Smoldering combustion of organic soils on the North Carolina coastal plain

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Primary Objectives

- At present, tools for evaluating the potential for ground fire are limited and the guidelines used in fire planning and suppression are based largely on local experience.

- Indices such as the Keetch-Byram Drought Index which are commonly used to evaluate the risk or fire danger in organic soils are based only meteorological inputs and do not incorporate any soil properties or hydrologic inputs.

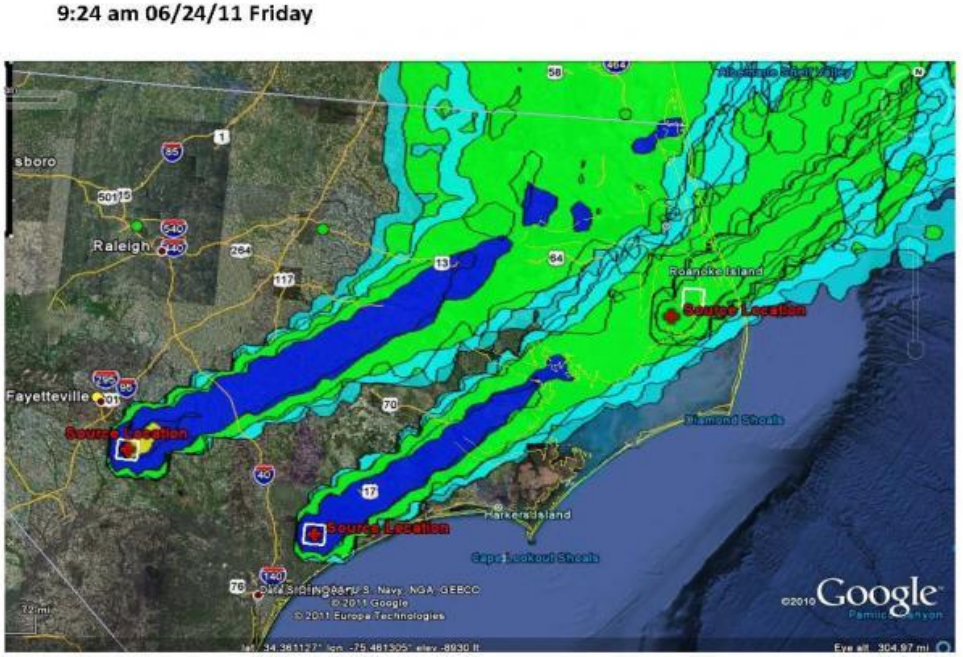
- This study demonstrates the use of a new alternative to estimate the smoldering potential of sustained smoldering in organic soils.

Flaming and Smoldering Combustion

Safety and Health Concerns

Pains Bay Fire :Dense Smoke on Highway 264 NC

Credit :Rob Shackelford, NCFS



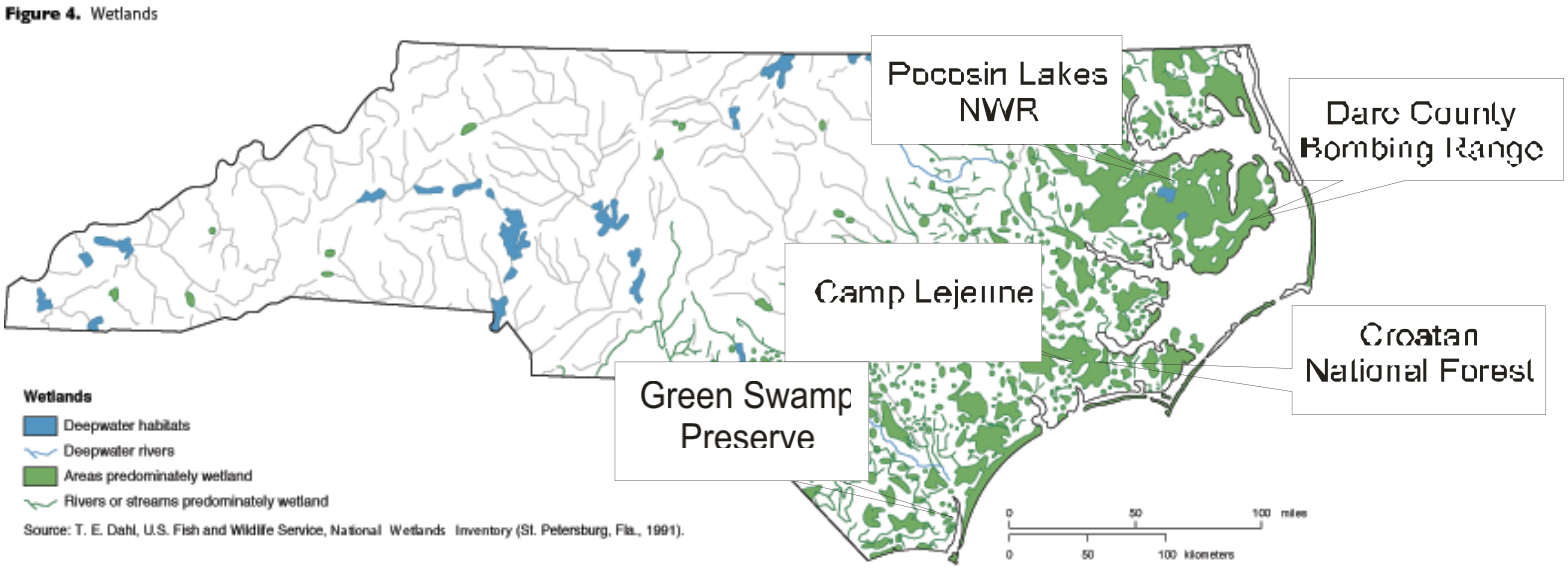
Pains Bay Fire : Smoke Drift Map 6-24-2011

Suppression Activities

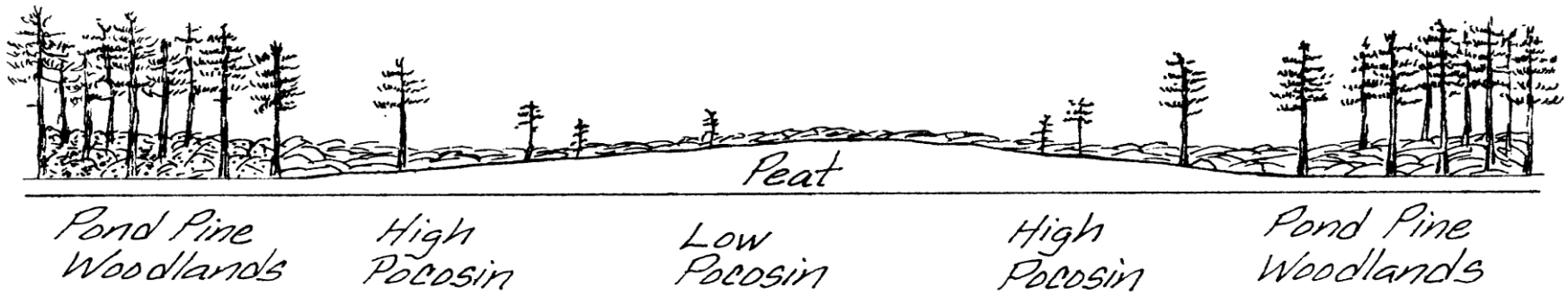
Potato patching

Fire Break and Sprinkler line

North Carolina Wetlands and Study Sites



Pocosin
Swamp on a hill

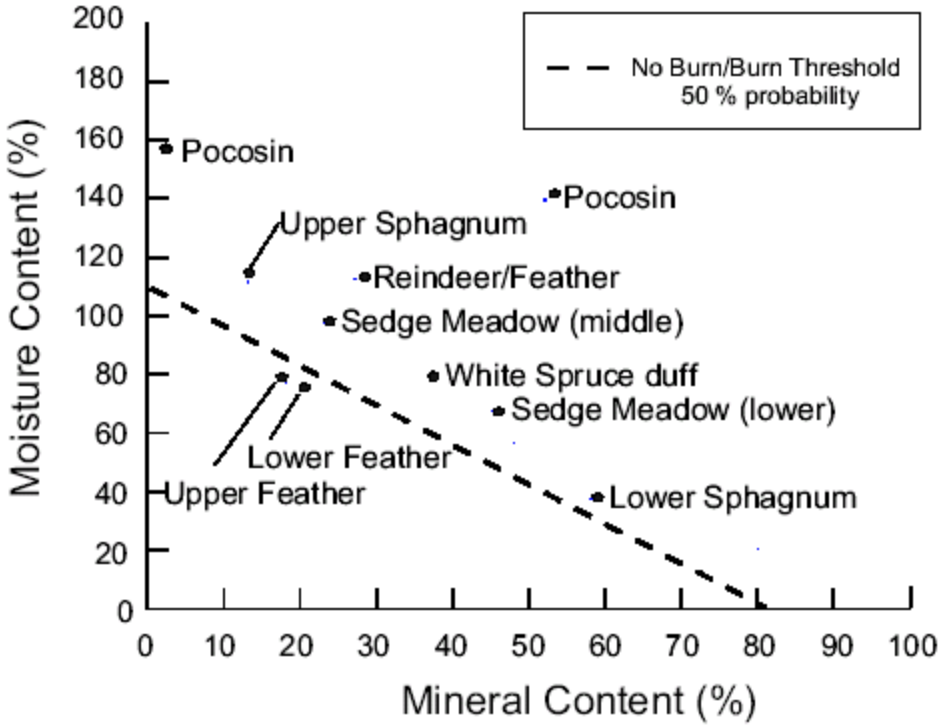


decreasing ← Organic Soil Thickness → decreasing

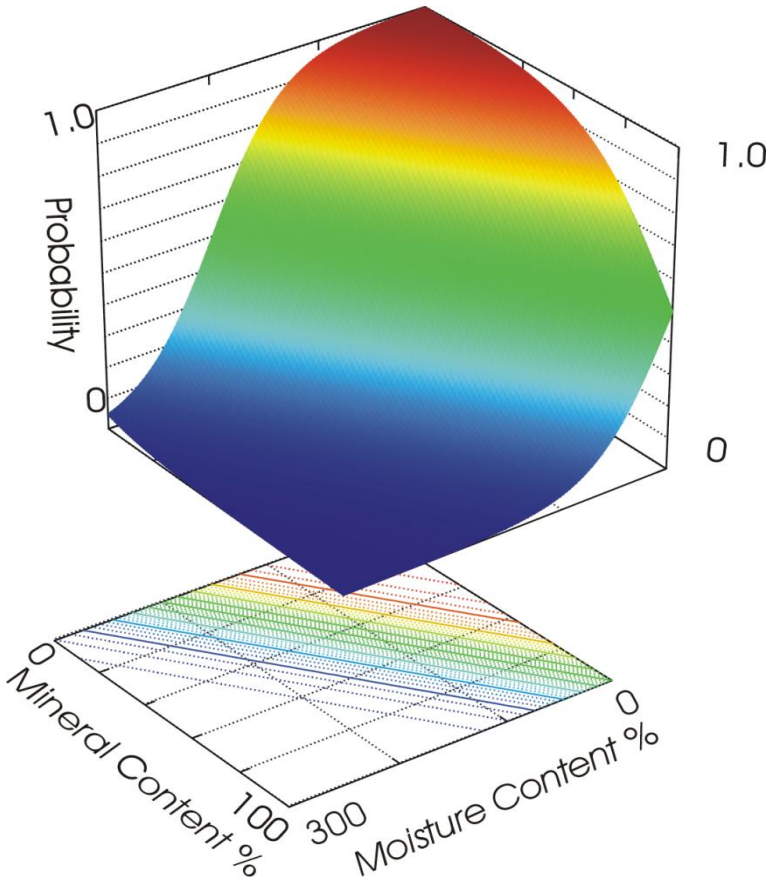
decreasing ← Hydroperiod → decreasing

increasing ← Fire Frequency → increasing

No Burn/ Burn Threshold

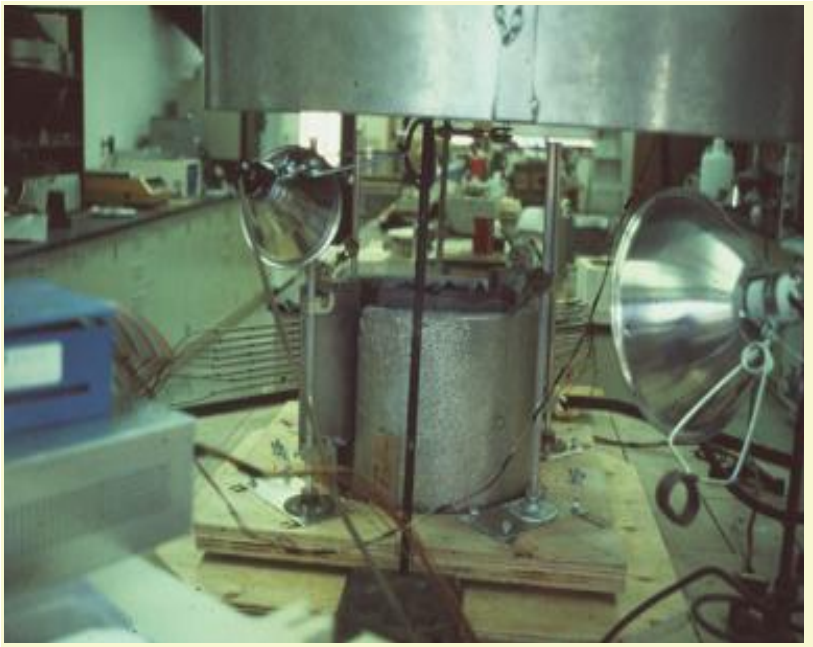


Estimated Smoldering Probability

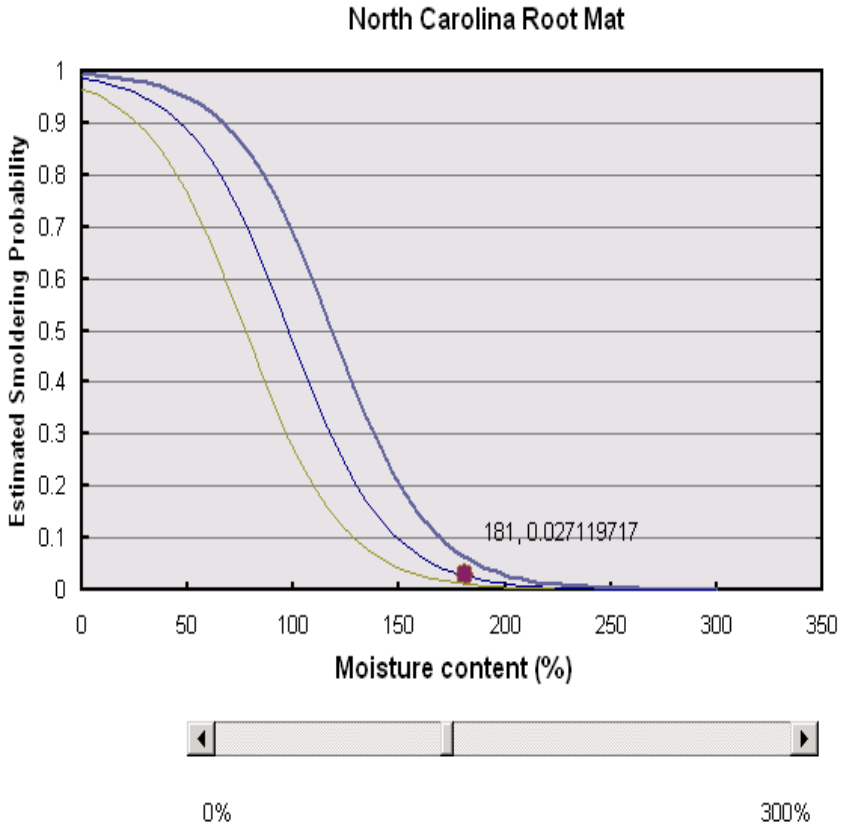


Root Mat Samples

Lower Muck Samples



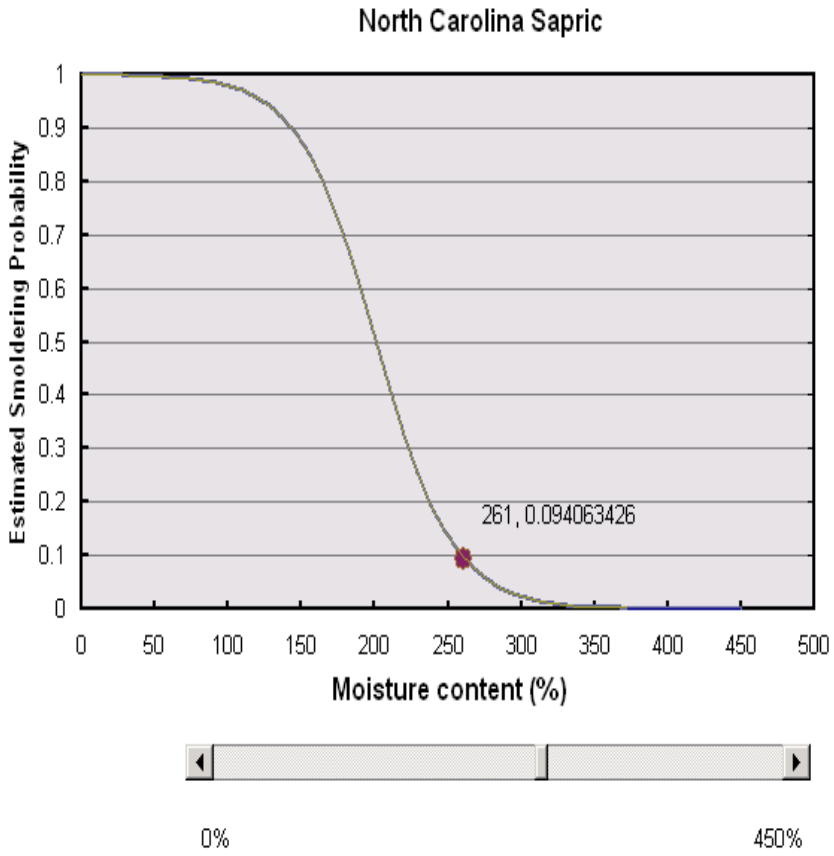
Moisture Limits of Root Mat Soils



Soil Type
North Carolina Root Mat
North Carolina Sapric
Alaska Feather moss

Moisture Content	181		
Mineral Content	3	5	7
Estimated Smoldering Potential	1.1%	2.7%	6.3%

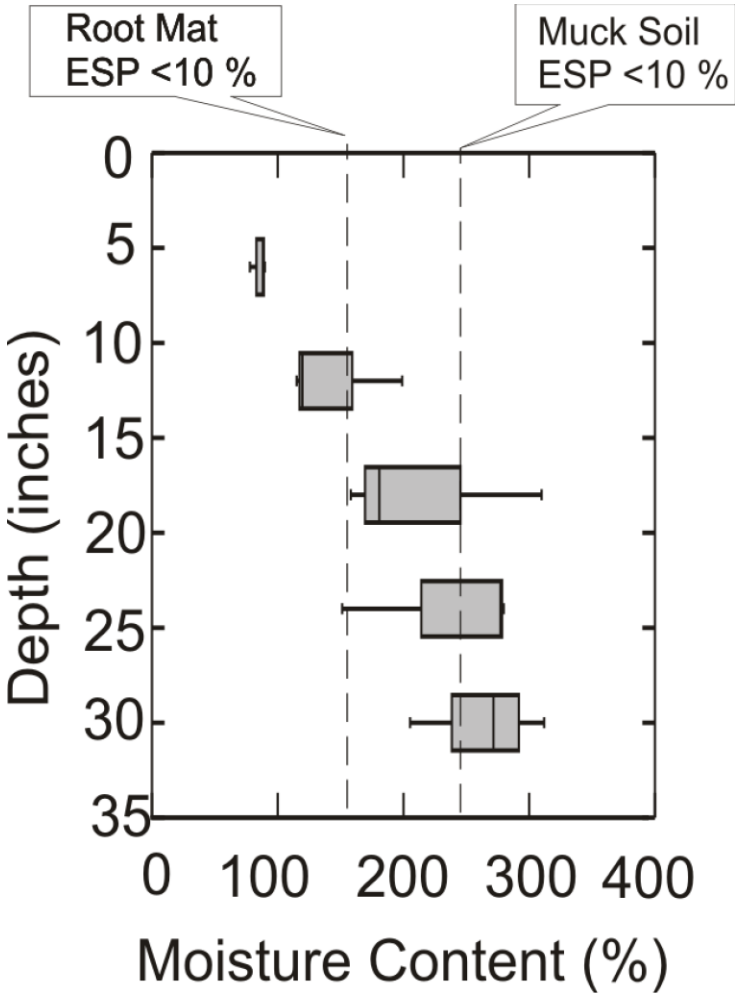
Moisture Limits of Lower Muck Soils



Soil Type
North Carolina Root Mat
North Carolina Sapric
Alaska Feather moss

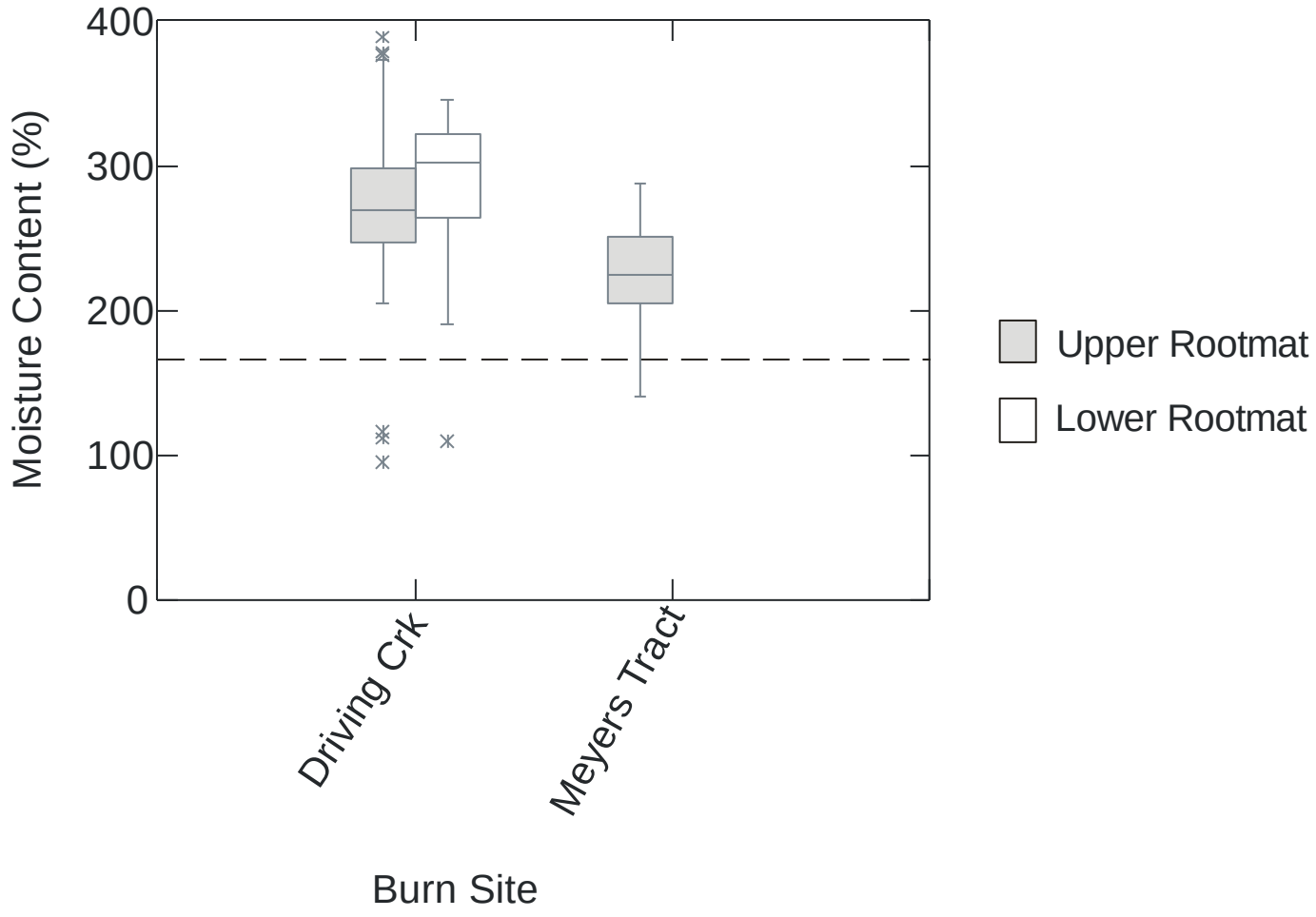
Moisture Content	261		
Mineral Content	0	0	0
Estimated Smoldering Potential	9.4%	9.4%	9.4%

Research Prescribed Burn
Green Swamp, Brunswick County NC

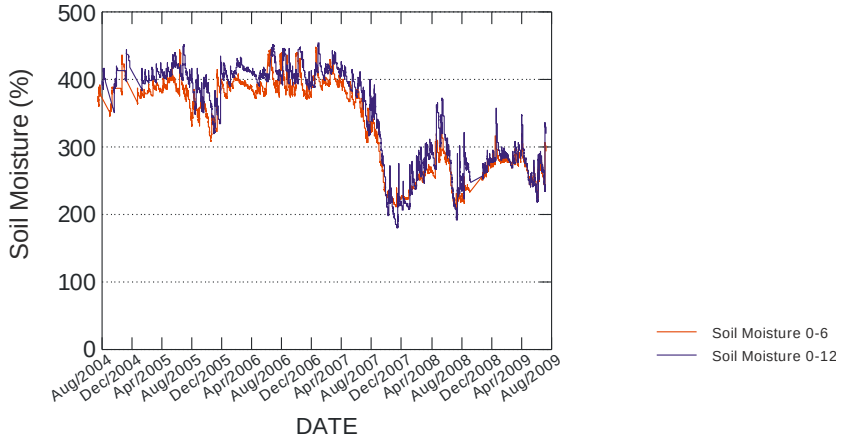


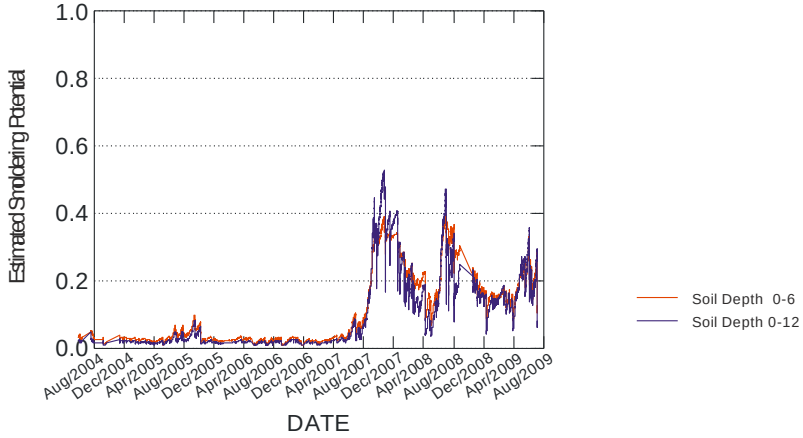
Driving Creek Burn

Root mat moisture content

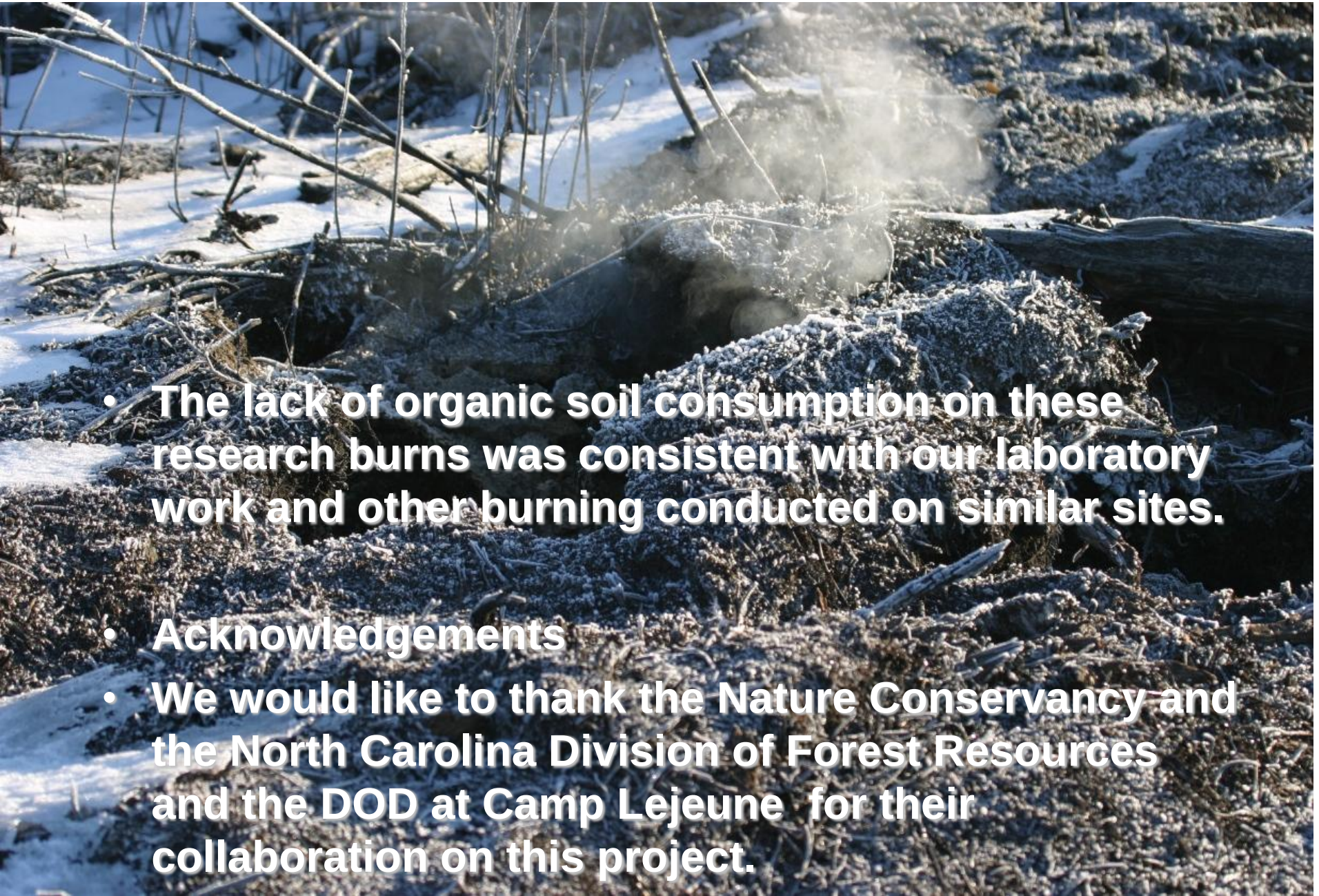


Soil moisture and estimated smoldering potential at Pocosin Lakes NWR





Summary



- The lack of organic soil consumption on these research burns was consistent with our laboratory work and other burning conducted on similar sites.

- Acknowledgements
- We would like to thank the Nature Conservancy and the North Carolina Division of Forest Resources and the DOD at Camp Lejeune for their collaboration on this project.