White Sands Village
Conservation Management Plan

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Contents

Executive Summary

This plan details goals, objectives, actions, metrics, and expected outcomes for a property in Horry County, SC. This plan addresses the period 2017 through 2047. A conservation easement was donated to the North American Land Trust in 2016 North American Land Trust was engaged to assist with development of conservation management strategies and techniques for the property based on its field work identifying conservation purposes and values during the easement drafting process, and its knowledge of the reserved rights and intended use for the property. This plan includes detailed instructions on how to manage the property and very preliminary costs and benefits of management. The authors fully expect that the plan will be modified regularly as conditions (market, ecological, and owner direction) change over time.

Given the size, location and topography, the property should be managed for wetland habitats and upland pine to provide habitat for local wildlife and sequester carbon. Both wetland and upland habitats are currently impacted by past land practices, and opportunities exist for restoration of both forested wetlands and longleaf pine (*Pinus palustris*). Restoring natural hydrology and fire regime is a high priority.

Property Overview and Characteristics:

The White Sands Village property is located in Horry County, South Carolina and consists of approximately 181 acres (Figure 1). The property has been used for the production of forest products and recreational hunting in recent years. Historically, the property was probably farmed in part as evidenced by the extensive system of drainage ditches.

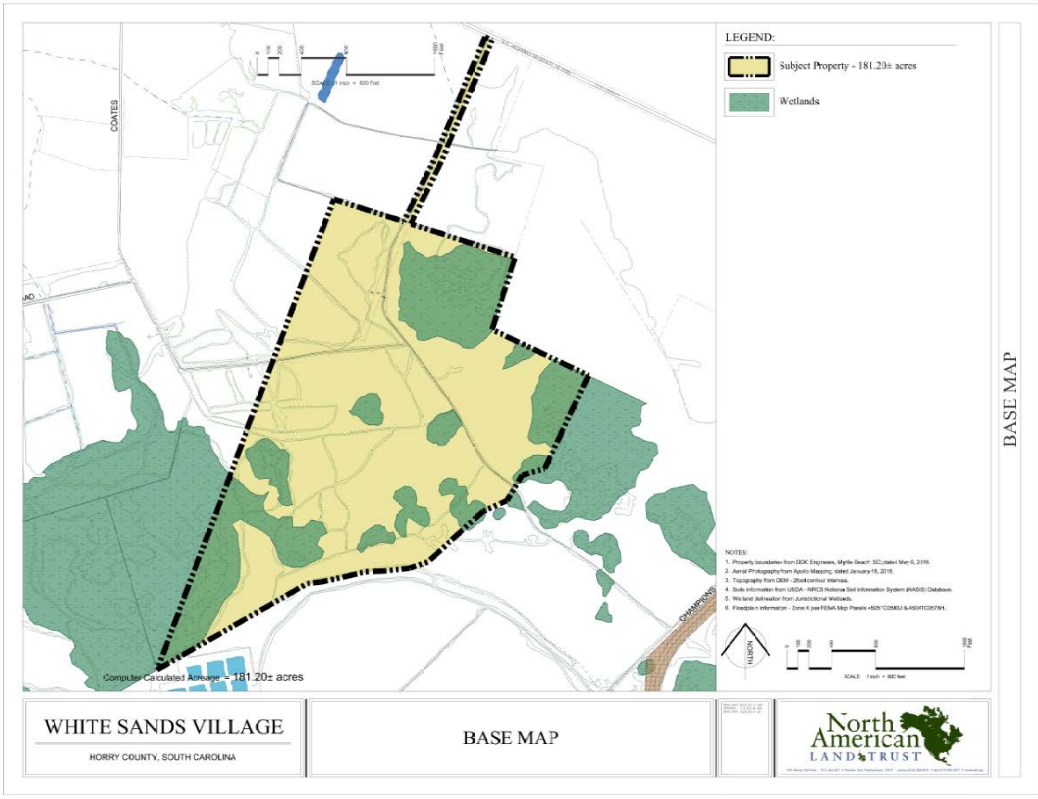

Figure 1: White Sands Village Resort Conservation Area, Horry County, SC.

In 2016, the property was protected by a conservation easement (see Appendix A). A building zone consisting of approximately 11.2 acres has been established as indicated in Figure 2.

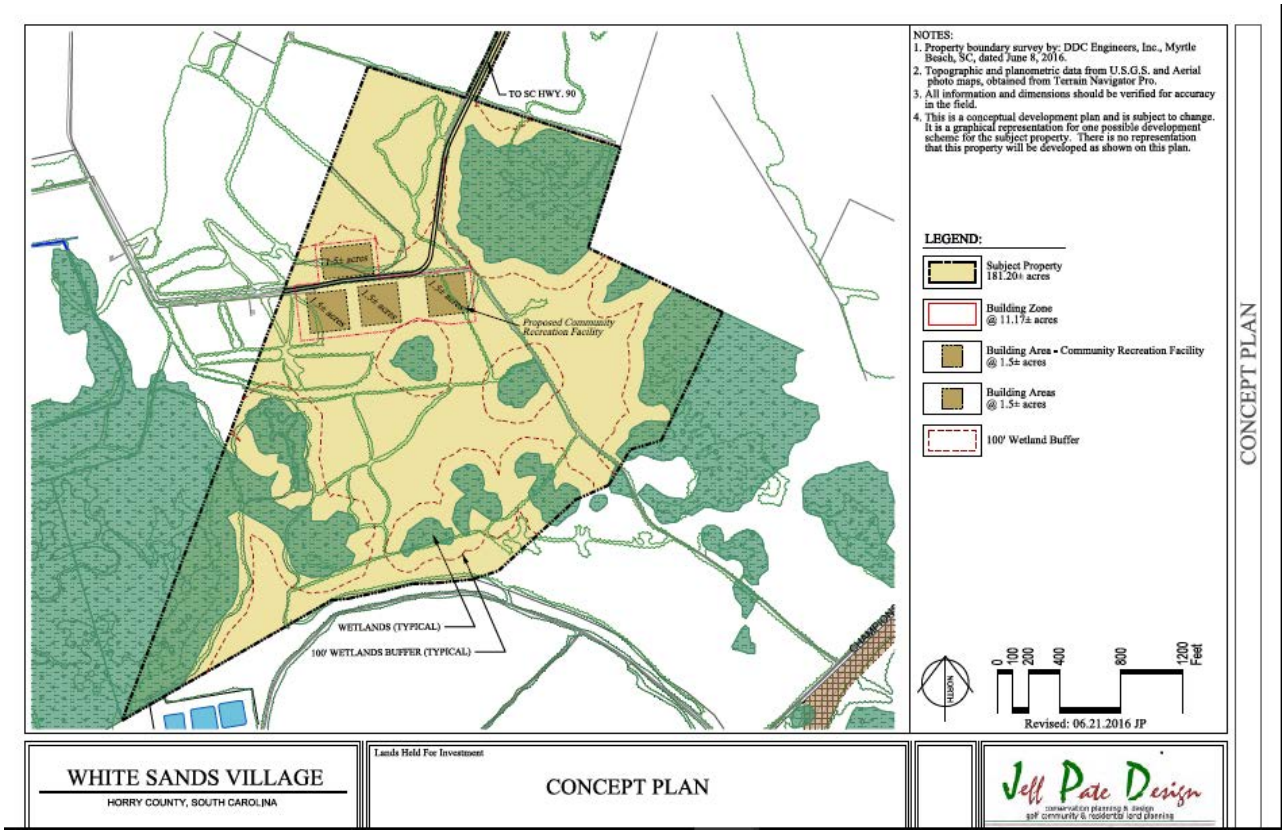

Figure 2: Development Zone accessed off Coates Rd.

Based on USGS topographic map data[1], elevation topography is negligible and elevation is approximately 40' above sea level. Rainfall averages 52" annually[2].

The subject property abuts two other conservation properties, a conservation easement held by the North American Land Trust on the west, the Ocean Grove Conservation Area, and on the south, the Peter Horry Preserve, an innovative wastewater facility owned by the Horry County Water and Sewer Authority to naturally treat wastewater, and protect Carolina Bays. White Sands Village is a priority property for protection within the Horry County Open Space Program initiative.

[1] See USGS Topographic data archive at http://store.usgs.gov/b2c_usgs/usgs/maplocator/(ctype=areadetails&xcm=r3standardpitrex_prd&carea=$root&layout=6_1_61_48&uiarea=2)/.do .

[2] http://www.weather.gov/media/ilm/climate/CRErecordsNormals.pdf .

The property is accessed from Hwy 90 on the northern boundary. Interior forest roads have been installed to access the entire property by 4-wheel drive in all weather conditions (in the absence of flooding).

Habitats and Species:

Three naturally occurring Ecological Systems are supported on the property (2016). Upland areas are best described as pine woodlands. The property contains scattered natural wetlands and extensive man-made ditches that have naturalized to linear wetlands.

1. Southern Atlantic Coastal Plain Depression Pond (CES203.262): This type is biologically important and described fully in the biological assessment for the property (Echols 2016).

2. Pine woodlands community: Canopy dominants are almost entirely loblolly pine (Pinus taeda). Young stands are monotypic. Older stands contain a higher diversity of oaks and softwood species in the canopy. As one travels closer to the edges of wetlands, the understory resembles wet flatwoods communities with an abundance of gallberry (Ilex glabra), shining fetterbush (Lyonia lucida) and other wetland species (Echols 2016).

3. Atlantic Coastal Plain Longleaf Pine Woodland (CES203.281). This community is tentatively placed within the Atlantic Coastal Plain Xeric Sandhill Scrub (CEGL003590) association, and it fits broadly within the Sandhill Pine Woodland type as described within Chapter 4 of the 2015 South Carolina State Wildlife Action Plan. According to the SC SWAP, Sandhill Pine Woodlands are known to support over 50 Terrestrial Priority Species for the Coastal Plain ecoregion (Echols 2016).

There are many species potentially using the property in its current condition and additional species that are expected to use the restored habitats on the site that will result from the management envisioned. State Wildlife Action Plan Species of Greatest Conservation Need (adapted from SWAP 2015) priority "High" or "Highest" and/or with legal status "State Threatened", "Federal Endangered", and/or "Federal Threatened"[3] are included in Appendix 5. These total

[3] Black bear and southern fox squirrel are included due to interest by landowner.

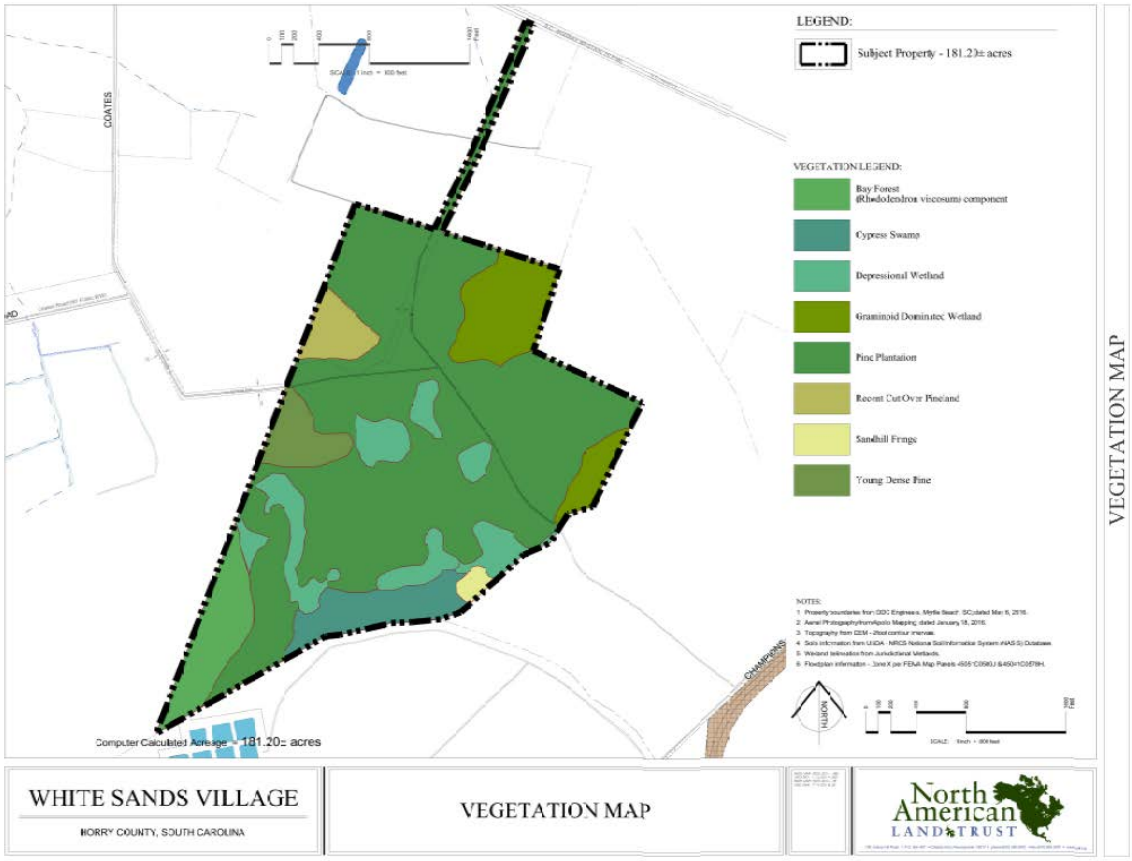

Figure 1: Vegetation types at White Sands Village.

Regional context: The White Sands Village property is in the Little River (HUC 030402080301) watershed within the larger PeeDee River system and the Atlantic Coastal Plain & Flatwoods Ecoregion[4] (McNab 2007). This eco-region is characterized by "a weakly dissected, flat alluvial plain of well drained deep sands with local areas of highly organic soils. The main forest vegetation is forest of longleaf-slash pine and loblolly-shortleaf pine cover types, with oak-gum-cypress along rivers." This region, however, has been severely altered over time due to settlement, farming and timber operations. Ditching, farming, and conversion to loblolly pine plantation is very common and more recently conversion to housing and associated support infrastructure is a growing source of land use change.

Ecological significance: The South Carolina State Wildlife Action Plan (SWAP 2015) extensively describes the threats and species of greatest conservation need (SGCNs) associated with the aquatic and terrestrial habitats of the PeeDee watershed within which the property resides. Habitat protection, private land cooperation, and habitat restoration as envisioned by this plan are called out specifically as the highest priorities in the SWAP. Specifically on page 5-17 of the SWAP:

[4] See US Forest Service Definitions at http://www.edc.uri.edu/atmt-dss/report_forecast/landscape_dynamics/SectionDescriptions.pdf .

Restore and enhance impaired habitat, where feasible and cost-effective. Habitat enhancements include:

a) Encourage nest/roost site retention/restoration
b) Employ prescribed burning
c) Restore natural stream courses and flows
d) Eliminate or reduce invasive and non-native species from habitats
e) Replant native plants
f) Wetland restoration

The SWAP goes on to specifically identify urban sprawl as a threat, mentioning Myrtle Beach as an example, and calling on land trusts specifically to assist with protection of habitat through acquisition and easements (p. 5-34). Additionally a portion of the property is identified as a high priority for conservation action by the South Atlantic LCC Blueprint[5], a multiagency effort to merge and analyze multiple datasets and identify areas on the ground where conservation work should be a priority.

Under the proposed management plan, the property should provide habitat for multiple species of greatest conservation need. A potential species list of rare, threatened, and endangered species by status category is included in Appendix 3. The South Carolina State Wildlife Action Plan (SWAP 2015) provides a generalized description of the ecoregion and discusses the various taxa specific conservation plans that cover the area. The specific management actions recommended to address Conservation Action Area 8: Urban and Developing Lands –

a. *Protection of habitat through acquisition and easements.*

This plan inherently protects habitat through an easement held by the North American Land Trust.

b. *Habitat (corridor and buffer) research and public education.*

While research and public education are not a part of this plan, protection of buffers and corridors is inherently a part of the plan since surrounding properties are also conservation areas.

c. *Strengthen comprehensive planning through research, enforcement, and public education. Coordinate the development process between the developer and local level stakeholders in a one-stop-shop manner.*

This plan incorporates very limited development in the form of four home sites (Figure 2) sited carefully to avoid negative impacts to the conservation values of the property.

d. *Promote better storm water management regulations and techniques on impervious surfaces. Develop constructive wetlands education and incentives.*

This plan avoids the vast majority of impervious surface potential on the property. If the property were developed in a business-as-usual manner for the area, impervious surface could by 100x greater or more.

[5] See http://blueprint.southatlanticlcc.org/v2.1/index.html

e. *Develop a higher-level coordination and training program for all levels of government and professionals, including appointed and elected officials.*

This isn't a part of the current plan, however coordination with local and state officials is ongoing.

Management Goals and 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:

- To protect and restore wetland habitat
- To re-introduce prescribed burning for upland portions of the property
- To protect and document biodiversity
- To preserve, fulfill and enhance Conservation Values and Purposes
- To restore and maintain road, trail and firebreak networks
- To sequester carbon to mitigate climate change
- To protect water quality
- To maintain a pleasing aesthetic to the property

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

Desired Future Condition: The desired future condition of the property is a mix of mature longleaf pine with an open understory on upland sites and a mature hardwood forest on wetland sites. The effect of ditches are minimized and hydrology is restored over most of the site. Fire regime is restored and conducted on a regular basis on as much of the property as can be safely burned. Existing trash dumps are removed. Access to the site is restricted with one gate on the old farm road into the property. The boundaries are marked. Invasive species are removed to the extent possible utilizing prescribed burning and spot application of herbicides.

Management Recommendation #1: Water Quality Protection/Riparian Protection Zone/Wetland Restoration

Overview: The property includes multiple wetlands currently, and the extensive forested area of the property provides important buffering and protection of those wetlands.

1. Wetland buffer protection: The vegetation around the existing wetlands should be protected throughout the property. South Carolina best-management-practices for silvicultural buffers (SC Forestry Commission 2007) call for a streamside/wetland management zone of 40' for timber operations. A buffer of 100' is recommended to insure minimum impact to wetland habitats.

2. Road Building and Maintenance: SC Forestry Commission (2007) makes recommendations regarding road grade, drainage control structures, culverts, stream crossings, and seeding unused roads. Plant materials for seeding roads should not include invasive species. These BMPs should be followed carefully to eliminate sedimentation into the stream during severe rainfall events.

Management recommendations:

1. Designate a riparian protection zone of 100' for timber operations.
2. Carefully follow water protection BMPs to eliminate sedimentation.
3. Restore additional wetlands by plugging ditches where possible.

Wetlands map with 100' buffer indicated.

Management Recommendation #2: Invasive Species Control

Overview: Invasive species are a major conservation challenge and can severely degrade a property if steps are not taken to deal with the problem. Invasive species outcompete native vegetation, and since they have few native insects that can forage on their leaves, they reduce the availability of insect larva and adults that are available during the breeding season for birds and other wildlife.

While the subject property is not badly impacted by invasive species at present, some invasive species were observed and dealing with them before they become a nuisance is recommended. Two invasive species observed on the site, Chinese wisteria (*Wisteria sinensis*) and Japanese honeysuckle (*Lonicera japonica*) are relatively simple to address with herbicides and burning.

Management recommendations:

1. Identify areas currently containing invasive species, and remove by cutting, pulling, and/or the use of herbicides. Follow label instructions for the use of herbicides.
2. Reintroduce ground fires through prescribed burning.

Figure 3: Chinese wisteria (Wisteria sinensi)

Figure 2: Japanese honeysuckle (Lonicera japonica)

Management Recommendation #3: Reintroduce Low-Impact Ground Fires.

***Overview*:** One of the singular most destructive factors for natural habitats in the southeast has been the suppression of natural fires. In pre-settlement South Carolina, large areas were burned frequently through the actions of Native Americans or as a result of lightning. Fire suppression has resulted in species and stocking changes in forests and reductions in forbs and grasses. NALT recommends prescribed burning of the property as safety and resources allow using certified contractors or certified volunteers from nonprofits and government agencies. Refer to standard procedures and protocols such as SC Forestry Commission (2007).

Management recommendations:

1. Develop a burn plan that maps burn units, fire lines, timing, required personnel and equipment, permits, and communications with local authorities/neighbors.
    a. Identify areas that may be burned with specific weather patterns
    b. Identify smoke management protection zones
2. Conduct spring ground fires on a 5-year cycle if possible.
3. Collaborate with local nonprofits and government agencies to share resources and reduce costs.

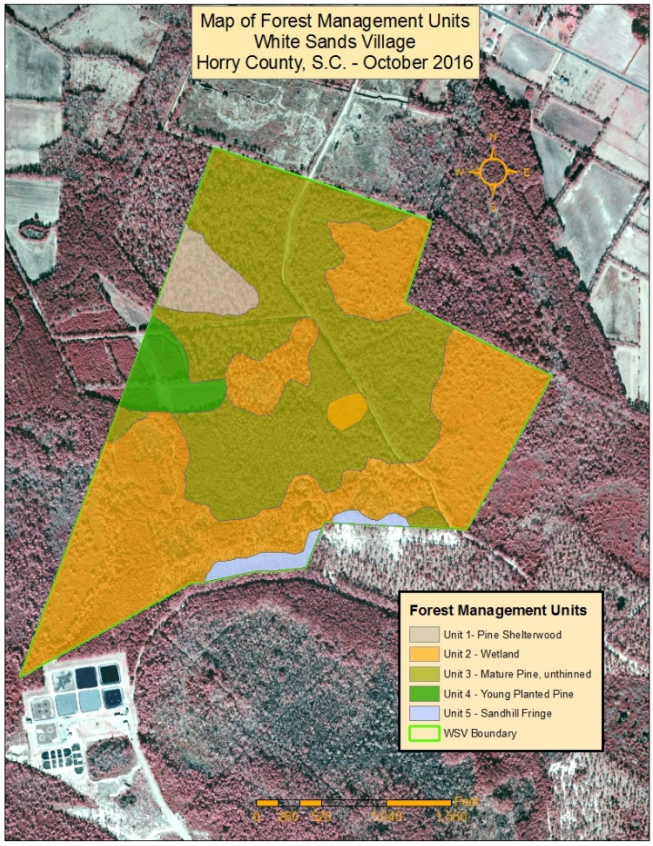

Figure 4: Management units 4 and 5 are planned for periodic low intensity prescribed fire (see Appendix 4) within the 10 year forest management planning horizon. Ultimately all the upland management units should be burned.

Management Recommendation #4: Manage Forest for Old-Growth Habitat and Carbon Sequestration

Although some timber has been removed recently from the property, significant loblolly pine volume still remains. Given the small size of the property and the fact that some of the timber value has been removed, NALT recommends removal of mature pine and conversion to native longleaf pine (*Pinus palustris*) where possible. A schedule for harvest and replanting is included in Appendix 4.

A typical management process would include:

a. controlled burning to reduce understory
b. group selection timber harvest to remove loblolly, generate revenue, and make room for longleaf reintroduction
c. thinning of younger stands of loblolly down to 60-80 sq. ft. basal area
d. spot herbicide invasive species colonizing harvest areas
e. supplemental planting to improve tree species diversity in hardwood stands and planting longleaf pine.

Management recommendations (from Wooten 2016):

1. *Timber Harvest on Unit 3* – It is recommended that a group selection type of timber harvest be conducted in Unit 3 during 2018. The primary goal of the harvest is to release hardwood trees in spots where they have been well established in the mid-story. The secondary goal is to provide supplemental timber income. It should be noted that a smaller acreage of this same forest type is present on the Ocean Grove Resort Conservation Area. It will be advantageous to the economics of the timber harvest to conduct this same treatment on the OGRCA property at the same time.

2. *Controlled Burn in Unit 5* - This forest type is fire-dependent. Historically the suite of plants found within this type were promoted through periodic understory fire. Currently the overstory with its lack of longleaf pine and the understory with its sparse representation of fire-dependent herbs indicates that the vegetative integrity of the plant community has been degraded through past management practices.

3. *Thinning in Unit 4* - It is recommended that the trees in this unit be thinned in 2022. The primary goal of this thinning is to prepare for the conversion of the unit to a longleaf pine forest. The secondary goal is to provide supplemental timber income. This unit is located on the site of the best drained soils on the property. The trees on the unit should be extensively thinned down to a condition that resemble a shelterwood stand. This means thinning down to basal area of 50 to 60 square feet. Such a low residual basal area should allow for moderate sun/shade conditions that will be conducive to the establishment and growth of planted longleaf pine seedlings in the understory. When targeting trees for removal by thinning, care should be taken to leave

the most dominant and structurally sound trees. These residual overstory trees will eventually be removed once the longleaf saplings have become well established.

4. *Controlled Burns on Unit 4* – It is recommended that two controlled burns be conducted on Unit 4. The primary goal of these burns is to prepare the site for the re-establishment of a periodic fire regime' and for the conversion of the unit to a longleaf pine forest. It is the intention to use these burns to eliminate the growth of competing plants that will most probably arise after the unit is thinned. It is also possible that the fires will facilitate the establishment of fire-adapted forbs and grasses.

5. *Planting in Unit 4* – It is recommended that longleaf pine seedlings be planted at a rate of 300-400 seedlings per acre in Unit 4. There are several sources for such seedlings including the South Carolina Forestry Commission nursery. Genetically improved containerized seedlings can be acquired from the SCFC nursery and it is suggested that this grade of seedling be planted. Although an understory planting of longleaf is a bit unusual and may preclude mechanical planting, a competent contractor should be able to hand plant the unit if necessary.

Figure 5: Longleaf pine (Pinus palustris) forest after frequent prescribed burns (Photo: William D. Boyer, U.S. Forest Service).

Management Recommendation #5: Priority Species/Biological Surveys and Botanical Inventories

Overview: Numerous priority species have been identified, or are suspected to exist at the subject property. Locations for these should be identified on the Priority Species Map when discovered. 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.

Management Recommendations:

1. Establish a species list for the property identifying each species in relationship to state and regional conservation priority. An initial draft list may be found in Appendix 3.
2. If resources for inventories are limited, focus on species groups that are likely rare, threatened, and endangered, and are detectable by low cost techniques (e.g. bats).
3. Partner with qualified organizations such as
    a. South Carolina Department of Natural Resources
    b. Local universities
    c. Coastal Carolina Herpetological Society
    d. South Carolina Chapter of The Wildlife Society
    e. South Carolina Chapter of the American Fisheries Society
    f. The Carolina Bird Club

    to include the property in regional and national monitoring programs like eBird, the North American Amphibian Monitoring Program, the Breeding Bird Survey etc.

Management Recommendation #6: Site Maintenance and Security

Overview: The property has a history of trash dumping and trespass by members of the community. With more activity on the site, this problem is expected to decline, but the trash that has been dumped on the property will need to be removed.

Management Recommendations:

1. Mark the boundary of the property with marking paint. Install "No Trespassing" signs at gates and obvious points of entry.
2. Remove trash as needed by hiring local community groups e.g. church youth groups, boy scouts, and/or girl scouts. Take care to clear areas of snakes and bees/wasps before sending in crews. Make a donation to the participating community groups' charity of choice.
3. Gate access roads with combination locks. Post name and phone number of property contact. Use bar gates set in concrete and protected lock hasps to limit break-ins[6].
4. Close unused roads with logging debris.

[6] A specifications guide for gates is published by the US Forest Service and available at https://www.fs.fed.us/eng/pubs/pdf/06231201.pdf.

Management Recommendation #7: Outdoor Passive Recreation

Overview: As the property is managed towards more natural vegetation and processes, wildlife diversity should improve supporting wildlife watching activities. Those same processes should improve game animal populations supporting both small game (quail) and large game (turkey and deer) hunting. NALT recommends using existing road beds where possible to develop a network of trails through the property on upland sites. A suggested trail network map is presented in Figure 6 amounting to .93 miles of trails on the property and connecting with neighboring properties to reach the recreation center to the south. A connection to the trail network on the White Sands Conservation Area to the east is also suggested allowing users to hike or bike from the property to the North Myrtle Beach Park and Sports Complex (presuming a right-of-way still exists on the old road from the White Sands property to Champion's Boulevard).

Management Recommendations:

1. Emphasize passive wildlife watching, and allow hunting within state wildlife law requirements.
2. Develop trails (hiking and mountain biking) utilizing existing roads, planned fire lines, or forest harvest roads to minimize impact to surrounding vegetation and minimize cost and upkeep.
3. Connect the trail network to the neighboring property and develop a trail to the North Myrtle Beach Park and Sports Complex.
4. Maintain trails regularly by mowing. Since trails will be heavily shaded, biannual mowing should be sufficient.

Figure 6: Proposed Trail Network (yellow lines)

Activities Timeline

The following schedule of activities at the property is provided for planning purposes:

Unit	Year	Practice
Perimeter	2017	Mark external boundary
Total property	2017	Remove debris dumped illegally
Unit 3	2018	Group selection timber harvest
Unit 5	2018	Controlled burn
Unit 4	2022	Pulpwood thinning
Unit 4	2023	Controlled burn
Unit 5	2023	Controlled burn
Unit 4	2025	Controlled burn
Unit 4	2026	Longleaf pine planting
Unit 5	2027	Controlled burn
Invasive Species Control	As needed	Herbicide treatment
Biological Inventory	As available.	Work with partners to identify species using the property.

Tangible Costs and Benefits

Projected Timber Income and Cost of Recommended Practices									
		current	2018	2022	2023	2025	2026	2027	Net
Estimated timber value									
Unit 3		$124,795	$129,786						
Unit 4		$10,625		$12,927					
Estimated timber revenue									
Unit 3			$45,425						$45,425
Unit 4				$9,049					$9,049
Estimated cost of recommended practices									
Unit 4									
controlled burn					-$500	-$285			-$785
longleaf planting							-$1,355		-$1,355
Unit 5									
controlled burn			-$700		-$700			-$700	-$2,100
Mark Boundary		-$500							-$500
Trails Establishment		-$500							-$500
Trails Maintenance			-$1,000	-$1,000	-$1,000	-$1,000	-$1,000	-$1,000	-$6,000
net income/cost =									$43,234

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Appendix 1: Conservation Easement and Baseline Assessment

Appendix 2: Author Qualifications

Patty Kennedy is the Conservation Management Director of the North American Land Trust based in Bluffton, South Carolina. Ms. Kennedy has ## years experience in conservation projects for land trusts throughout the Southeast. Ms. Kennedy received her B.S. degree…..

Jeff Waldon is currently serving as an advisor regarding land management, carbon, biomass energy, timber, and wildlife. He was recently the Director of Conservation and Education for the Virginia Conservation Legacy Fund, a nonprofit organization based at Natural Bridge, VA. Mr. Waldon has extensive experience in international forestry, biodiversity, carbon sequestration, and the international carbon markets.

He also serves as the Chief Technical Officer for Forest Carbon Offsets LLC a company devoted to the development of forest carbon offset projects in tropical forests and the United States. FCO developed the first Reduced Emissions from Deforestation and Degradation (REDD) project in the tropical western hemisphere certified by both the Climate, Community and Biodiversity Alliance and the Verified Carbon Standard. Mr. Waldon is currently involved in multiple projects in Belize.

Mr. Waldon was formerly the Executive Director of the Conservation Management Institute, a center within the College of Natural Resources at Virginia Tech and managed research centers at Virginia Tech for 23 years. The Conservation Management Institute employed over 80 faculty, staff, and students working on projects ranging from field surveys of animals and plants to biomass energy to GIS, remote-sensing, and web-based decision support systems development for agency land management.

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Appendix 4: Silviculture and Prescribed Burning

Insert Wooten FMP

Appendix 5: Species List

						COASTAL PLAIN ECOREGION				COASTAL ZONE ECOREGION			
SCIENTIFIC NAME	COMMON NAME	G-RANK	S-RANK	LEGAL STATUS	PRIORITY	Pine Woodland	Mesic Forest	Carolina Bays	Depressions	Pine Woodland	Mesic Forest	Depressions	SPECIFIC HABITAT REQUIREMENTS
MAMMALS													
Myotis austroriparius	Southeastern Bat	G3/G4	S1	State Threatened	Highest		X	X	X		X	X	caves (including limestone sinks), mines, abandoned buildings, and large hollow trees; prefers to feed and roost over water
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	G3/G4	S2?	State Endangered	Highest	X	X		X			X	T-beam and I-beam bridges, abandoned buildings, old bunkers and tunnels, cavity trees, rock outcrops, mines, caves
Lasiurus intermedius	Northern Yellow Bat	G4/G5	S?	Of concern, State	Highest	X	X		X	X	X	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 cinereus	Hoary Bat	G5	S?		Highest	X	X	X	X	X	X	X	tree cavities, trunks, tree foliage, squirrel nests, and Spanish moss
Ursus americanus	Black Bear	G5	S3?	Of concern, State	Moderate	X	X	X	X	X	X	X	early successional habitat and forest interior; den sites
Condylura cristata	Star-nosed Mole	G5	S3?	Of concern, State	High	X			X				swamps, marshes, bogs, streamsides; dense leaf litter
Sciurus niger niger	Southern Fox Squirrel	G5	S4	Of concern, State	Moderate					X			cavity trees
Eptesicus fuscus	Big Brown Bat	G5	SNR		Highest	X	X	X	X	X	X		buildings, cavity trees, under bridges and in bat boxes; forage in open fields or forest gaps
Microtus pennsylvanicus	Meadow Vole	G5	SNR	Of concern, State	High	X							tall grass prairie habitats
Mustela vison	Mink	G5	SNR		High				X				near swamps, streams, rivers, ponds, and saltwater marshes
Lasiurus borealis	Red Bat	G5	SNR		Highest	X	X	X		X	X		thinned stands; roost on smaller branches or twigs, often in the hardwood tree canopy; may roost in leaf litter
Lasiurus seminolus	Seminole Bat	G5	SNR		Highest	X	X	X	X	X	X	X	roost in large pines located near forested corridors; may roost in leaf litter
Lasionycteris noctivagans	Silver-haired Bat	G5	SNR		Highest	X	X			X	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

Perimyotis subflavus	Tri-colored Bat	G5	SNR		Highest	X	X	X	X	X	X	X	abandoned mines and caves, bridges, buildings
REPTILES & AMPHIBIANS	-	-		-	-	-	-	-	-	-	-	-	-
Heterodon simus	Southern Hognose Snake	G2	SNR	Of Concern, State	Highest	X				X			friable soils; underground refugia such as stump holes and rodent burrows; abundance of toads
Ambystoma cingulatum	Flatwoods Salamander (Frosted)	G2/G3	S1	Federal Threatened; State Endangered	Highest	X	X		X	X	X	X	isolated, temporary wetlands with no fish that have open canopy above and abundant grasses and sedges
Ophisaurus mimicus	Mimic Glass Lizard	G3	SNR	Of Concern, State	Highest					X	X	X	open-canopied pine forests; leaf litter or pine needles; underground refugia such as stump holes and rodent burrows
Rana capito capito	Gopher Frog (Carolina)	G3/G4	S1	Federal Threatened; State Endangered	Highest	X	X		X	X	X	X	isolated, temporary to semi-permanent wetlands with no fish that have open canopy above and abundant grasses and sedges
Pituophis melanoleucus mugitus	Pine Snake (Florida)	G4	S2	Of Concern, State	Highest	X	X			X	X		pine sites with well-drained soils; underground refugia such as stump holes and rodent burrows
Pituophis melanoleucus	Pine Snake (Northern)	G4	S2/S3	Of Concern, State	Highest	X	X			X	X		pine sites with dry soils; underground refugia such as stump holes and rodent burrows
Crotalus adamanteus	Eastern Diamondback Rattlesnake	G4	S3	Of Concern, State	High	X	X			X	X		underground refugia such as stump holes and rodent burrows
Eurycea chamberlainii	Chamberlain's Dwarf Salamander	G4	SNR		Highest	X	X	X	X	X	X	X	wetland types like seepages near small streams; leaf litter and small debris
Rhadinea flavilata	Pine Woods Snake	G4	SNR	Of Concern, State	High	X	X			X	X		moist pine flatwoods with many rotten logs; underground refugia such as stump holes and rodent burrows
Crotalus horridus	Timber Rattlesnake	G4	SNR	Of Concern, State	High	X	X			X	X		dry, south-facing slopes at high elevations; rock outcrops or logs for den sites with south face exposed to sun
Seminatrix pygaea	Black Swamp Snake	G5	S?	Of Concern, State	High			X	X			X	wetlands with abundant aquatic vegetation; leaf litter; *Sphagnum* moss
Pseudobranchus striatus striatus	Broad-striped Dwarf Siren	G5	S2	State Threatened	Highest			X	X			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
Micrurus fulvius	Coral Snake (Harlequin)	G5	S2	Of Concern, State	Highest	X	X			X	X		underground refugia such as stump holes and rodent burrows; loose soil for burrowing
Nerodia floridana	Florida Green Watersnake	G5	S2	Of Concern, State	Highest				X			X	quiet open water such as Carolina bays, lakes, old rice fields, and reservoirs with "pad plants"
Ambystoma tigrinum	Tiger Salamander	G5	S2/S3	Of Concern, State	Highest	X	X	X	X	X	X	X	isolated, temporary wetlands with no fish that have open canopy above and abundant grasses and sedges

Alligator mississippiensis	American Alligator	G5	S5	Federal Threatened	Moderate			X					large river swamps, lakes, ponds, coastal impoundments, abandoned rice fields, brackish water marshes, and estuarine tidal creeks; juveniles will use Carolina bays and other seasonal wetlands; shallow waters preferred
Clemmys guttata	Spotted Turtle	G5	S5	State Threatened	High			X	X			X	small ponds, streams, swamps, flooded bottomland hardwood forests, and other shallow water bodies with soft substrate for burrowing; aquatic vegetation
Deirochelys recticularia	Chicken Turtle	G5	SNR	State Threatened	Moderate			X				X	freshwater and wetland systems with still water; surrounding upland habitat of live oak/pine
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
Rana palustris	Pickerel Frog	G5	SNR	Of Concern, State	High				X			X	standing water in late winter; moist habitat usually within hardwood forests; sphagnum bogs, meadows, and grassy fields near shaded streams
Chelydra serpentina	Snapping Turtle (Common)	G5	SNR	State Threatened	Moderate			X	X			X	soft -bottomed wetlands like rivers, ponds, and lakes that have abundant aquatic vegetation
Trachemys scripta	Yellow-bellied Slider	G5	SNR	State Threatened	High			X	X			X	non-flowing wetlands like ponds and small lakes with soft bottoms and abundant vegetation
BIRDS													
Picoides borealis	Red-cockaded Woodpecker	G3	S2	Federal and State Endangerd	Highest	X				X			open pine woods with little to no understory; prefers longleaf; heartwood disease for nest cavity excavation
Aimophila aestivalis	Bachman's Sparrow	G3	S3	Of Concern, State	Highest	X				X			dense grass amongst pines for nesting; saw palemettos in coastal areas
Mycteria americana	Wood Stork	G4	S1S2	Federally Threatened and State Endangerd	Highest			X	X			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
Ammodramus henslowii	Henslow's Sparrow	G4	SZN	Of Concern, State	Highest	X		X	X	X		X	moist, grassy areas in open pinewoods
Limnothlypis swainsonii	Swainson's Warbler	G4T4	S4		High		X				X		in mountains: deciduous or mixed forest ravines with thick understory of rhododendron or mountain laurel; at coast: cane stands in hardwoods
Elanoides forficatus	Swallow-tailed Kite	G5	S2	State Endangered	Highest	X				X	X		open savannahs for foraging; mature trees for nesting near swamps and marshes
Hylocichla mustelina	Wood Thrush	G5	S3?		High		X				X		moist understory of shrubs or saplings in deciduous woodlands; leaf litter

Caprimulgus carolinensis	Chuck-will's-widow	G5	S4		High	X	X	X		X	X		openings for nocturnal feeding; mixed forests with light to moderate understory
Oporornis formosus	Kentucky Warbler	G5	S4		High		X				X		moist hardwood forests with rich understory
Seiurus motacilla	Louisiana Waterthrush	G5	S4		High		X	X					deciduous or mixed forests with rocky streams
Colinus virginianus	Northern Bobwhite	G5	S4		Highest	X				X			brushy areas and grasslands, thickets, woodland margins
Dendroica discolor	Prairie Warbler	G5	S4		High	X				X			open old fields with scattered saplings; open woodlands with shrub-scrub
Caprimulgus vociferus	Whip-poor-will	G5	S4		High		X						openings for nocturnal feeding; mixed forests with light to moderate understory
Coccyzus americanus	Yellow-billed Cuckoo	G5	S4		High		X				X		closed canopy deciduous forests with thick tangles
Icteria virens	Yellow-breasted Chat	G5	S4B		High	X				X			old fields, briar thickets, dry woodland margins;
Contopus virens	Eastern Wood-Pewee	G5	S5		High	X	X	X		X			open forests with sparse midstory
Spizella pusilla	Field Sparrow	G5	S5?		High	X							saplings and shrubs in weedy thickets and woodland margins
Falco sparverius paulus	American Kestrel	G5	SNR		Highest					X			nest cavity in large open area; extensive open areas with high perches for foraging
Ceryle alcyon	Belted Kingfisher	G5	SNR		High			X					sandy vertical banks for nesting burrows; perches near water for foraging
Toxostoma rufum	Brown Thrasher	G5	SNR		High	X	X			X	X		moderate to dense brush and saplings
Columbina passerine	Common Ground-Dove	G5	SNR	State Threatened	Highest	X							shrubs near openings for nesting; sandy bare ground or short grass for foraging
Sturnella magna	Eastern Meadowlark	G5	SNR		High	X							short to medium-height grasses for nesting and foraging
Pipilo erythrophthalmus	Eastern Towhee	G5	SNR		High	X	X	X		X	X		brushy areas; woodland margins and understory
Eudocimus albus	White Ibis	G5	SNR		Highest			X	X			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
Chaetura pelagica	Chimney Swift	G5	SNRB		High	X							open areas for foraging; cavity for nesting (often chimneys)
Passerina ciris	Painted Bunting	G5	SNRB		Highest	X							woodland margins; dense thickets in openings
Progne subis	Purple Martin	G5	SNRB		High				X				forage over open areas near or over water; nest in man-made houses or gourds

Mniotilta varia	Black-and-white Warbler	G5	SNRB,SNRN		High		X						mature hardwood forests; coves
Nycticorax nycticorax	Black-crowned Night Heron	G5	SNRB,SNRN		Highest			X					shorelines of water bodies for foraging; shrubs or trees over or surrounded by water for colonial nesting
Ammodramus savannarum	Grasshopper Sparrow	G5	SNRB,SNRN		Highest	X		X	X	X		X	broomsedge fields and other openings
Ardea alba	Great Egret	G5	SNRB,SNRN		High			X	X			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	X			X	shallow water bodies and shorelines for foraging; dense shrubs and thickets near water for nesting
Ixobrychus exilis	Least Bittern	G5	SNRB,SNRN		Highest			X					shallow water bodies for foraging; marsh vegetation
Egretta caerulea	Little Blue Heron	G5	SNRB,SNRN	Of Concern, State	Highest			X	X			X	shorelines, shallow water, or mudflats for foraging; shrubs or trees over or surrounded by water for colonial nesting
Anas platyrhynchos	Mallard	G5	SNRB,SNRN		Highest			X					freshwater boides for foraging; shallow water with accessible plants and invertebrates
Podilymbus podiceps	Pied-billed Grebe	G5	SNRB,SNRN		Highest			X					fresh or slightly brackish water with emergent vegetation within used for nesting; open water in winter for foraging
Egretta tricolor	Tricolored Heron	G5	SNRB,SNRN		High				X			X	shorelines, shallow water, or mudflats for foraging; shrubs or trees over or surrounded by water for colonial nesting
Nyctanassa violacea	Yellow-crowned Night Heron	G5	SNRB,SNRN		Highest			X	X			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
Aix sponsa	Wood Duck	G5	SNRB,SNRN,SNRM		High			X					nest cavities near fresh water; emergent vegetation; ponds, lakes, rivers, swamps, BEAVER PONDS
Porzana carolina	Sora	G5	SNRN		High			X					freshwater marshes for foraging and nesting
Gallinago gallinagodelicata	Wilson's Snipe	G5	SNRN		High			X	X			X	boggy areas; wet meadows with short grass; along pond and marsh margins for probe foraging
Cistothorus platensis	Sedge Wren	G5	SUB		Highest			X	X				favor brackish marshes
Setophaga virens waynei	Black-throated Green Warbler (Wayne's)	G5TU	SNR		Highest						X		coastal moist forests like swamps and bottomlands with cypress and white cedar

Appendix 6: Forested Wetland Road Best Management Practices

The following is excerpted from SC Forest Commission 2007:

FORESTED WETLAND ROAD CONSTRUCTION

Road construction for silvicultural purposes in jurisdictional wetlands does not require a permit because of the silvicultural exemption under Section 404 of the Clean Water Act. However, to qualify for the silvicultural exemption, the road construction must comply with the following BMPs, (from Clean Water Section 404 Program Definition and Permit Exemption, Part 3 .3).

Federally Mandated BMPs

1. *Permanent roads, temporary access roads, and skid trails in waters of the United States shall be held to the minimum feasible number, width, and total length consistent with the purpose of silvicultural operations and local topographic and climatic conditions.*
2. *All roads, temporary or permanent, shall be locate sufficiently far from streams or other waterbodies(except for portions of such roads which must cross water bodies) to minimize discharges of dredged or fill material into waters of the United States.*
3. *The road fill shall be bridged, culverted, or otherwise designed to prevent the restriction of expected flood flows.*
4. *The fill shall be properly stabilized and maintained to prevent erosion during and following construction.*
5. *Discharges of dredged or fill material into waters of the United States to construct a road fill shall be made in a manner that minimizes the encroachment of trucks, tractors, or other heavy equipment within the waters of the United States (including adjacent wetlands) that lie outside the lateral boundaries of the fill itself.*
6. *In designing, constructing, and maintaining roads, vegetative disturbance in the waters of the United States shall be kept to a minimum.*
7. *The design, construction, and maintenance of the road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body.*
8. *Borrow material shall be taken from upland sources whenever feasible.*
9. *The discharge shall not take, or jeopardize, the continued existence of a threatened or endangered species as defined under the Endangered Species Act, or adversely modify or destroy the critical habitat of such species.*
10. *Discharges into breeding and nesting areas for migratory waterfowl, spawning areas, and wetlands shall be avoided if practical alternatives exist.*
11. *The discharge shall not be located in the proximity of a public water supply intake.*
12. *The discharge shall not occur in areas of concentrated shellfish production.*
13. *The discharge shall not occur in a component of the National Wild and Scenic River System.*
14. *The discharge of material shall consist of suitable material free from toxic pollutants in toxic amounts.*
15. *All temporary fills shall be removed in their entirety and the area restored to its original elevation.*

Additional BMPs are listed below as interpretation of the 5 federally mandated BMPs.

- *The height of both MA (*main access*) and LU (*limited use*) roads on high ground should normally be less than two feet above the forest floor.*
- *Where a MA or LU road crosses a stream or slough, or enters a peat or muck swamp, the fill should not be higher than the road at either end, except as required by DHEC for crossing navigable streams.*

Normally the road height should be two to three feet above the forest floor, but it may be higher in low areas.

- *MA roads at streams should be bridged or culverted with permanent structures of a size and frequency to allow expected flow of water. Where fords are used in lieu of bridges or culverts, they must have adequate rock bases to protect the stream bed.*
- *Stabilize soils around each structure where MA roads cross intermittent or perennial streams which have an average annual flow of five cubic feet per second or greater, and where rainwater runoff from the road will likely cause serious erosion and stream sedimentation.*
- *Where LU roads cross intermittent or perennial streams, temporary bridges or culverts of sufficient size and frequency should be used to minimize interference with the flow of water. When a silvicultural operation is completed, temporary bridges and culverts should be removed, and LU roads cross-ditched where needed to allow normal water flow.*
- *Obtain roadbed material from upland borrow pits whenever possible. For roads that cross sloughs or muck swamps, the base may be logs or sand and clay. Logs are preferable because they reduce the amount of fill material required. Roads with only a sand or clay base gradually settle into the peat or muck, and must be constructed higher initially to ensure adequate width.*
- *Roads in muck swamps, headwater swamps, and black river bottoms may be constructed from dredge material obtained from a ditch along the upper side of the road, then capped with fill from an upland area. Continuous side ditches are preferred. They reduce the impoundment of water on the upper side of the road, provided there are adequate culverts to move water from the upper to the lower side. Ditch bottoms should follow surface topography and culverts should be located in the lower areas. Such ditches should not be designed to carry water for more than one-fourth mile. They must be separated from navigable water by vegetated filter strips.*
- *Ditches should not convert wetlands to uplands.*

Appendix 7: Species Fact Sheets

Black Bear

Eastern Diamondback Rattlesnake

Southern Fox Squirrel