Monitoring the Use of Prescribed Fire on Public Lands in Florida

Jim Cox and Kevin Robertson
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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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

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
Tier 1 – Coverage and Description

- On the day of the burn, provide a quick overview of the event
Tier 1 – Coverage and Description

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

  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/No.:** 
4. **Acreage in Burn Unit:** 
5. **Permit No.:** 
6. **DOF Customer No.:** 

7. **Burn Date:** / / 8. **Last Burn Date:** / / 9. **Start Time:** 10. **End Time:**

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### Table 1.1

<table>
<thead>
<tr>
<th>Burn Unit #</th>
<th>Period</th>
<th>Weather</th>
<th>Type #1</th>
<th>Fire Weather</th>
<th>Type #2</th>
<th>estro</th>
<th>Real</th>
<th># Acres in Burn</th>
<th>Acreage Burned</th>
<th>Acreage Burned</th>
<th># Acres in Burned</th>
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</thead>
<tbody>
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*General notes on instructions by Firewise Society of America, Inc.*

### Table 1.2

<table>
<thead>
<tr>
<th>Weather Condition</th>
<th>Percent</th>
<th>Temperature</th>
<th>Amount</th>
<th>%</th>
<th>Weather Condition</th>
<th>Percent</th>
<th>Temperature</th>
<th>Amount</th>
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<tbody>
<tr>
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<td>Wind</td>
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<td></td>
<td></td>
<td>Wind</td>
<td></td>
<td></td>
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<tr>
<td>Surface Heat Loss</td>
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<td></td>
<td></td>
<td></td>
<td>Surface Heat Loss</td>
<td></td>
<td></td>
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<tr>
<td>Total Surface Heat Loss</td>
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<tr>
<td>Total Wind Speed</td>
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<td>Total Wind Speed</td>
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<tr>
<td>Total Rainfall</td>
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<td>Total Rainfall</td>
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<td>Total Humidity</td>
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<td></td>
<td></td>
<td>Total Humidity</td>
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</tr>
</tbody>
</table>

12. **Reason(s) for Burning:** ecological | economical | forestry | fire reduction | range | site prep | wildlife

13. **Firefighting Technique:** back | flank | head | M. equipment | aerial | foot | vehicle

14. **Smoke Sensitive Areas Expected:** yes | no

15. **Any Ikats:** yes | no

16. **Max. Flame Length:** <3' | 3-6' | >6' | >9'

17. **Deb Burn Treatment:** chemical | chopper | harvest | mechanical | field | none

**General Observations:**

Tier 1 - Prescribed Burn Monitoring Form

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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
Table 2 - Post-Prescribed Burn Monitoring

<table>
<thead>
<tr>
<th>Location</th>
<th>Method</th>
<th>Baseline</th>
<th>1-3 months</th>
<th>4-6 months</th>
<th>7+ months</th>
<th>&gt; 9 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>Ground</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Field</td>
<td>Plot</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 3

<table>
<thead>
<tr>
<th>Location</th>
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<th>4-6 months</th>
<th>7+ months</th>
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<td>No</td>
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<td>Plot</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Figure 1 - Monitoring Concept Drawing

Figure 2 - Vegetation Loss

Table 4

<table>
<thead>
<tr>
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<th>Method</th>
<th>Baseline</th>
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<tr>
<td>Field</td>
<td>Plot</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Notes:

- Add additional notes and comments as needed.

- Review and update monitoring protocols as necessary.

- Conduct post-prescribed burn monitoring across all areas as specified in the protocol.

- Monitor vegetation loss and changes in the forest ecosystem.
## Tier 2 - Example

<table>
<thead>
<tr>
<th>19. *Percent Canopy Scorch</th>
<th>No Scorch</th>
<th>1% - 30%</th>
<th>31% - 60%</th>
<th>61% - 90%</th>
<th>&gt;90%</th>
</tr>
</thead>
</table>
| 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)

<table>
<thead>
<tr>
<th>Substrate (litter/duff)</th>
<th>Unburned</th>
<th>Scorched</th>
<th>Lightly Burned</th>
<th>Moderately Burned</th>
<th>Heavily Burned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>not burned</td>
<td>litter partially blackened; duff nearly unchanged; wood/leaf structures unchanged</td>
<td>litter charred to partially consumed; upper duff layer burned; wood/leaf structures charred, but recognizable</td>
<td>litter mostly to entirely consumed leaving coarse, light colored ash; duff deeply burned; wood/leaf structures unrecognizable</td>
<td>litter and duff consumed, leaving white ash; mineral soil visibly altered, often reddish</td>
</tr>
</tbody>
</table>
Use grids to help estimate extent of fire effects
Data from Test Sites

Flame Length (Rank Order)

Percent Area Having >90% Crown Scorch

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 m²), top-kill >95%.

5-10 hardwood stems per m², 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

### Wet Flatwoods, Initial Assessment

<table>
<thead>
<tr>
<th>Severity</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unburned</td>
<td>9850.5</td>
</tr>
<tr>
<td>Low</td>
<td>5673.825</td>
</tr>
<tr>
<td>Low-Moderate</td>
<td>3442.725</td>
</tr>
<tr>
<td>Moderate-High</td>
<td>1312.2</td>
</tr>
<tr>
<td>High</td>
<td>168.975</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20448.23</strong></td>
</tr>
<tr>
<td><strong>Total Burned</strong></td>
<td><strong>10597.73</strong></td>
</tr>
</tbody>
</table>

![Map and chart showing burn severity and percent fire area](image-url)