



Florida Department of Environmental Protection

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October 21, 2010

Ms. Corinne Hermle
Division of Forestry
3125 Connor Blvd./C25
Tallahassee, Florida 32399-1560

RE: Tiger Bay State Forest, Lease # 3902

Dear Ms. Hermle:

The Division of State Lands, Office of Environmental Services, acting as agent for the Board of Trustees of the Internal Improvement Trust Fund, hereby approves the Tiger Bay State Forest management plan. The next management plan update is due October 21, 2020.

Approval of this land management plan does not waive the authority or jurisdiction of any governmental entity that may have an interest in this project. Implementation of any upland activities proposed by this management plan may require a permit or other authorization from federal and state agencies having regulatory jurisdiction over those particular activities. Pursuant to the conditions of your lease, please forward copies of all permits to this office upon issuance.

Sincerely,

Marianne S. Gengenbach
Office of Environmental Services
Division of State Lands
Department of Environmental Protection

TEN-YEAR RESOURCE MANAGEMENT PLAN

FOR THE

TIGER BAY STATE FOREST

VOLUSIA COUNTY



PREPARED BY

FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

DIVISION OF FORESTRY

APPROVED ON

OCTOBER 21, 2010

TEN-YEAR RESOURCE MANAGEMENT PLAN
FOR THE
TIGER BAY STATE FOREST



Approved By:

A large, stylized black ink signature of Jim Karels.

Jim Karels, Director
Division of Forestry

Date

A blue ink signature of David Core.

David Core, Assistant Director
Division of Forestry

6-28-10

Date

A large, stylized black ink signature of Steve Jennings.

Steve Jennings, Chief
Forest Management Bureau

6-25-10
Date

TEN-YEAR RESOURCE MANAGEMENT PLAN
TIGER BAY STATE FOREST

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TEN-YEAR RESOURCE MANAGEMENT PLAN
TIGER BAY STATE FOREST

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LAND MANAGEMENT PLAN EXECUTIVE SUMMARY

LEAD AGENCY: Florida Department of Agriculture and Consumer Services, Division of Forestry

COMMON NAME OF PROPERTY: Tiger Bay State Forest

LOCATION: Volusia County, Florida

ACREAGE TOTAL: 27,396

<i>Historical Natural Communities</i>	<i>Acreage</i>	<i>Historical Natural Communities</i>	<i>Acreage</i>
Basin Swamp	11,130	Scrubby Flatwoods	193
Mesic Flatwoods	10,020	Sandhill	73
Wet Flatwoods	1,950	Basin Marsh	63
Dome Swamp	1,150	Wet Prairie	62
Depression Marsh	997	Hydric Hammock	6
Scrub	819	Sinkhole Lakes	123
Baygall	744	Ruderal or Developed	68
		TOTAL	27,396

LEASE/MANAGEMENT AGREEMENT NO.: 4086, 3902, & 4326

USE: Single Multiple ☒

MANAGEMENT AGENCY

Division of Forestry
St. Johns River Water Management District
Volusia County
Florida Fish and Wildlife Conservation
Commission
Division of Historical Resources

RESPONSIBILITY

General Forest Resource Management
Overall Management Review and Hydrological Activities
Overall Management Review

Wildlife Resources & Laws
Historical and Archaeological Resources

DESIGNATED LAND USE: Multiple-Use State Forest

SUBLEASE(S): None

ENCUMBRANCES: Existing water wells and related easements, Gopher Tortoise Mitigation Site (121.45 acres), and Plum Creek Timber Reserves (165 acres).

TYPE ACQUISITION: Environmentally Endangered Lands (EEL), Save Our Rivers (SOR), CARL, Preservation 2000 and Florida Forever.

UNIQUE FEATURES: Tiger Bay, Bennett Swamp, parts of Middle Haw Creek and Little Tomoka River, Indian Lake, Scoggin Lake, and Sawgrass Lake.

ARCHAEOLOGICAL/HISTORICAL SITES: Twelve (12) known sites.

MANAGEMENT NEEDS: Reforestation and thinning, fuel/fire management, hydrological restoration, road repair and maintenance, maintenance and expansion of recreational trails and facilities, game and non-game wildlife management gopher tortoise management, and update and maintain forest inventory.

ACQUISITION NEEDS: 10,316 acres (Exhibit D)

SURPLUS LANDS/ACREAGE: None

PUBLIC INVOLVEMENT: Management Plan Advisory Group, State Forest Liaison Committee, State Lands Management Review Team, and the Acquisition and Restoration Council

DO NOT WRITE BELOW THIS LINE (FOR DIVISION OF STATE LANDS USE ONLY)

ARC Approval Date: _____
Comments: _____

BTIITF Approval Date: _____

I. INTRODUCTION

A. General Mission, Goals for Florida State Forests, and Management Plan Direction

The Division of Forestry's (DOF) mission is to protect Florida and its people from the dangers of wildland fire and manage the forest resources through a stewardship ethic to assure these resources are available for future generations. Multiple-use management is the overall concept used to perpetuate the sustainability of the forest's native ecosystems and biodiversity.

The goals of the DOF in managing Florida's State Forests are:

- To restore, maintain, and protect in perpetuity, all native ecosystems;
- To ensure long-term viability of populations and species considered rare, endangered, threatened, or of special concern;
- To restore, maintain, and protect hydrological functions related to the quality and quantity of water resources and the health of associated wetland and aquatic natural communities;
- To integrate human use through the multiple-use concept, not emphasizing any particular use over the others or over restoration, maintenance, and protection of native ecosystems;
- To protect known archaeological and historical resources; and
- To practice sustainable forest management utilizing sound silvicultural techniques.

These goals are consistent with the goals for which the property was acquired.

This management plan provides the general direction for management of Tiger Bay State Forest (TBSF). It is intended to meet the planning requirements of Florida Statutes 253.034 and was prepared using guidelines outlined in Chapter 18-2.021 of the Florida Administrative Code. It is not an annual work plan or detailed operational plan, but provides general guidance for management of TBSF for the next ten years and outlines the major concepts that will guide management activities on the forest.

B. Overview of State Forest Management Program

The TBSF property was acquired under the Environmental Endangered Lands Program (EEL), Preservation 2000, Florida Forever, and the Save Our Rivers Program, and is comprised of approximately 27,396 acres. It is located in east central Volusia County, between Interstate 4 (I-4) and State Road 40 (SR-40) and bisected by US Highway 92.

The forest is important to aquifer recharge and surface water storage. In addition, it is a major link in a regional wildlife corridor, connecting other publically owned land. Unique features include the globally imperiled scrub community of Rima Ridge and Outstanding Florida Waters (OFW) that encompass Tiger Bay, Scoggins Pond, Coon

Pond, the west side of Indian Lake and the portion of the Little Tomoka River on the northeast corner of TBSF.

The wildfires of 1998 had a landscape-altering effect on the state forest resulting in nearly 50% of the forest acres being impacted (Exhibit A), and the salvage harvest of approximately 4,250 acres of mature timber. A total of 7,356 acres were reforested between 1999 and 2006 with 3,364 acres in longleaf pine and 3,938 acres in slash pine. In 2009, 1,300 acres of forest were impacted by wildfire, necessitating an additional salvage sale.

C. Past Accomplishments and Status of Previous Plan's Goals/Objectives

Major activity highlights of the most recent five years are summarized in Table 1. The table does not attempt to account for all activities on the forest, but summarizes major activities that are more easily quantifiable. It does not list or identify the multitude of daily activities and public interactions involved in managing the forest.

Since the approval of the previous management plan, there have been many events, developments and accomplishments. Among the most noteworthy have been the following:

- Two major land acquisitions resulted in new tracts for TBSF, the 11,156 acre Rima Ridge Tract, and the 3,883 acre Clark Bay Tract. (The Rima Ridge Tract acquisition closed on 12/31/97, however Management Authority was received on December, 2000 and this tract was not included in the previous management plan.) The state forest more than doubled in size, increasing from 12,268 acres to 27,396 acres. Table 4 Parcel Acquisition History summarizes the details of these and other acquisitions.

In June of 1998, wildfires burned over 13,000 acres of the state forest (Exhibit A). The areas burned were comprised of approximately 4,250 acres of mature timber which were salvage harvested, about 3,200 acres of pre-merchantable pine stands, and 5,800 acres of swamp. Reforestation of over seven thousand acres became necessary as a result of the devastating 1998 wildfires, and became the central issue of forest management activities for several years.

Site preparation methods prior to tree planting were selected based on the amount of logging debris, ground cover characteristics, soil types and future fire management of the stands. Stands located within one mile of smoke sensitive areas (I-4, US-92, SR-40) were more intensively site prepared to reduce live fuel loads.

- Some of the major roads on TBSF have had major repairs and all of the designated public use roads have had routine grading maintenance. As needed, culverts and water crossings were replaced or installed. Road maintenance standards have recently been developed by the DOF to ensure that roads are maintained at a desired uniform standard in all the state forests. A Road Management Plan was developed during the 2005-06 fiscal year and is updated annually.

- An Outdoor Recreation Plan for TBSF was completed in 1998 and is updated annually. Several recreation improvements were made on the Rima Ridge Tract, including establishment of the Indian Lake Recreation Area (primitive campground on the southern end of the Tract), and an equestrian primitive campground (northern end of the Tract) completed in the spring of 2005. A two-mile hiking trail and an interpretive brochure have been developed for the Indian Lake Recreation Area. This trail is a replacement for the previous Dukes Island Trail which was severely damaged by the 1998 wildfires. A parking lot for horse trailers and a five-mile equestrian trail are available to the public on the northern end of the Rima Ridge Tract.
- A law enforcement position was filled for Volusia County CARL Lands in fiscal year 2002-2003.
- Biological surveys that have been completed include: 1) a list of species occurring in the forest compiled by the Florida Fish and Wildlife Conservation Commission; 2) a natural community survey was completed and submitted to DOF by FNAI on June, 2005; and 3) a non-native invasive plant survey was completed by the Forest Management Bureau/Forest Health Section in 2005.
- Compartment maps with stand delineation have been created that depict existing and newly planted stands. Forest growth and other data are collected with the annual inventory. Also, a five-year harvest plan was completed and is updated annually.
- Facilities improvements have been made to the forest road system and day use area (picnic shelter). At the headquarters site, major roof repairs to the office building were completed during the 2002-2003 fiscal year and an equipment shed was added. An extension of the office building was completed in the fall of 2005 that includes three new offices and a handicapped-accessible restroom. A high-speed internet connection with networking capability was installed in July 2005.

Table 1- Accomplishment Summary for Tiger Bay State Forest FY 2004-2009

PROGRAM	ACTIVITY	MEASURED	FY 04/05	FY 05/06	FY 06/07	FY 07/08	FY 08/09	TOTAL
Reforestation	Site preparation	No. acres	337	287	0	0	15	639 acres
	Reforestation		253-Longleaf 143-Slash	85-Longleaf 335-Slash	0	10-Slash 17-Bald cypress	15-Slash	338 acres-Longleaf 503 acres-Slash 17 acres-Bald Cypress
Fire	Wildfire	No./ acres burned	1/6	2/3	5/50.7	4/21.5	10/1294	22/1,375 acres
	Prescribed Fire	No. acres	960	425	0	118	429	1,932 acres
	Fireline Maintenance	No. miles	0	N/A	8	11	17.8	36.8 miles
Boundary Maintenance	Marked or Fence Maintained	No. miles	21	8	47	7	12	95 miles
Timber Harvests	Timber Sales	No. sales	0	1	2	0	2	5 sales
	Pulpwood Sold	No. tons	0	3,046	1,760	0	5,424	10,230 tons
	Chip & Saw Sold		0	1,244	1,599	0	1,148	3,991 tons
	Saw timber Sold		0	0	1,748	0	130	1,878 tons
Roads /Trails	Roads Graded	No. miles	437	169	165	120	91	982 miles
	Road Shoulders Maintained		13	53	61	33	20	180 miles
	Roads Rebuilt		1	3	0	7	6	17 miles
	Culverts / Bridges Repaired or Installed	No. culverts	7	2	1	0	2	12 culverts
	Trails Maintained or Restored	No. miles	13	7	7	7	7	41 miles
Recreation / Visitor Use	Day Use	No. visitors	11,722	12,097	13,003	11,801	16,486	65,109 visitors
	Overnight		677	1,110	1,156	1,230	986	5,159 visitors
	State Forest Use Permits	No. permits	2	2	6	10	7	27 permits
Revenue	Timber Sales	\$	0	\$46,231	\$90,414	0	\$58,316	\$194,961
	Primitive Camping Fees		\$1,061	\$1,086	\$1,941	\$2,027	\$1,892	\$8,007
	Other Revenue		\$235	\$191	\$244	\$46.75	\$235	\$952

D. Goals/Objectives for the Next Ten Year Period

The following goals and objectives provide direction and focus for management of TBSF resources over the next ten-year planning period. Funding, agency priorities, and wildfire (or other natural disasters) will be influential in determining the degree to which these objectives are met. Short term goals shall be achievable within a 2 year planning period, and long term goals shall be achievable within a 10 year planning period. These short term and long term management goals shall be the basis for all subsequent land management activities.

GOAL 1: Habitat Restoration and Improvement

OBJECTIVE 1: Develop and implement Pine Stand Fuel Reduction Plan using thinning, mechanical treatments and prescribed fire. (Short/Long Term)

PERFORMANCE MEASURES:

- Number of acres improved by reducing fuel loads through mechanical treatments or thinning
- Number of acres burned and a fire regime established
- Establishment of demonstration plot for public education.

OBJECTIVE 2: Update the Fire Management Plan to address fire prevention, detection, suppression, prescribed burning, and promotion of FireWise guidelines. (Short Term)

PERFORMANCE MEASURE: Update of the Fire Management Plan.

OBJECTIVE 3: The TBSF contains approximately 15,327 acres of fire-dependent natural communities. Due to the large acreage of pre-merchantable pine stands and heavy fuel loading, annual acreage accomplishments may be lower during the first half of this planning period, allowing for fuel modification and for the young stands to mature. Therefore the initial goal will be to burn 2,000 acres per year; once pine densities and fuels are thinned and/or mechanically treated, the goal will be to prescribe burn 3,150 to 7,200 acres per year. (Short Term/Long Term)

PERFORMANCE MEASURE: Acres prescribed burned. (Acreage should increase as dense plantations are thinned over the ten year period.)

OBJECTIVE 4: Achieve and maintain 1,500 acres within target fire return interval. (Short Term)

PERFORMANCE MEASURE: Number of acres within fire return interval target.

OBJECTIVE 5: Achieve and maintain 3,200 acres within target fire return interval. (Long Term)

PERFORMANCE MEASURE: Number of acres within fire return interval target.

OBJECTIVE 6: Develop a Scrub/Sandhill Restoration Plan. (Short Term).

PERFORMANCE MEASURE: Completion of plan.

OBJECTIVE 7: Implement the Scrub/Sandhill Restoration Plan by conducting natural community improvement on 150/800 acres (Short Term/Long Term)

PERFORMANCE MEASURE: Acres with restoration underway.

OBJECTIVE 8: Implement the Scrub/Sandhill Restoration Plan by conducting timber harvests for the purpose of habitat restoration on 100 acres (Short Term).

PERFORMANCE MEASURE: Acres harvested.

OBJECTIVE 9: Increase groundcover diversity on 100/800 acres of Scrub/Sandhill by introducing growing season fire where the native ground layer has been eliminated or heavily impacted from historical land use. (Short/Long Term)

PERFORMANCE MEASURE: Number of acres of Scrub/Sandhill burned in the growing season.

OBJECTIVE 10: Develop a hydric natural community (Depression Marsh, Wet Prairie, and Wet Flatwoods) restoration plan with goal of improving native groundcover diversity and establishing 1-3 year prescribed fire regime. (Short Term)

PERFORMANCE MEASURE: Completion of plan with scope of work.

OBJECTIVE 11: Implement hydric natural community (Depression Marsh, Wet Prairie, and Wet Flatwoods) restoration plan using mechanical treatments and prescribed fire. (Short/Long Term)

PERFORMANCE MEASURES:

- Number of acres treated and improved
- Number of acres treated, burned, fire regime established and restored.

OBJECTIVE 12: Secure a biologist position to perform assessment of native groundcover quality throughout pine dominated stands and communities to assist with prioritizing prescription burning. (Long Term)

PERFORMANCE MEASURE: Position secured and assessment and map completed

OBJECTIVE 13: To restore the desired fire regime, fuel levels and native groundcover quality, stands will be identified and prescribed fire and thinning will be implemented on 3,000 acres of existing plantations in the flatwoods. (Short/Long Term).

PERFORMANCE MEASURES:

- Identification of stands completed
- Number of acres where fire regime established
- Identification of stands targeted for restoration

(Due to pending budgetary issues some restoration efforts may not be completed within the two year Short Term window.)

GOAL 2: Public Access and Recreational Opportunities

OBJECTIVE 1: Maintain public access and recreational opportunities to allow for a recreational facility carrying capacity of 224 visitors per day. (Short Term)

PERFORMANCE MEASURE: Number of visitor opportunities per day.

OBJECTIVE 2: Conduct forest-wide assessment to determine need for and potential locations for additional group, backpacking, host, and primitive camping sites. (Short Term)

PERFORMANCE MEASURE: Assessment completed.

OBJECTIVE 3: Develop additional public access and recreational opportunities to allow for a facility carrying capacity of 328 visitors per day (Long Term)

PERFORMANCE MEASURE: Number of visitor opportunities per day.

OBJECTIVE 4: Continue to conduct two interpretive/education programs annually. (Short Term/Long Term).

PERFORMANCE MEASURE: Number of interpretive/education programs held annually.

OBJECTIVE 5: Develop a public outreach program plan to identify additional opportunities for public awareness and visitor interpretation. (Long Term)

PERFORMANCE MEASURE: Assessment completed and plan developed.

OBJECTIVE 6: Develop and conduct two new interpretive/education programs annually. (Long Term)

PERFORMANCE MEASURE: Number of new interpretive/education programs provided.

OBJECTIVE 7: Conduct quarterly Liaison Committee meetings to receive feedback from the various user and interest groups. (Short Term/Long Term)

PERFORMANCE MEASURE: Number of Liaison Committee meetings conducted annually.

GOAL 3: Hydrological Preservation and Restoration

OBJECTIVE 1: Conduct or obtain a site assessment to identify potential hydrology restoration needs. (Short Term)

PERFORMANCE MEASURE: Assessment conducted.

OBJECTIVE 2: Protect water resources during management activities through the use of Silviculture Best Management Practices (BMPs) for public lands. (Short Term/Long Term)

PERFORMANCE MEASURE: Compliance with BMPs.

OBJECTIVE 3: Improve and restore natural hydrologic condition and functions to 100 acres of basin swamp community. (Long Term)

PERFORMANCE MEASURES:

- Number of acres for which hydrologic restoration is underway.

- Number of acres for which natural hydrologic conditions and function are restored.

OBJECTIVE 4: Complete assessment of 2009 wildfire suppression lines to determine the need for rehabilitation to restore disturbed hydric communities and/or reduce surface water runoff. Complete rehab and/or restoration work as necessary. (Short Term)

PERFORMANCE MEASURES:

- Completion of assessment
- Number of miles of suppression plow lines rehabilitated.

GOAL 4: Sustainable Forest Management

OBJECTIVE 1: Prepare a five year silviculture management plan including reforestation, harvesting, prescribed burning, restoration, and timber stand improvement activities and goals. (Short Term)

PERFORMANCE MEASURE: Completion of silviculture management plan.

OBJECTIVE 2: Implementation of the silviculture management plan in accordance with five year operational plan. (Long Term)

PERFORMANCE MEASURE: Number of acres treated.

OBJECTIVE 3: Implement the process, as outlined in the State Forest Handbook, for conducting stand descriptions and forest inventory including a GIS database containing forest stands, roads & other attributes (including but not limited to: threatened & endangered species, archaeological resources, exotic species locations, historical areas). (Short & Long Term Goals)

PERFORMANCE MEASURE: Complete GIS database and re-inventory all attributes every 3-5 years or as needed.

OBJECTIVE 4: Conduct Forest Inventory updates each year, according to established criteria. (Short Term/Long Term)

PERFORMANCE MEASURE: Number of acres inventoried annually.

GOAL 5: Non-Native Invasive Species Maintenance and Control

OBJECTIVE 1: Update non-native invasive plant species management plan. Monitor and treat, as needed, all known sites for Exotic Pest Plant Council (EPPC) Category I and Category II invasive exotic plant species. (Short/Long Term)

PERFORMANCE MEASURE:

- Completion of plan update.
- Number of sites and/or number of acres treated annually.

OBJECTIVE 2: Coordinate with local non-profits, such as Cooperative Invasive Species Management Areas (CISMAs), to develop applications for government grants to assist with non-native invasive plant management efforts. (Short/Long Term)

PERFORMANCE MEASURE:

- Completed grant application(s).
- Amount of funding gained.

OBJECTIVE 3: Monitor for nuisance animal species. (Short/Long Term).

PERFORMANCE MEASURE: Number of species observed and identified.

GOAL 6: Capital Facilities and Infrastructure

OBJECTIVE 1: Maintain four facilities, 52 miles of road, and seven miles of trail. (Short/Long Term)

PERFORMANCE MEASURE: Number of miles of facilities, roads, and miles of trails maintained.

OBJECTIVE 2: Maintain 15 miles of State Forest boundary annually. (Short/Long Term)

PERFORMANCE MEASURE: Number of miles of forest boundary maintained annually.

OBJECTIVE 3: Update annually 5-Year Road Management Plan. (Short/Long Term)

PERFORMANCE MEASURE: Annual update completed.

OBJECTIVE 4: Complete the forest road inventory on all service roads, including signage plan, and sign installation. Annually update forest road inventory with culvert changes, road status or condition, etc. Integrate culvert inventory with annual culvert inspections. (Short Term/Long Term)

PERFORMANCE MEASURES:

- Miles of service road inventory completed.
- Signage plan updated and service road signs installed.
- Annual culvert inspection completed.
- Annual road and culvert inventory updates completed.

OBJECTIVE 5: Conduct an assessment of service roads to determine needs for closure, and/or additional public access. (Short Term Goal)

PERFORMANCE MEASURE: Assessment completed.

GOAL 7: Cultural and Historical Resources

OBJECTIVE 1: Ensure all known (12) and future sites are recorded in the Florida Division of Historical Resources (DHR) Master Site file. (Long Term Goal)

PERFORMANCE MEASURE: Number of recorded sites.

OBJECTIVE 2: Continue to monitor the 12 recorded sites and send updates to the DHR Master Site File as needed. (Short/Long Term Goal)

PERFORMANCE MEASURE: Number of sites monitored.

OBJECTIVE 3: Bring 1 of 12 recorded sites/cultural resources into good condition; maintain 11 remaining sites in good condition. (Long & Short Term Goal)

PERFORMANCE MEASURE: Number of sites in good condition.

GOAL 8: Imperiled Species Habitat Maintenance, Enhancement, Restoration, or Population Restoration

OBJECTIVE 1: Develop baseline, site-specific, imperiled species occurrence inventory list and initiate inventory surveys on priority species (Long Term Goal).

PERFORMANCE MEASURE:

- Baseline imperiled species occurrence inventory list completed.
- Baseline inventories initiated.

OBJECTIVE 2: Develop monitoring protocols for selected imperiled species. (Long Term Goal)

PERFORMANCE MEASURE: The number of imperiled species for which monitoring protocols are developed.

OBJECTIVE 3: Implement monitoring protocols for selected imperiled species. (Long Term Goal).

PERFORMANCE MEASURE: The number of species for which monitoring is ongoing and data is maintained.

OBJECTIVE 4: In cooperation with FWC, develop a Wildlife Management Plan that addresses all appropriate fish and wildlife species, including appropriate imperiled species, their habitats, and their sustainability based on site-specific population data. In conjunction with this plan, institute a continuous monitoring program to ensure the viability of these populations. (Long Term Goal)

PERFORMANCE MEASURE: Wildlife Management Plan developed.

OBJECTIVE 5: Develop a native plant occurrence list. (Short Term Goal)

PERFORMANCE MEASURE: Plant list initiated.

E. Management Needs, Priority Schedule and Cost Estimates

Management activities on TBSF during this management period must serve to protect and conserve the natural and historical resources, improve forest health, and effectively manage resource-based public outdoor recreation, which is compatible with the conservation and protection of this forest.

FIRST PRIORITY

1. Prescribed Burning

Prescribed burning is one of the primary management tools for the forest. Approximately 50% of the acreage (roughly 15,327 acres) supports vegetative communities that are fire-dependent. The Fire Management Plan will be updated as necessary. The short term goal is to burn 2,000 acres per year due to heavy fuel buildup in young pine plantations (Annual cost of \$36,856 based on Fire Manual rates for contract burning and plowing). Eventually, the annual goal will be to prescribe burn 3,200 per year (Annual cost of \$49,071) as more acreage is converted from the restoration stage to the maintenance stage.

A Senior Forest Ranger (Annual Salary & Benefits \$37,800; Pickup truck, radio \$35,000) with dedicated Fire Management Officer responsibilities, as well as an additional Forest Ranger (annual cost, \$34,500; equipment cost \$35,000) to assist as a burn team member are needed to adequately support the increased level of prescribed burning demanded, and to implement the Pine Stand Fuel Reduction plan.

Mechanical fuel reduction equipment appropriate for operating in dense plantations with heavy palmetto/bay understory condition is needed to facilitate introduction of prescribed fire and reduce smoke management liability adjacent to smoke sensitive areas. The narrow isles between pine rows from expansive 1998 reforestation efforts do not accommodate current district equipment tolerances. Without acquiring a smaller scale piece of equipment with a narrow turning radius such as a Bobcat or similar skid steered implement, it will not be possible to control fuels at a maintenance level within these stands. This piece of equipment could also be used on other state forests within the Bunnell district that have similar conditions. (Bobcat w/ drumhead mower, trail - \$75,000).

Estimated Cost of Prescribed Burning: \$490,710

Estimated Annual (Salary) Cost: \$72,300

Estimated Equipment Cost: \$145,000

2. Road Restoration & Maintenance

The road system on TBSF has been established and must be maintained for administrative and public access. Forest roads are maintained for minimal impacts on the natural resources. Upgrading of some roads will be necessary to bring road access up to established standards. The initial road inventory was conducted in-house and completed in FY 2003-04. A Road Plan including an inventory was developed in 2005-2006 to identify existing conditions and needed improvements. All road improvements will follow the guidelines in the BMP manual as well as the DOF road standards.

Estimated Average Annual Cost: \$58,000

3. Non-Native Invasive Plant Control

Fund non-native invasive species control efforts with guidance from the Forest Health Section. Includes contract chemical treatment.

Estimated Cost: \$75,000

4. Hydrological Restoration

The Restoration work will require extensive use of mechanical equipment to rehabilitate the 2009 wildfire suppression lines in the Tiger Bay.

Estimated Cost: \$16,000

5. Reforestation

As a result of the March 2009 wildfire, there is a need for reforestation.

Approximately 94 acres of pine forest were adversely affected resulting in the salvage sale of approximately 48 acres of mature pine and the loss of 46 acres of pre-merchantable pine. Site preparation and reforestation costs are estimated at up to \$250/acre.

Estimated Cost: \$23,500

6. Timber Management

Improvement thinning will be conducted on approximately 1,000 acres throughout the course of this ten-year period. Approximate cost for timber marking (paint and supplies) is \$12/acre.

Estimated Cost: \$12,000

7. Recreation Program

Implementing the Outdoor Recreation Plan will cost approximately \$95,300 for FYs 2010-2015. In addition, the services of the District-wide Recreation Coordinator (60% use at TBSF - \$31,700); and a permanent Senior Clerk (\$32,730) are needed to support the program demands.

Estimated Information/Education Cost: \$95,300

Estimated Five Year Operational Costs: \$ 7,600

Estimated Annual Cost (Salaries): \$64,430

8. Natural Community Management

A District-wide Biologist III position (annual cost based on 50% use at TBSF) is needed to assist with increasing demands of listed species survey and management, coordination of invasive non-native plant control, and restoration projects. The position is necessary to initiate imperiled species surveys and monitoring efforts. In addition, a rare plant and animal species inventory and mapping survey are needed to follow up the Florida Natural Areas Inventory (FNAI) natural community survey. Cost will depend on the intensity of the survey, but is estimated at \$29,000.

Estimated Annual Costs: \$26,600

Estimated Survey Cost: \$29,000

Estimated Equipment Cost: \$35,000

SECOND PRIORITY

1. Forest Boundary Encroachments & Fencing

Some boundary encroachments by adjacent landowners have been revealed over the last several years, especially on the Rima Ridge Tract. These encroachments will be cataloged in order to determine how they may best be resolved. Approximately one mile of boundary requires fencing to deter unauthorized ATV activity from adjacent properties.

Estimated Fencing Cost: \$5,000

2. Wildlife Opening Maintenance

Cooperating with the Florida Fish and Wildlife Conservation Commission (FWC) on TBSF wildlife openings will be an ongoing process; with prescribed fire support to burn the openings as needed.

THIRD PRIORITY

1. Forest Boundary Line Maintenance

The state forest boundary must be maintained and some areas need to be reestablished. Boundaries will be patrolled on a routine basis and the entire boundary (72.25 perimeter miles) will be reworked over a five year period or as needed. The estimated cost for boundary maintenance is \$9,600 every fifth year. In addition, a system of boundary line firebreaks is partially in place but will need to be completed. A gyro-track will be used on areas (approximately two miles @ \$2,000/mile) that are too overgrown or wet for conventional equipment.

Estimated Cost, Marking & Posting: \$12,000

Estimated Cost, Discing Perimeter: \$7,200

Estimated Cost, Boundary line clearing (gyro-track): \$4,000

2. Recreation Improvements

A visitor center and a historical/interpretative display will be created at the TBSF office and in identified locations with the forest. This will include brochures and information about the archaeological and historical sites found on TBSF.

Estimated Cost: \$2,500

Table 2. Estimated Ten Year Expenditures Organized by Uniform Cost Accounting Council Categories

CATEGORY	PRIORITY 1	PRIORITY 2	PRIORITY 3	TOTAL
Resource Management:				
-Exotic Species Control	\$75,000			\$75,000
-Prescribed burning	\$481,500			\$481,500
-Timber Management	\$35,500			\$35,500
-Hydrological Management	\$16,000			\$16,000
-Biological monitoring	\$29,000			\$29,000
Administration:				
-Units/Projects				
-Staff/Housing Needs	\$1,633,300			\$1,633,300
Capital Improvements:				
-New Facility Construction				
-Facility Maintenance	\$580,000		\$23,200	\$603,200
-Tools/Equipment	\$180,000	\$5,000		\$185,000
Visitor Services/Recreation:				
-Information/Education Programs	\$95,300		\$2,500	\$97,800
-Operations	\$15,200			\$15,200
-Law Enforcement/Security				
TOTAL	\$3,140,800	\$5,000	\$25,700	\$3,171,500

II. ADMINISTRATION SECTION

A. Descriptive Information

1. Common Name of Property

The common name of the property is Tiger Bay State Forest (TBSF).

2. Location, Boundaries and Improvements

The TBSF is located in the east central portion of Volusia County, Florida. It is approximately seven miles west of Daytona Beach, extending from I-4 to State SR-40 in two contiguous blocks separated by US-92. The boundaries and the major parcels are identified in Exhibit B. Major DOF structures include an office/shop, equipment shed, and mobile home site on the headquarter parcel. Other structures located on easements include a Federal Aviation Administration (FAA) tower, one privately

owned communication tower, and several pump houses that belong to and provide water supply to the Cities of Daytona Beach and Ormond Beach.

3. Legal Description and Acreage

The TBSF is comprised of three (3) separate tracts, the Tiger Bay Tract, the Rima Ridge Tract, and the Clark Bay Tract totaling 27,396.00 acres (see table 4 and Exhibit B). The legal description is found in lease agreements #4086, #3902 and #4326 The property is located in all or part of Sections 28,29,31,32,33 of Township 14S, Range 31E and 2,3,4,9,10,11,13,14,15,16,23,24,25,26,27,28,29,32,33,34,35,36 of Township 15S, Range 31E and 31,32,30 of Township 15S, Range 32E and 5 of Township 16S, Range 32E and 2,3,4,5,8,9,10,11,12,13,14,15,22,23,24,26,27 of Township 16S, Range 31E of Volusia County Florida.

4. Degree of Title Interest Held by the Board

The Board of Trustees of the Internal Improvement Trust Fund (BOT) holds fee simple title to the Tiger Bay and Clark Bay Tracts. Lease agreements 4086 and 3902 provide authority for DOF to manage the Tiger Bay and Clark Bay Tracts of the TBSF. Copies of this agreement and related deeds are on file at the DOF State Office, the Department of Environmental Protection (DEP) office in Tallahassee, and at the DeLeon Forestry Station.

The St. Johns River Water Management District (SJRWMD) and the BOT hold joint fee title to the Rima Ridge Tract. Intergovernmental Management Agreement stated in lease agreement 4326 provides management authority of the Rima Ridge Tract to the DOF.

5. Proximity to Other Public Resources

Lands managed by state, federal or local government for conservation of natural or cultural resources that are located within approximately 12 miles of the TBSF include in Exhibit C as well as the table below:

Table 3. Nearby Public Conservation Lands and Easements

PROPERTY	AGENCY	DISTANCE
Daytona Beach City Forest	City of Daytona Beach	Adjacent
Port Orange City Forest	City of Port Orange	Adjacent
Plum Creek Conservation Easement	SJRWMD	Adjacent
Clark Bay Conservation Area	SJRWMD	Adjacent
Longleaf Pine Preserve	Volusia County	Adjacent
University Highlands Small Lot Program	Volusia County	Adjacent
West Ormond Wetlands Park	City of Ormond Beach	Adjacent
Heart Island Conservation Area	SJRWMD	4 miles NW
Spruce Creek Preserve	Volusia County	5 miles SE
Tomoka State Park	DRP	6 miles NE

PROPERTY	AGENCY	DISTANCE
Doris Leeper Spruce Creek Preserve	Volusia County	7 miles SE
Hagstrom Conservation Easement	SJRWMD	7 miles NW
DeLeon Springs State Park	DRP	7 miles W
Lake Woodruff National Wildlife Refuge	USFWS	7 miles W
Lake George State Forest	DOF	8 miles W
Bulow Creek State Park	DRP	8 miles NE
Relay Tract Conservation Easement	SJRWMD	9 miles NW
Blue Springs State Park	DRP	11 miles SW
Hontoon Island State Park	DRP	11 miles SW
Lower Wekiwa River Preserve State Park	DRP	12 miles SW

DOF- Florida Division of Forestry

DRP – Florida Division of Recreation and Parks

SJRWMD- St. John’s River Water Management District

USFWS - United States Fish and Wildlife Service

6. Aquatic Preserve/Area of Critical State Concern

The TBSF is not within an aquatic preserve or an area of critical state concern, nor is it in an area under study for either designation.

B. Acquisition Information

1. Land Acquisition Program

Following is a table indicating acquisition information for TBSF by parcel:

Table 4. Parcel Acquisition History

Parcel Name	Acres	Funding	Date
TIGER BAY TRACT			
EEL	6, 981.34	EEL	03/05/1979
Georgia Pacific	4, 320.97	DOF/P2000	12/21/1994
Tucker	10.76	DOF/P2000	06/08/1995
Howard	7.27	DOF/P2000	09/25/2000
Strickland	15.50	DOF Florida Forever	03/19/2004
Woodrow (Woody)	955.86	DOF/P2000	09/12/1997
Weiner & Krumholz	65.00	Unknown	06/04/1980
RIMA RIDGE TRACT			
Consolidated Tomoka	11,155.97	DOF/P2000/SOR	12/31/1997
CLARK BAY TRACT			

Parcel Name	Acres	Funding	Date
Volusia Conservation Corridor	3,883.01	Florida Forever	6/4/2004

EEL – Environmentally Endangered Lands

P2000 – Preservation 2000

SOR – Save Our Rivers

2. **Legislative or Executive Constraints**

There are no known legislative or executive constraints specifically directed toward TBSF.

3. **Purpose for Acquisition**

The main objectives for the acquisition of the property and the primary goals of the DOF in managing the tract are:

- To conserve and protect environmentally unique and irreplaceable lands that contains native, relatively unaltered flora and fauna representing a natural area unique to, or scarce within, a region of this state or a larger geographical area.
- To conserve and protect native species habitat and listed species.
- To conserve, protect, manage, or restore important ecosystems, landscapes, and forests, if the protection and conservation of such lands is necessary to enhance or protect significant surface water, ground water, coastal, recreational, and timber resources, or to protect fish or wildlife resources which cannot otherwise be accomplished through local and state regulatory programs.
- To provide areas for nature-based recreation.
- To preserve archaeological or historical sites.
- To provide research and educational opportunities related to natural resource management.

The initial TBSF acquisition of 6,981.34 acres was acquired in 1979 under the Environmentally Endangered Lands (EEL) program.

4. **Designated Single or Multiple-Use Management**

The TBSF is designated for multiple-use management and is managed under authority of Chapters 253, 259 and 589, Florida Statutes. According to Chapter 253.034 (2) (a), multiple-use means “the harmonious and coordinated management of timber, recreation, conservation of fish and wildlife, forage, archaeological and historic sites, habitat and other biological resources, or water resources so that they are utilized in the combination that will best serve the people of the state, making the most judicious use of the land for some or all of these resources and giving consideration to the relative values of the various resources.”

DOF’s primary goal in managing TBSF will be to utilize the multiple-use management approach. The forest will be managed so as to restore, protect and manage ecosystems and to maintain biological diversity and ecosystem functions while allowing compatible public uses. Multiple-use management includes, but is not limited to: silvicultural management, recreation management, wildlife management,

archaeological and cultural resource management, ecosystem restoration, environmental education, and watershed management. Only uses compatible with the conservation of TBSF and its ecosystems will be implemented. Compatible multiple uses may include such activities as hiking, hunting, fishing, primitive camping, picnicking, horseback riding, and bicycle riding. Recreational activities are identified in detail in Section IV.A.4 of this plan.

5. Alternate Uses Considered

The following uses were considered and determined not compatible: water resource development projects, water supply projects, storm-water management projects, and linear facilities, communication towers, and antennas, except as otherwise outlined in this plan. Deadhead logging is not compatible, and is not considered an appropriate use within or adjacent to the state forest boundaries.

6. Additional Land Needs

Various parcels should be considered for acquisition if they become available for purchase. See Exhibit D for these and other properties that would facilitate restoration, protection, maintenance, and management of the natural resources on TBSF.

The area depicted within the southwest area of Exhibit D is an antiquated subdivision known as University Highlands. This area is subdivided into hundreds of lots approximately 1.5 acres each. Volusia County Land Acquisition and Management implemented a Small Lot Acquisition Program in 2002, with ad valorem taxes dedicated to the acquisition of conservation lands, in an attempt to acquire parcels within this antiquated subdivision. To date within this desired acquisition area, Volusia County has acquired more than 600 lots, consisting of 1260 acres. Volusia County intends to continue acquisition within this area until 2020, or until the Volusia Forever funds expire.

A high priority should be made to focus on acquisition of a 2.6 mile long by 660 feet wide piece of undeveloped land, known as the City of Remados parcels, that lie between TBSF's boundary and the north side of US 92. Numerous parcels comprise this approximate 117-acre strip, however the two largest parcels (39 and 47 acres) comprise 75% of the total.

7. Adjacent Conflicting Uses

Nearby developed areas, and adjoining highway systems including I-4, US-92, and SR-40 hinder in some instances the prescribed burning program on this forest due to smoke management concerns. During the development of this management plan, DOF staff reviewed current comprehensive plans and future land use maps. Additionally, DOF staff meets with adjacent land owners and maintains liaison with those land owners as needed to ensure that any conflicting future land uses may be readily identified and addressed.

We welcome the opportunity to meet with any adjacent property owner(s), prospective owner(s), or prospective developer(s) to discuss methods to minimize negative impacts on management, resources, facilities, roads, recreation, etc. We also look forward to hearing/sharing ideas on how the property owner(s)/developer(s) may develop the property adjacent to the shared property line, and perhaps provide buffers to minimize encroachment into the forest and to reduce any management impacts.

8. Surplus Land Assessment

All of the land within this forest is suitable and necessary for state forest management and none is considered or will be declared as surplus.

C. Agency & Public Involvement

1. Responsibilities of Managing Agencies

The DOF is the lead managing agency, responsible for overall forest management and recreation. The Department of Agriculture and Consumer Services (DACS), Office of Agriculture Law Enforcement (OALE) has law enforcement responsibilities. The Fish & Wildlife Conservation Commission (FWC) is responsible for the joint development of hunting regulations, hunting law enforcement, wildlife monitoring, and wildlife management activities. The DOF will cooperate with the DHR regarding appropriate management practices on historical and/or archaeological sites on the property as stated in Section 267.061, Florida Statutes. The DHR and FNAI will be notified prior to the initiation of any ground disturbing activity by the DOF or any other agency involved with the forest. Volusia County will provide assistance as appropriate.

The SJRWMD has granted management authority of the Rima Ridge Tract to the DOF through the Intergovernmental Management Agreement 6346. The SJRWMD will be consulted and involved in matters relating to water management and hydrological restoration on TBSF.

2. Public and Local Government Involvement

This plan has been prepared by the DOF and will be carried out primarily by this agency. The DOF responds to public involvement through direct communication with individuals, user groups, and government officials. The plan was developed with input from the TBSF Management Plan Advisory Group through a process of review and comment. The advisory group also conducted a local public hearing at the Volusia County Agricultural Extension Center on May 17, 2010 to receive input from the general public. A summary of the advisory group's meetings and discussions, as well as any written comments received on the plan are included in Exhibit E. An additional public hearing was held subsequently in Tallahassee by the Acquisition and Restoration Council (ARC).

An interagency State Land Management Review Team (LMR) toured the forest and conducted a review of the Resource Management Plan on March 25, 2004. Another LMR team toured the forest and conducted a subsequent review on June 10, 2009. In

both cases, their comments and report indicate management activities to be consistent with the approved 1998 land management plan (Exhibit F). The review team reports and written comments did suggest several areas for improvement and/or management focus. All the LMR findings and team suggestions were considered during the development of this plan and incorporated as appropriate.

3. Compliance With Comprehensive Plan

The plan along with a letter (Exhibit G) was submitted to the Volusia County Council for review of compliance with their local comprehensive plan. Since a portion of the Rima Ridge Tract is within the limits of the City of Daytona Beach, the plan was also submitted for review of compliance with the city's comprehensive plan.

III. RESOURCE SECTION

A. Past Uses

Tiger Bay Tract

Under previous ownership by the Consolidated Tomoka Land Company and Hudson Pulp & Paper (Georgia Pacific Corporation (GP) bought out Hudson in 1979); both the EEL parcel and the GP addition were managed primarily for timber production. Most of the EEL parcel was clearcut except for portions of the loblolly bay (*Gordonia lasianthus*) swamps. Some areas were bedded and replanted with slash pine. At the time of the state acquisition the tract consisted of pine plantations and understocked second growth pine stands. After acquisition, 126 acres of the Tiger Bay Tract was removed from the DOF state forest lease and transferred to the Florida Department of Corrections to develop the Tomoka Correctional Institution.

The 1994 GP addition included pine islands with planted slash pine plantations of various ages, some of which were thinned prior to state purchase. Most of the areas were bedded prior to tree planting. As a result of the 1998 wildfires, most of the pine stands were clearcut and replanted.

At the time of purchase in 1997, the Woodrow 'Woody' parcel consisted of slash pine stands which had naturally regenerated after being harvested in the 1970's. This parcel also suffered extensive damage during the 1998 fires and almost all the merchantable pine acres had to be harvested during salvage operations and replanted. Presently, the DOF manages this tract for silviculture, ecological values and as a Wildlife Management Area (WMA).

Rima Ridge Tract

Most of the tract was owned by Consolidated Tomoka since the 1920s, with some of the property acquired by them as early as 1912. Historic uses of the tract include cattle grazing, turpentine production, timber management, hunting and apiary use. A Boy Scout camp was located on the southeast side of Indian Lake from about 1928 to 1930. The property was a designated Wildlife Management Area from 1950 through 1979. From 1979 until state acquisition, it was leased to Lighter Knots Hunt Club. Sun Oil Company had an oil and gas lease on a portion of the property from 1941 to 1950.

Sunray Oil Company had an oil and gas lease on a portion of the property from 1952 through 1962. The Civil Aeronautics Administration leased a portion of the property in 1950 for a radio tower. Southern Bell and Florida Power and Light have rights-of-way or easements within the state forest. American Tower has leased space for a communication tower.

The City of Daytona Beach and the City of Ormond Beach have easements for water supply well and pumping station locations within the property which originated when the tract was still under ownership by Consolidated-Tomoka Land Company. The City of Daytona Beach easement is for seven well sites. The current Consumptive Use Permit (CUP) # 8834 was issued by the SJRWMD on March 9, 2005 and expires November 9, 2011.

The City of Ormond Beach has an easement for four existing water supply wells; two were installed in 1987, and two in 1991. A 24 inch water main was constructed within the roadbed of Rima Ridge Road to convey the water following an Acquisition and Restoration Council (ARC) easement approval in 2003. An easement for three additional supply wells (0.6 acres) was granted by ARC in 2007. The City's Consumptive Use Permit number 8932 was last renewed January 8, 2008 and extends through January 8, 2028.

Presently, the DOF manages this tract for silviculture, ecological values and as a WMA.

Clark Bay Tract

The Clark Bay Tract is located on the west side of the Tiger Bay Tract and north of US-92. It was owned by Plum Creek Timberlands, L.P., until it was purchased by SJRWMD in July 2002, and subsequently conveyed to BOT in June 2004 for DOF management. While under Plum Creek ownership, it was managed for timber production. More than half of the timber on the tract was pre-merchantable at the time of SJRWMD acquisition. The timber rights to the mature pine stands on 275 acres were reserved by Plum Creek. As these areas are harvested, they are released to DOF for reforestation and management. See also section III.B.11. Presently, this tract is managed primarily for silviculture, ecological values and as a WMA.

B. Renewable and Non-Renewable Resources

1. Soil Types

The Tiger Bay Tract is located on the Talbot Terrace, an ancient marine terrace with land surface elevations ranging from 30 to 45 feet above sea level. The Talbot Terrace is bound on the east by the Rima Ridge and on the west by the DeLand Ridge. Tiger Bay is a basin swamp system that occupies the lower areas and isolated small depressions while pine islands occur on the slightly higher land surfaces. To the northeast of the Tiger Bay Tract, the Rima Ridge Tract occupies an ancient sand ridge bordered on the east by Bennett Swamp and on the west by Middle Haw Creek and Tiger Bay.

A majority of the Tiger Bay Tract is comprised of hydric soils including; Samsula-Terra Ceia-Tomoka in the wetlands, and Pomona-Wakula and Myakka-Smyrna-Immokalee in the flatwoods. All these soils possess very poor drainage characteristics. This area receives approximately 52 inches of rainfall annually, with occasional intense rainfall events associated with tropical weather systems. The low sand ridges of the Rima Ridge Tract are dominated by moderately to well drained soils of the Daytona-Satellite-Cassia group. These soils are interspersed with areas of poorly and very poorly drained flatwoods soils. The Clark Bay Tract is dominated by Pomona fine sand on dryer flatwoods sites and Tomoka muck in the lower areas. The Soil Survey of Volusia County, Florida (USDA - Natural Resources Conservation Service (NRCS)) identifies the soil groups indicated in Exhibit H. More detailed descriptions of the soils associated with this state forest can be found there as well.

2. **Archaeological and Historical Resources**

A CARL Archaeological Survey was completed by the Florida Bureau of Archaeological Research in March 2001. The survey indicated the location of twelve (12) known archaeological and/or historical sites on TBSF. The Bunnell District has two certified archeological monitors that inspect sites periodically.

Table 5. Listed Archeological/Cultural Sites on TBSF

SITE ID	SITE NAME	SITE TYPE
VO02595	Missing Truck Mound	Mound Burial
VO07196	Pershing Highway	Road
VO07197	Buncombe Hill Turpentine Camp	Naval Store
VO07204	Fryman's Sawmill	Lumber Mill
VO07205	Indian Lake	Home
VO07206	Indian Lake Road Mound	Mound Burial
VO07207	Bates Mound	Mound
VO07208	Rawlins Mound	Mound Burial
VO07209	Honey Bear Mound	Mound Burial
VO07210	Dukes Island Canal	Canal
VO07211	Tiger Bay Canal	Canal
VO07203	The Crosses	Historical Cemetery

A one mile section of the Pershing Highway exists south of US-92 and a mile section is also located just north of the TBSF office site. The Pershing Highway was the first highway to connect DeLand to Daytona Beach. It was part of the Pershing Triangle, which stretched 63 miles from Deland to Daytona Beach to New Smyrna Beach. This brick road was opened in 1917 and was used until US-92 opened in 1947. DHR reports the overall condition as excellent. The section north of US-92 is utilized by vehicles and logging trucks, while vehicular traffic is restricted on the section south

of US-92 and the section remains gated to protect it. Future historical interpretation and use as a short walking/bicycling trail are planned for this southern section.

The Buncombe Hill/Stillman Turpentine Camp was located on the Rima Ridge Tract. It was owned and operated by Consolidated Tomoka Land Company, prior to state ownership, and included several structures dating back to the 1920s or earlier. This site is now part of the Buncombe Hill Interpretive Trail. DHR reports the condition as fair, and it is overgrown with sand pine and oaks. Plans are to install an interpretative kiosk and careful clean-up of the overgrowth may be undertaken.

Fryman's Sawmill was located near the Gator Head Swamp off of Tram Road. While no structures remain at this site, a barrel well from this sawmill is still present. The DHR reported condition is fair, although the site needs more evaluation and general protection.

Indian Lake Recreation Area has a history which includes use as a cypress lumber camp in the 1920s as well as a Boy Scout camp in the 1920's, a sawmill in the 1930s-40s, and a homestead in the mid 1900s. This area has also produced prehistoric artifacts. The Boy Scout camp is interpreted through old photographs and the area is to be protected from undue equipment disturbance both for cultural and ecological reasons, since Indian Lake is an Outstanding Florida Water (OFW) and much of the adjacent natural community is scrub. DHR rates the condition of the site as "unknown" due to limited testing and previous disturbances.

Duke's Island Canal, south of US-92, was constructed in the 1940s to drain water away from US-92. Tiger Bay Canal, located north of US-92, was constructed during the same period and probably for the same purpose. The DHR report indicates the condition of both of these as good, and indicates the need for more evaluation and protection until sufficient information is available to evaluate them further.

The Rima Ridge Tract contains several mounds and possible burial sites. The sites are in variable condition ranging from good to poor. Degradation was the result of vandalism and silvicultural activities prior to State acquisition.

Most of the archaeological and/or historical sites on TBSF have insufficient information to deem them eligible for the National Register. The Bunnell District Recreation Coordinator is trained as archaeological monitor and serves as contact for historical issues. As the Archeological Resource Monitor training is offered, selected State forest staff members will be trained as monitors to facilitate protection of cultural resources. Sensitive Areas maps are provided to personnel to help identify locations where protection is critical. Periodic monitoring by staff and law enforcement is also important to protection efforts. Where cultural sites are part of current or future public use areas and DHR approves, interpretation may be utilized to inform and educate the public. Opportunities have been identified above and in the Recreation Management Plan.

The DOF will comply with the procedures outlined in “Management Procedures for Archaeological and Historical Sites on State-Owned and Controlled Lands” (Exhibit I). In the event of any proposed significant ground disturbing activity on TBSF, the DHR and FNAI will be contacted prior to the activity. The DOF will follow all appropriate provisions of Chapter 267.061, Florida Statutes.

3. Water Resources

The waters within the E.E.L. boundaries of the Tiger Bay State Forest are designated as Outstanding Florida Waters (OFW). These include Tiger Bay and the three water bodies of Coon Pond, Scoggin Lake and the west side of Indian Lake. In addition, the tributary of the Little Tomoka River, located within the northeast corner of TBSF is OFW (Exhibit J).

The following are other water resources located on TBSF: Sawgrass Lake, Ranch Pond, Duke’s Island Canal, Tiger Bay Canal, Rattlesnake Pond, Woody Pond, Bear Pond, and an additional borrow pit. The surface waters on this forest are classified as Class-III Waters- Recreation, Propagation, and Maintenance of a Healthy Well-balanced Population of Fish and Wildlife in accordance with Rule 62-302.400 Florida Administrative Code. All silvicultural activities conducted in close proximity to water resource features will be in compliance with the most recent publication of the Silviculture Best Management Practices (BMPs) Manual.

4. Fish and Wildlife

Management of TBSF will be directed toward the maintenance of biological diversity and species composition consistent with the existing natural community types. Wildlife management will be accomplished through habitat management. All biological resources will be managed to maintain diversity. Many game and non-game species inhabit the natural communities found throughout the forest. A current list of species observed on TBSF is in Exhibit K.

5. Endangered or Threatened Species

The FNAI Managed Areas Tracking Record for TBSF area is included as Exhibit L. This documentation results from the natural community’s survey that was completed in June 2005. This survey helped to identify and map flora and fauna species that occur on TBSF. A native plant occurrence list needs to be developed with assistance from land management agencies, other organizations and/or volunteers.

Specialized forest management and habitat restoration techniques will be used, as applicable, to protect and increase imperiled species of plants and animals occurring on the forest. Species-specific management plans will be developed when necessary. In particular, gopher tortoise (*Gopherus polyphemus*) and Florida black bear (*Ursus americanus floridanus*) have been well documented on this site by the FWC and the United State Fish & Wildlife Service (USFWS).

The current monitoring approach is for foresters to observe identified occurrences and guide efforts to protect wildlife in connection with on-going management activities.

Limited assistance is provided by FWC biologists and consultation with DOF ecologists from other areas. However, detailed monitoring plans have not been developed. A biologist is needed to develop and guide survey and monitoring efforts.

Those listed imperiled species that have been observed by DOF staff as actually occurring on the forest are listed below, along with the management practices necessary to protect and preserve these species.

Gopher Tortoise (*Gopherus polyphemus*)

The gopher tortoise is federally protected as a threatened species. In Florida, it is listed as a Species of Special Concern by the FWC. Gopher tortoises use a variety of upland habitats that are common in Florida, including scrub, sandhill, and pine flatwoods. Gopher tortoises are commonly found throughout the forest, especially on the Rima Ridge Tract. Gopher tortoises require periodic fire to reduce brush and favor grasses and forbs. Prescribed fire in the uplands will establish and maintain high quality gopher tortoise habitat. A 120-acre area on the Rima Ridge Tract has been designated as a Gopher Tortoise Mitigation Area (see Section IV.A.9.).

Florida Black Bear (*Ursus americanus floridanus*)

Florida Black Bear is designated as a threatened species by the State of Florida. Black bears need a variety of habitats over a large geographic area. This species will benefit from public land acquisitions that will ensure continuity of habitat and a corridor for dispersal. Black bear will benefit from the proposed wildlife crossings over/under I-4, which are proposed in the current Florida Department of Transportation (FDOT) Interstate 4 widening plan. Section IV.A.9 has more detail on the wildlife crossings.

Bald Eagle (*Haliaeetus leucocephalus*)

Bald Eagles were removed from the endangered species list in June 2007 because their populations recovered sufficiently. However, the protections under the Eagle Act continue to apply. When surveyed, eagle nests will be afforded a 330 foot buffer where human activity will be restricted. This is consistent with FWC habitat management guidelines. A single active nest located on the edge of a pine/wetland area of the Rima Ridge Tract was recently observed by state forest personnel.

Gopher Frog (*Rana capito*)

This amphibian is state listed as a species of special concern. It is found in dry, sandy upland communities e.g. scrub and sandhill. The gopher frog requires seasonal ponds for reproduction and fire maintains a favorable association of native plants. It is often found in association with gopher tortoise and takes refuge in the burrows.

Florida Mouse (*Peromyscus floridanus*)

The Florida mouse is a species of special concern in Florida. It inhabits sandy upland communities e.g. scrub and sandhill. Fire maintains sandy openings and

grasses and forbs that provide food and cover. Like the gopher frog, it is a denizen of the gopher tortoise burrow.

Sherman's Fox Squirrel (*Sciurus niger shermani*)

This squirrel is a species of special concern in Florida. It is found in sandhills and open pine flatwoods. Long leaf pine seed is an important source of food. The squirrel also depends on a variety of oaks for a seasonal source of acorns and nest material. Pine plantations are detrimental to the species as is development and row crops. Fire maintains favorable conditions including a wire grass ground cover component.

Bachman's Sparrow (*Aimophila aestivalis*)

This native sparrow is endemic to the southeastern United States. While not currently state listed, it is considered by some experts to be rare due to habitat degradation or loss from forest succession. Prescribed fire is the primary management tool to maintain grasses and forbs in scattered pine communities. The sparrow is a ground nester and uses clumps of grass for construction.

Rugel's False Pawpaw (*Deeringothamnus rugelii*)

This species is endemic to Volusia County and is Florida and U.S. endangered. It can be found growing in pine flatwoods with an open canopy. It is often in association with wiregrass and other grasses and mainly on the soil type known as Immokalee fine sand. Rugel's False Pawpaw benefits from prescribed burning which stimulates flowering. There is a population located off of Bear Island Road, west of Indian Lake where there are five historic element occurrences and 15 newly identified locations in 2009 by a DOF ecologist and TBSF staff. Another population documented by FNAI is located south of Coon Pond.

Celestial Lily (*Nemastylis floridana*)

Celestial Lily is a Florida endemic and state endangered species. It occurs in wet flatwoods and in the grassy wetland ecotones and edges of hydric hammocks. It is a fire-maintained species that depends on burning across the wetlands' grassy ecotones. Management will consider prescribe burning during conditions that enable use of wetlands as natural fire breaks when fire can be allowed to burn into the wetlands. There is one recorded FNAI element occurrence location recorded on the forest.

Large-flowered Rosemary (*Conradina grandiflora*)

This species is a Florida endangered plant that is found on sandhills and sand pine scrubs, and in the vicinity of ancient dunes of shores on Florida's Atlantic Coastal Ridge. Associates are typically *Pinus clausa*, *Lyonia*, *Ilex*, various evergreen scrub oaks of the genus *Quercus*, *Ceratiola*, *Polygonella* and *Opuntia*. Fires targeting scrub areas will improve conditions for large-flowered rosemary. There is one recorded FNAI element occurrence location recorded on the forest. Large flowered rosemary can be seen on the scrub restoration site east of Indian Lake.

Hooded Pitcherplant (*Sarracenia minor*)

This species is state threatened and occurs on the south and north tracts of TBSF in mesic-wet flatwoods as well as depression marsh communities and wet prairies. Prescribed fires that are allowed to burn into these areas would improve the condition of this species. Mechanical disturbance should be avoided in areas where the hooded pitcher plant occurs.

Catesby's Lily (*Lilium catesbaei*)

Catesby's Lily is listed as Threatened in Florida, but can be found in wet flatwoods and bogs in association with grasses. Prescribed fires that are allowed to burn into these areas will improve conditions for this species. Five point locations were taken the summer of 2009 on Gopher Ridge Road and north of Wampee Strand Road in wet flatwoods and basin marsh ecotones.

Garberia (*Garberia heterophylla*)

This evergreen, flowering species is a state threatened endemic species of Florida scrub. Literature indicates that Garberia has strong resprouting and flowering effects post fire, and has demonstrated the ability to establish seedlings after burning. Garberia has been observed by TBSF staff in scrub habitat in the vicinity of Indian Lake.

6. Beaches and Dunes

There are no beaches or dunes in TBSF.

7. Swamps, Marshes, or Other Wetlands

Approximately 60% of the TBSF is occupied by wetlands. These extensive wetlands provide critical aquifer recharge for the greater Daytona Beach area. Tiger Bay, Little Tiger Bay, and Bennett Swamp are large and irregular basin swamp systems. These basin swamp systems also include a mosaic of dome swamps, depression marshes, wet prairies, baygalls, and wet flatwoods, while the higher elevations within the swamp are occupied by pine islands.

8. Mineral Resources

There are no known mineral resources in TBSF.

9. Unique Natural Features

Tiger Bay, at 4,124 acres, is the largest physiographic feature of the Tiger Bay Tract. Three natural lakes occur in the Rima Ridge Tract: Indian Lake (66 acres), Scoggin Lake (43 acres) and Sawgrass Lake (13 acres). Bennett Swamp and Middle Haw Creek are other significant wetlands partially within the Rima Ridge Tract. In addition, the tributary of the Little Tomoka River that is located within the northeast corner of Tiger Bay State Forest is designated as OFW.

TBSF's position near or adjacent to other publicly-owned lands also contributes to wildlife corridors for several listed species, including Florida black bear. There are also potential nesting and foraging areas for bald eagles.

10. Outstanding Native Landscapes

N/A

11. Timber Resource

A comprehensive inventory of the merchantable pine stands was completed in 1997 and has been updated annually. The wildfires of 1998 had devastating effects on the pine stands and nearly 50% of the state forest stands that existed at the time of the 1997 inventory had to be clear-cut in salvage operations. Over 50,000 cords of pulpwood and chip & saw and nearly 2.2 million board feet of saw timber were sold in salvage sales.

For subsequent inventory updates, compartment and stand delineations had to be changed to reflect the salvage harvest, subsequent tree planting, and the addition of new stands with the Rima Ridge Tract and Clark Bay Tract purchases.

There are approximately 3,000 acres of mature merchantable pine forest on TBSF. The stands range in establishment dates from 1925 to 1989 with the majority of trees 20-30 years of age. Slash pine dominates in mesic communities and longleaf pine on drier sites such as scrubby flatwoods and sandhill communities. The bulk of the merchantable forest is located on both the Tiger Bay and Rima Ridge Tracts. Most of the trees on Rima Ridge Tract were planted and about a fifth or 20% of the pine timber acreage on Tiger Bay Tract is of natural origin. At this time, roughly 600 acres of natural pine forest exist on TBSF with the majority occurring in the mesic flatwoods.

Most of the merchantable pine stands on TBSF have been row thinned during the property's long history of logging. However, one notable exception is the 129-acre natural growth stand of slash pine dating to 1944. The stand is located along Canal Road on the east property line, north of Highway 92. The FNAI designation is wet flatwoods, but the abundance of hydric soils make logging problematic.

On the Clark Bay Tract, Plum Creek Timberlands had timber rights on most of the timber that was merchantable (275 acres) as of 2004. A total of 110 acres were released in 2007. Currently on the 3,883-acre Clark Bay Tract the rights to 165 acres are still retained by Plum Creek. Site preparation and reforestation will be the responsibility of the DOF. In 2012, another 80 acres will be released and in 2017 the remaining 85 acres will be released. See Exhibit M for a current map of the timber rights still outstanding on Clark Bay Tract. Timber management guidelines are provided in Section IV.A.6,

IV. MANAGEMENT CONCEPTS BY NATURAL COMMUNITIES AND PROPOSED MANAGEMENT ACTIVITIES

A. Existing and Planned Uses

1. Property Boundaries Establishment and Preservation

The TBSF boundaries have been painted and signs posted according to DOF boundary marking specifications. Forest boundary lines are maintained where they have been established.

2. Soil and Water Protection

Concern over a continuous, usable source of fresh water requires emphasis on protecting this vital resource. A weir located at Thayer Canal was installed in 2003 by Volusia County, under a September 1999 Memorandum of Understanding (FDACS Contract #51250) between SJRWMD, Volusia County, and DOF to promote surface water retention in Bennett Swamp. Volusia County is responsible for operating, maintaining, and adjusting water levels and SJRWMD is responsible for monitoring the water levels and making recommendations to the County for adjustments. The location of an additional proposed weir has been identified by the SJRWMD as part of a Wetland Impact Avoidance and Mitigation (WIAM) plan required of the City of Daytona Beach as a result of wetland impacts from previous well withdrawals (CUP #8834, March 2005).

The City of Daytona Beach's seven existing supply wells are 14-inch diameter wells, 300 feet in total depth. Each well is encased in a pumphouse and is located within a grassy buffer area. The original easement permits the future addition of two supply wells, however there are no specific plans or requests to add any. The CUP #8834 permits the use of 16.16 million gallons per day (mgd) for all of the City's wells. Withdrawal amounts for the wells within the state forest averaged about 3.1 mgd over the last reported period (January 2009 thru June 2009).

At the time of approval, a shortened CUP period was issued in order to evaluate the effectiveness of mitigative or remedial actions or corrections due to adverse impacts to wetlands systems which have already occurred both on and adjacent to the Rima Ridge Tract (City of Daytona Beach Wetlands Impact Avoidance and Mitigation (WIAM) Plan), and the following circumstances cited in the SJRWMD Consumptive Use Technical Staff Report:

- Modeling completed by District staff indicates the potential for adverse impacts to wetland systems associated with increased withdrawals through 2011.
- If the wetland augmentation projects are implemented there is still a potential for impacts but it is greatly reduced.
- Additional ground water and wetland monitoring data are needed to evaluate the effectiveness of impact avoidance measures and to determine whether or not the proposed groundwater withdrawals are sustainable without adverse impacts.

In 2005, six additional monitoring wells were installed by St. Johns River Water Management District around the Indian Lake vicinity after approval by DOF. Locations of the monitoring wells are shown on Exhibit N.

The CUP for the City of Ormond Beach supply wells capped the total annual pumpage allowance within the Rima Ridge Wellfield at 3.3 mgd through 2016 due to uncertainty in prediction models beyond that point. Each of the four existing supply wells is 10 inches in diameter and 300 feet in total depth. The three approved new wells will likely be constructed in 2010; the CUP includes withdrawals allowances for the three new wells. During the last reported period, January 2008 to June 2008, withdrawal amounts from the existing wells on the state forest averaged about 1.7 mgd. In 2006 three additional monitoring wells were installed by the City of Ormond Beach pursuant to Consumptive Use Permit requirements from the SJRWMD.

The following three paragraphs outline the St. John's River Water Management District's procedure for monitoring the effects of the Daytona Beach and Ormond water supply wells that are located on the Rima Ridge Tract. See Exhibit N which shows the location of existing and proposed water supply wells and their related monitoring wells.

The SJRWMD Minimum Flows and Levels (MFL's) Program, based on the requirements of Section 373.042 and 373.0421, Florida Statutes (FS), establishes MFL's for lakes, streams and rivers, wetlands, springs, and groundwater aquifers. The MFL's designate hydrologic conditions, below which significant ecological harm would occur, and identify levels and/or flows above which water is available for reasonable-beneficial uses (Section 373.019 (13), FS). The MFL's Program provides technical support to the District's regional water supply planning process (Section 373.0361, FS) and the consumptive use-permitting program (Chapter 40C-2, F.A.C.).

SJRWMD develops hydrologic and hydraulic models for specific water resources in the District. The hydrologic modeling and associated data analysis provide the framework to implement and evaluate MFL's. Analyzing the output from hydrologic models informs the SJRWMD about best way to manage and limit consumptive uses and to protect natural resources from significant ecological harm.

Measurement of surficial aquifer water levels at Indian Lake and Rima Ridge are necessary in order to develop hydrologic models for these areas. Monitoring wells have been established at selected locations around Indian Lake and Rima Ridge well fields to monitor long-term surficial aquifer water levels and to determine the direction of surficial aquifer flow. Additionally, information about the near surface soil characteristics and geology, obtained during monitor well installation, will also be incorporated into hydrologic model to improve its performance.

Impacts from firebreaks associated with the 2009 Indian Lake Wildfire occurred around the perimeter of Indian Lake during the subsequent rainy season. Efforts to rehabilitate these firebreaks involved reshaping, and stabilizing lines, and will need to be monitored.

3. Roads

The TBSF is bordered by three major roads in Volusia County: I-4, US-92, and SR-40. Within the boundaries of the state forest there are 47 miles of roads that are open to the public. Designated roads and trails are also available for use by hikers, bicycles, and equestrians. TBSF uses the guidelines and regulations (road closures, maintenance, etc.) outlined in the DOF Road Standards manual. A detailed Road Plan for TBSF was developed in 2005-2006.

In 2009, a revised site plan that was approved for Bennett Field Campground was developed that resulted in the rerouting of Bennett Field Road around the north side of the campground instead of through it. Bennett Field Campground now has an internal road system with one ingress/egress, which facilitates circulation and improves camper safety and security.

Plans for the establishment of any other new roads will be reviewed by the DHR and FNAI and processed through the DEP to the Acquisition and Restoration Council.

4. Recreation Management

Over the last five years, annual day use visitation on TBSF has ranged from 12,000 to 17,000 visitors, and overnight primitive camping has averaged around 1,000 visits each year. Hunting accounts for the largest numbers of users, followed by sightseeing, fishing, hiking and equestrian use.

Monitoring of visitor impacts is achieved by monthly visitor counts primarily from sign-in sheets at entrances. In addition user fees (day use and camping), hunter estimates, and trail head sign-in sheets are utilized to monitor specific areas and activities. Visitor impacts are managed in part by limiting access to daylight hours in specific areas (Rima Ridge Tract), electronic gate access, parking and camp site spaces, fishing and hunting regulations, and enforcement of Florida Administrative Code (F.A.C.) 5I-4 rules regarding the utilization of DOF lands and facilities.

The following, along with map Exhibit O, identifies existing and planned recreational opportunities on TBSF:

a. Existing Facilities and Recreational Activities

i. Public Access and Parking

Access is available to recreational users through six entrances and all access points are permanently open, except for gate-controlled access points on Rima Ridge Tract. A majority of the recreational facilities are located on the Rima Ridge Tract. Honor fees are collected for the day use activities at Indian Lake Recreation Area.

North Tiger Bay - The north entrance provides access via Old Deland Road from US-92 to Gopher Ridge Road for hunters and boaters entering the north

unit. A small area adjacent to the main graded road provides parking for hunters. This area is located 3 miles to the north off Gopher Ridge Road.

Equestrians, cyclists, and school groups may access the north unit at the headquarters site on US-92. Visitor and equestrian trailer/bus parking is available at this US-92 visitor entrance and office headquarters location.

South Tiger Bay - A south entrance provides access from US-92 to Duke's Island Road and Rattlesnake Pond. About one-half mile south of this entrance, a parking area is available for hikers and other users. Additional parking is available at Rattlesnake Pond to accommodate visitors. Another entrance accessed from US-92 is located about one mile west of the Duke's Island Road entrance.

Rima Ridge Tract - The Rima Ridge Tract has access points on US-92 via Indian Lake Road and on SR-40 about five miles west of Ormond Beach via Rima Ridge Road. In 2008 solar-powered electronic gates were installed at both of these entrances. These gates close automatically each night at sunset and re-open each morning at sunrise. Campers are given a keypad code upon registration to re-enter after hours. An electromagnetic sensor is embedded in the roads to allow exit after hours.

At Indian Lake Recreation Area and the Rima Ridge Equestrian Trailhead, improved shell parking areas have been provided. The equestrian trailhead parking is enclosed with board fence and gates. Additional parking is available at the Tram Road Recreation Area.

ii. Facilities

Tiger Bay – The 10.75-acre ranch site located on the north side of Highway 92 has been developed as a north-side visitor entrance and office headquarters for the state forest. Renovations to the office were completed in the fall of 2004, including a small visitor's center in the lobby that provides public lands information. A mobile home site offers on-site housing space. This site was retrofitted in 2009 to accommodate recreational vehicle hook-ups for potential volunteer positions.

Rima Ridge Tract - A small three-table picnic shelter was built in 2008 at Indian Lake Recreation Area. A vaulted toilet was approved by DOF's Forest Management Bureau following DHR review in July 2009 and was installed at Bennett Field Campground in March 2010.

iii. Trails

Equestrians and cyclists may use designated roads. Recreational trails are monitored for negative impacts through routine casual inspections. Trails are closed during prescribed burning activities, following intense storm events or

at other times when necessary. Significant ground disturbance may require the closing or rerouting of trails.

Rima Ridge Tract - The Rima Ridge Tract provides recreational trails for hikers and horseback riders. Buncombe Hill Interpretive Trail is a two-mile self-guided nature trail leading from Indian Lake Recreation Area. This trail is part of the statewide Trailwalker program.

An equestrian trail is also located on the Rima Ridge Tract. The five and a half mile loop trail is part of the statewide Trailtrotter program. The trailhead is located at the equestrian parking area just off SR 40. Extensions from this trail are planned for the future. The route for a seven mile extension was proposed by TBSF staff in 2002 and may be developed early in the planning period by utilizing existing roads and volunteers to maintain. Recently, there has been an increased interest in group horse back riding and recreational use.

Tiger Bay - A footbridge has been constructed across Duke's Islands Canal at Rattlesnake Pond, enabling a short loop trail around Rattlesnake Pond. This trail needs to be developed. The Dukes Island Hiking Trail was closed following extensive damage after the 1998 wildfires.

iv. Camping

Primitive camping is offered on the Rima Ridge Tract. At this time, the DOF has no plans to develop full facility camping areas in this forest.

The Bennett Field Campground on the Rima Ridge Tract is available with six designated campsites as well as a small group camping area. Camping is primitive and by permit only. A portalet was installed in 2004-2005. A permanent restroom structure with a pump-able tank was reviewed and approved by DOF state office to replace the portalet. The maximum camping capacity is 30 people (5 per campsite) for the single campsites and 30 people for the group campsite.

A designated equestrian campground was established in 2005 on the Rima Ridge Tract at Tram Road. There are five designated campsites with picnic table, fire ring, and tie-downs. Maximum camping capacity is 25 people (five per campsite). Non-potable water well and water trough, a fenced horse corral (16 foot x 16 foot) and a group picnic area are also available for equestrian users.

v. Day Use

Tiger Bay Tract – The 10.75-acre-ranch site located on the north side of US-92 has been developed as a visitor entrance and office headquarters for the state forest. A two-acre man-made pond located on this site is open for general public use. The pond was excavated, improved, and restocked with

game fish in 2008 to increase recreational opportunities. A picnic area with six picnic tables is adjacent to the pond.

Rattlesnake Pond is a man-made pond near the southern boundary that offers fishing, and a small unimproved boat launch. FWC has tried to improve and stock the pond, but low dissolved oxygen and ph levels have made previous efforts unsuccessful. The public use area at Rattlesnake Pond was severely damaged due to the 1998 wildfires. While public use at Rattlesnake Pond is still available, the primary focus of recreational development shifted to Rima Ridge Tract and there is little activity at this time in this area.

Rima Ridge Tract - The Indian Lake Recreation Area has improved shell parking, picnic tables, grills, self-guided interpretive nature trail, unimproved boat launch, handicap-accessible fishing/observation pier, a three table/ 15 person covered picnic pavilion with lake views and a portalet. An honor fee station is located here.

Day-use of the Tram Road equestrian camping area was approved by DOF Forest Management Bureau in addition to camping. A portalet was installed and site plan modified to include a central parking and meeting area, circulation and entrance improvements and honor fee station. The area is now designated as the Tram Road Recreation Area.

vi. Boating

The use of canoes and other boats not powered by internal combustion engines are permitted on Indian Lake, Scoggin Lake, Woody Pond, Bear Pond, and Rattlesnake Pond.

vii. Hunting and Fishing

Hunting and fishing activities are regulated by FWC. Currently, hunting is divided into two Wildlife Management Area (WMA) Units, the Rima Ridge WMA and the Tiger Bay WMA, each with different hunting schedules. Participation in game hunts is limited through a randomly drawn quota permit.

viii. Environmental Education and Public Outreach

Environmental education on TBSF has been conducted through guided tours and hands-on events, when requested. Targeted groups have included the general public, school and youth groups and various user groups. An interpretive self-guided hiking trail is available at the Rima Ridge Tract. In addition, a “State Forest Awareness Week” event is held every October to promote recreation in the forest.

b. Planned Facilities and Recreation Activities

i. Parking

A parking area will need to be established by the Tiger Bay at Bear and Woody Ponds and possibly another at the US 92 entrance for those bikers and equestrians wishing to utilize the loop road. A small parking area will be needed at the south US 92 brick road entrance to accommodate the planned interpretative trail there.

ii. Facilities

On the Tiger Bay Tract at the headquarters office site, a simple open-air pavilion for environmental education may be built if a funding source can be found. A watering source for horses may be provided. An additional vaulted toilet restroom to replace the portable restroom at the Indian Lake and Tram Road Recreation Areas may eventually be needed.

iii. Trails

Additional hiking and equestrian trails may be designated on North Tiger Bay and Rima Ridge. Potential locations for additional hiking trails are Bear Island (a 2.25-mile loop), an extension of the Buncombe Hill Interpretive Trail from Indian Lake to Coon Pond and Scoggin Lake (about a 4 mile loop), and a trail connecting to the primitive camping area (Bennett Field Camp). An observation point may be located near Coon Pond. A seven-mile loop will be added to the existing equestrian trail on north Rima Ridge.

South of US 92, approximately one mile of the DeLand/Daytona brick road is closed to vehicle traffic, and may be developed as a short interpretative walking or bicycling trail. A designated bicycle loop trail will be considered for the Woody Loop Road Loop Road. The short hiking trail loop round Rattlesnake Pond will be improved and marked.

iv. Camping

Additional primitive camping areas may be implemented over time. An assessment will be conducted to explore the need and possible locations for expanded camping opportunities including the possibilities of developed campsites which would include water, electric and sewer hook-ups. In addition, youth camping areas and primitive backpacking sites will be explored. Campground host sites for volunteers may be developed at Bennett Field Campground and Tram Road Equestrian Area and would include electrical hookup, septic, and well.

v. Day Use Areas

The headquarters site, Indian Lake and Tram Road Recreation Areas, and locations adjacent to several man-made ponds may be improved to allow expanded public use. Restrooms, picnic shelters, and trail/fishing enhancements will be considered.

vi. Boating

The Scoggin Lake boat ramp needs improvement to be stabilized with crushed shell or comparable natural product to alleviate erosion and improve user access.

vii. Environmental Education and Public Outreach

An Outreach Program plan will be developed to identify additional opportunities for public awareness. The plan may include strategies such as marketing through visitor bureaus, ongoing interpretative activities, expanding services through the use of volunteers, creating a local direct support chapter, and additional educational/awareness programs. The DOF will cooperate with Volusia County Land Management staff and others who have offered to assist with educational programs on the forest.

5. Fire Management

The DOF utilizes a total fire management program on state forests that includes: prevention, detection, suppression, and prescribed burning. This program is the responsibility of the DOF's Bunnell District, particularly the rangers assigned to this forest. The DOF approach to handling fire on TBSF is outlined in the TBSF Fire Management Plan (available at the TBSF office). Emphasis is placed on prescribed burning, wildfire prevention, and education to help reduce wildfire occurrences on the forest. The Incident Commander responding to wildfires on TBSF has three paramount considerations, listed in priority order: protection of human lives (of both the firefighter and the public), protection of improvements, and protection of natural resources. The Fire Management Plan includes a sensitive areas map which identifies the types of areas fire crews must consider for special protection when conducting fire control, pre-suppression, and other activities in the state forest. All guidelines as outlined in DOF's Fire Management Policy will be used on the forest. The smoke screening system will be used as a smoke management tool and to minimize the adverse impact of smoke.

It is DOF's goal that prescribed fire be utilized as the primary forest management tool to manage understory fuel loads and improve general forest health. Natural fire frequencies will be used when possible for each community to achieve a maintenance status. Fire return intervals vary by community type (see Table 7) and are intended to relate to historical burn frequencies. Florida's natural communities are adapted and most diverse & productive when prescription burns occur within these ecological cycles.

Target fire frequencies may need to be shorter for a period of time in areas that require restoration due to lack of any significant recent fire history. Such fuel reduction fires, typically conducted during the dormant season, are needed to reduce the height and cover of woody shrubs and keep to a minimum any pine mortality. Areas to be burned will be spread over the forest in a mosaic pattern and average burn unit size may be reduced in order to better control the heat and damaging impacts from fire.

A long-term goal for TBSF is to utilize prescribe burning in such a fashion that it emulates, as closely as possible, a natural fire regime in which a substantial acreage is burned during the lightning season (May through August) or growing season (March through October). Burning during the growing season has the benefit of stimulating recovery of the native herbaceous and grassy ground cover, promoting the regeneration of native pines, and maintaining and enhancing populations of fire-adapted listed species. Lightning season burns will be utilized to the greatest extent feasible on both tracts, but will be minimal at first due to the high level of fuel resulting from the absence of fire. Areas with heavy fuel levels will receive several dormant season burns until they can safely support the introduction of growing season burns.

These stands are vulnerable to fire mortality until large enough to safely withstand the heat and flame scorch from a fire. In addition, the close planting densities in many stands will not allow mechanical fuel management with present equipment resources. Consequently, fuel loads have dramatically increased over the last decade. This coupled with successive years of drought in Volusia County have contributed to the backlog of stands out of burn interval, increasing the potential for wildfire on TBSF.

A realistic short-term goal will be to prescribe burn between 1,000 and 2,000 acres per year. The focus will be on high priority restoration areas, maintaining areas currently within return interval, utilizing aerial burns whenever feasible, and initiating mechanical fuel reduction in thickly planted stands to permit subsequent dormant season fuel reduction burns. This will convert more acreage from a restoration stage to a maintenance stage, and provide the means to move accomplishments towards the desired target range and long-term goal of burning between 3150 to 7200 acres per year.

There have been two significant wildfires in TBSF since the 1998 wildfires. First was the 40-acre Scoggin Lake Fire, which occurred in the summer of 2007, the second, and most consequential, was the 1,300-acre Indian Lake Fire occurring in March 2009. Adverse weather conditions continue to plague prescribed burning efforts and can, if not well planned and executed, risk another wildfire event at TBSF.

In this regard, increased management capacity (see management needs identified in Section I.D.) is necessary. A more aggressive program of mechanical fuel reduction, prescribed fire, and fire prevention education, is necessary to limit and/or mitigate wildfire occurrence. In addition, it is the goal to expand the permanent perimeter firebreak system in conjunction with boundary maintenance efforts wherever feasible.

In using prescribed fire in the various pyric communities on this forest, it is important to understand the ecological richness of the ecotones between community types, especially those transition areas between wetland and upland communities. Every effort will be made to avoid the construction and/or maintenance of firelines in these environmentally sensitive areas. Staff will be trained to recognize sensitive areas and

will be provided with guidelines for fireline construction. Any such firelines that currently exist within these wetland margins (ecotones) will be assessed and opportunities sought over time to relocate these mechanically maintained breaks out of these zones. Whenever possible, existing roads and natural firebreaks will be used to contain and control prescribed and natural fires. The biological diversity of these ecotones will benefit from allowing prescribed fires to burn uninterrupted into the edges of the adjacent hydric communities. In this manner, fire also serves to limit the invasion of less fire-adapted hydric species (e.g. loblolly-bay) into the adjacent more mesic communities.

Wetland communities such as wet prairies, fresh water marshes, and seasonal ponds benefit from occasional fires. It serves to limit peat accumulation and invasion of woody vegetation and helps to prevent undesired transitions to plant species associated with more mesic conditions. In addition, moderately intense fire burning across the edges and into domes and swamps can benefit cypress by suppressing invasion of less fire-adapted hardwood species. Where these wetland communities are not sufficiently hydrated to prevent undesirable fire intensity, consideration should be given to delaying prescribed fire. When proceeding with burning in these conditions, fire lines should be located well out (> 100 feet) of the ecotone and up in the more mesic community type. Pre-suppression lines should avoid sensitive seepage slopes, adjacent to swamps and in any other area that would disrupt the natural hydrology of the site. TBSF staff will adhere to the recommendations contained in the Silviculture BMP manual relating to fireline construction.

Post-burn monitoring will evaluate prescription criteria success and record other observations important to assessing habitat impacts of the burn and the post-fire response of the vegetation. Other data, such as a count of active gopher tortoise burrows, may be part of these monitoring efforts.

6. Silvicultural Guidelines & Forest Resource Management Objectives

a. Objectives

The objectives of these timber management guidelines are:

- i.** To restore health and vigor to the forest ecosystem through thinning, prescribed burning, and reforestation, both naturally and artificially with species native to the site, including longleaf pine and slash pine.
- ii.** To maintain the forest over the long-term through natural regeneration, uneven-aged, and even-aged management.
- iii.** To create a naturally regenerating forest with old growth characteristics that yields sustainable economic, ecological, and social benefits.
- iv.** To avoid soil disturbances that are detrimental to sensitive groundcover.

b. Silvicultural Operations

The forest will be managed to promote and improve overall forest health.

Restoration of native species, even-aged and uneven-aged management of pine stands, selective thinning, removal of off-site species, and prescribed fire are all

actions used to promote healthy forest stands. Mechanical and chemical treatments may be used to reduce hardwood competition to-favor pine growth. Protection of native groundcover will be emphasized during all silvicultural operations.

Prescribed fire and mechanical applications will be the primary methods of site preparation prior to tree planting. On sites where chemical applications are necessary to control hardwoods or to assist with restoration, precautions will be taken to protect desired site species. Prescriptions for chemically treating stands will include guidelines that will ensure adequate numbers of residual oaks are left in order to benefit wildlife.

Uneven-aged management is the preferred silvicultural management system for longleaf pine stands on TBSF. Due to the current even-aged stand structure of the longleaf pine stands, it may take several planning cycles before this can be fully implemented when appropriate. Longleaf pine stands will be harvested on approximately a 10-15 year cutting cycle. Stand dynamics are based on maintaining basal area depending on community type between 40-80 square feet per acre. Individual tree selection and group tree selection are preferred timber harvest methods to create an uneven-aged stand structure.

Planted longleaf and slash pine stands utilize even-aged management practices for re-establishment of a stand. To eventually achieve a more natural looking stand characteristic, row thinning, selective tree thinning, group selection and shelterwood harvests may all be required in these pine plantations.

All aspects of forest management operations will follow the recommendations found in the Silviculture BMP Manual.

c. Timber Inventory Control

Within the State Forest System, the annual harvest volume on each forest will not exceed the annual growth for that forest, unless a salvage operation is necessary. This is accomplished by obtaining an accurate estimate of the standing timber to assure that the timber will not be depleted. Selected stands on the forest will be re-inventoried each year, according to parameters established by the DOF Bureau of Forest Management staff. Overall timber volumes on the forest will be determined using this updated inventory data and by using growth and yield models to determine volumes on the remaining stands.

In addition to sustainable yields, ecological values will be promoted at TBSF. Managing for naturally appearing uneven-aged stands by selectively thinning to reduce basal area will engender a productive, diverse and stable ecosystem.

d. Timber Sales Procedures

Timber sales will follow the guidelines stated in Chapter 6.4 of the State Forest Handbook.

7. Research Projects/Specimen Collection

Research projects are encouraged in certain areas of TBSF on a temporary or permanent basis for the purpose of obtaining information that expands the technical knowledge and understanding of forestry, natural community restoration, wildlife and plant biology, and management of the ecosystem. The DOF cooperates with other governmental agencies, non-profit organizations, and educational institutions, whenever feasible, on this type of research.

Research projects that do not require specimen collection (observation only) may be conducted after obtaining a Bunnell District special use permit. However, research projects that require specimen collections must be approved by the DOF Forest Ecologist before they are initiated. Any requests for research projects should be submitted in writing to the TBSF Forestry Supervisor II or to the Bunnell Forest Resource Administrator for forwarding to the Forest Management Bureau/Forest Ecologist for approval. Requests must include a letter outlining the scope of the project, the research methodology, and the location of the proposed project. Requests are subject to review by the Forest Ecologist, the Forest Entomologist, the Forest Pathologist, and/or the Forest Hydrology Section as appropriate. Permission to conduct research will require that the investigator provide copies of any reports or studies generated from research projects to the state forest staff. The status of existing projects will be subject to periodic review by state forest staff.

Research projects/specimen collections that have been initiated on the property include:

- Statewide Assessment of Road Impacts on Bears in Florida, FWC, (2001-2003)
- Slash Pine Seed Source Pitch Canker Resistance Trial & Demonstration, DOF, (1992 – ongoing)
- Ecological and Economic Consequences of the 1998 Florida Wildfires, USGS National Wetlands Research Center, (1998-ongoing).
- Effects of Nitrogen, Potassium, and Phosphorous on the Growth and Reproduction of the Sundew (*Drosera brevifolia*), Stetson University Biology Department, (annually).
- Evapotranspiration from a Cypress and Pine Forest Subjected to Natural Fires in Volusia County, Florida, USGS (2001).
- Bennett Swamp Surface Water Retention Demonstration Project, SJRWMD/ Volusia County (1998 - ongoing).
- Quantitative Description of Fire Maintained Natural Communities in Florida, (plant collection on several state forests), Susan Carr, University of North Carolina (2001- ongoing).
- Wetland Vegetation, Macro-invertebrates, Algae, and Water Chemistry in Isolated Wetlands, UF Center for Wetlands, (2001-2002).
- Study of Species and Population Level Variation in Natural Cypress Stands, Sydney Bacchus, the University of Georgia, (10/2002-12/2003).

- Survey and collection of *Deeringothamnus rugelii* and soils, Cheryl Peterson, Historic Bok Sanctuary (2003-04)
- Florida Black Bear abundance and distribution sampling, FWCC (2003)
- Lepidoptera Biodiversity Survey, Dr. Hugo Kons (2005)
- Exotic Tick Survey, University of Georgia, (2006)
- Soil cores on Rima Ridge - to study geological history and depositional ages, WJ Rink and K Burdette, McMaster University. (2007)
- Butterfly surveys on conservation lands, FNAI staff (2007)

8. Law Enforcement

Primary law enforcement responsibilities are handled by FDACS, Office of Agriculture Law Enforcement and the FWC wildlife officers. Additional assistance is rendered by the Volusia County Sheriff's office as needed.

Special rules of the FDACS, DOF were promulgated in 2004 for better control of forest traffic and camping. These rules are under Chapter 5I-4 of the Florida Administrative Code.

9. Wildlife and Fish Management

Under the terms of the management lease, DOF provides land management and general supervision following the multiple-use management concept. FWC biologists are responsible for assisting DOF with managing the fish and wildlife populations, and monitors selected game and non-game species populations. FWC does not routinely conduct wildlife surveys on TBSF, however at DOF's request, FWC will conduct wildlife surveys if funding and manpower permit. Pursuant a request by DOF, FWC Biologists will conduct gopher tortoise surveys in 2010.

Approximately 118 acres of wildlife openings are located on TBSF, and are managed for early successional native species on a rotational mowing and/or burning schedule. Division of Forestry assists FWC in burning openings as their schedule allows.

TBSF is a State Forest and Wildlife Management Area for hunting; Tiger Bay WMA consists of two units, Tiger Bay and Rima Ridge. The FWC recommends hunting season lengths and bag limits for game animals. Hunting seasons, schedules, quotas, and bag limits are agreed upon annually between DOF and FWC. Hunting on the Tiger Bay State Forest and Wildlife Management Area (WMA) is provided through both non-quota and quota hunts.

At the current time, Tiger Bay State Forest and WMA does not have quota permits for archery and muzzleloading gun seasons. FWC issues 150 quota permits for the first nine days of general gun season. However, after the first nine days, the area is again open to hunting without a quota permit. During spring turkey season there are 25 quota permits issued for each of three separate hunts (75 total permits).

Rima Ridge Unit WMA has 75 quota permits for archery, muzzleloading gun, and general gun seasons. During spring turkey season there are 20 quota permits for each of the 3 hunts (60 total permits).

TBSF is a popular destination for hunters, but FWC does not operate a hunter check station on TBSF. Game animals include deer, wild hogs, turkey and small game as outlined in the management area guidelines. All changes in hunting and fishing regulations will be approved by the DOF Director prior to implementation by the FWC.

FWC also regulates fishing on Tiger Bay WMA.

FWC works cooperatively with DOF to meet the goal of maintaining wildlife populations and activities at levels that can be produced and sustained through multiple-use management, the following guidelines will be used:

a. Managing Non-Game Species

Non-game species will be managed and protected through the restoration and maintenance of native ecosystems found on the forest. Research among state and federal agencies will provide valuable information in determining future management objectives of non-game species.

b. Sensitive Species

Specialized forest management techniques will be used, as necessary, to protect or increase listed species, as applicable for both plants and animals. Management needs of sensitive species will be carried out as directed in Section III.B.5 Endangered or Threatened Species. The management goals that are outlined in Section IV. B. will benefit sensitive species by improving, restoring or maintaining native communities that provide critical habitat. Species-specific management plans will be developed when necessary. Continued biological surveys will be conducted to determine locations of these species.

The following management practices are recommended to protect and preserve listed species that are present on the forest:

- i.** Locate and map: cover, food, critical resources, and breeding places for all listed species.
- ii.** Establish a monitoring plan for all listed species.
- iii.** Other specialized management practices for listed species may be implemented if deemed necessary. This includes designation of buffers for aquatic and wetland resources.

TBSF is involved in special projects to help mitigate the pressure of the urban interface on wildlife. Two projects in particular will involve the forest over the next ten years. The Department of Transportation (DOT) is planning to widen the I-4 interstate highway and this has prompted an evaluation of the project's impact

on wildlife species. The DOT is required under the Endangered Species Act to determine what impact, if any, the widening project would have, specifically on the Florida black bear population. To fulfill this obligation, a study was completed by Environmental Management Services- Scientists, Engineers, and Planners, Inc. (EMS) on three potential wildlife crossing areas (over/under I-4). Three of the proposed wildlife crossings are along the TBSF southern boundary (Exhibit P). Subsequently BOT Easement# 31830 (ORB 6327, pg 3778) was granted to DOT for construction of a ramp needed for one of the crossings. (Section IV.A. 9.6 also describes this easement). The wildlife crossings will mitigate for habitat fragmentation and are intended to reduce wildlife mortality related to vehicles, especially large mammals such as the Florida Black Bear.

Prior to state acquisition of the Rima Ridge Tract in 1997, USFWS had designated 121.45 acres as an alternate gopher tortoise mitigation site as part of a Development of Regional Impact (DRI). The State of Florida and SJRWMD purchased the Rima Ridge property with the understanding that this designation would be a legal encumbrance. Based on the terms of acquisition, DOF subsequently assumed responsibility for managing the gopher tortoise mitigation site from Indigo Development Inc. (IDI). The prescribed burning regime will initially target a two year burn cycle during dormant seasons. Fire management will shift burning to the growing season to further diversify groundcover to support gopher tortoise habitat. The burrows will be surveyed in 2010 to document locations and to describe condition and use. In the near future as the pines mature, they will be selectively thinned or clear-cut and replanted with longleaf pine to restore natural conditions. Growing season burns will continue on a cycle of 3-8 years when the mitigation area is deemed to be in a maintenance condition. Monitoring of burrows and gopher tortoises will occur after each burn event. Under the terms of the DRI and Agreement of Purchase and Sale, IDI was to reimburse the SJRWMD and the DOF at the rate of \$701.60 per acre for the area under the mitigation agreement. As a result, \$42,604.66 was received in 2003 by DOF as part of the mitigation settlement (Exhibit Q). The funds were credited to the DACS's Incidental Trust Fund to benefit the Bunnell District's CARL acquisitions.

c. Hunter Access

Hunting season dates, limits and methods are established annually cooperatively by DOF and FWC. Access to the Tiger Bay State Forest and WMA and the Rima Ridge Unit WMA are restricted to open designated roads as outlined in the WMA brochures, printed annually.

d. Timber Harvesting

General forest management guidelines are observed to best meet the needs of both the wildlife and forest resources. The DOF recognizes the value of snags to wildlife management. Hardwood and pine snags will be left alone in their natural environment unless they are deemed to be a potential safety hazard. Areas with

significant pine mortality will be harvested as directed by the severity of the situation.

e. Prescribed Burning

To the greatest extent possible, areas to be burned will be spread over the forest in a mosaic pattern. An all-season burning program will be established utilizing existing practices plus recent research findings. Whenever possible, existing roads and natural breaks will be used to contain and control prescribed and natural fires.

f. Wildlife Openings

Permanent wildlife openings will be set aside on up to 1% of the forest acreage. A wildlife opening plan has been developed and is included as Exhibit P.

10. Non-Native Invasive Species

The practice of the DOF is to locate, identify, eradicate or control non-native invasive species. Forest employees continually monitor the forest for non-native invasive species while conducting management activities and in particular forest inventory. Special attention is given to monitoring for non-native invasive species while conducting inventory in wetland communities because typically they are not as intensively managed as the upland pine communities and non-native invasive individuals or populations could go undetected.

When non-native invasive species are discovered, an eradication plan will be developed and implemented based upon the severity of the infestation and the availability of personnel and funding. Adjacent landowners who are known to have these species on their property will be approached in an effort to achieve a cooperative control program.

TBSF personnel will be scheduled for training in the identification and control of non native invasive species as time and resources permit. Training courses for non-native invasive plants will be coordinated by DOF's Forest Health Section and others including the area working group CISMA as opportunities arise. Control or eradication of non-native invasive species will be species specific, and in most cases will require the use of herbicides.

A non-native invasive plant survey was completed on TBSF in June 2006 by DOF's Forest Health Section and a Non-native Invasive Species Management Plan describing the status, location, and management treatments for each plant species was developed in 2008. There are 13 exotic invasive plant species occupying about 14 acres of forest at this time.

Torpedo grass (*Panicum repens*) accounts for 11 acres and is by far the most prevalent. This is a very aggressive species that occurs on many State forest roads and can be perpetuated by road grading mishaps. In addition, the species is adapted

to wet conditions where it out-competes road stabilizing species that are compatible or less ecologically disturbing.

After Torpedo grass, some of the more aggressive non-native invasive species that are increasing in population on the forest and require more intensive treatment include cogon grass (*Imperata cylindrica*), showy rattlebox (*Crotalaria spectabilis*) and Japanese climbing fern (*Lygodium japonicum*). Cogon grass and showy rattlebox have increased their density within, and number of locations from, the originally surveyed populations, while Japanese climbing fern has expanded its population within the originally surveyed locations, doubling its population.

Currently, the strategy on this forest is to treat and monitor the most aggressive and pervasive non-native invasive species, then focus on the remaining non-native invasive species as resources permit. Chemical herbicide provided in the past at no cost by the FWC invasive plant management staff has made a positive difference in DOF's ability to control invasive species at TBSF.

Grant and cost sharing opportunities are being investigated and realized to supplement these efforts. An OPS position was funded and filled in FY 2009-2010 with the express purpose of herbiciding non native invasive species on four state forests including TBSF. Identified species and information on their occurrence and treatment are displayed in Table 6. Specific locations of the plants documented below there can be found on the map in Exhibit R.

Monitoring is a key component of the TBSF non native invasive plant program. Monitoring information is obtained when the foresters do timber stand inventory each year, which provides a good cross section of the forest. In addition, the rangers and the foresters are instructed to document and report any observed invasive plants when conducting land management activities such as site preparation, reforestation and/or prescription burning within the forest.

TBSF staff locates and identifies non-native invasive plant infestations where management activities are planned to avoid spreading propagules by equipment and to provide for equipment cleaning between site locations. Staff consults several times a year with DOF's Forest Health personnel as a means to preempt a major invasive plant, animal, disease or insect outbreak.

Often this leads to the production of educational materials that are made available to the public. Through these measures, TBSF hopes to control and diminish current and future menace populations.

To date, no incidence of laurel wilt fungus (*Raffaelea* sp.) or it's the non-native vector, redbay ambrosia beetle (*Xyleborus glabratus*) have been confirmed on redbay (*Persea borbonia*) or other trees in the laurel family (*Lauraceae*) on TBSF. Posters warning visitors against bringing in infected firewood material have been posted. Field monitoring by forest staff and diagnostic testing by the DOF Forest Health

section of symptomatic samples will continue to be utilized as methods to detect any occurrence.

The feral hog population is currently small on the forest. However, the number can change over a short period of time. Over the next ten-year period, feral hog monitoring will continue. The DOF and the FWC will collaborate on management decisions concerning this species. All management activities and proposals will be scrutinized for their connection to non-native invasive species. Those activities and proposals found to promote these species will be eliminated or rejected.

Table 6. Non-Native Invasive Plants and Treatment Efforts

Scientific Name	Common Name	Acres	State Forest Priority	FLEPPC Priority	Treatment*	Treatment Timing	Herbicide**	Population ***	Habitat Impacted ****
<i>Cinnamomum camphora</i>	Camphor Tree	0.123	1	1	B-B	Winter & Spring	Triclopyr (Garlon 4, 30% in oil)	S	X
<i>Colocasia esculenta</i>	Wild Taro	0.01	2	1	F & M	Spring & Summer	Glyphosate (2% solution)	S	H
<i>Crotalaria spectabilis</i>	Showy Rattlebox	0.768	2	0	F & M	Winter & Spring	Glyphosate (2% solution)	I +	X
<i>Imperata cylindrical</i>	Cogon Grass	0.250	1	1	F	Fall	Imazapyr (Arsenal)	I ±	M
<i>Lygodium japonicum</i>	Japanese Climbing Fern	0.252	1	1	F	Fall	metsulfuron (Escort)	I	M-H
<i>Lygodium microphyllum</i>	Old World Climbing Fern	0.001	1	1	F & M	Fall	metsulfuron (Escort)	D	M-H
<i>Nephrolepis cordifolia</i>	Sword Fern	0.021	2	1	F	Spring & Summer	Glyphosate (1.5% solution)	S	M-H
<i>Panicum repens</i>	Torpedo Grass	11.213	1	1	F	Spring & Summer	Glyphosate (2 to 3% solution)	I	H-M
<i>Schinus terebinthifolius</i>	Brazilian Pepper	0.011	1	1	BB	Fall	Garlon 4 (10% solution)	D	M
<i>Sesbania punicea</i>	Purple Sesbane	0.325	2	2	M or F	Spring & Summer	Glyphosate (2% solution)	S	H-M
<i>Urena lobata</i>	Caesar's Weed	1.138	1	2	M or F	Spring & Summer	Glyphosate (2% solution)	S	H-M
<i>Wedelia trilobata</i>	Wedelia	0.04	2	2	F	Spring & Summer	metsulfuron (Escort)	S	M
<i>Dioscorea bulbifera</i>	Air Potato	0.05	1	1	M + F	Spring & Summer	Garlon 4 (0.5 to 2% solution)	S	M-H
Total		14.075							

* F=Foliar Herbicide, BB=Basal Bark Herbicide, M= Mechanical

** All recommendations for use of glyphosate at 41% active ingredient. "Rodeo" is specified for aquatic or wetland conditions and labeled target species.

*** I=Increase D=Decrease S=Stable

**** X=Xeric M=Mesic H=Hydric

+ Within original survey

± Three new populations

11. Insects, Disease and Forest Health

Volusia County has a history of outbreaks of pitch canker. If outbreaks do occur, scientifically-based operational and strategic plans will be implemented as appropriate to minimize the impacts of this disease. Specific long range strategies to avoid and/or minimize losses to such outbreaks in the future will be the management objective. Management strategies to accomplish these objectives will be developed in consultation with the DOF's Forest Health Section. TBSF staff will adhere to the recommendations for emergency operations contained in the DOF's Silviculture BMP manual.

In order to minimize the occurrence of pitch canker, slash pine seedlings planted in the state forest will be from genetically resistant pitch canker seed sources. Study plots have been established on nearby Lake George State Forest by the DOF Forest Health Section with the purpose of determining the natural resistance to pitch canker in different provenance lines of slash pine from the DOF's seed orchards. These plots are evaluated annually, and information obtained will be considered as appropriate in future management decisions and plans.

No insect outbreaks have affected the forest. Occurrence of southern pine beetle (*Dendroctonus frontalis*) was not identified in the state forest area during the 2000-2002 outbreaks. Should other unexpected insect/disease outbreaks occur, TBSF staff will consult with the Forest Health Section to develop and implement appropriate scientifically sound responses and/or management prescriptions.

In compliance with section 388.4111, Florida Statutes and in Sec. 5E-13.042, F.A.C., all lands have been evaluated and subsequently designated as environmentally sensitive and biologically highly productive. Such designation is appropriate and consistent with the previously documented natural resources and ecosystem values and affords the appropriate protection for these resources from arthropod control practices that would impose a potential hazard to fish, wildlife and other natural resources existing on this property. With the approval of this plan documenting this designation, the local arthropod control agency in Volusia County will be notified of this designation.

As a result, prior to conducting any arthropod control activities on TBSF, the local agency must prepare a public lands control plan, that addresses all concerns that DOF may have for protecting the natural resources and ecosystem values on the state forest. In this regard DOF will provide the local agency details on the management objectives for TBSF. This public lands control plan must be in compliance with DACS guidelines and using the appropriate DACS form. The plan must then be approved and mutually adopted by the county, DOF, and DACS prior to initiation of any mosquito control work. Should the local mosquito control district not propose any mosquito control operations on the property, no arthropod control plan is required.

12. On-Site Housing

DOF may establish on-site housing (mobile/manufactured home) on TBSF if deemed necessary to alleviate security and management issues. The need and feasibility specific for the state forest will be evaluated and established if considered appropriate by the center/district manager and approved by the DOF Director. On-site housing will only be available to individuals approved by the Director. This type of housing will not exceed three homes per location with the possibility of more than one on-site housing location occurring if considered necessary by the center/district manager and approved by the DOF Director.

Prior to the occurrence of any ground disturbing activity for the purpose of establishing on-site housing, a notification will be sent to the Division of State Lands as well as packages to the DHR and FNAI for review and recommendations. The package will contain a description of the project (location, number of units, type and amount of ground disturbance, affected natural community type and nearby known archaeological or historical sites), maps (topographic and aerial) and photographs of the area.

13. Utility Corridors and Easements

The DOF does not favor the fragmentation of natural communities with linear facilities; consequently, easements or transfer of ownership for such uses will be discouraged to the greatest extent practical. When such encroachments are unavoidable, previously disturbed sites will be the preferred location. The objectives, when identifying possible locations for new linear facilities, will be to cause no damage to sensitive resources (e.g., listed species and archaeological/historical sites), to avoid habitat fragmentation, and to limit disruption of management activities and resource-based multiple-use activities, such as recreation.

Collocation with existing corridors will be considered, but will be used only where expansion of existing corridors does not increase the level of habitat fragmentation and disruption of management and multiple-use activities. The DOF will further encourage the use of underground cable where scenic considerations are desirable. Easements for such utilities are subject to the review and approval by the BOT. The use of state forest property for utility lines, pipelines, linear facilities and transportation corridors will be discouraged to the greatest extent possible. The placement of these linear facilities fragments the natural communities in a forest. Request for linear facility uses will be handled according to the Governor and Cabinet's linear facilities policy.

Current utility easements include Florida Power & Light (FP&L) and Southern Bell. These easements are along Bear Island Road and Gopher Ridge Road and provide power and phone to the Federal Aviation Administration (FAA) tower. An FP&L easement on the west side of the office site provides power to the office and to the ranger residence. An FP&L easement also runs along Clark Bay Road to provide power to the residents within the out parcel of Clark Bay Tract. A major 500KW FP&L owned utility corridor runs along the middle of the Tiger Bay Tract, on the

portion north of US-92 and diagonally through the southwest corner of the Tract south of US-92. FP&L and Southern Bell have easements along the southern and northern end of Rima Ridge Road that provides power and phone service to the wells and to the communication towers located in the area. American Tower has leased space for a communication tower on the Rima Ridge Tract. A communication tower exists on an out-parcel owned by Sprintcom, Inc. on the south end of Clark Bay Road.

The cities of Daytona Beach and Ormond Beach have waterline easements related to the well fields on the Rima Ridge Tract. The City of Ormond Beach has a new utility easement for a raw water transmission pipeline from the existing wells along Rima Ridge Road to SR-40, and has received approval for the addition of three new water supply wells along this route. The City of Daytona Beach has received approval for an easement to construct four water mains crossing the state forest from its water treatment plant on LPGA Boulevard.

BOT Easement # 31830 (Official Record Book 6327, p. 3778) was granted to DOT in February 2009 for construction of a ramp needed for one of the planned wildlife crossings to be included in widening plans for Interstate 4 (I-4). The access ramp will be part of the over-land crossing structure intended to connect TBSF and City of Port Orange well-field lands located on the south side of the I-4 corridor.

All existing easements are on file with DEP's Division of State Lands, the DOF State Office in Tallahassee, as well as the TBSF headquarters.

14. Ground Disturbing Activities

Although the DOF's approach to handling ground disturbing activities is identified in various sections of this plan, the DOF's overall approach to this issue is summarized here. The DOF recognizes the importance of managing and protecting sensitive resources and will take all necessary steps to insure that ground disturbing activities will not adversely impact sensitive resources. This includes areas such as archaeological and/or historical sites, ecotones, wetlands, and imperiled species habitat. The construction of new pre-suppression fire lines will be limited to the extent practicable. When new pre-suppression firelines, recreational trails, or other low-impact recreational site enhancements are necessary their placement will be carefully reviewed by state forest field staff and developed to avoid sensitive areas. The DOF will consult with the DHR and FNAI for other ground disturbing activities such as construction of buildings, parking lots and new roads.

15. Apiaries

There are currently no apiary leases on TBSF. The feasibility of pursuing and establishing apiary leases on TBSF in areas where appropriate will be pursued.

16. Cattle Grazing

There are currently no cattle leases on TBSF. Cattle grazing can be a useful tool in fuel reduction planning and will be evaluated where appropriate.

17. Ground Cover

Management activities will be designed and conducted to protect and enhance the condition and integrity of the native ground cover. Management techniques, such as prescribed fire in the growing season, will be used to restore, recover, and maintain a diversity of native ground cover to the greatest extent practical.

18. Restoration

Like many areas in Florida, fire and hydrology represent the key ecosystem processes. Thus, the TBSF restoration vision focuses on mimicking pre-Columbian fire and hydrologic patterns. This restoration philosophy has produced three types of restoration challenges:

a. Fire

Prior to European settlement, fires in Florida generally burned on a landscape scale until stopped by rain, a body of water, or other natural fire barrier. These fires were frequent and burned most often in the lightning season. The combination of pronounced wet/dry seasons and nutrient poor soils produced a pyrogenic flora rich in one-hour and waxy fuels.

Management techniques that mirror ancient fire processes include: prescribing growing season burns at frequent intervals, burning across eco-tones and transition zones, and restoring fuels to carry fire where the understory has been eliminated. The need to re-establish natural burn frequencies is recognized as the most important issue at TBSF. This must occur before extensive shifts to growing season burns can occur. Complicating this effort is the heavy fuel buildup and/or stocking levels in old paper company pine stands and younger and extensive stands of slash and longleaf pine planted following the 1998 wildfires.

b. Hydrology

The transition from the upland forest to the forested wetlands occurs frequently through grassy ecotones that often host listed species (e.g. Celestial Lily) dependent on fire occurrence. These areas should be allowed to burn as much as possible when prescribed burning is conducted in the adjacent uplands. Where practical and in conjunction with adjacent logging operations, pines and hardwoods that have encroached into the wetland ecotones should be selectively removed to achieve the historically more open and grassy condition.

A large portion of the main swamps and a majority of the isolated ponds or dome swamps within the flatwoods burned in the 1998 wildfires. Natural regeneration of the cypress through root sprouting occurred in most of the burned areas where cypress was present before the fires.

Maintaining the integrity of the wetland communities is a high priority. Cautious avoidance of activities that would threaten natural hydrology is necessary. If it becomes necessary to conduct forestry activities such as salvage timber sales in the swamp areas, Low Ground Pressure (LPG) equipment will be used. No

mechanical or chemical site preparation will be conducted prior to reforestation. Natural recruitment from remaining trees will be the preferred method of reforesting these sites.

All forestry activities will be conducted in accordance with guidelines as described in the Silviculture BMP Manual. Wetland restoration will be coordinated with the SJRWMD. Any activities requiring water management district permits will be handled accordingly.

The water resources on TBSF perform essential roles in the protection of water quality, groundwater recharge, flood control and aquatic habitat preservation. In the interest of maintaining these valuable resource functions, state forest management personnel will work with the Division of Forestry's Hydrology Section to incorporate wetland restoration into the overall resource management program as opportunities arise, particularly where wetland systems have been impaired or negatively impacted by previous management activities or natural disasters.

A marked wet and dry season coupled with permeable soils and lack of topographic relief results in great extremes of flooding and drought in Florida. Human habitation has made Florida rich in roads, canals, and retention ponds but has altered historic water flows. In 2003, a weir was installed on Thayer Canal as a mitigation project to restore hydrological functions in Bennett Swamp which is located in the southeastern portion of the Rima Ridge Tract. SJRWMD and DOF have installed vegetative plots in and around Bennett Swamp to evaluate the impacts of elevated water levels after weir installation. With the assistance of the DOF Hydrology Section, TBSF personnel will evaluate the need for additional hydrologic management or restoration.

During the suppression of the 2009 wildfires, fire lines were plowed near sensitive wetland communities. Efforts are needed to assess the potential erosion and/or impact on natural surface water flows to determine sites that will require restoration efforts. Small-scale restoration of these fire lines and any roads on the forest discovered to be eroding should be achievable and productive.

c. Species Composition

Ensuring that species vital to ecosystem processes are in place on TBSF is a restoration priority. A continuous pyrogenic ground cover in fire-adapted systems is important, as is the presence of longleaf pine. Juvenile longleaf pine tolerates fire earlier than other woody vegetation allowing a shorter fire return interval to coexist with silviculture.

The multiple-use management approach used on TBSF will maintain habitat conditions suitable for the array of species typically found within the various ecosystems. This includes sensitive species such as the flatwoods salamander (*Ambystoma cingulatum*), scrub jay (*Aphelocoma coerulescens*) and the red-

cockaded woodpecker (*Picoides borealis*), although there are no currently known populations of these species. As restoration proceeds and habitat on the forest is improved, monitoring will be conducted to determine whether these species will return on their own.

There are no current plans to reintroduce any species that are thought to have been extirpated from TBSF. However, habitat conditions for key species will be monitored and, if habitat conditions become suitable, the case for reintroduction will be examined and attempted if it makes sense ecologically and from the standpoint of species recovery.

Restoration also aspires to control non-native invasive species. Currently, limited populations of these species dominate a few small areas. Long-term monitoring is vital and will be conducted as staffing and funding allow.

This ten-year resource management plan represents the best knowledge of the DOF at this time. Since restoration is inherently experimental, it is important to periodically monitor and evaluate land management to ensure it meets our mission statement. Evaluation will both highlight unsatisfactory management practices and practices that have succeeded enough to be de-emphasized or discontinued at the treatment location.

Specific restoration needs and planned projects are identified in the Natural Communities Descriptions later in the plan.

B. Description of Natural Communities and Proposed Management Activities

In 2005, FNAI completed an inventory and natural community mapping project on 27,395 acres of TBSF (Florida Natural Areas Inventory, 2005) and a historic natural community type map (Exhibit S) was created. The following desired future conditions, existing condition descriptions, and management recommendations are taken from this FNAI mapping project report and the Guide to the Natural Communities of Florida (FNAI 1990), as well as from the knowledge and experience gained by DOF during forest inventory efforts and routine field work on TBSF.

While some natural communities of TBSF have been somewhat disturbed, other areas have relatively intact ground cover. Many areas have a high percentage of woody shrubs and hardwood incursion and need improvement through consistent application of prescribed burning. Restoration during this ten-year period will begin with a forest wide assessment of the fuel loading, timber densities and groundcover to determine the most appropriate steps necessary to re-introduce prescribed burning. Strategies may include thinning of overly dense pine plantations, mowing or chopping in areas of heavy fuel buildup and/or application of cool dormant season fires. Through an adaptive management process, the results of these initial efforts will be monitored and more refined and detailed restoration plans will be made.

The management goal is to develop more detailed analysis of community specific conditions and restoration needs in order to develop restoration plans. A key effort will be to identify how many acres are within major existing condition categories (natural/planted, species, etc.) of each community. Restoration prescriptions for stands may then be refined and focused so that operational projects can be planned. Restoration plans for Pine Plantation Fuel Reduction, Scrub/Sandhill Restoration, and Hydric Communities (Wet Flatwoods, Depression Marsh, Wet Prairie) Restoration, have been identified as priorities for TBSF. A component of these plans will be prioritizing areas in need of significant restoration in order to achieve historic community conditions.

Historical acreage of each community type was identified by FNAI analysis and ground-truthing in 2005. The current intact community acreage is not known. It is estimated that 9000 acres of the forest are in pine plantations occurring in upland and some wetland communities. Those natural community types that are thought to have a planted pine component are noted with an asterisk below.

Table 7. Historical Vegetation Types – Acreage-and Fire Return Interval

FNAI Community	Acres Mapped (Historic)	Fire Return Interval (Years)
Basin Swamp	11,130	5-100
Mesic Flatwoods*	10,020 [†]	2-4
Wet Flatwoods*	1,950 [†]	2-5
Dome Swamp	1,150 [†]	5-100
Depression Marsh	997 [†]	1-8
Scrub*	819 [†]	10-20
Baygall	744	N/A
Scrubby Flatwoods*	193 [†]	3-8
Sandhill	73 [†]	1-3
Basin Marsh	63 [†]	1-8
Wet Prairie	62 [†]	2-4
Hydric Hammock	6	N/A
Lakes	123	N/A
Other	67	N/A

*Includes substantially planted pine component, totaling 9000 acres for the FNAI communities noted.

[†]Included in fire-dependent community acreage total (p. 6)

1. **Basin Swamp** (11,130 acres)

Desired Future Condition

A basin swamp is characterized as a relatively large and irregularly shaped basin that is not associated with rivers, but is vegetated with hydrophytic trees and shrubs that can withstand an extended hydroperiod. Dominant plants include: slash pine, swamp tupelo (*Nyssa sylvatica* var. *biflora*), cypress (*Taxodium ascendens*), red maple (*Acer rubrum*), loblolly bay, fetterbush (*Lyonia lucida*), buttonbush (*Cephalanthes occidentalis*), Virginia willow (*Itea virginica*), and occasional highbush blueberry (*Vaccinium corymbosum*). Typical herbaceous species are Walter's sedge (*Carex striata*), sawtooth fern (*Blechnum serrulatum*), Virginia chain fern (*Woodwardia virginica*), lizard's tail (*Saururus cernuus*), and sedge (*Carex* sp.). Vines are often common and include poison ivy (*Toxicodendron radicans*), greenbrier (*Smilax laurifolia*), and muscadine (*Vitis rotundifolia*).

On TBSF, basin swamps often contain a mosaic of forested wetland, basin marsh, wet and mesic flatwoods on islands of higher ground, and peripheral depression marsh. Animal species found in the basin swamp include: cricket frog (*Acris gryllus*), ringneck snake (*Diadophis punctatus*), cottonmouth (*Agkistrodon piscivorus*), hawks, turkey (*Meleagris gallopavo*), great horned owl (*Bubo virginianus*), barred owl (*Strix varia*), pileated woodpecker (*Dryocopus pileatus*), songbirds, grey squirrel (*Sciurus carolinensis*), Florida black bear, raccoon (*Procyon lotor*), river otter (*Lutra Canadensis*), bobcat (*Felis rufus*) and white-tailed deer (*Odocoileus virginianus*).

Soils in basin swamps are generally acidic, nutrient poor peats. Basin swamps rarely burn, except during long drought periods like those that occurred in Central Florida from 1998-2002.

Existing Conditions

Basin swamps at TBSF are extensive wetlands covering more than 40% of the forest. Past logging is evident in many sections. During a period of drought in 1998, intense wildfires swept through parts of the swamp. In these areas, the vegetation was killed back to the ground. Shrubs such as Carolina willow (*Salix caroliniana*), saltbush (*Baccharis halimifolia*), and wax myrtle (*Myrica cerifera*), are abundant among the dead pine and regenerating cypress trees. The 1,300-acre Indian Lake Wildfire, which originated in late March 2009, resulted in extensive fire breaks with potentially significant hydrological impacts to Tiger Bay, Wampee Strand, and other associated wetlands.

Management in basin wetlands in the last ten years has been limited to salvage harvesting after the 1998 and 2009 wildfires. Bay and pine tree species were harvested in some basin swamps that were heavily charred and where trees were dying. The condition now of the basin swamps on TBSF is variable depending on size, topography, and water availability at the time of these two wildfires. In some areas, the fires had a beneficial effect, while in other areas the fire burned deep into the organic soils. Natural regeneration through basal sprouting is occurring in all of these systems. Approximately

54 acres were reforested by DOF contractors with bald cypress and pond cypress. Most of the impacted areas eventually regenerated naturally through basal sprouting from the previous stand.

Restoration Needs and Strategies

The basin wetlands on TBSF should be returned to their natural state, prior to the 1998 and 2009 wildfires and the subsequent logging done to salvage burned over timber. Areas that have been harvested will continue to regenerate naturally. Areas burned in the wildfires will be monitored for exotic plant invasion. There will be little or no long term timber management on most areas of this vegetation type.

Prescribed Fire and Ecotones

As a general rule ecotones and the edges of basin swamps should be burned in rotation with adjacent stands, allowing fire to creep into these areas and create ecotones as conditions allow. The use of heavy equipment will be limited in the ecotones to avoid rutting and soil disturbance. Existing firebreaks will be rehabilitated wherever possible, and any new lines will be established only in extreme situations. Existing ditches that interfere with the movement of fire across the ecotone or that may have begun to “channel” surface water may require restoration. Pine encroachment into ecotones will be selectively harvested with adjacent pine stands.

The firebreaks (approximately 34 miles) established during the 2009 wildfire have been mapped, posted as “closed” to public access, and will be monitored for non-native invasive plant occurrence. Most significantly, a push line extends about two miles across the southern limits of Tiger Bay. At this time, approximately one mile has been rehabilitated with assistance from the St. Johns River Water Management District and their track backhoe. This was accomplished prior to the onset of the summer rain season of 2009. Removal of large earth and debris berms through the center of Tiger Bay have been prioritized and initiated, and will continue as conditions and equipment availability permit. These massive windrows of soil and trees were the result of creating fire lines to contain the spread of this significant wildfire. They will take several years to restore, unless outside district assistance can be garnered.

Hydrology

With the assistance of the DOF Hydrology Section, TBSF staff will evaluate the need for other hydrologic management or restoration, which will include small-scale restoration of individual roads and fire lines. Hydrologic restoration projects, involving such water control structures as low water crossings, culverts and shallow earthen plugs may occur on parts of this vegetation type, resulting in wetter conditions within the basin swamp as the natural hydrology is restored.

2. Mesic Flatwoods (10,020 acres)

Desired Future Condition

Mesic flatwoods are open canopy forests of mature pine trees with little sub-canopy and a dense ground cover of shrubs and herbs occurring on flat terrain. The dense shrub layer

usually lacks a sub-canopy and is maintained with fire to between 35 and 65 % cover to allow ample light for herbaceous species, especially wiregrass (*Aristida stricta* var. *beyrichiana*). In some areas populations of Rugel's False pawpaw are present.

Mesic flatwoods are frequently intermixed with a complex mosaic of multiple plant communities described by FNAI as wet flatwoods, basin swamp, basin marsh, depression marsh, dome swamp, and lake. Natural ecotones between flatwoods and adjoining and embedded plant communities, contain a higher diversity of plants and animals, and are often an entirely different plant community such as wet prairie surrounding a wetland.

On TBSF, high quality mesic flatwoods consist of stands of mature longleaf pine and slash pine. Good examples of mesic flatwoods that are close to the desired future condition are located south of US-92 in the southwestern corner of the Tiger Bay Tract. One stand has an open canopy of natural slash pine where the dominant trees average 50 years of age. The best example is a block of planted longleaf pine with intact shrub and herbaceous strata with low saw palmetto (*Serenoa repens*) and runner oak (*Quercus minima*) and abundant wiregrass. In some areas, populations of Rugel's False Pawpaw are present.

Existing Conditions

Mesic flatwoods on the Tiger Bay and Rima Ridge tracts are dominated by even-aged pine plantations. There are also mixed slash and longleaf pine stands of natural origin with two to four age classes present, as well as 5 to 10 year old plantations of slash pine and longleaf pine planted after the 1998 wildfires. On the Clark Bay Tract, there are several hundred acres of pre-merchantable loblolly pine (*Pinus taeda*) stands.

There is much variation in the age class of trees, presence of bedding and presence of remnant native groundcover. In addition to the pines, most of the mature stands also contain varied densities of mid-story trees that are of swamp or bottomland forest in origin, such as loblolly bay. In general, native shrubs and vines are abundant while the native herbaceous groundcover is sparse and weedy. The pine plantations are typically even-aged, dense stands of slash pine over a fire-suppressed shrub layer dominated by saw palmetto and gallberry (*Ilex glabra*). Wiregrass occurs at lower densities in much of the community type.

The 1998 wildfires burned a large percentage of mesic flatwoods. The pines were harvested and the ground intensely site prepped to suppress saw palmetto. The often bare ground was planted with slash pines and abundant weedy species flourished, especially bushy bluestem (*Andropogon glomeratus*). Longleaf pine and a small amount of loblolly pine have also been planted. The young longleaf pines are mainly south of US-92 on the Tiger Bay Tract, and on the Rima Ridge Tract.

The 2009 Indian Lake Wildfire resulted in salvage harvest of 48 acres of natural mesic flatwoods stands along Bear Island Road and 21 acres of planted mesic flatwoods stands along Dark Entry Rd. Fire break impacts include areas of multiple plowed firelines and equipment staging areas where ground cover was completely removed. Area of impact

included the Rugel's False pawpaw mentioned below, however post-wildfire observation of the population indicated an increase over the original population documentation by FNAI.

The highest quality mesic flatwoods occur in the western side of the portions of TBSF that are south of US-92 (former Woody parcel). In the southwest corner of the forest, there remains a relatively small area of mesic flatwoods in natural condition. However, regular prescribed burning has not taken place. Typical vegetation includes an open canopy of mature slash pine over saw palmetto that average three to four feet tall. Other shrubs include gallberry, wax myrtle (*Myrica cerifera*), staggerbush (*Lyonia fruticosa*), tarflower (*Bejaria racemosa*), dwarf huckleberry (*Gaylussacia dumosa*), and shiny blueberry (*Vaccinium myrsinites*). One block of planted longleaf pine has intact shrub and herbaceous strata with low saw palmetto and runner oak and abundant wiregrass.

A population of the federally endangered Rugel's False pawpaw is located in mesic flatwoods along Bear Island Road southwest of Indian Lake.

Restoration Needs and Approaches

Restoration of this community type will focus on conversion of existing pine plantations to uneven-aged management, reforestation of harvested areas, frequent prescribed fires, and hydrologic restoration in areas where access roads and silvicultural practices by previous landowners have disrupted the natural sheet flow.

Prescribed Fire and Groundcover

Groundcover restoration should focus on practices that will increase wiregrass abundance. Prescribed fire will be the preferred tool for maintenance of the flatwoods plant community. A continued effort will be made to achieve a two to four year fire return interval. Current tree stocking levels, smoke issues, duff accumulations, available personnel, and other factors will all influence the actual burn regime. Growing season burning will be used whenever possible to mimic natural fires once fuel loadings are desired future conditions to safely conduct these prescribe burns. It may become necessary to actively restore native groundcover in some stands. New ground disturbances will be avoided when possible to prevent elimination of the natural groundcover and establishment of weedy species.

Hydrology

Appropriate water control structures will be used to restore areas where the natural hydrology has been impacted by pine plantation practices that occurred in much of this community before the property was acquired by the state. The use of plowed firebreaks and other practices that disturb the soil will be minimized. Existing roads and wetlands will be used for firebreaks whenever possible. New and established firebreaks will be rehabilitated whenever possible.

Silviculture

Managing plantations to restore them to naturally regenerating stands with a mix of longleaf and slash pine will require some artificial regeneration, natural regeneration, and

thinning harvests. Slash pine plantations will likely be thinned at 15 to 20 years of age, and continue to be thinned in later years to maintain the pine density between 60 and 80 ft² of basal area per acre. Natural stands will have more variance of management, depending on the need of the individual stand. Existing longleaf pines should be retained to allow increased regeneration of that species on applicable sites. Artificial and natural regeneration stocking density should be sufficient to perpetuate productive stands while maintaining natural conditions.

Loblolly pine plantations will be harvested when they become merchantable and replaced with slash or longleaf pine, as appropriate per management rotation age. Natural regeneration methods will be preferred. Tree planting will be conducted if natural regeneration is not feasible. Site preparation methods prior to tree planting will be selected based on site assessment of native groundcover, the amount of debris, type of vegetation present, size and height of beds, etc. Roller chopping is one of many acceptable means of site preparation to better manage fuel loading from remnant logging slash.

Prescription burning will be the preferred site preparation method. Herbicides may be used infrequently for reforestation or restoration efforts where applicable. Activities will be monitored for stand establishment success and to be certain that hydrological alterations do not occur and non-native invasive species are not introduced or spread.

While not the primary focus, site preparation activities will be conducted in such a way as to degrade existing bedding to promote natural and historic drainage patterns.

Stand Level Prescriptions

Major categories of existing conditions of mesic flatwoods on TBSF and the restoration prescription for each are as follows:

Existing Slash Pine Plantations - These stands should be burned every 2-4 years and provide growing season burning opportunities once in a maintenance, low fuel load condition. Mowing may be necessary as a precursor to initial prescribed burns in young slash pine plantations to reduce the risk of mortality.

Thinning should be conducted in such a way as to promote large diameter trees and a possible conversion to uneven-aged management. Shelter-wood and seed tree techniques may also be employed, depending upon the circumstances. Existing longleaf pines should be retained to provide a seed source.

Maintenance may include roller chopping and/or mowing and burning to retard the resurgence of saw palmetto monocultures and promote the more desirable herbaceous species (e.g. wire grass).

Existing Longleaf Pine Plantations - The long term goal for these stands is to gradually convert them to uneven-aged longleaf pine stands with a natural appearance. Release burns should be implemented when possible to promote height growth in planted

seedlings. Generally this should occur when the trees are either in the grass stage or when they have reached a relatively safe height of 8-10 feet. At this point bark thickness should be adequate to protect from excessive heat. Even so, cool night burns are advisable for another level of insurance for the young longleaf pines. Growing season burns should be utilized when fuel loads will accommodate this type of prescribed burn.

Maintenance may include roller chopping and/or mowing and burning to retard the resurgence of saw palmetto monocultures and to promote bunch grasses and associated herbaceous species.

Clear cuts (no regeneration) - These areas will be prescribed burned and planted to slash or longleaf pine. Drum chopping and/or herbicide treatments may be necessary in areas to facilitate survival of planted seedlings and to control ground cover composition. Once the pines are established, vegetation will be maintained primarily by prescribed burning with some supplemental mechanical or chemical work as needed.

Seed Tree or Shelterwood Cuts (Natural Regeneration) Site preparation will include roller chopping and prescription burning prior to the next calculated bumper seed crop. This will require careful coordination and monitoring in the spring to decide adequacy of cone accumulation and again in the fall to sequence prescription burning just before seed drop. The whole process could be deferred to another year should the numbers prove unsatisfactory.

Areas that have natural regeneration of slash pine should be left unburned until the majority of dominant trees have reached a height of 13-15 feet or more which will take 7-10 years. These stands will be converted eventually to uneven-aged management by previously discussed silvicultural techniques.

3. **Wet Flatwoods** (1,950 acres)

Desired Future Condition

Wet flatwoods are open canopy forests of native pine trees with little or no sub-canopy and a variable ground cover of herbs and shrubs occurring on low flat terrain. Wet flatwoods are a fire maintained community. Wet flatwoods are a transitional upland natural community on TBSF.

Wet flatwoods are often intermixed with depression marsh and mesic flatwoods. The typical wet flatwoods has an open canopy of mature slash pine and occasionally longleaf pine over younger pines. Tall wax myrtle extends over the prevalent gallberry and saw palmetto. The amount of wiregrass, bracken fern (*Pteridium aquilinum*), and cinnamon fern (*Osmunda cinnamomea*) groundcover should be 25% or more. Pond pine (*Pinus serotina*) and hooded pitcher plant are also frequently present.

Existing Conditions

Wet flatwoods have generally been managed with the adjacent mesic flatwoods pine plantations and therefore have similar stand structure. Like mesic flatwoods, there is

much variation in the age class of trees, severity of bedding, and the presence of any remnant native groundcover. In general, the native herbaceous groundcover is sparse.

The pine plantations are typically even-aged, dense stands of slash pine over a fire-suppressed shrub layer dominated by loblolly bay (*Gordonia lasianthus*), wax myrtle (*Myrica cerifera*), sandweed (*Hypericum fasciculatum*) and to a lesser extent gallberry and saw palmetto. Bushy bluestem, Carolina redroot (*Lachnanthes caroliniana*), shortleaf yellow-eyed grass (*Xyris brevifolia*), and Baldwin's nutgrass (*Scleria baldwinii*) are common herbs. Unlike mesic flatwoods, wiregrass is rare in this more hydric community. The absence of a wet flatwoods ecotone suggests hydrology disturbance. Good examples of intact wet flatwoods are difficult to find.

The 1998 wildfires burned a large percentage of wet flatwoods. These pines were harvested and the ground site prepared, primarily by roller chopping and prescription burning to remove saw palmetto that had encroached during drier years. The resulting disturbed ground was planted with pines, but weedy species flourished, especially bushy bluestem

Restoration Needs and Approaches

Wet Flatwoods will be maintained with prescribed fire. Multiple winter burns (December through March) may be required to reduce the amount of fuels in the understory to allow for summer burns (May through August). The fire return interval for wet flatwoods is every two to four years. In mature stands, prescribed fire followed by commercial thinning to open the overstory and midstory should be considered to rejuvenate remnant native groundcover. Frequent prescribed fire is critical to maintain a diversity of plant species in the mid-story and groundcover.

Wet flatwoods are vulnerable to alterations of the landscape that affect hydroperiod. The absence of an ecotone suggests hydrology disturbance. Monitoring followed by assessment and remedial action such as the installation of weirs and culverts may be necessary for viable wet flatwoods community.

Prescribed Fire and Groundcover

Groundcover restoration should focus on practices that will increase native herbaceous species. Prescribed fire will be the preferred tool for maintenance of the wet flatwoods plant community. A continued effort will be made to maintain a two to four year fire return interval. Current tree stocking levels, smoke issues, duff accumulations, and other factors will all influence the actual burn regime. Growing season burning will be used whenever possible to mimic natural lightning fires. It may become necessary to actively restore native groundcover in some stands. New ground disturbances will be avoided when possible to avoid hydrology-related problems and to prevent elimination of the natural groundcover and establishment of weedy species.

Hydrology

The use of plowed firebreaks and other practices will be minimized. Existing roads, firebreaks, wetlands or other natural barriers will be used for firebreaks whenever

possible. Depth of plowed firebreaks will be minimized to prevent hydrologic alteration within the surrounding community. All fire lines will be rehabilitated as soon as possible after suppression activities have ceased.

Silviculture

Plantations and natural stands will be thinned to promote individual tree and forest health and improve ground cover conditions and maintain pine basal area at 50-80 square feet per acre. Restoring the plantations to naturally regenerating uneven-aged stands will be the management goal in the wet flatwoods. This could be accomplished through natural regeneration harvest methods such as shelter wood or seed tree cuts. In addition, ecotones will be restored through a combination of harvesting and prescribed burning

Special attention and control will be given to any non-native invasive species that occur in the wet flatwoods (e.g. Japanese climbing fern) as conditions are conducive to rapid spread.

Stand Level Prescriptions

Major categories of existing conditions of wet flatwoods on TBSF and the restoration prescription for each are as follows:

Existing Slash Pine Plantations - These stands should be aggressively burned and thinned. Mowing may be necessary in congested young slash pine plantations to implement initial prescribed burns.

Clear cuts (no regeneration) - These areas are most likely to be associated with salvage cuts following wildfire. They will be prescribed burned and planted to slash pine. Prescribed burning will be the primary management tool for site preparation.

Reforestation will be planned to accommodate mowing aisles as needed to mechanically reduce fuels and to diversify groundcover. The fire return interval for wet flatwoods is every two to five years.

It will be necessary to monitor for non-native invasive species and to correct hydrological problems (e.g. impounded or de-watered areas). Low water crossings will be used where possible.

Seed Tree/Shelterwood Cuts (Natural Regeneration) - Areas intended for natural regeneration of slash pine should retain approximately 10 to 30 trees per acre for seed trees, uniformly distributed across the site. Cone crop should be monitored and selected for abundance in early spring followed by a prescription burn to prepare the bed in early autumn prior to seed drop.

The stand should remain unburned until the majority of dominant trees have reached a height of 15 feet (7-10 years). These stands will be managed through a series of commercial thinnings.

It will be necessary to monitor for non-native invasive species and to correct hydrological problems e.g. impounded or de-watered areas. Low water crossings will be used where possible.

4. **Dome Swamp** (1,150 acres)

Desired Future Condition

Dome swamps are isolated shallow, forested usually circular depressions that generally present a domed profile, because larger cypress exist in the most central or deepest portions of the wetlands with smaller cypress and species less tolerant of inundation toward the periphery.

High quality cypress domes should have a canopy of mature pond cypress, open sub-canopy and shrub strata, and a variety of herbs such as those currently existing (see Existing Conditions below).

The surface soils and groundcover ranges from bare sand to some thickness of peat, duff and leaf litter. The peat generally becomes thickest toward the center of the dome. The periphery of these wetlands is often rimmed with an ecotone of wetland grasses that may be classified as wet prairie.

Existing Conditions

Dome swamps are widely distributed at TBSF and can be distinguished from basin swamps by their small size. They have a wide range of vegetation structure depending on fire, forestry practices, and stand age. Many have been disturbed by forestry operations and woody encroachment by loblolly bay and slash pine. Some have been disturbed by the 1998 wildfires, which killed some cypress and many pines.

Dome swamps at TBSF have a canopy dominated by pond cypress (*Taxodium ascendens*), slash pine, and swamp tupelo (*Nyssa sylvatica* var. *biflora*). The subcanopy consists of young cypress, dahoon holly (*Ilex cassine*), and swamp red bay (*Persea palustris*). The shrubs are sandweed, wax myrtle, fetterbush (*Lyonia lucida*), and occasional highbush blueberry (*Vaccinium corymbosum*). The groundcover is a mixture of Virginia chain fern (*Woodwardia virginica*), maidencane (*Panicum hemitomon*), Walter's sedge (*Carex striata*), ten-angled pipewort (*Eriocaulon decangulare*), and witchgrass (*Panicum scabriusculum*).

Restoration Needs and Approaches

Dome swamps which have been timber harvested in the past will be allowed to continue to regenerate naturally. Dome swamps should be monitored for exotic plant invasion, especially those burned in the 1998 wildfires.

Prescribed Fire and Ecotones

Restoration of ecotones around dome swamps will require frequent prescribed fire, and limited use of heavy equipment to avoid rutting and soil disturbance. Some existing ditches and plow lines may require restoration if they interfere with the movement of fire and water across the eco-tone. As a general rule, fire will be allowed to creep into these

areas to increase and enhance ecotones as conditions allow. These areas may need more frequent fire to rejuvenate remnants of native groundcover. Existing fire breaks will be rehabilitated, and new lines will be established upland of the eco-tone wherever possible.

Hydrology

Appropriate water control structures may be used to restore portions of this community where the natural hydrology has been impacted by intensive pine plantation practices that occurred in much of adjacent flatwoods community before the property was acquired by the state.

5. **Depression Marsh** (997 acres)

Desired Future Condition

Desired future conditions for depression marshes should generally match the description for the undisturbed depression marshes at TBSF described below. Grasses and sedges should dominate the vegetation cover in all but the deepest areas of the marsh where maidencane, sawgrass or pickerelweed may be present. Shrub cover, except for *Hypericum fasciculatum*, should be 0 to 5%.

Existing Conditions

The depression marshes mapped at TBSF are typically irregularly shaped and occur along the edges of basin and dome swamps. They often extend outward to connect these swamps. Less commonly they are nearly circular shallow depressions found in flatwoods. They are generally inundated during the rainy season.

Currently, depression marshes at TBSF range in condition from relatively intact to highly disturbed areas. Some historical marsh habitat is not easily recognizable having been converted to pine plantation by bedding and planting with slash pine. The shrub and herbaceous strata can continue, however, to contain the typical marsh wetland species. In the 1943 aerial photographs, the depression marshes are extensive and can be distinguished from the surrounding upland community by a darker uniform signature void of any trees.

Disturbed depression marshes have a planted young slash pine canopy and a shrub cover dominated by sandweed and an occasional wax myrtle. The herbaceous vegetation includes chain fern, longleaf three-awn, panic grass (*Panicum* sp.), fascicled beaksedge (*Rhynchospora fascicularis*), ten-angle pipewort (*Eriocaulon decangulare*), maidencane, blue maidencane (*Amphicarpum muhlenbergianum*), bushy bluestem, camphorweed (*Pluchea rosea*), narrowfruit horned beaksedge (*Rhynchospora inundata*), lemon bacopa (*Bacopa caroliniana*), Carolina redroot, Walter's sedge, Elliott's yellow-eyed grass (*Xyris elliottii*), sphagnum moss (*Sphagnum* spp.) and other yellow-eyed grasses. Hooded pitcher plant, state-listed as threatened, occurs infrequently.

Restoration Needs and Approaches

Pine plantation covers most of the historical depression marsh at TBSF.

Restoration would require removal of the planted pines and the elevated beds they were planted on. Timber harvesting operations on adjacent stands may be extended during the

dry season to selectively remove stems from the ecotonal areas. It is not likely that beds will be removed unless it is determined that they are impeding hydrology in some significant way. An exception to this would be following a catastrophic event where the clock has been reset and conditions could be restored to normal.

Depression marshes likely burned irregularly every 1 to 8 years depending on water levels at the time of fires on the landscape. Fires generally occur early (April-June) during the lightning season and prior to the summer rainy season, when water levels are still low and surrounding plant communities are dry.

Prescribed Fire and Groundcover

Prescribed fires will be allowed to burn into this community when practical.

Ideally fire should be prescribed in the surrounding community at a time when water in the marshes is low or absent. Marshes with substantial shrub cover (either within the marsh or surrounding edges) should be targeted for repeated lightning season fires on a short return interval.

Hydrology

Appropriate water control structures may be used to restore portions of this community where the natural hydrology has been impacted by intensive pine plantation practices that occurred in much of adjacent flatwoods community before the property was acquired by the state. In addition to the historical marsh habitat planted to pine described above there are other areas of marsh where, due to fire exclusion, a moderate-to-dense canopy of slash pines have become well-established. This has resulted in higher than normal rates of evapo-transpiration which has dehydrated these marshes more than would have occurred historically.

Silviculture

This community is not well suited to timber management and naturally would have little or no tree canopy. The pine canopy that currently exists in many of the marshes on TBSF will require some level of logging and/or canopy control if native habitat and natural hydroperiods are to be restored to historical conditions. Efforts will have to ensure “light-on-the-land” practices that do not permanently damage the existing groundcover where it exists.

6. Scrub (819 acres)

Desired Future Condition

Scrub is characterized by xeric shrubs on areas of well drained white sand. The ground cover is generally very sparse, dominated by ground lichens or rarely herbs, with between 10 to 30% of the area in barren white sand. Typical plants include sand live oak (*Quercus virginiana* var. *geminata*), *Lyonia*, Chapman’s oak (*Quercus chapmanii*), myrtle oak (*Quercus myrtifolia*), rosemary (*Ceratiola ericoides*), saw palmetto, *Garberia*, *Palafoxia*, and *Calamintha* spp.

A mosaic of scrubs with different heights would be desirable. The dominant tree canopy is sand pine and is ideally sparse. The sub-canopy remains relatively low with a height of one to nine feet with oaks less than six feet. A fire regime of every 10-20 years keeps the

canopy height low and arrests succession, not allowing the transformation into mixed hardwood forest (xeric hammock).

Scrub management in Florida is typically directed at conditions favorable to scrub-jays. Although scrub-jays are not presently known to be in the immediate area of TBSF, they are present in other parts of Volusia County.

Ecotones- Scrub ecotones are mostly bare sandy clearings that separate the scrubs from the surrounding flatwoods, scrubby flatwoods and sandhill. They act as firebreaks to limit fire frequency within the scrub from the frequency of the surrounding xeric and mesic communities. These ecotones contain *Calamintha* spp. and *Garberia* and may be the only place where these plants are present. They may also provide good habitat for certain species of invertebrates, and other animals that frequent open sandy areas.

Existing Conditions

Scrub at TBSF occurs on a series of white sand islands which form a ridge along both sides of Rima Ridge Road. The scrub was largely converted to slash, longleaf and sand pine plantations, resulting in various densities of canopy and sub-canopy vegetation. Areas with planted slash pine usually have stunted pines due to the xeric conditions. Many areas have been planted with longleaf pine after being site prepped to thin the shrub layer. In 2009, a closed canopy sand pine scrub existed near the intersection of Rima Ridge Road and Bear Island Road and at the south entrance to the Rima Ridge Tract, both planted and natural canopy over dense and tall shrubs

In natural areas of scrub on TBSF sand pine canopy varies in density with stage of succession, incidence of disturbance and maturity of the stand. Exposed patches of white sand occur. The tall shrub layer is typically 10 to 15 feet tall, moderately dense, and composed of sand live oak, myrtle oak, Chapman's oak, and staggerbush (*Lyonia ferruginea*). The short shrub layer is typically dense and composed of smaller scrub oaks, saw palmetto, and shiny blueberry (*Vaccinium myrsinites*). Herbaceous cover is sparse, composed mainly of large-fruited beakrush (*Rhynchospora megalocarpa*) and three-awn grass (*Aristida rhizamorha*). Florida rosemary (*Ceratiola ericoides*) is present, but diminished from shaded conditions. Wiregrass is less commonly seen. Gopher tortoise burrows were observed in the scrub. The oaks are too tall and dense to support Florida scrub-jay at present.

Restoration Needs and Approaches

Habitat restoration was initiated in 2009 and sand pine harvesting was accomplished on approximately 175 acres. Individual plants of large-flowered rosemary, state-listed as threatened, were detected in the limited shrub layer under the sand pines. The closed and shaded conditions had adversely affected the health of individual plants as well as the population as a whole. No special conditions were affected to preserve these individuals during logging operations as sub-canopy oaks obscured their presence.

With the recommendation from the Northeast Florida Scrub Working Group (NEFS), the sand pine was clear-cut and the logging slash roller-chopped in preparation for a series of restoration prescription burns. The first is scheduled for spring 2010 with the objective

of affecting a 'hot' burn. Subsequent burns will be scheduled when the fuels have recovered to the point when fire can be effectively carried.

It was the consensus of the Group that desirable species (e.g. shiny blueberry and large flowered rosemary) would most likely repopulate from the seed bank with increased sunlight through a broad-brush approach to restoration versus an individual plant strategy. Conversely, individual gopher tortoise burrows were identified and protected during harvesting operations.

Beyond natural areas, restoration efforts should focus on clear-cutting slash pine and longleaf pine plantations as they become merchantable, greater than or equal to 4.5 inches DBH and a minimum of 24 feet in height. The presence of some sand pine in scrub is considered normal. However, since sand pine is an aggressive colonizer, efforts should be taken to limit numbers of mature sand pine. Where scrub acreage has been clear-cut and the logging slash has been chopped and is drying out, prescription burning will be introduced during the dormant season and for successive seasons as fuels and other burning conditions permit. Once in a managed state, the scrub will be allowed to burn every 10-20 years. A location specific scrub restoration and management plan that addresses endemic and imperiled species shall be developed.

In harvested areas where large oaks, other overtopping canopy and heavy debris remain, additional efforts will be needed. Mechanical and/or chemical methods will be used to reduce the canopy density. Mechanical means may also be utilized to facilitate the reintroduction of prescribed fire. Caution will be utilized where sensitive species may be at risk.

The use of plowed firebreaks and other practices will be minimized. Existing roads, firebreaks, and wetlands will be used for firebreaks whenever possible. Established firebreaks will be rehabilitated and disturbance to gopher tortoise and vegetative cover avoided, where possible.

Prescribed Fire and Groundcover

Prescribed fires from adjacent mesic flatwoods and scrubby flatwoods will be allowed to carry into scrub areas. Fire prescriptions targeting scrubs will be implemented if they have not burned within the prescribed fire interval, and fuel levels are sufficient to carry a fire.

In general, the fire return interval is 10-20 years, but may be modified depending upon identified needs addressed by management for endemic and imperiled species. Scrub management guidelines developed by FWC in 2009 suggest that some scrub and scrubby flatwoods may be ready to burn as soon as three years post-restoration prescribed fire treatment. The condition of large-flowered rosemary, which is adversely affected by shade and other native and rare species, will be improved with prescribed burning.

Silviculture

Slash pine and longleaf pine plantations will be clear-cut in the scrub areas as they mature or sooner if severely stunted. Most of the existing mature sand pine will be clear-cut.

Stand Level Prescriptions

Major categories of existing conditions of scrub on TBSF and the restoration prescription for each are as follows:

Existing Natural Sand Pine Stands Clear-cut mature sand pine trees. Limit roller chopping to mechanically render heavy slash where present. Prescribe burn to diminish slash accumulation and repeat as fuel conditions permit before going to a maintenance prescription burn interval of 10-20 years. Allow prescribed fires in neighboring mesic and scrubby flatwoods communities to burn into these areas. Prescribed burns should be targeted in areas where fuel loads are sufficient to carry a fire.

Existing Slash Pine Plantations - Stands should be clear-cut in the short term if stunted or when merchantable. Fuels should be reduced through a series of restoration prescription burns and mechanical treatments when deemed appropriate. Natural regeneration through the native seed bank will be promoted source..

Existing Longleaf Pine Plantations - The long term goal for these stands is to remove them when merchantable and to work toward restoration of scrub species through a regular fire regime. Scrubby flatwoods areas embedded within the FNAI-mapped scrub community may continue to be managed as longleaf stands where sustainable.

Clear cuts (Natural Regeneration) - Existing mature sand pines will be clear-cut and regeneration will be limited to promote a diversity of native groundcover and mid-story level plants.

7. Baygall (744 acres)

Desired Future Condition

Baygall is a seepage wetland occurring along the bottom of the scrub ridges and at the edges of basin swamp. Typical baygall vegetation includes a canopy dominated by abundant loblolly bay, slash pine, and fewer sweetbay (*Magnolia virginiana*). The sub-canopy is comprised of young loblolly bay, dahoon holly, and occasional swamp tupelo. The shrub shiny lyonia is often abundant and grows over chain fern.

Existing Conditions

The 1998 wildfires burned through parts of the baygall at TBSF killing many of the trees. In some areas bordering the basin swamp, logs of loblolly bay trees lay on the ground and new shoots are sprouting from the stumps. Other parts in the north end of the forest burned so intensely that the landscape appears to be a meadow of chain fern. The majority of baygall remains covered with mature trees more than 60 feet tall. Vegetation includes a canopy dominated by loblolly bay, slash pine, and fewer sweet bays. The sub-canopy is comprised of young loblolly bay, dahoon holly, and occasional swamp tupelo

(*Nyssa biflora*). The shrub shiny lyonia (*Lyonia lucida*) is often abundant and grows over chain fern.

Restoration Needs and Approaches

Restoration of these areas will focus on allowing fires in adjacent flatwoods and scrub communities to burn into the edges of the community and extinguish naturally.

Prescribed Fire and Groundcover

Areas burned in the 1998 wildfires will be monitored for exotic plant invasion. With time, these areas should naturally return to their pre-burn condition.

Hydrology

New and established firebreaks on adjacent pine plantations will be rehabilitated. Existing culverts will be maintained and replaced as necessary.

Silviculture

There will be no long term timber management on this community type.

8. Scrubby Flatwoods (193 acres)

Desired Future Condition

Scrubby flatwoods are characterized by an open-canopy forest of pine trees with a xeric shrubby understory on areas of well drained white sand. Scrubby flatwoods often occur at the edges of scrub and share many of the same species.

The sub-canopy and groundcover have a higher percentage of saw palmetto and wiregrass than scrub. The 1 foot to 5 foot tall shrub stratum is dominated by sand live oak, myrtle oak and Chapman's oak. Scrubby flatwoods should have a tree canopy of widely spaced mature longleaf pine and to a lesser extent mature slash pine or sand pine.

Existing Conditions

Scrubby flatwoods at TBSF occur in association with the scrub habitat on a series of white sand islands along both sides of Rima Ridge Road. Prior to the wildfires of 1998, the majority of these areas were composed of slash pine plantations. Typically, these planted pines were stunted due to the xeric conditions.

Approximately 30% of this community remains in slash pine plantations - which range from merchantable stands thinned prior to the state acquisition, to pre-merchantable plantations established in the mid 1990s and late 1980s. Any tree planting completed subsequent to the 1998 wildfires, however, was done mostly with longleaf pine after the site was prepped to thin the shrub layer. As a note here, it should be said that it is often difficult to distinguish the historical scrub and scrubby flatwoods communities due to the intensive roller chopping done at that time.

In summary, the typical scrubby flatwoods vegetation at TBSF is a tree canopy of planted young longleaf or planted mature slash pine over a shrub stratum dominated by sand live oak, myrtle oak, and Chapman's oak. Saw palmetto, shiny lyonia (*Lyonia lucida*),

staggerbush, and deerberry (*Vaccinium stamineum*) are also present. The groundcover generally has sparse wiregrass because of shrub shading and chopping. Sand pine has encroached in some stands. Active gopher tortoise burrows are occasionally found in the more open areas.

Restoration Needs and Approaches

Management of the scrubby flatwoods will continue to utilize prescribed fire to control sand pine encroachment and to keep the understory at the desired level. Where practical and as resources permit, mature sand pine will be sold on the open market if volume is adequate. Otherwise, individual trees will be felled by chain saw. Management of the over-story will primarily consist of even-aged or uneven-aged management and the conversion of off-site slash pine plantations to longleaf pine.

Scrubby flatwoods typically require less frequent fire (3-8 years) than mesic flatwoods (2-4 years), which allows dense patches of scrub oaks to develop. Where scrubby flatwoods are adjacent to mesic flatwoods, the entire area will be managed for the mesic flatwoods, allowing fire to burn through or extinguish naturally every 3-4 years within the scrubby flatwoods.

The use of plowed firebreaks and other practices will be minimized. Existing roads, firebreaks, and wetlands will be used for firebreaks whenever possible. New and established firebreaks will be rehabilitated and bedding obliterated as opportunities arise.

Prescribed Fire and Groundcover

Growing season burning will be used in preference to dormant season burning whenever possible, to mimic natural lightning fires. Even though the scrubby flatwoods occupy a drier environment than the surrounding mesic flatwoods, the general scarcity of ground vegetation and the greater proportion of relatively incombustible scrub-oak litter reduce the frequency of naturally occurring fires. Under natural conditions the fire return interval is 3 to 8 years for this natural community.

As indicated in the lease agreement for the Rima Ridge Tract, approximately 120 acres east of Indian Lake have been designated by Consolidated Tomoka, prior to the state purchase, as alternate gopher tortoise habitat mitigation area. This area will be burned on a 2-3 year rotation, fuels permitting. Burning will be conducted in the summer to stimulate growth of herbaceous vegetation which is desirable for gopher tortoise foraging.

Silviculture

Management will focus on even-aged or uneven-aged practices necessary to manage primarily for longleaf pine and to a lesser extent slash pine. Off-site slash pine plantations when they reach merchantable size should be clear-cut and subsequently converted to longleaf pine. Timber in other areas will be harvested using different methods, including thinning, seed tree cuts and shelter wood cuts.

Basal area (40 to 80 square feet) should be lower in scrubby flatwoods than in mesic flatwoods to allow adequate sunlight to maintain an abundant grass and herbaceous groundcover. Existing longleaf pines will be retained during seed tree cuts to allow for natural regeneration. Higher density merchantable stands should be thinned first to maintain health and allow reintroduction of prescribed fire as soon as possible.

Stand Level Prescriptions

Major categories of existing conditions of scrubby flatwoods on TBSF and the restoration strategies for each are as follows:

Existing Slash Pine Plantations - Unless stunted, these stands should be managed through rotation to a merchantable pulpwood size. When merchantable, the slash pine will be clear-cut leaving existing longleaf pines to provide a seed source for natural regeneration. Seeding or planting of longleaf pine will be preceded by roller-chopping and prescribed burning.

Existing Longleaf Pine Plantations - The goal for these stands is to convert them to uneven-aged longleaf pine stands. Release burns should be implemented whenever possible to promote height growth in planted seedlings. Once a stand is in a maintenance condition, growing season burns should be emphasized as average tree height exceeds 8-10 feet. Initially, cooler night burns may be necessary to reduce risk of sapling mortality. Pine basal area will be maintained between 40-80 square feet per acre by thinning to provide a more natural and vigorous condition.

Clear cuts (no regeneration) - These areas will be roller chopped, prescribed burned, and planted to longleaf pine. Band-spray herbicide treatments may be necessary in areas to facilitate survival of planted seedlings. Early introduction of prescribed fire will facilitate better fuel level maintenance and encourage healthy and diverse groundcover and shrub layers. These stands will be eventually converted to uneven-aged management through commercial thinning operations. Stands will be burned on 3-8 year intervals and will incorporate growing season burning.

Clear cuts (Natural Regeneration) - Natural regeneration should favor longleaf pine and stands should be monitored for stocking success. Stands where regeneration returns slash pine should be site prepared and planted to longleaf pine the following planting season. Stands will be burned on 3-8 year intervals, incorporating growing season burning to encourage healthy and diverse ground cover and shrub layers. Eventually, these stands will be converted to uneven-aged management through commercial thinning to achieve a more natural appearance.

9. Sandhill/Xeric Hammock (73 acres)

Desired Future Condition

Sandhills are forests of mature longleaf pine trees with an understory of deciduous oaks and a fairly dense ground cover of grasses and herbs on hills of well drained sand. Sandhill should have an open canopy cover of mature longleaf pine with an open sub-canopy of turkey oak (*Quercus laevis*). The understory should be a mix of shrubs and

herbs with some patches of bare sand. Shrubs should include running oak, gopher apple (*Licania michauxii*), huckleberry (*Gaylussacia dumosa*), Darrow's blueberry (*Vaccinium darrowii*), and slimleaf pawpaw (*Asimina angustifolia*). Typical herbs should include wiregrass, narrowleaf silkgrass (*Pityopsis graminifolia*), bracken fern (*Pteridium aquilinum*), queen's delight (*Stillingia sylvatica*), anise scented goldenrod (*Solidago odora*), wild indigo (*Baptisia* spp.), milk peas (*Galactia* spp), whitetop aster (*Aster tortifolius*), tall ironweed (*Vernonia angustifolia*), summer farewell (*Dalea pinnata*), greeneyes (*Berlandiera pumila*), gayfeather (*Liatris* spp.), pinweeds (*Lechea* spp.), frostweeds (*Helianthemum* spp.), and pine-woods dropseed (*Sporobolus junceus*).

Existing Conditions

Only a few small remnant areas of sandhill were mapped by FNAI on TBSF. These areas occur in the northern part of the forest along Rima Ridge Road. They have been subject to commercial pine planting and harvesting and years of fire suppression. None are in good condition. However, about 10 acres are currently being restored and another 15 acres are in a natural condition, but are in need of regular prescribed burning. The largest piece is west of Tram Road at the west side of a scrub ridge. Planted slash pines were harvested and scattered turkey oak and clumps of wiregrass remain.

Approximately 15 acres of sandhill off Rima Ridge Road associated with Tram Road Recreation Area and Bennett Field Campground have succeeded to xeric hammock and are composed of large sand live oak and a few longleaf pines with a sparse groundcover of sandhill herbs and wiregrass. There is no intention to use this property for any other use and it is not included in our restoration plans.

Sandhill also occurs north of the intersection of Rima Ridge Road and Indian Lake Road. This small embedded sandhill component (7 Acres) within the scrub restoration area was clear-cut of sand pine in 2009. Dense shade from the sand pine had largely diminished the desired populations of native herbaceous and grass species. Because of the heavy fuel generated from logging slash, the Northeast Florida Scrub Working Group (NEFS) recommended roller chopping the site before running a hot fire through it mid-winter 2010. In preparation for a hot fire, the perimeter stands were prescribed burned in 2009. Through a regular sequence of prescription burning, it is very likely that a diversity of native ground-cover will rebound.

Other vegetation in these remnant sandhills include bluejack oak (*Quercus incana*), Carolina frostweed (*Helianthemum carolinianum*), narrowleaf silkgrass (*Pityopsis graminifolia*), Adam's needle (*Yucca filamentosa*) and tread softly (*Cnidioscolus stimulosus*).

Restoration Needs and Approaches

Restoration of this community type will focus on removal of off-site pine species e.g. slash pine and sand pine. Roller chopping will be limited due to fragility of soils, but used when appropriate to manage species richness and facilitate fuel reduction.

Reforestation with longleaf pine and introduction of prescribed fire at the appropriate 1-3 year fire return interval, should improve species composition of the ground-cover and

shrub layers and forest health in general. Basal area will be managed to allow for adequate sunlight to reach the groundcover, approximately 40-80 square feet B.A.. Seed tree or shelter-wood harvesting methods will create a natural appearance and promote plant and wildlife ecology. Retained longleaf pines will provide for natural regeneration.

Prescribed Fire and Groundcover

Growing season burns will be emphasized at a 1-3 year interval to promote groundcover restoration in these areas. In particular, these burns will promote the growth and spread of wiregrass. Only sporadic bunches of wire grass currently exist. Stands will be monitored and if necessary may be seeded or planted with wire grass to enhance the local population. In addition, the stands will be monitored and when warranted treated for non-native invasive species.

Hydrology

The use of plowed firebreaks and other practices will be minimized; existing roads, firebreaks, and wetlands will be used for firebreaks whenever possible. New and established firebreaks will be rehabilitated whenever possible.

Silviculture

Focus will be on uneven-aged management of mature longleaf pine stands, and on even-aged practices to establish new longleaf stands where they don't exist at this time. Off-site slash pine plantations will be converted to longleaf pine when they reach merchantable size. Mature longleaf pine stands will be managed to have an open canopy and a basal area of approximately 40-80 square feet

Stand Level Prescriptions

Major categories of existing conditions of sandhill on TBSF and the restoration prescription for each are as follows:

Existing Slash Pine Plantations - Off-site slash plantations will be harvested when they are merchantable and converted to longleaf pine. Existing longleaf pines will be retained to provide a seed source for natural regeneration. Site preparation will be by prescribed burning, unless conditions dictate otherwise and may include mechanical treatment of residual un-merchantable slash pine.

Existing Longleaf Pine Plantations - The goal is to achieve natural appearance, uneven-aged longleaf pine stands through commercial thinning. Pine basal area will be managed at 40-80 square feet per acre.

Release burns should be implemented to promote height growth in planted stands still in the grass stage or where saplings exceed an average of 8-10 feet in height. Once established, growing season burns should be emphasized to promote native herbaceous and grass groundcover.

Clear cuts (no regeneration) - Site preparation will be by prescribed burning, unless conditions indicate otherwise. The stands will then be planted to longleaf pine at the

stocking of 605 trees per acre. Release burns should be implemented to promote height growth in stands still in the grass stage or where saplings exceed an average of 8-10 feet in height. Once established, growing season burns should be emphasized to promote native herbaceous and grass groundcover. The long-term goal is to achieve natural appearance uneven-aged longleaf pine stands through commercial thinning. Basal area will be managed at 40-80 B.A. or stocking of 200-300 trees per acre.

10. Basin Marsh (63 acres)

Desired Future Condition

Grasses and sedges should dominate the vegetative cover in all but the deepest areas of the marsh where maidencane, sawgrass (*Cladium jamaicense*), or pickerelweed (*Pontederia cordata*) may be present. Shrub cover, except for sandweed, should be 0 to 5%.

Existing Conditions

Basin marshes are characterized as herbaceous or shrubby wetlands in large irregularly shaped basins. They are found on TBSF as infrequent openings in the widespread basin swamps. These areas at TBSF are generally in good condition. The sparse canopy consists of scattered pond cypress. Shrubs include buttonbush (*Cephalanthus occidentalis*) and wax myrtle. Herbaceous species are maidencane, pickerelweed, bulltongue arrowhead (*Sagittaria lancifolia*), sawgrass, water lily (*Nymphaea odorata*), and bladderwort (*Utricularia* sp.).

Restoration / Needs and Approaches

Fire is necessary along the edges of this community to prevent shrub invasion. Prescribed fires will be allowed to burn in these areas when practical.

Prescribed Fire and Groundcover

Fire maintains this community by restricting shrub invasion. The normal fire interval is around 1 to 8 years with those dominated by herbaceous species burning about every 3 years and those having a shrubbier component probably burning on a 3 to 10 year interval. Prescribed fires in surrounding flatwoods areas will be allowed to burn into the perimeter of basin marsh areas if conditions are appropriate.

Hydrology

Appropriate water control structures may be used to restore portions of this community where the natural hydrology has been impacted by intensive pine plantation practices that occurred in much of adjacent flatwoods community before the property was acquired by the state.

11. Wet Prairie (62 acres)

Desired Future Condition

Wet prairies are open, treeless areas dominated by a diverse assemblage of herbs with scattered shrubs. Wet prairie in good condition has no or few pines and scattered shrubs. The signature groundcover consists of dense clumps of wiregrass interspersed with other

herbs such as ten-angled pipewort (*Eriocaulon decangulare*), blue butterwort (*Pinguicula caerulea*), yellow butterwort (*Pinguicula lutea*), snowy orchid (*Platanthera nivea*) and the state-listed hooded pitcherplant (*Sarracenia minor*) and Catesby's lily (*Lilium catesbaei*).

Historically, wet prairie is adjacent to the depression marshes between and connecting basin and dome swamps within the upland flatwoods communities. Wet prairie can occur in solid blocks but more frequently narrow bands are interwoven with wet and mesic flatwoods.

Existing Conditions

Wet prairie was very likely a very minor natural community on TBSF. No wet prairie was observed on TBSF during the FNAI site visits. The extensive pine plantations seem to have obliterated them. The 1943 photographs seem to indicate they were present in small areas.

Restoration Needs and Approaches

Pine plantation covers the wet prairie on TBSF. Restoration will require removal of the planted pines and the elevated beds they are planted on. Prescribed fires will be allowed to burn into this community when practical.

Groundcover

Wet prairie likely burned irregularly every 2 to 4 years depending on water levels at the time of fires on the landscape. Fires had generally occurred early (April-June) during the lightning season when water was low and the surrounding communities were dry. Prescribed fires in surrounding flatwoods areas will be allowed to burn into the perimeter of wet prairie areas if conditions are appropriate.

Hydrology

Appropriate water control structures may be used to restore portions of this community where the natural hydrology has been impacted by intensive pine plantation practices that occurred in much of adjacent flatwoods community before the property was acquired by the state.

Silviculture

This community is not well suited to timber management and naturally would have little or no tree canopy. The pine canopy that currently exists in many of the marshes on TBSF will require some level of logging and/or canopy control if native habitat and natural hydroperiods are to be restored to historical conditions. Efforts will have to ensure "light-on-the-land" practices that do not permanently damage the existing groundcover where it exists.

12. Hydric Hammock (6 acres)

Desired Future Condition

A hydric hammock is a low-lying, closed-canopy forest that is periodically flooded. Hydric hammocks should have a closed canopy of mixed hardwoods dominated by

swamp laurel oak (*Quercus laurifolia*) and cabbage palm (*Sabal palmetto*). Herbaceous plants are sparse due to the closed canopy, but typically include wood oats (*Chasmanthium* spp.), millet beaksedge (*Rhynchospora miliacea*), lizard's tail (*Saururus cernuus*), and Virginia chain fern.

Existing Conditions

A good example of an intact hydric hammock is located on the north side of Tram Road in the northeast portion of the Rima Ridge Tract. This area has a closed-canopy of mature trees in most areas. Dominant trees are swamp laurel oak, live oak, swamp tupelo, and sweetgum. The sub-canopy consists mainly of cabbage palm and young canopy saplings.

The uplands surrounding three sides of this community have been converted to pine plantation and may be affecting hydrology due to bedding and fire lines that tend to intercept and impound water that would normally sheet-flow into the hydric hammock. Other hydric hammocks on TBSF have been heavily disturbed by the 1998 wildfires and subsequent salvage operations. These fragments are not easily recognizable.

Restoration /Needs and Approaches

Hydric hammocks will be allowed to naturally revegetate areas where it has been converted to pine plantation.

Prescribed Fire and Groundcover

Fire is not required to maintain this community due to the generally saturated soils and scarcity of groundcover.

Hydrology

The maintenance of natural hydrologic regimes is critical to the health of hydric hammock. The elevated road along the hammock's south boundary will be reviewed to ensure adequate culverts to allow surface water flow and reinstate historical hydroperiods, as much as possible.

C. Impact of Planned Uses on Property Resources

1. Silviculture

Silvicultural management will be implemented to ensure a sustainable renewable timber resource and diverse ecological resources for an indefinite time period.

2. Recreation

Recreational uses will be monitored to evaluate impacts on the natural systems. Modification to recreational uses will be implemented should significant impact be identified. The DOF currently attempts to identify existing and planned carrying capacity to assist in monitoring public use and impacts.

3. Historical/Archaeological

In the event of any significant proposed ground disturbing activity, DHR will be contacted for review and comment. The DOF will then follow the procedures outlined in “Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Lands” (Exhibit I) and will comply with all appropriate provisions of Florida Statutes 267.061(2).

4. Water

Water resources will be protected through the use of guidelines from the Silviculture BMP Manual and/or other appropriate measures as deemed necessary by the DOF’s Forest Hydrologist and/or Watershed Specialist.

5. Wildlife

Wildlife resources, both game and non-game species, will be protected through multiple-use management techniques coordinated between the DOF and the FWC.

V. MANAGEMENT SUMMARY

A. Operations Infrastructure

The current annual budget (FY 2009-2010) for TBSF is \$516,968. The budget includes: salaries, expense, and operating capital outlay:

Salary and Benefits	\$328,947
Expense (costs for fuel, supplies, etc.)	\$167,180
Contractual Costs	\$6,245
Operating Capital Outlay	\$0
Other Personnel Services	\$21,528

Six people are currently assigned to TBSF. They include a Forester, a Senior Forest Ranger, two Forest Rangers, a Park Ranger, one OPS Park Ranger, and an OPS Senior Clerk. In addition, there is a Forestry Supervisor II, Forest Resource Administrator, a Master Mechanic, a Law Enforcement Officer, and a Recreation Coordinator position which all share duties with other Bunnell District state forests. Lake George State Forest personnel, a Forest Area Supervisor, and the DOF’s Volusia County Forest Rangers provide additional support.

Volunteers are also important assets to TBSF. As available, they assist staff with trail maintenance, road inventory, and seedling survival counts. Additional volunteer recruitment will be encouraged to assist with other activities to further the DOF’s mission.

B. Plans to Locate Fragile, Non-Renewable Natural and Cultural Resources

Representatives of the DHR and FNAI will be consulted prior to the initiation of any proposed significant ground disturbing activity by the DOF or any other public agency. The DOF will make every effort to protect known archaeological and historical resources. Ground disturbing activities not specifically covered by this plan will be

conducted under the parameters of the “List of ARC/Division of State Lands Approved Interim Management Activities”.

1. Archaeological Resources

The DOF District 10 has two personnel trained as Archaeological Monitors. Trained monitors will oversee ground-disturbing activities in which the DHR recommends monitoring. The DOF will utilize the services of the DHR Public Lands archaeologists, when available, to locate and evaluate unknown resources and to make recommendations in the management of known resources. Known archaeological and historical sites have been identified on maps to aid state forest staff and law enforcement personnel in patrolling and protecting sites.

As previously mentioned, all significant ground disturbing projects that are not specifically identified in an approved management plan will be sent to the DHR for review. Recommendations outlined in the “Management Procedures for Archaeological and Historical Sites and Properties on State Owned or Controlled Lands” (Exhibit I) will be followed, whenever and wherever appropriate.

2. Soil and Water Resources

Planned projects will restore and/or maintain ecological integrity while allowing controlled recreational access. Management activities will be executed in a manner to minimize the potential for soil erosion. All activities planned for the forest will be conducted in accordance with the BMP manual for public lands and/or other appropriate measures as deemed necessary by the DOF’s Forest Hydrologist and/or Watershed Specialist. In addition, if future soil and water resource problems should arise, they will be immediately assessed and the appropriate action will be proposed and implemented under the direction of the DOF’s Forest Hydrologist and/or Watershed Specialist. As previously stated, the DOF, through its Forest Hydrology Section staff, will work with the SJRWMD to monitor levels and quality of ground and surface water resources.

3. Other Resources

Applicable surveys will be conducted by the DOF’s staff and/or others during the process of planning and implementing ecosystem management activities. The DOF personnel will remain alert for any environmentally significant resources (e.g. eagle nests) and protective actions will be taken as necessary.

C. Conformation to State Lands Management Plan

Management of the forest under the multiple-use concept complies with the State Lands Management Plan and provides optimum balanced public utilization of the property. Specific authority for the DOF’s management of public lands is derived from Chapters 253 and 589, Florida Statutes.

D. Multiple-Use Potential – Income Producing Activities

Numerous activities on the state forest allow for multiple-use as well as to generate income to offset management costs. Below are some of the activities that have occurred on TBSF and/or have the potential to generate income in the future.

Camping – There are ten primitive camp sites located off Rima Ridge Road. Camping generates approximately \$1,000 annually.

Palmetto Frond Sales – TBSF may be able to contract the harvesting of palmetto fronds. If an interested buyer is found, palmetto frond sales may generate approximately \$5,000 per year.

Palmetto berries - TBSF may be able to sell permits for individuals harvesting drupes or “berries” from the palmettos for the limited season (August to early October) each year. The sale of permits may generate \$2,000 to \$4,000 annually, depending on local interest.

Recreation Fees – In FY 2002-2003, TBSF began collecting fees for day use at improved public recreation areas. The fee is now \$2.00 per person and generates approximately \$200 annually. This user fee may be extended to the equestrian trailhead within this ten-year management period. Camping fees generated \$1,892 in 2008-2009, and can be expected to remain stable or slightly increase over the next few years.

Stickwood Sales – TBSF may be able to sell stems of various shrubby and hardwood saplings such as wax myrtle and loblolly bay for use in the artificial foliage industry. Revenue generated will depend on demand.

Timber Sales – In FY 05-06, the Gopher Ridge sale generated \$69,666; The Brick Road sale in FY 06-07 brought in \$66,740; The Stopping Sapling sale in FY 07-08 realized \$39,881 and the Indian lake 08-09 salvage sale recouped \$48,894. There were no timber sales in FY 09-10.

Over the next ten years timber sales are projected every two or three years and will likely total less than 1,000 acres over this period

E. Potential Use of Private Land Managers

The forest manager makes ongoing evaluations of use of private land managers, consultants, and/or contractors to facilitate the restoration or management of the forest. The opportunities for outsourcing land management work include or are anticipated to include:

Reforestation – As off-site sand pine stands, Plum Creek Timber Reserves, and salvage areas are harvested, or where wildfire damage has occurred to pre-merchantable stands, contractual site preparation and planting will be considered.

Biological Assessments - FNAI (non-profit) was hired to survey TBSF (completed initial survey).

Other Contractual Services – Site Preparation and post reforestation treatments are bid out to contractors.

Other Contractual Services –Mechanical fuel reduction has been bid out to contractors and may be a future contractual item.

Road Repair – Road stabilization materials delivery may be contracted as needed for upgrade and repair projects.

VI. REFERENCES

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