Monitoring the Use of Prescribed Fire on Public Lands in Florida

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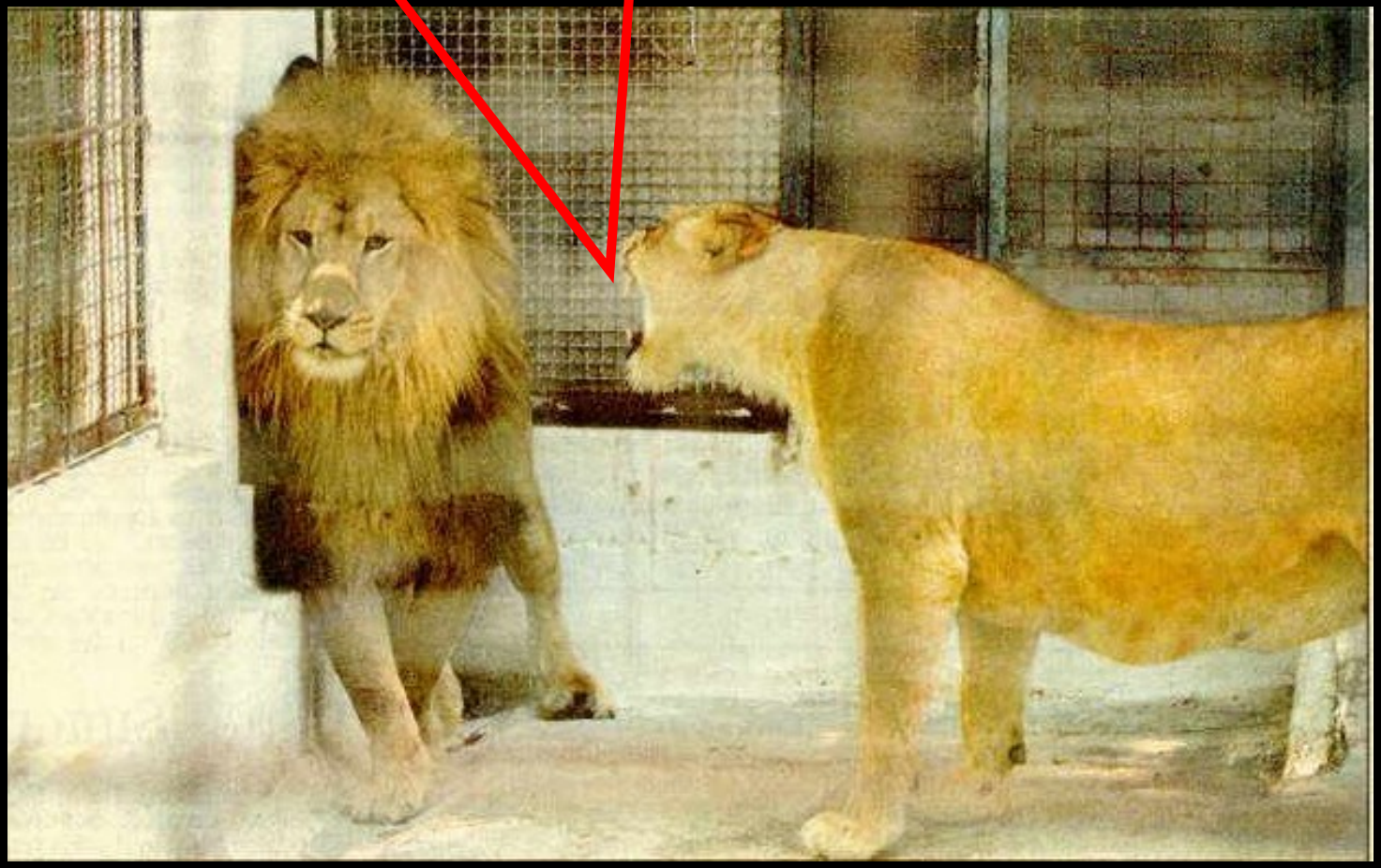
TALL TIMBERS
Research · Conservation · Education

Florida Prescribed Fire Monitoring Project

- Assess status of prescribed burning and monitoring efforts
- Recommend procedures land managers can use to monitor the use of prescribed fire

You **MUST** conduct post-burn evaluations!



Importance of Fire Monitoring

- Identify needs for changes in management plans, including funding and resources
- Institutional knowledge improved
- Possibility of linking permits to data on a given burn unit
- Improves information exchange among agencies
- May improve burn program

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REAL Importance of Fire Monitoring

- ***If we don't provide accurate numbers, politicians will make them up!***

"Forest burning in Florida creates more air pollution than coal power plants."

Debbie Lightsey, Tallahassee Commissioner

Interview agency personnel & survey land managers

Develop draft protocols & solicit comments at 3 regional workshops

Refine protocols & conduct field tests

Create manual & provide cost estimates

Results from Land Manager Survey
(n = 87)

- 48% say burn plans not adequately implemented
- Top limitation (16%): staff funding
- 90% say burns blocks digitized

Results from Land Manager Survey (n = 87)

- 55% want to increase “summer” burning
- 32-58% want to increase frequency (varies by habitats)
- Top need (26%): better fuel models
- **83% conduct post-burn evaluations (54% GPS’ed)**

Our current fire-monitoring program

What is Fire Monitoring?

- Record and analyze *First-order Fire Effects*


Don’t you go taking my staff away from any burning!

Tiered Approach for Flexibility

Tier 1 – Burn Coverage and Fire Description on Burn Day

Tier 2 – Qualitative Post-burn Evaluation Requiring Follow-up Visit

Tier 3 – Quantitative PBE's such as TNC, TTRS, and others

Tier 1 – Requirements

- Acreage or GIS coverage for Burn Blocks (available for most managed areas)
- Standard habitat description (using FNAI hierarchical approach)
- Fuel Model Number (Rothermel)
- Estimate of Burn Acreage per Habitat Type
- Prescription Information

Tier 1 –Coverage and Description

Florida Habitat Type Number	Habitat Type	*Natural Communities Included:
0	Unburnable Habitat	Inundated Wetlands, Hardwood Drain, Lakes, etc.
1	Upland Pine Forest	Sandhills, Clayhills
2	Rocklands	Pine Rockland
3	Scrub	
4	Upland Hardwood Forest	Upland Mixed Forest, Fire-suppressed Pine Forest
5	Pine Flatwoods	Mesic Flatwoods, Scrubby Flatwoods, Dry Prairie, Wet Flatwoods
6	Mesic Hardwood Forest	Slope Forest, Mesic Hammock, Bottomland Forest, Maritime Hammock, Prairie Hammock
7	Wetland Forest	Floodplain Swamp, Dome Swamp, Strand Swamp, Baygall, Basin Swamp
8	Wet Prairie	Depression Marsh, Seepage Slope
9	Marsh/Slough	Marl Prairie, Floodplain Marsh, Slough, Swale, Tidal Marsh, Basin Marsh
10	Pasture/Agriculture	
11	Plantation/Orchard	

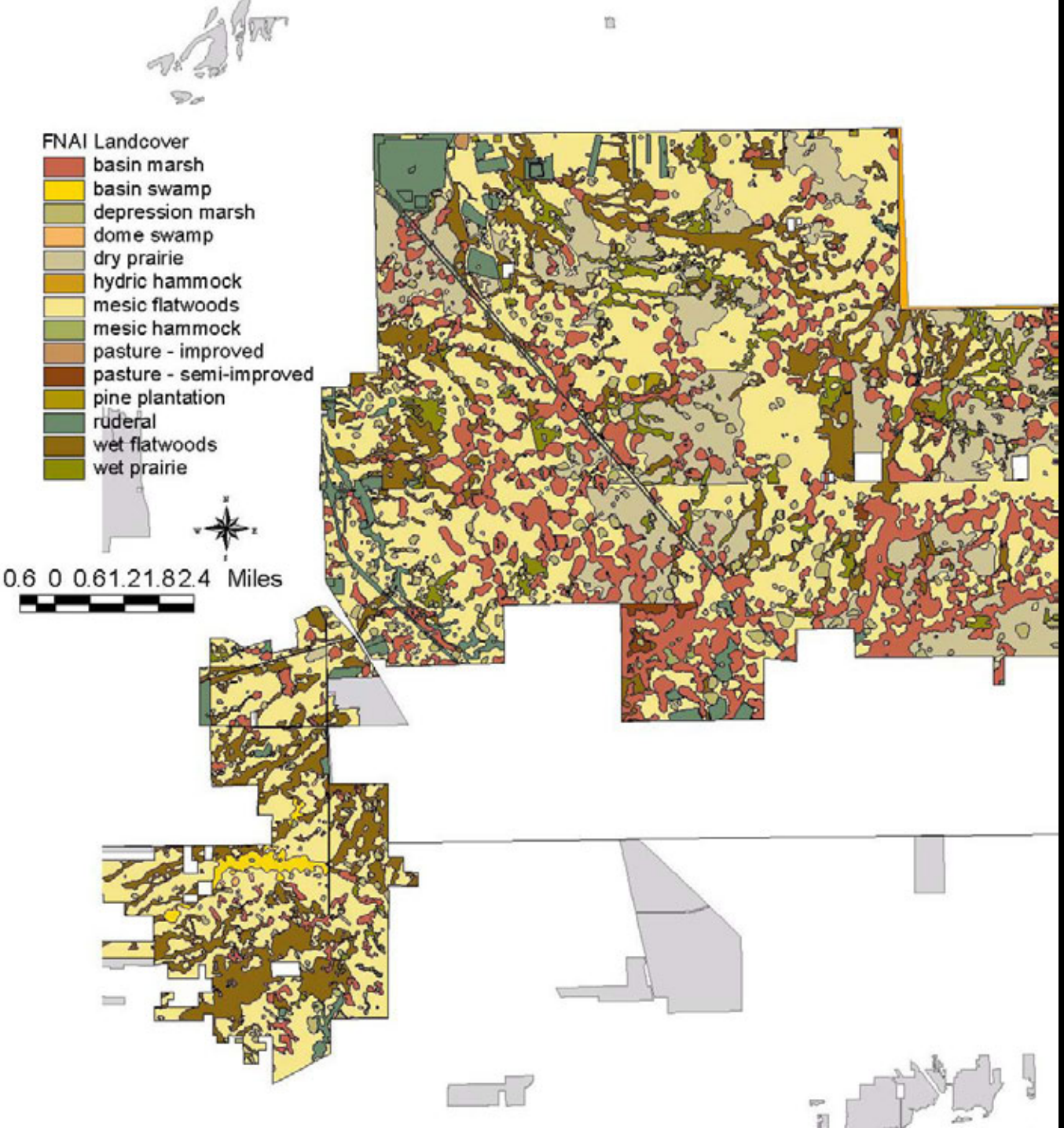
Standard Fuel Models

1 Short grass
2 Timber/grass cover
3 Tall grass
4 Chaparral
5 Brush
6 Dormant brush
7 Southern rough
9 Hardwood litter
10 Timber/litter
11 Light logging slash
12 Medium logging slash
13 Heavy logging slash

Webb WMA

FNAI Cover Map

Burn blocks digitized



Tier 1 – Coverage and Description

- On the day of the burn, provide a quick overview of the event

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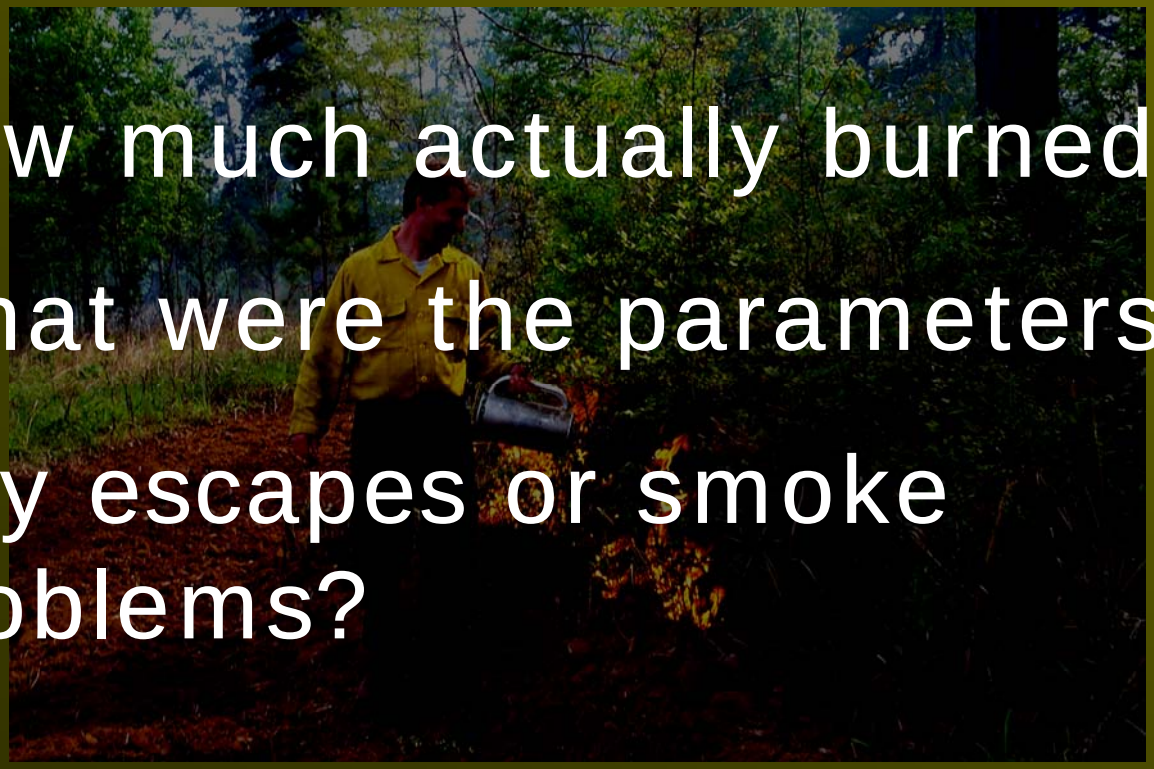


How much actually burned?

What were the parameters?

Any escapes or smoke problems?

Tier 1 - Prescribed Burn Monitoring Form

1. Property _____ 2. Agency _____

3. Burn Unit Name/# _____ _____

4. # Acres in Burn Unit _____ 5. Permit # _____ 6. DOF Customer # _____

7. Burn Date ___/___/___ 8. Last Burn Date ___/___/___ 9. Start Time _____ 10. End Time _____

Table 1.1

Burn Unit(s) #	Florida Habitat Type # *	Fuel Model # *	Habitat Type Characteristic	# Acres within burn	# Acres targeted to burn	# Acres actually burned

** Some resource conservation or Florida Habitat Inventory and Fuel Manual*

Table 1.2

Weather Conditions	Prescribed	Forecasted	Actual	Weather Conditions	Prescribed	Forecasted	Actual
Percent Chance of Rain				Minimum Mixing Height			
Days Since Last Rain				Dispersion Range (Day)			
Surface Wind Direction				Dispersion Range (Night)			
Midflame Surface Windspeed				Maximum Temperature			
Transport Wind Direction				Minimum Relative Humidity			
Transport Windspeed Range				KBDI Maximum			

12. Reason(s) for Burning: ECOLOGY | EXOTICS | FORESTRY | FUEL REDUCTION | RANGE | SITE PREP | WILDLIFE

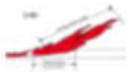
13. Firing Technique(s): BACK | FLANK | HEAD

14. Ignition Method(s): AERIAL | FOOT | VEHICLE

15. Smoke Sensitive Areas Effected: YES | NO

16. Any Escapes: YES | NO

17. Maximum Flame Length: <3' | 3-6' | 6-9' | >9'



18. Pre-Burn Treatment(s): CHEMICAL | CHOPPING | MOWING | MASTICATION | TILLING | NONE

General Observations: _____

Tier 1 - Prescribed Burn Monitoring Form

Table 1.3

Is This Monitoring Helpful?

- One test site targeted 2300 acres on permit but burned only 165 acres
- One site targeted 650 acres, but RH was 65% and acreage burned was 320


You're doing okay so far about the staff thing…

Tier 2 – Post-burn Evaluation (PBE)

- Conduct qualitative PBE using categorical and incremental measures

Tier 2 - Post Prescribed Burn Monitoring

1. Property _____ 2. Agency _____

3. Burn Unit Name _____ 4. Burn Unit #(s) _____

5. Burn Date ___/___/___ 6. Rain Amt. Since Burn _____ 7. # Acres in Burn Unit(s) _____

Table 2.1

Fire Effects on Burned Area						
Canopy Scorch*	N/A	None	1 – 30%	31 – 60%	61 – 90%	> 90%
Percent of Area						
Low/Midstory/Shrub Scorch	N/A	None	1 – 30%	31 – 60%	61 – 90%	> 90%
Percent of Area						
Hardwood Top-kill (d <1", ht< 8')	N/A	None	1 – 30%	31 – 60%	61 – 90%	> 90%
Percent of Area						
Young Pine Top-kill (d <1")	N/A	None	1 – 30%	31 – 60%	61 – 90%	> 90%
Percent of Area						
Mature Top-kill	N/A	None	1 – 30%	31 – 60%	61 – 90%	> 90%
Percent of Area						
Subsurface Burn Severity Class*	Unburned		Scorched	Lightly Burned	Moderately Burned	Heavily Burned
Percent of Area						

*See reverse for description of Canopy Scorch and Subsurface Burn Severity Class.

Table 2.2

Method(s) Used to Measure Fire Effects							
Scorch	Roadside	Walk Through	Fixed Plots	Fixed Transects	GPS Points	GPS Transects	Remote Sensing
Method Used							
Top-kill	Roadside	Walk Through	Fixed Plots	Fixed Transects	GPS Points	GPS Transects	Remote Sensing
Method Used							
Subsurface Burn	Roadside	Walk Through	Fixed Plots	Fixed Transects	GPS Points	GPS Transects	Remote Sensing
Method Used							

List Additional Monitoring Protocol(s) Used: _____

Observations Dependent Upon Management Goals: (Examples: stem char, root damage, resin seepage, insect damage, rare/endangered species, tree mortality, seedling survival or deviations from plan)

_____

_____

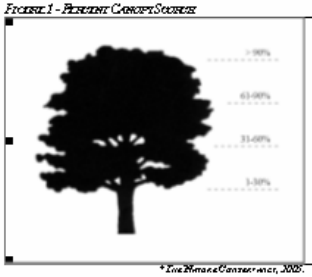
Were Burn Objectives Met? YES | NO _____

Recommendations for Next Burn: _____

_____

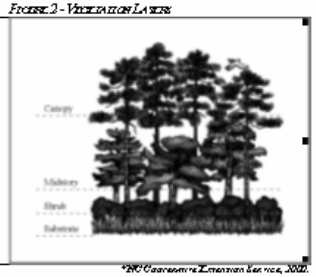
Tier 2 - Post Prescribed Burn Monitoring

Figure 1 - Percent Canopy Scorch



** Tree Planter Conservation, 2002.*

Figure 2 - Vegetation Layers



**NC Cooperative Extension Service, 2002.*

Table 2.3

Subsurface Burn Severity Class*					
	Unburned	Scorched	Lightly Burned	Moderately Burned	Heavily Burned
Subsurface (Duff / Fine Fuels)	Not burned	Duff partially blackened, duff and fuel undamaged, woody fuel surfaces undamaged	Duff charred in patches, upper duff layer burned, woody fuel surfaces charred, but recognizable	Duff mostly or entirely consumed, upper duff layer burned, woody fuel surfaces unrecognizable	Duff and duff completely consumed, leaving white ash, mineral soil visibly altered, often reddish or other color, woody fuel surfaces unrecognizable

**National Park Service, 2002.*

Additional Notes: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

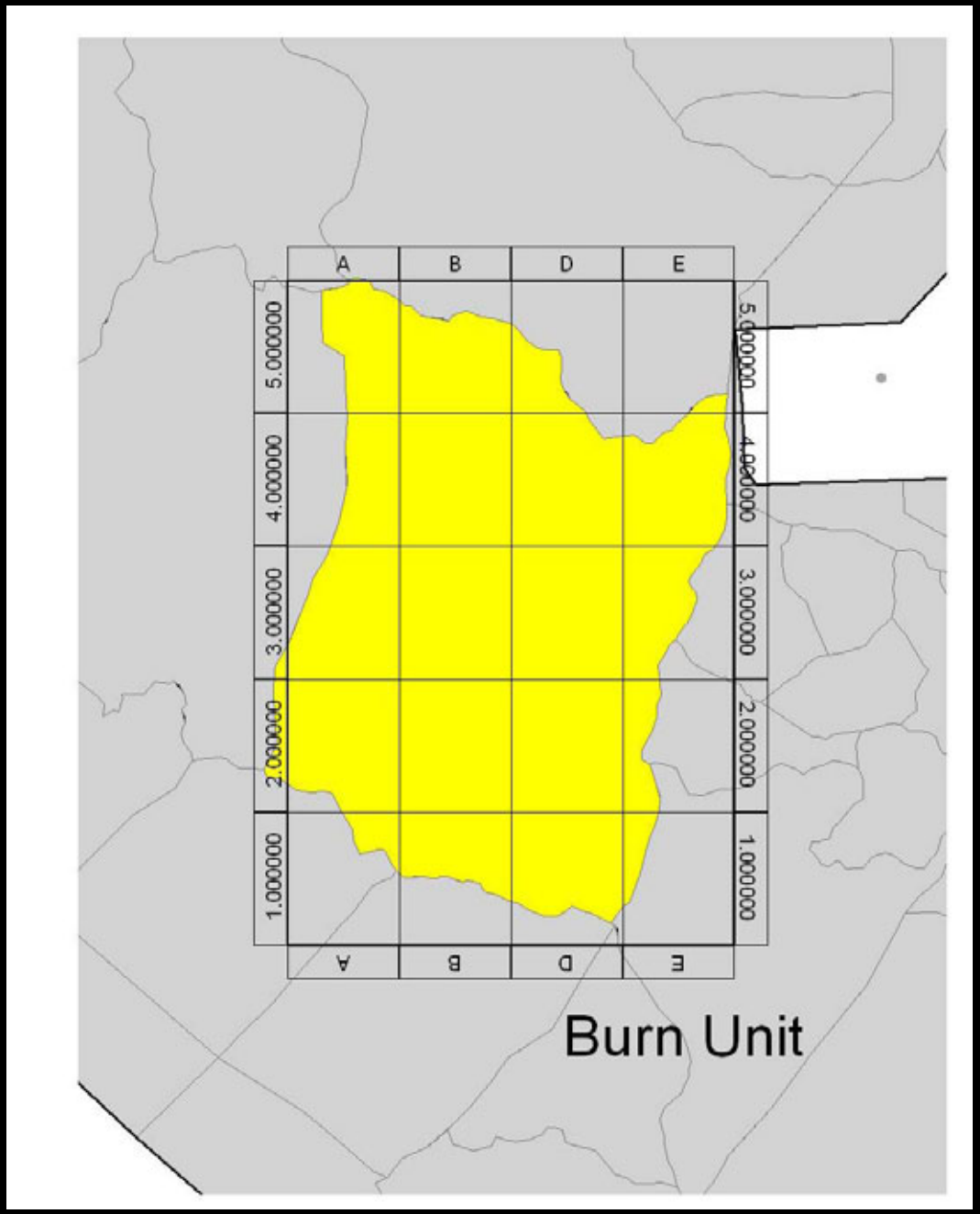
_____

Tier 2 - Example

19. *Percent Canopy Scorch	No Scorch	1% - 30%	31% - 60%	61% - 90%	>90%
20. Hardwood TopKill (2-8ft)	0% - 25%	26% - 50%	51% - 75%	>76%	**Objectives Met?** Yes No NA
21. Young Pine Topkill (2-8ft)	0% - 25%	26% - 50%	51% - 75%	>76%	**Objectives Met?** Yes No NA
22. *Substrate Burn Severity Class	Unburned	Scorched	Lightly Burned	Moderately Burned	Heavily Burned

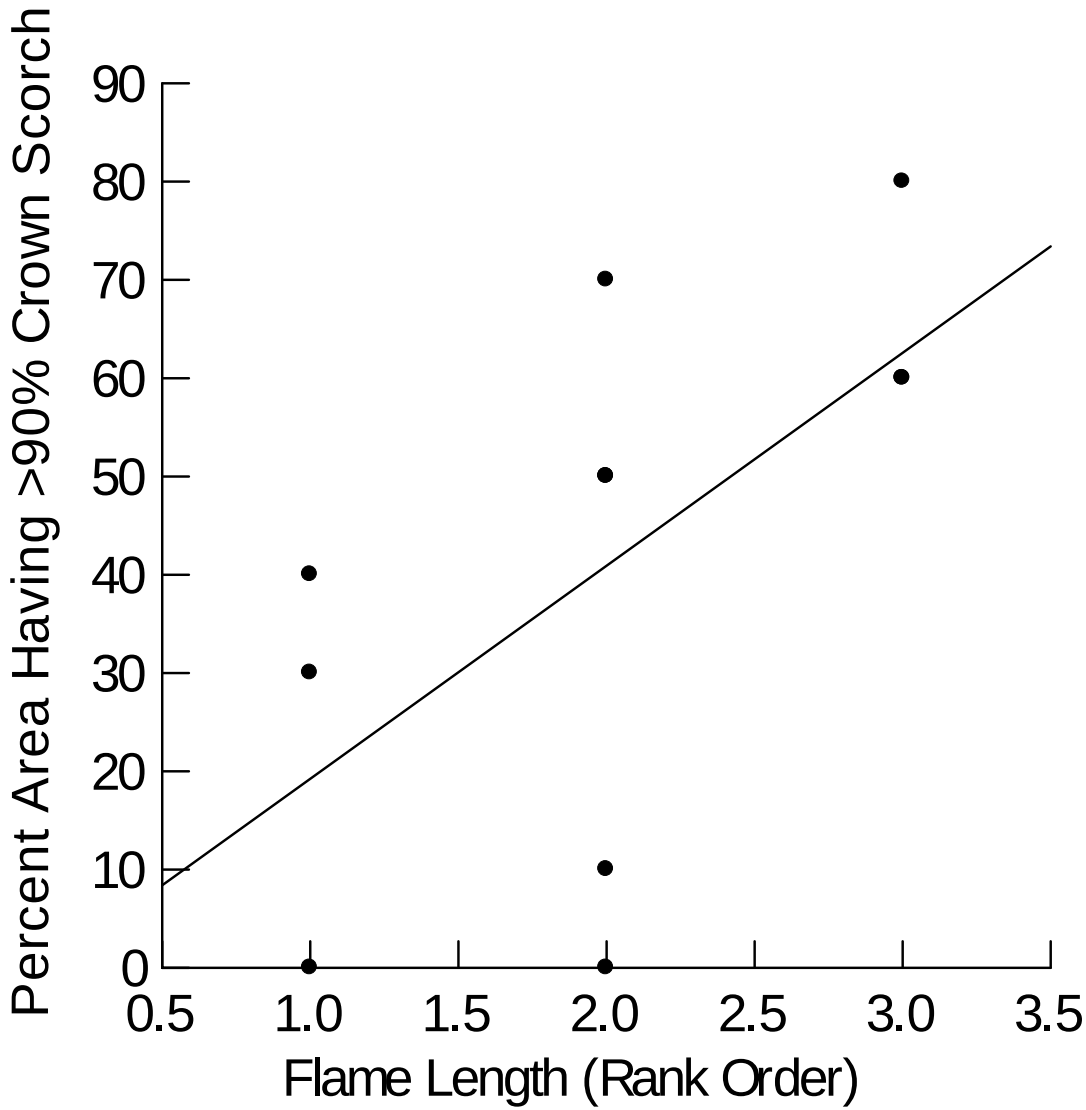
Tier 2

Burn Severity Class (NPS 1991)					
	Unburned	**Scorched**	**Lightly Burned**	**Moderately Burned**	**Heavily Burned**
Substrate (litter/duff)	not burned	litter partially blackened; duff nearly unchanged; wood/leaf structures unchanged	litter charred to partially consumed; upper duff layer burned; wood/leaf structures charred, but recognizable	litter mostly to entirely consumed leaving coarse, light colored ash; duff deeply burned; wood/leaf structures unrecognizable	litter and duff consumed, leaving white ash; mineral soil visibly altered, often reddish

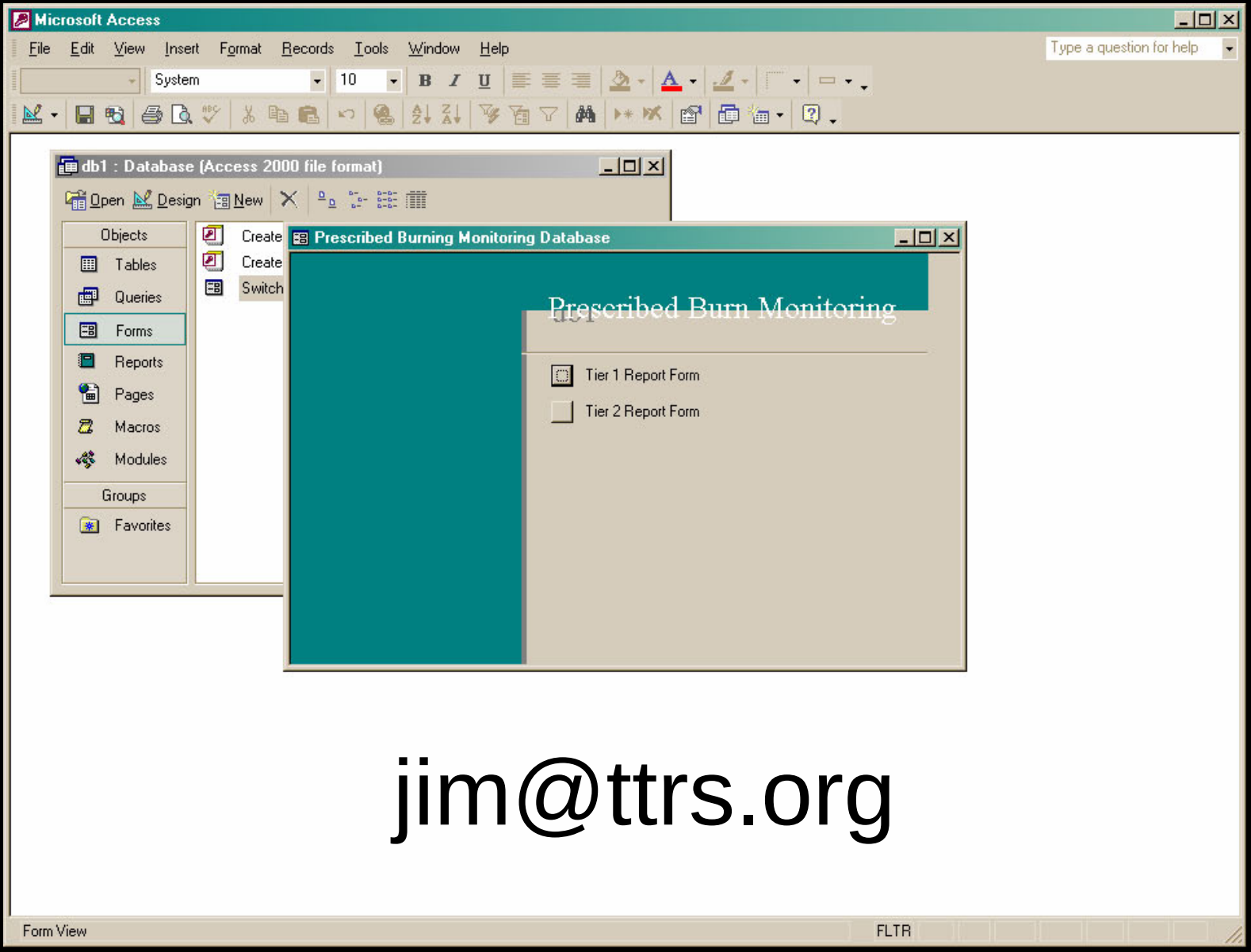


Use grids to help estimate extent of fire effects

Data from Test Sites

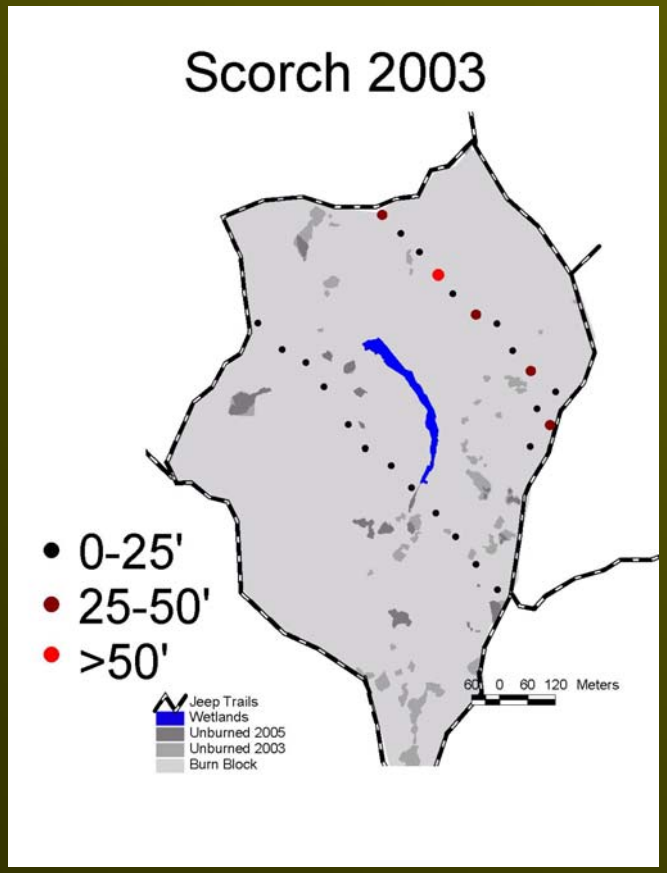


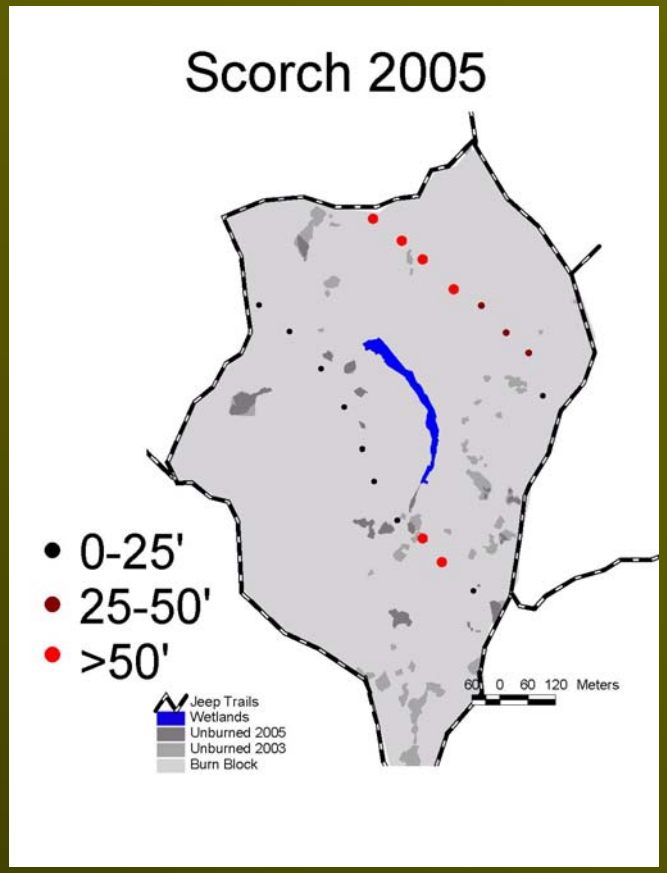
Access Database Structure



jim@ttrs.org

Tier 3 – Multiple Samples





TTRS Transects: 1 hour per 200 acres

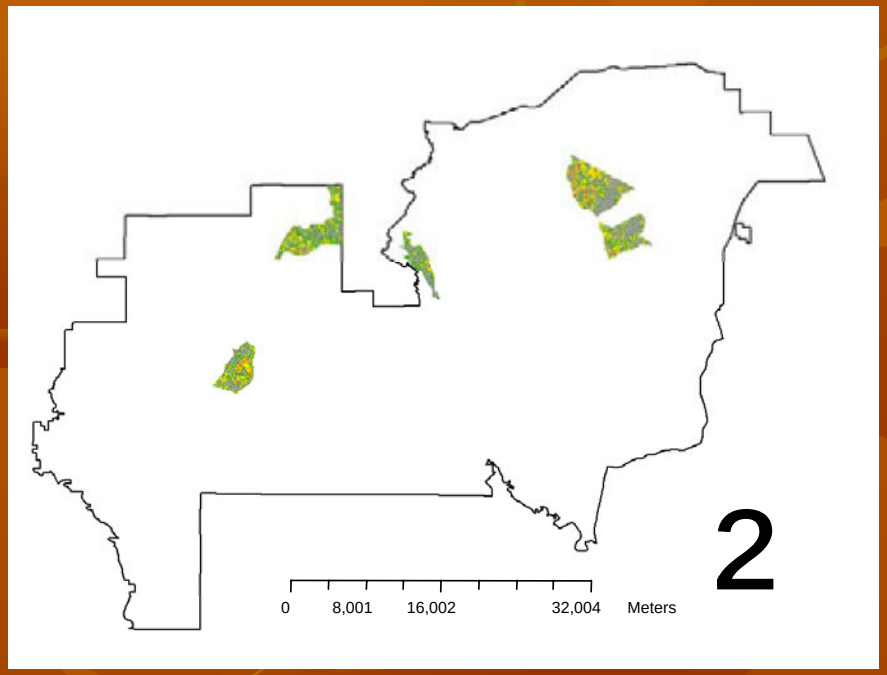
Dense small hardwood stems (>20 per m^2), top-kill >95%.

5-10 hardwood stems per m^2, top-kill 60-90%.

Tier 3 Information

- Data collection based on multiple samples (walk-through transects, plots, etc.)
- Provide nature of additional information and contact info (e.g., long-term vegetation monitoring plots, fuel-load measurements, photo points, research projects).

Results-Flatwood Burn Severity



Severity	Acres
Unburned	9850.5
Low	5673.825
Low-Moderate	3442.725
Moderate-High	1312.2
High	168.975
Total	20448.23
Total Burned	10597.73