



**National Park Service
Fire Ecology Annual Report
Calendar Year 2010
Big Thicket National Preserve**

A. Summary

The year 2010 marked the beginning of new endeavors for fire ecology program at Big Thicket National Preserve. We increased efficiency in monitoring activities and added rapid assessment plots to burn units without plots. We also utilized photo point monitoring for projects where plots were not feasible. We continued monitoring long-term fire effects plots, mechanical treatments, live fuel moisture, longleaf pine mortality, photo points, and Texas trailing phlox reintroduction. Although no one left the park for fire assignments, we assisted with prescribed burn planning and FEMO duties on eight burns and one wildfire for the Preserve. Both the fire ecologist and lead monitor created interpretative signs for kiosks where burns occurred adjacent to trails. To foster communication and share data results, the fire ecology program put together an end of season meeting for the fire and park management.

The fire ecologist worked on NEPA and 106 compliance for seven categorical exclusion fuels treatment projects and a draft environmental assessment. She continued to work closely with the prescribed fire specialist on burn plan reviews and fire staff on prescribed burn planning. She facilitated meetings of an interagency longleaf pine restoration group with NPS and TNC and assisted with restoration planning and implementation. She reported survivorship from previous longleaf pine plantings, coordinated an herbicide treatment, created signs to post in restoration areas, helped plan a planting project for winter 2011 during a volunteer work week, and represented NPS at TX and LA longleaf taskforce meetings. The ecologist continued to review proposals and work with researchers conducting inventory work for an ongoing All Taxa Biotic Inventory for the Big Thicket as a member of the science committee.

The lead fire effects monitor supported the fire ecologist by conducting literature reviews for the herbicide portion of the EA, compiling a fire history of the prescribed burn program at BITH to serve as an administrative record, and developing public information notices and success stories for BITH fire. The lead monitor also received an award for serving as the collateral duty safety officer for the Preserve. In addition to regular CSDO duties, she facilitated safety meetings, assisted in radon testing facilities, administered an occupational safety survey, created a NPSafe Orientation power point for new employees, coordinated Operational Leadership training, and most notably compiled the first Documented Health and Safety Plan for the Preserve in 10 years.

The fire ecology program at BITH would have never accomplished the plot work and the rapid assessment surveys without the dedicated seasonal crew of 2010. They were able to pick up the plot work quickly and work with new protocol with very little supervision. They also worked on a Gyrotrac mechanical treatment monitoring report which was presented to the park at the end of the season meeting.

Table 1. Fire Effects Plot Workload 2010

Park	Monitoring Unit	Veg Type	Type of Plot (FMH, photo point, other)	Pre-burn	Immed. Post	Postburn (1-20 yrs)	Cont rols	Total Plots
Big Thicket	Big Sandy	Upland Pine Forest	Fire Monitoring			3		4
		Upper Slope Pine Oak Forest	Fire Monitoring	1		3	1	8
		Mid Slope Oak Pine Forest	Fire Monitoring	1		2	2	7
		Lower Slope Hardwood Pine Forest	Fire Monitoring			2		4
			Rapid Assessment	8*				8*
			Gyro-Trac	8	5	7		8
			Phlox	11				16
	Village Creek Corridor	Long Leaf Pine Restoration area	Mortality Surveys	1				1
	Hickory Creek	Wildland Urban Interface	Fire Monitoring		2			2
	Turkey Creek	Upland Pine Forest	Fire Monitoring		1			3
			Rapid Assessment	18*	9*			18*
			Mortality Surveys	1				1
			Phlox	5				5
	Lance Rosier	Wetland Pine Savannah	Fire Monitoring		1			5
			Rapid Assessment	23*				23*
TOTALS				79	18	17	3	113

* Pilot sampling plots, pre-treatment, post-treatment

Table 2. Fire Ecology Staffing 2010

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Deanna Boensch Fire Ecologist	01/2010	12/2010	26	NO	Wildland Fire Refresher IT/ Ethics/ Discrimination Training HAZCOM Refresher Operational Leadership Training Hiring Telnet Courses Wildlife Mgmt in Utility Corridors DVD Training
Iola Hallock Lead FEMO	01/2010	12/2010	26	NO	Wildland Fire Refresher IT/ Ethics/ Discrimination Training HAZCOM Refresher NPS Fundamentals II Wx Station (RAWS) Training Operational Leadership Training Fire Interpretation Conference
Hannah Hunsberger FEMO Seasonal	5/2010	8/2010	7	NO	Discrimination in the workplace IT/ Ethics/ Discrimination Training HAZCOM Refresher Wildland FFT Refresher
Danny Lynch FEMO Seasonal	5/2010	9/2010	9	NO	Discrimination in the workplace IT/ Ethics/ Discrimination Training HAZCOM Refresher Wildland FFT Refresher
William Platz FEMO Seasonal	5/2010	8/2010	10	NO	Discrimination in the workplace IT/ Ethics/ Discrimination Training HAZCOM Refresher Initial Wildland FFT Training

Table 3. Management Objectives and Monitoring Results 2010

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (XX% confidence interval)	Objective Achieved?
Pine Uplands: Pitcher Plant Bog Rx	30-80% total fuel reduction	Total fuel reduction = 36% (<i>n</i> =9 plots)	YES
	First order fire effects: 60-100% topkill of brush	Understory brush topkill = 96% (<i>n</i> =9 plots)	YES
Big Sandy Gyro-trac MFR in bug kill pines	25-65% total fuel reduction in 1,000 hour fuels	total fuel reduction = 38% (<i>n</i> =5 plots)	YES
	Reduce height of woody brush	Total height reduction = 43% (<i>n</i> =9 plots)	YES

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (XX% confidence interval)	Objective Achieved?
Hickory Creek Savanna Unit Prescribed Burn	30-80% total fuel reduction	total fuel reduction = 38% (<i>n</i> =5 plots)	YES* 2 year fire return interval

B. Fire ecologist accomplishments and areas of focus

Table 4. Fire Ecologist Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	25%	• Prescribed Burn and Mechanical Treatment Plan Reviews • SHPO and THPO Consultations • NEPA: CE's, ESF's, Decision Memorandums: 7 Projects in 2010 • Improved draft Environmental Assessment for Big Sandy Unit • Managed PEPC and Administrative Records
Presentations	5%	• 2010 Season Fire Ecology Presentation to fire and park staff. • Global ReLeaf Signs created and posted in restoration areas. • Pitcher Plant Bog Sign and Success Story submitted.
NPS Meetings/ task groups	10%	• Fire Management Weekly Meetings • ID Team Meetings • BITH ATBI Science Committee Meetings
Interagency work	10%	• Facilitator for Longleaf Pine Restoration Team • TX and LA Longleaf Pine Taskforce • Member of Texas Trailing Phlox Working Group • Supervised work week for 12 person volunteer group.
Fire Assignments	15%	• FEMO on eight prescribed fires
Research	<5%	• ATBI Science Committee Proposal Reviews • Fuels Reserve Research Funding Request
Data collection	5%	• FEMO and Phlox Plots
Data entry	<5%	• Finished work on data conversion to FFI
Data analysis	5%	• Longleaf Pine Seedling and Phlox Survivorship • Pitcher Plant Bog Rx Rapid Assessment Analysis • Big Sandy South Data
Supervision/Admin	15%	• Supervised lead monitor, completed EPAP evaluations • Travel and time paperwork • CA1's and seasonal crew supervision • Purchasing and IT issues
Training	<5%	• Firefighter refresher and Annual Mandatory Training • Hiring Telnet Courses • Defensive Driving and Operational Leadership
Miscellaneous	<5%	• PT, Employee Association, and Office Cleaning

C. Fire effects crew accomplishments and areas of focus

Table 5. Fire Effects Crew Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	25%	Completed all pre-burn, 1 st year, 2 nd year, and post-burn, and control reads needed for the 2010 season.
WUI plots	<5%	Read Hickory Creek WUI Plots.
CBI plots	0	There are none on the BITH
Other plot work	35%	• Rapid Assessment plots • Photo pt plots for HQ Project • Gyro-Trac fuels treatment plots • Texas Trailing Phlox monitoring • Longleaf pine seedling mortality surveys
Fire Assignments	0	• No fire assignments
Fuels Project work	<5%	FEMO crew participated in Preserve Rx fire activities as FFT2's.
Data entry	10%	• Standard Data Entry • Data quality checks
Data analysis	<5%	Created Live Fuel Moisture PowerPoint based on past data.
Supervision/Admin	<5%	Supervised a 3 person monitoring crew.
Training	<5%	• Wildland Firefighter initial training and refreshers • NPS IT, Discrimination & Ethics Training • HAZCOM Refresher • Operational Leadership • Completed NPS Fundamentals II • Attended SE Region Fire Interpretation Conference
Miscellaneous	20%	• Lead FEMO time spent on CDSO • Coordinated Preserve-wide Operational Leadership Training • Revised the Preserve Documented Health and Safety Plan • Assisted teaching S-290- Delivered LFM PPT • Triclopyr Research for Big Sandy Unit Environmental Assessment • Fire History Project. • Coordinate recycling, office cleaning & organizing

D. Additional Information

Table 6. Data Entry and Projects Monitored

Park	% 2010 Data Entered	% 2010 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Big Thicket National Preserve	100%	100%	5	2	12	0

* Number of treatment units with treatment effects monitoring conducted. Include pre-burn and post-burn monitoring but not burn-day monitoring.

E. Optional Information

One challenge to the Big Thicket monitoring program is not having plots or photo points in every burn unit to allow for reporting prescribed burn results. The pitcher plant bog burn units have been some of the most frequently burned units, however, they did not contain plots. We did not want to have plots in the bog since the soils and vegetation are sensitive to foot traffic and we wanted to conduct a more rapid assessment compared to our traditional square plots adopted from Rice University. We decided to document fire effects in the bog with a series of photo points taken from the boardwalk trail and also installed rapid assessment circular plots adapted from protocol a Louisiana TNC ecologist uses in pine uplands. We were very pleased to have documented the most successful burns in the bog in over a decade (see attached photos).

The fire ecologist supported the fire management program with NEPA and Section 106 consultations on seven categorical exclusion projects. All required NEPA documents, SHPO and THPO consultation were completed by the ecologist and uploaded into PEPC. After the administrative records are completed, the projects are centrally filed with the fire management officer. The 2010 projects included:

1. Surge Fuel Breaks (IDIQ Contract)
2. NW Big Sandy Gyro-trac Treatment in Bug Killed Fuels
3. Ranchhouse Fuel Breaks and Fireline Prep
4. Headquarters and Visitor Center Hazardous Fuel Reduction
5. North Turkey Creek Longleaf Pine Restoration Area Herbicide
6. Beech Creek Road and Boundary Fuel Breaks (IDIQ) Contract
7. Big Sandy Central Mechanical Fuel Reduction Gyro-trac Treatment

The fire ecologist continues to facilitate meetings for a longleaf pine restoration team between NPS and TNC. This small group meets every quarter working under a cooperative agreement. An herbicide treatment was conducted by both agencies within a restoration area to reduce competition and prepare for planting in January 2011. The fire ecologist also conducted seedling mortality surveys to monitor the success of previous plantings and determine which areas need additional stocking and coordinated restoration work with the prescribed burn program.

Currently the ecologist is working with fire and park staff on the completion of the Big Sandy Longleaf Pine Restoration EA that could allow for the use of herbicide in addition to mechanical and prescribed burn treatments. Although this document has been in draft for a long time, the EA is a priority for the park to complete in the year 2011. The ecologist also submitted a technical assistance request for help developing strategies for longleaf pine restoration at the Preserve. She has also continued to work on and improve a PMIS proposal for Texas trailing phlox reintroduction and will work with region for technical assistance to improve and modify the proposal.

For the first time, the fire ecology program put together an end of the year presentation for fire and park management staff. We had good intentions of keeping the meeting to one hour, however with questions and discussions we held our audience for over two and a half hours. The presentation was well received by the superintendant and chief of resource management who

would like a similar presentation from fire staff; therefore we may conduct a combined presentation in 2011. Although fire management staff was more familiar with our work, the FMO and Prescribed Fire Specialist appreciated the data result presentation. The following pages include portions of our presentation such as fuels reduction results for the Hickory Creek Savanna Burn, photo points at the pitcher plant bog burn, a gyrotrac monitoring report from Big Sandy, and a summary of live fuel moisture data.

FFI Update:

During the spring of 2010 the fire ecologist worked with John Caratti on getting the excel data converted into FFI, however once the field season started we did not have time to work with the database. We planned to send the lead monitor to FFI training in the winter, but it was not considered feasible based on predicted budget and park travel cap. In 2011 we plan to work on the database and to get data entered and generate reports. We will pursue web based training or classroom sessions close to the park now we have a data set. Not having the funds to support FFI has been a challenge for the program.

The Hickory Creek Savanna Unit is another unit that is not well represented with fire effects monitoring plots and has had a significant amount of restoration work including chemical, mechanical, and prescribed burn treatments. A portion of the boundary is adjacent to a large community making it a priority for hazardous fuel reduction. Before the fuel treatments were conducted, the unit had become encroached with yaupon holly and researchers had documented a loss of species diversity. The fire ecologist will be working with a botanist during 2011 to conduct an inventory herbaceous vegetation to determine if species diversity has improved since the last inventory in 2001.

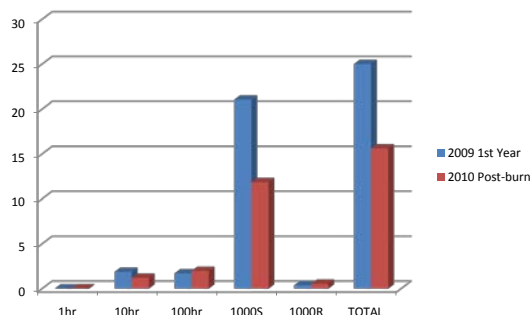
The most notable accomplishment of the 2010 Hickory Creek Savanna burns is the short 2 year fire return interval which helped speed up the process of restoration in the savanna ecosystem. Some managers even recommend annual burning in order to decrease fuels and increase species diversity.

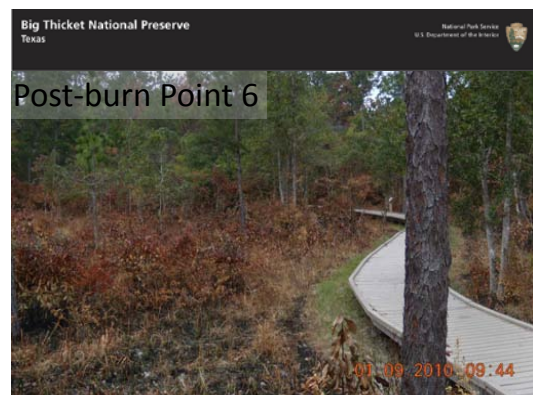
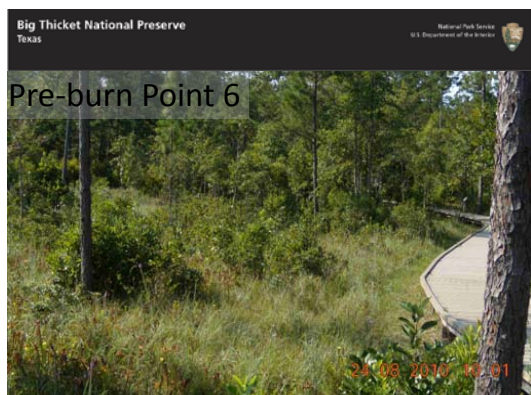
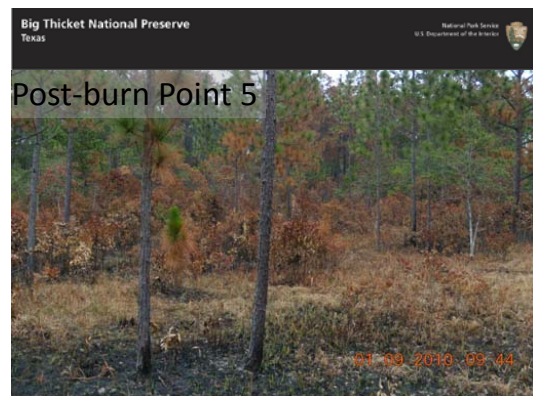
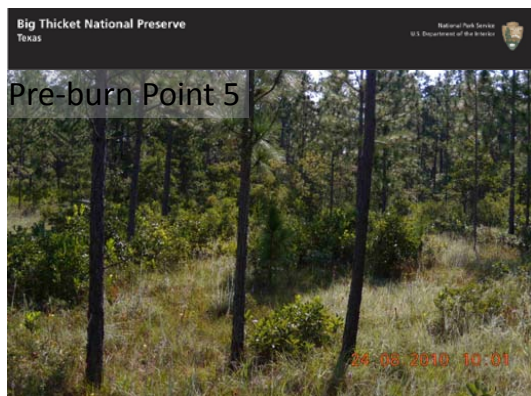
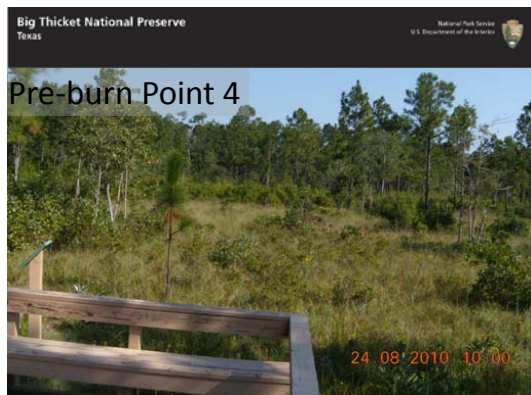
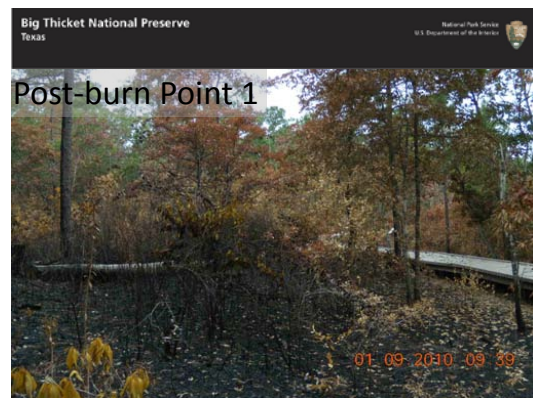
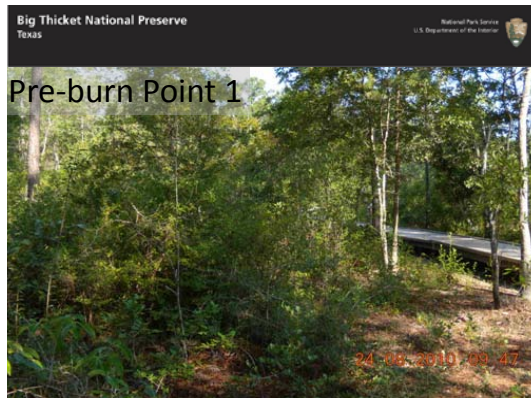


There was a 38% reduction in total tons per acre, however this reduction occurred primarily in the 1,000 hour sound category.

With the shorter 2 year fire return interval, there is less of a downed woody debris buildup and not as much change to monitor, however this is a great restoration burn for the savanna.

201 Downed Woody Fuel Data





2010 North West Big Sandy Bug Kill Gyro-Track Monitoring Report

Report by 2010 Fire Effects Monitoring Crew

Background:

Past events in the history of the Northwest Big Sandy Unit include: logging operations, southern pine beetle (*Dendroctonus frontalis*) infestation (1980's), and hurricane winds – most recently hurricanes Rita (2005) and Ike (2008). The resulting decrease in over-story cover, combined with the historic suppression of natural wildfire, allowed an increase in the density of the mid-story component. The establishment of dense mid-story vegetation shaded out the under-story, eliminating the native herbaceous vegetation layer. In the last 4 years, Rita and Ike created a significant amount of blow-down dramatically increasing fuel loading in the treatment area.

Objective:

The purpose of the Gyro-Trac mechanical mastication treatment is to reduce downed woody fuels, and mid-story hardwood vegetation. The treatment will decrease mid-story hardwood cover, promote herbaceous understory growth and aid in regeneration of the historic longleaf pine (*Pinus palustris*) forest. Removal of mid-story hardwoods lowers the potential for extreme fire behavior by reducing the density of volatile fuels such as Yaupon Holly (*Ilex vomitoria*). The treatment is also highly effective in reducing the accumulation of needle drape and other ladder fuels that could potentially lead to crown fires. The resulting moderate fire behavior is more indicative of historic fire regime and poses a lower risk to firefighters and the public.

Implementation:

Pre-treatment conditions were measured on April 29, 2010 at eight random locations. Each location was recorded by GPS (Garmin Etrex), marked with driven rebar and flagged. A random azimuth was taken and marked with driven rebar 50 feet from the center post. A downed woody fuel inventory (Brown's line) and an ocular mid-story cover estimation were conducted along this transect. The mechanical treatment was carried out using mastication from a Gyro-Trac machine. Three plots (5, 7, and 8) were not treated and therefore not used in final analysis. Post-treatment conditions were measured on August 3, 2010 at six of the original locations. Downed woody fuel inventories and ocular mid-story cover estimations were conducted. The resulting data was entered into a pre-existing spreadsheet for analysis.

Results:

The results show that the overall fuel loading decreased by 5.53 tons per Acre. The treatment did not affect the duff layer as no duff was present in pre-treatment data. The tonnage of 1000 hour fuels (3"+) was decreased and scattered. This is reflected in the increase of 1 hour (0"-0.25"), 10 hour (0.25"-1") and 100 hour (1"-3") fuels (Table 1). All heavy (3"+) rotten woody fuels were eliminated.

Analysis of Downed woody fuels:

	Average Duff Depth	Tons per Acre: 1 Hr.	Tons per Acre: 10 Hr.	Tons per Acre: 100 Hr.	Tons per Acre: 1000 Hr. Sound	Tons per Acre: 1000 Hr. Rotten	Total Tons per Acre	Average Fuel size for Sound 1000 Hr. Material	Average Fuel size for Rotten 1000 Hr. Material
Pre Treatment	0	0.10	0.54	0.57	11.34	1.84	14.39	7.16	5.13
Post Treatment	0	0.37	1.14	0.85	6.50	0.00	8.86	6.2	0.00
Difference	0	+0.27	+0.60	+0.29	-4.84	-1.84	-5.53	-0.96	-5.13

Table 1

As seen in table 2, the percent cover of all classes, with the exception of dead wood, was decreased by the mechanical treatment. Live woody cover was decreased by approximately 30% while herbaceous (live and dead) was decreased by approximately 20%.

Analysis of cylindrical ocular mid-story/herbaceous estimates:

Category	Post Treatment	Pre-Treatment	Difference
Live wood (% cover)	27.3	56.6	-29.3
Dead Wood (% cover)	29.15	23.3	5.85
Herbaceous (% cover)	10.65	31.8	-21.15
Dead Herbaceous (% cover)	1.3	20.45	-19.15
Herbaceous Height (In)	7	7.5	-0.5
Wood Height(In)	30.4	53.4	-23

Table 2

The following photos illustrate a decrease in mid-story coverage within the treatment area.



Figure 4.1: Plot 4 pre-treatment



Figure 4.2: Plot 4 post-treatment



Figure 5.1: Plot 6 pre-treatment



Figure 5.2: Plot 6 post-treatment

Conclusion:

It can be concluded that the immediate goals of the treatment were accomplished by a measurable decrease in mid-story cover and heavy fuels. However, further research is required in order to quantify future herbaceous understory growth and longleaf pine regeneration. The area must be actively managed to control basal re-sprouting of mechanically treated vegetation and prevent further woody encroachment. Management practices such as prescribed fire, herbicide application, and further mechanical treatment used synergistically will help to accomplish desired future conditions.

Live Fuel Moisture Data Collection

LIVE FUEL MOISTURE DATA

The Big Thicket National Preserve started collecting live fuel moisture data in order to:

1. follow local weather conditions (*This helps increase situational awareness for the firefighters and fire managers. Increases safety*)
2. pinpoint when vegetation is most flushed with moisture in the spring and when it enters dormancy (*This influences the prescribed fire program*)
3. study how live fuel moisture correlates with drought and fire occurrence

ABOUT THE DATA

- The Big Thicket Fire Effects monitoring crew has been collecting and recording live fuel moisture data since 2004
- However, the most consistent collection and recording has occurred since 2006
- Samples are taken every two to three weeks throughout the year and are taken from sites selected for prescribed fire treatment

OVERALL AVERAGE GRAPH

Figure 1 shows the average live fuel moisture values from 2004-2009.

- From this graph we see there is a surge in moisture (indicating spring growth) mid-April and a second surge (indicating growth) just before the plant goes dormant for the winter.

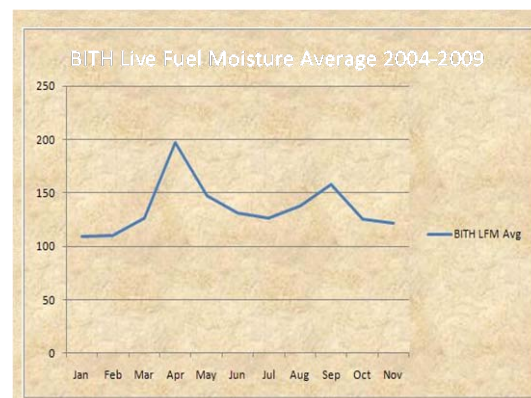


Figure 1

AVERAGE BY YEAR

Having a complete dataset allows us to see and review past weather conditions (See Figure 2).

- 2006 was our wettest fall on record with extensive flooding and 2007 was our wettest spring on record.
- 2008 fall growth surge following Hurricane Ike (Sept 9, 2008) demonstrates a response to the wind disturbance.
- 2009 was a very dry summer (3 months without rain), however there is little indication from the graph.
- There are low levels of moisture exhibited in the spring flushes of 06 & 09. Both of these lower spring values follow a hurricane from the previous fall.

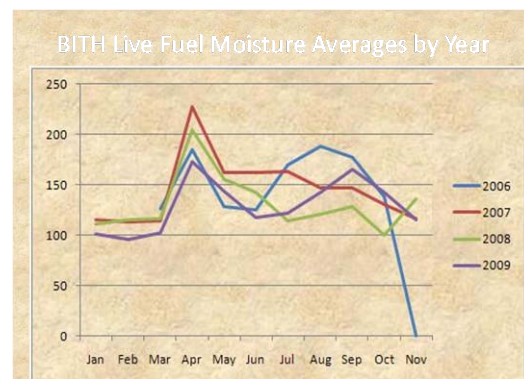


Figure 2

LFM as a Fire Management Decision Tool

1. Keeping up with the LFM helps managers keep up with the
2. fuel trends and make prescribed burn and wildfire severity decisions.
3. BITH LFM data is tracked online in the National Live Fuel Moisture Database. Anyone who wants to see the data trends can request graphs and data information on demand from this website:
<http://72.32.186.224/nfmd/public/index.php>

