPTING CONTAMINANTS (RWO 153)**

Investigator: T. S. Gross  
Completion Date: September 1997

**WADING BIRD POPULATION MONITORING, ENVIRONMENTAL CORRELATES OF ADULT FORAGING SUCCESS, AND MEASUREMENT OF NESTLING ENERGETIC NEEDS IN THE EVERGLADES: PART I (RWO 158)**

Investigator: P. C. Frederick  
Personnel: J. Surkick  
J. Salatas  
J. Burm  
C. Schaadt  
Completion Date: April 1997

**MARINE TURTLE CONSERVATION ON THE CARIBBEAN COAST OF NICARAGUA (RWO 171)**

Investigator: L. J. Guillette, Jr.  
Personnel: C. L. Campbell  
C. J. Lagueux  
Completion Date: December 1997

**EVALUATING THE ECOLOGICAL ROLE OF ALLIGATOR HOLES IN THE EVERGLADES LANDSCAPE**

Investigator: F. J. Mazzotti  
H. F. Percival  
Personnel: L. A. Brandt  
Completion Date: December 1997

**TWO GIS AND LAND USE ANALYSIS OF FRESHWATER MUSSELS IN THE APALACHICOLA RIVER DRAINAGE (RWO 164)**

Investigator: J. Mossa  
Personnel: J. Howard  
Completion Date: July 1997

**EGG VIABILITY AND POPULATION TRENDS OF LAKE APOPKA ALLIGATORS**

Investigator: H. F. Percival  
Personnel: K. G. Rice  
G. Davidson  
Completion Date: July 1997

**EFFECT OF MARINE POLLUTION ON JUVENILE PELAGIC SEA TURTLES (RWO 66) AND BIOLOGY OF PELAGIC SEA TURTLES: EFFECTS IF MARINE DEBRIS (RWO 118) (RWO 118 is a continuation of RWO 66)**

Investigator(s): K. A. Bjorndal  
A. B. Bolten  
Completion Date  
(RWO 66): June 1995  
(RWO 118) June 1998

**ENHANCEMENT OF NATURAL DUNE BUILDING AND REVEGETATION PROCESSES ON SANTA ROSA ISLAND (RWO 159)**

Investigator(s): D. L. Miller  
Mack Thetford  
Completion Date: August 1998

**PATHOGENIC, MOLECULAR AND IMMUNOLOGICAL PROPERTIES OF A HERPESVIRUS ASSOCIATED WITH GREEN TURTLE FIBROPAPILLOMATOSIS. PHASE I.**

**VIRUS ISOLATION AND TRANSMISSION (RWO 161)**

Investigator(s): P. A. Klein  
E. Jacobson  
Completion Date: June 1998

**MIGRATIONS AND HABITAT USE OF SEA TURTLES IN THE BAHAMAS (RWO 166)**

Investigator(s): K. A. Bjorndal  
A. A. Bolten  
Completion Date: September 1998

**POPULATION GENETIC STRUCTURE OF MARINE TURTLES, *Eretmochelys imbricata* AND *Caretta caretta*, IN THE SOUTHEASTERN UNITED STATES AND ADJACENT CARIBBEAN REGION (RWO 167)**

Investigator(s): B. W. Bowen  
A. L. Bass  
Completion Date: June 1998

**DISTRIBUTION AND ABUNDANCE OF SENSITIVE WILDLIFE AT AVON PARK AIR FORCE RANGE (RWO 169)**

Investigator: R. Franz  
Completion Date: December 1998

**RED-COCKADED WOODPECKER CAVITIES AND SNAGS IN LONGLEAF PINE FORESTS: CAVITY NESTER USE AND NESTING SUCCESS (RWO 170)**

Investigator: K. E. Sieving  
Completion Date: September 1998

**PLANT AND INVERTEBRATE COMMUNITY RESPONSES TO RESTORATION TECHNIQUES IN DEGRADED FLORIDA SANDHILLS: THIRD YEAR POSTTREATMENT (RWO 174)**

Investigator(s): G. W. Tanner  
D. R. Gordon  
Completion Date: July 1998

**DEMOGRAPHICS, GENETIC  
RELATIONSHIPS, AND IMPACTS FROM  
RED IMPORTED FIRE ANTS ON THE  
FLORIDA GRASSHOPPER SPARROW  
(RWO 175a)**

Investigator: H. F. Percival  
Completion Date: March 1998

**RED IMPORTED FIRE ANT IMPACTS ON  
THE ENDANGERED FLORIDA  
GRASSHOPPER SPARROW (RWO 175b)**

Investigator: H. F. Percival  
Completion Date: June 1998

**WADING BIRD POPULATION  
MONITORING, ENVIRONMENTAL,  
CORRELATES OF ADULT FORAGING  
SUCCESS, AND MEASUREMENTS OF  
NESTLING ENERGETIC NEEDS IN THE  
EVERGLADES - PHASE II (RWO 176)**

Investigator: P. C. Frederick  
Completion Date: April 1998

**POPULATION CHARACTERIZATION OF  
KEMP'S RIDLEY SEA TURTLES IN THE  
BIG BEND AREA, GULF OF MEXICO,  
FLORIDA (MONITOR, ASSESS, AND  
PREDICT STATUS OF AND IMPACTS TO  
PROTECTED SPECIES AND THEIR  
ECOSYSTEMS) (RWO 177)**

Investigator: R. R. Carthy  
Completion Date: September 1998

**BREEDING AND REINTRODUCTION OF  
THE ENDANGERED SCHAU'S  
SWALLOWTAIL (RWO 179)**

Investigator: T. C. Emmel  
Completion Date: March 1998

**ESTIMATING SURVIVAL AND  
MOVEMENTS IN SNAIL KITE  
POPULATION (RWO 183)**

Investigator(s): W. M. Kitchens  
R. E. Bennetts  
Completion Date: July 1998

**TREE ISLAND BIOLOGICAL  
INVENTORY: LANDSCAPE LEVEL  
ASSESSMENT AND DETERMINATION OF  
TREE ISLAND AREA, SHAPE, AND  
VEGETATION ZONES (RWO 184)**

Investigator(s): W. M. Kitchens  
L. A. Brandt  
Completion Date: September 1998

**BIOLOGICAL DIVERSITY IN FLORIDA:  
AN EVALUATION OF POTENTIAL  
SPECIES IN RELATION TO HABITAT  
AND EXISTING RESERVES (RWO 98)**

Investigator(s): W. M. Kitchens  
L. G. Pearlstine  
S. E. Smith  
J. L. Hardesty  
Completion Date: September 1998

**IMPROVING SURVEY METHODS AND  
ASSESSING IMPOUNDMENT EFFECTS  
ON WATERFOWL ECOLOGY AT THE  
MERRITT ISLAND NATIONAL WILDLIFE  
REFUGE (RWO 186)**

Investigator: R. R. Carthy  
Completion Date: June 1999

**FACTORS AFFECTING BREEDING  
STATUS OF WADING BIRDS IN THE  
EVERGLADES (RWO 188)**

Investigator(s): P. C. Frederick  
M. G. Spalding  
Completion Date: January 1999

**EFFECTS OF PRESCRIBED FIRE ON  
SOIL NUTRIENTS, FORAGE QUALITY,  
AND PLANT COMMUNITY  
COMPOSITION, AND ON BREEDING  
BIRD COMMUNITIES ON THE FLORIDA  
PANTHER NWR (RWO 168)**

Investigator: Martin B. Main  
Completion Date: July 1999

**FLORIDA GAP ANALYSIS (RWO 187)**

Investigator(s): L. G. Pearlstine  
Scot E. Smith  
Completion Date: December 1999

**MODELING AND SIMULATION SUPPORT  
FOR ATLSS (RWO 154a)**

Investigator: Paul A. Fishwick  
Completion Date: December 1999

**THE EFFECT OF EVERGLADES FOOD ITEMS (PREY) ON CROCODILIAN GROWTH DEVELOPMENT, AND FERTILITY (RWO 154b)**

Investigator: P. T. Cardielhac  
Completion Date: December 1999

**AMERICAN ALLIGATOR DISTRIBUTION, THERMOREGULATION, AND BIOTIC POTENTIAL RELATIVE TO HYDROPERIOD IN THE EVERGLADES NATIONAL PARK (RWO 154c)**

Investigator(s): H. F. Percival  
Kenneth G. Rice  
Completion Date: December 1999

**NESTING, GROWTH, AND SURVIVAL OF AMERICAN CROCODILES IN NORTHEASTERN FLORIDA BAY, EVERGLADES NATIONAL PARK: PHASE I (RWO 178)**

Investigator(s): Frank J. Mazzotti  
Laura A. Brandt  
Completion Date: April 2000

**CREATION OF UPDATED LAND COVER MAP OF FLORIDA**

Investigator(s): L. G. Pearlstine  
W. M. Kitchens  
Completion Date: August 1999

**ORIENTATION OF DIGITAL AERIAL IMAGES AND PROTOCOL DEVELOPMENT**

Investigator(s): L. G. Pearlstine  
Scot E. Smith  
Completion Date: April 1999

**PRODUCE A MANUAL OF SEA TURTLE RESEARCH AND CONSERVATION TECHNIQUES (RWO 172)**

Investigator(s): Karen A. Bjorndal  
Alan B. Bolten  
Completion Date: July 1999

**WILDLIFE REFUGE WATERFOWL SURVEY DATABASE (RWO 202)**

Investigator(s): R.. R. Carthy  
Erin McMichael  
R. Subramaniya  
Completion Date: December 2000

**MOVEMENTS, SPATIAL USE PATTERNS, AND HABITAT UTILIZATION OF RADIO-TAGGED WEST INDIAN MANATEES (*TRICHECHUS MANATUS*) ALONG THE ATLANTIC COAST OF FLORIDA AND GEORGIA (RWO 163)**

Investigator(s): H. F. Percival  
C. J. Deutsch  
Lynn W. Lefebvre  
Completion Date: July 2000

**PATHOGENIC, MOLECULAR, AND IMMUNOLOGICAL PROPERTIES OF A VIRUS ASSOCIATED WITH SEA TURTLE FIBROPAPILLOMATOSIS. PHASE II: VIRAL PATHOGENESIS AND DEVELOPMENT OF DIAGNOSTIC ASSAYS (RWO 180)**

Investigator(s): Paul A. Klein  
E.R. Jacobson  
Daniel R. Brown  
S. S. Coberley  
Dean Bagley  
Completion Date: June 2000

**DRY DOWN TOLERANCE OF FLORIDA APPLE SNAIL (*POMACEA PALUDOSA*): EFFECTS OF AGE AND SEASON (RWO 182)**

Investigator(s): H. Franklin Percival  
Philip C. Darby  
Z. C. Welch  
Completion Date: August 2000

**EFFECTS OF COASTAL EROSION ON NESTING SEA TURTLES ALONG THE FLORIDA PANHANDLE (RWO 185)**

Investigator(s): R. R. Carthy  
M. M. Lamont  
Completion Date: May 2000

**A COMPARISON BETWEEN THE POPULATION OF THE POTENTIAL TUMOR-PROMOTING DINOFLAGELLATE, *PROROCENTRUM* SPP. AND THE INCIDENCE OF FIBROPAPILLOMATOSIS IN GREEN TURTLES (*CHELONIA MYDAS*) IN FLORIDA AND HAWAII (RWO 192)**

Investigator(s): R.R. Carthy  
Y.C. Anderson  
Completion Date: June 2000



**INCUBATION TEMPERATURES AND SEX RATIOS OF LOGGERHEAD SEA TURTLES (*CARETTA CARETTA*) HATCHED ON NORTHWEST FLORIDA BEACHES (RWO 197a)**

Investigator(s): R. R. Carthy  
M. L. Maglothlin  
Completion Date: August 2000

**BIOLOGY OF NESTING SEA TURTLES ALONG THE FLORIDA PANHANDLE (RWO 197b)**

Investigator(s): R. R. Carthy  
M. M. Lamont  
Completion Date: August 2000

**A COMPARISON BETWEEN HAWAII AND FLORIDA: THE POTENTIAL LINK BETWEEN THE TUMOR-PROMOTING DINOFLAGELLATE, PROROCENTRUM SPP, AND THE PREVALENCE OF FIBROPAPILLOMATOSIS IN GREEN TURTLES (RWO 210)**

Investigator(s): R. R. Carthy  
Y.C. Anderson  
Completion Date: December 2000

**FEEDING ECOLOGY AND HABITAT AND HABITAT AFFINITIES OF KEMP'S RIDLEY SEA TURTLES IN THE BIG BEND, FLORIDA (RWO 189)**

Investigator: R.R. Carthy  
Personnel: J.S. Staiger  
Completion Date: August 2001

**TIME LAPSE LANDSCAPE ECOLOGY: MERRITT ISLAND NATIONAL WILDLIFE REFUGE (MINWR) (RWO 198)**

Investigator: R.R. Carthy  
J.B. Wooding  
Personnel: W.J. Barichivich  
Completion Date: December 2001

**APPLICATION OF THE SPECIES AT RISK CONSERVATION FOR THE FLORIDA ARMY NATIONAL GUARD AT CAMP BLANDING TRAINING SITE, CLAY COUNTY, FLORIDA (RWO 201)**

Investigator: R.R. Carthy  
Personnel: C.J. Gregory

A.J. Gruschke  
L.G. Pearlstine  
Completion Date: August 2001

**HYDROLOGICAL CHARACTERIZATION OF THE WHITE RIVER BASIN (RWO 203)**

Investigator: W.M. Kitchens  
Personnel: M.A. Craig  
W.R. Wise  
Completion Date: September 2001

**A MULTIMODEL IMPLEMENTATION SUPPORTING ATLSS: ACROSS TROPHIC LEVEL SYSTEM SIMULATION (RWO 204)**

Investigator: P.A. Fishwick  
Personnel: R.M. Cubert  
L.K. Dance  
J.F. Hopkins  
T. Kim  
Completion Date: December 2001

**RELATIONS OF ENVIRONMENTAL CONTAMINANTS, ALGAL TOXINS, AND DIET WITH THE REPRODUCTIVE SUCCESS OF AMERICAN ALLIGATORS ON FLORIDA LAKES (RWO 193)**

Investigator: H.F. Percival  
T.S. Gross  
Personnel: B. Bradford  
Completion Date: August 2001

**FURTHER STRATEGIES FOR EVALUATING THE ETIOLOGICAL ROLE OF A TUMOR-ASSOCIATED HERPESVIRUS IN MARINE TURTLE FIBROPAPILLOMATOSIS (RWO 194)**

Investigators: E.R. Jacobson  
P.A. Klein  
Personnel: D.A. Bagley  
S.S. Coberly  
R. Hirschman  
Completion Date: September 2001

**EVALUATION OF DESERT TORTOISES  
IN AND AROUND FORT IRWIN FOR  
EXPOSURE TO A TORTOISE  
HERPESVIRUS (RWO 196)**

Investigators: E.R. Jacobson  
P.A. Klein  
Personnel: F.C. Origgi  
S. Tucker  
Completion Date: April 2001

**RESPONSE OF NESTING SEA TURTLES  
AND FORAGING SHOREBIRDS TO  
BARRIER ISLAND DYNAMICS (RWO 206)**

Investigator: R.R. Carthy  
Personnel: M.M. Lamont  
Completion Date: August 2001

**FACTORS AFFECTING BREEDING  
STATUS OF WADING BIRDS IN THE  
EVERGLADES (RWO 191)**

Investigator: P.C. Frederick  
Personnel: J.D. Semones  
R.A. Hylton  
G.A. Babbitt  
R. Ruane  
J.A. Heath  
Completion Date: April 2002

**ECOLOGICAL INVENTORY OF MOODY  
AIR FORCE BASE AND SURROUNDING  
PROPERTIES (Z-038)**

Investigator: Wiley M. Kitchens  
Personnel: C. J. Gregory  
M.t M. Lamont  
Completion Date: March 2003

**ECOLOGICAL INVENTORY OF MOODY  
AIR FORCE BASE AND SURROUNDING  
PROPERTIES (Z-039)**

Investigator: Raymond Carthy  
Personnel: C. J. Gregory  
Brittany Bird  
Completion Date: March 2003

**LARGE SCALE HABITAT MONITORING  
FOR MIGRATORY BIRDS: DIGITAL  
VIDEO MOSAICS IN MULTI-LEVEL  
IMAGES (RWO 215)**

Investigator(s): Bon A. Dewitt  
L. G. Pearlstine  
Personnel: Grady Trull

Sara R. Gonzales  
Leslie Hicks  
G. P. Jones, IV  
Completion Date: August 2003

**INVENTORY AND MONITORING OF THE  
AMPHIBIANS OF EVERGLADES  
NATIONAL PARK, BIG CYPRESS  
NATIONAL PRESERVE AND VIRGIN  
ISLANDS NATIONAL PARK (RWO 208)**

Investigator(s): H. Franklin Percival  
Kenneth G. Rice  
Raymond R. Carthy  
James D. Nichols  
Personnel: C. D. Bugbee  
M. E. Crockett  
Amber D. Dove  
Brian Jeffery  
Andrew J. Maskell  
J.Hardin Waddle  
Completion Date: December 2003

**AMERICAN ALLIGATOR DISTRIBUTION,  
THERMOREGULATIONS, AND BIOTIC  
POTENTIAL RELATIVE TO  
HYDROPERIOD IN THE EVERGLADES  
(RWO 199)**

Investigator(s): H. F. Percival  
Kenneth G. Rice  
Personnel: Matthew D. Chopp  
Adam G. Finger  
Phillip George  
Brian Jeffery  
Michael T. Tuten  
Completion Date: December 2003

**SEROEPIDEMIOLOGICAL STUDIES OF  
HERPESVIRUS – ASSOCIATED  
DISEASES OF MARINE TURTLES:  
FIBROPAPILLOMATOSIS AND LUNG-  
EYE-TRACHEA DISEASE (RWO 213)**

Investigator: Raymond Carthy  
Paul A. Klein  
Elliot R. Jacobson  
Personnel: Dean A. Bagley  
S S Coberly (Curry)  
Rachel Hirschman  
Completion Date: December 2003

**AN ESTIMATE OF POPULATION AND AGE STRUCTURE FOR GULF OF MEXICO STURGEON, *ACIPENSER O. DESOTOI*, ON THE YELLOW RIVER (RWO 214)**

Investigator(s): Michael S. Allen  
Personnel: James Berg  
Completion Date: December 2003

**CONTAMINANT SCREENING TO INVESTIGATE WILDLIFE MORTALITY ON LAKES ON CENTRAL FLORIDA (RWO-195)**

Investigator(s): H. Franklin Percival  
J. Perran Ross  
Personnel: Y. Temsiripong  
Completion Date: April 2003

**HIBERNATION VS MIGRATION OVERWINTERING STRATEGIES OF JUVENILE SEA TURTLES IN THE FLORIDA PANHANDLE (UF Project # 00037385)**

Investigator(s): Raymond R. Carthy  
Erin McMichael  
Personnel: Russell Scarpino  
Completion Date: June 2004

**COASTAL HABITAT USE BY JUVENILE AND ADULT SEA TURTLES IN NORTHWEST FLORIDA (RWO 212)**

Investigator(s): Raymond R. Carthy  
Personnel: Erin McMichael  
Russell Scarpino  
Completion Date: August 2004

**ESTIMATION OF CRITICAL DEMOGRAPHIC PARAMETERS OF THE FLORIDA SNAIL KITE DURING AND AFTER DROUGHT CONDITIONS (RWO 216)**

Investigator(s): Wiley M. Kitchens  
Personnel: Julien Martin  
Christopher Cattau  
Christina Rich  
Derek Piotrowicz  
Completion Date: December 2004

**DEMOGRAPHIC MOVEMENT AND HABITAT STUDIES OF THE ENDANGERED SNAIL KITE IN**

**RESPONSE TO HYDROLOGICAL CHANGES (RWO 207)**

Investigator(s): Wiley M. Kitchens  
Personnel: Julien Martin  
Chris Cattau  
Andrea Bowling  
Dan Huser  
Melinda Conners  
Completion Date: March 2005

**MONITORING OF WADING BIRDS NESTING ACTIVITY IN WCAS I, II, AND III OF THE EVERGLADES AND STUDY OF WOOD STORK SURVIVAL AND MOVEMENTS (RWO 218)**

Investigator(s): Peter C. Frederick  
Personnel: Rebecca Hylton  
John David Semones  
Matthew Bokach  
Julie Heath  
John Simon  
Kate Williams  
Completion Date: March 2005

**EVALUATION OF SEA TURTLE HATCHLING DISORIENTATION AND ASSESSMENT OF TECHNIQUES FOR MINIMIZING LIGHTING IMPACTS AT TYNDALL AFB, BAY COUNTY FLORIDA (RWO 217)**

Investigator(s): Raymond R. Carthy  
Personnel: Russell Scarpino  
Completion Date: March 2005

**PARTNERSHIP IN CASE STUDIES FOR TRAINING AND OUTREACH (UF Project # 00050944)**

Investigator(s): H. Franklin Percival  
Martha Monroe  
Personnel: Kristy Bender  
Completion Date: August 2005

**CONTINUED VEGETATION MONITORING OF THE SAVANNAH RIVER TIDALLY INFLUENCED MARSHES**

Investigator(s): Wiley M. Kitchens  
Personnel: Kristianna Lindgren  
Zachariah Welch  
Completion Date: December 2005

**GEOMORPHIC ASSESSMENT OF  
CHANNEL CHANGES ALONG A  
MODIFIED FLOODPLAIN PASCAGOULA  
BASIN, MISSISSIPPI**

Investigator(s): Joann Mossa  
Personnel: David Coley  
Jim Rasmussen  
Glenn Hermansen  
Robert Godfrey  
Alexis Villegas  
Completion Date: December 2005

**GEOMORPHIC ASSESSMENT OF  
CHANNEL CHANGES ALONG A  
MODIFIED FLOOD PLAIN:  
PASCAGOULA RIVER, MISSISSIPPI**

Investigator(s): Joann Mossa  
Personnel: James Williams  
Completion Date: June 2006

**FACTORS AFFECTING POPULATION  
DENSITY AND HARVEST OF NORTHERN  
BOBWHITE (*COLINUS VIRGINIANUS*) ON  
BABCOCK/WEBB WILDLIFE  
MANAGEMENT AREA, CHARLOTTE  
COUNTY, FLORIDA**

Investigator(s): Franklin Percival  
Ralph Dimmick  
Madan Oli  
Personnel: Susan Dimmick  
Steven Brinkley  
Jeff Hostetler  
Gerald Coker  
Amy Brinkley  
Chris Jones  
Completion Date: June 2006

**COST AND ACCURACY OF ANALYSIS  
OF GOPHER TORTOISE POPULATION  
ESTIMATION TECHNIQUES**

Investigator(s): Ray Carthy  
Madan Oli  
Personnel: Esther Langan  
John Wooding  
Saif Nomani  
Erin Cantwell  
Kristin Miller  
Meana Voigt  
Completion Date: July 2006

**SURVEYS OF SNAIL KITE BREEDING  
AND HABITAT USE IN THE UPPER ST.  
JOHNS RIVER BASIN**

Investigator(s): Wiley Kitchens  
Personnel: Julien Martin  
Chris Cattau  
Andrea Bowling  
Sara Stocco  
Brain Reichert  
Completion Date: February 2006

**QUANTITATIVE ANALYSIS SUPPORTING  
REPTILE AND AMPHIBIAN RESEARCH  
IN FLORIDA'S EVERGLADES**

Investigator(s): Franklin Percival  
Frank Mazzotti  
Personnel: Mark Miller  
Completion Date: August 2006

**SEA TURTLE HABITAT USE AND  
INTERACTIONS WITH HUMANS IN THE  
COASTAL ZONE**

Investigator(s): Ray Carthy  
Personnel: Russell Scarpino  
Completion Date: August 2006

**SOUTHEASTERN ADAPTIVE  
MANAGEMENT GROUP (SEAMG)**

Investigator(s): Franklin Percival  
Robert Dorazio  
Fred Johnson  
Completion Date: June 2006

**DEVELOPMENT OF UNMANNED AERIAL  
VEHICLES FOR ASSESSMENT OF  
WILDLIFE POPULATIONS AND  
HABITATS PHASE 2**

Investigator(s): Franklin Percival  
Bon Dewitt  
Peter Ifju  
Leonard Pearlstine  
Personnel: Jamie Duberstein  
Daniel Grant  
Completion Date: December 2006

**TOHO V – A PROPOSAL TO DOCUMENT  
FLORAL AND FAUNAL SUCCESSION  
FOLLOWING ALTERNATIVE HABITAT  
RESTORATION TECHNIQUES IN A  
LARGE CENTRAL FLORIDA LAKE**

Investigator(s): Wiley Kitchens  
Personnel: Janell Brush  
Melissa DeSa  
Carolyn Enloe  
James Reyes  
Completion Date: June 2006

**POPULATION STRUCTURE OF A  
LOGGERHEAD TURTLE (*CARETTA  
CARETTA*) NESTING COLONY IN  
NORTHWESTERN FLORIDA AS  
DETERMINED THROUGH MITOCHONDRIAL  
DNA ANALYSIS**

Investigator(s): Ray Carthy  
Personnel: Russell Scarpino  
Completion Date: April 2006

**CONSERVATION, ECOLOGY, AND  
PROPAGATION OF FLORIDA  
ORCHIDACEAE *EULOPHIA ALTA*  
(*LINNAEUS*) FAWCETT AND RENDLE**

Investigator(s): Michael Kane  
Completion Date: December 2006

**RAPID DELINEATION OF PROVENANCE  
FOR FLORIDA SEA OATS USED FOR  
BEACH AND DUNE STABILIZATION**

Investigator(s): Michael Kane  
Personnel: Nancy Philman  
Pete Sleszynski  
Scott Stewart  
Daniela Dutra  
Completion Date: September 2006

## 2006 Theses and Dissertations

Barichivich, W.J. 2006. Characterization of a marine turtle aggression in the Big Bend of Florida. M.S. Thesis. University of Florida, Gainesville, FL.

Brush, J.M. 2006. Wetland avifauna usage of littoral habitat prior to extreme habitat modification in Lake Tohopekaliga, Florida. M.S. Thesis. University of Florida, Gainesville, FL.

Stolen, E.D. 2006. Habitat selection and foraging success of wading birds in impounded wetlands in Florida. Ph.D. Dissertation, University of Florida, Gainesville, FL.

Waddle, J.H. 2006. Use of amphibians as ecosystem indicator species. Ph.D. Dissertation. University of Florida, Gainesville, FL.

## 2006 Publications

- Carthy, R. R. 2006. An owner's manual for the Chelonioidae. Book review for "Sea Turtles. A complete guide to their biology, behavior, and conservation, by James R. Spotila." *Journal of Conservation Biology*.
- Gregory, C. J., R. R. Carthy, and L. G. Pearlstine. 2006. Application of species at risk at camp blanding training site, FLARNG (Florida). *Southeastern Naturalist*, in press.
- Jones, G., L. Pearlstine, and H.F. Percival. 2006. An assessment of unmanned aerial vehicles for wildlife research. *Wildlife Society Bulletin* 34(3):750-758.
- Martin, J., J. D. Nichols, W. M. Kitchens, and J. E. Hines. 2006. Multiscale patterns of movement in fragmented landscapes and consequences on demography of the snail kite in Florida. *Journal of Animal Ecology* 75:527-539.
- Stewart, S. 2006. Symbiotic and asymbiotic orchid seed germination as tools in conservation. *In Vitro* 42:14-A.
- Temsiripong, Y., A.R. Woodward, J.P. Ross, P.S. Kubilis, and H.F. Percival. 2006. Survival and growth of American Alligator (*Alligator mississippiensis*) hatchlings after artificial incubation and repatriation. *Journal of Herpetology* 40:415-423.
- Waddle, J.H., F.J. Mazzotti, K.G. Rice. 2006. Changes in abundance of gopher tortoise burrows at Cape Sable, Florida. *Southeastern Naturalist* 5(2):277-284.

## 2006 Presentations

- Adams, C. R., M. E. Kane, D. L. Watts, N. M. Steigerwalt and L. Richardson. 2006. Historic pond restoration in the Florida Panther National Wildlife Refuge. *in* Florida Fish and Wildlife Cooperative Coordinating Committee Meeting, Gainesville, FL.
- Adams, E. a. P. C. F. 2006. Sublethal effects of chronic methylmercury exposure on foraging behavior in juvenile white ibises (*Eudocimus albus*). *in* North American Ornithological Conference, Veracruz, Mexico.
- Beech, T., and F. Johnson. 2006. Using dynamic programming to determine optimal fire management for Florida scrub-jay habitat. *in* U.S. Fish and Wildlife Service and U.S. Geological Survey Decision Analysis Seminar.
- Borkhataria, R. a. P. C. F. 2006. "A preliminary model of Wood Stork population dynamics in the Southeastern United States". *in* North American Ornithological Conference, Veracruz, Mexico.
- Borkhataria, R. R., R.A. Hylton, and P.C. Frederick. 2006. The importance of early wet season water levels to dispersing juvenile wood storks in the Florida Everglades. *in*, Titusville, FL.
- Brush, J. M., and W.M. Kitchens. 2006. Wetland avifauna usage of littoral habitat prior to extreme habitat modification in Lake Tohopekaliga, Florida. *in* Wildlife Ecology and Conservation Masters Symposium, University of Florida, Gainesville, FL.
- Bryan Jr, A. L., R. Borkhataria, B. Hylton, P. C. Frederick and B. Brooks. 2006. "Do wood stork populations from Mexico and the southeastern United States mix?" *in* North American Ornithological Conference, Veracruz, Mexico.
- Dimmick, R. W. 2006. Regulating the bobwhite harvest on public lands. *in* Second Annual Quail Management Shortcourse, Monticello, Florida.
- Frederick, P. C. 2006. "Why the bump? Evaluating causes of dramatic increases in nesting populations of long legged wading birds (Ciconiiformes) in south Florida." *in* North American Ornithological Conference, Veracruz, Mexico.
- Johnson, F. A., T. Beech, R. M. Dorazio, M. Epstein, and J. Lyon. 2006. Abundance and detection probabilities of Florida scrub-jays at Merritt Island National Wildlife Refuge using spatially replicated counts. Gainesville, FL.
- Lee, K., P. G. Ifju, W. S. Bowman, A. C. Watts, H. F. Percival, L. G. Pearlstine, and B. A. Dewitt. 2006. University of Florida micro and autonomous air vehicles. *in* Association for Unmanned Vehicle Systems International's Unmanned Systems North America, Orlando, Florida.
- Martin, E. 2006. Dunlin foraging behavior and predation risk at Merritt Island National Wildlife Refuge. *in* Florida Ornithological Society Meeting, Titusville, Florida.



- Pearlstine, L., A., Watts, and K, Lee. 2006. Unmanned aerial vehicles for natural resource management and wildlife surveillance. *in* Restoration Coordination and Verification Leadership Group Meeting, Fort Lauderdale, FL.
- Pearlstine, L. A., A. Watts. 2006. The application of unmanned aerial vehicles (UAVs) to CERP MAP monitoring. *in* Restoration Coordination and Verification Assessment Team Meeting, Fort Lauderdale, FL.
- Percival H.F., L. P., B. Dewitt, S. Smith, A. Watts, P. Ifju, K. Lee, and S. Bowman 2006. Autonomous unmanned aerial vehicle for ecological research. *in* Coordinating Committee Meeting, Florida Cooperative Fish and Wildlife Research Unit, Gainesville, Florida.
- Percival, H. F., and A. C. Watts. 2006. Unmanned aerial vehicles (UAVs) for natural resource management and wildlife surveillance. *in* Invited seminar at the St. Johns River Water Management District, Palatka, FL.
- Ross, J. P., D.C. Honeyfield, D. Carbonneau, S. Terrell, A. Woodward, T. Schoeb, H.F. Percival, and J.P. Hinterkopf. 2006. Neurological pathology in alligators driven by ecosystem change: thiamine deficiency associated with a shad diet. *in* Carnivores 2006: Habitats, Challenges, and Opportunities, Defenders of Wildlife, St. Petersburg, FL.
- Stewart, S. 2006. Gators, Florida panthers, and orchids (abstract). *in* Native Orchid Conference, Ashland, Oregon.
- Stewart, S. 2006. Symbiotic and asymbiotic orchid seed germination as tools in conservation (abstract). *in* Society for In Vitro Biology Annual Meeting, Minneapolis, Minnesota
- Watts, A. C., H. Franklin Percival, Leonard G. Pearlstine, Peter G. Ifju, Bon A. Dewitt, Scot E. Smith, Ahmed Mohamed and W. Scott Bowman. 2006. Development of an autonomous unmanned aerial vehicle (UAV) system for Wildlife and Ecological Research. *in* 3rd National Conference on Coastal and Estuarine Habitat Restoration, New Orleans, Louisiana.
- Williams, K. and P.C. Frederick. 2006. "Estimation of breeding population size and nest failure rates in colonially breeding wading birds". *in* North American Ornithological Conference, Veracruz, Mexico.
- Zweig, C. and. W. Kitchens. 2006. Characterizing an Everglades in transition: wetland vegetation dynamics. *in* Greater Everglades Ecosystem Restoration conference.

## 2006 Technical Reports

Johnson, F. A., and T. J. Beech. 2006. Adaptive management of scrub-jay habitat at Merritt Island NWR. *in* Southeastern Adaptive Management Group Steering Committee.

Wells, O. 2006. Research Highlight: Historic Pond Restoration in the Florida Panther National Wildlife Refuge.

## 2006 Graduates, Honors, and Awards

### Graduates:

Hardin Waddle, PhD

Eric Stolen, PhD

Janell Brush, MS

Jamie Barichivich, MS

### Awards:

Kristen Candelora was awarded the best student paper award for her presentation at the following two conferences:

Candelora, K., M. Spalding, S. Nesbitt, J. Olson, L. Perrin, H. F. Percival, H.F. and J. Parker. 2006. Infectious Bursal Disease in Wild Populations of Florida Turkeys and Sandhill Cranes, Preliminary Findings. The Tenth North American Crane Workshop, Zacatecas, Mexico. February 9, 2006.

Candelora, K., M. Spalding, S. Nesbitt, J. Olson, L. Perrin, H. F. Percival, H.F. and J. Parker. 2006. Infectious Bursal Disease in Wild Populations of Florida Turkeys and Sandhill Cranes, Preliminary Findings. The Florida Chapter of the Wildlife Society Spring Conference, Cocoa Beach, FL. April 5, 2006.

Hardin Waddle was awarded the University of Florida Alumni Fellowship for 2002-2006.