FOREST STEWARDSHIP PLAN UPDATE

St. Marys River Shoals Recreation Park
Baker County, Florida

Prepared by:

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<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original 2006 Forest Stewardship Plan Document</td>
<td>1-58</td>
</tr>
<tr>
<td>2017 Forest Management Plan Update</td>
<td>59-92</td>
</tr>
<tr>
<td>Location and Ownership</td>
<td>60</td>
</tr>
<tr>
<td>Location Map</td>
<td>61</td>
</tr>
<tr>
<td>Tax Parcels Map</td>
<td>62</td>
</tr>
<tr>
<td>Soils Drainage Map</td>
<td>63</td>
</tr>
<tr>
<td>Topography Map</td>
<td>64</td>
</tr>
<tr>
<td>Compartment Map</td>
<td>65</td>
</tr>
<tr>
<td>Timber Type Maps by Compartment</td>
<td>66-69</td>
</tr>
<tr>
<td>Acres by Compartment (Chart)</td>
<td>70</td>
</tr>
<tr>
<td>Stand Descriptions and Management Recommendations</td>
<td>71</td>
</tr>
<tr>
<td>Harvest Schedule Map</td>
<td>72</td>
</tr>
<tr>
<td>Activities Map</td>
<td>73</td>
</tr>
<tr>
<td>Road and Trail Maintenance</td>
<td>74</td>
</tr>
<tr>
<td>Prescribed Fire</td>
<td>74</td>
</tr>
<tr>
<td>Appendix</td>
<td>75-92</td>
</tr>
</tbody>
</table>
Forest Stewardship Plan
for
St. Marys River Shoals
Recreation Park
Sections 1, 2, 3 and 10, Township 2 South, Range 21 East
Section 35, Township 1 South, Range 21 East
Baker County, Florida

prepared by

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August 2006
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location and Ownership</td>
<td>1</td>
</tr>
<tr>
<td>Background Source Material</td>
<td>1</td>
</tr>
<tr>
<td>Description of Natural Communities</td>
<td>2</td>
</tr>
<tr>
<td>Soils</td>
<td>10</td>
</tr>
<tr>
<td>Soils Map</td>
<td>11</td>
</tr>
<tr>
<td>Key to Soils Map</td>
<td>12</td>
</tr>
<tr>
<td>Summary of Management Objectives</td>
<td>13</td>
</tr>
<tr>
<td>Timber Type Map</td>
<td>15</td>
</tr>
<tr>
<td>Aerial Photograph</td>
<td>16</td>
</tr>
<tr>
<td>Stand Management Descriptions and Recommendations</td>
<td>17</td>
</tr>
<tr>
<td>Harvest Summary</td>
<td>21</td>
</tr>
<tr>
<td>Restoration</td>
<td>22</td>
</tr>
<tr>
<td>Roads and Trails</td>
<td>22</td>
</tr>
<tr>
<td>Recreation Map</td>
<td>23</td>
</tr>
<tr>
<td>Recreation</td>
<td>24</td>
</tr>
<tr>
<td>Soil and Water Conservation Considerations</td>
<td>24</td>
</tr>
<tr>
<td>Prescribed Fire</td>
<td>24</td>
</tr>
<tr>
<td>Summary of Wildlife Management Recommendations</td>
<td>26</td>
</tr>
<tr>
<td>Schedule of Recommended Activities</td>
<td>31</td>
</tr>
<tr>
<td>Appendix</td>
<td>32</td>
</tr>
</tbody>
</table>
LOCATION AND OWNERSHIP

The St. Marys River Shoals Park Tract (The Park) is a 1640± acre forested property located approximately 5 miles north of Glen St. Mary, Baker County, Florida. The Tract is in all or part of Sections 1, 2, 3 and 10, Township 2 South, Range 21 East and part of Section 35, Township 1 South, Range 21 East, Baker County, Florida. It is situated between SR 125, Odis Yarborough Road and the St. Marys River and is titled to Baker County. The Park was acquired from Longbranch Farms, LLP in 2005 through a partnership with the Florida Communities Trust, The Trust for Public Land and the Florida Department of Environmental Protection. The goal of the acquisition was to secure this tract as part of a corridor forming an ecological connection between other public recreational land. In recent years, The Park had been a part of Champion International Corporation’s industrial forestry holdings.

BACKGROUND SOURCE MATERIAL

In the course of acquiring The Park property, two planning documents were generated. Both documents are well written and contain extensive information both necessary and useful in formulating a Forest Stewardship Plan. Materials from these documents will be incorporated into this plan.

1. 2004 Timber Cruise and Timber Appraisal Report prepared by Alton Foster, Southern Forestry Consultants, Inc. Monticello Florida. This report estimates the timber volumes and values as of March 10, 2004 and describes timber stands, site indices and growth rates.

2. FCT Project number 03-040-FF3 Management Plan for the St. Marys Shoals Park. Prepared by the Florida Communities Trust, this plan spells out prioritized management objectives, describes the site, details conditions particular to the site that must be addressed.
DESCRIPTION OF NATURAL COMMUNITIES

Vegetative Community Assessment and Natural Resource Protection (from FTC Plan)

St. Marys Shoals Park contains six distinct natural communities: blackwater streams, floodplain lakes, floodplain swamps, floodplain forests, cypress domes and mesic pine flatwoods. Following are descriptions provided by the Florida Natural Areas Inventory (Guide to the Natural Communities of Florida, Florida Natural Areas Inventory and the Florida Department of Environmental Protection, 1990.) and a preliminary assessment of each natural community.

Blackwater Stream – (synonyms: blackwater river, blackwater creek)

Blackwater streams are characterized as perennial or intermittent seasonal watercourses originating deep in sandy lowlands where extensive wetlands with organic soils function as reservoirs, collecting rainfall and is charging it slowly to the stream. The tea-colored waters of Blackwater Streams are laden with tannins, particulates, and dissolved organic matter and iron derived from drainage through swamps and marshes. They generally are acidic (pH = 4.0-6.0), but may become circumneutral or slightly alkaline during low-flow stages when influenced by alkaline groundwater. Water temperatures may fluctuate substantially and are generally correlated with seasonal fluctuations in air temperature.

The dark-colored water reduces light penetration and, thus, inhibits photosynthesis and the growth of submerged aquatic plants. Emergent and floating aquatic vegetation may occur along shallower and slower moving sections, but their presence is often reduced because of typically steep banks and considerable seasonal fluctuations in water level.

Typical plants include golden club, smartweed, sedges, and grasses. Typical animals include river longnose gar, gizzard shad, threadfin shad, redfin pickerek. Chain pickerel, ironcolor shiner, Ohooppoe shiner, weed shiner, blacktail shiner, chubsucker, channal catfish, banded topminnow, pygmy killfish, mosquito fish, mud sunfish, flier, everglades pygmy sunfish, banded sunfish, redbreast sunfish, dollar sunfish, stumpknocker, spotted bass, black ciappie, darters, Alabama waterdog, river frog, alligator, snapping turtle, alligator snapping turtle, river cooter, Florida cooter, peninsula cooter, stinkpot, spiny softshell, red-belly watersnake, brown watersnake, beaver and river otter.

Blackwater Streams have sandy bottoms overlain by organics and frequently underlain by limestone. Limestone outcrops may also occur. Blackwater Streams generally lack the continuous extensive floodplains and natural levees of Alluvial Streams. Instead, they typically have high, steep banks alternating with Floodplain Swamps. High banks confine water movement except during major floods. The absence of significant quantities of suspended sediments reduces their ability to construct natural levees.

Blackwater Streams are the most widely distributed and numerous riverine systems in the southeast Coastal Plain. Very few, however, have escaped major disturbances and alteration. The limited buffering capacity of Blackwater Streams intensifies the detrimental impacts of agricultural and industrial effluents.
DESCRIPTION OF NATURAL COMMUNITIES - Cont.

The St. Marys Shoals Park contains approximately 6 miles of Blackwater Stream community in the St. Marys River, Cedar Creek and Dougherty Creek. Water quality in these streams is extremely high, affected only by silvicultural activities on adjacent uplands, and one highway crossing at SR 125. Protection of water quality entering the Blackwater Streams will be among the highest management priorities for Baker County, and restoration of more natural hydroperiods to the streams and floodplains are management objectives of this plan.

**Floodplain Swamp** – (synonyms: river swamp, bottomland hardwoods, seasonally flooded basins or flats, oak-gum-cypress, cypress-tupelo, slough, oxbow, back swamp).

Floodplain Swamps occur on flooded soils along stream channels and in low spots and oxbows within river floodplains. Dominant trees are usually buttressed hydrophytic trees such as cypress and tupelo; the understory and ground cover are generally very sparse. Other typical plants included ogeechee tupelo, water tupelo, swamp titi, wax myrtle, dahoon holly, myrtle-leaved holly, large gallberry, possumhaw, hurrah-bush, white alder, lizard’s tail, leather fern, royal fern, marsh fern, soft rush, laurel greenbrier, hazel alder, hawthorn and swamp privet.

Floodplain Swamps harbor a diverse array of animals including both temporary and permanent residents. Typical animals include marbled salamander, mole salamander, amphiuma, Alabama waterdog, Southern dusky salamander, two-lined salamander, three-lined salamander, dwarf salamander, slimy salamander, rusty mud salamander, southern toad, cricket frog, bird-voiced treefrog, gray treefrog, bullfrog, river frog, Southern leopard frog, alligator, river cooter, stinkpot, Southeastern five-lined skink, broadhead skink, mud snake, rainbow snake, redbelly water snake, brown water snake, glossy crayfish snake, black swamp snake, cottonmouth, yellow-crowned night heron, wood duck, swallowtail kite, Mississippi kite, red-shouldered hawk, woodcock, barred owl, chimney swift, hairy woodpecker, pileated woodpecker, Acadian flycatcher, Carolina wren, veery, white-eyed vireo, red-eyed vireo, parula warbler, prothonotary warbler, hooded warbler, Swainson’s warbler, cardinal, towhee, opossum, southeastern shrew, short-tailed shrew, beaver, wood

Soils of Floodplain Swamps are highly variable mixtures of sand, organic and alluvial materials, although some sites, especially within sloughs or on smaller streams, may have considerable peat accumulation. Floodplain Swamps are flooded for most of the year, with sires along channels inundated by aerobic flowing water while these of sloughs and backswamps are flooded with anaerobic water for extensive periods of time. Soils and hydroperiods determine species composition and community structure. Seasonal and often prolonged inundations restrict the growth of most shrubs and herbs, leaving most of the ground surface open or thinly mantled with leaf litter. Floods redistribute detrital accumulations to other portions of the floodplain or into the main river channel. This rich organic debris is essential to the functional integrity of downstream ecosystems such as estuaries. These swamps are usually too wet to support fire.
DESCRIPTION OF NATURAL COMMUNITIES - Cont.

Floodplain Swamps are often associated with and grade into Floodplain Forest or Hydric Hammock, and occasionally Baygall. The species composition of Floodplain Swamps is frequently similar to the Slough, Strand Swamp, Dome Swamp, and Basin Swamp communities.

Alteration of the hydroperiod by impoundments or river diversions and the disruption of floodplain communities by forestry or agriculture have devastating consequences to entire river and bay systems. Many plant and animal species, both onsite and downstream, depend upon the presence and natural fluctuations of these swamps for survival and reproduction.

The property contains approximately 220 acres of Floodplain Swamp community. These areas are in excellent condition, with few intrusions by past silvicultural activities. Restoration of more natural hydroperiods and protection of incoming water quality will be the primary management efforts needed for the protection of these areas.

Floodplain Forest – (synonyms: bottomland hardwoods, seasonally flooded basins or flats, oak-gum-cypress, elm-ash-cottonwood, second bottom, levee forest, river terrace, river ridge).

Floodplain Forests are hardwood forests that occur on drier soils at slight elevations within floodplains, such as on levees, ridges and terraces, and are usually flooded for a portion of the growing season.

Floodplain Forests are largely restricted to the alluvial rivers of the panhandle. The dominant trees are generally mixed mesophytic hardwoods, such as overcup oak, water hickory, diamond-leaf oak and swamp chestnut oak. The understory may be open and park like or dense and nearly impenetrable. Other typical plants include bluestem palmetto, willow oak, green ash, Florida elm, sweetgum, hackberry, water oak, American hornbeam, tulip poplar, coastal plain willow, black willow, eastern cottonwood, swamp cottonwood, river birch, red maple, silver maple, box elder, American sycamore, catalpa, sweetbay magnolia, hawthorn, swamp azalea, pink azalea, gulf seastiana, lanceleaf greenbrier, poison ivy, peppervine, rattanvne, indigo bush, white grass, plume grass, redtop panicum, carice sedges, silverbells, crossvine, American wisteria and wood grass.

Floodplain Forests harbor a diverse array of animals including both temporary and permanent residents. Typical animals include marbled salamander, mole salamander, two-toed amphiuma, Alabama waterdog, Southern dusky salamander, two-lined salamander, three-lined salamander, dwarf salamander, slimy salamander, rusty mud salamander, sirens, southern toad, cricled frog, bird-voiced treefrog, gray treefrog, bullfrog, river frog, Southern leopard frog, alligator, river cooter, stinkpot, Southeastern five-lined skink, broadhead skink, mud snake, rainbow snake, redbelly watersnake, brown water snake, glossy crayfish snake, black swamp snake, cottonmouth, yellow-crowned night heron, wood duck, Mississippi kite, swallowtail kite, red-shouldered hawk, woodcock, barred owl, chimney swift, hairy woodpecker, pleated woodpecker, Acadian flycatcher, Carolina wren veery, white-eyed vireo, red-eyed vireo, Paula warbler, prothonotary warbler, Swainson's warbler, hooded warbler, cardinal. Towhee, opossum, southeastern shrew, short-tailed shrew, beaver, wood rats, rice rats, cotton mouse, golden mouse, bear, and raccoon.
DESCRIPTION OF NATURAL COMMUNITIES - Cont.

Soils of Floodplain Forests are variable mixtures of sand, organics and alluvials, which are often distinctly layered. Hydroperiods is the primary physical feature of Floodplain Forests, which are inundated by flood waters nearly every year for 2 to 50% of the growing season. The organic material accumulating on the Floodplain Forest floor is picked up during floods and redistributed in the floodplain or is washed downstream to provide a critical source of minerals and nutrients for downstream ecosystems, in particular estuarine systems. These floods also replenish soil minerals through deposition on the floodplain. Floodplain Forests usually do not have standing water in the dry season.

Floodplain Forests are often associated with and grade into Floodplain Swamp, Bottomland Forest, Bay gall, or Slope Forest. The species composition is frequently similar to that of Hydic Hammock and Bottomland Forest communities. The maintenance of natural hydrologic regimes is critical to the health of Floodplain Forests and to the downstream systems with which they are connected. Species composition and the functional relationships throughout a river system are negatively impacted by hydrological alterations such as artificial impoundments, river diversion projects, pesticide use, forest clear cutting, or intensive agriculture.

St. Marys Shoals Park contains approximately 420 acres of floodplain forest community, which is in excellent condition. Alteration of surface water drainage patterns and minor disturbances along the ecotone between these communities and the mesic flatwoods communities are the main disturbances. Hydrological restoration of adjacent flatwoods communities will serve to protect and enhance the viability of these areas in the future.

River Floodplain Lake and Swamp Lake – (synonyms: cypress pond, gum pond, oxbow lake, backwater lake or pond).

Swamp Lakes and River Floodplain Lakes are generally characterized as shallow open water zones, with or without floating or submerged aquatic plants, that are surrounded by Basin Swamp or Floodplain Swamp. They are generally permanent water bodies, although water levels often fluctuate substantially and they may become completely dry during extreme droughts. They are typically lentic water bodies occurring in confined basins or depressions. However, during floods or following heavy rains, they exhibit decidedly lotic characteristics, flowing with the flood water or overflowing their banks into lower topographic areas. Some may even exhibit a slow perennial sheet flow, but water movement is generally so slow that lentic conditions prevail.

Except for the fringe of hydrophytic trees, shrubs and scattered emergents, plants may be absent altogether, or they may almost completely cover the water surface. When present, typical plants include fragrant water lily, banana lily, American lotus, spatterdock, duckweed, water meal, bog mat, water fern, dollar bonnet, frog’s bit, water hyssop, water pennywort, coontail, milfoil, bladderwort, bog moss, and fanworts. Several exotic plants may also occur, including water lettuce, water hyacinth, salvinia, alligator weed, water spinach, parrot’s feather, water chestnut, water sprite, hydriella, and elodea. Scattered emergent plants such as lizard’s tail, pickerelweed, slender spikerush and golden club may also occur, but the community will more appropriately be called Depression Marsh or Floodplain March if emergents dominate the water body.
DESCRIPTION OF NATURAL COMMUNITIES - Cont.

Typical animals include Florida gar, bowfin, redfin pickerel, golden shiner, taillight shiner, lake chubsucker, brown bullhead, tadpole madtom, pirate perch, golden topminnow, pygmy killfish, mosquito fish, flier, blue spotted sunfish, bluegill, largemouth bass, swamp darter, mole salamander, two-toed amphibius, Alabama waterfrog, sirens, cricket frog, bullfrog, pig frog, river frog, leopard frog, alligator, snapping turtle, Florida cooter, yellow-belly turtle, eastern mud turtle, stinkpot, Florida softshell turtle, mud snake, redbelly water snake, banded water snake, brown water snake, cottonmouth, great blue heron, great egret, snowy egret, little blue heron, green-backed heron, white ibis, wood stork, kingfisher, beaver, and river otter.

The substrates of Swamp Lakes and River Floodplain Lakes are variable and may be composed primarily of peats, sands, alluvial clays, or any combination of these. Swamp Lakes characteristically have highly colored, acidic, soft water with moderate mineral content (sulfate, chlorides, calcium, magnesium). Both types are generally mesotrophic to eutrophic (i.e., have moderate to high nutrient levels and primary productivity), although they sometimes exhibit partial oligotrophic characteristics, with low nutrient levels and primary productivity, because their darkly stained, acidic waters and surrounding tree canopy limit their productivity.

Swamp Lakes may have originated from one or more of the following geological processes: (1) solution of the underlying limestone and subsequent collapse of the surface to form a depression; (2) lowering of sea levels to isolate ancient coastal features, such as lagoons or dune swales; or (3) isolation of ancient river systems within relatively confined basins. River Floodplain Lakes generally originate along former stream channels as oxbows that have been isolated when new channels cut across a meander loop in the river, or along erosion scours formed by the tremendous forces of flood stage waters. They may also have been influenced by some of the processes that developed Swamp Lakes, or be the result of “Nature’s engineer”, the beaver.

Swamp Lakes and River Floodplain Lakes are important breeding areas for many terrestrial and semiaquatic amphibians. They are frequently very important feeding areas for many wading birds, ducks and reptiles. They are also important nursery grounds and habitats for several species of fish. Swamp Lakes and Floodplain Lakes are extremely vulnerable to hydrological manipulations which lower the water levels and hasten successional processes. They are also vulnerable to land clearing and timber harvest operations within the surrounding swamps or adjacent uplands. Upland activities generally increase sedimentation, while activities within the swamp may increase inorganic levels, alter nutrient levels and, in the case of Floodplain Lakes, increase the effects of flood scouring.

Approximately 12 acres of Floodplain Lake are located in the park along the St. Marys River. The lakes are undisturbed and will be protected and enhanced by the protection of surface water quality and restoration activities proposed by the County.
DESCRIPTION OF NATURAL COMMUNITIES - Cont.

**Dome Swamp** – (synonyms: isolated wetland cypress dome, cypress pond, gum pond, bayhead, cypress gall, pine barrens pond).

Dome Swamps are characterized as shallow, forested, usually circular depressions that generally present a domed profile because smaller trees grow in the shallower waters at the outer edge, while bigger trees grow in the deeper water in the interior. Pond cypress, swamp tupelo, and slash pine are common plants. Other typical plants include red maple, dahoon holly, swamp bay, sweetbay, loblolly bay, pond apple, Virginia willow, fetterbush, chain fern, netted chain fern, poison ivy, laurel greenbrier, Spanish moss, wild pine, royal fern, cinnamon fern, coastal plain willow, maidencane, orchids, wax myrtle, swamp titi, St. Johns wort, sawgrass, lizard’s tail, swamp primrose, water hyssop, redroot, sphagnum moss, floating heart, buttonbush, arum, and fore flag.

Typical animals include flatwoods salamander, mole salamander, dwarf salamander, oak toad, southern cricket frog, pinewoods treefrog, little grass frog, narrowmouth toad, alligator, snapping turtle, striped mud turtle, mud turtle, western mud snake, cottonmouth, woodstork, wood duck, swallow-tailed kite, barred owl, pileated woodpecker, great-crested flycatcher, prothonotary warbler and rusty blackbird.

Dome Swamps typically develop in sandy flatwoods and in karst areas where sand has slumped around or over a sinkhole, creating a conical depression. Soils are composed of peat, which becomes thickest toward the center of the dome, and are generally underlain with acidic sands and then limestone, although other subsoils may also occur. Some domes have a clay lens that helps retain water levels. Dome Swamps often derive much of their water through runoff from surrounding uplands, but they may also be connected with underground channels, in which case subterranean flows would dominate the hydrological regime.

Dome Swamps generally functions reservoirs that recharge the aquifer when adjacent water tables drop during drought periods. The normal hydroperiod for Dome Swamps is 200 to 300 days per year with water being deepest and remaining longest near the center of the dome.

Fire is essential for the maintenance of a cypress dome community. Without periodic fires, hardwood invasion and peat accumulation would convert the dome to Bottomland Forest or Bog. Dome Swamps dominated by bays are close to this transition. Fire frequency is greatest at the periphery of the dome and least in the interior where long hydroperiods and deep peat maintain high moisture levels for most of the year. The normal fire cycle might be as short as 3 to 5 years along the outer edge and as long as 100 to 150 years towards the center. The profile of a Dome Swamp (i.e., smaller trees at the periphery and largest trees near the center) is largely attributable to this fire regime. The shorter hydroperiods along the periphery permit fires to burn into the edge more often, occasionally killing the outer trees. Cypress is very tolerant of light surface fires, but suck fires burning into the peat can kill them, lower the ground surface, and transform a dome into a pond.

Dome Swamps may have a Depression Marsh or pond in their center, creating a doughnut appearance when viewed from above. Dome Swamps typically grade into Wet Prairie or Marl Prairie around the periphery, but they may also be bordered by Bottomland Forest or Swale. The species composition of Dome Swamps frequently
DESCRIPTION OF NATURAL COMMUNITIES - Cont.

overlaps with Strand Swamp, Wet Flatwoods, Basin Swamp, Baygall, Floodplain Swamp, and Freshwater Tidal Swamp. Normal hydroperiod must be maintained. Somewhat deeper than normal water levels are not likely to do much harm, but extended hydroperiods will limit tree growth and prevent reproduction. Shortened hydroperiods will permit reproduction. Shortened hydroperiods will permit the invasion of mesophytic species, which will change the character of the understory and eventually allow hardwoods to replace cypress. Dome Swamps may also be degraded by pollution and the invasion of exotic plants.

Dome Swamps comprise approximately 14 acres of the St. Marys Shoals Park. These communities have been affected most by silvicultural activities, including road building, ditching and draining and timber harvest operations. Management of the mesic flatwoods community by Baker County, which will include some timber management areas for an ongoing source of revenue, will be conducted using best management practice for the protection of the wetland communities. Restoration of natural drainage patterns will serve to enhance the communities and the eradication and continued exclusion of invasive exotic plants will assure their long-term health.

Mesic Flatwoods – (synonyms: pine flatwoods, pine savannahs, pine barrens).

Mesic Flatwoods are characterized as an open canopy forest of widely spaced pine trees with little or no understory but a dense ground cover of herbs and shrubs. Several variations of Mesic Flatwoods are recognized, the most common associations being longleaf pine - wiregrass-runner oak and slash pine-gallberry-saw palmetto. Other typical plans include: St. Johns wort, dwarf huckleberry, fetterbush, dwarf wax myrtle, stagger bush, blueberry, gopher apple, tar flower, bog buttons, blackroot, false foxglove, white-topped aster, yellow-eyed grass, and cutthroat grass.

Typical animals of Mesic Flatwoods include: oak toad, little grass frog, narrowmouth toad, black racer, red rat snake, southeastern kestrel, brownheaded nuthatch, pine warbler, Bachman's sparrow, cotton rat, cotton mouse, black bear, raccoon, gray fox, bobcat, and white-tailed deer.

Mesic Flatwoods occur on relatively flat, moderately to poorly drained terrain. The soils typically consist of 1-3 feet of acidic sands generally overlying and organic hardpan or clayey subsoil. The hardpan substantially reduces the percolation of water below and above its surface. During the rainy seasons, water frequently stands on the hardpan’s surface and briefly inundates much of the flatwoods; while during the drier seasons, ground water is unobtainable for many plants whose roots fail to penetrate the hardpan. Thus, many plants are under stress of dehydration during the dry seasons. Another important physical factor in Mesic Flatwoods is fire, which probably occurred ever 1 to 8 years during pre-Columbian times.

Nearly all plants and animals inhabiting this community are adapted to periodic fires; several depend on fire for their continued existence. Without relatively frequent fires, Mesic Flatwoods succeed into hardwood dominated forests whose closed canopy can essentially eliminate the ground cover herbs and shrubs. Additionally, the dense layer of litter that accumulates on the unburned sites can eliminate the reproduction of pines which require a mineral soils substrate for proper germination.
DESCRIPTION OF NATURAL COMMUNITIES - Cont.

Thus, the integrity of the Mesic Flatwoods community is dependent on periodic fires. However, fires that are too frequent or too hot would eliminate pine recruitment and eventually transform Mesic Flatwoods into Dry Prairie.

Mesic Flatwoods are closely associated with and often grade into Wet Flatwoods, Dry Prairie, or Scrubby Flatwoods. The differences between these communities are generally related to minor topographic changes. Wet flatwoods occupy the lower wetter areas, while Scrubby Flatwoods occupy the higher drier areas.

Mesic Flatwoods are the most widespread biological community in Florida, occupying an estimated 50% of the State’s uplands. However, very few undisturbed areas of Mesic Flatwoods exist because of habitat mismanagement and silvicultural, agricultural, or residential development. Mesic Flatwoods are often fairly resilient, and with proper management they can generally be restored.

In all, approximately 770 acres of the project site supports mesic slash pine flatwoods community, all of which has been harvested, replanted and manipulated for timber production or maintained as agricultural fields in the past. Thinning, selective harvesting, reforestation, prescribed fire management, hydrological restoration and exotic plant removal will be the management techniques used for the long term restoration and enhancement of the natural community.
SOILS

The soils on the St. Marys River Shoals Park Tract are primarily of two types:

1. Very poorly drained soils of the Osier-Surrency-Mulat association. These soils were formed in sandy and loamy marine deposits and are situated in the Cedar Creek St. Marys River flood plain and swamp. These landscapes are characterized by low ridges and flood plains and are interspersed with swamps, oxbows, knolls and small waterfront bluffs. These soils typically have a dark grey mucky sand over sandy clay loam and wet sand. Heavily influenced by fluctuating water tables, these sites support wetland vegetation and are not suitable for intensive forestry activities.

2. Somewhat poorly and poorly drained soils that are of the Leon-Pottsburg-Boulogne and Pelham-Pantego-Ocilla association. These soils formed in sandy marine deposits and are located on flatwoods, floodplain and depressional sites. Consisting of Ultisols and Spodosols, soils are sandy and support natural vegetative communities dominated by slash and longleaf pine with gallberry/palmetto understory. These areas lend themselves to support commercial forestry activities.
### Key to Soils Map

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Vegetative Community</th>
<th>Drainage</th>
<th>Slash Pine Site Index 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
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<td>Flatwoods/drain</td>
<td>very poor</td>
<td>65</td>
</tr>
<tr>
<td>36</td>
<td>Pantego</td>
<td>Ponds, drains</td>
<td>very poor</td>
<td>NA</td>
</tr>
<tr>
<td>29</td>
<td>Mascotte</td>
<td>Flatwoods</td>
<td>poor</td>
<td>67</td>
</tr>
<tr>
<td>54</td>
<td>Albany</td>
<td>Flatwoods/ridges</td>
<td>somewhat poor</td>
<td>62</td>
</tr>
</tbody>
</table>

This table does not identify the minor soils found on the tract. Site Index is a measure of forest productivity that estimates the height of the dominant and co-dominant slash pines at age 25. No site index is given for wetland soils. Site indices are from the USDA/NRCS Baker County Soil Survey and approximate slash pine growth on the respective soils.
SUMMARY OF MANAGEMENT OBJECTIVES

The forest management objectives are based on three factors:

1. The long term goals spelled out in Baker County’s agreement with FCT,
2. The County’s need to generate timber sale revenues to help meet annual maintenance and operation costs,
3. The provision of public access and recreation opportunities.

More specific objectives under each factor are:

1. FCT Goals
   a) Restore the hydrology by phasing out unneeded roads and ditches and substituting less restrictive drainage structure when possible.
   b) Manage the mesic flatwoods for both timber production and restoration, focusing on longer rotation forestry.
   c) Develop and implement prescribed fire management plans and procedures.
   d) Improve habitats used by listed species of wildlife.
   e) Identify, remove and control invasive exotic plants.

2. Evaluate the existing timber resources and devise a harvest and reforestation plan that will provide a sustainable source of revenue to fund Baker County’s annual park operations and maintenance obligations. Such a plan should be consistent with 1 above.
   a) Identify stands to be clearcut and replanted for long term sustainable revenue generation.
   b) Identify stands to be thinned, shelterwood or seed tree cut and managed for natural regeneration.
   c) Identify stands to be reforested to restore the hydrology and species composition.
   d) Identify stands to be preserved for wildlife and wetland protection.
   e) Identify stands that will be converted to public recreational uses.

3. Evaluate existing and planned roads and trails and classify according to projected future uses.
   a) Major forest roads that will be used for public access and forestry operation.
   b) Forest roads that will be used for initial forestry operation and subsequently converted into hiking or equestrian trails.
SUMMARY OF MANAGEMENT OBJECTIVES – Cont.

c) Existing trails that will be upgraded to support hiking and equestrian activities.

d) Locations for new trails that will provide linkages to complete existing trail systems.
St. Marys River Shoals Park

Sections 1, 2, 3 and 10, Township 2 South, Range 21 East
Section 35, Township 1 South, Range 21 East
Baker County, Florida

1. Planted Slash Pine - Thin  207± acres
2. Planted Slash Pine - Shelterwood  35± acres
3. Planted Slash Pine - Clearcut/Replant  39± acres
4. Planted Slash Pine - Clearcut/Restore  105± acres
5. Planted Longleaf/Slash Pine - Premerchantable  207± acres
6. Cutover - Site Prepare & Plant  271± acres
7. Planted Slash Pine - Previously Thinned  42± acres
8. Future Public Recreation Areas  90± acres
9. Wetlands - Preserve & Enhance  628± acres
10. Pine/Hardwood Buffers  16± acres

- Roads
- Utility

N

August 2006
STAND MANAGEMENT DESCRIPTIONS AND RECOMMENDATIONS

Pine Plantations – 593± acres

Merchantable Pine Plantations – 386± acres

The pine plantations are situated in the mesic flatwoods vegetative community and were established during a previous industrial ownership. Stands are bedded slash pine that were planted at an initial stocking of 700± stems per acre. Ages ranged from 22 to 28± years old. Based on Southern Forestry Consultants 2004 report, the summary of their cruise results is as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Merchantable Plantation Acres</td>
<td>320</td>
</tr>
<tr>
<td>Total Sampling Points</td>
<td>51</td>
</tr>
<tr>
<td>Total Pine Green Tons</td>
<td></td>
</tr>
<tr>
<td>Pulpwood – 24,029</td>
<td>(75 tons/acre)</td>
</tr>
<tr>
<td>Chip’ n’ Saw – 4,889</td>
<td>(15 tons/acre)</td>
</tr>
<tr>
<td>Trees per Acre</td>
<td>399</td>
</tr>
<tr>
<td>Basal Area</td>
<td>107 ft²</td>
</tr>
<tr>
<td>Average Site Index$_{25}$</td>
<td>55</td>
</tr>
<tr>
<td>Average Annual Growth</td>
<td>2%</td>
</tr>
</tbody>
</table>

Stands targeted for active timber management were classified according to the type of harvest planned. Acres differ from cruise acres due to growth from premerchantable to merchantable class.

Stand 1 - Planted Slash Pine – 207± acres

Vigorously growing plantations on good sites that will benefit from thinning from below. An initial fifth row thin, with selections from the four residual rows, will remove diseased, suppressed and poorly formed trees. Residuals will be dominant and co-dominant trees that have a good probability of producing a higher value product in the future. Target residual basal area is 55 to 60 square feet. These stands border Cedar Creek and Dougherty Branch and will be evaluated in 5 to 7 years to determine whether a second thinning, shelterwood cut or seed tree cut is indicated. The ultimate goal is for these stands to become naturally regenerating stands, using fire, along with seed trees or seed in place. Thinning will reduce competition and increase pine resistance to Southern Pine Beetle. Skidding and other harvest activities should help eliminate residual beds and restore pre plantations hydrology.

Stand 2 - Planted Slash Pine – 35± acres

These sites support older plantations and are primarily located in high visibility areas along roads or trails. With live crown ratios of less than 25%, these stands are not good candidates for operator select row thinning but rather should be marked and cut to a shelterwood density. Leaving the best 50 to 60 trees per acre will provide some tree cover needed for aesthetics, while opening up the stand so the crowns can develop. Unlike stand 1, this harvest will be the final one, unless seed tree regeneration is planned in future years. As with stand 1, thinning will increase resistance to Southern Pine Beetle.
STAND MANAGEMENT DESCRIPTIONS AND RECOMMENDATIONS - Cont.

Stand 3 - Planted Slash Pine – 39± acres

A 39± acre stand located on the eastern edge of the Park adjacent to a residential development. This stand is 28± years old, has reached financial maturity, and exhibits signs of decreasing biological growth. Located on a moderately dry site, Stand 3 should be marketed during the next five years when the market conditions are good. The stand should be clearcut, site prepared and planted. It will be necessary to acquire access across private lands to the south or east before harvesting and replanting this stand. Either slash or longleaf pine are appropriate for reforesting this site. If hardwood sprouting is extensive, a herbicide should be employed at site prep rates prior to planting.

Stand 4 - Planted Slash Pine – 105± acres

These stands of 18 year old bedded slash pine are located on very poorly drained sites in the Cedar Creek flood plain. According to a knowledgeable local observer, the areas with slightly higher elevations were harvested and replanted to pine during an extended dry period. The soils are very poorly drained wet sands of the Surrency-Mulat complex (frequently flooded) and are normally dominated by cypress, black gum, bay, maple and other wetland species. Although the stocking is adequate, 500± stems per acre, growth rates are poor with few trees exceeding pulpwood size.

These stands are good candidates for restoration to their former hydrological condition. We recommend clearcutting these sites and regenerating with wetland dependent trees, either through natural regeneration from stump and root sprouts or from seedlings or seed in place. In many areas sufficient young trees are present in the understory and may be released following pine harvest. If natural regeneration is not sufficient, seedlings can be hand planted to provide coverage. Since the existing beds have already slouched from frequent flooding and logging will further flatten them, we do not believe any additional mechanical treatments will be needed to restore the surface flow.

Premerchantable Pine Plantations – 207± acres

Stand 5 – Premerchantable Loblolly/Slash Pine Plantations – 207± acres

These stands were site prepared and planted, primarily by Champion International, and are typical industrial bedded plantations with 500-600 stems per acre.

The ages, species and approximate acres are as follows:

| Stand 5a | 2002 loblolly | 64± acres |
| Stand 5b | 2001 loblolly | 104± acres |
| Stand 5c | 1999 loblolly | 15± acres  |
| Stand 5d | 1997 slash   | 24± acres  |

The stands should be protected from fire until they reach 12+ years, an age when they can be control burned. Pre suppression fire lines, particularly along exterior boundaries, are useful. If possible, these stands should be mowed to eliminate and lower the fuels and to allow earlier control burns. Mowing also decreases woody competition and encourages the growth of grasses and herbs. Loblolly stands will benefit from a single application of Diammonium Phosphate at 200-250 lbs./acre.
STAND MANAGEMENT DESCRIPTIONS AND RECOMMENDATIONS-Cont.

Cutover Sites – 271± acres

The approximate acreage, soils and recommended species and planting methods are as follows:

Stand 6a – 155± acres

Sites located on poorly drained flatwoods soils with good potential for pine plantation forestry. Although most commonly planted to slash and loblolly, longleaf will also thrive on these sites. The site should be chopped and burned, followed by hand or v blade planting of containerized longleaf pine seedlings. If funding is available, a herbaceous weed control chemical can be band sprayed during the spring or early summer following planting. If carefully planned, a low intensity backfire during years 2 or 3 would also benefit stand development. We recommend low density planting of 400± stems per acre for tree vigor and wildlife purposes. Funding from State cost sharing programs should be pursued.

Stand 6b – 31± acres

Site located on poorly drained flatwoods soils with moderate potential for pine growth. These sites have grown up in water oak, palmetto, wax myrtle, panicum, broom sedge and bluestem grasses. These sites can also be regenerated with longleaf pine, although the oak competition dictates the use of a site prep herbicide such as hexazinone. After herbicide application in the late spring, the site can be burned in the late summer and hand or v blade planted in the fall. If fuel is adequate, the stand can be control burned at age 2 to 3.

Stand 6c – 85± acres

These sites are located in the flood plain forest of the northern portions of the Park along the St. Marys River and its bordering wetlands. Harvested in the past 3 to 4 years, the sites have naturally regenerated to blackgum, maple, sweetgum, river birch, bay, cypress, and associated understory shrubs, vines and herbaceous plants. Portions of these areas were bedded and planted to slash pine. The drainage ranges from somewhat poorly drained to very poorly drained on soils that are predominately sands with clay subsoils.

We recommend chopping the better drained sites and leaving wet areas and those that have resprouted with adequate stands of hardwood. The chopped area should be burned and hand planted with pine seedlings, preferable containerized. If the park operating plan does not include periodic control burns on these sites, native hardwoods can also be planted. The summary of wildlife recommendations offers ideas on practices that are silviculturally sound while at the same time ensure quality wildlife habitat. These practices, including burning, mowing, permanent wildlife openings, and brush piles should be incorporated into reforestation plans when possible.
STAND MANAGEMENT DESCRIPTIONS AND RECOMMENDATIONS—Cont.

Stand 7 – Seed Tree Cut Planted Slash Pine – 42± acres

Planted slash pine stands situated on poorly drained flatwoods sites with good potential for pine productivity. These stands have been row thinned or cut back to a 25± stems per acre seed tree density. The stands in the southwest corner of the park border, near a planned entry, are located on soils that could be converted to parking or fields. If not used in this manner, these stands, along with the row thinned stands on the western boundary line, should be control burned and evaluated in 5 to 7 years.

Stand 8 – Future Public Recreation Areas – 90± acres

This site includes both a 2001 loblolly plantation and a cutover area. Located in the southeast corner of the property, it would be a good candidate for conversion to public and recreations uses. The plantation is situated on some of the better drained soils in the Park and is close to the eastern entry at Yarborough Road.

Stand 9 – Wetlands – 628± acres

This wetland area includes floodplain swamps, floodplain forests and cypress dome swamps. In line with the management objectives, wetlands are to be protected for water quality and wildlife benefits. Restoration of adjacent stands and elimination of hydrological alteration should have long term benefits. No harvesting or other silvicultural activities are recommended.

Stand 10 – Pine/Hardwood Buffers – 16±

Timbered sites along the St. Marys River bank. The use of heavy equipment or other activities that may cause erosion are to be avoided. Buffers should be retained at their present stocking. These sites should be burned periodically as part of the overall burning regime.
HARVEST SUMMARY

The following chart characterizes and summarizes the timber harvest recommendations.

<table>
<thead>
<tr>
<th>Stand #</th>
<th>Acres</th>
<th>Approx. Basal Area</th>
<th>Harvest Type</th>
<th>Tons Removed</th>
<th>Relative Value/acre</th>
<th>Best Season/Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>207±</td>
<td>100</td>
<td>Row thin w/ selections</td>
<td>30-45</td>
<td>Medium-High</td>
<td>Fall or winter When dry</td>
</tr>
<tr>
<td>2</td>
<td>35±</td>
<td>75-90</td>
<td>Marked thin</td>
<td>50+</td>
<td>Medium</td>
<td>Same as 1 above Marked to leave</td>
</tr>
<tr>
<td>3</td>
<td>39±</td>
<td>85+</td>
<td>Clearcut</td>
<td>75+</td>
<td>High</td>
<td>All Weather Secure Access</td>
</tr>
<tr>
<td>4</td>
<td>105±</td>
<td>45-60</td>
<td>Clearcut</td>
<td>40+</td>
<td>Low-Medium</td>
<td>Dry weather only Fall/winter best for residual resprout</td>
</tr>
</tbody>
</table>

The priority of harvest is highly related to the weather conditions. Stand 4 can only be cut during dry periods, but will benefit from additional years of growth. Portions of Stand 1 should be harvested first to open the canopy, prepare trails and realize income. Stand 2 can be harvested at the same time as Stand 1. Stand 3, a clearcut, should be sold when market conditions favor dryer tracts and when funds can be earmarked for reforestation.
RESTORATION

In addition to the restoration of Stand 6, the cutover sites and Stand 4, the following actions are recommended:

- Following harvest activities, existing drainage ditches should be filled and leveled to restore hydrology. The two primary ditches are located in and north of the portion of Stand 1 northeast of the Cedar Creek Bridge.
- Where possible, fire lines should be leveled with a rework harrow and maintained to prevent hydrological disturbance.
- Trails and roads should be maintained and restored as spelled out in the Roads Section of this Plan.
- In commercial tree crop areas where bedding is not necessary for tree growth, beds will not be pulled.

ROADS AND TRAILS

A Recreation Map has been prepared by Nels Parson, recreation planner and land manager from the St. Johns River Water Management District. The types of roads and trails and their uses and limitations are:

- Access Roads (Red) – All weather logging and public access roads. These roads will comply with FL DOF BMP standard and will include ditches, culvert and fill crossings and low water rock crossings. They should be maintained to a standard necessary to provide vehicular access to the public.
- Trails (Blue) – Existing three path and jeep trails that will be converted to hiking and equestrian trails following timber harvesting activities.
- Future Trails (Yellow) – Sections of trails that are necessary to link existing routes or establish new foot paths and equestrian trails. Where possible, trail locations will be marked and cut during logging. In other instances they will be established by mowing or mulching.
RECREATION

Public recreation will be an important aspect of the park. Activities will include hiking, horseback riding, biking, camping, picnicking, canoeing and wildlife viewing.

The primary recreation facilities will be a marked trail system, campsites, picnic areas and a canoe launching area. Most trails will be available for equestrian, hiking and other activities approved by the county. Trails will be color blazed and mapped. Since initial trail development will take place during logging activities, trails will be closed while timber sales are active.

In addition, Baker County has designated the area identified as Stand 8 for public and recreations uses.

SOIL AND WATER CONSERVATION CONSIDERATIONS

The landowner should file a notice of intent to comply with Silviculture BMP’s. A sample of the form and instructions are included in the Appendix along with applicable BMP information from the most recent manual.

In addition, a notice of intent should be filed with the St. Johns River Water Management District. A copy of the permit application and directions are found in the Appendix.

PRESCRIBED FIRE

An active burn program should be put in place as soon as practical. Since several of the natural communities on the Park are fire dependent or fire influenced, fire is probably the most important tool for restoration and preservation of diversity of plants and animals. Fire is essential to reduce hazardous fuel loads, release nutrients, improve access and preserve native species.

Once decisions are made on public and recreational uses, the County should work with Florida Division of Forestry to develop a long term fire management plan. This plan should spell out burn frequency and seasonality, smoke management, safety, equipment and burn strategies for various communities. Such a plan should be incorporated into the overall land management plan.

Initial activities should include:
- construction of firebreaks
- initiation of dormant season burns to reduce fuel loads and prepare the land
- growing season burns to mimic lightning fires.

Timing of initial burns is dependent upon harvesting schedules. Since some mills now cannot take timbe: with heavily charred bark, we recommend harvesting prior to the initial
PREScribed FIRE – Cont.

burn. A full growing season is needed for trees to recover from the stress of harvest before burning.

The Summary of Wildlife Recommendations offers an excellent overview of prescribed fire and its role in creating and maintaining habitat.
SUMMARY OF WILDLIFE MANAGEMENT RECOMMENDATIONS

To ensure the best overall quality habitat for wildlife, the park should strive to maintain a good mixture of hardwood areas, pines (preferably different age plantations) and at least 5% of the total area in permanent openings. By having a diverse mix, you are providing good wildlife habitat, which maximizes both the capacity to support abundant wildlife and the diversity of species which will thrive on the property.

Active management for wildlife will be accomplished through routine forestry practices conducted on the planted pines. Management practices that will improve wildlife habitat include thinning pine plantations, longer rotations of the pines geared toward growing chip-n-saw and saw timber, rotational mowing programs in pre-merchantable stands that cannot be prescribed burned, prescribed burnings and fireline construction (which will serve as travel corridors and transitional areas). By combining all of these activities, a more diverse habitat is created which will benefit wildlife as well as the land manager and park visitor.

Timber management practices will greatly influence the quality of wildlife habitat available on your property. Wildlife and timber management can co-exist to produce a viable economic return for the landowner, as well as, provide wildlife habitat. Preferred tree spacing, in pine plantations, compatible with both timber and wildlife is 6x12 spacing approximately 600 trees per acre. Wider tree spacing allows sunlight to reach the forest floor longer in the rotation. Likewise, longer rotations on pine plantations, aimed at producing chip-and-saw and saw timber (i.e., 30 years or greater), allow for multiple thinnings that open the canopy and allow sunlight to reach the ground for herbaceous vegetation growth. Prescribed burning and rotational mowing (where applicable) are other tools that compliment both timber and wildlife and should be conducted in 2-3 year rotations.

Rotational Mowing
To improve wildlife habitat within the pine plantation, the land manager should establish a once-a-year mowing regime (September through February) to open rows for wildlife travel and to reduce herbaceous/woody competition for the pines. This effort will also reduce vegetation height increasing availability and palatability associated with new growth. The land manager should mow 1/3 or 1/5 of the plantation to allow rough areas to exist between pine rows. Thereafter, 1/3 (or 1/5 if time and economics are limiting factors) of the plantation should be mowed each winter. This can be most easily accomplished by mowing every third row or mowing “blocks” of rows (for example, mow 3 rows, skip 6 rows); as long as 1/3 of the area is mowed. By leaving “rough areas”, you are creating ideal nesting and cover habitat for most ground nesting birds, such as the bobwhite quail and wild turkey, while still reducing vegetation competition with the pines. Rotating the rows which are mowed each year will also greatly benefit your target species as well as other wildlife by creating adjacent rows with different stages of vegetation growth. Note: If management activities have been absent from this stand since the pines were planted, the land manager may want to mow every row initially then continue with the aforementioned mowing regime.
SUMMARY OF WILDLIFE MANAGEMENT RECOMMENDATIONS

Prescribed Fire
Firebreak creation and maintenance should be one of the top priorities of the land manager. Currently, the Division of Forestry can provide assistance in firebreak creation, usually with only a nominal fee. Contact the Baker County forester (904-259-5128) for more information. After the firebreaks are plowed, the land manager should use a disc to smooth the areas for better access lanes and to help facilitate growth of herbaceous vegetation by discing annually, usually during the fall/winter months to promote wildlife-friendly vegetation in the spring.

Firebreaks can serve many purposes if properly maintained. They will 1) provide protection to planted pines 2) provide access to the property from the perimeter, 3) will help control prescribed burnings, and 4) will also provide transitional zones that are very important to wildlife species. The edges of firebreaks can provide excellent nesting and foraging habitat and will also serve as travel corridors for wildlife. Firebreaks should be at least 15 to 20 feet wide and follow the natural contour of the land to the fullest extent possible.

Maintenance of the lines will consist of discing during the winter months for promotion of wildlife-friendly herbaceous vegetation and to maintain access throughout the property. Discing during the winter months, usually November through February, will promote the presence of native weeds and legumes such as partridge pea, beggarweed, and common ragweed, all of which provide a valuable seed source.

Prescribed burning effects for wildlife include:

1. Recycles nutrients for better plant uptake and growth which in turn makes the plants more palatable and nutritional value for wildlife.

2. Stimulates growth of herbaceous vegetation, shrubs and grasses.

3. Increase in insect production after a fire which provides food for turkey and quail broods and songbirds, such as bluebirds and flycatchers.

4. Stimulates germination of legumes by breaking down hard seed coats.

5. Decrease in diseased trees.

6. Creates snags, which provide homes for cavity nesting and roosting species such as woodpeckers and owls.

For wildlife, the tract to be burned should be divided into burn units. Units should be burned in different years so that there is always adjacent cover for ground nesting species such as turkey and quail. Areas that contain specific wildlife habitat such as snags, thickets, old homesites, should be protected from fire. Ultimately, a prescribed burn that
leaves “unburned” patches, also called a “mosaic” burn, is what you should strive for when using a prescribed burn for wildlife habitat improvement. Frequency is also important and will dictate what vegetative species are present. Burning in a 1-2 year regime will stimulate legume and grass production, beneficial to quail and turkey but suppresses fruit production from briars, shrubs and trees. Delaying burning to every 2-4 years will stimulate soft mast production. Your particular site will also determine your burning schedule.

Several endangered species in our area rely on fire dependent communities for their home. Gopher tortoises, for example, dig deep burrows to avoid fires and in turn provide shelter for many other species of wildlife including reptiles, amphibians and small mammals.

Transition Zones
An important concept in managing for wildlife on a particular property is the realization that wildlife prefers many different types of vegetation to be present, i.e., diversity. Hence, transition zones can be an important component in a management regime. Transition zones are areas where 2 or more habitats converge, in which the vegetative cover is a mix of the adjacent habitats. It is essentially a “separate” habitat type between 2 or more distinct habitats. Transition zones are also called edges or ecotones. They can also be very important travel corridors for wildlife, especially white-tailed deer.

Where possible, transition zones can be established and maintained along the edges of the hardwood areas. It is recommended that transition zones be approximately 20’-30’ in width. Transition zones should be maintained every 2-3 years by mowing, chopping or burning. A double firebreak that has each half disced in alternate years is an ideal transition zone. Vegetation within the zones should be disturbed at least every 3 years, if possible. If areas are left undisturbed for any longer, hardwoods become unmanageable, the area becomes too thick, and consequently, loses its wildlife value.

Transition areas between the hardwood areas and planted areas could be optimal locations for permanent wildlife openings, either in native vegetation or supplemental plantings. Where 2 or more different habitat types converge (or the transition zone), a mixture of vegetative types from all habitats is present, thereby increasing the overall diversity of the location. One of the keys to providing “good” habitat for a variety of wildlife species is diversification of the vegetative composition.

Permanent Wildlife Openings
Planting non-native food crops for wildlife is an option, although if an overall habitat management scheme is adopted on the property, the land managers would probably not have to provide food for wildlife. At this point, food plots would only serve as a “congregating” area for wildlife observation, photography, or harvest. From the initial land reconnaissance, many native food sources were observed (wild grapes, greenbrier, mast producing oaks, blackberry) and as openings are placed and managed throughout the tract, more herbaceous vegetation would become available as browse.
SUMMARY OF WILDLIFE MANAGEMENT RECOMMENDATIONS-
Cont.

The following guidelines should be followed when establishing permanent openings/food plots for wildlife:

- It is recommended that approximately 5% of the total property be in various types of permanent openings. This can include firebreaks, roads, food plots, natural open areas (such as those in the pines created by the high mortality rates), and transition zones.

- To minimize over-browsing, food plot size should be a minimum of one acre. Ideally food plots should be at least 3 acres in size and managed to provide supplemental nutrition throughout the year.

- A soils test should always be conducted before planting to determine the appropriate fertilizer and liming rates. This is a “garden” for wildlife. Plant it just like you would your own garden for best germination and production.

- Shape can vary, but linear openings are more visually appealing and will attract more use (30’ x 1452’ = ~ 1 acre). Deer are more likely to use a linear opening because of its proximity to cover. Within a large square opening, deer would have to venture farther from cover in order to feed, thus increasing their use of the opening during low light hours and nighttime and decreasing the opportunity for wildlife observation.

- Plot location will vary; however, it is recommended that openings be several hundred yards away from the property boundary, adjacent to good escape cover, and about a 1/4 mile apart for distributing wildlife use. Old logging decks and natural open areas within the stand would be an optimum location.

- Firebreaks could provide an excellent area for supplemental plantings, if full sunlight is available to encourage vegetation growth (~ 6 hours). One side of a woods road (or firebreak) can be widened (to ~ 30’), with part of it planted in food crops or left in native vegetation to concentrate wildlife for viewing.

- Mortality areas in the pines can be used as permanent openings. The land manager should mow, disc, or burn these areas to knock back the woody vegetation, increase visibility and increase herbaceous vegetation growth. If possible, the land manager should connect these areas to existing openings (such as firebreaks or roads) to increase the size.

The land manager may also consider only winter disking some areas to encourage native vegetation instead of planting supplemental forages. By disking during winter months, native legumes such as partridge peas are encouraged, as well as ragweed and other native plants preferred by quail, dove, white-tailed deer, turkeys and songbirds. Another consideration is to allow the areas planted to remain fallow every few years to reduce soil erosion from farming practices and to return nutrients to the soil. Fallow fields provide excellent cover and nesting areas for birds such as quail, turkey and many songbirds.
SUMMARY OF WILDLIFE MANAGEMENT RECOMMENDATIONS-
Cont.

Brush Piles
A simple habitat improvement for wildlife is the creation of brush piles. Brush piles can have a multitude of functions including shelter from the weather, hiding places from predators, and provide food sources from insects found within the structure. Man-made brush piles can be placed throughout your property, adjacent to permanent openings, food plots, and field edges where natural cover is lacking but a food source is readily available. Wildlife species such as bobwhite quail, rabbits, songbirds, reptiles and amphibians will use brush piles. Building a brush pile is not complex. Materials needed for the piles can come from your yard trash or tree trimming activities.

The most common materials are logs (usually 6 – 10” in diameter), small limbs, and rocks. Dimensions of your brush piles can vary. Recommended height is between 6 - 10’ and 6 – 12’ in diameter. Start by placing 4 – 5 logs on the ground, parallel and approximately 6” apart. By allowing room between each log, you are providing tunnels and air spaces for wildlife. Place another layer of logs perpendicular to the 1st layer. Then place smaller branches onto your base, criss-crossing some to provide stability. Your brush pile should take on an igloo or tepee shape when finished. Large rocks can be substituted for the base logs.

Depending on the size of the piles and the lack of natural cover available, 2 – 8 piles per acre should be sufficient. Keep brush pile away from residences or barns to avoid attracting unwanted wildlife species to yards and gardens. Brush piles are an easy way to improve your existing cover component on your land while keeping limbs/tree trimming debris out of landfills, allowing natural materials to decay back into the ground and provide a home/shelter for many wildlife species.

Appendix presents a list of endangered and threatened species that are known to occur in Baker County. Recommendations presented in this plan are conducive to any threatened or endangered species that may frequent the property. No threatened or endangered wildlife species were observed during the initial land inspection.
SCHEDULE OF RECOMMENDED ACTIVITIES

The order of these activities may change based on weather and timber market conditions.

Fall 2006 - Winter 2007
- Trails – mark proposed trail routes for harvest by logging
- Stand 1 – fifth ROW thin from below with selections (portion)
- Stand 7 – dormant season burn of previously thinned area

Spring – Summer 2007
- Stands 6A and 6B – prepare sites by chemical or mechanical methods, for fall planting (This can be split into 2 seasons if necessary)
- Stand 1 – layout and construct fire lines
- Trails and Roads – complete layout and construction of trails and roads where harvesting is complete and in areas to be planted

Fall – Winter 2007
- Stands 1 and 2 – complete fifth ROW thinning and marked thinning
- Stand 1 (thinned 2006) – conduct dormant season burn
- Stands 6A and 6B – plant seedlings

Spring-Summer 2008
- Stands 1 and 2 – layout and construct fire lines
- Trails and roads – complete segment through portions logged in 2007
- Stand 4 – harvest wet reforestation sites if possible
- Stands 6A and 6B – apply chemical weed control over newly planted seedlings

Fall – Winter 2009
- Stand 1 (burned 2007) – maintain fire lines by discing
- Stands 1 and 2 – conduct dormant season burn

Spring – Summer 2009
- Stand 5d – evaluate for possible dormant season burn and if burn is feasible prepare fire lines
- Stand 4 – Evaluate natural regeneration of to determine of restoration planting is necessary
SCHEDULE OF RECOMMENDED ACTIVITIES – Cont.

Fall – Winter 2010
- Stand 3 – conduct clearcut harvest if market conditions are acceptable
- Stands 1 and 2 – maintain fire lines
- Stand 5d – conduct dormant season burn if conditions warrant

Spring – Summer 2010
- Stand 3 – prepare site if logged
- Stands 6A and 6B – evaluate longleaf seedlings for possible dormant season burn-layout fire lines

Fall – Winter 2011
- Stands 6A and 6B – conduct burn of indicated
- Stand 3 – plant seedlings
- Stands 1 and 2 – maintain fire lines

Spring – Summer 2011
- Stand 3 – apply chemical weed control if indicated
APPENDIX
Guidelines for Creating and Managing Wildlife Openings in Pine Plantations

Scotland Talley, Wildlife Biologist
Habitat Conservation Scientific Services
Division of Habitat and Species Conservation
Florida Fish and Wildlife Conservation Commission

Always keep in mind that openings are just a supplement to well managed forest habitat and should never be considered the primary resource for wildlife. Openings are an opportunity to increase diversity in the landscape, a source of supplemental nutrition, and an attractant to increase harvest or improve viewing opportunities. Food plots cannot substitute for poor quality habitat in an unmanaged forest.

Size, Shape and Location

When developing a plan for wildlife openings the targeted species determines the size, shape and location. Openings for deer and turkey should be no less than 1 acre in size, while openings for bobwhite quail ¼ to 1 acre in size are perfectly adequate. Fields planted for doves should be a minimum of 3-5 acres in size, or larger depending on the number of hunters. On forested properties with no agriculture at least 5% of the acreage should be maintained in openings, 10% if the stands have a high basal area and dense canopy.

Openings should maximize the amount of edge created. Long, linear openings with irregular shapes are more effective than large square or round fields. Wildlife tends to avoid large open areas and tends to stay close to cover. If a log ramp or other existing opening is to be managed leaving brush piles or clumps of shrubs in the opening can create more edges and break up sight lines. Utility right-of-ways are good locations for managing vegetation, but require coordination with the utility company to avoid conflicts. Full sunlight for at least 6 hours per day is desirable for maximizing the productivity of openings. In mature stands with trees 50+ feet in height the orientation of the opening is important. Openings that are oriented on an east-west axis can be narrower since they will receive more sunlight. A width of 30-50 ft. should be sufficient for an east-west opening, while a north-south oriented opening would require 75-100 ft. in width. Openings that will be managed for native vegetation can be narrower than openings that are planted to agronomic species. For bobwhite quail “ring-a-round” openings can be created around large hardwood trees or clumps of hardwoods. These openings should be created outside the dripline of the hardwoods and serve as firebreak to protect them from prescribed burns. These openings can also be managed for native vegetation or agronomic species, and shrubby vegetation can be managed inside the ring. These openings will provide hard and soft mast, seeds and excellent cover.

Openings should be well distributed across the property and away from public roads or property boundaries where they might be attractive to poachers. Avoid slopes or areas with poor soils. Openings that are located along changes in habitat are very beneficial to wildlife. For example, an opening placed along the transition between pine plantation and hardwood drain will create a space where three habitat types are in close proximity. Openings placed near bedding or roosting areas and thick escape cover are also beneficial. On properties where water is scarce openings should be close to a water source.
Openings can be managed for native vegetation or agronomic species. The type of vegetation managed depends on the primary species of interest, the acceptable costs, and the level of supplemental nutrition required for meeting your objectives.

**Managing Native Vegetation in Openings**

Managing native vegetation is the least costly and time-consuming option. If the area is forested there is a high initial cost associated with clearing the trees, but using log ramps or temporary harvest roads or skid trails can reduce this cost. Stumps should be cleared if possible to allow manipulation of the soil to maintain the opening. If stumps are not cleared then the opening can be maintained by burning and/or mowing for several years, then disking can be begin after the stumps have rotted sufficiently.

Disking at different times of year and different frequencies will favor different plant communities and structure. Similarly, burning can be used to affect the structure and composition of the plant community. As a general rule, disking in the late fall and winter favor legumes and seed producing herbaceous plants such as ragweed and beggarweeds, while spring and summer disking and burning tend to favor a grass dominated community. On land that has been in agricultural production prior to reforestation spring and summer disking can result in stands dominated by undesirable weeds such as coffeeweed, wild radish, and rattlebox. Disking annually or biannually will maintain a community of annual forbs and legumes while disking less frequently will promote a community that includes grasses, woody shrubs, and blackberry.

Larger openings provide an opportunity to create diversity by dividing them into strips or blocks that receive treatments in rotation. By disking or burning one-half or one-third of an opening each year several different types of habitat are available. Including a border around the opening that is allowed to grow up into shrubby cover that is mown, disked, or burned every 4-5 years can enhance this diversity. In smaller openings it may be impractical to divide them into strips, but a rotation of treatments on smaller openings around the property can provide diversity in the landscape.

Managing openings for natural vegetation has several advantages. The cost is lower, and native vegetation is adapted to the site and climatic conditions. The diversity of forages produced ensures that something is available year round for wildlife. The volume and palatability of forage may not equal the production of a food plot planted to agronomic species, but improvements can be made by applying fertilizer.

**Managing Agronomic Species in Openings**

Planting wildlife openings to agronomic species is a popular option, but is more costly and requires a significantly greater investment of time. Unsuccessful plantings are usually the result of poor planning or "cutting corners". These plantings are essentially agricultural crops and therefore require the same degree of planning and care as a crop planted for market. The payoff for proper planning and care is a large quantity of highly palatable and nutritious forage.
The first step is determining what crops are to be managed in each opening (Table 1). Larger openings can be divided into strips and planted to several different crops. Some openings can be planted to reseeding annuals or perennials, which will reduce the intensity of management. Ideally a planting schedule will ensure that across the property some of the wildlife openings are producing quality forage throughout the year.

For example, a planting schedule for annuals might be strips of grain sorghum (milo) and browntop millet planted in spring/summer followed by a fall planting of a rye/wheat mixture in fall over the browntop millet strips. Food is provided through summer/fall and early winter by the millet and grain sorghum and the rye/wheat mixture provides forage in late winter through spring. A planting of reseeding annuals or perennials might consist of deer vetch (Aeschynomene), perennial peanut, or clovers. Selecting the best species depends on the soils and moisture available on the site. The deer vetch and perennial peanut are warm season forages and clovers will provide winter and spring forage. This type of planting will require a light disking in the fall to promote reseeding and should not need replanting for 3-5 years. Another strategy is planting a reseeding annual such as clover and over-planting with an annual such as iron clay pea in summer or wheat in the fall.

After determining what will be planted a soil test should be obtained for each opening. Your County Extension agent can provide you instructions on collecting soil samples. The test will provide liming and fertilization requirements for the crops you intend to plant. Liming should be carried out as soon as possible because the effect of lime on soil chemistry requires 2-3 months to develop. Fertilization requirements will be reported for the three major nutrients: Nitrogen (N), Phosphorus (P), and Potassium (K). Fertilizer is sold in various mixes of these three nutrients. The mix is identified on the label in percent by weight in the order N-P-K, thus a 50 lb. bag of 10-10-10 contains 5 lb. of each nutrient in 35 lb. of inert material. Fertilizer should be applied just prior to planting at the rate recommended by the soil test. If the Nitrogen (N) requirement is very high (> 100 lb./ac.) applications should be made half at planting and the other half at 6-8 weeks after germination.

Your County Extension agent can provide information on the best local varieties to plant, planting dates, and recommended planting rate. If planting legumes the proper inoculants must be applied to the seed prior to planting. Crops should be monitored for any sign of insect activity after planting. If caught early a light application of pesticide can be effective and prevent loss. For reseeding annuals or perennials a selective herbicide treatment may be necessary to control competition and ensure good establishment.

Keeping records and experimenting with different planting strategies is the best way to determine what will give you the best results. Soils, climate, aspect, wildlife population density and many other variables will influence your openings.

**Other Considerations**

If you are planting for white-tailed deer using exclusion cages to protect a small area will allow you to determine what impact deer are having on your planting. A 10-foot piece of welded wire fencing will make a 3-foot diameter cage that can be staked down in your opening. Roll the
fencing into a cylinder and stake it down securely in your food plot. This will give you an easy visual assessment of the utilization of your planting. You may find that the peas germinated just fine, but your deer hammered them before they could become established.

If you are managing your openings for birds you should not use insecticides in spring because hens and pouls are feeding heavily on insects at that time of year. Mowing or disking strips in fall and winter will make seed more readily available for quail and dove, but some cover strips should be left standing. Always make sure there is a brush pile or some weedy thickets nearby so quail and turkey pouls can escape avian predators.

Another feature that can be added to an opening is planting edges with fruit producing shrubs and small trees. Native plums, crabapple, blueberries, pears and other species will provide excellent food and cover further enhancing the wildlife opening. These can be planted or you can take advantage of existing blackberries, dogwoods, etc. by protecting them from fire or mechanical disturbance. Hedgerows of blackberries, blueberries, plums and other shrubs should be cut back periodically (4-7 years) to encourage new growth that will produce more fruit. No more than ½ of the hedgerow should be cut back in a given year.

Experiment and keep records to ensure that you’re getting the most out of your efforts. Most importantly take time to sit a few evenings and enjoy watching visitors to your wildlife garden. After all that’s the best reward!
<table>
<thead>
<tr>
<th>Condition to establish</th>
<th>Requirements for good spring moisture</th>
<th>Well drained, Jan 1 - March 15</th>
<th>Well drained, Jan 1 - June 30</th>
<th>Well drained, May 1 - June 1</th>
<th>Well drained, May 1 - June 1</th>
<th>Well drained, July 1 - August 1</th>
<th>Well drained, June 1 - July 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snow, blockpicks and recesses</td>
<td>Good mixed with small grains</td>
<td>Broadcast after soil tent, sand or clay</td>
<td>Best on loamy soils</td>
<td>Best on loamy soils</td>
<td>Best on loamy soils</td>
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<tr>
<td>High dry density</td>
<td>Good mixed with small grains</td>
<td>Broadcast after soil tent, sand or clay</td>
<td>Best on loamy soils</td>
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<td>Date</td>
<td>Event Description</td>
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<td>April 1 - June 1</td>
<td>Plant, well-drawn, W. D. 0. 1.</td>
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<tr>
<td>April 1 - July 15</td>
<td>Plant, well-drawn, W. D. 0. 1.</td>
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<tr>
<td>Sept 1 - Nov 15</td>
<td>Plant, well-drawn, W. D. 0. 1.</td>
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<td>March 15 - July 1</td>
<td>Plant, well-drawn, W. D. 0. 1.</td>
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<td>Plant, well-drawn, W. D. 0. 1.</td>
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**Table 1. Plants for Waffle Openness**
51-6 BEST MANAGEMENT PRACTICES FOR SILVICULTURE
51-6.001 Purpose
51-6.002 Approved Best Management Practices (BMP)
51-6.003 Presumption of Compliance
51-6.004 Notice of Intent to Implement
51-6.005 Record Keeping

51-6.001 Purpose.
The purpose of this rule is to effect pollutant reduction through the implementation of non-regulatory and incentive based programs which may be determined to have minimal individual or cumulative adverse impacts to the water resources of the state.

Specific Authority 403.067(7) (d), F.S.; Law Implemented 403.067(7) (d), F.S.; History – New

51-6.002 Approved BMPs.
The document titled Best Management Practices for Silviculture (2003) is hereby incorporated and adopted by reference in this rule. Copies of the document may be obtained from the Department of Agriculture and Consumer Services, Division of Forestry, 3125 Conner Boulevard, Tallahassee, Florida 32399-1650 (850) 414-9935 or FAX (850) 488-0863.

Specific Authority 403.067(7) (d), F.S.; Law Implemented 403.067 (7) (d), F.S.; History – New

51-6.003 Presumption of Compliance.
In order to obtain the presumption of compliance with state water quality standards and release from the provisions of s. 376.307 (5), F.S. for those pollutants addressed by the practices the applicant must:


(2) Submit a Notice of Intent to Implement as outlined in 51-6.004.

(3) Implement the non-regulatory and incentive-based BMPs identified as a result of the assessment of the subject properties and listed in the Notice of Intent to Implement.

(4) Maintain documentation to verify the implementation and maintenance of the non-regulatory and incentive-based BMPs as outlined in 51-6.005.

Specific Authority 403.067 (7) (d), F.S.; Law Implemented 403.067 (7) (d), F.S.; History – New

51-6.004 Notice of Intent to Implement.

(1) A Notice of Intent to Implement Non-Regulatory and Incentive Based BMPs identified in the document titled Best Management Practices for Silviculture (2003) shall be submitted to the Department of Agriculture and Consumer Services, Division of Forestry, 3125 Conner Boulevard, Tallahassee, Florida 32399-1650 (850) 414-9935 or FAX (850) 488-0863. Such notice shall identify BMPs the applicant will implement. The notice shall also include: the name of the property owner; the location of the property; the property tax ID number(s); a timeline for implementation; the gross acreage on which the practices will be implemented; the name and contact information of an authorized representative; and the signature of the owner, lease holder, or an authorized agent. This notice is a one-time notification and is not required for each and every individual silviculture activity undertaken by the applicant.

(2) Once filed with FDACS, the Notice of Intent to Implement shall enable the applicant to apply for assistance with implementation as identified in s. 403.067 (7)(d), F.S.

Specific Authority 403.067 (7) (d), F.S.; Law Implemented 403.067 (7) (d), F.S.; History - New

DACS-11305 Rev. 12/05
Page 1 of 3
SILVICULTURE

Best Management Practices Checklist

Instructions: Place a check beside each sub-category of Best Management Practices (BMP) that are currently being implemented. For those BMPs that are not currently being implemented but planned for the future, enter the year that you expect BMP implementation to occur beside each category and/or sub-category. Use the silviculture BMP Manual for details on individual practices within each sub-category.

Special Management Zones
- □ ______ Primary Zone
- □ ______ Secondary Zone
- □ ______ Stringer

Wetlands
- □ ______ Drainage and Conversion
- □ ______ Roads
- □ ______ Harvesting
- □ ______ Skidding

Canals
- □ ______ General
- □ ______ Maintenance

Sinkholes
- □ ______ General

Forest Roads
- □ ______ Planning
- □ ______ Construction
- □ ______ Drainage
- □ ______ Maintenance

Stream Crossings
- □ ______ General
- □ ______ Culverts
- □ ______ Hard Surface Crossings

Timber Harvesting
- □ ______ Skid Trails
- □ ______ Slash Disposal

Site Preparation and Planting
- □ ______ General

Fireline Construction
- □ ______ General

Pesticide and Fertilizer Use
- □ ______ Pesticides
- □ ______ Fertilizer

Waste Disposal
- □ ______ Waste Oil
- □ ______ Solid Waste

Wet Weather Operations
- □ ______ General

Emergency Operations
- □ ______ Wildfire
- □ ______ Insect and Disease

Primary Zone Exceptions
- □ ______ Exception #1
- □ ______ Exception #2
- □ ______ Exception #3a
- □ ______ Exception #3b
51-6.005 Record Keeping.
Where silviculture BMP implementation is not physically observable in the field, participants must
preserve sufficient documentation to confirm implementation of the non-regulatory and incentive based
BMPs identified in the Notice of Intent to Implement. All field activities and documentation related to
BMP implementation are subject to FDACS, Division of Forestry inspection.
Specific Authority 403.067 (7) (d), F.S.; Law Implemented 403.067 (7) (d), F.S.; History – Nev

NOTICE OF INTENT TO IMPLEMENT

In accordance with Chapter 403.067(7) (d) F.S. and Rule 51-6.004 FAC, the following
information is hereby submitted as verification of my intent to implement silviculture
Best Management Practices.
Forest Landowner __________________________ Acres ____________
Property Tax ID# (s) __________________________
County(s) __________________________
Authorized Local Contact __________________________
Address __________________________
Phone __________________________

Complete the attached silviculture Best Management Practices Checklist and submit it
along with this Notice of Intent to the Department of Agriculture and Consumer Services,
Division of Forestry at the address listed below. Keep a copy of the completed Notice(s)
of Intent for your files.

Signature of Forest Landowner or Authorized Agent __________________________ Date __________________________
Mail this notice and the attached Checklist to: FDACS – DOF
Attn: BMP Program
3125 Conner Blvd
Tallahassee, FL 32399-1650

DACS-11305 Rev. 12/05
Page 2 of 3
Foreword

Introduction

This manual establishes the Best Management Practices (BMPs) for silviculture operations in Florida. These practices are designed as the minimum standards necessary for protecting and maintaining the State’s water quality as well as certain wildlife habitat values, during forestry activities. As such, they represent a balance between overall natural resource protection and forest resource use.

In addition, these practices were developed specifically for silviculture and are intended to be applied on all such operations. However, they are not intended for use during tree removal or land clearing operations associated with development or other activities that have non-forestry objectives.

Best Management Practices for Silviculture in Florida were first established in the mid 1970’s in response to the Federal Clean Water Act of 1972. Those original BMPs were designed exclusively to protect Florida’s streams and lakes from potential sources of pollution associated with forestry activities.

In 1992, Agriculture Commissioner Bob Crawford established a BMP Technical Advisory Committee which included representatives from state and federal government, university, forest industry and environmental groups. This committee was directed to review the existing BMP Manual and revise the practices where necessary to reflect the scientific, social and economic changes that have taken place since the original BMP development.

With this revision, some of the original practices have been retained as part of the continuing strategy to achieve water quality goals. However, many of these practices have been expanded to address additional water resource features such as sinkholes, smaller lakes, canals and wetlands. In addition, general ecological considerations and wildlife habitat values have been included in specific BMP objectives, resulting in expanded versions of original BMP concepts such as Special Management Zones, as well as new ones such as BMPs for wetlands.

Although many of the relationships between silviculture activities and impacts to natural resources have been well quantified, many others have not. Consequently, as significant new information has become available, it has been incorporated into the practices in this Manual. To that end, the BMP Technical Advisory Committee will continue to meet biennially, in concert with BMP compliance monitoring, to evaluate the status and progress of BMP implementation and effectiveness.

Because of the extensive revisions to this document, some of the technical terms used in the Manual have specific definitions that may differ from con-
ventional or traditional meanings. The reader is strongly advised to review the Glossary of terms prior to reading the Manual or implementing the practices.

**BMP Monitoring and Regulatory Requirements**

Since 1981 the Florida Division of Forestry has monitored BMP implementation by conducting a biennial Compliance Survey. Like BMPs in general, the Survey has traditionally been heavily oriented toward forestry activities involving intensive pine management, near streams and lakes. With the new and expanded practices in this Manual, BMP compliance monitoring was also revised. Following the development of this Manual in 1993, a BMP Monitoring Task Force revised the Compliance Survey making it compatible with the new BMPs, and more technically and statistically sound. The revised Survey was first used in 1996 and includes significant procedural changes such as a numerical scoring system for determining BMP compliance, special criteria for identifying a significant risk to water quality, and an expansion of the Survey into all Florida counties. Through 2001, the Survey has determined a statewide, long-term average of 93% compliance with silviculture BMPs.

In addition, a BMP Effectiveness Study was completed in 1999, using the Survey as a measure of BMP compliance and using stream bio-assessment techniques to measure water quality. The study concluded that where silviculture BMPs were properly applied water quality, aquatic habitat and overall stream ecosystem health were protected.

The BMPs in this Manual are intended for implementation on all silviculture operations regardless of whether or not the operation is subject to other regulatory standards or permits. Anyone who desires to conduct silviculture activities that are not in compliance with this Manual must necessarily seek and obtain a permit from the appropriate local, state and/or federal government agency prior to conducting the operation. In addition, the maintenance of State water quality standards is required during all silviculture operations.

For the purposes of this Best Management Practices Manual, the cutting and removal of timber and associated activities to prepare land for development are not considered silviculture (see Glossary) and are controlled by other governmental permitting processes.
Application of SMZs: Perennial Streams

Perennial streams are those that have a well defined channel and maintain flow or continuous pools of water throughout most of the year under typical climatic conditions. This includes natural streams that have been altered by dredging and/or straightening (see Canal Section). For perennial streams, the overall Special Management Zone is composed of a Primary Zone and, depending on the SSC, possibly a Secondary Zone. The Primary Zone for perennial streams ranges in width from 35 to 200 feet, depending on stream width or type, as shown in Table 1. Primary Zone widths in Table 1 are given for one side of the stream only. However, the Zone is applied to both sides of the stream. In addition, where the stream is connected to the inflow and/or discharge point of a flowing wetland, the Zone extends an additional 50 feet beyond the defined channel into the wetland (Figure 4). The Primary Zone is measured from the stream, beginning at the break in slope at the top of the stream bank, out to the designated width. Stream width is the typical bank to bank width of the stream within the harvest unit, measured in feet.

<table>
<thead>
<tr>
<th>Stream Width/Type</th>
<th>Primary Zone Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20'</td>
<td>35' per side</td>
</tr>
<tr>
<td>20-40'</td>
<td>75' per side</td>
</tr>
<tr>
<td>&gt; 40'</td>
<td>200' per side</td>
</tr>
<tr>
<td>OFW</td>
<td>200' per side</td>
</tr>
<tr>
<td>Class I</td>
<td>200' per side</td>
</tr>
<tr>
<td>ONRW</td>
<td>200' per side</td>
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</tbody>
</table>

Selective timber harvesting is allowed within the Primary SMZ, consistent with the Primary Zone - Management Criteria. Clearcut harvesting is prohibited in the Primary SMZ, unless the operation qualifies as an exception as described in Appendix 11.

Depending on the SSC of the harvest unit, a Secondary Zone may also be required. If so, the Secondary Zone width is measured beginning at the outer boundary of the Primary Zone and continuing landward for the required distance as determined by the SSC (Appendix 1). Figure 1 shows examples of Primary and Secondary Zones on several different perennial streams, each with a different SSC. Note that where there is no Secondary Zone required, the Primary Zone is the total SMZ. Likewise, where the SSC is such that a Secondary Zone is required, the total SMZ width is the sum of the Primary Zone and Secondary Zone, up to a maximum of 300 feet.
Unlike forest management on private lands, the need to derive economic return may not be the dominant force that leads to public land ownership or drives public land management. Often, the acquisition and management of public land has as its objective, to maximize ecological restoration, preserve existing natural resources and facilitate optimum public use.

When such is the case, the BMP's in this manual must be considered as minimum standards that, by themselves, will not always achieve public land management goals. Consequently, public land management agencies charged with developing and implementing management plans for public lands should do so in conformance with this Manual, and to the greatest extent practical, with the following enhancements:

Areas within the Special Management Zone designated as a Primary Zone should be managed as a no-cut zone. Any timber harvesting within these no-cut zones should be limited to operations that are in association with ecological restoration or wildlife habitat enhancement practices. However, isolated wetlands and intermittent streams on state forests shall be exempt from OFW derived Primary Zones. Each individual state forest, within the forest management plan, shall prescribe management practices for isolated wetlands and intermittent streams on a case by case basis.

The Special Management Zone is only one of the BMP concepts that may warrant additional consideration by land managers prior to implementation on public lands. Public land management agencies are advised and encouraged to augment the BMPs where appropriate, particularly on lands that are managed for non-forestry objectives. Protection of forested wetlands within these lands should be given special consideration.

In addition, such agencies should maintain environmental/ecological inventories of public lands and actively implement and study alternatives that exceed the BMPs in this manual. Results should be well documented to help facilitate future BMP revisions. Copies of enhanced management plans or any such studies should be forwarded to the Florida Department of Agriculture and Consumer Services, Division of Forestry.

Note: Public land management agencies must often adhere to specific legislative provisions or policies when developing and implementing management plans on certain public lands. In particular, the USDA Forest Service is constrained by the Clean Water Act, the National Forest Management Act, and National Environmental Policy Act to develop and implement a Land and Resource Management Plan that will govern management of certain federally-owned forested land. Similar constraints may occur in legislation that governs acquisition and management of lands owned or controlled by local, regional, or state agencies.

To the extent that adherence to these BMPs do not conflict with legislatively established management goals, objectives, requirements, or mandates, public agencies are required to incorporate these BMPs into management plans. In addition, to the greatest extent practical, public agencies are encouraged to incorporate the above BMP enhancements wherever applicable.
Application of BMPs: Wetlands

For regulatory purposes, wetlands are defined by the presence or absence of specific types of vegetation, soils and hydrologic conditions. However, it is not the intent nor within the scope of this Manual, to define wetlands for regulatory purposes or to use any particular regulatory definition. Wetlands, for the purpose of this Manual, are listed by type in Appendix 5.

In addition, areas of pine flatwoods may contain certain wetland types listed in this Manual, such as cypress ponds. However, for the purpose of this Manual, pine flatwoods are not considered wetlands. Conversely, the presence of pine species within swamps, sloughs or floodplains does not necessarily make these areas "pine sites".

Because of the generally wet soil conditions associated with forested wetlands, some of these areas can be very sensitive to forestry activities, particularly during flooding or periods of soil saturation. For silviculture operations in general, wetlands are probably most susceptible to changes in hydrology or hydroperiod, which can result from improper forest road construction, logging operations, and certain types of site preparation activities.

In general, the EMPs that apply to any other land type also apply to wetlands. For example, a stream within a wetland area would receive a SMZ, and a road or stream crossing constructed within a wetland would be required to apply the appropriate BMPs. However, because of the sensitivity of some types of wetlands to certain forestry related activities, the following special BMPs also apply.

Drainage and Conversion
- Ditching in association with road construction and maintenance, fireline plowing or other activities in wetlands, must not significantly change the hydrologic condition of wetlands or the overall drainage pattern of the site.
- Do not significantly alter the natural drainage or flow patterns on forest lands immediately adjacent to wetlands, particularly isolated wetlands, such as cypress ponds or gum ponds. Logging slash must not be pushed into or piled around ponds or other isolated wetlands.
- Do not conduct intensive mechanical site preparation such as bedding, raking and windrowing in wetlands.
- Avoid fireline plowing in wetlands (see Fireline Construction).

Roads
- When constructing roads in wetlands, refer to the Roads section of the manual in addition to the following BMPs.
- Avoid fill road construction, especially in floodplains or other wetlands.
with flowing water. Roads constructed at ground level are less likely to restrict flowing water.

- Do not construct permanent roads in wetlands except to serve large and frequently used areas, provide access for a crossing, or provide fire protection.

- When crossing wetlands, insure that fill roads are properly and adequately culverted and do not act to impound or divert normal stormflow, flood flow or sheet flow (see Stream Crossings).

**Harvesting**

- For harvesting timber in wetlands: **wetland area** means the acres of each contiguous wetland within a contiguous ownership; **selectively cut** means to harvest in accordance with the Management Criteria for the Primary Zone of the SMZ (see Special Management Zones); **leave trees** are large, mast producing and/or cavity trees that represent the older age classes within the stand. For stands where cypress trees are predominant, cypress trees should be selected for leave trees to the extent that safety and harvesting operations allow, and the number of leave trees per acre should be the upper limit of the ranges listed below. In addition, pond cypress trees should be cut at a point on the stem that approximates the average high water mark (except for skid trails or roads). The average high water mark can usually be identified by the water stain line, the lichen line or the area at which the stem begins to swell (buttress).

**A) Harvesting in a wetland area less than 200 acres must meet the following criteria:**

1) retain all snags within the wetland area, to the extent that safety and harvesting operations allow; and,

2a) retain at least 3 to 5 leave trees per acre: if a wetland flow-way is present, leave trees should be left along it's center line; otherwise leave trees should be randomly distributed throughout the wetland; or,

b) retain at least 10% of the harvest area as selectively cut: the 10% area may be left anywhere on-site. However, for wetlands with a well defined stream, an SMZ (as specified in the SMZ section) will be required for the stream, and may be used as part or all of the 10%; for flowing wetlands the 10% should be left along the center line of the wetland flow-way to the greatest extent possible.

**Note:** 2b) is the preferred option where it is applicable

**B) Harvesting in a wetland area 200 acres and larger must meet the following criteria:**

1) retain all snags within the wetland area, to the extent that safety and harvesting operations allow; and,

2) retain at least 1 to 2 leave trees per acre: leave trees should be left
along the center line of the wetland flow-way if applicable; otherwise
leave trees should be randomly distributed throughout the wetland.
3) clearcut areas cannot exceed 160 acres in size.
4) clearcuts should be separated from any other clearcut by a 200' se-
lectively cut buffer or by a 200' wide area which has an average tree
height of at least 20 feet. However, multiple clearcuts within any 160
acre harvest unit may be separated by a 100 foot buffer. Limited timber
harvesting is allowed within the 100 foot buffer provided that trees left
in the buffer are equivalent to the number and size specified in the leave
tree requirements described above. Under this scenario, the trees left in
the 100 foot buffer will satisfy the "leave tree" requirements for the clear-
cut area associated with it, and no other leave trees would be required.
For wetlands with a well defined stream(s), the Primary Zone left along
the stream may be used to contribute toward the 200' requirement. For
flowing wetlands, trees left along the center line of the wetland flow-way
should be used to separate clearcut areas where applicable.
A harvest unit which contains five or more small isolated wetlands,
each less than two acres in size, must retain 20% of the number of isolated
wetlands unharvested. For example, if the harvest unit contains ten, two
acre cypress ponds, eight may be clearcut and two must be left uncut until
the regenerated stands on the other eight attain an average tree height of
at least 20 feet.

Skidding
- Minimize skidder and other heavy equipment operation in wetlands
during wet conditions to avoid widespread excessive soil rutting. Although
some minor rutting may occur in a typical wetland harvesting operation,
skidders and other heavy equipment operations should be planned for dry
seasons and/or dry periods as much as possible. When excessively wet har-
vesting conditions are unavoidable, low ground pressure equipment such as
dual-tire skidders, tracked machines or special techniques such as "mat-log-
ging" or "shovel-logging" should be employed where practical and economi-
cally feasible.
- To the greatest extent possible: forestry operations in wetlands which ex-
hibit seasonal inundation or saturation should be limited to dry conditions
only, and forestry operations in wetlands which are continually saturated or
inundated should be limited to low-water conditions.
- When skidding in wetlands with organic soils, concentrate skid trails to
as small an area as possible, and minimize the number of trails on a given
site (see Timber Harvesting).
Note: Ditching and drainage activities as well as the placement of fill material in wetlands generally requires a permit from regulatory agencies. Individuals engaged in such activities are advised to contact the appropriate agency for specific guidance (Appendices 13 and 14). In addition, state water quality standards may apply to wetlands that are connected to streams, lakes, or other waterbodies.

Note: Typically, cypress planting is not necessary on a large scale basis; however, where site conditions or other factors conducive to natural regeneration of stands are limited, planting of cypress seedlings may augment reforestation efforts.

Retaining isolated wetlands that have the following characteristics may improve the habitat value for wetland dependent species within the landscape:

- Intermittent surface water
- Wetland margin dominated by native wetland plants
- High species and age class diversity in standing timber
- Presence of snags and den trees
- Unique plant communities
- Where natural hydrology is least disturbed
Application of BMPs: Timber Harvesting

Timber harvesting activities should be conducted carefully, especially on steeper slopes and near streams, lakes, sinkholes, wetlands or other waterbodies. When harvesting timber in close proximity to a waterbody, follow the specific criteria provided in the Special Management Zones section of this manual. Depending on conditions, timber harvesting in these areas may be significantly limited.

BMPs for Timber Harvesting

Skid Trails

- Locate skid trails along the contour whenever practical to promote revegetation and reduce soil erosion. If skidding must be done up or down the slope, the operator should skid uphill and avoid long, continuous skid trails.

- After skidding activities are complete, stabilize skid trails where necessary by installing water bars or similar structures at recommended intervals. Seeding and fertilizing skid trails will accelerate stabilization on erodible soils and/or steep slopes.

- When skidding in muck or peat (organic) soils such as in swamps, bogs or similar wetlands, concentrate skidding to as few trails as possible—this will confine soil compaction to small areas.

- When skidding on mineral soils, such as in uplands, skidding should be dispersed so that soil compaction is minimal even in individual trails.

- Keep main skid trails out of all Special Management Zones except to approach a designated crossing.

Slash Disposal

- In order to allow natural, unrestricted water flow and to protect the water's nutrient balance:

  - Logging slash, such as tops and limbs, which are incidental to timber harvesting activities may be left in place, as long as such material is not left in a waterbody.

  - Remove logging slash from all waterbodies including both intermittent and perennial streams, lakes and sinkholes.

  - Do not pile or push logging slash into cypress ponds or strands, swamps, marshes, grassy ponds, or waterbodies such as streams, lakes, sinkholes or similar water resource features.
Application of BMPs: Site Preparation & Planting

Although site preparation activities are part of the reforestation operation, these activities can temporarily create large areas of bare soil. Depending on soil types and slope, mechanical site preparation in particular, may have the potential for significant erosion and sedimentation. For these reasons, mechanical site preparation may be restricted or prohibited near streams, lakes, sinkholes and other waterbodies. When conducting site preparation activities near surface waters, follow the specific criteria provided in the Special Management Zone section of this manual.

BMPs for Site Preparation and Planting

- Plan site preparation and planting procedures prior to timber harvesting activities.

- Select only the site preparation techniques that are necessary to establish seedlings and minimize vegetative competition - do not needlessly disturb the ground surface or expose the topsoil.

- Do not conduct mechanical site preparation within any part of the Special Management Zone.

- Do not conduct intensive mechanical site preparation such as bedding, raking and windrowing in wetlands.

- When chopping, pull chopper perpendicular to a waterbody to orient soil indentations along the contour (not necessary if chopping is followed by bedding or if the waterbody is separated from the chopped area by windrows or a similar barrier to overland flow).

- Arrange windrows and soil beds parallel to a waterbody or wetland in order to provide a barrier to overland flow, prevent concentration of runoff and reduce erosion.

- When using a blade to shear, push, or pile debris, keep the blade above the soil surface. This will minimize erosion and facilitate rapid site recovery and tree growth.

- Do not pile or push logging slash into cypress ponds or strands, swamps, marshes, grassy ponds, or waterbodies such as streams, lakes or similar water resource features.

- Do not conduct site preparation burning within the SMZ when slopes are greater than 18%.
Application of BMPs: Fireline Construction

Fireline construction is an integral component of both fire suppression and prescribed burning. However, firelines can result in excessive erosion and water quality degradation. Lines plowed in wetlands can also result in excessive drainage and possibly conversion of wetlands to non-wetland systems. Extra precautions are necessary when constructing firelines near surface waters and wetlands.

BMPs for Firelines

- Plow firelines only where necessary, making use of existing barriers such as roads, waterbodies, etc.

- Where possible, use alternatives to plowed lines such as harrowing, foam lines, wet lines or permanent grass.

- Do not plow lines through sensitive areas such as wetlands, marshes, prairies and savannas unless absolutely necessary. Avoid these areas or use alternative line construction methods.

- Maintain minimum plow depth at all times.

- When crossing waterbodies with plowing equipment, raise the plow to prevent connecting the line directly to the waterbody.

- Do not construct firelines which act as drainage systems, particularly those that might connect or drain isolated wetlands.

- Avoid constructing plowed firelines in the Special Management Zone, particularly the Primary Zone.

- Use water bars, turnouts and/or vegetation to stabilize firelines when erosion and sedimentation might otherwise result.

- When revegetating firelines, use native species when possible.

- Orient firelines along the contour wherever possible to prevent erosion and gullying.

- Do not prescribe burn for site preparation purposes within the Special Management Zone when the slope of the site is 18% or greater (SSCs 5 and 6). Burning for ecological purposes on steep slopes is not restricted.
NOTICE OF INTENT TO CONSTRUCT A MINOR SILVICULTURAL SYSTEM

Effective Date __________________________ Application No. __________________________

1. Send Certified Mail/Return Receipt Requested To:
St. Johns River Water Management District
Department of Resource Management
Permit Data Services
P.O. Box 1429
Palatka, FL 32178-1429

2. Application is for: __Construction __Alteration
   __Removal __Abandonment __Maintenance

   (Application To Construct or Alter Is Also Considered As Application To Operate)

3. Name of Owner
   Address ____________________________________________
   City: ___________________ State: ______ Zip Code: ___________
   Telephone ________________________________

4. Name of Owner's Agent
   Address ____________________________________________
   City: ___________________ State: ______ Zip Code: ___________
   Telephone ________________________________

5. Only the silvicultural systems listed on the back of this sheet may qualify for this general permit after notice. After reviewing the list, which letter or letters identify the system you propose?

   (Please circle)      A B C D E F G H I

Specific Description of Proposed System ____________________________________________

Approximate Starting Date: __________________________

6. Location of Proposed System:

   U.S.G.S. Topo
   Quad-Map: __________________________
   County __________________________
   Section __________________________
   Township __________________________
   Range __________________________
   Water Course/Water Body Most Affected: __________________________
   Upstream Watershed
   Area (square miles) if proposed system comes within A, B, or C
   on back: __________________________

   Please list any related permit application numbers _______________________________________

Form Number 40C-400-000(2)
The following is the list of systems which may qualify for the noticed general permit for minor silvicultural surface water management systems described in Section 40C-400.500, F.A.C.:

A. A permanent culverted fill road with a road surface of 28 feet or less in width placed in or crossing a stream or other watercourse of less than ten (10) cubic feet per second average discharge at the location of the work or with a drainage area upstream of the work of less than ten (10) square miles. The design of the work must allow for conveyance of normal flows and for overtopping during large storm events, and any fill placed in wetlands associated with the stream or other watercourse must be less than one-half (1/2) acre in area. Under this paragraph, the fill material shall be no more than twenty-four (24) inches above culvert structures. The fill material on the road approaches shall be no more than twenty-four (24) inches above grade, except within an area of one hundred (100) feet from either side of a culvert. The road must be designed with culvert inlets positioned at or below the natural grade of the bed of the stream or other watercourse to prevent the permanent impoundment of water, and to provide an overflow area or areas which will prevent erosion and adverse effects to water levels upstream and downstream of the road.

B. A temporary culverted fill road or a temporary bridge up to 50 feet long, with a road surface of twenty-eight (28) feet or less in width placed in or crossing a stream or other watercourse of less than ten (10) cubic feet per second average discharge at the location of the work or a drainage area upstream of the work of less than ten (10) square miles. The design of the work must allow for conveyance of existing flow during the period of use and any fill placed in wetlands associated with the stream or other watercourse must be less than one-half (1/2) acre in area. The work must be designed only to facilitate the temporary movement of equipment and must be removed immediately after the operation for which the crossing was needed is complete or within thirty (30) months of the filing of the Notice of Intent, whichever is sooner.

C. A permanent bridge up to one hundred (100) feet in length and twenty-eight (28) feet or less in width supported on pilings or trestles, placed in or crossing a stream or other watercourse of less than ten (10) cubic feet per second average discharge at the location of the work or with a drainage area upstream of the work of less than ten (10) square miles. The design of the work and associated approach roads, if any, must allow for conveyance of normal flows and for overtopping during large storm events and any fill placed in wetlands associated with the stream or other watercourse must be less than one-half (1/2) acre in area. The height limitation for fill on the bridge approach roads shall be a maximum of twenty-four (24) inches above natural grade.

D. A permanent culverted fill road or bridge with a road surface of twenty-eight (28) feet or less in width, placed in or crossing a wetland or other impoundment, excluding reservoirs created by dams, where the road surface area over the wetland or other impoundment is less than one half (1/2) acre. Such crossings are not authorized when the landowner can construct a road which avoids filling in wetlands. Such crossings must be located in a manner which minimizes the area of wetlands being filled. Fill material for crossings of isolated wetlands or other isolated impoundments may be excavated from the wetland being crossed provided that all excavation takes place immediately adjacent to the road surface and that the excavated area consists only of narrow trenches which are not connected to ditches constructed or maintained for drainage purposes. In addition, such excavations shall not result in drainage from the wetland.

E. Temporary stream channel diversions necessary to complete the works described in paragraphs A, B, or C above, provided that the area used for the temporary diversion is restored to its previous contours and elevations.
F. Clearing and snagging in a stream or other watercourse within fifty (50) feet of the center line of a culverted fill road or a bridge described in paragraphs A, B, or C above, necessary to construct said work.

G. A permanent low water, hard surfaced crossing in a stream, other watercourse, wetland or other impoundment consisting of the placement of rock or similar material no more than twelve (12) inches higher than the bed of the stream, other watercourse or impoundment. Such crossings must be designed only to facilitate the movement of equipment by creating a stable foundation in shallow streams, other watercourses, wetlands or other impoundments. Temporary low water, hard surfaced crossings may be constructed using logs, but must be removed immediately following the completion of the silvicultural operation or within thirty (30) months of the filing of the Notice of Intent, whichever is sooner.

H. Upland field ditches of a temporary nature to facilitate only harvesting, site preparation, and planting, with a maximum cross-sectional area of eighteen (18) square feet spaced no closer than six hundred and sixty (660) feet from any other parallel ditch. After seedling establishment, the ditches shall be allowed to revegetate naturally. The permittee will not be required to fill field ditches after seedling establishment.

I. Above grade, unpaved, upland silvicultural roads with an average road surface width of twenty-eight (28) feet or less within a construction corridor up to fifty (50) feet in width. These roads must also incorporate sufficient culverts at grade to prevent alteration of natural sheet flow and may have associated borrow ditches. Road ditches shall be constructed only to obtain road material for the associated road and to provide only enough storage to maintain a dry road surface. Such road ditches must not provide drainage to the tract adjoining the road, other than to provide drainage of the road surface and minor, incidental drainage of abutting lands. These road ditches may be connected to other roadside ditches that were constructed pursuant to this section or chapter 40C-43, F.A.C., adopted October 11, 1987, but must not connect directly or indirectly to any works on-site or off-site which are designed or constructed to provide drainage or conveyance or which result in drainage or conveyance. Road ditches must be separated from wetlands and other surface waters by a buffer strip of indigenous ground cover and a water turnout prior to said buffer strip. However, road ditches may discharge directly to a wetland when the slope of the uplands within one thousand (1000) feet of the edge of the wetland is equal to or less than two (2) percent, provided the ditch does not result in drainage of the wetlands and provided that the ditch does not create a hydrologic connection between two or more wetlands. The width of the buffer strip shall be no less than thirty-five (35) feet, or fifty (50) feet when located adjacent to an Outstanding Florida Water, an Outstanding National Resource Water, or Class I waters.

J. Upland borrow areas needed to obtain fill material for crossings authorized by this noticed general permit of streams, other watercourses, wetlands and other impoundments. These upland borrow areas must not provide drainage and must not be hydrologically connected to roadside ditches or field ditches.
A copy of Chapter 40C-400, F.A.C., is available from the District. A District permit does not relieve the permittee from obtaining necessary approvals of any unit of local, state, or federal government.

I have full knowledge of and will comply with the requirements of Chapter 40C-40043, F.A.C. I understand that this noticed general permit is available only under limited circumstances as set forth in Chapter 40C-400, F.A.C., and that permittees are required to comply with all limiting conditions listed in Section 40C-400.215, F.A.C.

Name of Applicant or Applicant's Agent

Signature of Applicant or Applicant's Agent* Date

*Signing by someone other than the owner is also certification that the person is authorized to act as the owner's agent.
FOREST STEWARDSHIP PROGRAM

☐ New Plan
☐ Revision

for

________________________________________
(Landowner Name)

was prepared, reviewed, and approved by the following:

________________________________________
Landowner

______________
Date

________________________________________
Florida Division of Forestry

______________
Date

Florida Fish and Wildlife Conservation Commission (if applicable)

17 Aug 2006

Date

________________________________________
Natural Resource Consultant (if applicable)

______________
Date

Rev. 01/06
FOREST STEWARDSHIP PLAN
UPDATE 2017
LOCATION AND OWNERSHIP

Subsequent to the 2006 plan, the following adjoining tax parcels have been added to the Shoals Park ownership and are shown on the updated ownership map.

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<th>Tax Parcel #</th>
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<th>Acres</th>
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TOTAL 1,000.89
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**Total Forested Acres**: 755, 731, 326, 635
## STAND DESCRIPTIONS AND MANAGEMENT RECOMMENDATIONS

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<tr>
<th>Timber Type</th>
<th>Description</th>
<th>Harvest Type</th>
<th>Burn</th>
<th>Mechanical/Chemical</th>
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<td>1a</td>
<td>Merchantable pine plantation; Thinned Slash Pine, 25+ years old</td>
<td>Shelterwood 30-60 TRBA</td>
<td>Yes, after harvest, 3-5 year cycle</td>
<td>None</td>
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<tr>
<td>2a</td>
<td>Merchantable pine plantation; Thinned Loblolly Pine, 25+ y.o.</td>
<td>Shelterwood 30-60 TRBA</td>
<td>Yes, after harvest, 3-5 year cycle</td>
<td>None</td>
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<td>2b</td>
<td>Merchantable pine plantation; Thinned Loblolly Pine, 15-24 y.o.</td>
<td>Shelterwood 30-60 TRBA</td>
<td>Yes, after harvest, 3-5 year cycle</td>
<td>None</td>
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<td>3a</td>
<td>Merchantable pine plantation; Unthinned Slash Pine, 25+ y.o.</td>
<td>4th or 5th row thinning with selections, 60-65 TRBA</td>
<td>Yes, after harvest, 3-5 year cycle</td>
<td>None</td>
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<tr>
<td>3b</td>
<td>Merchantable pine plantation; Unthinned Slash Pine, 15-24 y.o.</td>
<td>4th or 5th row thinning with selections, 60-65 TRBA</td>
<td>Yes, after harvest, 3-5 year cycle</td>
<td>None</td>
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<td>4a</td>
<td>Merchantable pine plantation; Unthinned Loblolly Pine, 21+ y.o.</td>
<td>4th or 5th row thinning with selections, 60-65 TRBA</td>
<td>Yes, after harvest, 3-5 year cycle</td>
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<td>4b</td>
<td>Merchantable pine plantation; Unthinned Loblolly Pine, 15-20 years old</td>
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<td>Yes, after harvest, 3-5 year cycle</td>
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<td>5</td>
<td>Merchantable pine plantation; Slash Pine seed tree</td>
<td>None</td>
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<td>Mechanical*, if needed</td>
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<td>6a</td>
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<td>6b</td>
<td>Premerchantable pine plantation; Slash Pine, 5-9 years old</td>
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<td>None</td>
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<td>6c</td>
<td>Premerchantable pine plantation; Slash Pine, 10-13 years old</td>
<td>4th or 5th row thinning with selections after merchantable</td>
<td>Yes, after harvest, 3-5 year cycle</td>
<td>None</td>
</tr>
<tr>
<td>7</td>
<td>Premerchantable pine plantation; Non-productive plantation or natural stand</td>
<td>None</td>
<td>None</td>
<td>Mechanical **, Chemical</td>
</tr>
<tr>
<td>8a</td>
<td>Premerchantable pine plantation; Longleaf Pine, 5-10 years old</td>
<td>None</td>
<td>Yes, 2-3 year cycle</td>
<td>Mechanical*, if needed</td>
</tr>
<tr>
<td>9</td>
<td>Wetland</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>10</td>
<td>Wetland, previously harvested</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>11</td>
<td>Natural Stands, upland pine/hardwood</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>12</td>
<td>Buffer, natural and planted</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>O-Oa</td>
<td>Open – Plantable, previous SPB harvest</td>
<td>None</td>
<td>None</td>
<td>Mechanical, Chemical ***</td>
</tr>
<tr>
<td>O-Ob</td>
<td>Open – Plantable, failed planting</td>
<td>None</td>
<td>None</td>
<td>Chemical****</td>
</tr>
</tbody>
</table>

1Harvest timing may be adjusted according to weather conditions. TRBA = Target Residual Basal Area per acre post-harvest.
2Allow ≥ 1 growing season after timber harvesting before prescribed burning. 1 Allow ≥ 1 growing season after prescribed burning before timber harvesting.
*Mechanical site prep may be needed to prepare a seed bed if adequate regeneration is not present in current stand.
**Mechanical and Chemical needed to prepare for re-planting. Type of Mechanical and Chemical site prep will vary by site.
***These sites were harvested in 2016 after Southern Pine Beetle outbreak. They should be site prepped and planted in 2017-18. Mechanical site prep may include chopping, raking, and bedding, depending on site conditions. Planting species will vary by site, with Longleaf on dryer upland sites and Slash on flatwood sites.
****Beds are present on these sites; should be chemically treated and planted with quality containerized Slash seedlings.

Forest Stewardship Plan Update: St. Marys River Shoals Park  Page 71
ROAD AND TRAIL MAINTENANCE

A Recreation Map has been prepared by Nels Parson, recreation planner and land manager from the St. Johns River Water Management District. Mr. Parson (nparson@sjrwmd.com) is available to assist Baker County in updating his 2006 map and planning for new and future road and trail uses.

PRESCRIBED FIRE

The 2006 plan spelled out the importance of prescribed fire and offered recommendations for developing a long-term plan. Specifically, the plan should provide details regarding:

- burn frequency and seasonality,
- smoke management,
- safety,
- equipment, and
- burn strategies for various communities.

The county should work with the Florida Forest Service to develop this long-term plan. There is no single management tool that is more important and useful in the North Florida flatwoods than fire. This should be a high management priority.

The Summary of Wildlife Management Recommendations in the 2006 plan contains an excellent overview of prescribed fire activities that are beneficial to wildlife and the native environment.
APPENDIX
QUALIFICATIONS OF FORESTER

W. LEONARD WOOD

Member - Association of Consulting Foresters of America

Member - Society of American Foresters

State Certified General Real Estate Appraiser - Florida

Certified General Real Property Appraiser - Georgia

Registered Forester - Georgia

Certified Forester - Society of American Foresters

Licensed Real Estate Salesperson - Florida

President - JOWETT & WOOD, INC., Consulting Foresters


Graduate - University of Florida, Bachelor of Science, Forest Resources & Conservation-1983, with honors

Research Forester - ITT Rayonier - 1983-1986
Responsible for research and operations in forest fertilization, hardwood silviculture and longleaf pine regeneration

District Forester - ITT Rayonier – 1986-1990
Responsible for preparation of open market timber sales and for silvicultural operations on 90,000 acres of timberland in Nassau County, Florida and Charlton and Camden Counties, Georgia

Practicing Consulting Forester since 1990
QUALIFICATIONS OF FORESTER

ANDREW WOOD

Member: Society of American Foresters

Florida Certified Prescribed Burner

Graduate: University of Florida
Bachelor of Science
School of Forest Resources and Conservation – 2015

Jowett & Wood Inc., Consulting Foresters: Forester, 2010 – Present
TERMINOLOGY

Acre: 43,560 square feet

Artificial Regeneration: introducing seed or seedlings from a source outside of the immediate area.

Basal Area: the cross-sectional area of all trees measured at 4.5' above the ground including the bark, and expressed in square feet per acre. It is a measure of stocking.

Bedding: construction of parallel mounded ridges, usually 10' to 12' apart, upon which seedlings are planted. A site preparation method used widely on flatwood sites.

Biological Competition: any vegetation competing for limited nutrients, light, and water on a site. Competition can cause reduced survival and tree growth. In established stands, it primarily affects volume through reduced diameter growth.

Board Foot: a unit of measure equal to a board one foot long, by one foot wide, by one inch thick. As applied to volumes of standing timber, it is usually expressed as MBF (thousand board feet) or MMBF (million board feet). Board foot estimates for a stand of timber may vary widely depending on the board foot scale used. Common scales used include International 1/4 inch scale, Scribner scale, Scribner decimal C scale, and Doyle scale.

Chain: a 66' increment of measurement used in land surveying. 10 square chains equals one acre.

Chip-n-saw: small logs (8" to 15" DBH) which are delivered to a mill in tree length; the tops and slabs are chipped and utilized by pulp mills; the remaining cant is sawn into dimension lumber. Stumpage values are higher than pulpwood, but less than plylogs.

Clearcutting: the harvest of an entire crop of merchantable trees.

Conversion Factors: factors used to change from one unit of measurement to another (tons to cords, cords to MBF, etc.).

Cord: a unit of measurement of wood containing 128 cubic feet of wood, bark, and air. A stacked cord of wood measures 4 feet x 4 feet x 8 feet. A cord of wood typically weighs from 2.65 to 2.8 tons. Most facilities buying wood use their own conversion factor. Cords are calculated from tons as opposed to scaling by volume.

Cut and Haul Price: the price paid to cut down, sort, load, and truck raw material to a facility.

Cutover: description of an area from which most or all merchantable wood has been harvested.

DBH: Diameter at breast height, or 4.5' above the ground.
TERMINOLOGY - Cont.

Delivered Price: the price paid for raw material delivered F.O.B. at the mill.

Economically: the growth rate of the stand has dropped to the point where a new stand will produce more value than the continued growth of the existing stand.

Forest types: category of forest defined by its vegetative composition, topography, and soils.

Grade material: trees suitable for converting to products of higher value than pulpwood.

Hardwoods: trees other than conifers and having broad leaves.

Harvesting: cutting merchantable trees for an economic return.

High-grade: to harvest the highest valued trees from a stand. Leaves poor products, poor genetic material. Poor forestry practice. May masquerade as "selective thinning".

Lump Sum Sale: a sale in which one sum is paid for all the standing timber in an area.


Mensuration: the science dealing with the measurement of volume, growth, and development of individual trees and stands, and the determination of various products obtainable from them.

Merchantable timber: trees, crops or stand of trees that are of a minimum size, quality and condition suitable for marketing to a forest products processing plant. What might be merchantable for one forest product (pulpwood) might not be merchantable for another product (sawtimber).

Natural Regeneration: establishment of a stand from seed sources present on site or from adjacent stands.

Old Growth: virgin timber.

Open Market Sealed Bid Sale: a timber sale in which the market is invited to submit sealed bids for the timber to be sold, at a given time and place. Invariably brings the highest price if handled professionally. Reliable market indicator.

Over mature timber:
Biologically: trees or stands of trees showing a decline in vigor, health and soundness associated with aging. May display a net loss of growth per acre.

Plot: an area along a cruise line where sample measurements are taken. Usually a circular area measuring a fraction of an acre.
TERMINOLOGY - Cont.

Point: the point from which a variable radius sample is taken using a prism to select sample trees.

Percent plantable: percentage of a tract which can be prepared and planted to regenerate a stand of timber.

Plantation: a stand resulting from planting trees.

Plylogs (peeler logs or veneer logs): larger logs suitable for peeling on a lathe to make veneer sheets for plywood manufacture. Stumpage prices are greater than chip-n-saw, but less than poles.

Poles: utility poles and construction members, usually the highest value product in the southern forests. Generally 11" - 16" DBH, predominantly straight, and free of disease with minimal knots.

Premerchantable Timber: growing stock or regeneration. Trees not meeting minimum size specifications for merchantability.

Product class: a classification of forest products based on probable use. Some common pine product classes are pulpwood, chip-n-saw, sawtimber, poles, and plylogs.

Product Mix: the proportion of products, by volume, found in a stand or on a tract of timber.

Pulpwood: wood cut or prepared primarily for manufacture into paper or cellulose products. Pulpwood ranges from 4.5 inches DBH and greater. The value is lower than that of chip-n-saw.

Rotation: the period of years chosen to grow a timber crop to a specified condition of maturity.

Sampling Intensity: number of plots required to produce desired accuracy.

Sawtimber: trees that will yield logs suitable in size and quality for the production of lumber.

Second growth timber: plantations and natural stands produced after the virgin timber was cut. Virtually, all timber is second growth in the southeastern United States.

Silviculture: the art and science of producing and tending a forest; the theory and practice of controlling forest establishment, composition, and growth.

Site index: a measure of forest productivity generally expressed as the height in feet of dominant and co-dominant trees of a certain species at a specific index age such as 25 or 50 years. In the south, site index usually refers to a 50-year or 25-year measurement.
TERMINOLOGY - Cont.

Site Preparation: the reducing of competing vegetation or logging debris to make a site easier to plant or to improve conditions favorable to seedling growth and survival.

Site productivity: the relative capability of the soil to produce a crop of timber.

Site quality: The relative productivity of a site.
Stand: a community, composed of trees, possessing sufficient uniformity of composition, age, spatial arrangement or condition, to be distinguished from adjacent communities, so forming a silvicultural or management entity.
Stocking: an indication of the number of trees in a stand relative to the desirable number for best growth and management, such as well-stocked, overstocked, or partially stocked.

Stumpage: the value of timber as it stands, or "on the stump".

Tally: to record products measured on a plot in a timber cruise. May be recorded on a tally sheet, or on a field data recorder.

Thinning: a partial harvest of merchantable wood to generate revenue, increase the growth rate on crop trees, remove suppressed, diseased, or poorly formed trees, or promote the production of grade products.

Ton: 2,000 lbs.

Weight scale: a method to determine volume (board foot, cubic foot, etc.) by weight.

Yield: an estimate of the amount of wood which may be harvested from a particular type of forest stand (by species, site stocking and management regime) at various ages.
BACKGROUND INFORMATION RELATIVE TO MANAGEMENT DECISIONS

Productivity

Productivity of a site is expressed in one of two ways:

1. Site Index at age 25 - the height, which the dominant or co-dominant trees of a given species of tree will reach in twenty-five years of growth.

2. Volume/acre/year - a measure of annual growth, expressed in cords or tons.

Factors affecting the site index are:

A. The fertility and structure of the soil. The presence of spodic horizons (concentrations of fine organic material accumulating in subsurface layers), clay, and the relative position of the water table determine these factors.

B. The species present on the site. The most appropriate species for a site is usually the one exhibiting the highest site index, however, markets may influence species selection when two or more species could be grown.

Factors affecting growth/acre/year are:

A. The site index.

1. Phosphorus deficiency will limit production from an otherwise fertile site. This is a common condition of flatwoods sites.

2. Water becomes a limiting factor on excessively drained sites.

3. Soils with organic horizons (spodic horizons) and/or clay (argillic horizons) are the most productive for tree growth.

B. The stocking level.

C. Competition from undesirable species. Grasses and hardwoods comprise the worst competition for pine stands. Grass competition may reduce stocking levels by out-competing newly planted seedlings. Hardwoods compete for nutrients and sunlight, replacing pine volume for hardwood volume on a nearly one-for-one basis. Historically, hardwood has brought 1/4 to 1/3 the price of pine on a volume basis.

D. The age of a stand is important in terms of productivity. Very young stands are growing rapidly when growth is expressed as a percentage of increase, but actual volume growth is greatest between ages 10 and 20. Annual volume growth begins to decline at some point between these ages. As trees pass age 20, growth slows to a point where more wood can be produced through harvesting and replanting than can be produced by allowing the stand to continue to grow through a second rotation period.

Forest Stewardship Plan Update: St. Marys River Shoals Park  Page 82
BACKGROUND INFORMATION - Cont.

Site Preparation for Planting

Site preparation treatments will vary with each site. The primary objective of site preparation is to achieve seedling survival. The secondary objective is to increase volume production. This is accomplished through competition control and preparation of a superior micro-environment for tree growth. Inadequate site preparation results in poor seedling survival and reduced growth. Additional expenditures for site preparation are required to remedy this situation. Failure to remedy results in low productivity over the rotation and low harvest returns.

Competition control is accomplished by mechanical or chemical treatments, but chemical treatments have a more lasting benefit. The following treatments may be prescribed for site preparation.

- Drum chopping is used to cut small diameter brush, and logging slash into short sections. Chopping is usually followed by burning. It creates a condition which allows bedding; however, it does not increase volume production or reduce hardwood competition by itself.

- Shearing is used to cut down larger cull trees using a sharpened blade (KG blade) mounted on a large crawler tractor. Shearing involves minimal soil disturbance, but hardwoods can be expected to resprout from sheared stumps.

- Raking sheared material, logging slash, or material which a chopper could not cut into smaller pieces, prepares a site for harrowing or bedding. Raking may be heavy, requiring an hour or more per acre, or light, only raking small areas within the planting site.

- Harrowing or discing, using heavy woodland discs, helps control palmetto competition and early grass competition. It may be used to prepare a site for natural regeneration.

- Bedding creates a broad, mounded ridge on which to plant seedlings. On flatwoods sites, bedding has been shown to significantly increase growth. Two passes (double bedding) further increases growth. Bedding controls early grass competition, improves soil structure, concentrates organic matter in the bed, and keeps the seedling roots out of the ground water during wet periods. Bedding is most beneficial when done on clean sites, with the last or only pass done in late fall.
BACKGROUND INFORMATION: Site Preparation - Cont.

- Scalping of grass cover is done on pastures and fields to provide a firm planting surface with minimal grass competition. It may be used in cutover areas with a grass understory. Scalping increases initial survival over planting efforts in heavy grass, but does not increase growth in later years.

- V-blade planting involves a tractor with a snowplow-like device, scalping a two- to four-foot swath while pulling a tree planter. The V-blade performs the same function as a scalper, but may be used on cutover sites. It combines site preparation and planting, but does little to control hardwood competition unless used in conjunction with herbicide application.

- Herbicides may be applied several years before harvest to kill hardwoods and reduce site preparation costs, or applied after harvest, or after planting. Depending on the species present, the site, and the diameters, various chemical combinations may be used. Some are applied by air, some by rubber-tired tractors, and some by hand. Prescriptions must match conditions. Herbicides offer excellent economical control of hardwood competition, but chemical control of palmetto and gallberry is not practical at this time.

- Burning of logging slash and sites treated with chemicals allows preparation of superior planting surfaces. Some hardwood control is accomplished if done in spring or summer. Liability from hazards to traffic created by smoke is a deterrent to use.
BACKGROUND INFORMATION - Cont.

Timber Stand Improvement

In established pine stands, unwanted competition may be in the form of hardwoods or excessive numbers of pine stems. Precommercial thinning may be required to reduce pine stocking to a desirable level. This is usually accomplished with a drum chopper or a heavy mower at an early age. Inadequate stocking fails to utilize the potential of the site. Excessive stocking spreads volume over so many stems that few reach merchantability within the rotation period.

Volume produced in the form of hardwood competition replaces pine volume on approximately a cord-for-cord basis. Chemical release from hardwood competition is cost effective only if the competition is heavy. It is best to control hardwood competition through appropriate site preparation techniques. An advantage of good competition control is the reduced fuel buildup in the understory. In the absence of burning, this factor may be important in fire prevention and suppression.
BACKGROUND INFORMATION - Cont.

Species and Genetic Selection

It is important to match the appropriate species to the site to ensure maximum timber production. In addition, it is important to choose wisely from the many genetic selections that are available.

Slash pine seedlings offer about five types of genetic selections:

1. Common seedlings are no different from what was available fifteen years ago. Growth, form, and disease resistance are unimproved.

2. High gum slash was developed for naval stores. These trees are still offered by some state nurseries, but there is no benefit from the genetic properties except for turpentine production.

3. First generation improved seedlings offer about seven to ten percent more volume growth over common seedlings. A slight improvement in form and resistance to fusiform rust can be expected.

4. Second generation seedlings are classified as superior seedlings. A twelve to fifteen percent increase in volume can be expected from superior seedlings. A significant improvement in form and disease resistance is present.

5. Rust-resistant seedlings may not show the greatest increase in growth, but the vast improvement in fusiform rust resistance yields large volume gains for the stand as a whole through reduced mortality.

Loblolly pine seedlings may be common, improved, superior, Livingston Parrish or East Texas. The latter two sources offer rust resistance, as do some superior seedlings bred for rust resistance.

Longleaf pine is either bare root stock or containerized. Containerized are more expensive but yield very high survival rates. Bare root stock frequently experiences high mortality from drought or competition.

Direct seeding may be used to regenerate a site. While this practice is less expensive than planting, stocking densities are not easily controlled. Genetic improvements can be introduced to the site through purchase of superior seed, but some site preparation is needed to ensure successful germination and survival.
BACKGROUND INFORMATION - Cont.

Fertilization

Fertilization is one means of increasing productivity of selected sites. Many flatwoods sites are phosphorus deficient. Soil groups classified by the University of Florida's Cooperative Research in Forest Fertilization (CRIFF) studies are helpful in predicting the growth response to fertilization.

The probable response to various types of fertilizer for each soil class has been documented for its response to phosphorus at planting, its response to phosphorus and nitrogen at mid-rotation (8 to 10 years), and for soils which show no economical response to fertilization.

Soils are placed into one of seven groups according to their drainage and the depth to and nature of the subsoil. The information necessary to categorize a site into a soil group can easily be obtained in the field or from existing soil maps. The groups are broad enough that delineated areas of a given group are usually large enough to map and manage.

A and B group soils are usually highly responsive to fertilization at planting. The primary difference between A and B group soils is the depth to argillic horizon or clay.

C and D group soils are spodosols and occur in typical flatwoods situations. They are differentiated from each other by the presence or absence of clay below the spodic. Very poorly drained C group soils may be responsive at planting, and will be responsive at mid-rotation. D group soils are responsive at mid-rotation.

E, F, and G soils are considered primarily drier upland soils and are differentiated on depth to clay and drainage. G group soils should never be fertilized.

Application is normally done one time during rotation unless intensive straw sales are made. Then applications are made every four years after raking starts.

Response is usually 1/4 to 1/3 cord/acre/year of additional growth on responsive sites when the appropriate prescription is applied. Fertilization of responsive sites can be used to grow more volume, add a higher percentage of sawtimber to the eventual product mix, or shorten the rotation, having produced the desired volume in a shorter time.
**BACKGROUND INFORMATION - Cont.**

**Rotation Period**

The rotation age is the age at which plantations are expected to be harvested, or the length of time chosen over which to completely harvest the pine lands one time and replant them.

Shorter rotations are chosen for markets dominated by high pulpwood prices and an active pulpwood market. Longer rotations are chosen for markets where grade material (products with a higher value than pulpwood) dominates the market or where pulpwood prices are lower.

The presence of endangered species may require a long rotation regardless of markets.
BACKGROUND INFORMATION - Cont.

Harvest Systems

There are several harvest systems available for pine management:

1. Clearcut with no thinning on a short rotation provides the highest return at this time.

2. Clearcut with one or two intermediate thinnings on a short rotation returns capital costs sooner, but results in significantly less total volume removed. Thinnings will harvest pulpwood only; the final harvest will be largely grade material. Some mortality from insects attracted to trees damaged in the thinning process can be expected. Losses can be heavy, and will be in the better trees. Clearcut areas usually require an investment in site preparation and planting to ensure adequate future stocking.

3. Natural regeneration systems involve one or more thinnings, with five to forty stems/acre of the best trees left at the last thinning to provide a seed source for the next stand. Some soil disturbance is required to prepare a seed bed. If logging does not accomplish this, or if competition is too heavy, some form of site preparation of the seed bed will be required.

The advantage of natural regeneration is lower site preparation costs. Disadvantages include:

a. Stocking of the new stand may be inadequate, resulting in low volume and values for future harvests.

b. Stocking may be too heavy, requiring precommercial thinning or resulting in many trees which require an inordinate length of time to reach merchantable diameter.

c. Seed trees are particularly susceptible to lightning and insect attack, as they are standing alone and have had a great deal of soil disturbance around the roots.

d. The seed tree overstory should be removed within three years after establishment of the new stand. The sale of seed trees, the best trees grown during the rotation, frequently brings a lower price per cord because of the added cost to a logger of cutting a small volume scattered over a large area.

e. In natural regeneration, the opportunity is lost to take advantage of the latest genetic improvement in seedlings available for planting.
Diseases

**FUSIFORM RUST**

Fusiform rust (*Cronartium fusiforme*) causes more loss of value and volume than any other disease or insect in our area. It is dependent on red oak species for a part of its life cycle, but causes no damage to the oaks.

Fusiform rust infects the succulent new growth in late summer or fall, eventually causing a canker or gall. As the wood dries and decomposes at the site of the infection, the tree may be completely girdled and die. Wind storms cause infected trees to break at the weakened infection site. Trees surviving to harvest with stem infections are limited to pulpwood use.

The trees putting on the most growth during the summer have a proportionally higher chance of infection, thus the disease attacks the most desirable trees in greater numbers.

**BROWN SPOT NEEDLE BLIGHT**

Brown spot needle blight (*Scirrhia acicola*) infects young longleaf pine seedlings causing defoliation and reducing early growth. Defoliation for three years in a row usually results in mortality. Infection occurs when spores are "spattered" onto needles by rains. Brown spot is most prevalent in rainy years.

Heavy infections are treated by burning while the longleaf seedlings are still in the "grass" stage. At this point, the seedling has no stem. It resembles a dark green clump of heavy grass. The bud is protected from the heat of the fire by the dense needle mass surrounding it. Spores are destroyed by the fire and the new needle growth can supply enough nutrition for the seedling to begin height growth within two years.

**PITCH CANKER**

Pitch canker (*Fusarium lateritium*) is a fungus which may infect slash pine or longleaf pine. Trees less than three inches in diameter may be killed. Larger trees usually survive, but sustain deformities. The disease is evidenced by dead and dying branches and conspicuous pitch flow from cankers under the bark. By peeling the bark back, a white fungus mycelium may be exposed on the wood. The wood is pitch-soaked and may be pink or purple in color. Infection is suspected to be transmitted by insects feeding on pine trees.
BACKGROUND INFORMATION - Cont.

Insects

BEETLES

The most serious damage to pine stands caused by insects is caused by bark beetles. They are attracted to trees weakened by fire, flooding, old age, open wounds, or to trees planted on sites that are not suitable for that species. The bark beetles bore through the bark, feeding and laying eggs in galleries found in the cambium layer just beneath the bark. This cambium layer is where cell division responsible for growth occurs. The galleries girdle the tree from inside the bark.

Ips engraver beetles (Ips spp.) and black turpentine beetles (Dendroctonus terebrans) rarely infest areas larger than one acre. Frequently, attacks are limited to five to ten trees.

Southern pine beetles (Dendroctonus frontalis), SPB, pose a more serious threat because they can destroy hundreds of acres of timber in a matter of a few months. Prevention of SPB attacks is accomplished by maintaining vigorously growing stands of relatively young timber. The appropriate species selection for planting on each site is important in maintaining vigorous growth. Damaged or weakened timber should be salvaged to avoid attracting bark beetles.

Control of the SPB is accomplished through early recognition and rapid salvage of infested trees. Small pockets may be treated by cutting and debarking the trees, burning the tops, or spraying with lindane.

WEEVILS

Pales weevils (Hylabius pales) are attracted to fresh stumps. Adults lay eggs in lateral roots of the stump. Eggs hatch within ten days and the emerging larvae feed on the roots of the stump. Mature weevils attack the bark of seedlings found in the area, causing up to 90% mortality in extreme cases. Control is accomplished by delaying planting for a year if logging is not completed by the end of June. This allows larvae overwintering in stumps to hatch and leave before planting occurs.
BACKGROUND INFORMATION - Cont.

Fire Protection

Wildfires are most damaging when they occur in premerchantable stands. Merchantable stands damaged by fire can be sold for salvage, mitigating the loss to some extent. Older timber is better able to withstand fire as bark thickness increases.

Preventing or reducing fire losses is accomplished through establishment of presuppression fire lines and control of the fuel or "rough" in the understory. The use of controlled fire during favorable weather is normally used to reduce fuel buildup. Expanses of recently burned fuels offer a place in which fire fighters can control a wildfire. Fire lines offer a narrow break in fuels which may stop a fire, but fast moving fires will likely cross a single fire line. Fire fighters may be able to widen an existing fire line, backfire off the line, or plow additional parallel lines to stop a fire.

Early detection and suppression activities reduce losses. Large fires create their own weather around the front of the fire, drying out and preheating fuels and creating stronger winds.

The most common source of fires is debris burning, including garden spots, pastures, trash barrels, and brush piles. Other common causes are woods arson, lightning strikes, discarded cigarettes, children building campfires, and mechanical malfunctions.

The weather from February to June creates hazardous fire conditions. Windy days with low humidities and warm air are the most dangerous. The worst fires normally come from a westerly direction because that is the direction of spring winds. Presuppression efforts should consider likely sources of ignition and probable wind direction in a worst case scenario.

Forest Stewardship Plan Update: St. Marys River Shoals Park