DFW Post-Harvest Flora
Montague Plains WMA, Montague, MA
Date of survey: 10/14/2009
Surveyed by: DFW Staff

General Description and Setting

This initial post-harvest survey covers small portions of two timber sale areas within the Montague Plains WMA that were harvested under winter conditions in 2004 and 2006 (four stands totaling 70 acres under contract no. CV-MP-1) and 2007 and 2008 (four stands totaling 130 acres under contract no. CV-MP-2). A forest cutting plan summary for CV-MP-2 is available at: http://www.mass.gov/dfwele/dfw/habitat/management/bdi/forest_mgt/pdf/montague_plains_cutting_plan.pdf. This initial post-harvest survey data does not cover the entire harvested areas, and occurred in October 2009, which was too late in the growing season to capture much of the herbaceous species diversity. A complete survey is planned for late-spring/early-summer of 2010, and results of that survey will be posted here.

Prior to these two harvesting operations, all stands were dominated by closed canopy pitch pine forest above a relatively sparse scrub oak understory growing on formerly tilled agricultural land. Prior to European settlement, a substantial portion of what is now the town of Montague had supported a unique, extensive, open-canopied and fire-adapted inland oak/pine barrens characterized by a relatively sparse overstory of tree oaks (e.g., black oak, scarlet oak, red oak, white oak, pin oak, chestnut oak) and pitch pine, and a relatively dense understory of scrub oak on a sandy outwash plain (Motzkin 1996, 1999, and 2001). Most of the pine barrens were converted to agriculture during the late 1700's and early 1800's, and subsequently abandoned during the late 1800's and early 1900's. Much of the abandoned agricultural land was developed, but the remaining undeveloped portions were primarily reclaimed by pitch pine without much of the original tree oak component because the wind-disseminated pitch pine seed germinated and grew well on the abandoned agricultural fields while tree oak acorns typically need to be directly deposited in the soil by birds (e.g. blue jays) or mammals (e.g. squirrels and chipmunks) to germinate and grow, and abandoned agricultural fields are not used extensively by these animals. Dense scrub oak was primarily confined to about 15% of the plains area that had not been tilled during agricultural use.

In order to protect development and people near Montague plains, fire suppression occurred throughout the 1900's, and as a result of fire exclusion the formerly open-canopied pitch pine forest accumulated high fuel loads and succeeded to a closed-canopy condition. The 2004/2006 and 2007/2008 harvests were designed to re-establish an open-canopied pitch pine/tree oak forest and to reduce dangerous fuel loads so that fire-adapted rare species habitat on the plains could be managed using prescribed burning under controlled conditions (Duveneck 1995). The Fire Management Plan for Montague Plains is available at: http://www.umass.edu/nebarrensfuels/.

Prior to the harvests, the pitch pine overstory had suppressed the growth of many understory plant species, not only those used by barrens specialists such as the rare Barrens Buck Moth, but also those producing food for common game species such as white-tailed deer and wild turkey. The continuous canopy also represented a public safety

hazard to the nearby village of Lake Pleasant, which was impacted by crown fires burning out of the plains 50 and 100 years ago.

Scattered overstory pitch pines with healthy crowns and all overstory oak trees were marked for retention, using a prescription developed by cooperating researchers at the UMass, Amherst, Department of Natural Resource Conservation to minimize the likelihood of a running crown fire (wild fire) while maximizing wildlife habitat benefits. Remaining overstory trees were harvested with a feller-buncher, collected and moved by grapple skidder to a landing site off of Lake Pleasant Road, and loaded on trucks for transport to local wood processing facilities. Some portions of harvested pitch pine were processed for sawlogs at a Massachusetts sawmill (pitch pine can be used for construction beams, cabinets, furniture, and for 'yellow pine' flooring), while most of the pitch pine material was chipped into trailers, and transported offsite for either landscape mulch or for local biomass energy production at the Westminster, MA, Pine Tree power plant. Most understory trees and shrubs were felled to reduce fuel load height, but were left on the ground for nutrient retention.

As a result of the harvests, the root systems of formerly suppressed understory plants responded with vigorous growth. Since the harvests, prescribed burns have been conducted in some portions of the harvest areas to encourage the growth of scrub-oak and other fire-tolerant sand plain species. By the time of the initial post-harvest vegetation survey in October 2009, the open overstory was dominated by mature pitch pine, scarlet oak, and black oak, with occasional white pine, red oak, red maple, gray birch and big-tooth aspen, while the vigorous understory was dominated by scrub-oak, gray birch, and young pitch pine, with blueberry and dewberry significant components of a low shrub layer. While the herbaceous component of the understory will not be fully assessed until 2010, a variety of grasses (e.g. little bluestem), sedges (e.g. Pennsylvania sedge), occur, along with bracken fern, whorled loosestrife, large-podded pineweed, and fan clubmoss.

Significant Flora and Habitats

Sand plain scrub oak thickets are a rare habitat type in Massachusetts, supporting numerous rare species of flora and fauna. A summary of the status of rare species on Montague Plains can be found in a separate document (Monitoring Management Results at Montague Plains – 2009) on this webpage.

Invasive Exotic Species

No exotic invasive species were found within the treatment area.

References

Duveneck. M. 2005. Characterizing canopy fuels as they affect fire behavior in Pitch Pine (Pinus rigida) P.Mill. M.S. Thesis, University of Massachusetts, Amherst, MA.

Motzkin, G., D. Foster, A. Allen, J. Harrod, and R. Boone. 1996. Controlling site to evaluate history: vegetation patterns of a New England sand plain. Ecological Monographs 66:345-365.

Motzkin, G., W.A. Patterson III, and D. R. Foster. 1999. A historical perspective on pitch pine - scrub oak communities in the Connecticut Valley of Massachusetts. Ecosystems 2:255-273.

Motzkin, G. 2001. Montague Plain: a Resource manual of Historical and Ecological Information Gathered by Harvard Forest. submitted to Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program by Harvard Forest, Petersham, MA.

CV-MP-1

Stratum/life form	*Height (ft)*	*Cover class*
T1 Emergent Tree		
T2 Tree canopy	60	2
T3 Tree sub-canopy	30	2
S1 Tall shrub	6	4
S2 Short shrub	1	3
H Herbaceous	3	2
N Non-vascular	<1	+
V Vine/liana		

Cover Classes	
+	<1%
1	1-5%
2	6-25%
3	26-50%
4	51-75%
5	>75%

Stratum	*Species*	*Common Name*	*Cover Class*
T2	Pinus rigida	Pitch Pine	2
T2	Quercus coccinea	Scarlet Oak	1
T2	Acer rubrum	Red Maple	+
T3	Quercus rubra	Red Oak	+
T3	Quercus velutina	Black Oak	+
T3	Betula populifolia	Gray Birch	+
T3	Populus grandidentata	Big-tooth Aspen	+
T3	Pinus strobus	White Pine	+
S1	Quercus illicifolia	Scrub Oak	3
S1	Betula populifolia	Gray Birch	2
S1	Pinus rigida	Pitch Pine	1
S1	Prunus pennsylvanica	Pin (Fire) Cherry	+
S2	Populus tremuloides	Quaking (trembling) Aspen	+
S2	Vaccinium angustifolium	Lowbush (Low Sweet) Blueberry	3
S2	Vaccinium pallidum	Dryland (Lowbush) Blueberry	2
S2	Rubus flagellaris	Northern Dewberry	1
S2	Pinus rigida	Pitch Pine	+
S2	Prunus serotina	Black Cherry	+
S2	Quercus rubra	Red Oak	+
S2	Acer rubrum	Red Maple	+
S2	Amelanchier sp	Serviceberry (Shadbush)	+
S2	Quercus illicifolia	Scrub Oak	+
H	Schizachyrium scoparium	Little Bluestem	1
H	Sedge sp	Sedge	2
H	Lysimachia quadrifolia	Whorled Loosestrife	+
H	Lespideza capitata	Round-headed Bush-clover	+
H	Comptonia peregrina	Sweetfern	+
H	Apocynum cannibinum	Prairie Dogbane	+
N	Polytrichum sp	Braken Fern	2

Figure 1. View into treated area from adjacent field, showing aspen sprouts along edge and treated area in background at Montague Plains CV-MP-TS1 restoration area, 5 years after initial harvest. This area has been subsequently managed with fire and manual felling of birch and aspen. MassWildlife photo by Brian Hawthorne on October 14, 2009.

Figure 2. Diverse savannah understory of little blue-stem grass, blueberry, scrub oak and pitch-pine at Montague Plains CV-MP-TS1 restoration area, 5 years after initial harvest. This area has been subsequently managed with fire and manual felling of birch and aspen. MassWildlife photo by Brian Hawthorne on October 14, 2009.

Figure 3. Fire tolerant vegetation such as blueberry, dewberry, and wintergreen at Montague Plains CV-MP-TS1 restoration area, 5 years after initial harvest. This area has been subsequently managed with fire and manual felling of birch and aspen. MassWildlife photo by Brian Hawthorne on October 14, 2009.

Figure 4. Recently burned area shows response of ericaceous shrubs, grasses and sedges at Montague Plains CV-MP-TS1 restoration area, 5 years after initial harvest. This area has been subsequently managed with fire and manual felling of birch and aspen. MassWildlife photo by Brian Hawthorne on October 14, 2009.

Figure 5. Vertically complex multi-strata savannah with sparse pitch pine and tree oak canopy in recently burned area at Montague Plains CV-MP-TS1 restoration area, 5 years after initial harvest. This area has been subsequently managed with fire and manual felling of birch and aspen. MassWildlife photo by Brian Hawthorne on October 14, 2009.

Figure 6. Recently burned area shows response of soft-mast producing shrubs (lowbush blueberry) at Montague Plains CV-MP-TS1 restoration area, 5 years after initial harvest. This area has been subsequently managed with fire and manual felling of birch and aspen. MassWildlife photo by Brian Hawthorne on October 14, 2009.

Figure 7. An unburned brush pile provides cover for rabbits and other small mammals at Montague Plains CV-MP-TS1 restoration area, 5 years after initial harvest. This area has been subsequently managed with fire and manual felling of birch and aspen. MassWildlife photo by Brian Hawthorne on October 14, 2009.

CV-MP-2

Stratum/life form	*Height (ft)*	*Cover class*
T1 Emergent Tree		
T2 Tree canopy	70	2
T3 Tree sub-canopy	18	1
S1 Tall shrub	8	4
S2 Short shrub	1	4
H Herbaceous	1	2
N Non-vascular	<1	2
V Vine/liana		

Cover Classes	
+	<1%
1	1-5%
2	6-25%
3	26-50%
4	51-75%
5	>75%

Stratum	*Species*	*Common Name*	*Cover Class*
T2	Pinus rigida	Pitch Pine	2
T2	Quercus coccinea	Scarlet Oak	1
T2	Quercus velutina	Black Oak	1
T3	Quercus coccinea	Scarlet Oak	1
T3	Quercus velutina	Black Oak	+
T3	Tsuga canadensis	Eastern Hemlock	+
S1	Betula populifolia	Gray Birch	3
S1	Prunus pennsylvanica	Pin (Fire) Cherry	+
S1	Quercus illicifolia	Scrub Oak	3
S1	Quercus velutina	Black Oak	+
S2	Amelanchier sp	Serviceberry (Shadbush)	+
S2	Betula papyrifera	White (Paper) Birch	+
S2	Betula populifolia	Gray Birch	+
S2	Pinus rigida	Pitch Pine	+
S2	Pinus strobus	White Pine	+
S2	Populus tremuloides	Quaking (trembling) Aspen	+
S2	Quercus illicifolia	Scrub Oak	+
S2	Quercus velutina	Black Oak	+
S2	Rubus hispidus	Bristly Dewberry	2
S2	Vaccinium angustifolium	Lowbush (Low Sweet) Blueberry	3
S2	Vaccinium pallidum	Dryland (Lowbush) Blueberry	+
H	Apocynum cannibinum	Prairie Dogbane	+
H	Carex spp	Sedge	1
H	Comptonia peregrina	Sweetfern	1
H	Diphasiastrum digitatum	Fan Clubmoss	+
H	Lechea intermedia	Large-podded Pineweed	+
H	Lysimachia quadrifolia	Whorled Loosestrife	+
H	Pteridium aquilinum	Bracken Fern	1
H	Schizachyrium scoparium	Little Bluestem	1

Figure 8. View into treated area from adjacent powerline right of way, showing road and landing area with chips along edge and treated area in background at Montague Plains CV-MP-TS2 restoration area, 1 ½ years after initial harvest. MassWildlife photo by Brian Hawthorne on October 14, 2009.

Figure 9. Sparse pitch pine and oak overstory with regenerating scrub oak and gray birch at Montague Plains CV-MP-TS2 restoration area, 1 ½ years after initial harvest. Prescribed fire will be used to reduce cover of gray birch and favor scrub oak and ericaceous shrubs. Closed canopy pitch pine stand in background is representative of pre-treatment conditions. MassWildlife photo by Brian Hawthorne on October 14, 2009.

Figure 10. View of structural diversity of understory, ranging from areas of bare litter to herbaceous cover to shrubs at Montague Plains CV-MP-TS2 restoration area, 1 ½ years after initial harvest. MassWildlife photo by Brian Hawthorne on October 14, 2009.

Figure 11. Regenerating understory ranges from birch to oak to pine at Montague Plains CV-MP-TS2 restoration area, 1 ½ years after initial harvest. MassWildlife photo by Brian Hawthorne on October 14, 2009.