

South Carolina Cooperative Fish & Wildlife Research Unit

*Report of Activities
2008-2009*

*Cooperating Agencies
U.S. Geological Survey
South Carolina Department of
Natural Resources
Clemson University
Wildlife Management Institute*

*South Carolina Cooperative
Fish and Wildlife Research
Unit*

*G27 Lehotsky Hall
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Black Skimmer chicks in Cape Romain NWR



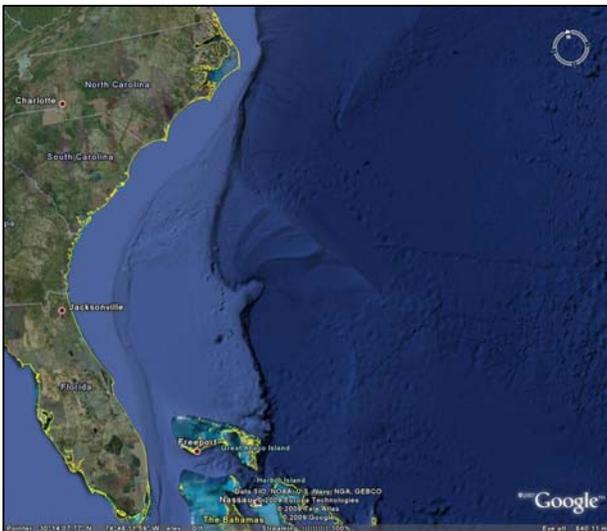
Determining sex of a sturgeon with a borescope



Audubon's Shearwater colony, Long Cay, Bahamas



American eel passage at a dam



Synthesis of seabird data for the South Atlantic Bight



Drew Trested (Ph. D student) and Jeff Isely conducting sturgeon research

Front Cover (top to bottom): Molly Giles (MS student) banding Canada Goose; Jess Gorzo, MS student, checking Painted Bunting nest; Beth Wrege (PhD candidate) with striped bass

*USGS South Carolina
Cooperative Fish and Wildlife Research Unit*

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Cooperating Agencies

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USFWS Bears Bluff National Fish Hatchery
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National Park Service, Congaree National Park

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Chechessee Creek Club
Georgia Sea Turtle Center
Low Country Institute
National Fish and Wildlife Foundation
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Beth Wrege, Ph.D. Wildlife & Fisheries Biology (Isely)

Projects in Fisheries Science



Jim Woodruff Dam, Apalachicola, River, FL

Population size and passage efficiency of Alabama shad reaching Jim Woodruff Lock and Dam, Florida

Principle Investigators: J. Jeffery Isely, SCCFWRU
Travis Ingram, M.S. student
Duration: January 2009 - May 2013
Funding Source: Georgia Department of Natural Resources
Project Location: Apalachicola River, Florida
Status: Ongoing

Historically, the Apalachicola River supported large runs of anadromous fish. The creation of Lake Seminole and subsequent flow alterations to the system significantly altered population characteristics and species distributions. Currently, it is believed that Jim Woodruff Lock and Dam on the Apalachicola River serves as a significant barrier to migration of anadromous fishes. Researchers have documented the failure of the navigation lock to pass some fish, as well as spawning activity by Gulf sturgeon in the tailrace of the dam. In this study, we estimated the population size of migrating Alabama shad below JWLD in the Apalachicola River located in the central panhandle of Northwest Florida near the Georgia border using mark recapture and relative abundance techniques. The number of marked fish will be adjusted for tag loss, emigration and mortality. The population size of migrating Alabama shad near JWLD was estimated at 5,286 (95% C.I. = 1,674 - 10,428) in 2009. The current population size of Alabama shad reaching Jim Woodruff Lock and Dam is relatively small when compared to both current and historic estimates of American shad population size along the Atlantic coast. We also evaluated the effectiveness of the navigational lock at JWLD for upstream passage of Alabama shad using fixed-station telemetry. About 18% of Alabama shad implanted with sonic transmitters abandoned their spawning migration. Passage efficiency of the remaining study fish was 59%. We conclude that the navigational lock at JWLD can be effective in passing migrating Alabama shad.

Age, growth, mortality and abundance of Lake Sturgeon in the Grasse River, New York

Principle Investigators:	J. Jeffery Isely, SCCFWRU Drew Trested, Ph.D. student
Duration:	January 2007 - May 2010
Funding Source:	Unfunded
Project Location:	Massena, New York
Status:	Ongoing

The Grasse River population of lake sturgeon *Acipenser fulvescens* is one of a few populations in New York State where recruitment has been documented. Little is known about the current condition of the Grasse River lake sturgeon population. The purpose of our study was to assess the current status of lake sturgeon in the Grasse River system, specifically age, growth, mortality and abundance. We determined age for 196 of 211 lake sturgeon captured from the Grasse River, New York, by examination of sectioned pectoral fin rays. Ages ranged from 0 to 32 years and the annual mortality rate for fish between ages 7 and 17 was 9.9%. The weight (W, g) to total length (TL, mm) relationship was $W = 1.281 \times 10^{-6} TL^{3.202}$. The von Bertalanffy growth equation for total length was $TL = 2,049(1 - e^{-0.0258(t+10.3103)})$. While the range of observed ages was similar to that of nearby St. Lawrence River populations, mean weight at age for an individual at 1,000 mm TL was lower than that observed for lake sturgeon within Lake Saint Francis of the St. Lawrence River. Predicted growth based on von Bertalanffy parameters for the Grasse River yielded similar values to those observed for Lake Saint Francis lake sturgeon. An open population estimator using the POPAN sub-module in Program MARK produced an abundance estimate of 793 lake sturgeon (95% CI = 337 to 1,249). Based on our current abundance estimate, range of year classes and mortality rate, the Grasse River lake sturgeon population appears to be sustainable under current system conditions.

A large volume Striped Bass egg incubation chamber: design and comparison with a traditional method

Principle Investigators:	J. Jeffery Isely, SCCFWRU Chris Harper, M.S. student
Duration:	January 2007 - May 2009
Funding Source:	Georgia Department of Natural Resources
Project Location:	Richmond Hill, Georgia
Status:	Completed

We conducted a comparative study of a new jar design (experimental chamber) with a standard egg incubation vessel (McDonald jar). Experimental chambers measured 0.4 m in diameter by 1.3 m in height and had a volume of 200 L. McDonald hatching jars measured 16 cm in diameter by 45 cm in height and had a volume of 6 L. Post-hatch survival was estimated at 48, 96 and 144 h. Stocking rates resulted in an average egg density of 21.9 eggs ml⁻¹ (range = 21.6 – 22.3) for McDonald jars and 10.9 eggs ml⁻¹ (range = 7.0 – 16.8) for experimental chambers. We were unable to detect an effect of container type on survival to 48, 96 or 144 h. At 144 h striped bass fry survival averaged 37.3% for McDonald jars and 34.2% for experimental chambers. Survival among replicates was significantly different. Survival of striped bass significantly decreased between 96 and 144 h. Mean survival among replicates ranged from 12.4 to 57.3%. We were unable to detect an effect of initial stocking density on survival. Experimental jars allow for incubation of a larger number of eggs in a much smaller space. As hatchery production is often limited by space or water supply, experimental chambers offer an alternative to extending spawning activities, thereby reducing manpower and cost. However, the increase in the number of eggs per rearing container does increase the risk associated with catastrophic loss of a production unit. We conclude the experimental chamber is suitable for striped bass egg incubation.

Age and growth of Loggerhead Turtles from coastal South Carolina estimated from mark-recapture data

Principle Investigators:	J. Jeffery Isely, SCCFWRU Beth M. Wrege, Ph.D. student
Duration:	January 2009 - May 2010
Funding Source:	Unfunded
Project Location:	Coastal South Carolina
Status:	Ongoing

Populations of loggerhead turtles, *Caretta caretta*, have been in jeopardy as the result of a variety of anthropogenic impacts. Assessing loggerhead populations has been difficult because determining the age of living turtles has been problematic. In this study, we estimate the age and growth of loggerhead turtles from mark – recapture data. Loggerhead turtles (n=1437) were captured from commercial and research fishing vessels off the coasts of North Carolina, South Carolina, Georgia and Florida using a variety of methods as part of several standard marine sampling programs. Turtles were measured (CCLnn; cm), marked and released. Upon recapture (n = 69), tag number, carapace length and time at large were recorded. Of these recaptured turtles, the initial CCLnn at mark ranged from 53.7 cm to 97.4 cm. Final CCLnn for the recaptured turtles, ranged from 54.6 cm to 97.9 cm. For the recaptured turtles, the time between mark and recapture ranged from 27 days to 1544 days. Turtles included in the growth model were limited to those that had 300 days or more (n = 32) between mark and recapture. Measured growth ranged from 0.1 cm to 6.8 cm. Von Bertalanffy growth equation parameters L_{∞} and k were calculated using an iterative method developed by Fabens. We estimated $L_{\infty} = 119.02$ (95% C.I. = 89.05 – 148.90) and $k = 0.0219$ (95% C.I. = 0.0167 – 0.0374). We calculated $t_0 = 0.1274$ using known size at hatch. Based on our model, we estimated the age range of loggerhead turtles in the population as 21 – 60 years. We conclude that measurement of carapace length from captured and recaptured individuals provides a viable method of estimating age and growth of loggerhead turtles.

Projects in Wildlife & Ecological Sciences



The intertidal zone at Crab Bank, Charleston Harbor, SC

Carolina Bogmint at Congaree National Park: distribution, mapping, and population status assessment

Principle Investigators: Craig R. Allen, NCFWRU, University of Nebraska, Lincoln, NE
(formerly Unit Leader of the SCCFWRU)
Joan Walker, USFS
Kate Manry, Ph.D. Student

Duration: January 2004 – August 2009

Funding Source: National Park Service

Project Location: Congaree National Park

Status: Completed

Macbridea caroliniana is a rare herbaceous mint that occurs patchily in floodplain swamp forests of the Carolinas and Georgia. Large patches of blooming *M. caroliniana* have been associated with canopy gaps following tree falls. Because there are more blooming flowers in canopy gaps compared to closed canopy conditions, patches in canopy gaps are likely to experience more frequent sexual reproduction. With more sexual reproduction, we would expect patches from canopy gaps to have greater genetic diversity than closed-canopy patches. Although a variety of molecular techniques are available to examine genetic variation within plant species, allozymes are often the method of choice because they are efficient and cost-effective.

The objectives of this research are to: (1) compare the genetic diversity of *M. caroliniana* patches occurring in gaps and under closed-canopy conditions; (2) compare the distribution of genetic diversity between *M. caroliniana* gap patches and closed-canopy patches; and (4) make recommendations for conservation strategies based on the results. We sampled leaves from 192 *M. caroliniana* stems at a population within the Congaree National Park. We sampled 24 stems at each of four gap patches and four closed-canopy patches. We resolved 12 enzyme systems and 23 loci using starch gel electrophoresis. Contrary to our expectations, the mean genetic diversity for patches in gaps was not greater for patches occurring in canopy gaps than for those of closed canopies; it was approximately the same ($H_e = 0.110$, and 0.107 respectively). However, how genetic diversity is distributed among gap versus closed-canopy patches is different ($G_{ST} = 0.0445$ and 0.199 respectively). The patches from gaps are genetically more like each other than closed-canopy patches. Presumably, more flowering results in more visitations from pollinators and gene flow via pollinator foraging can explain the result of less genetic differentiation between gap patches compared to closed canopy patches. We suspect the closed-canopy patches may have become established and/or increased in size following the formation of canopy gaps many years ago. Over time, as canopy gaps closed in with new trees, levels of genetic diversity were maintained perhaps by rare seedling recruitment. In a previous range-wide study of eleven *M. caroliniana* populations, we found this population to have very high levels of genetic diversity. Because natural processes are maintaining the gene flow and genetic diversity within and among the Congaree National Park patches, we do not recommend any management intervention to improve the genetic diversity or gene flow of *M. caroliniana* patches here.

Roosting requirements of Rafinesque's big-eared bats in Congaree National Park

Principle Investigators: Susan Loeb, USFS
Patrick Jodice, SCCFWRU
Jessica Lucas, M.S. student
Duration: January 2006 to September 2009
Funding Source: National Park Service, USFS
Project Location: Congaree National Park
Status: Completed

The Rafinesque big-eared bat (*Corynorhinus rafinesquii*) is considered rare throughout its range and may be extirpated in Indiana and Ohio. In South Carolina, the species is considered endangered by the South Carolina Department of Natural Resources. Because roost structures are one of the most critical resources for bats, knowledge and understanding of roost requirements are critical for developing effective bat management and conservation policies.

The objectives for this project were to determine roost tree characteristics of Rafinesque's big-eared bats in the Congaree National Park and to determine foraging habitat requirements. In 2006-2007 (May-August), Rafinesque's big-eared bats were tagged with radiotransmitters. We located 43 roost trees (13 maternity, 30 non-maternity) from radiotagged bats and tree searches. Visual confirmation was made for all roosts.

Number of roosts per individual ranged from 1 to 7. Bats showed strong selection for tupelo (*Nyssa* sp.), particularly water tupelo *N. aquatica*. Half of the roosts used by maternity colonies were in basal cavities and the other half were in cavities with entrances in the upper bole. In contrast, the majority (73%) of roosts used by solitary individuals were in basal cavities. Both maternity colonies and solitary individuals selected large diameter trees. Maternity roost trees were taller than random trees although roost trees used by solitary individuals were not. All but one of the roost trees was located in cypress-tupelo forest types. Our data suggest that old-growth bottomland hardwood forests provide important habitat features for Rafinesque's big-eared bats. Further, trees with upper bole openings may be particularly important for successful reproduction.

Protection and management of seabird colonies in South Carolina

Principle Investigators: Patrick Jodice, SCCFWRU
Lisa Ferguson, Ph.D. student
Duration: May 2006 to December 2009
Funding Source: SCDNR
Project Location: Crab Bank, Deveaux Bank, Bird Key Stono, Charleston County, SC
Status: Ongoing

Seabirds nest in colonies on approximately nine islands along the coast of South Carolina. These islands are characterized by sandy beaches, absence of mammalian predators, low vegetation, and an upland that provides habitat for nesting shorebirds and colonial seabirds. One of the main challenges faced by managers at these colonies is balancing the needs of breeding and migratory birds with those of island visitors. The goal of the study is to monitor seabirds and collect baseline measures of breeding parameters to better evaluate the health and condition of seabird populations at the protected islands.

The first objective of this study was to map habitat use by seabirds during the breeding season. To meet this objective we conducted intertidal surveys during the 2007 and 2008 breeding seasons to identify areas of high bird use. We conducted 12 surveys at Crab Bank, 18 surveys at Bird Key Stono, and 17 surveys at Deveaux Bank. We also measured habitat characteristics of the intertidal zones of these three islands. Over 30 species of waterbirds were recorded during these surveys, and data suggest that use varies spatially and temporally during the breeding season. Our next objective was to measure reproductive and behavioral parameters of breeding seabirds. In 2007 and 2008 we measured Black Skimmer (*Rynchops niger*) nest success at three nesting islands. Across all colonies and years, mean hatching success was 0.45 ± 0.26 chicks hatched per nest and mean productivity was 0.27 ± 0.21 chicks fledged per pair. Temperature loggers were placed in 108 nests to determine the effect of temperature patterns during incubation on nest success; these data are being analyzed. Brown Pelican (*Pelecanus occidentalis*) reproductive parameters were monitored during all years of the study. Across all colonies and years, mean hatching success was 2.0 ± 0.26 chicks hatched per nest and mean productivity was 1.48 ± 0.26 chicks fledged per pair. We recorded provisioning and attendance behavior of pelicans at the Deveaux Bank colony in 2008. These data are being analyzed and will be comparable to those published by Sachs and Jodice (2009) from Crab Bank. Our final objective was to determine condition and health of seabird populations. To meet this objective, we monitored health parameters of 43 nestling Brown Pelicans to establish reference values and investigate the role of ticks nestling health. The field work portion of this study was completed in October 2008 and analysis is currently underway.

Movement patterns of seabirds breeding in the Exuma Cays, Bahamas

Principle Investigators: Patrick Jodice, SCCFWRU
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Jennifer Arnold, Penn State University
Richard Phillips, British Antarctic Survey
Tom Barbernitz, Bahamas National Trust
Duration: January 2008 to December 2009
Funding Source: USFWS
Project Location: Exuma Cays, Bahamas
Status: Ongoing

During the period May – July 2008 we collected 93 blood samples for H5N1 (avian influenza) analysis from various seabird colonies in the Exuma Cays, Bahamas. Samples were collected from Audubon’s Shearwater, White-tailed Tropicbird, Sooty Tern, Bridled Tern, and Brown Noddy. Samples were sent to the National Wildlife Health Lab in Madison, WI, and are now part of the Highly Pathogenic Avian Influenza Early Detection Data System (HEDDS) database <http://wildlifedisease.nh.gov/ai/>. No positive cases of H5N1 AI were detected.

We also attached geolocators (GLSs) to 11 Audubon’s Shearwaters and 13 White-tailed Tropicbirds. GLSs are small (2-3 g) devices that estimate location based on ambient light levels and also record salt-water immersion; hence time foraging at sea also can be estimated. The devices we used were provided by the British Antarctic Survey. These are the first efforts to deploy GLSs on these species or in this region. We recovered 2 GLSs from Audubon’s Shearwaters after 5 weeks during the 2008 breeding season. These birds engaged in a combination of long and short foraging trips as estimated from the proportion of time spent at-sea. Locations ranged from local use of the waters throughout the Exumas to periodic use of waters south of Cuba.

We revisited colonies during June 2009. We recovered 4 additional GLSs from Audubon’s Shearwaters and 3 from White-tailed Tropicbirds. These data are being analyzed currently and should contain the first records of annual movement patterns for either of these species. We will revisit colonies during summer 2010 in an attempt to recover the remaining GLSs (which can store data through 2012). We also intend to deploy additional GLSs.

Reproductive success of Painted Buntings on golf courses in South Carolina

Principle Investigators: Patrick Jodice, SCCFWRU
Laurel Barnhill, SCDNR
Chris Marsh, Low Country Institute
Jessica Gorzo, M.S. student
Duration: January 2008 to December 2010
Funding Source: National Fish and Wildlife Foundation
Project Location: Golf courses in Beaufort County
Status: Ongoing

The passerine species Painted Bunting (*Passerina ciris*) has been placed on the Audubon WatchList due to a steady decline since 1966. The reason for the decline is unknown, but habitat loss is suspected to be the predominant factor. Painted buntings have established 2 breeding populations in the US, one in the southwest and one in the coastal southeast. The southeastern distribution ranges from southern North Carolina to northern Florida. This coastal population often uses salt marshes for foraging and nests in dense shrubbery or Spanish moss.

The lowcountry of South Carolina supports a large breeding population of Painted Buntings. This area has experienced substantial development in the forms golf courses and associated communities. Thus, shrub habitat typically used for nesting by Painted Buntings is being removed and altered, and wetland systems often used for foraging are being modified. This changing landscape presents management concerns for Painted Bunting populations.

During the breeding season of 2008 and 2009, we searched Spring Island and Chechessee Creek Club in Okatie, SC for nests. Once found, nests were monitored until they succeeded or failed. We recorded signs of success or failure, nest height, nest plant species, and GPS location. During these two seasons we located 18 nests. Of these, 13 were located in shrub habitat and the remainder in trees. Three nests occurred in clumps of Spanish moss. Most nests were located during incubation and most failed although causes of failure were difficult to document.

During 2010 we will incorporate a new analysis that will use GIS data to examine small- and large-scale landscape characteristics of Painted Buntings from many courses in the region. We will assess vegetation characteristics with presence/absence of painted buntings, thus lending insight to possible land management techniques for southeastern coastal golf courses.

Movement patterns, habitat use and conservation assessment of stopover sites for migratory Canada Geese

Principle Investigators: Patrick Jodice, SCCFWRU
Buddy Baker, SCDNR
Marc Epstein, John Stanton & Haven Barnhill, USFWS
Molly Giles, M.S. student
Duration: January 2008 to May 2010
Funding Source: SCDNR, USFWS
Project Location: Santee National Wildlife Refuge
Status: Ongoing

A portion of the Southern James Bay Population (SJBP) of Canada geese, which originates from the breeding range along the southern James Bay coast, Ontario, Canada, has wintered at the Santee National Wildlife Refuge in South Carolina since the 1940's. Numbers of SJB geese at Santee NWR peaked at 39,000-40,000 during the mid 1960's. However, from the mid 1960's to 1987, there was a 96% decrease in the numbers of geese at the refuge, and currently there are fewer than 1,000 SJBP geese wintering in and adjacent to the refuge. This regional decline is thought to be caused by the "short-stopping" of geese in northern parts of the flyway. Factors linked to this south to north shift in distribution include changes in climate, changes in agricultural and urban land use, the creation of public and private waterfowl refuges, and increases in resident or temperate-nesting geese.

In an effort to protect the already declining population of migratory geese wintering at Santee NWR, Clarendon County and parts of neighboring Orangeburg and Berkeley Counties have been closed to late season goose harvest. There has been recent interest in opening a portion of Clarendon County to resident goose harvest, however little is known about the degree of mixing between migrant and resident populations in the area. Therefore, the objectives of this project are to: (1) determine the wintering distribution of migratory Canada geese in and adjacent to the Santee NWR, (2) measure individual movement patterns and home ranges of migratory Canada geese in and adjacent to the Santee NWR, and (3) compare habitat use of migratory and resident Canada geese in and adjacent to the Santee NWR.

In addition to the study at Santee NWR, large-scale flyway research will also be conducted. A GIS will be used to assess threats to migratory stopover and wintering sites used by SJBP geese throughout sixteen states and provinces in the Atlantic and Mississippi Flyways. The preliminary stages of this research will use band return data from geese captured on SJBP breeding grounds to identify stopover and wintering sites. This information will be compared and contrasted with spatial data pertaining to protected lands and urbanization to assess the level of threat for important areas used by geese. Subsequent research will examine how the proportion of agricultural and urban land use has changed in and around stopover and wintering sites over the decades, and will also examine changes in the proportion of protected lands available for migrating and wintering geese. The goal of this GIS-based research is to provide managers with information that can be used in habitat planning and conservation for the Southern James Bay Goose Population.

Nest success of Black Skimmers and Least Terns in Cape Romain National Wildlife Refuge

Principle Investigators: Patrick Jodice, SCCFWRU
Felicia Sanders, SCDNR
Gillian Brooks, M.S. student
Duration: January 2009 to December 2010
Funding Source: USFWS, SCDNR
Project Location: Cape Romain National Wildlife Refuge
Status: Ongoing

Cape Romain National Wildlife Refuge (CRNWR) supports abundant beach-nesting birds during the breeding season. Recently, however, beach-nesting birds in this region have been declining. The Least Tern (*Sterna antillarum*) and Black Skimmer (*Rynchops niger*) both nest in CRNWR and each appears to be experiencing declines in nesting numbers. The purpose of this study is to identify variables which influence nest success of the Least Tern and Black Skimmer.

We measured hatch success and fledge success, the latter defined as success from hatch to fledge. We assessed each measure of success in relation to nest initiation date, distance from nest to colony edge, nest location within colony (center, middle, edge), colony size (number of nests), presence/absence of predators, adult attendance rate during incubation period, and vegetation characteristics. For the 2009 field season, 101 Least Tern and 169 Black Skimmer nests were monitored at three study sites. Nests were monitored every 2-4 days from 4 May to 31 July until nest fate was determined. Nest success was also monitored by infrared time-lapse video cameras on Cape Island and Middle White Banks. Cameras documented colony disturbance and predation by Black Vultures (*Coragyps atratus*) and American mink (*Neovison vison*). Apparent hatching success for Least Tern and Black Skimmer nests was 0% at Lighthouse Isl., 5.4% and 62% at Cape Island, and 83% and 59% at Middle White Banks, respectively. We color banded 38 Least Tern chicks on Middle White Banks and conducted resighting surveys every 2-4 days until no Least Tern fledglings were observed utilizing the study site. Of the 38 individuals banded, 22 (58%) were resighted at least once at 18 days or older. Preliminary analysis suggests predation and washover were major causes of nest failure.

Double-crested Cormorants as agents of change in ecosystems

Principle Investigators: Patrick Jodice, SCCFWRU
William Bowerman, Clemson University
Kate Sheehan, Ph. D student

Duration: June 2009 to December 2013

Funding Source: Seeking funding

Project Location: Sleeping Bear Dunes National Park, MI
Apostle Islands National Lakeshore, WI
Voyageurs National Park, MN
Jean Lafitte National Park, LA
Lake Guntersville State Park, AL
Others

Status: Initiation

Colonies of migratory birds can influence the function, health, and quality of ecosystems. The redirection of cycling nutrients coupled with the high metabolic turnover of endothermic apex predators can result in restructuring of aquatic ecosystems. An avian migrant of particular concern in northern nesting locations and southern wintering colonies is the double-crested cormorant. Once on the brink of extinction, these birds now form large colonies, in some cases > 10k birds. Large and dense colonies of cormorants have been shown to affect natural aquatic ecosystems by deforesting waterfronts, preying upon commercially important fishes, and impacting water quality where they roost and forage. In synthetic ecosystems (aquaculture fisheries), cormorants have been shown to prey upon commercial fish stocks and perhaps contribute to disease transmission.

This project seeks to examine the effects of cormorants on natural aquatic ecosystems across trophic levels. We will monitor environmental variables, community composition, nutrient concentration, and trophic food web interactions. Additionally, diseases and parasites within the community will be examined as changes in parasite communities can indicate changes in food web stability or act as biomarkers of environmental change. We are thus implementing a novel, yet broad-scale study to evaluate the impact of double crested cormorants on the ecosystems where they nest and winter.

South Atlantic information resources: data search and literature synthesis for seabirds

Principle Investigators: Patrick Jodice, SCCFWRU
Duration: October 2009 to December 2010
Funding Source: Minerals Management Service
Project Location: South Atlantic Bight (no field work)
Status: Initiation

A recent synthesis of oceanographic data for the South Atlantic Bight is lacking and this is particularly true for avian taxa in this region. Clapp et al. (1982) composed distributions of marine birds from records dating until the early 1980s but no comprehensive synthesis has been conducted since. The need for such a synthesis is warranted given the increase in human activity within this zone (e.g. commercial and recreational fisheries) and proposed or experimental activities focused on energy development. Furthermore the region supports a wide array of breeding and migratory seabirds, many of which are declining or have population trends of unknown trajectories. In many cases research on these species has been minimal and not always made available in easy-to-access outlets.

We will synthesize the existing knowledge on distribution and ecology of seabirds in the South Atlantic Bight which includes coastal South Carolina and waters offshore of South Carolina. Data gaps will be identified and areas for future research highlighted. The work will build upon current efforts to increase the knowledge-base of seabird ecology along the South Atlantic US coast. This effort will result in a synthesis that will include species accounts, location accounts, distribution maps, and summaries of research and survey efforts.

Peer Reviewed Publications (* denotes graduate student advisee):

Adelman, I., P. Moy, M. Walsh, C. Caldwell, B. Durham, J. Isely, D. Jackson, A. Zale. 2008. AFS topic oriented meetings: A new opportunity for information exchange. *Fisheries* 33:291-291.

Eggert, L.M.F.*, P.G.R. Jodice, K.M. O'Reilly. 2009. Stress response of Brown Pelican nestlings to ectoparasite infestation. *General and Comparative Endocrinology*. In Press.

Friebel, B.A.*, P.G.R. Jodice. 2009. Home range and habitat use of wild hogs in the Congaree National Park, South Carolina. *Human-Wildlife Conflicts* 3:49-63.

Jodice, P.G.R., D.D. Roby, K.R. Turco, R.M. Suryan, D.B. Irons, J.F. Piatt, M.T. Shultz, D.G. Roseneau, A.B. Kettle. 2008. Growth rates of Black-legged Kittiwake *Rissa tridactyla* chicks in relation to delivery rate, size and energy density of meals. *Marine Ornithology* 36:107-114.

Peden-Adams, M.M., J.E. Stuckey, K. Gaworecki, J. Berger-Ritchie, K. Bryant P.G.R. Jodice, T.R. Scott, S. Boone, W.D. McGuinn, J.C. DeWitt, D.E. Keil. 2009. Developmental toxicity in white leghorn chickens following *in ovo* exposure of perfluorooctane sulfonate (PFOS). *Reproductive Toxicology* 27:307-318.

Sachs, E.*, P.G.R. Jodice. 2009. Behavior of parent and nestling Brown Pelicans during early brood-rearing. *Waterbirds* 32:276-281.

Wrege, B. M.*, and J. J. Isely. 2009. High-resolution hydro- and geo-stratigraphy at Atlantic Coastal Plain drillhole CR-622 (Strat 8). *Stratigraphy* 6:79-86.

Young, S. P.*, and J. J. Isely. 2008. Evaluation of methods for attaching PIT tags and biotelemetry devices to freshwater mussels. *Molluscan Research* 28:175-178.

Presentations at Scientific Meetings:

Invited Seminars

Isely, J. J. 2009. Behavioral thermoregulation in fish. NOAA Southwest Fisheries Science Center, LaJolla, California, USA.

Invited Presentations

Isely, J. J., S. Lamprecht, B. M. Wrege, and S. P. Young. 2009. Variation in growth and condition of striped bass in a Southeastern reservoir. 139th Annual Meeting of the American Fisheries Society. Nashville, Tennessee, USA.

Contributed Papers / Presentations / Posters

Duncan, M. S., B. M. Wrege, F. M. Parauka, L. D. Hollensead, H. L. Gray, and J. J. Isely. 2009. Location of Gulf of Mexico sturgeon within four northwest Florida bays following hurricanes Ivan and Dennis. 139th Annual Meeting of the American Fisheries Society. Nashville, Tennessee, USA.

Duncan, M. S., B. M. Wrege, and J. J. Isely. 2009. Gulf sturgeon activity patterns in Pensacola Bay, Florida. Southern Division of the American Fisheries Society Spring Meeting. New Orleans, Louisiana, USA.

Eggert, L.M.F., P.G.R. Jodice, P. Redman, J.R. Speakman. 2009. Daily energy expenditure in Black Skimmer chicks. Pacific Seabird Group Annual Meeting, Hakodate, Japan

Ely, P., J. J. Isely, and S. P. Young. 2009. Population size and passage of adult Alabama shad reaching Jim Woodruff Lock and Dam, Apalachicola River, Florida, USA. 139th Annual Meeting of the American Fisheries Society. Nashville, Tennessee, USA.

Isely, J. J., C. Post, and D. J. Coughlan. 2009. Anadromous fish restoration efforts in South Carolina rivers. Southern Division of the American Fisheries Society Spring Meeting. New Orleans, Louisiana, USA.

Jodice, P.G.R., L.C. Wickliffe, E.B. Sachs. 2009. Seabird use of discarded bycatch from shrimp trawlers: what's on the menu and who's buying? International Marine Conservation Congress, Fairfax, Virginia.

Jodice, P.G.R., W. Mackin, J.A. Arnold, R. Phillips. 2009. Do Audubon's Shearwaters alternate between long and short foraging trips when provisioning young? Pacific Seabird Group Annual Meeting, Hakodate, Japan

Parauka, F.M., M. S. Duncan, B. M. Wrege, and J. J. Isely. 2009. Coastal movement of Gulf of Mexico sturgeon throughout northwest Florida. 139th Annual Meeting of the American Fisheries Society. Nashville, Tennessee, USA

Trested, D., and J. J. Isely. 2009. Population parameters, seasonal movements and habitat selection of lake sturgeon in the Grasse River, New York, USA. 139th Annual Meeting of the American Fisheries Society. Nashville, Tennessee, USA.

Vander Pol, S.S., D.W. Anderson, P.G.R. Jodice, J.E. Stuckey. 2009. East versus west: contaminant differences in Brown Pelican eggs from Gulf of California and South Carolina, USA. Carolina Society of Environmental Toxicology and Chemistry, Charleston, South Carolina.

Wickliffe, L.C., E.B. Sachs, P.G.R. Jodice. 2009. Fisheries discards as food for seabirds: fast food, junk food, or health food? Pacific Seabird Group Annual Meeting, Hakodate, Japan

Wrege, B. M. M. S. Duncan, F. M. Parauka, and J. J. Isely. 2009. Diel behavior of Gulf of Mexico sturgeon within four northwest Florida bays. 139th Annual Meeting of the American Fisheries Society. Nashville, Tennessee, USA.

Wrege, B. M., P. P. Maier, and J. J. Isely. 2009. Age and growth of loggerhead turtles from coastal South Carolina estimated from mark – recapture data. 29th Symposium on Sea Turtle Biology and Conservation. Brisbane, Australia.

Wrege, B. M., P. Ely, and J. J. Isely. 2009. Anadromous fish passage and population dynamics at Jim Woodruff Dam on the Apalachicola River, FL. Southern Division of the American Fisheries Society Spring Meeting. New Orleans, Louisiana, USA.

Graduate Theses and Dissertations, Clemson University:

Hand, C. 2008. Foraging ecology of American Oystercatchers during the nonbreeding season. M.S. Degree Wildlife and Fisheries Biology, Department of Forestry and Natural Resources

Harper, C.J. 2008. A large volume Striped Bass egg incubation chamber: design and comparison with a traditional method. M.S. Degree Wildlife and Fisheries Biology, Department of Forestry and Natural Resources.

Teaching:

Jeff Isely

WFB840 Fish Management, Summer 2009, 3 credits

WFB861 Fish Ecology, Spring 2009, 3 credits

WFB863 Fish Population Dynamics, Fall 2009, 3 credits

Patrick Jodice

WFB 861 & 493, Wildlife Habitat Relationships, Spring 2009, 2 credits

WFB 861, Foundations of Ecology, Fall 2009, 3 credits

Graduate Committee Service:

Patrick Jodice

Chris Chumbley, Dept. Forestry & Natural Resources, M.S., Clemson University

Cady Etheredge, Dept. Forestry & Natural Resources, Ph.D. Clemson University

Amanda Hackney, Dept. Forestry & Natural Resources, M.S. Clemson University

Sarah Latshaw, Environmental Studies Program, M.S., College of Charleston

Lindsay Moore, Dept. Forestry & Natural Resources, Ph.D. Clemson University

Katie Snipes, Environmental Studies Program, M.S., College of Charleston

Michael Waller, Dept. Forestry & Natural Resources, M.S., Clemson University

Professional and Faculty Service:

Jeff Isely

Member, Robust Redhorse Conservation Committee
Member, SACS Assessment Committee for the Ph.D. Degree Program in WFB
Faculty Advisor, Clemson Student Subunit of the American Fisheries Society
Member, Annual Meeting Oversight Committee, American Fisheries Society

Patrick Jodice

Chair, Scientific Program, First World Seabird Conference
Executive Council, Waterbird Society (Elected)
Team Leader, Individual Tracking Studies, Atlantic Marine Bird Conservation Cooperative
Facilitator, Dept. Forestry and Natural Resources Seminar, Clemson University
Chair, Publication Committee, Pacific Seabird Group
Strategy Team Member, South Atlantic Regional Research Project
Co-chair, Atlantic Marine Bird Symposium, Waterbird Society Annual Meeting
Internal Reviewer, Promotion and Tenure Committee, Clemson Univ.
Student Paper Judge, Pacific Seabird Group Annual Meeting
External Reviewer, Promotion and Tenure Committee, Univ. Portland

Professional Awards:

Jeff Isely

Fulbright Fellow, University of Iceland, Reykjavik, Iceland

Graduate Student Awards

Beth Wrege, University Fellowship recipient, Clemson University, Graduate School, 2008
Beth Wrege, NSF – SEAGEP Follow, Clemson University, Graduate School, 2008
Lisa Ferguson Eggert, Wade Stackhouse Fellowship, 2008-2009



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