

PHASE 1 REPORT

Five-Star Restoration Grant Project

Entitled

**Sandpiper Pond Restoration of Wetlands and Coastal Habitat
At Huntington Beach State Park
(2004-0017-018)**

Project Period 7/01/2004 to 9/30/2005
(Phase 1 Period 7/01/2004 to 4/30/2005)



Submitted by

**The Friends of Huntington Beach State Park
Murrells Inlet, South Carolina**

**James V. Basilico, Project Officer
Date: Sept. 15, 2005**

The following report includes the tasks that were planned and scheduled for Phase I of the grant project. (*Attachment A*)

1. Build Observation Deck

This observation deck was constructed at the north end of Sandpiper Pond, during July 2004. One of the features includes access for the disabled. The deck is used by many bird watchers and is a great focal point for Sandpiper pond. One of the project partners, The Nature Conservancy, contributed over \$17, 000 for this task.



The New Sandpiper Pond ADA-accessible Wildlife Observation Deck

2. Press Release

A press release that describes the five-star grant award was distributed to the partners and local media contacts (*Attachment B*). The project has received media coverage, with articles appearing in the Sun News, the Georgetown Times, and the S.C. State Park Service magazine ParkView (*Attachment C*). The project officer has appeared on Time-Warner local cable TV two times. One of our partners, Murrells Inlet 2007, organized and promoted a town meeting which was crucial to educating stakeholders about the project.

3. Baseline Sampling and Monitoring

Coastal Carolina University signed a contract with the Friends of Huntington Beach State Park effective 9/1/04 to 9/30/05 to conduct or assist with the following activities:

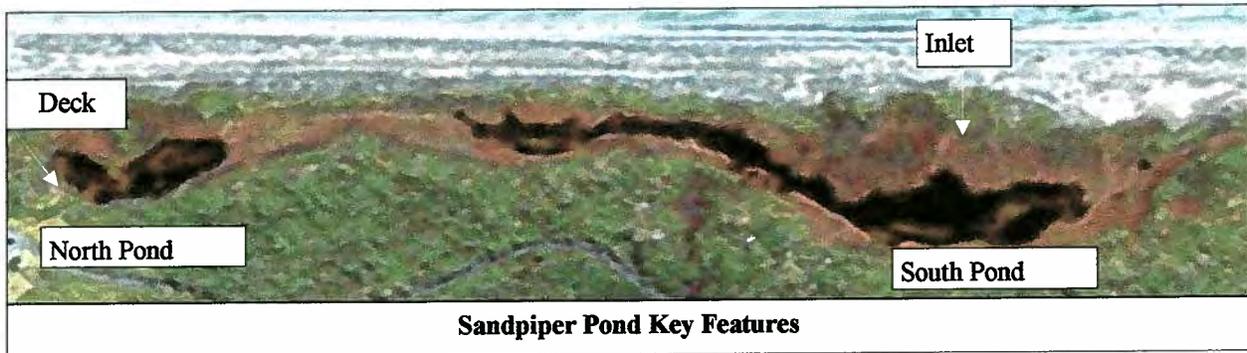
Phase I:

- Hire intern.
- Collect baseline water quality and biology data.
- Provide educational programs to park visitors.
- Install signage
- Begin post-restoration monitoring/collection of water quality and biology data



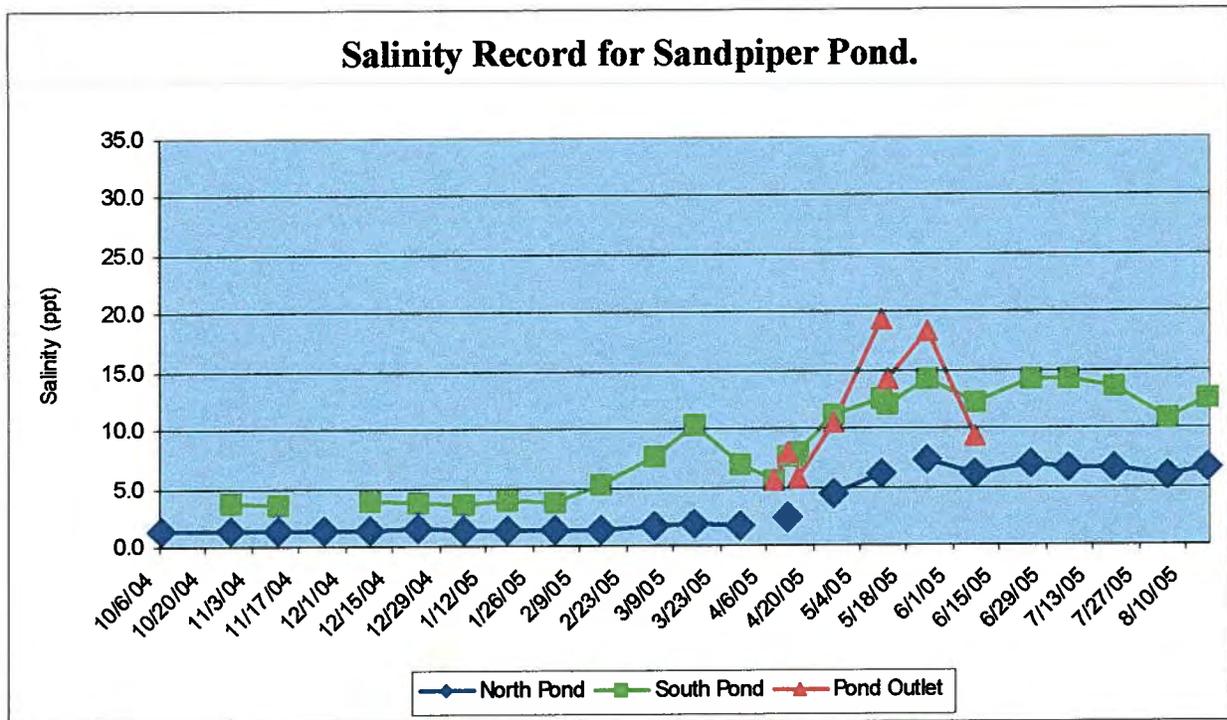
CCU Intern Performing Water Sampling on Sandpiper Pond

Eric Tosso, an undergraduate marine science major at Coastal Carolina University, was employed and trained to work with the Environmental Quality Laboratory's technician, Amanda Hall in monitoring water quality at Sandpiper Pond. During Phase I, a reconnaissance survey was conducted to identify water quality sampling sites. One site was selected on the upper reach of the pond (now adjacent to the observation deck); this site is referred to as "North Pond". A second site was selected in the lower pond adjacent to the location of the proposed inlet; this site is referred to as "South Pond". A boat was acquired and secured to the new observational deck. A path was cut through the *Phragmites* to provide sampling access.



Sampling commenced in mid-October and was continued thereafter every other week. A total of 13 samplings were performed before the first re-opening of the inlet (10/6/04 to 4/6/05).

The water quality monitoring includes the following parameters: temperature, dissolved oxygen, conductivity/total dissolved solids/salinity and *Enterococci*. As shown in the following graph, the re-opening of the inlet has caused a significant increase in salinity in both ponds. It is hypothesized that the *Phragmites* will die off following sustained exposure to elevated salinity.



A considerable amount of work above and beyond the tasks in the grant proposal has been conducted. This was largely possible because the following CCU faculty agreed to participate in the project: Jim Luken and Keith Walters (Wetland Plant Ecology), Richard Moore (fish and crustacean), and Scott Harris (geology and aerial photography). This additional work includes:

- (1) Acquisition of a set of aerial photographs to document pre-restoration conditions. A post-restoration set is planned.

(2) Additional water quality parameters have been monitored including: pH, chlorophyll, phaeophytin, total nitrogen and total phosphorus, total and volatile suspended solids. *Enterococci* samples were also collected north and south of the inlet.

(3) Monitoring of biological parameters including seine net sampling of fish and crustaceans and estimation of emergent plant densities to species level.

(4) Meeting of biology and marine faculty from CCU with HBSP and NOAA staff to develop a restoration strategy.

This led to development of a restoration evaluation plan (*Attachment D*) at the request of Howard Schnabolk (NOAA). This plan will be completed at the end of the grant period.

(5) Acquisition of a South Carolina Sea Grant Consortium seed proposal (Effects of Inlet Restoration on Control of Invasive Species, Reestablishment of Native Coastal Habitats and Tidal Exchanges at Sandpiper Pond, SC) to fund much of this additional work. \$8820 provided by SC SG and \$10,601 in matching funds from CCU. A no-cost extension has been obtained to enable this project to run through Dec. 2005.

(6) Time series study of aerial photographs since 1970's (*Attachment E*).

(7) Acquisition of vibracores and GPR data to reconstruct past geohydrological setting (*Attachment E*).

(8) Preliminary organization of a mini-conference to be held at HBSP on Nov. 7th to review all these data. The following faculty are expected to attend with their graduate and undergraduate students: Jim Luken and Keith Walters (Wetland Plant Ecology), Richard Moore (fish and crustacean), Susan Libes and Joe Bennett (water quality) and Scott Harris (geology and aerial photography).

(9) Presentation of research results by undergraduate students at two professional meetings. One of these presentations won a best student poster presentation award. Both posters have been mounted and are hanging in the Burroughs and Chapin Center for Marine and Wetland Studies. These following can be viewed at: <http://www.coastal.edu/wwa/posters.html>. The abstracts and citations are attached. (*Attachment E*)

-Coastal Carolina University Interim Report (9/2/05)

Submitted by Dr. Susan Libes,

Burroughs and Chapin Center for Marine and Wetland Studies



Fish sampling.

4. Obtain Permits, Design Inlet



Aerial Views of Sandpiper Pond before re-construction of the inlet (left), and after (right).

Several divisions within the South Carolina Dept. of Parks, Recreation & Tourism were involved in this task. This work included obtaining the necessary permits from the U.S. Army Corps of Engineers and the South Carolina Dept. of Health and Environmental Control, Office of Ocean and Coastal Resource Management. The permit issued by the OCRM stipulates that no work can be done to the inlet between May 15 and August 15 to prevent any potential disturbance to nesting loggerhead sea turtles. Scott Langford, an engineer with the Recreation, Planning and Engineering section of SCPRT, handled this aspect of the project, as well as the task of designing the inlet. Kurt Becht, Chief of Maintenance with the S.C. State Park Service, and Paul Whitehead with the Friends of Huntington Beach State Park, handled the surveying aspects of the project.

5. Cut Inlet

Construction of the inlet reconnecting the pond to the ocean was completed during the first week of April. Two bulldozers were leased with funds provided by the U.S. Fish and Wildlife Service, S.C. Coastal Ecosystem Program at a cost of \$3,358.13. All labor to operate the heavy equipment was provided by the S.C. State Park Service. The main purpose of the grant was to re-construct the former inlet, allowing seawater to enter the pond and increase salinity to naturally control the invasive plant *Phragmites spp.* The inlet was designed to receive seawater only on high tides, so as not to create a barrier to public beach access.



Constructing new inlet.

6. Public Education Programs

From May through August 2005, an intern from CCU has conducted educational programs including a tour of the restoration site on a weekly basis under the supervision of the park's interpretive rangers. (Attachment F) In addition, 2 PowerPoint presentations were created by the park's interpretive rangers. One is used as an audio-visual exhibit in the park's Education Center. The other is part of an outreach program that has been presented to stakeholders in the project, including a community meeting organized and sponsored by Murrells Inlet 2007, a meeting of the Friends of Huntington Beach State Park, classes at Waccamaw High School, and several civic groups. A limiting factor of the outreach program was that it could only be presented to groups that had a digital projector. Procurement of a portable digital projector is recommended in order to reach a larger audience.



Sandpiper Pond Restoration program.

7. Exotic Plant Removal

In order to make the most of this research opportunity, it was requested by scientists from CCU that control of the *Phragmites spp.* be first attempted by increasing the salinity by re-establishing the inlet. Thus, no physical removal or herbicidal treatment of exotic plants has taken place at this point in the project except those growing in the area of the re-established inlet. Prior to construction of the inlet, many volunteers from Waccamaw High School and the Friends of HBSP hand cut, sawed, and removed heavy growth of wax myrtles that clogged the inlet. Volunteers also relocated sea oats and other native dune plants that were growing in areas that would be effected by the bulldozers.



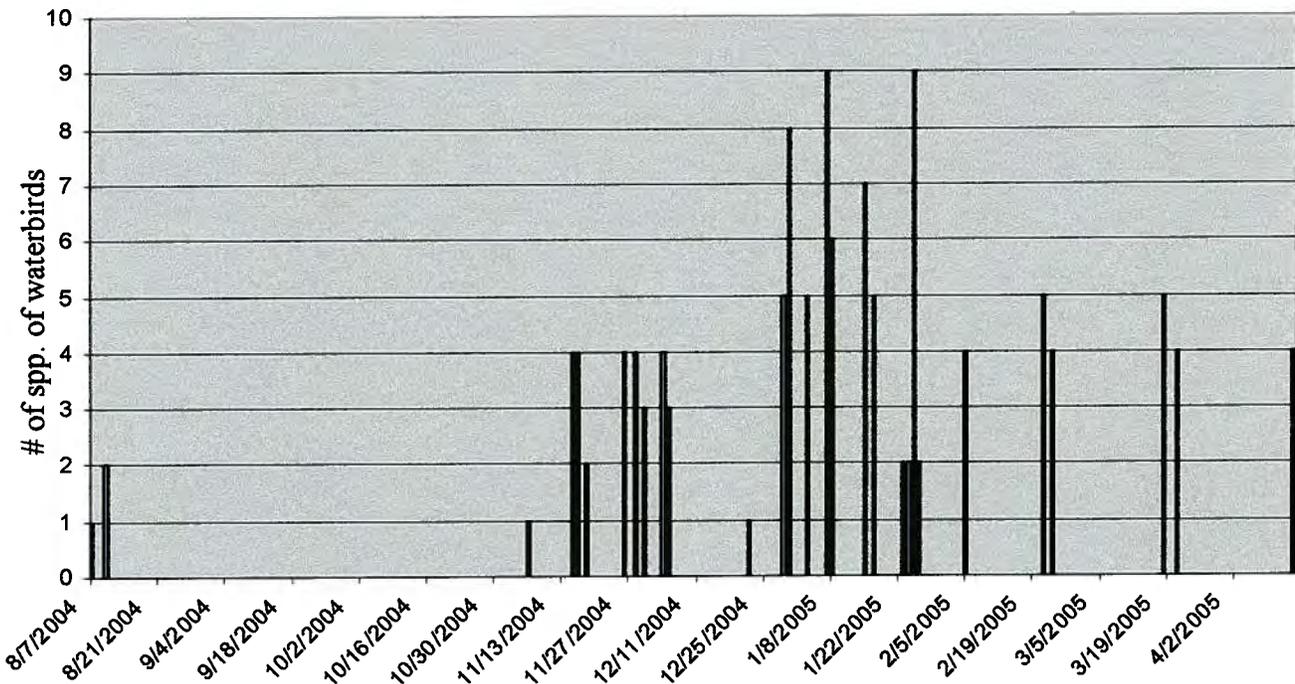
Volunteers relocating sea oats.

8. Bird Surveys

Volunteers from the Waccamaw Audubon Society have conducted bird surveys of the restoration site, both before and after reconstruction of the inlet on an average of twice a month. Bird spp. were categorized as either waterbird or non-waterbird. Some interesting sightings of birds feeding in the new inlet included: 3 black-necked stilts on 5/5/05, and 6 sanderlings and 8 Semipalmated plovers on 6/2/05. Only sightings of waterbirds are shown below (*Attachment G*).



Bird Surveys



9. Design Interpretive Signs

The intern from Coastal Carolina University (CCU) worked with the park's interpretive rangers to design and produce 3 large vinyl posters about the restoration project (*Attachment H*) which have been posted in permanent displays in three locations around the restoration site: near the new observation deck, on the beach adjacent to the newly constructed inlet, and on the Sandpiper Pond Nature Trail. Huntington Beach State Park interpretive rangers built the mounts and protective enclosure for the signs.



Attachment A.

Five-Star Restoration Grant Program Title: Sandpiper Pond Restoration of Wetlands and Coastal Habitat Huntington Beach State Park, S.C.

Project Timeline

TASKS	PARTNERS	Jul. '04	Aug. '04	Sep. '04	Oct. '04	Nov. '04	Dec. '04	Jan. '05	Feb. '05	Mar. '05	Apr. '05	May '05	Jun. '05	Jul. '05	Aug. '05	Sep. '05	Oct. '05	Nov. '05	
1	Build observation deck	TNC																	
2	Press release	FOHBS, HBSP																	
3	Baseline sampling, monitoring	CCU																	
4	Obtain permits, design inlet	SCPRT																	
5	Cut inlet	SCSPS																	
6	Public educational programs	HBSP, CCU																	
7	Exotic plant removal	WHS, FOHBS																	
8	Bird surveys	WAS																	
9	Design interpretive signs	HBSP, CCU																	
10	Restoration monitoring	CCU																	
11	Community awareness	Mi2007																	
12	Prepare final report	CCU																	
13																			
14																			

- Abbreviations:**
- CCU Coastal Carolina University
 - FOHBS Friends of Huntington Beach State Park
 - HBSP Huntington Beach State Park
 - Mi2007 Murrells Inlet 2007
 - SCPRT S.C. Dept. of Parks, Recreation & Tourism
 - SCSPS South Carolina State Park Service
 - TNC The Nature Conservancy
 - WAS Waccamaw Audubon Society
 - WHS Waccamaw High School

- Grant Program Sponsors:**
- National Fish and Wildlife Federation
 - NOAA Restoration Center
 - National Association of Counties
 - U.S. Fish and Wildlife Service
 - Environmental Protection Agency
 - Wildlife Habitat Council



Friends of Huntington Beach State Park South Carolina

Press Release

Friends Organization Awarded Grants Totaling \$32,000 for Restoration of Sandpiper Pond at Huntington Beach State Park

The Friends of Huntington Beach State Park, in partnership with the South Carolina State Park Service, Coastal Carolina University, The Nature Conservancy, Waccamaw Audubon Society, Murrells Inlet Project 2007, and Waccamaw High School are joining together to restore 35 acres of brackish wetlands known as Sandpiper Pond. Grant funds have been received from: the federal Five-Star Recreation Grants Program (\$15,000); the U.S. Fish and Wildlife Service (\$5,000); and the Nature Conservancy (\$12,000). In-kind services contributed by the project will total over \$50,000. The project will cost approximately \$82,000.

This project will involve the wetland known as Sandpiper Pond, which was formerly a tidal inlet. The tidal mud flats and pond once supported heavy populations of shorebirds and fish. However, these species have largely disappeared because Sandpiper Pond has not received tidal water on a regular basis from the Atlantic Ocean in over a decade. The original tidal inlet, which was destroyed by Hurricane Hugo and other factors, is scheduled to be re-opened by the State Park Service in April 2005. The constructed inlet from the ocean will be over 250 feet long.

Major activities of this project will include: Monitoring of water quality and bird populations to establish conditions "before and after" the re-opening of the tidal inlet; removal of invasive exotic plants; developing future environmental and educational programs; and community awareness and information programs. Furthermore, this site will feature a wildlife observation deck that is also accessible to the handicapped.

The Friends of Huntington Beach State Park are committed to helping the park fulfill its mission to protect its natural resources while providing quality outdoor recreation and educational opportunities. This project will demonstrate how various volunteer, environmental, civic, schools, and other socio-economic groups working together can make a difference in restoring this ecologically damaged area.

For further information about this project you may contact Mike Walker, Project Field Coordinator, at Huntington Beach State Park, Education Center (843-235-8755; or Jim Basilico, Grant Project Officer, Friends of Huntington Beach State Park, same telephone number.

November 10, 2004

P. O. Box 3019, Murrells Inlet, S.C. 29576 www.huntingtonbeachstatepark.com

Attachment D.

RESTORATION EVALUATION PLAN

Project Name: Sandpiper Pond Restoration

Project Proponent: Friends of Huntington Beach State Park

Project Goal (the overall intent of the habitat restoration effort; in some cases, it can be long-term and exceed the life of the immediate available funding): The project will restore Sandpiper Pond to a brackish tidal wetlands that will support migratory waterfowl and other wildlife. Reduce the coverage of invasive plants such as common reed and cattail. Increase coverage of plants indicative of high-quality salt marsh.

Structural Objective:

Parameter (what will be measured and in what units): Coverage of plant species.

Technique for Measurement (optional): 1.0 m² quadrats stratified random placement (mid-, upper-, and high-marsh)

Baseline (pre-construction or earliest available post-construction numerical value for the structural parameter): Monitoring of vegetation prior to inlet opening.

Reference (ideal numerical value for the structural parameter): Monitoring of vegetation of a reference marsh during the duration of the project.

Target (proposed numerical value desired for the structural parameter): Complete type conversion of the system.

Timing (sampling frequency and end date): seasonal: pre restoration (Fall and Winter 2004), post restoration (Spring 2005, Summer 2005, Fall 2005)

Functional Objective:

Parameter (what will be measured and in what units): Diversity of waterfowl, wading birds, and shorebirds using wetland

Technique for Measurement (optional): census of bird spp.

Baseline (pre-construction or earliest available post-construction numerical value for the functional parameter): 5 species

Reference (ideal numerical value for the functional parameter): 10 species

Target (proposed numerical value desired for the functional parameter): 10 species

Timing (sampling frequency and end date): every two weeks

Attachment E: Scientific Posters presented at Conferences

Restoration of a Former Marine Wetland in Huntington Beach State Park, Murrells Inlet, SC.

Eric Tosso, Joseph Bennett, Susan Libes, Amanda Hall and Azure Bevington
Burroughs and Chapin Center for Marine and Wetland Studies, Coastal Carolina University

Sandpiper Pond in Murrells Inlet, South Carolina, is the focus of a project/study that will restore it to its former state as a tidal marine cat's-eye pond. Located within Huntington Beach State Park, the pond has received seawater on a less frequent basis since the installation of jetties at the mouth of the inlet in the early 1980's. This has ultimately led to closure of the pond's tidal inlet to the Atlantic Ocean; to wit: the pond has been connected to the ocean only once since Hurricane Hugo in 1989. The resulting freshwater conditions have supported a change in plant community, leading to almost complete coverage by an invasive plant species, *Phragmites*. Eutrophication has also led to periods of hypoxia resulting in fish kills. It is hoped that re-establishment of the tidal inlet and introduction of seawater will lead to the elimination of *Phragmites* and reestablishment of native marine wetland vegetation, such as *Spartina alterniflora*. The collection of baseline measurements for water quality and biotic status prior to restoration, was begun in September 2004, and will continue until April 2005 when the new inlet is slated to be cut. These results will then be compared to post-restoration measurements to evaluate the success of the restoration. Parameters of interest are: temperature, pH, dissolved oxygen, turbidity, salinity, chlorophyll, nutrients, as well as total and volatile suspended solids. Biological assessments include measurements of macrophyte, fish and waterfowl densities.

Poster presented at Southeastern Estuarine Research Society. Semiannual Meeting, Feb 28 – March 2, 2005, Charleston, SC. (poster) and SC Section of the American Water Works Association and SC Water Environment Association's 15th Annual South Carolina Environmental Conference, Mar 19-23, 2005, Myrtle Beach, SC.

Sandpiper Pond: A Historical Look at Coastal Changes of a Cat's-Eye Pond

Megan Willis, M. Scott Harris, Branden Kramer, Robert Pender, Eric Wright, and Susan Libes,
Marine Science Department, Coastal Carolina University

Sand Piper Pond, located at Huntington Beach State Park, just south of Murrell's Inlet, is a cat's-eye pond that has been reported closed to the ocean since Hurricane Hugo in 1989. The pond has since been overtaken by invasive species, which has generated an interest in management of the pond, along with reopening its connection to the open ocean. This study involves a monthly to yearly look at aerial photographs (1975-1997), coupled with ground penetrating radar and vibracoring to document changes in the system over the last 30 years. The aerial photographs indicate multiple inlets throughout the 1970's and 1980's, along with one major opening after Hurricane Hugo. Jetties were built in the early 1980's just north of the pond, apparently causing inlet openings to be less frequent as the beach and primary dune ridges have widened seaward. This historical documentation is important in understanding a cat's-eye ponds pattern of openings and closures to the open ocean, as well as management of this type of coastal feature.

Poster presented at Southeastern Estuarine Research Society. Semiannual Meeting, Feb 28 – March 2, 2005, Charleston, SC. (best undergraduate poster)

Attachment G.

waterbirds

American Coot
Common Moorhen
Pied-billed Grebe
Virginia Rail
Sora
Ring-necked Duck
Hooded Merganser
White winged Scoter
Green-winged Teal
Blue-winged Teal
Widgeon
Bufflehead
Redhead ducks
Northern Shoveler
Lesser Scaup
Anhinga
Double-crested Cormorant
Brown Pelican
Great Blue Heron
great egret
snowy egret
Least bittern
black-crowned night heron
ring-billed gull
royal tern
Wilson Snipe
Spotted Sandpiper
Least Sandpiper
Black-Necked Stilt
semi-palmated Plover
Sanderling
Bald eagle
Northern Harrier
Osprey
Marsh Wren
Swamp Sparrow

non-waterbirds

Yellow-shafted Flicker
Mockingbird
Gray catbird
Yellow-rump Warbler
Prairie Warbler
common yellowthroat
red wing blackbird
boat tailed grackle
painted bunting
barn swallow

Attachment H.

Interpretive signs designed and constructed to educate the public about the restoration project.

Huntington Beach State Park Sandpiper Pond Restoration Project

South Carolina State Parks

Efforts are now underway to restore Sandpiper Pond, an impounded wetland, to its previous state as a salt marsh. It's hoped that this will rejuvenate the area by creating a more biologically diverse ecosystem.

A wildlife observation dock was installed in 2004 on the north end of the pond.

A new inlet to be cut in the summer of 2005, will introduce seawater to the pond for the first time in almost a decade.

Sampling sites, like this one at the south end of the pond, are being used to measure the success of the restoration process.

5 Star Grant Sponsors:

Huntington Beach State Park Sandpiper Pond Restoration Project

South Carolina State Parks

Impoundment, by either natural or engineered interruption of tidal flow, can isolate coastal marsh habitat from saltwater influences. The result is the loss of native salt marsh and an opportunity for invasive species to gain a foothold; this disrupts the natural balance found in these ecosystems.

The ecological dynamics of Sandpiper have changed drastically since the construction of the Murrelets Inlet Jetty in 1980 and Hurricane Hugo in 1989 - the pond has not received tidal water from the ocean in almost a decade.

The Friends of Huntington Beach State Park, in partnership with several professional and volunteer groups and funding from a 5 Star Grant, have proposed to restore Sandpiper Pond to its former state as a tidal inlet.

It is hoped that cutting a new inlet will create a more biologically diverse ecosystem.

2001: Inlet closed

1989: Inlet open (Shortly after Hurricane Hugo)

Phragmites, an invasive plant species, has overtaken native plants and choked off much of the open water in Sandpiper pond.

Faculty and students at Coastal Carolina University are monitoring the pond in order to gain a better understanding of the restoration process.

6 Star Grant Sponsors:



Huntington Beach State Park Sandpiper Pond Restoration Project

South Carolina State Parks

Human actions, no matter how well intentioned, often carry with them unforeseen and/or undesirable consequences. This is especially true when those actions influence the fragile balance of a natural ecosystem. Sandpiper Pond is an excellent example of this: the installation of the jetties at the mouth of Murrelets Inlet in the early 1980's has led to the closure of the inlet that once supplied the pond with seawater. As a result of this impoundment, the pond has become a fresh water wetland.

Although intermittent and relatively short closures of the Inlet were a natural phenomenon before the jetty construction, this long term closure has deprived some native species of birds and other animals of natural habitat for feeding and raising their young. It has also allowed at least one invasive species of plant, *Phragmites*, to almost completely overtake native species and choke off much of the open water in the pond.

In an effort to restore the pond to its natural state, a new inlet is slated to be cut in the summer of 2005 that will reconnect the pond to the Atlantic Ocean. If you'd like to learn more about the progress of the restoration or the process itself, there is more information on posters at either end of the trail leading to the pond. There will also be educational tours starting in the summer.

Phase 1 Expenditure Report

7/01/04 to 4/30/05

In-Kind Services/ Cash

Partner	Planned Total Hrs. or \$	Expended Hrs.	Equivalent \$	Cash \$
Friends of Huntington Beach State Park	520 hrs.	250 x \$18/hr.	\$4,500.00	
South Carolina Dept. of Parks, Recreation & Tourism	\$6,000	64 hrs. x \$50/hr. 620 mi. @ .345/mi. meals	\$3,200.00 \$213.90 \$26.00	Legal ad \$35.00
South Carolina State Park Service	416 hrs.	496 hrs. x \$18/hr	\$8,928.00	
Waccamaw High School	1440 hrs.	314 x \$10/hr.	\$3,140.00	
Murrells Inlet 2007	160 hrs.	70 hrs. x \$16/hr.	\$1,120.00	
Waccamaw Audubon Society	624 hrs.	110 hrs. x \$16/hr.	\$1,760.00	
The Nature Conservancy	\$12,000			\$17,400
U.S. Fish and Wildlife Service	*\$5,000			*\$3,358.13
SUB-TOTAL			\$22,887.90	\$17,435
TOTAL			\$40,322.90	

* Federal Funds not counted towards in-kind total.

Grant Funds– Expenditures

Partner	Description	subtotal
Coastal Carolina University	Supplies	\$205.10
	Travel	\$236.44
	Salary	\$688.50
	Fringe	\$54.74
	interpretive signs	\$135.00
Friends of Huntington Beach State Park	interpretive signs	\$135.00
TOTAL		\$1,454.78