



NATURAL RESOURCES ELEMENT

Background

The Natural Resources Element considers coastal resources, slope characteristics, prime agricultural and forest land, plant and animal habitats, parks and recreation areas, scenic views and sites, wetlands, and soil types.

Kiawah Island is the largest barrier Island in the state of South Carolina, located just south of Charleston. The Island has a rich variety of maritime habitats and scenic natural resources that include over 10 miles of beach, a broad salt marsh with tidal creeks, freshwater wetlands, and extensive maritime forest and shrub thickets.



In 1975, the Kiawah Island Company introduced plans to develop Kiawah Island as a scenic residential and Resort community which capitalized on its natural beauty. Residential areas are interlaced with recreational open space, a system of lagoons and ponds, wildlife corridors and nature trails that are functional and aesthetically pleasing. The intra-Island brackish and fresh water ponds serve multiple purposes including storm water retention and removal. Roadway and other pavement runoff are naturally filtered through the marshes, protecting river and ocean water quality.

As a result of environmentally sensitive planning, Kiawah Island has been recognized nationally for its creative balance between natural and developed areas by the Urban Land Institute and the American Planning Association. Map V.1 shows the parks, trails and open spaces that exist in the Town as of June 2010.

Existing Conditions

Beach and Dune Preservation

Oceanfront beach and dunes serve several important functions. These include: storm protection for upland areas, habitat for a variety of plant and animal species (such as important daytime resting cover for bobcats and nesting for sea turtles and beachfront birds), and recreation for Town residents, property owners and guests.



The beach and dune system is currently judged to be in excellent condition and is monitored annually. The beach is divided into seven reaches or zones (Figure V.1) and annual erosion and accretion rates are calculated each year. This is done by conducting beach profile monitoring at 86 locations along the beachfront. Between 2008 and 2009, all reaches accreted sand with the exception of the Stono Inlet reach. The Stono Inlet area is very dynamic due to its location along the Stono River. This reach is not adjacent to any homes or structures.

Figure V.1 Location of Beach Reaches



East End Beach Restoration Project

In 2006, the Town conducted a large scale Beach Restoration Project on the eastern end of Kiawah Island. This project stopped intensive erosion on the eastern end of the island adjacent to the Ocean Course clubhouse. A total of 550,000 cubic yards of sand was moved onto the beach by land-based equipment. The total project cost was \$3.6 million, the majority of which was paid by the Town of Kiawah Island. Financial contributions to the project also came from the Kiawah Island Golf Resort, Kiawah Development Partners, and the Kiawah Island Community Association. Monitoring of this project's success is conducted annually in conjunction with the overall beach survey. In addition, the mitigation plan for the project requires annual monitoring of habitat changes (including ground elevation surveys and aerial orthophotography) and periodic Piping Plover surveys of the project area through 2012.

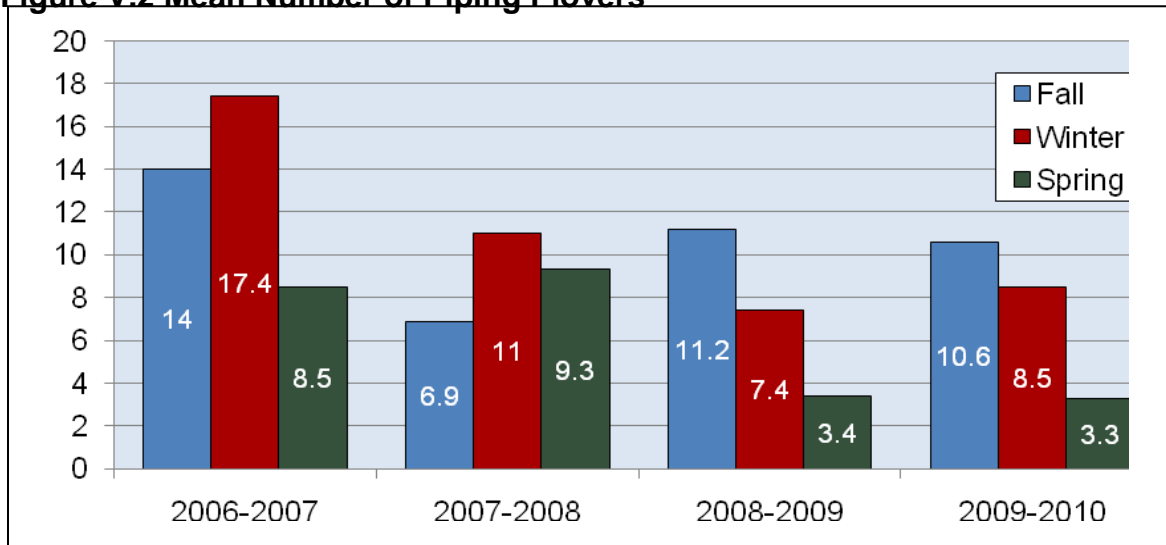


Piping Plover Surveys

Because of the potential effects of the East End Beach Restoration Project, the US Fish and Wildlife Service mandated the Town to conduct seasonal surveys for Piping Plovers within the project area. Piping Plovers are an endangered species that uses Kiawah Island for feeding and resting during the fall, winter, and spring.

Surveys must be conducted twice every 10 days in the fall (August – October 31) and spring (March 1 – April 15) and twice each month during the winter (November 1 – February 28). Two surveys are conducted during each sample period; one within two hours of high tide and one within two hours of low tide. In 2007, the Town expanded the piping plover survey to include the entire beach. Surveys began on August 1, 2006 and must continue until April 15, 2012. Survey data for the East End project area can be found in Figure V.2.

Figure V.2 Mean Number of Piping Plovers





Baseline and Setback Lines

Baseline and setback lines are established by the South Carolina Office of Coastal Resource Management as required in the 1990 Beach Management Act. No new development is allowed seaward of the setback line and existing structures located in these areas typically cannot be rebuilt if destroyed. The baseline is set at the “crest of the primary dune” for most areas. Setback lines are drawn 20 feet landward of the baseline for stable and accreting beaches. In erosional areas, the setback line is located landward of the baseline a distance equal to 40 times the annual long term erosion rate.

The baseline and setback lines for Kiawah Island were created in July 1991. Lines are required to be revised every 8-10 years. Kiawah’s lines were revised in September 1999 and again in October 2009. The draft setback lines proposed by OCRM would have placed 25 homes and 7 villa units seaward of the line. The Town, along with other entities and individuals, successfully argued that the draft line was based on inaccurate data and that it needed revision. OCRM agreed and the line was redrawn and adopted. There are no homes or structures seaward of the current setback line.

Critical Habitat Areas

In October 2009, Town Council designated both ends of Kiawah Island’s beach as critical habitat. The critical habitat designation prohibits pets from entering these areas at any time. Both areas provide vital habitat for a variety of shorebirds, including: Piping Plovers, Wilson’s Plovers, American Oystercatchers, Least Terns, Black Skimmers, and Red Knots. An interactive map of these areas, including all beach pet restrictions, can be found on the following web page: http://www.wildlifeatkiawah.com/kiawah_wildlife_065.htm.

Maritime Forest Preservation

The extensive maritime forest and understory serve to enhance Kiawah Island’s natural beauty and shelter a diversity of wildlife. As Island development progresses, careful attention and planning must be given to preserving and maintaining maritime forest, understory and the quality of the Island’s lakes and ponds. Data obtained from wildlife research and monitoring efforts should be used to help plan future development to limit impacts to native wildlife species.



History of Wildlife Management on Kiawah Island

An extensive environmental inventory of Kiawah Island was conducted in 1975. This study examined all portions of Kiawah Island, “pre-development,” and provides good baseline documentation for use in tracking changes as a result of development. Since 1990, there has been a committee of citizens and experts that has been at the forefront of managing and surveying the island’s wildlife species. From 1990-1994, Wildlife and Fisheries Committee had responsibility. In 1994, this responsibility was taken over by the Town’s Wildlife Committee, renamed as the Environmental Committee in 2003.

In September 2000, the Town hired a full-time wildlife biologist to oversee all wildlife management and research activities on the island. An additional assistant wildlife biologist position was created and filled in August 2008 to help with and expand existing wildlife research and monitoring efforts.

Wildlife Research on Kiawah

Five major research studies were undertaken by the Town between 1996-2010 in order to better understand and manage Kiawah’s wildlife populations. Until 2004, research was funded entirely by the Town, in coordination with the University of Georgia. The Kiawah Conservancy became a major funding contributor beginning in 2004 and has provided more than \$200,000 to support research endeavors since that time.

Study	Purpose	Findings
Deer Ecology (1996-1998)	Provide a baseline ecological assessment of deer and bobcat populations on the island.	<ul style="list-style-type: none"> • Deer populations are very high and need to be managed • Deer are very abundant (100 deer per square mile) • Deer-vehicle collision rates are high (50 or more per year) • Bobcats serve as the primary natural predator on deer
Fertility Control (1999-2002)	Test the efficacy of a fertility control drug (prostaglandin) in controlling deer numbers within the central portion of Kiawah Island.	<ul style="list-style-type: none"> • Fertility control is effective and reduced fawn numbers by ~50% • Fertility control is not feasible long term because deer learn to avoid treatments • Bobcat predation rates on deer fawns are increasing, providing a better, more natural control of rising deer numbers
Bobcat Ecology (2000-2001)	Track 12 bobcats for one year to determine home range size and general habitat use.	<ul style="list-style-type: none"> • Bobcats in developed areas move more and are more likely to be killed • Bobcats in developed areas have a much larger home range • Bobcats feed primarily on rodents but deer are an important prey item
Predator-Prey Ecology	Determine predation rates on	<ul style="list-style-type: none"> • Bobcats are the most important predator of deer fawns on Kiawah,



(2002-2005)	deer fawns (2002-2005) and home range size and habitat use by bobcats and gray foxes (2004-2005). The Kiawah Conservancy funded this study.	<p>responsible for killing 70 of 124 fawns monitored during the study (56% predation rate)</p> <ul style="list-style-type: none"> • Bobcat population has low mortality rate and reproduction is high • Gray fox population has a high mortality rate (40%) • Future research should focus on maintaining bobcat numbers
Bobcat GPS (2007-2010)	Provide fine-scale habitat use data for bobcats using global positioning system (GPS) collars.	<ul style="list-style-type: none"> • 28 bobcats monitored and more than 30,000 locations mapped • Bobcats spend daylight hours in patches of thick cover and do not move often • Daytime cover is critical for bobcats, consisting primarily of dense scrub-shrub habitat found in the secondary dunes and along marsh edges • Denning cover is very important for bobcats and bobcats typically seek larger, more secluded patches of undeveloped cover for denning • Bobcats move throughout developed portions of the island during nighttime hours in search of food and often use road buffers and corridors for travel • A detailed Bobcat Management Plan was created, including the designation of Important Bobcat Areas and action plans to protect and enhance these areas.

Wildlife Population Monitoring

Town biologists monitor population size and health of many of the wildlife species that live on Kiawah Island. Information on some of the more prominent species is detailed in this section. More information is available at: www.wildlifeatkiawah.com/kiawah_wildlife_007.htm

Species	Description
Loggerhead Sea Turtles	Kiawah Island is home to reproducing loggerhead sea turtles, a protected endangered species. The number of their nests on the Island fluctuates greatly. A program to protect the turtle’s nests on the Island’s beach has been in operation since 1973. The program is carried out entirely by community Turtle Patrol volunteers.
American Alligators	Kiawah Island’s alligator population has been monitored annually since 2003 by Town biologists in conjunction with KICA’s Lakes Department. Town biologists are also responsible for removing aggressive alligators from the island under the state’s Nuisance Alligator Program. Each year, biologists remove two to six such alligators that have lost their fear of humans typically as a result of being fed by people.
White-tailed Deer	Deer populations are monitored through biennial spotlight surveys. These surveys determined the deer population increased 27% between 2005 and 2009, and the density in 2009 was 52 deer per square mile. Kiawah Island’s target deer density is 30-70 deer per square mile.
Bobcats	Bobcats serve as the primary control on the deer population. In 2010, there are 30-35 bobcats on the island. These bobcats



Species	Description
	have adapted well to development and are commonly seen. The Town's Bobcat Management Plan provides detailed information on managing and preserving Island bobcats.
Foxes	Gray foxes, Kiawah Island's only native fox, are important to controlling rodent populations. In recent years, the gray fox population has fluctuated dramatically due to outbreaks of canine distemper. Red foxes, not native to Kiawah, were first documented on Kiawah in 2010. Red foxes need to be monitored because an increase in their population would likely have a negative effect on gray foxes
Coyotes	Coyotes are not native to Kiawah Island and have the potential to cause substantial damage to native wildlife populations and pets. Coyotes were first spotted on Kiawah Island in 2008; their population needs to be monitored and prevented from increasing.
Raccoons	Raccoon populations are high on Kiawah Island and cause significant property damage each year. They also cause significant damage to loggerhead turtle nests and beachfront nesting birds. Raccoons are primarily responsible for periodic outbreaks of canine distemper on the island.

New Wildlife Monitoring Programs

Beginning in 2008 after the hiring of an assistant biologist, the Town's wildlife monitoring efforts were expanded significantly. Details on these new programs are provided below and additional information is available on the Town wildlife website: www.wildlifeatkiawah.com/kiawah_wildlife_007.htm.

Species	Monitoring Program
Wilson's Plovers	Wilson's Plovers are listed as threatened and their population is probably declining due to coastal development, habitat destruction, and disturbance from beachgoers and their pets. Kiawah Island's beach is home to Wilson's Plovers year-round and is an important area for nesting. 52 Wilson's Plovers were recorded in 2009 and 70 were recorded in 2010.
Red Knots	Red Knots have become a species of special concern as their population has dropped significantly. Kiawah Island is an important stop-over site for Red Knots during the spring as they rest and refuel for their journey north. Town biologists conduct periodic surveys for red knots and report flags to aid this research. As of May 2010, Town biologists have resighted 252 flagged Red Knots. SCDNR and Town biologists are exploring ideas to expand efforts in 2010 and to begin a capture and banding program.
Bird Banding	In Fall 2009, Town biologists initiated a program to band birds of the maritime forest and scrub-shrub habitat zones. Two stations were created in currently undeveloped parts of the island; one at the Island's west end in scrub-shrub (Captain Sam's Spit) and one at the east end in maritime forest (Cougar Island). A total of 1,277 birds were banded between Fall 2009 and Spring 2010.
Marsh Birds	Initiated in 2010, marsh birds are monitored during their breeding season using a standardized protocol developed by the US Geological Survey for the National Marsh Bird Monitoring Program. The three most common species recorded during 2010 were Clapper Rails, Common Moorhens, and Least Bitterns.
Nightjars	The Town began participating in the United States Nightjar Survey Network in 2009. Surveys conducted in 2009 determined



Species	Monitoring Program
	that Chuck-Wills-Widow and Common Nighthawks are the only two Common Nightjars on Kiawah Island. Numbers of each species increased slightly between 2009 and 2010.
Breeding bird point counts	Town biologists began monitoring birds by conducting point-counts in the summer of 2009. There are 218 roadside and off-road point-count stations and all birds seen or heard within a 5 minute period are recorded. The overall abundance of birds was very similar between 2009 and 2010 with 3,036 and 3,060 birds recorded, respectively. Seventy-four species were recorded in each year
Beach bird nest monitoring	Least Terns, Wilson’s Plovers, American Oystercatchers, and Black Skimmers are monitored for breeding success along Kiawah Island’s beach. Nests are searched and marked very discretely with tongue depressors. Nests are monitored remotely using a spotting scope every 5-7 days until the eggs have hatched, chicks have fledged or a nest is suspected of being depredated or abandoned.
Breeding Bird Survey	From 1998-2009, the Town contracted with Citadel Professor Dennis Forsythe to conduct the annual US Geological Survey Breeding Bird Survey each June. This survey provides valuable data concerning regional and large-scale population trends for a variety of songbirds.
Osprey Nesting	Ospreys are large raptors located on the Island; there were twenty active osprey nests during 2010. An interactive map of the 20 nests can be found on the TOKI wildlife website

Education and public outreach

TOKI Wildlife Website

A new wildlife website was created by Town biologists in August 2009 (www.wildlifeatkiawah.com). The website contains a wealth of information on Kiawah’s wildlife inhabitants, including videos and slideshows. There are also interactive maps showing all of the GPS locations for Bobcats between 2009-2010, the best places to view wildlife, Osprey nest locations, beach bird nesting areas and, dog-leash restrictions. Website traffic increased dramatically from 232 visits in August 2009 to 3,963 visits in May 2010. The 5 most heavily visited web pages during January to May 2010 were: [Homepage](#), [Wildlife Sightings](#), [Meet our Wildlife](#), [Bobcat GPS Data](#), and [Where to See Wildlife](#).

Brochures

The Town of Kiawah Island Environmental Committee produces 12 wildlife brochures that are free to the public at the Nature Center at Night Heron Park and at the Town Hall Visitors Center. The brochures are also available for download on the TOKI wildlife website at: http://www.wildlifeatkiawah.com/kiawah_wildlife_066.htm. The list of brochures follows: American alligator, Bird Life, Birds of Prey, Bobcat, Crabs, Lakes and Ponds, Loggerhead turtles, Other mammals, Seashore and river, Shorebirds, Snakes, and White-tailed deer.



Jewels in the Crown

During 2007-2008, the Town Environmental Committee produced a 6-article series to highlight the importance of preserving and enhancing Kiawah's natural habitat and wildlife species. The articles were released monthly in Town Notes and the entire series was bundled together into a single, high-quality publication. The final edition, containing all 6 articles, was sent by mail to all Kiawah Island property owners in 2008. This publication can be downloaded at: www.wildlifeatkiawah.com/linked/jewelsinthecrown.pdf.

Lakes and Ponds

The Town has an extensive pond system (owned and maintained by KICA) which serves as an important component of the Island's ecology. The pond system includes 117 ponds that encompass approximately 365 acres of water surface. These water bodies range from nearly fresh (<0.5 ppt) in the center of the Island to close to sea strength (30 ppt) on the edges of the Island. The system supports at least 30 species of fish, 3 species of bivalves, 6 species of crustaceans, 4 species of reptiles, and a host of smaller invertebrates. It also supports numerous avian species and is an important asset for migratory waterfowl. An interactive pond map can be viewed at: http://www.wildlifeatkiawah.com/kiawah_wildlife_063.htm.

Fish Tissue Testing

The Town of Kiawah Island conducts annual fish tissue testing from a selection of island ponds and waterways to determine if fish are safe to consume. Town biologists, in coordination with KICA Lakes staff, collect 10-20 samples during summer and fall each year. Samples are prepared following state guidelines and analyzed by General Engineering Laboratories. Each sample is tested for 4 heavy metals (cadmium, lead, mercury, and arsenic) and a long list of pesticides. Samples indicate that fish from Kiawah Island are safe to consume.

Key Issues

The following are the key issues related to the Natural Resource Element:

- As the Town is developed, an increasing amount of the Island's natural habitat is taken away; and
- Development removes the connectivity between natural habitats, putting stress on the Island's wildlife to find alternate routes to move around the Island; and



- Continued monitoring and research of native wildlife species and their response to development will be vital to protecting these species; and
- Research and monitoring data should be taken into account when planning new developments or other projects; and
- Property owners and island entities should be encouraged to eliminate existing invasive plant species and discourage future use of these plants; and
- As one of the Island’s key natural resources, the beach and dunes must be maintained and protected.

Goals

To help the Town further realize its Vision, the following goals should be considered when evaluating proposals for change.

1. Complete the Island’s development in a way that maintains the Island’s environmental integrity and natural beauty and is consistent with the Vision of the Town.

	Implementation Strategy	Responsibility	Time Frame
a.	Ensure that Development Agreements recognize that the Town is a residential community surrounded by a unique and beautiful natural setting while also providing for appropriate economic development and orderly growth in areas where economic benefits are available (See also Economic Development Element Goal #1-a).	Town Council Planning Commission	Ongoing
b.	Ensure that land use and zoning ordinances implement the Town’s Comprehensive Plan and that related proposals comply with the appropriate ordinances (See also Economic Development Element Goal #1-b).	Planning Commission	Ongoing
c.	Ensure proposed development and building use site design and construction standards, methods, and practices appropriate to limit natural area disturbance resulting from such building design, location and construction. Standards in the ARB Building and Landscaping Guidelines, “Designing with Nature,” the Kiawah Conservancy’s “Landscaping for the Legacy, ”and KICA’s “Landscape Management Guidelines for Association	Planning Director	Ongoing



	Members” should be used as a guide.		
d.	Ensure that land use and zoning ordinances provide for or create open spaces, including undisturbed spaces, natural habitat areas, and access thereto throughout the Town so as to protect the natural and visual character of the community; provide for appropriate active and passive recreational uses; and preserve corridors for wildlife travel between larger open space areas, including the preservation of open space for properties developed adjacent to existing open spaces.	Town Council Planning Commission	Ongoing
e.	Assess availability of funds from other public sources for purposes of preserving and enhancing our natural resources including the Charleston County Greenbelt Program.	Town Council Town Administrator	By 2011

2. Manage the Island’s natural systems to maintain the existing quality of Kiawah Island’s natural resources and to provide appropriate benefit for both human and environmental needs.

	Implementation Strategy	Responsibility	Time Frame
a.	Support the Town Environmental Committee to, among other things, (i) study and report on environmental issues in the Town, (ii) provide public education and mediation, (iii) monitor beach, marsh, ponds, and the health and population of birds and animals, and (iv) recommend ways to improve the quality of environmental services.	Town Council Environmental Committee	Ongoing
b.	Encourage property owners to (i) limit disturbances to the Island’s natural resources and unique natural setting, (ii) protect natural habitats and corridors essential for the health and integrity of native wildlife populations, (iii) protect native vegetation, and (iv) perform wetlands mitigation onsite or elsewhere on Kiawah Island.	Environmental Committee Town Wildlife Dept. Planning Director	Ongoing
c.	Monitor the Town’s beach, marshes, tidal creeks, ponds, wetlands, and maritime forest, among other natural resources, and make recommendations to maintain their quality.	Environmental Committee	Ongoing
d.	Monitor the Town’s wildlife, particularly as development increases on the Island, and make recommendations related to wildlife quality.	Environmental Committee	Ongoing



		Town Wildlife Dept.	
e.	Participate in regional air quality planning and monitoring efforts and support opportunities to reduce motor vehicle usage through planning and alternative transportation (bicycle, walking) methods.	Town Wildlife Dept.	Ongoing
f.	Provide public education and outreach programs related to the Town's natural environment (including the Town's beach) and wildlife. Seek methods of communication with the Town's resident, non-resident property owner, and visitor populations.	Environmental Committee Town Wildlife Dept.	Ongoing

3. Develop and maintain an environmentally sustainable system of parks and open spaces which provide access to the beach and river; preserves, protects and enhances natural resources; and meets residents' diverse recreational needs (See also Community Facilities Element Goal #3).

	Implementation Strategy	Responsibility	Time Frame
a.	Coordinate park and recreation site planning with efforts to achieve the open space and natural resource preservation goals established in the Natural Resources section of this plan. Ensure such planning continues to address the Town's needs, including: (i) access to beaches, rivers and other waterways, (ii) sites for recreational activities and sports such as golf, tennis, softball, swimming and basketball, (iii) locations for informal recreational and social activities, such as crabbing and picnics, (iv) linkages between larger park sites and other community destinations, (v) buffers or transitions between different developed land uses, and (vi) habitat for wildlife species.	Environmental Committee Planning Commission	Ongoing
b.	Preserve and enhance Night Heron Park which provides open space for informal sports, including soccer, softball, and basketball, for residents and visitors.	Environmental Committee Planning Commission	Ongoing