



Big Thicket National Preserve
National Park Service
Fire Ecology Annual Report
Calendar Year 2007

This year the fire effects monitoring program at Big Thicket National Preserve implemented herbaceous plant monitoring in the plot protocol. We spent many days with our heads down, wrestling with a square frame in hurricane blowdown, and thumbing through field guides and floras trying to identify vegetation to species. We quickly learned the value of lumping species into genera, and local botanists provided valuable specimen identification. During the field season we kept busy with our typical plot work load, monitored various mechanical fuel reduction treatments, assisted with prescribed burns, participated in training, and worked on many various western fire suppression details.

Major highlights of the off season included assisting with planning and presenting at the 4th Big Thicket West Gulf Coastal Plain Science Conference, planting longleaf pine seedlings for restoration, and Texas trailing phlox reintroduction. The fire ecologist kept busy with NEPA work on the various mechanical treatments, the new fire management facility (to be completed August 2008) and a longleaf pine restoration EA. The fire ecologist also leads a cooperative longleaf pine restoration team with The Nature Conservancy and serves as an active member on the Texas trailing phlox working group and Big Thicket ATBI science committee. The lead monitor was able to focus on organizing and quality checking much of the fire effects data, actively monitor the mechanical fuel reduction by the gyro-trac, collect live fuel moisture samples throughout the year, and help teach S-290 at a Texas wildfire academy.

In 2008, the fire effects monitoring crew will have to re-read plots that did not get burned the year before because planned prescribed burns did not occur. One Big Thicket FY07 prescribed burn did not meet burn objectives and left many of the plots unburned. This unit was selected for hazardous fuel reduction by the gyro-trac machine, and the fire effects crew was able to work with the operator, carefully treating the plots with the machine. This will provide the fire ecology group will good long-term data to document the effects of the mechanical treatment in comparison to prescribed burns. Big Thicket will attempt to burn this unit again when the fuels have had some time to cure and the weather conditions are favorable.

Table 1. Fire Effects Plot Workload 2007**(each plot equals five 10x10 meter subplots)**

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Control	Pre-burn	Immediate Postburn	Postburn (1-20 yrs)	Total Plots
Big Thicket	Upland Pine	RICE	2	2			4
	Upper Pine/Oak	RICE	6	1	1	1	9
	Midslope Pine/Oak	RICE	4	1	1		6
	Lower Oak/Pine	RICE	3	2			5
	Wetland Pine Savannah	RICE	2	3			5
	Sandhill	RICE	2	1		2	5
	Wildland Urban Interface	RICE		1		1	2
Total			19	11	2	4	36

Table 2. Fire Ecology Staffing 2007

Monitor	Starting Date	Ending Date	# of Pay Periods	Training and Development
Deanna Boensch Fire Ecologist	1/1/07	12/31/07	26	Wildland Fire Refresher CPR/1 st Aid 1 st Responder Training Completed S490 precourse work and test (class was canceled) NEPA/106 Class IT, PA, RMA, and Ethics Training Retirement Training
Iola Hallock Lead FEMO	1/1/07	12/31/07	26	Discrimination in the workplace Fire Extinguisher Training CPR/1 st Aid 1 st Responder Training NEPA Concepts 1&2 IT security training Wildland Fire Refresher Ethics for New Supervisors Assisted in teaching S-290
Lily Zhou FEMO Seasonal	4/09/07	9/26/07	12.5	Discrimination in the workplace Fire Extinguisher Training IT Security Training Wildland Fire Refresher
Jonathan Brotzman FEMO Seasonal	5/14/07	9/26/07	10	Discrimination in the workplace Fire Extinguisher Training IT Security Training Wildland Fire Refresher
Tiffany Dandy Byers FEMO Seasonal	5/14/07	9/26/07	10	Discrimination in the workplace Fire Extinguisher Training IT Security Training Wildland Fire Refresher

Table 3. Management Objectives and Monitoring Results 2007

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (XX% confidence interval)	Objective Achieved?
PAIS Bird Island Basin	Reduce grass thatch loading (tons/acre) by 20-75% immediate postburn	First Order Fire Effects observations indicated 40-50% reduction	YES
BITH NW BSU Rx Upland And Midslope Pine Oak (n = 10 subplots)	Reduce amount of dead and down fuels 30-80% 1000 hour fuels 20-50%, litter and duff 20-75%, Seedlings and pole-sized trees 25-75%, and keep overstory mortality less than 10%.	Most of the plots were unburned and only 20% of the unit was treated with fire.	NO
BITH Sandhill Rx (n = 15 subplots)	Reduce amount of dead and down fuels 30-80% 1000 hour fuels 20-50%, litter and duff 20-75%.	1, 10, and 100 hr reduction = 55% 1,000 hr fuel reduction = 50% Duff Reduction – data inconclusive	YES
	Seedlings and pole-sized trees 25-75%	Seedlings increased by 9% within one year, but larger saplings decreased by 80%, which is acceptable due to expected mortality from hurricane disturbance by Rita in 2005.	YES
	Keep overstory mortality less than 10%.	Plots indicate overstory tree mortality (>5cm dbh) is 50%, which is acceptable due to expected mortality from hurricane disturbance by Rita in 2005.	NO

Fire ecologist accomplishments and area of focus

Fire Ecologist: Deanna Boensch

Category	Percent Time	Accomplishments and/or areas of activities
Planning	10%	• Consultations with SHPO and FWS concerning new fire building, and several mechanical fuel reduction projects. • Organized NEPA/106 files for fire management, prepared CE forms, decision memos, maintained administrative records, and managed projects in PEPC. • Review and compiled comments for Big Sandy EA and attended meetings as member of ID Team. • Attended meetings as ID Team member for Pine Island Debris Removal EA.
Presentations	<5%	• Presented at the Big Thicket West Gulf Coastal Plain Science Conference on the cooperative longleaf pine restoration team work and restoration results. • Fire Ecology talk with the Woodville Garden Club. • Posters and fire ecology outreach at the Big Thicket ATBI kickoff event.
NPS Meetings/ task groups	15%	• Lead meetings and served as a member of a Longleaf Pine Restoration team with The Nature Conservancy. • Helped conduct restoration work on a 100 acre tract to plant with longleaf pine seedlings. • Worked on girdling trees and spraying brush of exotic species on the North Turkey Creek Longleaf Restoration site. • Completed an interpretative sign on the Restoration Partnership for longleaf pine and an interpretative sign of fire in the longleaf pine ecosystem. • Served on the Texas Trailing Phlox working group and helped locate sites and plant phlox on adjacent lands. • Served on the Planning Committee for the Big Thicket Science Conference • Attended meetings for All Taxa Biotic Inventory Project • Resource management meeting and site visits throughout the Preserve.
Interagency work	<5%	• Attended a Landfire Workshop to help model local ecosystems.
Fire Assignments	25%	• Served as FEMO and FFT1 on BITH Rx Burns • 14 day severity detail to FLAG to help staff an engine. • Traveled to Utah in BITH engine for 7 day wildfire assignment. • 14 day assignment to Idaho as HECM and lookout.
Research/PLOT Work	15%	• Helped Fire Effects Monitoring Crew with Plot work. • Lead the collection of herbaceous data for the first time in the BITH fire effects program. • Helped other researchers in the Preserve conduct field work.
Data entry	<5%	• Entered herbaceous plot data. • Worked on quality checking data and some entry.
Data Conversion	0	No Conversion for our Park
Data analysis	5%	• Analyzed fuel loadings for burn plan work. • Analyzed vegetation for presentation on longleaf restoration.
Supervision/Admin	15%	• Meeting with lead monitor on projects and work load. • Worked on all of the hiring for seasonal crew, worked on KSA's, conducted interviews.

		• Conducted performance evaluations for FEMO crew. • Ordered Supplies for program. • Emails, meeting notes, and reports. • Travel and Time documents
Training	10%	• Firefighter refresher, CPR/1st Aid, Preparedness Drills... • Worked on 490 prework and test, but then class was canceled. • 1st Responder training attended. • NEPA/106 class attended. • Completed 6 credit hours of classes at Stephen F Austin State University (Tree Physiology and Advanced Professional Development) • PT
Miscellaneous	7%	• Big Thicket Science Conference calls, meetings, and work to help the conference operations. • FEMO Reports • SAR in park • Field visits with botanist • Helped with maintenance around office buildings and compounds (cleaning ect.) • Managing files and other mundane office duties

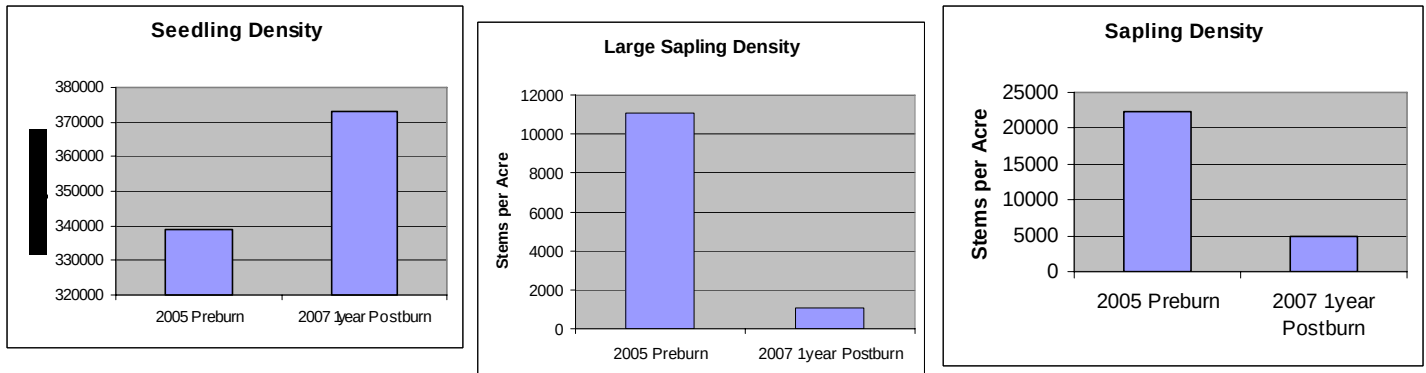
Fire effects crew accomplishments and area of focus.

This section deals with roles and functions of the fire effects crew. Identify accomplishments and/or focus areas along with a rough estimate of the amount of time spent in these areas (see table format and example below).

Fire Effect Crew Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
FMH plots	25%	- Helped with herbaceous plot reads on all FEMO plots. - Completed all pre-burn, 1st year, 2nd year, and post-burn, and control reads needed for the 2007 season.
WUI plots	3%	- Read Hickory Creek WUI Plots. - Gyro-Trac monitoring plots
CBI plots		No CBI plots exist on the preserve
Other plot work	2%	- Habitat equivalent analysis - Seedling mortality surveys
Fire Assignments	27%	- Assisted prescribed fire operations at BITH - FEM crew assisted national firefighting effort with 6 off preserve fire assignments to OK, AZ, NV, UT, OR and Padre Island, TX
Fuels project work	10%	Entire FEM crew assisted fuels crew in Rx prep and burning.
Data entry	8%	Completed data entry for all 2007 data.
Data conversion	0	N/A
Data analysis	5%	- Completed a down woody fuel inventory analysis for all FEM data. - Completed analysis on current Gyro-trac data.
Supervision/Admin	2%	Supervised 3-person crew in the field
Training	5%	- First responder training - Assist in teaching S-290 - Fire refreshers, NEPA training etc.
Miscellaneous	12%	- Office reports - JHA Project - Field season prep - Solo Fire Planting - Big Thicket Science Conference - Lady Bird Johnston's Funeral - Live Fuel Moisture collection and calculation - Landfire workshop - Search & Rescue - Endangered species reintroduction- Phlox planting

SANDHILL PRESCRIBED BURN - 1 YEAR POST BURN DATA ANALYSIS



The graphs above show the changes in density of woody vegetation before the burn and 1 year after the burn. When all of the size classes are averaged the burn meet the objective of reducing seedlings and pole-sized trees 25-75%. Although the seedling density graph appears to have a large increase in seedling density, it only increased by 9%. The large reductions in sapling densities and large sapling densities can be attributed to the higher than normal fuel loadings due to Hurricane Rita in 2005 and the moderate to high intensity of the prescribed burn.

The average overstory tree mortality across the plots was 50%, much higher than the <10% objective, however this number includes hurricane mortality and damaged trees, where most of the mortality occurred in the smaller tree size class. When collecting data in the field with the crew several large populations of rare fire dependent wildflowers were observed around the fire effects plots. These species included scarlet catchfly (*Silene subciliata*) and Winkler's gaillardia (*Gaillardia aestivalis* var. *winkleri*). The fire ecologist plans to work with resource management staff to document the location of these rare plant species with environmental occurrence records and gps data. Furthermore, the fire ecologist assisted the park biologist with monitoring the endangered Texas trailing phlox reintroduction plots (*Phlox nivalis* ssp. *texensis*) and found that many of the plants presumed dead had been revitalized by the burn. Overall, the more open canopy and understory on the sandhill from hurricane and fire mortality greatly helped the populations of rare and endangered fire dependant wildflowers. With the addition of the herbaceous plots we hope to track these important changes in vegetation as a result of effective prescribed burning, as well as identify units where prescribed burning has not been as effective to encourage restoration.



2006 Sandhill Prescribed Burn



Sandhill – Preburn 2005



Sandhill - Postburn 2006



Sandhill – 1 year Postburn 2007

GYRO-TRAC MONITORING

We have many lessons learned from the implementation of a mechanical fuel reduction (Gyro-trac) that occurs in conjunction with our prescribed burn program. The fire effects monitoring program found it necessary to develop a Gyro-Trac monitoring in order to document how effectively fuel loading was manipulated and if the treatment impacted rare, endangered, invasive or exotic vegetation. It is crucial to have good communications with the operator to ensure that the plots get treated with the machine. We had to abandon several plots because they were missed by the machine, or the project was not completed due to weather constraints. Another great challenge to the program is relocating the rebar stakes after the machine has ground the underbrush, to say we are looking for a needle in a haystack would be an understatement. We have thought about investing in a metal detector, but through trial and error, we learned that it is helpful to bring the before treatment photos to the gps waypoint to refine the search area. After this year we have also considered changing the plot protocol, to a longer transect with Brown's lines branching off of it, so that we can reduce the amount of rebar we need to search for in the woods.

The Gyro-Trac monitoring survey consists of three parts completed before and after fuels treatment. These 3 parts consist of recording a digital photo point, conducting a Brown's survey line and determining herbaceous plant cover (by guilds). The presence of exotic, invasive, rare or endangered plant species is recorded at any time during the survey.

The results of Gyro-Trac monitoring provide both a pictorial and data specific way to follow the Gyro-Trac's progress in reducing wildfire hazards and risks in the wildland urban interface, and its impact to soils and the ecosystem. Additional benefits include establishing a base line for monitoring the effects of mechanical fuels treatment on exotic and invasive plants and on rare and native plants endemic to the southeast Texas ecosystems.

The following report is an example of some of the gyro-trac projects that we have been monitoring.

NW BIG SANDY Gyro-trac Monitoring Report

Planning

In the fall of 2007, Big Thicket Fire Management deemed a mechanical treatment necessary to reduce the hazardous fuels in the NW Big Sandy Unit. Historically, prescribed fire has not carried very well in this unit due in part to the dense amount of mid-story brush and a significant amount of hardwood species in the uplands. When Big Thicket attempted another prescribed burn in September 2007, only a third of the actual targeted acreage burned. Furthermore, the portion of the unit that did burn was at a very light to moderate intensity, which did not meet burn objectives of mid-story brush reduction. The gyro-trac mulching machine was determined to be an effective tool for removal of mid-story hazardous fuels.

Results

The gyro-trac was used to target dense thickets of yaupon in the mid-story forest canopy. The gyro-trac successfully removed these areas, opening the mid-story and reducing the total fuel loading by an average of 42%. The post-treatment Brown's line survey shows an overall 20% increase in the 10hr time lag fuel, which was expected.

Below are the survey results from both the pre and post-treatment downed woody fuel inventories expressed in tons per acre. These surveys were taken from fire monitoring plots located in the treatment area. The attached photo series (Appendix A) for both 119 and 121 illustrates the dramatic reduction in fuel loading from the gyro-trac treatment.

119

	2007	2007
	Pre Gyro	Post Gyro
Avg. Duff	0.25	0.06
1hr	0.27	0.29
10hr	1.07	1.34
100hr	0.85	0.71
1000S	0	0.25
1000R	3.04	0.34
TOTAL	5.23	2.93

121

	2007	2007
	Pre Gyro	Post Gyro
Avg. Duff	0	0.2
1hr	0.14	0.23
10hr	1.68	1.95
100hr	1.41	2.26
1000S	20.07	9.36
1000R	0	0.27
TOTAL	23.31	14.07

Plot 119 Post gyro-trac treatment subplot e was not treated and therefore not added to post calculations.

All calculations are in tons/ acre

Conclusions

This was the most successful gyro-trac treatment so far in terms of communication between the machine operator and the monitors. The monitors were able to gather sufficient pre and post treatment data in order to start tracking how well the mechanical treatment met our objectives to reduce mid-story hazardous fuels accumulations and provide a protection buffer to adjacent private property. Another prescribed burn is necessary to determine if the mechanical treatment will help carry fire across the entire burn unit and the response from herbaceous plant species and midstory brush re-sprouts.



Pre-Gyrotrac Treatment (121c 3-4)



Post-Gyrotrac Treatment (121c 3-4)