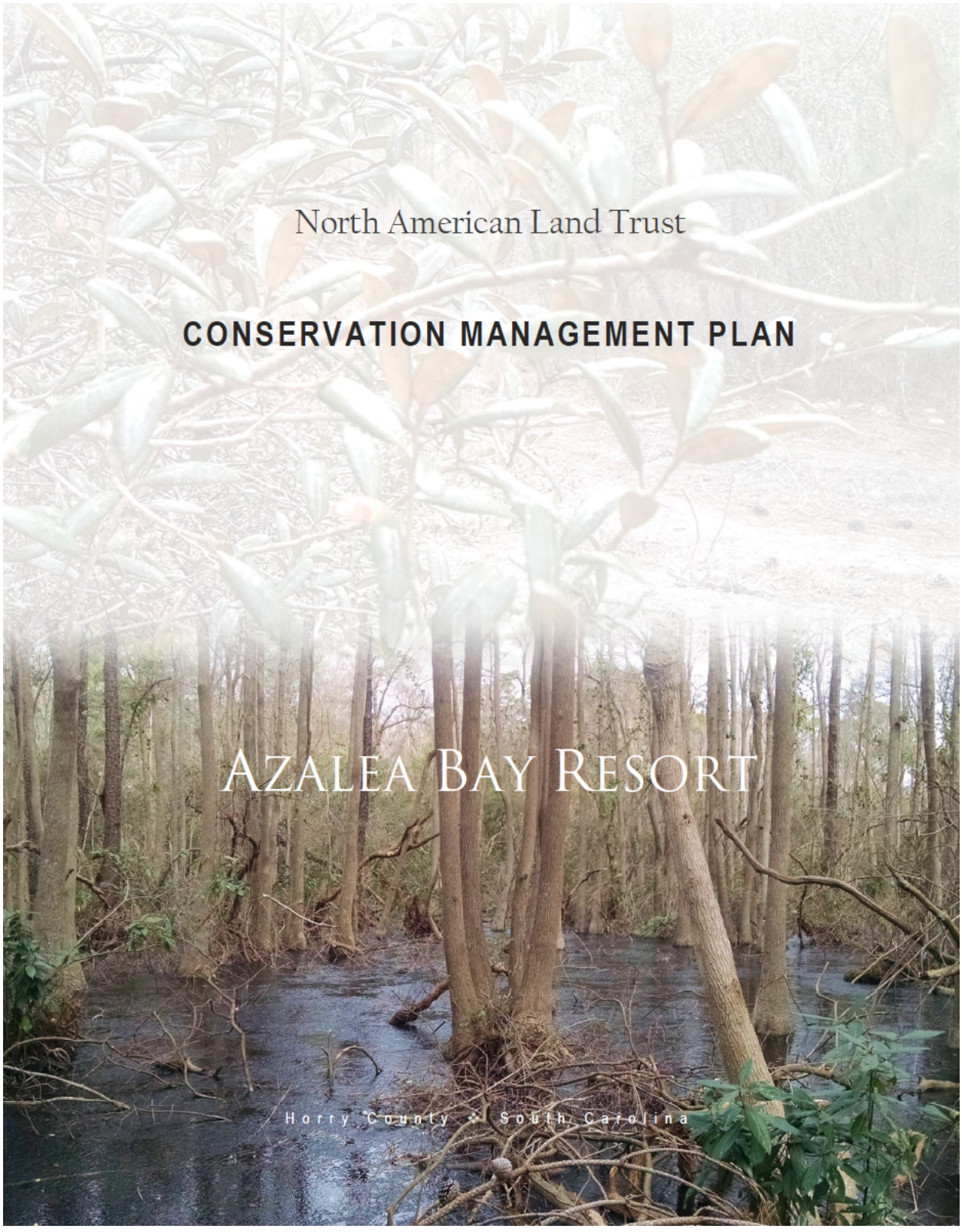

North American Land Trust

CONSERVATION MANAGEMENT PLAN

AZALEA BAY RESORT

Horry County ❖ South Carolina

Azalea Bay Conservation Area
Conservation Management Plan

Prepared By: Patty Kennedy

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Date: January 15, 2016

Azalea Bay Conservation Area
Conservation Management Plan

Table of Contents

I. Property Overview and Regional Context:

The Azalea Bay Conservation Area property is located in Horry County, South Carolina and consists of approximately 269 acres. The property is comprised of several terrestrial communities explored in the document, including high quality upland and wetland systems. Moreover, the property represents the opportunity to manage for high quality Long Leaf Pine habitat.

In recent years, portions of the property were used for the production of forest products, and most of the uplands planted in Loblolly Pine for commercial timber operations. In 2015, the property was protected by a conservation easement.

Regional context:
The property lies within the Coastal Plain Ecoregion, and historically boasted upland maritime forests, sandhill ecosystems and other depressional wetlands. The property lies in an area referred to by SCDNR as the "outer belt" or "flatwoods" landscape of this ecoregion, referencing the primarily pine-dominated forest with close proximity to both the Waccamaw and Little Rivers.

This region, and this property, are part of a large system of Carolina Bays along the coastline. Horry County has documented over 410 Carolina Bays of various degrees of productivity. All are significant as a natural feature, but many are falling prey to alteration, ditching or poor management. Known for the plethora of botanical species associated with them, this region and the nearby Lewis Ocean Bay Heritage Preserve also host the largest population of coastal black bears in SC.

This property is located in North Myrtle Beach, an area that has remained one of the fastest growing regions on the East Coast for many years. From a natural resource perspective, residential and commercial development is the single largest threat to the region, leading to the loss of habitat and flora and faunal species, as well as water quality degredation.

General Property characteristics of ecological significance:
The Azalea Bay Conservation Area contains several productive habitats indicative of the region, or allowed to naturally occur on the property. Present on the property are:

Pine/Sandhill Pine Woodlands

1. Dry Long Leaf Pine-Xeric Sandhill-Sandhill Pine Woodland
2. Loblolly Pine Plantation

Wetlands

1. Southern Atlantic Coastal Plain Nonriverine Swamp and Wet Hardwood Forest System
2. Small Depression Shrub Border community (although not biologically intact due to dominance of Loblolly Pine)
3. Coastal Plain Depression Swamp

Watershed context: Azalea Bay is located in the Coastal Sampit watershed in SC. This watershed includes properties from Myrtle Beach as well as Georgetown County.

II. Management Objectives:

Based on the current land cover and use, the North American Land Trust submits the following recommendations for short term, and long term conservation and forest management objectives for the landowner as outlined below:

The long term goals and objectives for the Azalea Bay Preserve are as follows:

1. To restore high quality native habitats whenever possible
2. To re-introduce prescribed burning for upland portions of the property
3. To protect wetlands and associated habitats
4. To maintain and manage for species of concern
5. To protect and document biodiversity
6. To preserve, fulfill and enhance Conservation Values and Purposes
7. To allow for passive recreational use and enjoyment of the property while managing for conservation
8. To restore and maintain road, trail and firebreak networks

The short term goals and objectives would be:

1. Secure site
2. Restore natural/historical landscapes
    a. Manage current habitat for Long Leaf Ecosystem
    b. Transition planted pine stands to Long Leaf Ecosystem
    c. Establish prescribed burning routine
3. Protect and manage for species of concern
4. Eradicate invasive species when documented
5. Continue biological surveys and species inventories

For this to be possible, a plan is necessary to accomplish these goals. The management plans should be adaptive. Natural and sometimes manmade occurrences can require adjustments to a long range plan. Listed below are practices that are recommendations by the North American Land Trust, to achieve the long term and short term goals of an integrated conservation management plan.

1. Secure site and remove debris present from illegal dumping
2. Conduct biological surveys to further identify habitats and species of concern
3. Identification and prioritization of areas for prescribed fire due to highways and roads
4. Strategic timber thinning (for revenue generation, but also for habitat transition)
5. Maintenance of road systems
6. Work with Grand Strand Water and Sewer Authority on management/maintenance

III. Management Recommendations For Habitat or Species

Management Recommendation #1: Long Leaf Pine Restoration

Overview: Prior to the colonial settlement of the southeastern United States, the primary landscape was a Long Leaf Pine Savanna, with widely spaced pines and a diverse herbaceous ground cover maintained by frequent wildfire. It is estimated that this habitat dominated up to 90 million acres over nine states ranging from Virginia to Texas. An entire ecosystem was supported and thrived in this natural environment with over 200 species of plants and animals found in this habitat type. Due to cropland conversion, logging and urban development, there remains only about 3 percent of this native habitat (about 3.4 million acres). As the acres declined so did many of the species which are dependent on the habitat and/or the wildfires that sustained it. Currently, there are 29 species of concern or endangerment directly attributed to the loss of this habitat.

At least three dozen grasses occur in longleaf pine-grassland habitats, indispensable as shelter for birds and small mammals, edible grains, and fuel for fires. As with most species identified with this habitat, the grass species for open forest habitats are tolerant or dependent on frequent fire.

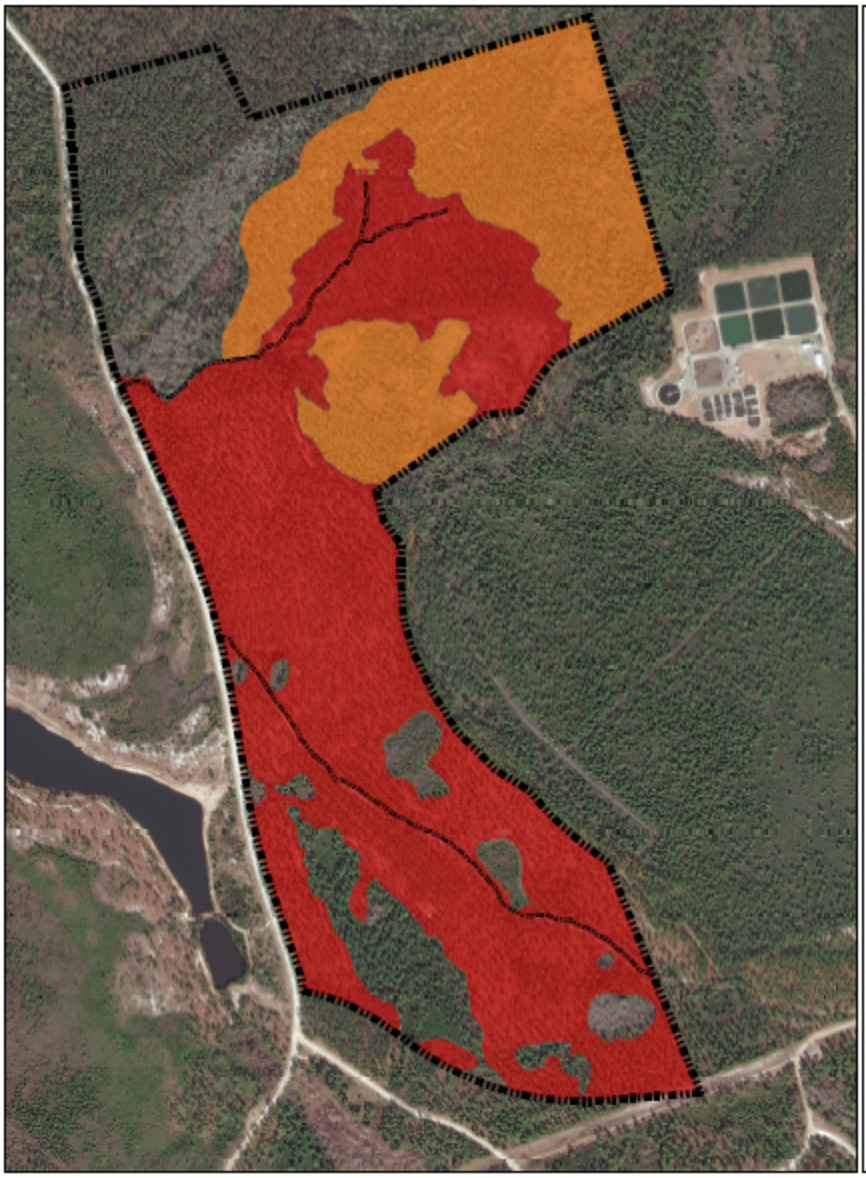
A note on wiregrass: Wiregrass is the most noted native grass for an open forest ecosystem. The reason is that its physical structure encourages fire. Overlapping leaves from adjacent clumps act as a net to catch fallen pine needles, allowing air to circulate along the savanna floor and keep the ground primed for burns. Fire spreads easily from clump to clump, burning rapidly under dry conditions. This structure also discourages the decomposition of the pine needles over a two- to three-year cycle and results in the maintenance of higher fuel loading than sites without wiregrass. As conservationists we will always recommend establishing wiregrass as a prime understory plant, however, we recognize that this can be cost prohibitive or even difficult in some forest situations.

There are numerous resources on managing/restoring Long Leaf Ecosystem, and the Forestry Management Plan included in Appendix A provides details for management of Azalea Bay.

The primary components of this ecosystem and management strategy are to manage for Long Leaf Pine overstory, native grass (primarily wiregrass understory), maintained with prescribed fire. The long –term goal for the property is for passive recreational uses, without intense timbering objectives.

Management recommendations include:

1. Management of the pine stands as uneven aged stands. This would involve retention of the existing overstory and promotion of natural longleaf pine recruitment.
2. Timed prescribed fire should be applied in advance of heavy longleaf pine seed production.
3. Currently sweetgum is present in the understory of the mesic portions of the property. These should be controlled through application of a forest herbicide.
4. Prescribed burning to benefit native grasses and legumes. (see Prescribed burning recommendations.)



LEGEND:

Long Leaf Ecosystem Management

- Prescribed Burn - Priority 1
- Prescribed Burn - Priority 2
- Established Firebreaks/Trail System
- Azalea Bay Boundary

Management Recommendations

1. Burn Priority 1 compartments at earliest convenience
2. Burn Priority 2 compartments after completion of Priority 1 compartments
3. Establish existing trails as firebreaks and maintain as walkable trails
4. Conduct uneven-aged timber management in longleaf pine stands
5. Manage sweetgum and other competitors chemically

-Longleaf compartments derived from NALT field surveys, NALT aerial image interpretation, and DDC Engineers, Myrtle Beach, SC wetland surveys
-Trail system derived from NALT on-site GPS capture (+/- 2 meters)
-Aerial Image from The World View Satellite 3, image captured on 2/20/2015

N

0 0.075 0.15 Miles

AZALEA BAY

HORRY COUNTY, SOUTH CAROLINA

LONGLEAF PINE MANAGEMENT

North American LAND TRUST

LONGLEAF PINE MANAGEMENT

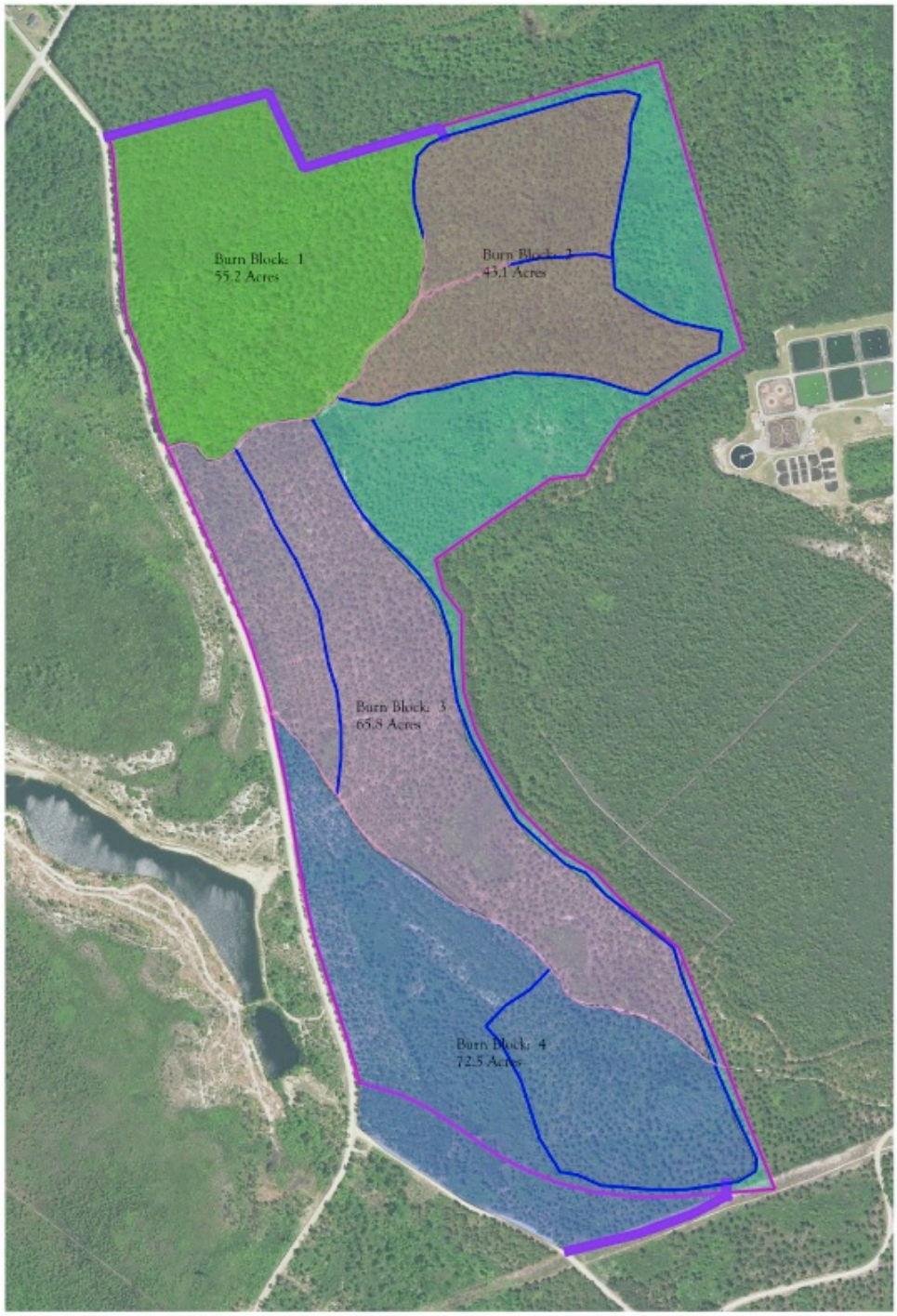
Management Recommendation #2: Re-introduce Prescribed Burning

Overview: One of the singular most destructive factors for natural habitats in the southeast has been the suppression of natural fires. Once occurring routinely, through lightning strikes or by Native Americans, both open grasslands and forest stands benefited from periodic low level fires. With the loss of these fires due to human settlement and conversion to agriculture and silviculture, numerous habitats have been altered by the inclusion of fire intolerant species, and numerous plant and animal species associations are in decline.

NALT strongly recommends the reintroduction of prescribed burning for the Azalea Bay Preserve. Although sandy soils or proximity to Carolina Bays may limit burning activities, prescribed burning is essential to successfully achieving the Long Leaf Ecosystem.

Management recommendations:

1. Create a prescribed burning map, identifying:
    a. priorities for prescribed burning each year
    b. areas that may be burned with specific weather patterns
    c. smoke management protection zones
    d. fire breaks and trail networks
2. Management induced fire frequency should be every 3 to 4 years. (Portions of the xeric sand hill sites will not likely burn because of lack of herbaceous ground cover. Fire should not be forced through these areas but rather allow fire to carry naturally.) Mesic stands will burn significantly and repeated fire will reduce coverage of shrubby species and promote herbaceous ones.
3. Prescribed fires should be timed to control entry of fire into the Carolina bays. While fire is beneficial for Carolina bays it should not burn as frequently as adjacent uplands.
4. Dormant season fire when Carolina bays are likely to contain water would limit the travel of fire across the bay. Also, the peat-like soils in Carolina bays can smolder for days or weeks after a fire. Timing of prescribed fire during the wet season would minimize smolder associated smoke for the following days or weeks. Persistent smoke associated with a smoldering fire could pose a safety hazard to Carolina Bays Parkways (State Highway 31).
5. North Myrtle Beach operates a water treatment facility to the east of Azalea Bay. Research should be given as to whether this municipality would accept prescribed fire in proximity to water treatment ponds.



Legend

- Sandridge_ROW
- new fire lines
- Roads
- Proposed Trails

Burn Blocks

- 1
- 2
- 3
- 4
- Property Boundary

N 0 250 500 Feet

PROPOSED PRESCRIBED FIRE BLOCKS AND FIRE BREAKS.TRAILS

AZALEA BAY
HORRY COUNTY, SOUTH CAROLINA

PROPOSED PRESCRIBED FIRE BLOCKS AND FIRE BREAKS.TRAILS

Map Drawn by Clay Folk, SC
Registerd Forester #1814
Date Drawn: 7 April 2016

Management Recommendation #3: Wetland Conservation

Wetlands Overview: Often called "nurseries of life," wetlands provide habitat for thousands of species of both aquatic and terrestrial plants and animals. These nurseries support the critical developmental stages for many plants and animals.

The wetlands at Azalea Bay have particular importance due to their proximity to high quality sand hill sites. Not only are they productive fishless habitats in and of themselves, their relationship to high sandy soils is particularly important to numerous reptile species.

Azalea Bay has three distinct wetland communities identified on the property:

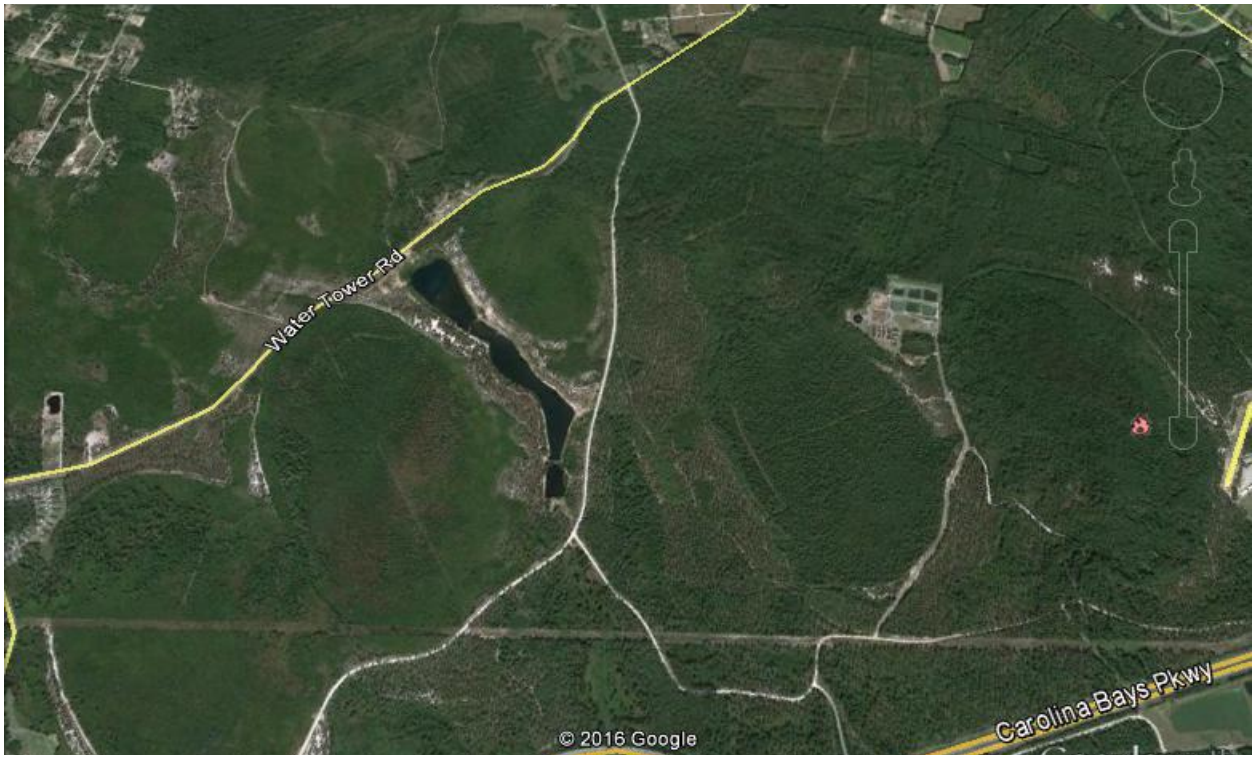
1. Southern Atlantic Coastal Plain Nonriverine Swamp and Wet Hardwood Forest System
2. Small Depression Shrub Border community (although not biologically intact due to dominance of Loblolly Pine)
3. Coastal Plain Depression Swamp

Each of these communities has slightly different geomorphology and vegetative structure, however, they have similar ecological function. As is typical with coastal plain wetlands, they have variable water levels depending on rainfall; they are detritus-based and they are "fishless" habitats. As a result, they are extremely biologically important for a number of plant and animal species. As stated above, proximity to high quality sandhill habitat increases the importance of this habitat to support larval stages of many amphibian and reptiles.

Wetland Management recommendation:

1. Install signage or silt fencing to identify, protect wetlands and buffers.
2. Create a reproducible map of protected wetlands to give to loggers or equipment operators showing areas to avoid
3. Consider growing season prescribed fire (spring/summer) every 1 to 3 years in the wetlands.
4. Avoid ditching, bedding, plowed fire lines, food plots or other soil disturbance within identified wetlands or buffers.
5. Walk-in only access – no off-road vehicles.
6. Allow a 100-foot natural buffer around a depressional wetland to protect water quality. A 1,000-foot radius is ideal for the habitat and food supply of amphibians.
7. Leave mature specimen trees in place. Trees and leaf litter are an important part of the wetland ecosystem. Leaf litter is important for food and protection. Brush, logs and dead trees are important as well, since some salamanders live beneath dead trees and logs.
8. Avoid dumping debris in a dry depression. Do not dig in the bottom of a pool, even if it is dry, or you will impact the area's ability to hold water. Dormant salamanders living under the ground will also be affected.
9. Continue biological surveys of both wetlands and uplands to further document species.

Wetland Conservation in regards to Carolina Bays



The Azalea Bay Preserve serves as the upland portion of a system of Carolina Bays that occur in the region. Though the property does not contain a defined Bay on-site, its close proximity and direct relationship to the Peter Horry Preserve owned and managed by the Grand Strand Water and Sewer Authority are worth mentioning and managing cooperatively.

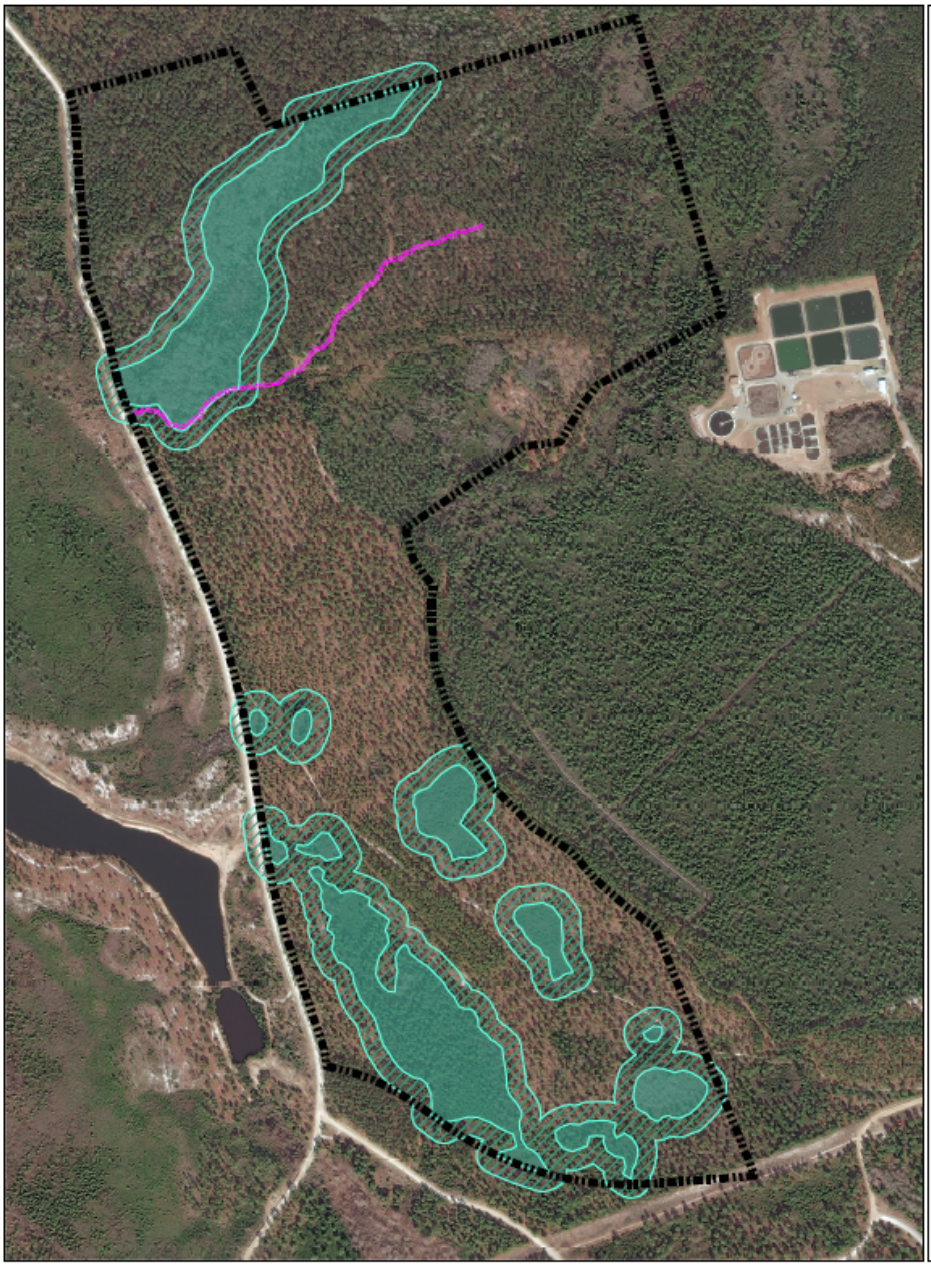
Carolina Bays are elliptical-shaped, freshwater wetlands that are only found in the coastal plain of the eastern United States. They are oriented in a northwest-southeast direction, and their origin remains unknown. The Carolina Bay is sometimes called 'pocosin' which is the Indian word for "swamp on a hill." Many have raised sand rims and their interiors are rich with peat. The plants and animals that live in or around these wetlands are dependent upon their seasonal fluctuation in water levels. Many are also reliant upon fire for increased productivity.

Bays can range in size from less than one acre to more than 1,000 acres. According to a SCDNR report, Horry County has 410 Carolina Bays over 2 acres, which is more than any other county in the State (Bennett & Nelson, 1991). Unlike bays found in other counties, those in Horry County are typically small and often overlap one another. The Waccamaw River happens to be the only river in the world to originate and be fed by a Carolina Bay.

Carolina Bays have been heavily impacted by ditching, draining, or ponding for agricultural uses. Activities along the perimeter of these Bays, such as development and sand mining, can have an indirect impact on the biodiversity of these wetlands. Many animals, especially reptiles, are

dependent upon these adjacent uplands for a portion of their lives, but these outer rims are not protected by Federal and State wetland regulations. Because Carolina Bays are considered a threatened ecosystem, SCDNR has incorporated Lewis Ocean Bay and Cartwheel Bay into their Heritage Preserve Program.

NALT recommends coordination with state Natural Resource Agencies and GWSA Representatives to coordinate enhancement for adjacent Carolina Bays.



LEGEND:

- Wetlands 100 ft Buffer
- Wetlands
- Trail with Debris
- Azalea Bay Boundary

Management Recommendations

1. Allow a 100-foot natural buffer Wetlands to protect water quality: A 1,000-foot radius is ideal for the habitat & food supply of amphibians
2. Install signage or silt fencing to identify and protect wetlands and their associated buffers
3. Consider growing season prescribed fire (spring/summer) every 1 to 3 years in the wetlands
4. Avoid any soil disturbance within identified wetlands or buffers
5. Walk-in only access – no off-road vehicles
6. Leave mature specimen trees in place
7. Leave leaf litter, brush, logs and dead trees for amphibians
8. Remove debris from along trail area

-Wetland compartments from DDC Engineers, Myrtle Beach, SC wetland surveys
-Trail system derived from NALT on-site GPS capture (+/- 2 meters)
-Aerial Image from The World View Satellite 3, image captured on 2/20/2015

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0 0.075 0.15 Miles

AZALEA BAY

HORRY COUNTY, SOUTH CAROLINA

HABITAT & SPECIES PROTECTION

North American LAND TRUST

HABITAT & SPECIES PROTECTION

Management Recommendation #4: Priority Species/Biological Surveys and Botanical Inventories

Overview: Numerous priority species have been identified, or are suspected to exist in Azalea Bay Resort. Locations for these will be identified on the Priority Species Map when discovered. Listed below are fact sheets and management strategies for target species that are known to exist on site. Overall management techniques should be adapted and refined as new priority species are discovered.

NALT recommends that biological inventories and botanical surveys be continued each season, and management strategies refined accordingly. Whether hiring experts in a particular biological discipline, engaging with natural resource agencies, or partnering with universities and coalitions, NALT recommends continued documentation of this property. The priority species listed in the next section should be a starting point for inventories.

Species of concern known to, or believed to exist at Azalea Bay Resort include:

1. Black Bear, *Ursus americanus*
2. Red cockaded woodpecker, *Leuconotopicus borealis*
3. Flora and Fauna of Long Leaf Ecosystem
    a. Eastern Fox Squirrel, *Sciurus niger*
    b. Canebrake Rattlesnake, *Crotalus horridus*

Fact sheets for some of these species, are attached. Additional species will be added as inventories occur.

Sandhill Rosemary
(Ceratiola ericoides Michaux)

Listed: SC Rare (S1),

Description: Evergreen **shrub** up to 6 feet (2½ meters) tall, rounded, and densely branched; older branches with gray, shredding bark and rough leaf scars; young twigs with dense hairs. **Leaves** less than 5/8 inch (8 - 15 mm) long, dark green, needle-like, in pairs set at right angles to each other and appearing to be in whorls of 4 or 6 needles when viewed from the end of the twig; leaves smell strongly of rosemary or, during hot weather, of honey. **Female flowers** and **male flowers** on separate plants, small, papery, yellow to brown, clustered in the angle between leaf and twig, sometimes filling nearly all the spaces between leaves.

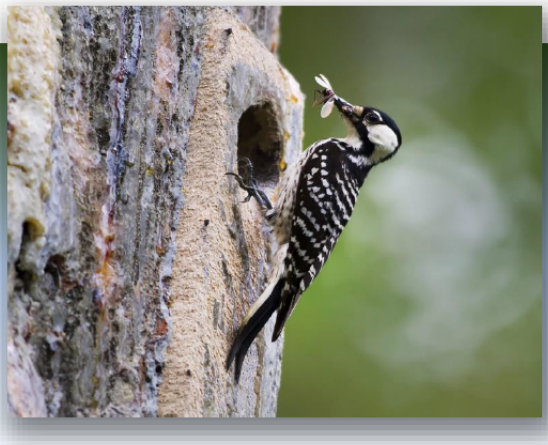
Habitat: Extremely dry sandhills and sand ridges along the east sides of several Coastal Plain rivers; with woody goldenrod, dense patches of lichens, and large areas of bare sand.

Life History: Sandhill rosemary has a whorled branching pattern, each whorl representing one year of growth; plants may be aged by counting the number of whorls (or nodes) on the main stem. Plants studied in Florida scrub begin to set seed between 10 - 15 years; seed production declines between 20 - 30 years. Fruits are eaten by ants, mice, and birds. Sandhill rosemary habitat does not burn frequently or readily, largely due to a lack of fine fuels (grasses). When fires do occur, they tend to be catastrophic, burning most plants to the ground, and killing sandhill rosemary which responds to fire with a flush of germination of seeds stored in the soil seed bank.

Conservation and Management Recommendations: Burn scrub sites every 20 - 40 years, leaving some areas unburned. Rosemary is killed by fire but will vigorously re-seed. Prevent conversion of sand ridges and scrub to pine plantations or pasture.

The Red-Cockaded Woodpecker

(*Leuconotopicus borealis)*



Overview: The Red-cockaded woodpecker is the only woodpecker to excavate cavities in living pine trees, rather than dead trees. Preferring mature southern pine forests, the Red-cockaded woodpecker will typically live in longleaf pines, averaging 80 to 120 years old, and loblolly pines, averaging 70 to 100 years old. These older pines often suffer from red heart disease, a fungus that attacks the center of the trunk, which results in the inner heartwood becoming soft, allowing the woodpecker to more easily excavate its cavity.

Habitat: When the Red-cockaded woodpecker establishes its cavity in one of these longlife pine trees, a process that takes 1 to 6 years, the bird will peck holes around actively used cavities. Its cavity can then be identified by the surrounding, numerous small resin wells from which sap flows. The sap acts as a defense mechanism against predators, such as rat snakes.

These woodpeckers are faithful to their cavity trees, which are called a cluster, and may include 1 to 20 or more trees on 3 to 60 acres. The typical territory for a group of the Red-cockaded woodpecker ranges from 125 to 200 acres.

Threats & Management: In order to protect the red-cockaded woodpecker, its dwindling ecosystem upon which the species depends must be preserved. Frequent, low intensity controlled burns can help keep the forest midstory from getting too tall and therefore prevent predators and nest competitors from having easier access to woodpecker cavities. This fire and the subsequent removal of undergrowth prevents the woodlands from becoming too dense with trees, and it creates open, park-like areas that the woodpeckers like. In addition, the construction of artificial cavities that are placed 60 feet up a suitable pine tree by a biologist, as well as the planting of longlife pine trees are other efforts used to preserve the Red-cockaded woodpecker's habitat. It is also beneficial to mark a tree with an established cavity, so as to prevent its accidental removal.

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American Black Bear
(Ursus americanus)

Overview: The smallest of the three bear species found in North America, the American black bear is the smallest. Black, brown or cinnamon, they have short, non-retractable claws that allow them to climb trees easily. This species is found throughout North America, from Canada to Mexico, inhabiting both coniferous and deciduous forests, as well as open alpine habitats. They live in a variety of areas where they can find food, but they typically do not occur on the Great Plains or other open areas.

The American Black Bear is an opportunistic omnivore, meaning it will consume herbaceous vegetation, fruits, nuts, insects, fish, animals, and human-related foods such as garbage and apples. This variety in their diet allows them to inhabit a diversity of habitat types. An important habitat feature for the black bear is a source of fall mast, such as American chestnuts, acorns, beechnuts, hazelnuts, and pine nuts. This available source is eaten during the fall to increase fat reserves in preparation for winter hibernation. American black bears hibernate for up to 7 months in the northern areas of their range, or for shorter periods in the southern portions. Females will typically den and give birth to 2-5 cubs.

Threats & Management: Thanks to effective conservation efforts, the American Black Bear is not currently a species of conservation concern; however, increased conflicts with humans are a threat to the species. As more people encroach on bear habitat, due to urbanization and increasing density of roads, the frequency of interactions between bears and humans has increased. As a result, the leading cause of bear deaths is car accidents. Another threat to the Black Bear is hunters and poachers and the opportunity for illicit commercial tradeoff bear claws and gallbladders by poachers. In order to maintain successful co-existence between bears and humans, humans must be responsible for the welfare of the bear population by preserving wild areas as important bear habitat.

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The Flora of the Long Leaf Pine System
(excerpted from Sherpa Guides. Written By Elizabeth W. Crofton. Photos by Richard T. Bryant.)

Grasses

At least three dozen grasses occur in longleaf pine-grassland habitats, indispensable as shelter for birds and small mammals, edible grains, and fuel for fires. Grasses are wind-pollinated plants with inconspicuous flowers and extensive root systems comprising up to 90 percent of the plant's total weight. Because the growing part of a grass stem is at the base rather than the tip, grasses reappear quickly after fire. Bunch-form grasses growing in clumps, rather than sod forms, populate this ecosystem.

Wiregrasses, which have narrow, stiff leaves, are a vital component of the ecosystem in parts of Georgia, North Carolina, and most of Florida. Broader-leafed grasses such as broomsedge (*Andropogon virginicus*), Indiangrass (*Sorghastrum secundum*), wood grass (*S. nutans*), panic grass (*Panicum spp*.), and water grass (*Bulbostylis barbata*) may also be prevalent in Georgia. Elsewhere on the Coastal Plain, bluestem, silky scale, toothache, and dropseed grasses become common. Bluestem grasses (*Andropogon* spp., *Schizachyrium* spp.) replace wiregrasses in longleaf pine habitats from western Alabama to Texas. In parts of the coastal flatlands from southeast Mississippi to southeast Georgia and into central Florida, saw palmetto (*Serenoa repens*) is the dominant ground cover species.

Wiregrass

This perennial bunch grass grows in the seasonal wet bogs and dry sandhills of the Atlantic Coastal Plain from Mississippi to southeastern North Carolina to south Florida. Carolina wiregrass (*Aristida stricta*) dominates in the northern longleaf woodlands but is replaced by southern wiregrass (*Aristida beyrichiana*) in the more southerly Coastal Plain sections. Wiregrass thrives under open longleaf pine canopies, occurring in clumps up to 6 inches across with soft, hairlike tufts at the leaf base. Flat leaves, which sometimes reach lengths of 20 inches, appear cylindrical because they curl inward at the edges.

Wiregrass's physical structure encourages fire. Overlapping leaves from adjacent clumps act as a net to catch fallen pine needles, allowing air to circulate along the savanna floor and keep the ground primed for burns. Fire spreads easily from clump to clump, burning rapidly under dry conditions. This structure also discourages the decomposition of the pine needles over a two- to three-year cycle and results in the maintenance of higher fuel loading than sites without wiregrass.

Wiregrass and longleaf pines have a mutually beneficial relationship based on the need for fire. Without fire, hardwood seedlings would dominate the understory, overshadowing wiregrass and competing for moisture and nutrients (and eventually overtaking the pine trees). Fires during growing season stimulate flowering and seeding in wiregrass. Fire suppression can be fatal. Debris accumulated over a number of years can fuel a fire hot enough to kill the plant's roots. Wiregrass does not readily re-establish once destroyed.

Legumes

Members of the bean family (Fabaceae), legumes are a large and important group of over 13,000 species, exceeded in diversity only by the composites. Legumes are typical inhabitants of a fire-maintained longleaf pine-wiregrass ecosystem. Most native species are perennials and tolerant of the shade created by the open pine canopy. Identifiable by flowers that resemble peas and pod-like seed packets, legumes can be vines, herbs, or woody shrubs.

Legumes are an important source of food and/or cover for wildlife including gopher tortoises, bobwhite quail, songbirds, white-tailed deer, and pocket gophers. The plants also fix nitrogen from the atmosphere, replenishing what's lost in prescribed fires, and make these nutrients available through rapid decomposition.

Longleaf pine grasslands host abundant and diverse native legume species; a study at the Joseph W. Jones Ecological Research Center in Baker Country, Georgia showed almost 50,000 stems per acre and 43 distinct species at the research site. Common native legumes include numerous beggarweeds (*Desmodium* spp.) and lespedezas (*Lespedezas* spp.), goat's rue (*Tephrosia virginiana*), sensitive briar (*Schrankia microphylla*), butterfly pea (*Clitoria mariana*), dollar leaf (*Rhyncosia reniformis*), and rabbitbells (*Crotalaria rotundifolia*).

Composites

The composite family (Compositae) wears the title of the most diverse family of flowering plants on the planet. They are, along with grasses and legumes, one of the more dominant families of flora represented in the longleaf pine-wiregrass ecosystem.

Composites owe their name to their flowers: What appears to be a single bloom is actually a cluster of hundreds of tiny individual flowers pressed densely together. In most composites, tiny tubular disk flowers create the round center of the display. Ray flowers, commonly called petals, emanate from the center. The advantage of this arrangement is that during pollination, an insect can make contact with hundreds of flowers at once. Their seeds are a food source for many birds and small mammals.

Common examples of composites in the longleaf pine-wiregrass habitat include goldenrod (*Solidago* spp.), asters (*Aster* spp.), goldenaster (*Chrysopsis mariana*), rayless sunflower (*Helianthus radula*), narrow leaf sunflower (*Helianthus angustifolia*), pineland daisy (*Chaptalia tomentosa*), ironweed (*Vernonia angustifolia*), deer tongue (*Carphephorus odoratissima*), blazing star (*Liatris* spp.), thistles, Sun's

bonnets (*Chaptalia tomentosa*), thoroughwort (*Eupatorium cuneifolium*, other spp.), and black-eyed susan (*Rudbeckia hirta*).

Insectivorous Species

Insectivorous plants are common in the bogs associated with some longleaf pine forests. They include hooded pitcher plants (*Sarracenia minor*), yellow pitcher plants (*S. flava*), parrot pitcher plants (*S. psittacina*), bladderworts (*Utricularia inflata*, other spp.), yellow butterwort (*Pinguicula lutea*), and sundews (*Drosera capillaris*, several other spp.) These plants have special structures that allow them to capture and digest protein-rich insects and spiders. When broken down, the proteins release nitrogen, a nutrient essential for plant growth. Since soil acidity slows decomposition, sources of mineralized nitrogen do not exist in bogs. Their carnivorous nature is an adaptation that allows these plants to survive.

The pitcher plant provides a good illustration of this adaptation. It secretes nectar from its hood to attract insects. An insect alights on one of the plant's hollow, tubular leaves and is lured under the hood, where it tries to escape through translucent spots in the hood. Instead, tired from the struggle, the insect falls into the liquid-filled "pitcher" of the leaf, where curved hairs prevent the prey from escaping and it is broken down by plant enzymes and bacterial action. Bladderworts use suction to trap living aquatic or terrestrial organisms that have touched the trigger hairs at the mouth of one of the bladders.

The sundew's flowers occur as clusters of white blooms on one side of a tall, leafless stalk rising above a rosette of small, sticky leaves. Pitcher plants have fiddle-shaped, yellow to reddish-green flowers that grow on separate, leafless stalks. Bladderworts and yellow butterworts have yellow flowers.

Scrub Oaks

Various scrub oaks comprisethe sparse, broad-leaved understory (the middle layer of flora, between the pine overstory and grassy/herbaceous ground cover) in longleaf-wiregrass woodlands of the Coastal Plain and Fall-Line sandhills. Blackjack and post oaks (*Quercus marilandica, Q. stellata*) are prevalent where clay content is high; turkey, bluejack, and sand post oaks (*Q. laevis, Q. incana, Q. margaretta*) are scattered on sandier sites.

Running oak (Q*uercus pumila*), which has evolved under fire conditions just as longleaf pines and wiregrass have, is a natural hardwood component of this ecosystem. The running oak's adaptation to fire is its ability to form a major root and trunk system underground (though not in the shape of the aboveground trunk). The tree produces a full-sized acorn that is food for quail, turkey, songbirds, and deer.

The running oak rarely grows taller than 4 feet in height, even after years of fire suppression. Without fire, this tree will eventually disappear, succumbing to shading and competition from other hardwoods. Because it is difficult to re-establish once eradicated from an area, its presence indicates healthy, virgin soil.

The Fauna

Red-Cockaded Woodpecker

Now on the federal list of endangered species, the red-cockaded woodpecker (*Picoides borealis*) was once a common inhabitant of Coastal Plain pine forests. Populations have dwindled significantly from habitat loss.

Mature red-cockaded woodpeckers are about 7 inches long, with a black crown, white cheek, and back barred with black and white horizontal stripes that give a ladder-back appearance. Juvenile males have a small red area on the crown. Adult males have a thin red streak above the cheek, visible only up close or when the bird is excited.

Unlike other woodpeckers that nest in dead trees, the red-cockaded is the only woodpecker that excavates cavities exclusively in living pine trees. The birds choose trees infected with red heart disease, a fungus that softens the heartwood and allows for easier excavation. Cavities are used for nesting and roosting and generally take from one to three years to excavate. One bird occupies each cavity. The red-cockaded woodpecker is a cooperative breeding species and nests from April through June.

These nonmigratory birds inhabit territories of 125 to 200 acres and live in clans, family groups consisting of a breeding pair and one to four of the male's offspring who act as helpers. Clans spend a great deal of time foraging for food-insect larvae, cockroaches, beetles, ants, and centipedes-in tree limbs and trunks.

To protect nest cavities from predators such as tree-climbing snakes, red-cockaded woodpeckers drill resin wells around the cavity opening, allowing sticky sap to coat the tree's trunk. The white sap gives the tree a candle-like appearance.

Northern Bobwhite Quail

Since the 1940s, bobwhite quail (*Colinus virginianus*) numbers have steadily declined throughout the southern United States, owing mainly to loss of habitat. Hedgerows between fields-prime quail cover-have become less prevalent as small family farms divided by hedgerows and weedy edges have been amalgamated into large fields with intensified methods. Extensive timber production and fire suppression (which allows a dense understory to choke out the herbaceous plants quail feed on) has also limited quail populations.

Adults are an irregular reddish-brown color with a short gray tail and striped flanks. Males have a white throat and eye stripe. The males' rising "bob-white" whistle is heard in spring and summer.

Quail live in groups, or coveys, until the nesting season begins in April. Courting pairs construct ground nests of dead plant matter. Average clutch size is 13 eggs, incubated by males 25 percent of the time. Juveniles are fully feathered at about six weeks, when their diet starts to shift from insects to seeds and fruit.

Because it is a premier game bird across the Southeast, efforts have been made to increase wild quail populations by releasing pen-raised birds, a restocking strategy that has not been effective. Annual survival rates for these birds are low, but they do provide hunting opportunities for sportsmen. A compromise in some managed hunting areas has been to dedicate a specific block of land to pen-raised quail while devoting most of the property to native populations. Pen-raised birds can be distinguished from wild quail by weight; their average weight is 0.44 pound, while wild birds generally weigh about 0.35 pound.

Eastern Diamondback Rattlesnake

Ranging from 3 to 8 feet in length, the Eastern diamond rattlesnake (*Crotalus adamanteus*) is the largest rattler in North America and one of the most dangerous. They inhabit sandhill and longleaf pine communities and abandoned farmland of the Coastal Plain from eastern Louisiana to southeastern North Carolina and throughout Florida. These are heavy-bodied snakes, recognizable by a distinctive pattern of dark diamonds with light centers bordered by light yellow scales. Their large heads are distinct from their necks.

Diamondback rattlers are known to inhabit gopher tortoise burrows and dense patches of saw palmetto in southern pine grasslands. They eat rabbits, squirrels, and birds, and their venom is highly destructive to blood tissue. Their numbers have decreased as a result of habitat loss and hunting by humans.

Flatwoods Salamander

Because their required breeding habitat-small, upland ponds that dry up every few years and prevent predatory fish from flourishing-has declined significantly over time due to habitat destruction, the flatwoods salamander (*Ambystoma cingulatum*) population has also declined. Eggs laid in dried-up woodland ponds in the rainy months from October to December are coated with a protective jelly that dissolves when rain fills the pond. Eggs must be inundated with water to hatch. Prey changes from zooplankton to small insects as the flatwoods salamander larvae grow.

In the winter, the larvae lose their gills, develop adult coloring, and gain leg strength, a metamorphosis that allows them to live on land. Adult salamanders average 3.5 to 5 inches in length and are dark brown or black in color with silvery netlike markings on their backs. They are most active during breeding season, remaining dormant underground when conditions are dry.

Bachman's Sparrow

This bird's traditional habitat is mature to old-growth southern pine woodland characterized by frequent fire and a thick grass and herb understory. With the loss of much of that habitat, the Bachman's sparrow (*Aimophila aestivalis*) has gradually begun to colonize recent clear-cuts and old fields, but those areas do not provide suitable long-term habitat. Moreover, the sparrow no longer breeds in longleaf pine stands where fire has been suppressed for five years or more and canopy cover has increased.

The adult Bachman's sparrow has a large bill, thin russet stripe extending back from the eye, gray back heavily streaked with dark brown, light gray or buff sides and breast, and whitish belly. Adults are 3 to 4 inches in total length. Juveniles have a distinctive eye ring and streaked breast, throat, and sides. The song of the male Bachman's sparrow is a medley of trills and whistles at different pitches, sung from low, open perches.

Brown-Headed Nuthatch

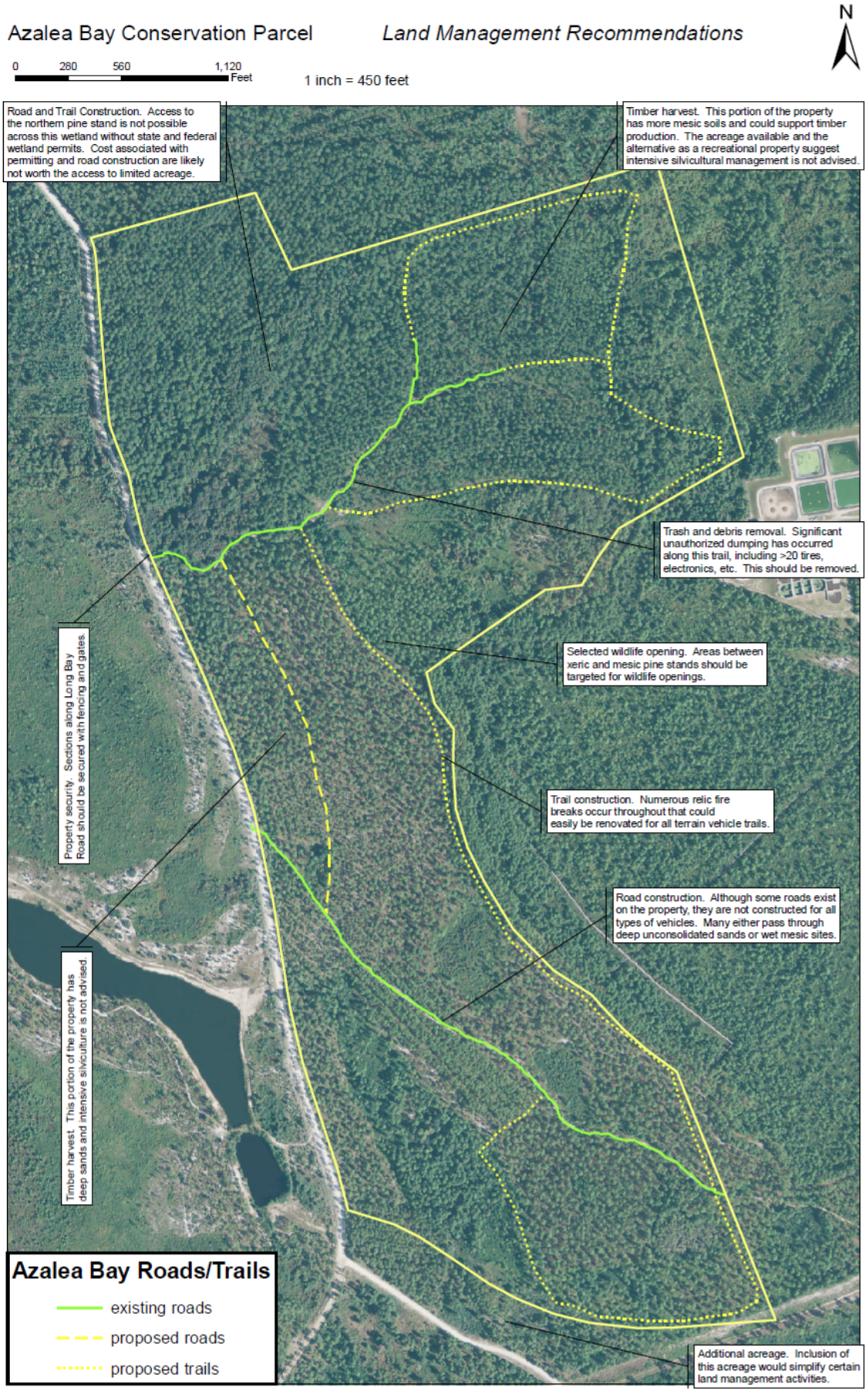
Along with the Bachman's sparrow and red-cockaded woodpecker, the brown-headed nuthatch (*Sitta pusilla*) forms a triumvirate of birds most closely associated with the longleaf pine-wiregrass plains of southwestern Georgia. The woodpecker's preference for older growth pine is well documented, as is the sparrow's preference for the grassland's thick groundcover. The nuthatch nests in low snags in the pine trees and subsists on the insects and larvae it pries from the trees' bark.

True to its name, the brown-headed nuthatch has a dark brown cap atop a buff- colored neck and breast and a gray back. Its call is a short double note that sounds like the squeak of a child's rubber toy. Feeding flocks may also twitter and chirp.

Management Recommendation #5: Roads/trails/Firebreaks

Access across the property is important for its ultimate use as a recreational and hunting parcel; however, soil conditions pose some limitations. The higher sandhill soils are deep, unconsolidated material and travel through these areas is possible for only all-terrain vehicles. Mesic portions of the parcel are subject to moist soil conditions that would make travel difficult except for all terrain vehicles. One or two primary road routes have been identified for enhancement as all weather and all vehicle roads. This would allow access throughout significant portions of the property. Additional roads or trails could be created from native soil material to reduce cost.

a. Numerous trails exist that appear to have been created during previous timber harvests and/or emergency fire break development. These areas are devoid of larger timber and stumps. They do have an irregular grade that should be leveled.
b. Once graded, establish routine maintenance schedule.
c. Improve primary roads to provide all terrain vehicle access.
d. Firebreaks will be added as prescribed burning work is undertaken, and these should be maintained each year.
e. The following map shows the network.


Azalea Bay Conservation Parcel
Land Management Recommendations
N
0 280 560 1,120 Feet
1 inch = 450 feet
Road and Trail Construction. Access to the northern pine stand is not possible across this wetland without state and federal wetland permits. Cost associated with permitting and road construction are likely not worth the access to limited acreage.
Timber harvest. This portion of the property has more mesic soils and could support timber production. The acreage available and the alternative as a recreational property suggest intensive silvicultural management is not advised.
Trash and debris removal. Significant unauthorized dumping has occurred along this trail, including >20 tires, electronics, etc. This should be removed.
Selected wildlife opening. Areas between xeric and mesic pine stands should be targeted for wildlife openings.
Property security. Sections along Long Bay Road should be secured with fencing and gates.
Trail construction. Numerous relic fire breaks occur throughout that could easily be renovated for all terrain vehicle trails.
Road construction. Although some roads exist on the property, they are not constructed for all types of vehicles. Many either pass through deep unconsolidated sands or wet mesic sites.
Timber harvest. This portion of the property has deep sands and intensive silviculture is not advised.
Azalea Bay Roads/Trails
existing roads
proposed roads
proposed trails
Additional acreage. Inclusion of this acreage would simplify certain land management activities.

Management recommendation #6: Control of invasive, exotic plant species

Although small in area, several invasive plant species exist on the property (i.e., English ivy, Japanese honeysuckle, and multiflora rose). These should be treated to ensure they do not spread to other areas of the property.

a. English Ivy and Japanese honeysuckle could be treated with 3% glyphosate and 1% surfactant applied to leaf surface area in late spring.
b. Multiflora rose should be treated with 2% Aresenal and 2% surfactant applied to leaf surface area in late spring.
c. Monitor site for Chinese Tallow intrusion in wetlands or near road beds. Eradication at the start of an infestation is accomplished through multiyear applications of herbicide Clearcast (foliar at 4% with 2% surfactant).

Multiflora Rose

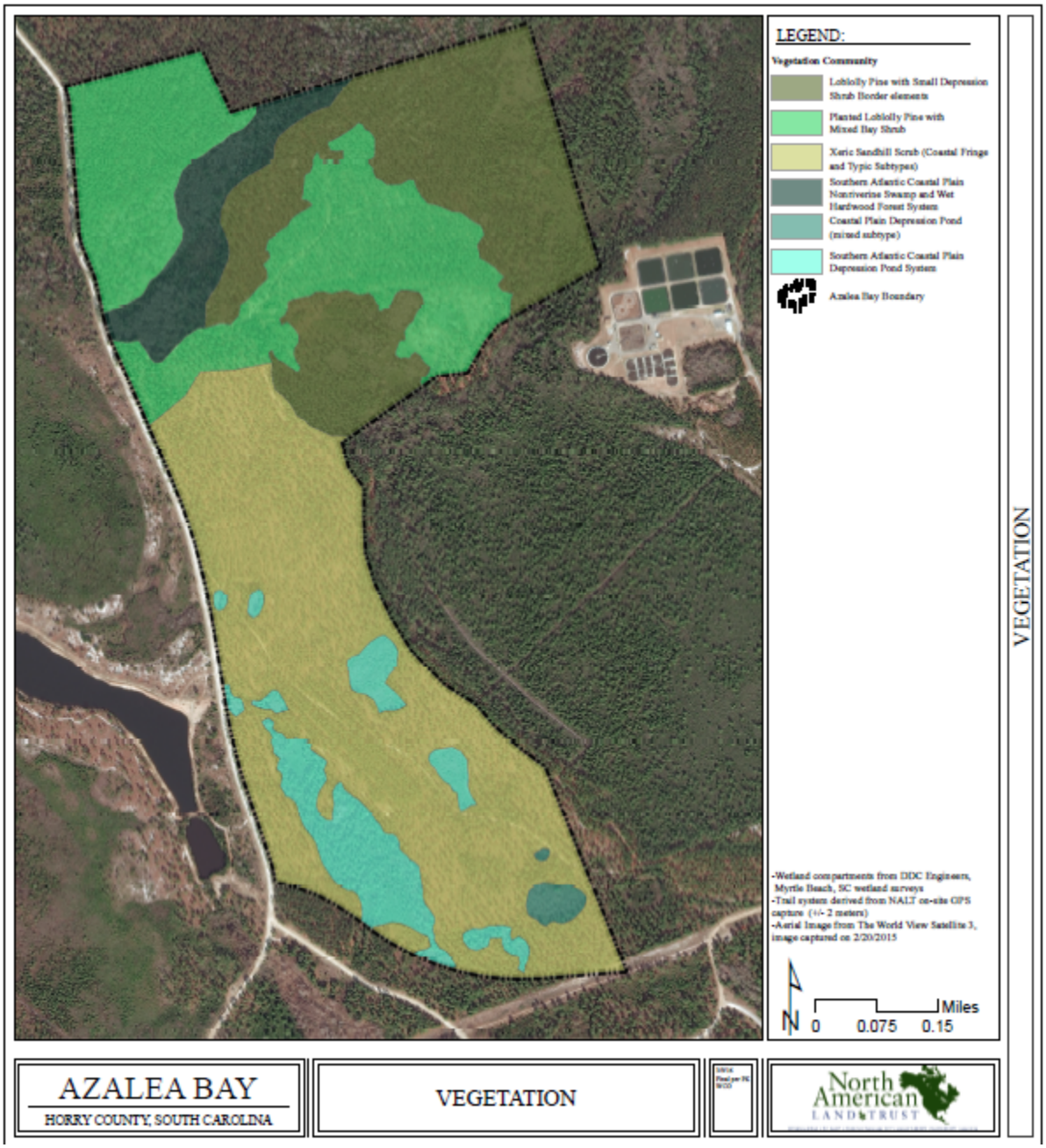
Management recommendation #7: Site Security and Debris Removal

Azalea Bay has an immediate need for security fencing and gates. Additionally, the site has been used for illegal dumping of trash and debris over time. Immediate steps to clean debris, and secure the site from trespassers should be undertaken.

Management recommendations:

1. No trespassing signs should be posted throughout the property.
2. The property should be entered in the SC DNR Property Watch program, a program that gives State Wildlife Officials and the local sheriff's department the ability to patrol and remove unwanted individuals.
3. Gates should be installed at all entry points.

IV. Existing Habitats and Associated Species of Concern



Property overview: Habitats at Azalea Bay are the quintessential Coastal Plain Sandhills. SC DNR appropriately characterized this property: “Although xeric sandy soils predominate, the rolling terrain and variations in soil and subsoil composition provide significant local variation in habitat composition. The principal habitat of this ecoregion is Sandhills pine woodland, with local structure and composition influenced mainly by fire history. Fire is a dominant factor in the ecology of this region. Sandhills pine forests are a fire climax community; as such, these forests are dependent on frequent ground fires to reduce hardwood competition and to perpetuate pines and grasses.

Deep sand ridges ranging from 91 to over 183 m (300-600 ft.) above mean sea level are one of the most striking and dominant features of the Sandhills Ecoregion. Ridge tops of pure Lakeland and Kershaw Sands, some up to 9 m (30 ft.) in depth (Wharton 1978), support the most extreme xeric scrub communities of longleaf pine and turkey oaks. The sandy soils on the ridges, excessively drained with low available water capacity, are low in fertility due to rapid leaching and possess little to no leaf litter (Lawrence 1976).

Sand ridges that have more clay and silt mixed with sand support subxeric Sandhill scrub vegetation and mesic pine flatwoods. Increased plant diversity in such areas is a result of the more moderate growing conditions. Due to the increase in leaf litter, fire is an important factor in the maintenance of the subxeric scrub forest and woodlands.

Rainwater rapidly percolates through the sand ridges until it reaches hardpan, at which point it moves laterally until emerging at the surface on side slopes or near the base of sand ridges. These natural seepage areas result in distinctive wetland habitats embedded within the xeric forests and woodlands.

The community type that develops is determined by the amount of water, the position on the slope, and—especially—by fire. In the absence of fire, this wetland habitat can be forested with longleaf or pond pines (*Pinus serotina*) growing over a dense evergreen pocosin-like shrub layer or, with frequent fire, it can be an open hillside herb bog. Seepage accumulating at the base of the sand ridges results in a saturated zone that supports a streamside pocosin forest.”

Listed below are the existing habitat and species of concern associated with them.

Pine Woodlands/Sandhill Pine Woodlands

In the uplands at Azalea Bay, pine plantation dominates the canopy. In the northern pine plantation the dominant species is Loblolly (*Pinus taeda*). On the periphery of the northern wetlands Pond pine (*Pinus serotina*) begins to intergrade into the uplands, but quickly disappears as the environment become less mesic. As one moves into the drier southern leg of the property, Loblolly pine begins to change over to Longleaf pine (*Pinus palustris*) with scrub oaks in the understory.

Pine Habitats

The Conservation Area contains at least three ecological associations and one ecological system as recognized by the International Vegetation Classification System.

The most common is Dry Long leaf Pine Forest – Xeric Sandhill Scrub (Typic Subtype). This community "is one of the driest longleaf pine types on the Atlantic Coastal Plain, north of central South Carolina. It is the typical xeric sandhill *Pinus palustris*-dominated association, within the range of *Aristida stricta*." The open canopy is dominated by Longleaf pine *(Pinus palustris)*. The subcanopy is characteristically dominated by Turkey oak (*Quercus laevis*). The herbaceous stratum contains wiregrass (*Aristida stricta*), with the lichen *Cladonia spp.* (Natureserve 2014)"

Dry Long leaf Pine Forest – Xeric Sandhill Scrub (Coastal Fringe Subtype). This Subtype is distinguished by exhibiting Ilex vomitoria and Quercus geminata (Schafale, 2011).

The southern half of Azalea Bay is largely dominated by the typic subtype and grades into the Coastal Plain Subtype as one moves southeast on the main southern road.

Summary of species of concern associated with this habitat:

Highest Priority:	American Kestrel, Bachman's Sparrow, Brown-headed Nuthatch, Eastern Wood Pewee, Northern Bobwhite, Red-cockaded Woodpecker, Wood Thrush, Coral Snake, Gopher Tortoise, Pine Snake, Southern Hognose Snake, Henslow's Sparrow, Black Bear, Northern Yellow Bat
High Priority:	Eastern Diamondback Rattlesnake, Mimic Glass Lizard Pine Woods Snake
Moderate Priority:	Eastern woodrat, Eastern Fox Squirrel, Slender Glass Lizard

Management Recommendations:

Recommendation #1 Long Leaf Pine management/transition
Recommendation #2 Prescribed burning
Recommendation #4 Roads and Trails
Recommendation #5 Invasive Species
Recommendation #6 Biological inventories
Recommendation #7 Site Security

						Sandhill Pine Woodland	
SCIENTIFIC NAME	**COMMON NAME**	**G-RANK**	**S-RANK**	**LEGAL STATUS**	**PRIORITY**	**SPECIFIC HABITAT REQUIREMENTS**	
MAMMALS	-	-	-	-			
Eptesicus fuscus	Big Brown Bat	G5	SNR		Highest	X	buildings, cavity trees, under bridges and in bat boxes; forage in open fields or forest gaps
Lasionycteris noctivagans	Silver-haired Bat	G5	SNR		Highest	X	roosts include tree cavities, under loose bark, rock crevices, under tree foliage, and occasionally in buildings, stacks of firewood, and bird boxes; forage over water
Lasiurus borealis	Red Bat	G5	SNR		Highest	X	thinned stands; roost on smaller branches or twigs, often in the hardwood tree canopy; may roost in leaf litter
Lasiurus cinereus	Hoary Bat	G5	S?		Highest	X	tree cavities, trunks, tree foliage, squirrel nests, and Spanish moss
Lasiurus intermedius	Northern Yellow Bat	G4/G5	S?	Of concern, State	Highest	X	forage over open areas such as fields, pastures, golf courses, marshes, and along lake and forest edges; roost in clumps of Spanish moss or under old palm fronds
Lasiurus seminolus	Seminole Bat	G5	SNR		Highest	X	roost in large pines located near forested corridors; may roost in leaf litter
Neotoma floridana	Eastern Woodrat	G5	S3/S4	Of concern, State	Moderate	X	wide variety of habitats
Parascalops breweri	Hairy-tailed Mole	G5	SNR	Of concern, State	High		loose and easily drained soils for excavation
Perimyotis subflavus	Tri-colored Bat	G5	SNR		Highest	X	abandoned mines and caves, bridges, buildings
Sciurus niger niger	Southern Fox Squirrel	G5	S4	Of concern, State	Moderate	X	cavity trees
Ursus americanus	Black Bear	G5	S3?	Of concern, State	Moderate	X	early successional habitat and forest interior; den sites
REPTILES & AMPHIBIANS	-	-	-	-	-	-	-
Ambystoma cingulatum	Flatwoods Salamander (Frosted)	G2/G3	S1	Federal Threatened; State Endangered	Highest	X	isolated, temporary wetlands with no fish that have open canopy above and abundant grasses and sedges
Ambystoma tigrinum	Tiger Salamander	G5	S2/S3	Of Concern, State	Highest	X	isolated, temporary wetlands with no fish that have open canopy above and abundant grasses and sedges
Crotalus adamanteus	Eastern Diamondback Rattlesnake	G4	S3	Of Concern, State	High	X	underground refugia such as stump holes and rodent burrows
Crotalus horridus	Timber Rattlesnake	G4	SNR	Of Concern, State	High	X	dry, south-facing slopes at high elevations; rock outcrops or logs for den sites with south face exposed to sun
Heterodon simus	Southern Hognose Snake	G2	SNR	Of Concern, State	Highest	X	friable soils; underground refugia such as stump holes and rodent burrows; abundance of toads

Micrurus fulvius	Coral Snake (Harlequin)	G5	S2	Of Concern, State	Highest	X	underground refugia such as stump holes and rodent burrows; loose soil for burrowing
Ophisaurus attenuatus	Slender Glass Lizard	G5	S4		Moderate	X	underground refugia such as stump holes and rodent burrows; open canopied forests or fields
Pituophis melanoleucus	Pine Snake (Northern)	G4	S2/S3	Of Concern, State	Highest	X	pine sites with dry soils; underground refugia such as stump holes and rodent burrows
Pituophis melanoleucus mugitus	Pine Snake (Florida)	G4	S2	Of Concern, State	Highest	X	pine sites with well-drained soils; underground refugia such as stump holes and rodent burrows
Rana capito capito	Gopher Frog (Carolina)	G3/G4	S1	Federal Threatened; State Endangered	Highest	X	isolated, temporary to semi-permanent wetlands with no fish that have open canopy above and abundant grasses and sedges
Rhadinea flavilata	Pine Woods Snake	G4	SNR	Of Concern, State	High	X	moist pine flatwoods with many rotten logs; underground refugia such as stump holes and rodent burrows
BIRDS	-	-		-			
Aimophila aestivalis	Bachman's Sparrow	G3	S3	Of Concern, State	Highest	X	dense grass amongst pines for nesting; saw palemettos in coastal areas
Ammodramus henslowii	Henslow's Sparrow	G4	SZN	Of Concern, State	Highest	X	moist, grassy areas in open pinewoods
Caprimulgus carolinensis	Chuck-will's-widow	G5	S4		High	X	openings for nocturnal feeding; mixed forests with light to moderate understory
Chaetura pelagica	Chimney Swift	G5	SNRB		High	X	open areas for foraging; cavity for nesting (often chimneys)
Colinus virginianus	Northern Bobwhite	G5	S4		Highest	X	brushy areas and grasslands, thickets, woodland margins
Contopus virens	Eastern Wood-Pewee	G5	S5		High	X	open forests with sparse midstory
Dendroica discolor	Prairie Warbler	G5	S4		High	X	open old fields with scattered saplings; open woodlands with shrub-scrub
Dendroica pinus	Pine Warbler	G5	SNR		Moderate	X	typically middle to mature pine forests
Dryocopus pileatus	Pileated Woodpecker	G5	SNR		Moderate	X	extensive mature forests with dead snags for nest cavities; probably prefer riverbottom hardwoods
Elanoides forficatus	Swallow-tailed Kite	G5	S2	State Endangered	Highest	X	open savannahs for foraging; mature trees for nesting near swamps and marshes
Falco sparverius paulus	American Kestrel	G5	SNR		Highest	X	nest cavity in large open area; extensive open areas with high perches for foraging
Icteria virens	Yellow-breasted Chat	G5	S4B		High	X	old fields, briar thickets, dry woodland margins;
Icterus spurius	Orchard Oriole	G5	S5?B		Moderate	X	orchard-like sttings; woodland margins
Junco hyemalis	Dark-eyed Junco	G5	SNRB,SNRN		Moderate	X	short grass openings near conifer woodlands
Melanerpes carolinus	Red-bellied Woodpecker	G5	SNR		Moderate	X	open, mature woods with dead snags for nest cavities; man-made poles with cavities
Melanerpes erythrocephalus	Red-headed Woodpecker	G5	SNR		Moderate	X	open, mature woods with dead snags for nest cavities; man-made poles with cavities
Passerina cyanea	Indigo Bunting	G5	SNRB		Moderate	X	woodland margins; shrubby thickets in openings
Picoides borealis	Red-cockaded Woodpecker	G3	S2	Federal and State Endangerd	Highest	X	open pine woods with little to no understory; prefers longleaf; heartwood disease for nest cavity excavation
Picoides pubescens	Downy Woodpecker	G5	SNR		Moderate	X	middle-aged to mature woodlands; prefer hardwoods; dead snags for nest cavities

Pipilo erythrophthalmus	Eastern Towhee	G5	SNR		High	X	brushy areas; woodland margins and understory
Piranga rubra	Summer Tanager	G5	S?		Moderate	X	dry, mixed woodlands
Poecile carolinensis	Carolina Chickadee	G5	SNR		Moderate	X	mature woodlands with dead snags for nest cavities; will use bird boxes
Regulus satrapa	Golden-crowned Kinglet	G5	S4		Moderate	X	winter in coniferous or mixed woodlands
Setophaga dominica	Yellow-throated Warbler	G5	S3?		Moderate	X	moderately open, mature, moist forests; pines, mixed forests; Spanish moss
Sitta pusilla	Brown-headed Nuthatch	G5	S4		Moderate	X	mature, open pines for foraging; nest cavities in snags
Thryothorus ludovicianus	Carolina Wren	G5	SNR		Moderate	X	woodland thickets; leaf litter; cavities or ledges for nesting; will use bird boxes and many other human material
Toxostoma rufum	Brown Thrasher	G5	SNR		High	X	moderate to dense brush and saplings
INSECTS							
Atrytone arogos	Arogos Skipper					X	specialist in seasonally wet to dry grassland and pine savannah habitats; regenerating burn sites; host plants: Little Bluestem, Pine Barrens Reed Grass, and Lopsided Indian Grass; nectar plants
Dorymyrmex bureni	"A Pyramid Ant"					X	prefer sandy soils in highly disturbed areas like pastures, open fileds, open scrub, sandhills, dunes, lawns, and roadsides
Dorymyrmex medeis	"A Pyramid Ant"					X	prefer sandy soils in highly disturbed areas like pastures, open fields, open scrub, sandhills, dunes, lawns, and roadsides
Mycotrupes retusus	Sandhills Earth Boring Scarab Beetle					X	restricted to deep, well-drained xeric sands of Fall-line Sandhills; mostly fossorial
Rhadinoceraea zigadenusae	Zigadenus Sawfly					X	dependent upon host plant: Death Camas (*Zigadenus densus*)

Wetlands Systems

Southern Atlantic Coastal Plain Nonriverine Swamp and Wet Hardwood Forest

The largest wetland in the north is best generally described as a Southern Atlantic Coastal Plain Nonriverine Swamp and Wet Hardwood Forest System. The example in Azalea Bay is largely dominated by Swamp tupelo (*Nyssa biflora*) with lesser amounts of Pond pine (*Pinus serotina*) and Carolina red maple (*Acer rubrum v. trilobum*). Large examples of Swamp titi (*Cyrilla racemiflora*) are in the mid stratum with many clumps of Shining fetterbush (*Lyonia lucida*) growing on elevated *sphagnum sp.* mats.

It is also very common in the proposed conservation area to communities that are mimicking a Small Depression Shrub Border community. Azalea Bay examples express dominate amounts of Swamp titi (*Cyrilla racemiflora)* and Shining fetterbush (*Lyonia lucida).* Lesser amounts of Laurel Greenbriar (*Smilax laurifolia)* and Holly (*Ilex sp.*) can be found with the occasional Loblolly pine (*Pinus taeda)*. In a true Small Depression Shrub Border community one would find more commonly find Pond pine (*Pinus serotina*) in place of Loblolly pine (*Pinus taeda*) but due to the anthropogenic effects of pine plantation these areas in Azalea Bay can only be superficially described as such.

Coastal Plain Depression Swamp (mixed subtype) are seen in smaller, more pronounced, isolated depressions. At Azalea Bay there are examples in the south with a "well-developed canopy of *Taxodium ascendens* or *Nyssa biflora* in a depressional wetland, without a well-developed herb layer. The shrub layer may range from open to dense (Schafale, 2011)." In the case of Azalea bay the shrub layer is moderate to dense with dominate species of Wax myrtle (*Morella cerifera)*, Swamp titi (*Cyrilla recemiflora)* and Shining fetterbush (*Lyonia lucida)*.

Associated Species of Concern with this habitat:

Highest Priority:	Little Blue Heron, Yellow-crowned Night-Heron, Flatwoods Salamander, Tiger Salamander, Carolina Gopher Frog, Broad-striped Dwarf Siren, Chamberlain's Dwarf Salamander
High Priority:	Black Swamp Snake, Chicken Turtle, Florida Cooter, Florida Green Watersnake, Florida Softshell Turtle, Gulf Coast Mud Salamander, Yellowbelly Turtle, Upland Chorus Frog, Mink, Southeastern Bat
Moderate Priority:	Great Blue Heron, Great Egret, Common Snapping Turtle, Spotted Turtle, Southern Dusky Salamander, Northern Cricket Frog

Management recommendations:

1. Management recommendation #3 Wetland Protection
2. Management recommendation #2 Prescribed burning
3. Management recommendation #4 Biological surveys

Appendix 1-A Terrestrial Priority Species and Their Ecosystems						Depressions	
SCIENTIFIC NAME	**COMMON NAME**	**G-RANK**	**S-RANK**	**LEGAL STATUS**	**PRIORITY**	**SPECIFIC HABITAT REQUIREMENTS**	
MAMMALS	-	-	-	-			
Condylura cristata	Star-nosed Mole	G5	S3?	Of concern, State	High	X	swamps, marshes, bogs, streamsides; dense leaf litter
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	G3/G4	S2?	State Endangered	Highest	X	T-beam and I-beam bridges, abandoned buildings, old bunkers and tunnels, cavity trees, rock outcrops, mines, caves
Eptesicus fuscus	Big Brown Bat	G5	SNR		Highest	X	buildings, cavity trees, under bridges and in bat boxes; forage in open fields or forest gaps
Lasiurus cinereus	Hoary Bat	G5	S?		Highest	X	tree cavities, trunks, tree foliage, squirrel nests, and Spanish moss
Lasiurus intermedius	Northern Yellow Bat	G4/G5	S?	Of concern, State	Highest	X	forage over open areas such as fields, pastures, golf courses, marshes, and along lake and forest edges; roost in clumps of Spanish moss or under old palm fronds
Lasiurus seminolus	Seminole Bat	G5	SNR		Highest	X	roost in large pines located near forested corridors; may roost in leaf litter
Mustela vison	Mink	G5	SNR		High	X	near swamps, streams, rivers, ponds, and saltwater marshes
Myotis austroriparius	Southeastern Bat	G3/G4	S1	State Threatened	Highest	X	caves (including limestone sinks), mines, abandoned buildings, and large hollow trees; prefers to feed and roost over water
Perimyotis subflavus	Tri-colored Bat	G5	SNR		Highest	X	abandoned mines and caves, bridges, buildings
Ursus americanus	Black Bear	G5	S3?	Of concern, State	Moderate	X	early successional habitat and forest interior; den sites
REPTILES & AMPHIBIANS	-	-	-	-	-	-	-
Acris crepitans	Northern Cricket Frog	G5	S5	Of Concern, State	Moderate	X	isolated, temporary wetlands with no fish; open grassy marshes or shallow water bodies
Ambystoma cingulatum	Flatwoods Salamander (Frosted)	G2/G3	S1	Federal Threatened; State Endangered	Highest	X	isolated, temporary wetlands with no fish that have open canopy above and abundant grasses and sedges
Ambystoma tigrinum	Tiger Salamander	G5	S2/S3	Of Concern, State	Highest	X	isolated, temporary wetlands with no fish that have open canopy above and abundant grasses and sedges
Chelydra serpentina	Snapping Turtle (Common)	G5	SNR	State Threatened	Moderate	X	soft -bottomed wetlands like rivers, ponds, and lakes that have abundant aquatic vegetation
Clemmys guttata	Spotted Turtle	G5	S5	State Threatened	High	X	small ponds, streams, swamps, flooded bottomland hardwood forests, and other shallow water bodies with soft substrate for burrowing; aquatic vegetation
Eurycea chamberlainii	Chamberlain's Dwarf Salamander	G4	SNR		Highest	X	wetland types like seepages near small streams; leaf litter and small debris
Kinosternon baurii	Striped Mud Turtle	G5	S?	Of Concern, State	Moderate	X	in and around the floodplain swamps of rivers; shallow water; soft substrates
Nerodia floridana	Florida Green Watersnake	G5	S2	Of Concern, State	Highest	X	quiet open water such as Carolina bays, lakes, old rice fields, and reservoirs with "pad plants"
Pseudacris feriarum	Upland Chorus Frog	G5	S3/S4	Of Concern, State	Moderate	X	isolated, temporary wetlands with no fish

Pseudemys floridana	Florida Cooter	G5	SNR	State Threatened	Moderate	X	slow-moving rivers and non-flowing wetlands like ponds and small lakes with soft bottoms, basking sites, and aquatic vegetation
Pseudobranchus striatus striatus	Broad-striped Dwarf Siren	G5	S2	State Threatened	Highest	X	isolated, shallow, acidic, temporary wetlands with no fish that have open canopy above and abundant grasses and sedges; small streams with no flow and muck bottoms sometimes
Rana capito capito	Gopher Frog (Carolina)	G3/G4	S1	Federal Threatened; State Endangered	Highest	X	isolated, temporary to semi-permanent wetlands with no fish that have open canopy above and abundant grasses and sedges
Rana palustris	Pickerel Frog	G5	SNR	Of Concern, State	High	X	standing water in late winter; moist habitat usually within hardwood forests; sphagnum bogs, meadows, and grassy fields near shaded streams
Seminatrix pygaea	Black Swamp Snake	G5	S?	Of Concern, State	High	X	wetlands with abundant aquatic vegetation; leaf litter; *Sphagnum* moss
Trachemys scripta	Yellow-bellied Slider	G5	SNR	State Threatened	High	X	non-flowing wetlands like ponds and small lakes with soft bottoms and abundant vegetation
BIRDS							
Ammodramus henslowii	Henslow's Sparrow	G4	SZN	Of Concern, State	Highest	X	moist, grassy areas in open pinewoods
Ammodramus savannarum	Grasshopper Sparrow	G5	SNRB,SNRN		Highest	X	broomsedge fields and other openings
Ardea alba	Great Egret	G5	SNRB,SNRN		High	X	shallow water bodies or shorelines for foraging; trees over or surrounded by water for nesting
Ardea herodias	Great Blue Heron	G5	SNRB,SNRN		Moderate	X	shallow water bodies or shorelines for foraging; trees over or surrounded by water for nesting
Butorides virescens	Green Heron	G5	SNRB,SNRN		Highest	X	shallow water bodies and shorelines for foraging; dense shrubs and thickets near water for nesting
Cistothorus platensis	Sedge Wren	G5	SUB		Highest	X	favor brackish marshes
Egretta caerulea	Little Blue Heron	G5	SNRB,SNRN	Of Concern, State	Highest	X	shorelines, shallow water, or mudflats for foraging; shrubs or trees over or surrounded by water for colonial nesting
Egretta thula	Snowy Egret	G5	SNRB,SNRN		Moderate	X	shorelines, shallow water, or mudflats for foraging; shrubs or trees over or surrounded by water for colonial nesting
Egretta tricolor	Tricolored Heron	G5	SNRB,SNRN		High	X	shorelines, shallow water, or mudflats for foraging; shrubs or trees over or surrounded by water for colonial nesting
Eudocimus albus	White Ibis	G5	SNR		Highest	X	shallow water or mudflats for foraging on crustaceans; wet meadows or mudflats for probing; thickets or trees over or surrounded by fresh water for colonial nesting
Gallinago gallinagodelicata	Wilson's Snipe	G5	SNRN		High	X	boggy areas; wet meadows with short grass; along pond and marsh margins for probe foraging
Mycteria americana	Wood Stork	G4	S1S2	Federally Threatened and State Endangerd	Highest	X	shallow water with concentrated prey (6-10 in. deep) for foraging; trees over or surrounded by water for colonial nesting, particularly cypress swamps and trees on small islands
Nyctanassa violacea	Yellow-crowned Night Heron	G5	SNRB,SNRN		Highest	X	shorelines of water bodies for foraging, especially for crustaceans; trees or thickets near water for colonial nesting, will nest in trees that are on dry lands
Progne subis	Purple Martin	G5	SNRB		High	X	forage over open areas near or over water; nest in man-made houses or gourds
INSECTS							

Acanthametropus pecatonica	"A Mayfly"					X	mesic forests near water
Dolania americana	American Sand Burrowing Mayfly	G4	S3			X	mesic forests near water
Euphyes bimacula	Two-Spotted Skipper					X	isolated wetlands: open bogs, fens, and marshes with *Carex* sp.; nectar plants like iris
Homoeoneuria dolani	"A Mayfly"					X	mesic forests near water
Rhadinoceraea zigadenusae	Zigadenus Sawfly					X	dependent upon host plant: Death Camas (*Zigadenus densus*)
Siphlonurus decorus	"A Mayfly"					X	mesic forests near water
Somatochlora calverti	Calvert's Emerald	G3	SNR			X	boggy forest seepages for breeding; forest openings for foraging
Taeniopteryx robinae	Savannah Willowfly	G1	SNR			X	mesic forests near water
Toxorhynchites rutilus rutilus	"An Elephant (Tree Hole Mosquito)"					X	tree holes and artificial basins for breeding; nectar producing plants for foraging
Toxorhynchites rutilus septentionalis	"An Elephant (Tree Hole Mosquito)"					X	tree holes and artificial basins for breeding; nectar producing plants for foraging
TERRESTRIAL LEECHES							
Haemopis septagon	"A terrestrial leech"				High	X	moist areas near water sources; feeds on earthworms; only known from Georgetown County but probably more widespread in Pee Dee region of Coastal Plain

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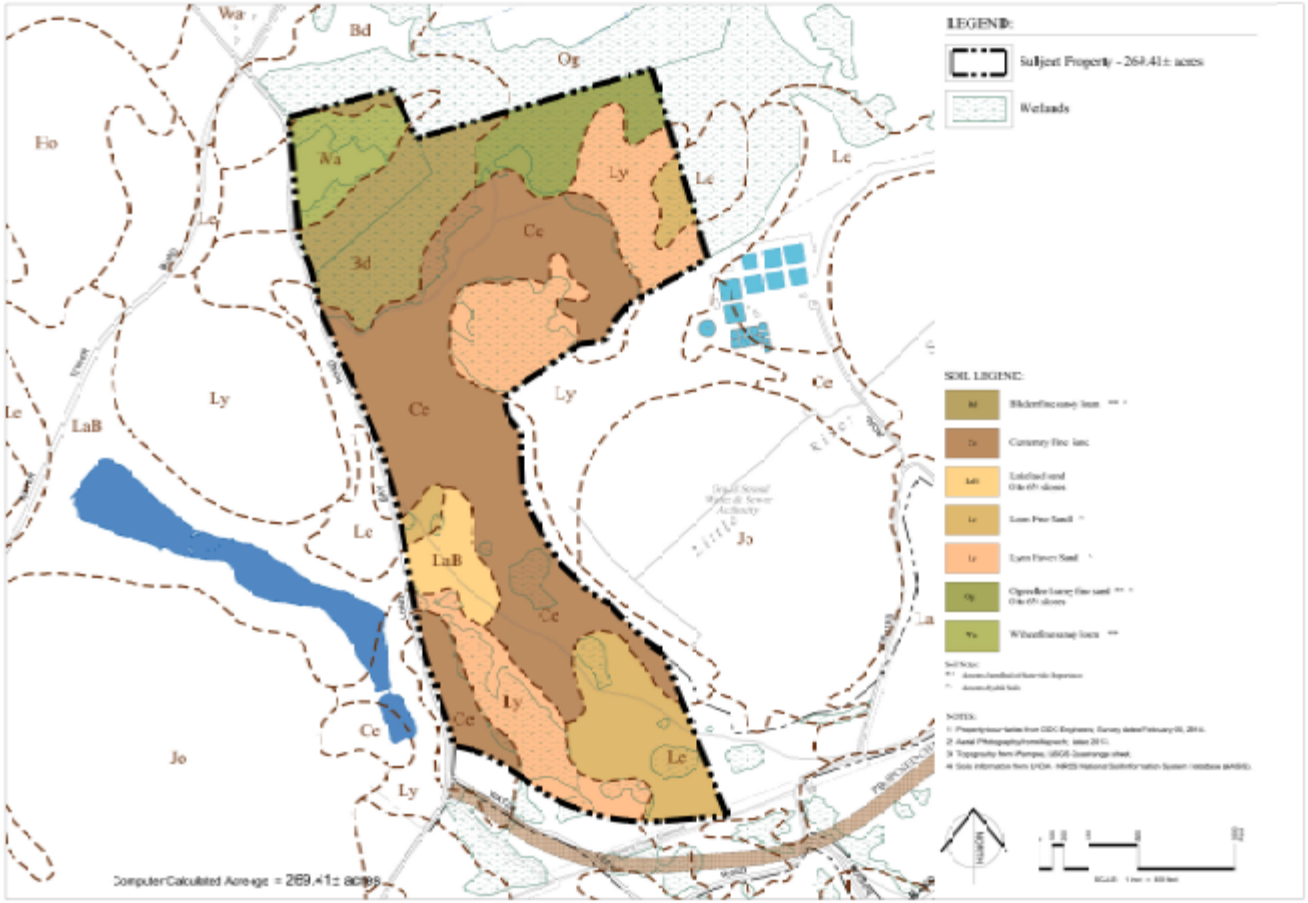
V. Maps

A. Soils
B. Land Use
C. Aerial
D. Concept Plan



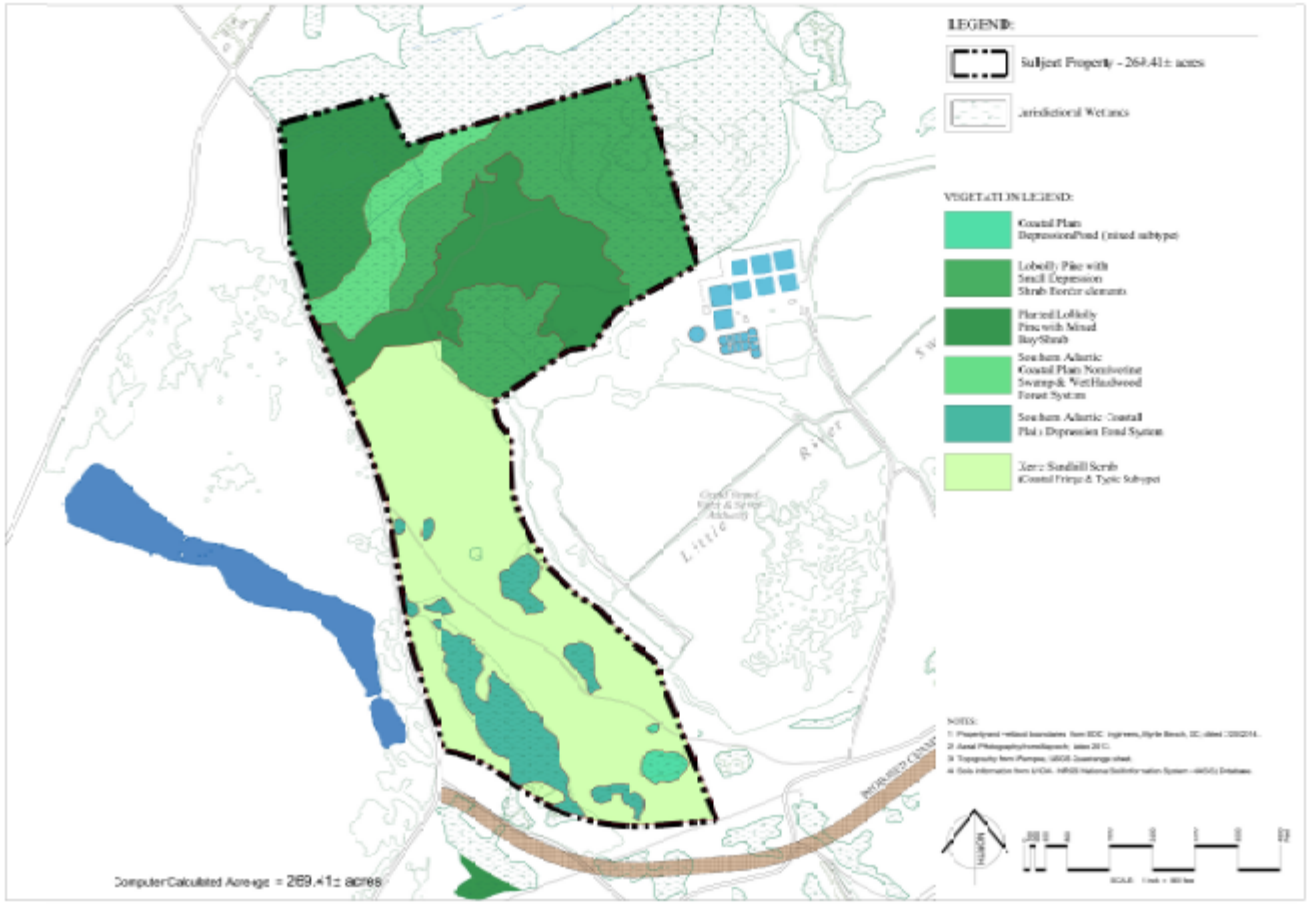
SOILS MAP

AZALEA BAY RESORT

BERRY COUNTY, SOUTH DAKOTA

SOILS MAP

North American LAND TRUST



LAND USE MAP

AZALEA BAY RESORT

HORRY COUNTY, SOUTH CAROLINA

LAND USE MAP

North American LAND TRUST

LEGEND:

Subject Property - 269.41± acres

NOTES:

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]

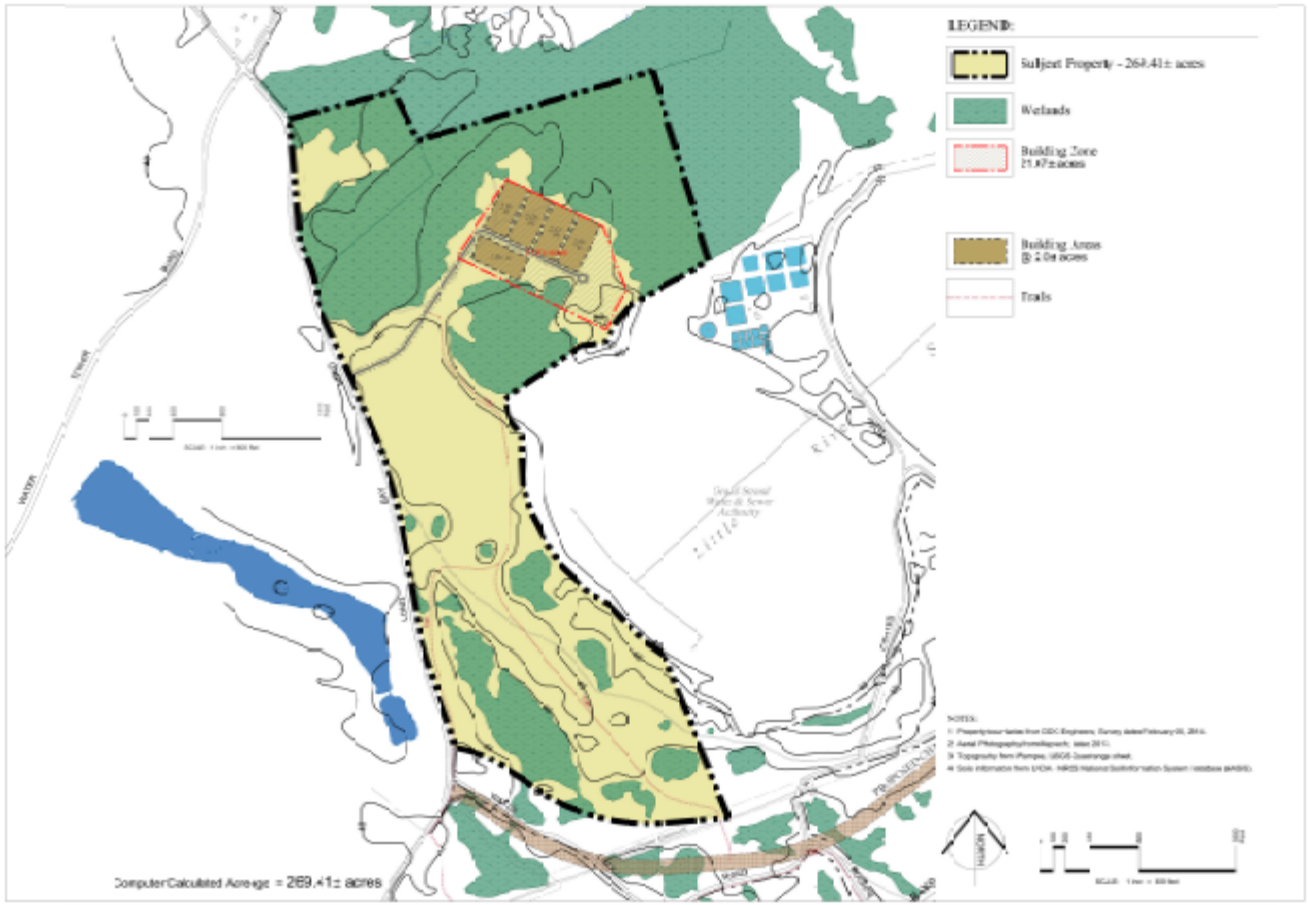
AZALEA BAY RESORT

HORRY COUNTY, SOUTH CAROLINA

AERIAL PHOTOGRAPH

North American LAND TRUST

AERIAL PHOTOGRAPH



CONCEPT PLAN

AZALEA BAY RESORT

BORRY COUNTY, SOUTH CAROLINA

CONCEPT PLAN

North American LAND TRUST

VI. Next Steps and Activity Timeline

NALT recommends the following tasks during the first year of operation:

1. Identify Conservation Management Team to include:
    a. Forestry Management Contractor
    b. Prescribed burning contractor
    c. Road maintenance contractor (general)
    d. Site improvement/repair contractor (construction)
    e. Lagoon maintenance contractor (as necessary)
    f. Biological expertise (as necessary)
    g. Site security contractors (as necessary)
    h. Natural resource agencies and partners

2. Develop a list of local partners/players to open dialogue as necessary:
    a. Utility companies (particularly with powerline easement rights of way)
    b. Local government and planning departments
    c. Academics or natural resource partners
    d. Adjacent POA/landowners
    e. Hunt clubs
    f. State parks or nearby Preserves
    g. Local NGO partners

3. Meet with contractors on CMP Plan components to obtain bids, determine timetable for implementation

4. Draft annual Management Budget for the property (begin 3-5 year projection)

5. Implement Conservation Management Plan to include

6. Modify budget and timetables for the next five-year period.

VII. Proposed Budget

Sample budget to be used for implementation				
Proposed 2015-2016 Budget				
	Proposed Cost	Committed	Discretionary	Notes
Site Maintenance				
Securing site gate, locks, fencing, etc.)				
Misc (signs, hardware, etc.)				
Routine mowing				
Preserve				
ROW				
Drainage pipes				
Road repair/maintenance				
Habitat Enhancement/Land Mngmt				
Prescribed burning				
New firebreaks/trails				
Burning (labor, equip, etc.)				
Timber thinnings				
Improvement cut/transition				
Removal of regeneration stands				
Invasive species treatments				
Lagoon Management				
Water quality monitoring/treatment				
Fish stocking				
Native Grass/Prairie Restoration				
Wildlife Management				
Nuisance control (hogs, beavers, etc.)				
Healthy herd management				
Biological surveys/enhancements				
Wetland enhancement/restoration/monitoring				
Biological surveys				
Site improvement				
Building envelope/view shed ex.				
New trails				
Capital Expenditure/Amenity/Improvements				
Fishing dock/pier				
Boardwalks				
Docks				
Site inspection and management				
Total				
Total Committed				
Total Discretionary				

Appendix 1: Conservation Easement and Baseline Documentation