

Prescribed Fire Summary for Holland Hill Barrens, Subunits A & B

BURN UNITS: Subunits A & B
ACRES BURNED: 4.4 (A = 1.2 and B = 3.2)
DATES BURNS CONDUCTED: May 7th, 2012
LOCATION: Holland Hill Barrens, Mashpee, Massachusetts
SUMMARY PREPARED BY: Joel R. Carlson
Northeast Forest and Fire Management, LLC
DATE PREPARED: May 11th, 2012

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BURN OVERVIEW:

On May 7th subunits A and B of the Holland Hill Barrens prescribed burn unit were burned, totaling 4.4 acres – completing the 13.5 acre prescribed burn project. The burn and mop-up operations were conducted using a combination of Town of Mashpee partner organization, and contract resources (See Table 7). The burn boss, Joel R. Carlson from Northeast Forest and Fire Management, LLC was under contract by the Town of Mashpee to conduct the prescribed burn. Personnel, equipment, and supplies were adequate for the burn (Tables 6 and 7).

The test fire for the prescribed burn showed favorable fire behavior, smoke behavior, and fire effects (Tables 1 and 5). Winds were light and variable but the burn was achievable as a result of its small size, firebreak configurations, and onsite resources. Winds shifted to the southeast sporadically, a direction that was not prescribed in the burn plan but given adequate lift and dispersion in addition to downwind smoke impact monitoring it was determined that no impacts were occurring on smoke receptors downwind. Post-burn ocular estimates indicate that all burn objectives were met (Table 5). Mop-up on the unit took a limited amount of time as a result of the low KBDI 122. No smoldering was occurring when the unit was declared secured at 1700 on the 7th of May (Table 7).

The unit was checked daily until it was declared out on the 9th of May. After the 7th of May no smoke or smoldering was observed in the unit. On the 9th of May 0.19 inches of precipitation was recorded and the unit was declared out.

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OBSERVATIONS, RECOMMENDATION (FROM AARS AND OTHER SOURCES):

COMMAND/GENERAL STAFF

- Coordination and establishment of contingency procedures was efficient and easily setup with the Mashpee Fire Department and DCR Fire Control.
- No Public Information Officer was required, however if no Public Information Officer is present the fire weather observer/Fire Effects Monitor should have adequate knowledge and experience to interact with the public as required.
- Onsite communications with the fire department and patrols in potential smoke impact areas greatly enhanced safety and efficiency of operations in addition to enabling the burning of the unit when wind directions shifted outside prescribed conditions.

FINANCE AND ADMINISTRATION

- Check-in and check-out for the size of the operation was efficient. Having an individual in charge of check-in and directing resources to the appropriate location increased the ease and efficiency of setup.
- Actions taken and information received during and following an incident should be compiled and added to the burn/incident file by both the burn boss and the site staff.

LOGISTICS

- Having two cases of drinking water was important. On warmer days additional water and Gator Aid or a similar drink would be important.
- A UTV(s) to move equipment around the unit would shorten setup time and decrease fatigue on the burn crew.
- The use of the contract fire cache and contract crew familiar with setup and burn operations increased efficiency and safety and should be considered for future burns.

PLANNING

- Great Hay Road should be closed during future burns in this area, specifically when the burn unit is immediately adjacent to the road.
- Unit perimeter should be marked with flagging and the flagging marked with point numbers to be used for crew reference points.
- Breaking up of fuels with mastication increased safety for igniters by providing escape routes and reduced fatigue on igniters.
- Having a qualified Fire Effects Monitor familiar with the event log and monitoring sheets greatly enhanced the quality and quantity of recorded information during a prescribed burn.
- Post burn evaluation protocols of burn units to measure 1st order effects and to better verify the degree that goals and objectives were met should be established (beyond ocular estimates but not overly detailed).
- Foliar Moisture Content for pitch pines and the KBDI should continue to be tracked for burns.
- Prior to future burns abutting land management agencies should be notified of intent to burn.

OPERATIONS

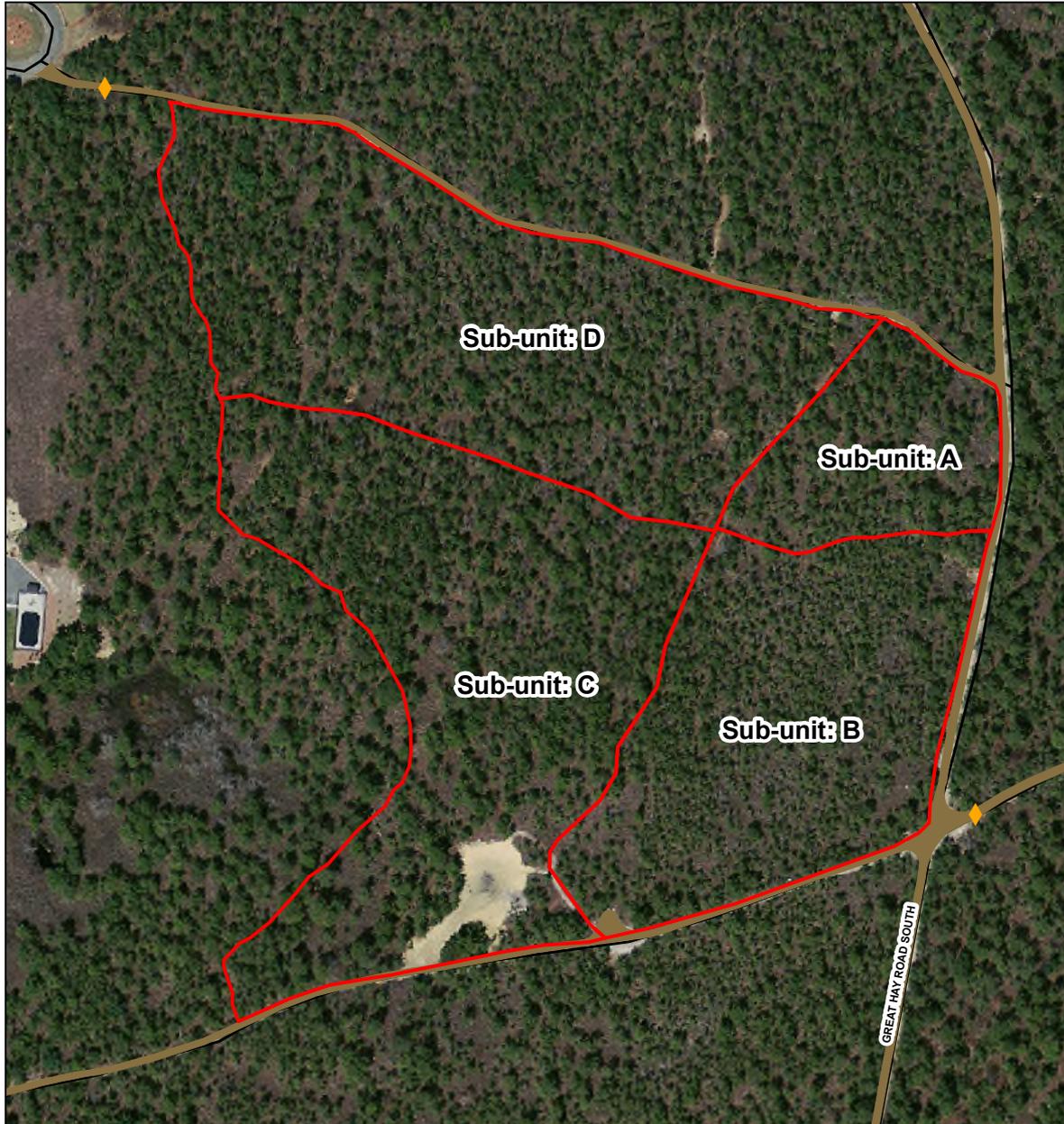
- Crew and equipment were adequate for operations.
- Having two brush breakers in reserve while burning in the heavy fuels that was in the unit was important and should be considered for future burns. The breakers should be stage as close as possible to the burn unit and staffed with at least one person on each when possible.
- The onsite water tender greatly improved efficiency of refilling engines and providing for contingencies.
- The experience level of the crew greatly contributed to burn safety and the efficiency of operations.
- Additional igniter would have reduced wear and tear on ignition crew in dense fuels that required intensive ignition tactics in addition to difficult walking conditions.

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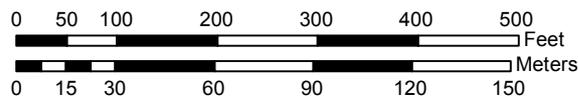
FIGURE 1. BURN UNIT MAP

Mashpee National Wildlife Refuge
Mashpee, Massachusetts

Unit Ortho Photo



 Burn Unit  Gate  Dirt Road  Paved Road



Date Prepared: 05/18/11
Disclaimer: This map is for planning purposes only, with specific points subject to verification on the ground. It is not to be used by itself for legal boundary definition.
Data Sources: Office of Geographic Information (MassGIS), MA ITD
Town of Mashpee
Northeast Forest and Fire Management, LLC

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TABLE 1. BURN GOALS AND OBJECTIVES

Based on Post Burn Ocular Estimates	
<u>BURN UNIT GOALS:</u>	
A.	Fuel hazard reduction of surface fuels and overstory/mid-story thermal thinning.
B.	Ecological maintenance of northeast barrens habitat, with a focus on New England Cottontail habitat improvement.
C.	Training - wildland fire training through practical application in wildland fire behavior, fire suppression principles, and prescribed fire techniques.
<u>BURN UNIT OBJECTIVES:</u>	
RESOURCE OBJECTIVES	
1.	<p>Reduce active and passive crown fire potential by removing ladder fuels within the pine dominated area, increase canopy base height, and reduce canopy bulk density so that the crowning and torching indices are 30 and 20 or less, respectively, for severe drought conditions.</p> <p>Ocular estimates suggest this burn was successful in achieving this objective. Canopy base height has been increased by 10 to 15 feet throughout the stand by thermal thinning. Canopy bulk density is estimated to have been reduced by approximately 20% by thermal pruning, consumption of foliage, and the limited mortality of trees that will result from the fire.</p>
2.	<p>Reduce 1 Hour and fine dead fuel loads throughout the unit by 20 to 50%.</p> <p>Ocular estimates suggest this burn was successful in achieving this objective. 1 hour and fine dead fuel loads are estimated to have been reduced by 40 to 50%.</p>
3.	<p>Expose 25 to 75% of the upper duff layer.</p> <p>Ocular estimates suggest this burn was successful in achieving this objective. 100% of the upper duff layer is estimated to be exposed by the low severity fire that occurred in the subunits.</p>
4.	<p>Top kill less than 20% of the overstory trees and greater than 50% of the shrub layer.</p> <p>Ocular estimates suggest this burn was successful in achieving this objective. As a result of girdling, thermal thinning, and foliage consumption it is estimated that less than 20% of the overstory pitch pine will have direct or indirect mortality from the burn. It is estimated that up to 95%+ of the low and high shrub layer shrubs will result in top kill of their stems as a result of the low to high severity fire that occurred in the subunits (estimates are high due to the burns timing related to emergence of leaves in the low shrubs).</p>
5.	<p>Reduce shrub fuel loading by 25 to 35%, while still increasing stem density to improve habitat for New England Cottontail and other conservation target populations.</p> <p>Ocular estimates suggest this burn was successful in achieving this objective. It is estimated that 35% of the shrub fuel load was reduced by the low to high severity fire that primarily occurred in the low shrub layer. Since the shrub layer was only top killed stem densities will likely increase post fire as a result of resprouting and increased light resulting from the thermal pruning and thinning that occurred.</p>
6.	<p>Provide training assignments for 2 to 4 fire fighters.</p> <p>Two crewmembers served as Fire Fighter Type 2 (FFT2) Trainees, one as a Fire Effects Monitor (FEMO) Trainee, and one as an Engine Boss (ENGB) trainee. All crew benefited from exposure to observed fire behavior and prescribed fire tactics. The Mashpee Fire Department's understanding and acceptance of prescribed fire as a management tool was greatly enhanced.</p>
PRESCRIBED FIRE OBJECTIVES	
1.	<p>Complete each subunit within one operational period.</p> <p>Two subunit was completed in one operational period.</p>

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Based on Post Burn Ocular Estimates	
2.	<p>Have no escapes or injuries.</p> <p style="margin-left: 40px;">No fire burned outside the intended area and no escape was declared.</p>
3.	<p>Have no smoke impacts to sensitive smoke receptors. Prevent smoke impacts to off base receptors from exceeding 2.5 ppm (Environmental Protection Agency standard for “Unhealthy for Sensitive Groups”) and avoid creating prolonged periods of nuisance smoke generation.</p> <p style="margin-left: 40px;">No complaints were reported related to smoke. No indication of offsite smoke impacts beyond minimal visible smoke was observed.</p>
4.	<p>Complete operations without preventable damage to equipment.</p> <p style="margin-left: 40px;">No damage to equipment occurred.</p>
5.	<p>Create a reduced fuel area from which to extend future prescribed burns.</p> <p style="margin-left: 40px;">A reduce fuel area of 4.4 acres extending the 9.1 acres from the previously burned subunits has been established near a development and adjacent.</p>

TABLE 2. BURN EVENT LOG SUMMARY

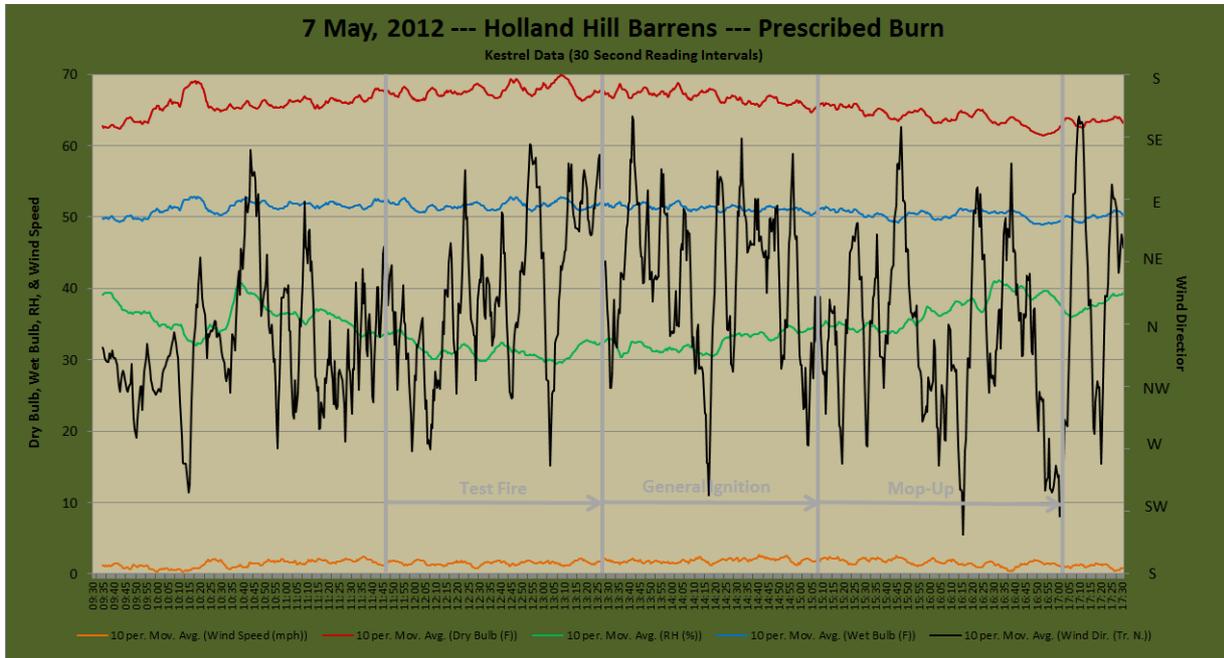
EVENT	TIME
NE-FFM Crew Arrival at Mashpee Fire Department Station 2	0800
NE-FFM Crew Arrival at Site	0830
Setup Initiated	0830
Setup Complete	0900
General Crew Arrival at Mashpee Fire Department Station 2	0900
General Crew Arrival at Site	0930
Sign In Completed	1000
Briefing Initiated	1005
Briefing Completed	1055
Test Fire Initiated	1145
Test Fire Completed	1225
Prescribed Burn Initiated	1225
General Ignition Complete	1510
Debriefing/AAR Initiated	1543
Debriefing/AAR Completed	1615
Mop-up Initiated	1615
Mop-up Completed	1700
Breakdown Initiated	1615
Breakdown Complete	1700
Unit Secure	1700
General Crew Depart Site	1700
NE-FFM Crew Depart Site	1730

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TABLE 3. WEATHER OBSERVATIONS

Time	Mid-Flame Wind (mph)	Wind Direction (True)	Dry Bulb (F°)	Wet Bulb (F°)	Relative Humidity (%)	Probability of Ignition (%)	1-hour Fuel Moisture (%) Measured	1-hour Fuel Moisture (%) Calculated
Prescription	0 - 8	S → N	35 - 90	--	30 - 100	--	6 - 12	6 - 12
0935	0	-	62	54	59	20	12	11
1100	2	WSW	72	54	29	60	7	5
1100	-	-	67	58	58	30	10	10
1100	-	-	68	55	42	30	-	10
1140	2	SW	66	54	44	40	9	7
1200	3	S	68	54	38	40	8	7
1230	3	SSW	66	54	44	40	7	7
1300	2	S	68	54	38	40	-	7
1330	1	E	68	53	34	50	-	6
1400	2	S	66	52	36	50	-	6
1430	1	S	68	54	38	40	-	7
1510	3	SW	66	54	44	40	-	7

FIGURE 2. WEATHER RECORDS SUMMARY



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FIGURE 3. DROUGHT INDEX

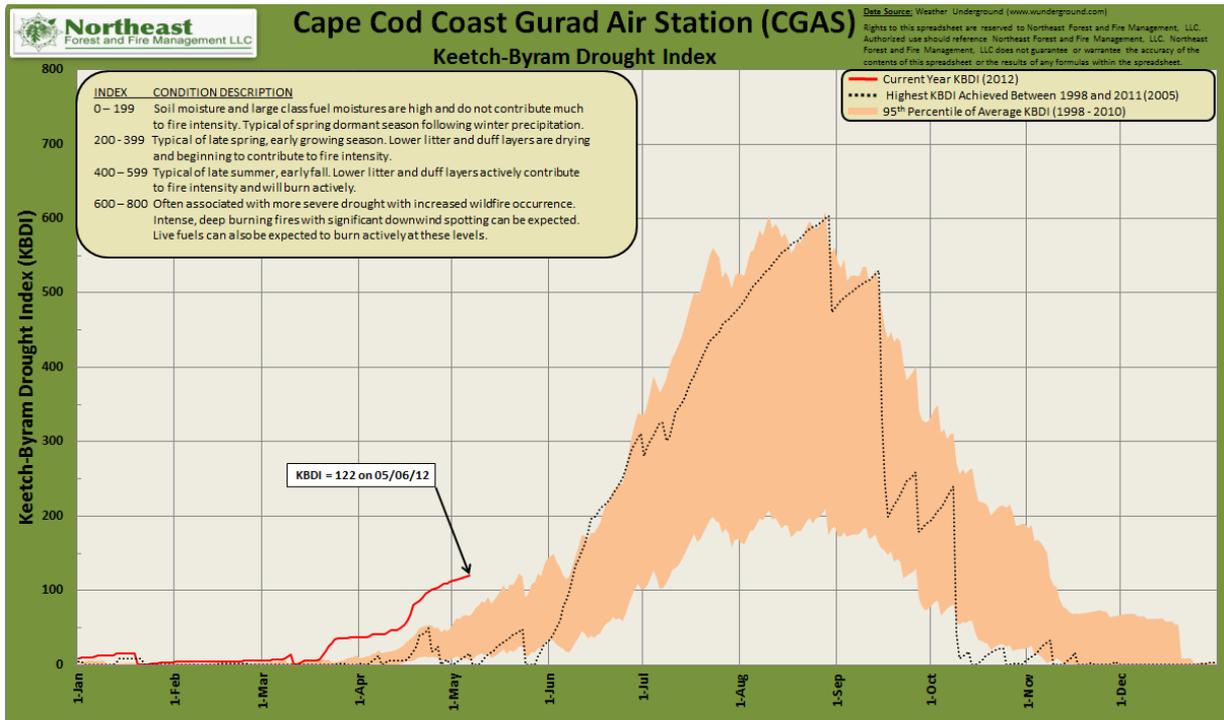
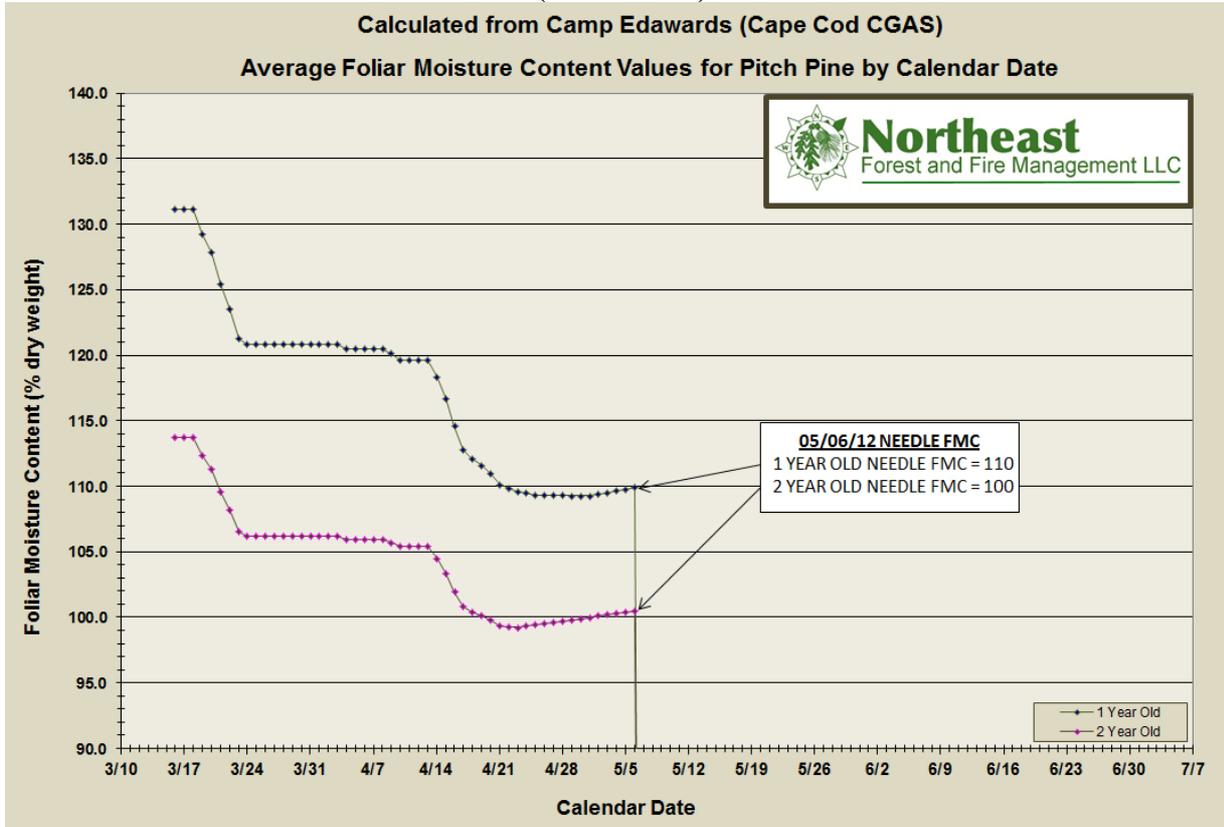


FIGURE 4. FOLIAR MOISTURE CONTENT (PITCH PINE)



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TABLE 4. EMISSION ESTIMATES

SMOKE EMISSIONS -- FOFEM 5.9										
Model Inputs										
Fuel Model Used:		FCCS 124 - Pitch Pine - Oak Forest								
Season:	Spring		Moisture Scenario:			Dry		Fuel Category:		Natural-Fuel
Fuels (Tons/Acre)	Litter	0 - 1/4"	1/4 - 1"	1 - 3"	3"+	Duff	Herb	Shrub	Foliage	Branch
	4.59	0.20	0.50	0.50	0.40	18.75	0.11	0.73	No Data	No Data
1/4 - 1" Moisture %:		10*		3"+ Moisture %:		15*		Duff Moisture %:		40*
3"+ Log Rotten %:		50		Duff Depth (in.):		1.6		Crown Burn %:		20
Log Loading Dist.:		Even/Entire								
Run Results (Pounds/Acre) for Flaming and Smoldering Combustion Phases										
<i>PM₁₀</i>	<i>PM_{2.5}</i>	<i>CH₄</i>	<i>CO</i>	<i>CO₂</i>	<i>NO_x</i>	<i>SO₂</i>	<i>NH₃</i>	<i>VOC</i>	<i>EC</i>	<i>OC</i>
777	689	392	8,492	52,411	33	38	119	1,953	5	372
Run Results (Pounds for 4.4 Acres) for Flaming and Smoldering Combustion Phases										
<i>PM₁₀</i>	<i>PM_{2.5}</i>	<i>CH₄</i>	<i>CO</i>	<i>CO₂</i>	<i>NO_x</i>	<i>SO₂</i>	<i>NH₃</i>	<i>VOC</i>	<i>EC</i>	<i>OC</i>
3,419	3,032	1,725	37,365	230,608	145	167	524	8,593	22	1,637
NOTES:										
<ul style="list-style-type: none"> • #* indicates that preset moisture scenario numbers were used. • The following formulas were used to estimate emissions for emission estimates that FOFEM does not provide; $NH_3 = 0.014 \times CO$, $VOC = 0.23 \times CO$, $EC = 0.0072 \times PM_{2.5}$, and $OC = 0.54 \times PM_{2.5}$. The equations are from "Fire Emissions Inventory Development for The Midwest Regional Planning Organization"; Final Report dated 30 September, 2004. 										

TABLE 5. BURN SEVERITY

BURN SEVERITY					
BURN SEVERITY	UNBURNED (%)	SCORCHED (%)	LOW SEVERITY (%)	MOD. SEVERITY (%)	HIGH SEVERITY (%)
SUBSTRATE (TOTAL = 100%)	0	0	100	0	0
HERBACEOUS VEGETATION	/	/	/	/	/
LOW - WOODY VEGETATION	0	0	50	30	20
HIGH - WOODY VEGETATION	0	25	40	30	5
TREES - WOODY VEGETATION	0	90	5	4	1
Scorch Height	Subunit A 30 Feet & Subunit B 25 Feet				

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TABLE 6. SUPPLIES EXPENDED

ITEM	QUANTITY
Drip Torch Fuel (gallons)	5
Fussees (Number)	0
Pump Fuel (Gallons)	Not Recorded
Vehicle Fuel (Gallons)	Not Recorded
Flares (Number)	0
MREs or Packaged Meals (number)	None Issued
Bottled Water/Gator Aid (Number)	48
Drinking Water/Gator Aid (gallons)	0
Water Flowed During Burn Operations (Gallons)	400
Water Flowed During Mop-up (Gallons)	2,000

TABLE 7. RESOURCES AND EQUIPMENT

Agency	Operational Personnel	Type 3 Tender	Type 4 Engine (Brush Breaker)	Type 6 Engine
Mashpee Fire Department	3 & 1 Trainee	-	1	-
DCR	4 & 1 Trainee	1	1	1
USFWS	3	-	-	1
Northeast Forest and Fire Management, LLC	7	-	-	-
Total	17 & 2 Trainees	1	2	2

TABLE 8. TIME AND EFFORT BREAKDOWN

EVENT	DURATION
Arrival to Briefing	2 hr. 5 min.
Briefing	50 min.
Test Fire	35 min.
General Ignition	3 hr. 50 min.
Debriefing	25 min.
Mop-up	45 min.
Breakdown	45 min.
Total Time	8 hr.
Total Operational Person Hours	136 hrs. (16 hrs. for FFT2-T)
Acres Burned	4.4 acres
Person Hours/Acre	31 hr./acre (Not Including FFT2-T)

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TABLE 9. BURN DOCUMENTATION, DVD CONTENT LIST --- FILE: "DVD Contents.doc"

- ❖ Burn Summary
 - Burn Summary (PDF & DOCX)
- ❖ Burn Day Documentation
 - Event Log (PDF)
- ❖ Burn Plan
 - Signed Burn Plan (PDF)
- ❖ IAP
 - Crew Handout (PDF)
- ❖ Notifications
 - Phone Notification Documentation (PDF)
 - Crew Notification Emails (PDF)
 - DEP Notification and Corrected Notification (PDF)
- ❖ Other
 - Contract and Invoices Folder with Invoices, Contract, and Proposal (PDF)
 - DEP Permit and Permit Renewal (PDF)
 - MNWR Fire Management Fact Sheet (PDF)
 - Unit Declared Out Emails (PDF)
 - GPS Track Log for FEMO [Egan] and FEMO-T [Sullivan] (GPX)
- ❖ Photos
 - Geo-referenced Photographs by Carlson
 - Geo-referenced Photographs by Egan
 - Geo-referenced Photographs by Sullivan
 - Geo-referenced Water Marked Photos by Carlson, Egan, & Sullivan
 - Geo-referenced Photo Report (PDF)
 - Burn Video (WMV)
 - Web Quality Burn Video (MP4)
- ❖ Weather
 - Burn Day Weather Forecast (PDF & DOCX)
 - SPOT Weather Forecast (PDF)
 - Kestrel Weather Records (XLSX)