



Use of Prescribed Fire in the Quabbin and Ware River Watersheds

WSCAC meeting June 14, 2022



What is prescribed fire?

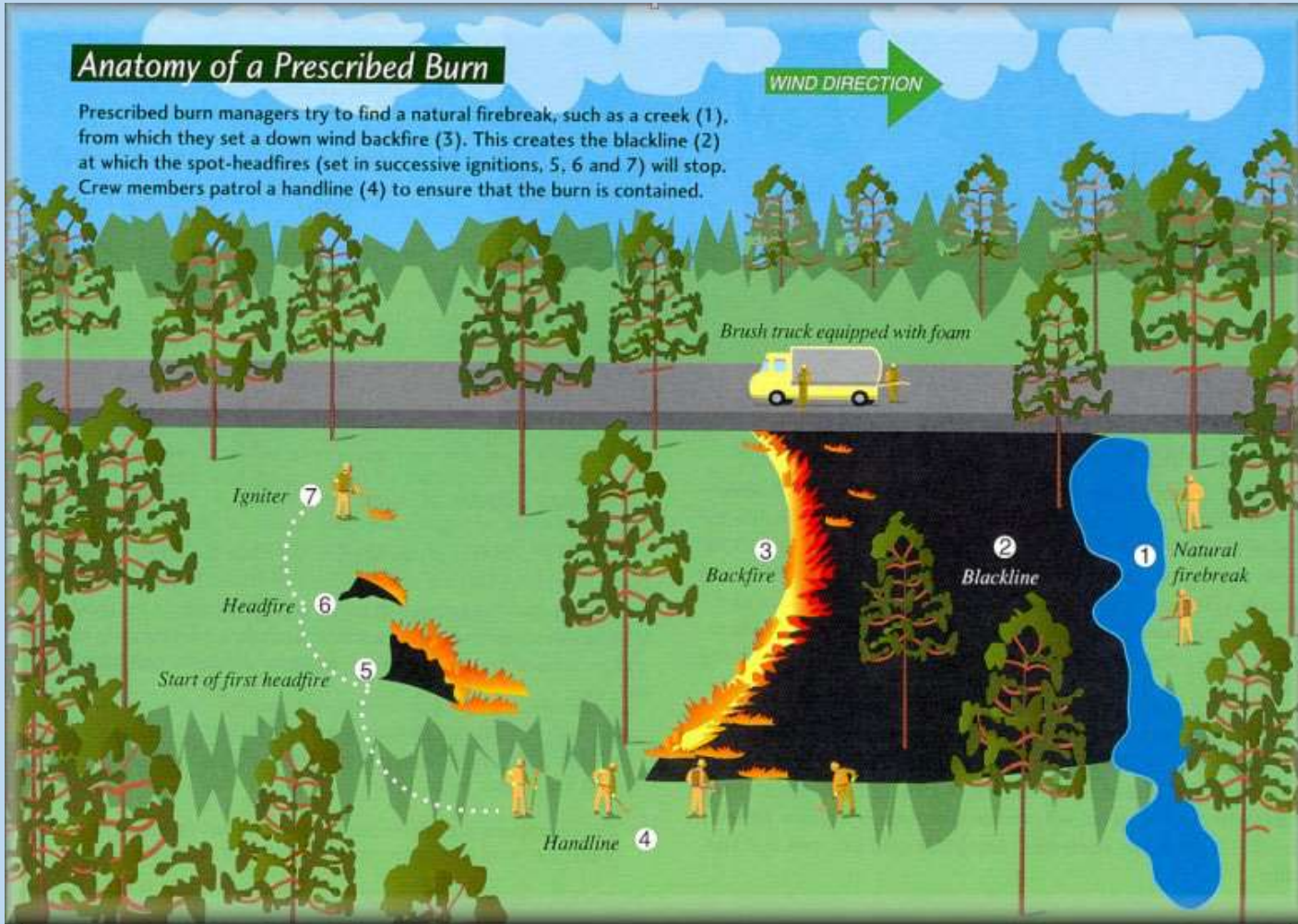
Application of fire:

- Applied in a skilled manner,
- Within specific weather parameters,
- In a defined location,
- With specific goals

Anatomy of a Prescribed Burn

Prescribed burn managers try to find a natural firebreak, such as a creek (1), from which they set a down wind backfire (3). This creates the blackline (2) at which the spot-headfires (set in successive ignitions, 5, 6 and 7) will stop. Crew members patrol a handline (4) to ensure that the burn is contained.

WIND DIRECTION



Courtesy of the Florida Forest Service



Burn plan

Appendices

Element 1 Signature Page

Element 2A Agency Administrator Ignition Authorization

Element 2B Prescribed Fire Go/No-Go Checklist

Element 3 Complexity Analysis Summary and Final Complexity

Element 4 Description of Prescribed Fire Area

Element 5 Management Goals and Burn Objectives

Element 6 Permits, Notifications and Contacts

Element 7 Prescription

Element 8 Scheduling

Element 9 Pre-burn Considerations and Weather

Element 10 Briefing

Element 11 Organization and Equipment

Element 12 Communication

Element 13 Public and Personnel Safety, Medical

Element 14 Test Fire

Element 15 Ignition Plan

Element 16 Holding Plan

Element 17 Contingency Plan

Element 18 Wildfire Declaration

Element 19 Smoke Management and Air Quality

Element 20 Monitoring

Element 21 Post-burn Activities

Appendix A: Maps: Vicinity, Project or Ignition Units (or both), Optional: Significant or Sensitive Features, Fuels or Fuel Model, Smoke Impact Areas

Appendix B: Technical Reviewer Checklist

Appendix C: Complexity Analysis

Appendix D: Agency-Specific Job Hazard Analysis or Risk Assessment

Appendix E: Fire Behavior Modeling Documentation or Empirical Documentation

Appendix F: Smoke Management Plan and Smoke Modeling Documentation (Optional)

Appendix G: COVID-19 Risk Management Plan



Element 4

B. Vegetation/Fuels Description:

1. On-site fuels data:

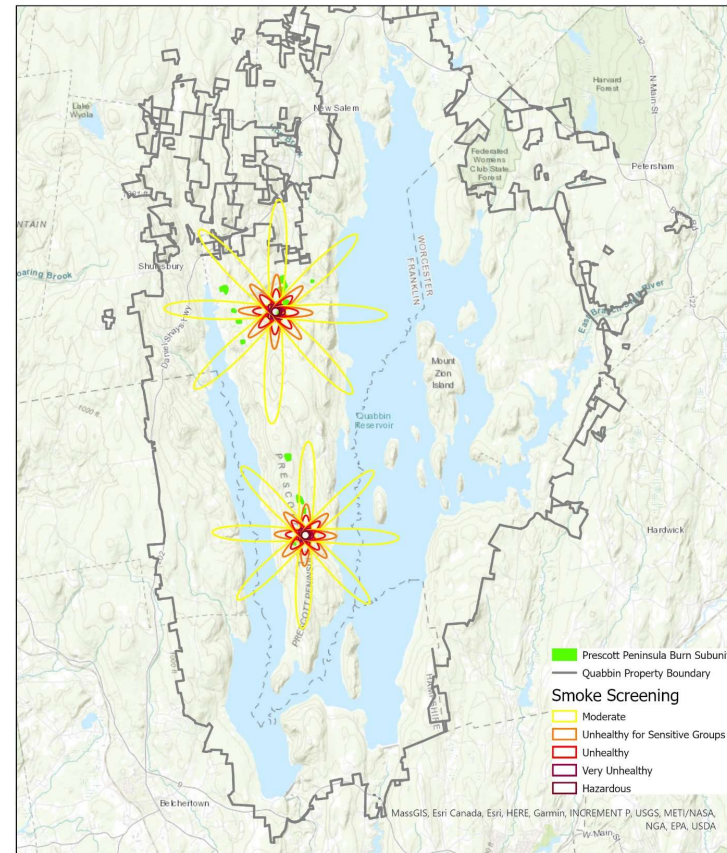
- Most of the fields (97%) were classified as fuel type GR3 (see tables on page. 8-9). Fields with higher woody vegetation component, were classified as SH3 (3% of fields). Vegetation communities were categorized into fuel models described in: *Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153.*
- Fuels and vegetation were described based off field inspection. Many of the fields are dominated by forbs, with cool season grasses, vines, shrubs and young trees present. Some had low amounts of warm season grasses, such as little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*) and Indian grass (*Sorghastrum nutans*), though the numbers of these are generally so low that these would not be the primary carriers of fire. The primary carriers would be cured forbs, cool season grasses, and vines such as dewberry and grape.

Adjacent fuels data:

- Most of the fuels adjacent to the subunits are closed canopy forest and classified into the fuel group TL6. These range from white pine dominate, hemlock- hardwood mix, oak- hardwood mix, white pine-oak mix, black birch- red maple- cherry mix, and non-native red pine. See Map 5 for the units and adjacent forest types.
- Timber harvests are actively conducted on the peninsula, some adjacent fuels may have decreased canopy cover if recently harvested. Areas that were harvested were classified in the fuel group SL1. See Map 5 for adjacent harvests that occurred adjacent to burn subunits within the last ten years.

Smoke Management

- Permits acquired through DEP
- Sensitive receptors and nearest neighbors mapped
- Use V-Smoke modeling to predict smoke impacts
- Day of burn: towers and roving smoke monitor(s) used to assess impacts of smoke.



VSmoke- web
3.5 tons/ acre
60% consumption
500 ft mixing height
10 mph transport winds

Prescott Peninsula Fields - Smoke Screening Map
New Salem, MA

0 1.5 3 6
Miles

 **dcr**
Massachusetts

Prepared by: Virginia Dauteriv, DCR/DWSP Natural Resources



Why use fire on DWSP lands?

Current land management activities consist of mowing and brush-hogging to maintain open habitats; deer management and timber harvests to promote age and species diversity in forests.

Moving forward, DWSP has started integrating the use of fire to assist us in reaching our landscape diversity goals.




Silvicultural Use
to reestablish and maintain
oak and oak-hickory
woodlands and forests.



Photo by: Pacific Northwest Research Station, Forest
Service, USDA

Restoration

of rare inland barrens habitats, including heathlands, sandplain grasslands, shrublands, oak and pitch pine woodlands.



Purple milkweed—Massachusetts state listed species

Barre Heath



September 25, 2008



August 10, 2018



June 4, 2019



May 4, 2020



April 4, 2021



May 10, 2021

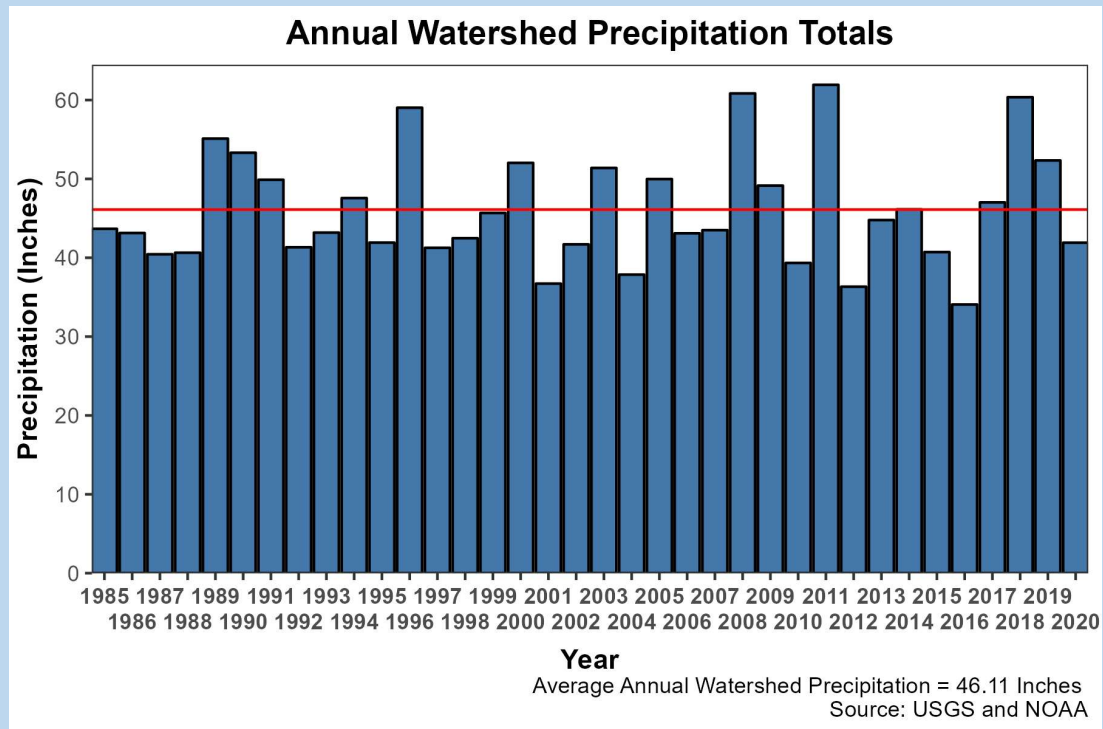


July 26, 2021



Maintenance
of grasslands, heathlands, shrublands, and woodlands.

Fuel Reduction



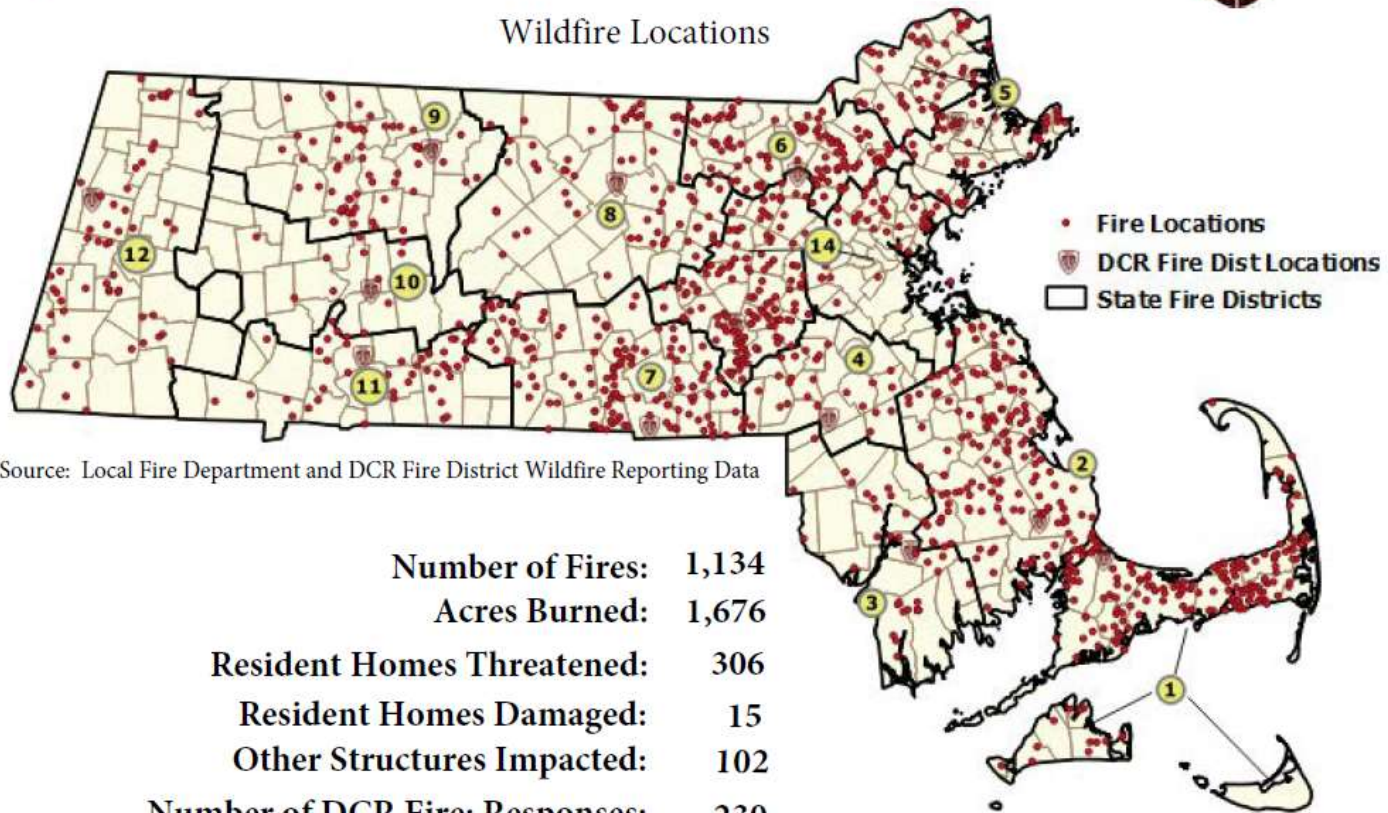
Climate change projections of warmer winters, resulting in longer growing seasons, as well as more extreme cycles of drought and increases in rainfall, increasing wildfire risk.



MASSACHUSETTS WILDFIRE OCCURRENCE 2021 SUMMARY



Wildfire Locations



Source: Local Fire Department and DCR Fire District Wildfire Reporting Data

Number of Fires:	1,134
Acres Burned:	1,676
Resident Homes Threatened:	306
Resident Homes Damaged:	15
Other Structures Impacted:	102
Number of DCR Fire: Responses:	230

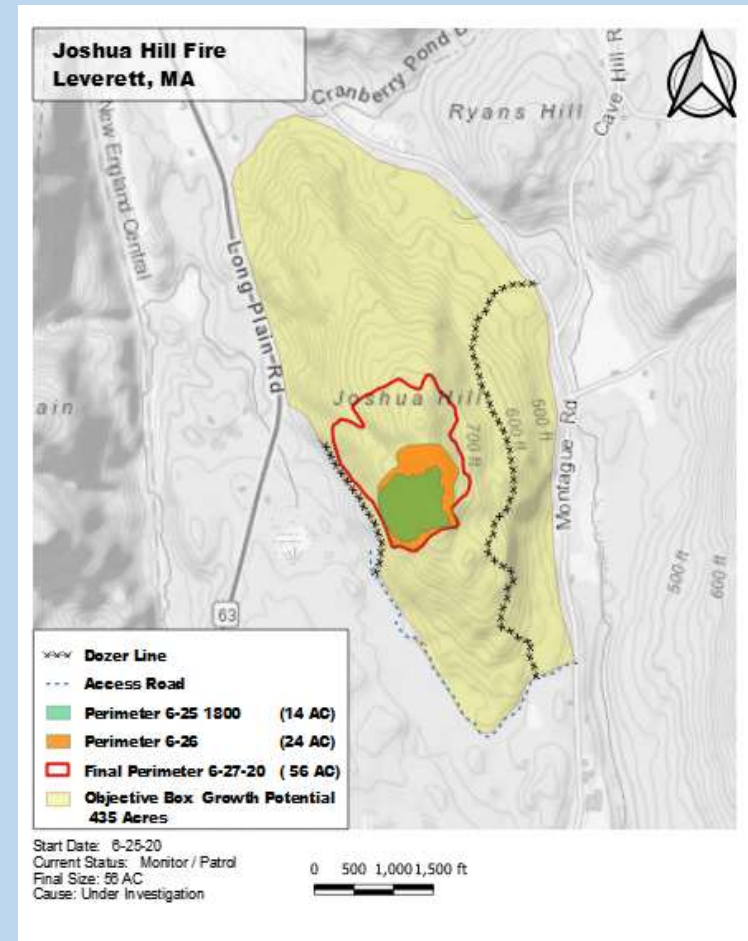
Western Mass. Blaze Serves As Reminder Of State's 'Rich History' Of Wildfire Leverett, MA



Amid scorched tree trunks, crews from MassWildlife survey the recently burned forest in Leverett, MA.

Daniel Ackerman / for GBH News

Source: [Western Mass. Blaze Serves As Reminder Of State's 'Rich History' Of Wildfire \(wgbh.org\)](https://www.wgbh.org/news/local/western-mass-blaze-serves-as-reminder-of-state-s-rich-history-of-wildfire)



Manuel Correllus State Forest- Martha's Vineyard



Left treated with prescribed fire, right without

Courtesy of DCR Fire Control

Bastrop State Park, TX - after a 32,000-acre wildfire



Left treated with prescribed fire, right without

Courtesy of NPR: [In Bastrop's Ashes, Officials Find a Lesson in Prescribed Burning](#) | [StateImpact Texas](#)

Training

- On the ground training is invaluable and cannot be replaced with classroom.
- Prescribed fires give local fire departments, DCR, and our partners valuable experience with fire behavior, firefighting tactics and use of specialized wildfire equipment, as well as the Incident Command System.



Prescribed Fire and Water Quality

Samples	Forest floor		Leachate water quality				Treatability		
	W_{woody} W_{detritus} (Mg/ha)	Cumulative DOC export (g)	DOC Concentration (mg/L)	THM FP ($\mu\text{g/L}$)	HAA FP ($\mu\text{g/L}$)	DOC	THM FP	HAA FP	
Unmanaged	7.6 \pm 4.2 36.7 \pm 4.6	~16.9	41.4 \pm 15.8	4299 \pm 2080	4191 \pm 2113	52 \pm 7 56 \pm 11	69 \pm 3 70 \pm 7	79 \pm 3 78 \pm 9	
Managed pre-burnt (2-3 years)	8.0 \pm 4.6 8.9 \pm 1.0	~8.94	23.7 \pm 10.3	2519 \pm 1537	2428 \pm 1468	52 \pm 4 57 \pm 6	69 \pm 7 70 \pm 10	79 \pm 6 81 \pm 11	
After dormant season burn	6.1 \pm 2.0 2.0 \pm 0.5	~8.49	22.5 \pm 9.1	2168 \pm 1044	2297 \pm 1209	48 \pm 9 51 \pm 11	68 \pm 9 72 \pm 11	77 \pm 7 78 \pm 10	
After growing season burn	5.9 \pm 1.0 5.1 \pm 1.1	~8.21	23.6 \pm 9.4	2092 \pm 965	2273 \pm 1197	42 \pm 14 49 \pm 13	67 \pm 7 67 \pm 10	75 \pm 13 77 \pm 10	

Fig. 5. The box model is summarizing the effect of prescribed fire on the forest floor, leachate water quality, and treatability. Errors show a standard deviation between three replicates. Cumulative DOC export (g) indicates total mass leached from 1 kg of mixture for ~1 year of the incubation period.

- Prescribed fire can alter detrital mass and chemistry in ways that improve water quality
- Periodic prescribed fire affected DOM composition, partially consuming humic-like substances and reducing tri-halomethane (42 \pm 23%) and haloacetic acid (42 \pm 20%) formation potentials in leachate water (Uzun et al. 2020)
- Long-term forest management (e.g. prescribed fire) improved water quality by reducing DOC and total N concentrations in surface waters (Majidzadeh et al. 2019)



Questions?

Thank you!