

Conclusions



Trail in southwest corner of the property, fall 2003.

While the Olin Powder Farm property has long been recognized as desirable open space for the Town of Hamden, the completion of the Farmington Canal Heritage Greenway next to the site in 2004 makes now an opportune time for park development. The Olin Powder Farm is a unique ecologically and historically significant site—a 102.5-acre parcel of forested land in a densely populated urban setting. Its forests have been ironically preserved by its industrial past and are now a valuable refuge for wildlife. The ponds on the property serve as beneficial siltation basins, treating urban stormwater runoff before it flows into the Mill River and then Lake Whitney and is treated for public drinking water.

The citizens of Hamden we have interviewed expressed immense support for open space development in southern Hamden and have requested green space for passive recreation, where they can hike, bird-watch and sit in peace to enjoy nature. The Olin Powder Farm offers just this, providing a good complement to the busy, faster paced Canal trail and nearby recreation venues.

Neighbors and potential park users have also expressed a concern in maintaining the unusual habitat value of the site and recreation on site will have to be balanced with habitat preservation, as well as water quality maintenance.

Once a park is developed, the above values can be met by maintaining a diversity of species, forest structure, and habitat types across the site over time with a passive management regime. Managers should expect shifting species composition within stands as they grow up and promote native species and control the spread of invasives, and encourage low-impact recreation by limiting off-trail and pond use. Enforcement of park use will play an integral role in natural resource protection and the maintenance of a safe recreation venue for the citizens of Hamden.

In conclusion, on-site trail, forest, and water resources provide unique and aesthetically pleasing recreation and educational opportunities. This property can be an invaluable asset for the Town of Hamden, once contamination issues are resolved. The following chart summarizes management recommendations for the Olin Powder Farm.

Presented here are management recommendations prioritized according to the sections they occur in, as well as outlined in a timeline of tasks for park development and stewardship.

Summary Recommendation Matrix for Park Development and Stewardship

Recommendations	Importance	Cost
Organizational Development and Ownership		
• Two-Stage Park Development	High	High
• Advocate for Regional Water Authority ownership	High	Low
• Form a volunteer park development coalition	High	Low
• Form a long-term Olin Powder Farm task force	Medium	Low

• Create an OPF Web site	Medium	Low
• Consult community leaders and present at community meetings	High	Low
• Attend Town of Hamden meetings where open space and economic development in southern Hamden is being discussed	High	Low
• Create a site lesson plan that addresses local curriculums	Medium	Low
• Address school transportation and safety concerns	Low	Low
• Build required facilities for outdoor education	Low	High
Recreation and Trail Options		
• Allow walking, hiking, running, cross-country skiing, and snowshoeing on all trails	High	Low
• Allow dog-walking on leash	Medium	Medium
• Prohibit the use of the ponds	High	Medium
• Prohibit motorized vehicles	High	Medium
• Prohibit off-trail use	High	Medium
• Prohibit bike and rollerblade access	High	Medium
• Prohibit fires and smoking	High	Medium
• Use existing trails when possible and minimize the development of new paths, especially paved paths	High	Low
• Test for wetland soils	High	Medium
• Minimize the development of impervious surfaces	High	None
• Follow Department of Public Health standards for trail and facilities development	High	Low
• Post trail map and trail use signs at major junctions	Medium	Medium
• Repair and maintain existing paved paths	Low	Medium
• Clear paths of debris and remove and monitor nearby snags	Medium	Medium
• Connect to existing trails and open space	High	Medium
• Create an interpretive trail	Medium	Medium
• Fix bridges	Medium	Medium
Access and Parking		
• Create main public entrances off of Leeder Hill Drive and off of the Farmington Canal trail behind Stop N' Shop	High	Medium
• Use existing parking lots	High	Low
• Make main entrances handicap accessible	Medium	Medium
• Install a board with park rules and a map at the main entrance	Medium	Medium

• Create access to the Farmington Canal trail	High	Medium
• Create additional pedestrian entrances off of Treadwell Street, Oregon Street, and behind the Whitney Center	High	Medium
• Post signs with park rules and hours at each entrance	High	Medium
• Establish an emergency vehicle entrance on Putnam Avenue	High	Low
• Establish a call-system between the site and the fire department	Low	Medium
• Connect to existing trails and open space networks	High	Low
Facilities		
• Remove or secure existing dangerous structures	Medium	High
• Provide bike racks at main entrances	High	Medium
• Place benches at lookouts	Medium	Medium
• Provide picnic tables	Medium	Medium
• Provide trash bins at entrances, as well as bench and picnic areas	Medium	Medium
• Build restroom facilities	Medium	High
• Consider the creation of a lookout tower, boardwalk, shelter, and amphitheater	Low	High
Diversity of Native Species and Habitats		
Forest Resources		
• Maintain a diversity of species, varied canopy closure, vertical stratification, and density	High	Low
• Actively control invasive plant species	High	Medium
• Actively regenerate white pine	Medium	Medium
• Control Norway maple	High	Medium
• Eradicate Japanese knotweed	High	Medium
• Control Asiatic bittersweet	High	Medium
• Limit herbicide use	High	Medium
• Do not eradicate poison ivy	High	None
• Create new gaps as necessary to meet other management objectives	High	None
• Plant white pines on mineral soils if excavation is used in site remediation	High	Medium
• Exclude fire on site	High	Low
Wildlife		
• Maintain snags	High	None
• Maintain areas of dense native understory	High	None
• Maintain vertical structure of the forest	High	None
• Maintain coarse woody debris	High	None

• Control feral cats in order to protect native bird and small mammal populations	Low	Medium
• Evaluate the property for species of special concern	Low	Medium
• Actively regenerate white pine	Medium	Medium
• Create artificial nesting platform for osprey	Low	Low
• Create artificial cavity nests for woodpecker species	Low	Low
Water Quality and Edge Habitat		
• Continue surface and groundwater quality testing	High	Medium
• Test pond sediments for pollutants and monitor sediment levels in ponds	Low	Medium
• Educate public on water quality	High	Low
• Clean “forebay” ponds on a regular basis	Medium	Medium
• Reconstruct stormwater drainage pipe on east side	Low	High
• Estimate urban runoff and minimize impervious surfaces	Medium	Low
• Limit use of bog islands	High	Low
• Erosion control	High	Low
Recreation, Safety and Aesthetics		
• Monitor dying and dead trees along all trails	High	Medium
• Remove Scotch pine along the paved road	Low	Medium
• Limit recreational use to terrestrial portions of the property	High	Low
• Keep trails clear of debris	Medium	Medium
• Maintain signs	High	Medium
• Garbage cans and picnic areas restrooms	High	Medium
• Control invasive plant species	Medium	Medium
• Close park from dusk to dawn	High	None
• Do not install lighting	High	None
• Maintain fence on a regular basis	Medium	Medium
• Remove barbed wire	Medium	Medium
• Clean existing garbage dumping sites	High	Medium
• Work with Farmington Canal trail management to reduce dumping between the trail and the OPF property boundary	Medium	Low
• Post “no dumping” signs in areas of observed dumping	Medium	Medium
• Partner with existing neighborhood and Farmington Canal police patrol	High	Low
• Hire a fulltime ranger, if funds permit	Medium	High

Time Frame for Recommendations

1. Recommendations that should be implemented immediately

Recommendations	Importance	Cost
• Form a volunteer park development coalition	High	Low
• Advocate for Regional Water Authority ownership	High	Low
• Consult community leaders and present at community meetings	High	Low
• Attend Town of Hamden meetings where open space and economic development in southern Hamden is being discussed	High	Low
• Create an OPF Web site	Low	Low

2. Recommendations to implement once future ownership is known and park development can begin

A. Initial Park Development

Recommendations	Importance	Cost
• Two-Stage Park Development	High	High
• Form a long-term Olin Powder Farm task force	High	Low
• Allow walking, hiking, running, cross-country skiing, and snowshoeing on all trails	High	Low
• Allow dog-walking on leash	Medium	Medium
• Prohibit the use of the ponds	High	Medium
• Prohibit motorized vehicles	High	Medium
• Prohibit off-trail use	High	Medium
• Prohibit bike and rollerblade access	High	Medium
• Prohibit fires and smoking	High	Medium
• Use existing trails when possible and minimize the development of new paths, especially paved paths	High	Low
• Test for wetland soils	High	Medium
• Minimize the development of impervious surfaces	High	None
• Follow Department of Public Health standards for trail and facilities development	High	Low
• Post trail map and trail use signs at major junctions	Medium	Medium
• Repair and maintain existing paved paths	Low	Medium
• Connect to existing trails and open space	High	Medium
• Fix bridges	Medium	Medium

• Create main public entrances off of Leeder Hill Drive and off of the Farmington Canal trail behind Stop N’ Shop	High	Medium
• Use existing parking lots	High	Low
• Install a board with park rules and a map at the main entrance	Medium	Medium
• Create access to the Farmington Canal trail	High	Medium
• Create additional pedestrian entrances off of Treadwell Street, Oregon Street, and behind the Whitney Center	High	Medium
• Post signs with park rules and hours at each entrance	High	Medium
• Establish an emergency vehicle entrance on Putnam Avenue	High	Low
• Remove or secure existing dangerous structures	Medium	High
• Evaluate the property for species of special concern	Low	Medium
• Limit recreational use to terrestrial portions of the property	High	None
• Close park from dusk to dawn	High	None
• Do not install lighting	High	None
• Clean existing garbage dumping sites	High	Medium
• Work with Farmington Canal trail management to reduce dumping between the trail and the OPF property boundary	Medium	Low
• Post “no dumping” signs in areas of observed dumping	Medium	Medium
• Partner with existing neighborhood and Farmington Canal police patrol	High	Low

B. Advanced Park Development

Recommendations	Importance	Cost
• Create a site lesson plan that addresses local curriculums	Medium	Low
• Address school transportation and safety concerns	Low	Low
• Build required facilities for outdoor education	Low	High
• Create an interpretive trail	Medium	Medium
• Make main entrances handicap accessible	Medium	Medium
• Establish a call-system between the site and the fire department	Low	Medium
• Provide bike racks at main entrances	High	Medium
• Place benches at lookouts	Medium	Medium
• Provide picnic tables	Medium	Medium
• Provide trash bins at entrances, as well as bench and picnic areas	Medium	Medium
• Build restroom facilities	Medium	High
• Consider the creation of a lookout tower, boardwalk, shelter, and amphitheater	Low	High
• Create artificial nesting platform for osprey	Low	Low
• Create artificial cavity nests for woodpecker species	Low	Low

• Test sediments for pollutants and monitor sediment levels in ponds	Low	Medium
• Reconstruct stormwater drainage pipe on east side	Medium	High
• Remove Scotch pine along the paved road	Low	Medium
• Hire a fulltime ranger, if funds permit	Medium	High
• Remove barbed wire	Medium	Medium

3. Ongoing Stewardship Recommendations for Park Maintenance

Recommendations	Importance	Cost
• Actively control invasive plant species	High	Medium
• Actively regenerate white pine	Medium	Medium
• Control Norway maple	High	Medium
• Eradicate Japanese knotweed	High	Medium
• Control Asiatic bittersweet	High	Medium
• Limit herbicide use	High	Medium
• Do not eradicate poison ivy	High	None
• Create new gaps as necessary to meet other management objectives	High	None
• Maintain snags	High	None
• Maintain areas of dense native understory	High	None
• Maintain vertical structure of the forest	High	None
• Maintain coarse woody debris	High	None
• Control feral cats in order to protect native bird and small mammal populations	Low	Medium
• Continue surface and groundwater quality testing	High	Medium
• Clean “forebay” ponds on a regular basis	Medium	Medium
• Estimate urban runoff	Medium	Low
• Limit use of bog islands	High	Low
• Control erosion	High	Low
• Educate public on water quality	High	Low
• Monitor dying and dead trees along all trails	High	Medium
• Keep trails clear of debris and remove and monitor nearby snags	Medium	Medium
• Maintain signs	High	Medium
• Maintain garbage cans, picnic areas, and restrooms	High	Medium
• Maintain fence on a regular basis	Medium	Medium

Appendices



Pond E, view facing northeast, winter 2003

Appendix A: Biophysical Sampling Design for the Olin Powder Farm

The primary goal of our sampling was to characterize the structure and floristic composition of forested areas. From these data we inferred successional trajectories based on regeneration observed, assessed the suitability of habitat for wildlife, and potential uses of the landscape for passive recreation.

Sampling of terrestrial portions of the property was done in a systematic way, using nine transects, all 200 feet apart and at an azimuth of 19 degrees East (parallel to the Farmington Canal), laid across the entire property (see **Figure M25** below). Points on the transects were assigned every 440 feet along the azimuth moving from the Southeast to the Northwest. A random starting point of 165 feet from the southeast start was used. On the base map the following covertypes were depicted: hazardous sites, lakes, disturbed and undisturbed forest. All covertypes were sampled with equal intensity with at least 3 plots in each. All points landing in water or hazardous waste areas were discarded. In an effort to assure three plots in each stand, 2 plots were randomly added to the pine cover type. Centered on each sampling point we established a 30-ft radius plot to sample trees, snags, and shrubs. A nested 6-ft radius plot was used to sample groundstory vegetation. Coarse woody debris was sampled using the line intercept method, with a transect length of 60 feet. As we walked from point to point we noted trails crossed, populations of invasive species, evidence of human use, and evidence of wildlife use. Plant species along pond edges and on islands were identified from canoe.

In the 30-ft plot, the following data were collected:

1. General characterization of site from plot center, including
 - i) Aspect
 - ii) Position
 - iii) Slope
 - iv) Drainage class
 - v) Depth to mineral soil
 - vi) Stand structure class and canopy openness
2. Census of trees and snags in the 4" size class (i.e. 3.6"-4.5") and up, including
 - i) Species
 - ii) DBH
 - iii) Position in canopy (dominant, co-dominant, intermediate, suppressed)
 - (a) Heights for some dominants
 - iv) Health (using decay state)
 - v) Wildlife evidence (e.g., nests, excavations, browse, abrasion)
3. Simple tally by species of trees in the 1"-3" size classes and shrubs.
 - i) Ocular areal estimates of:
 - ii) Garbage/other human use evidence
 - iii) Eroding ground

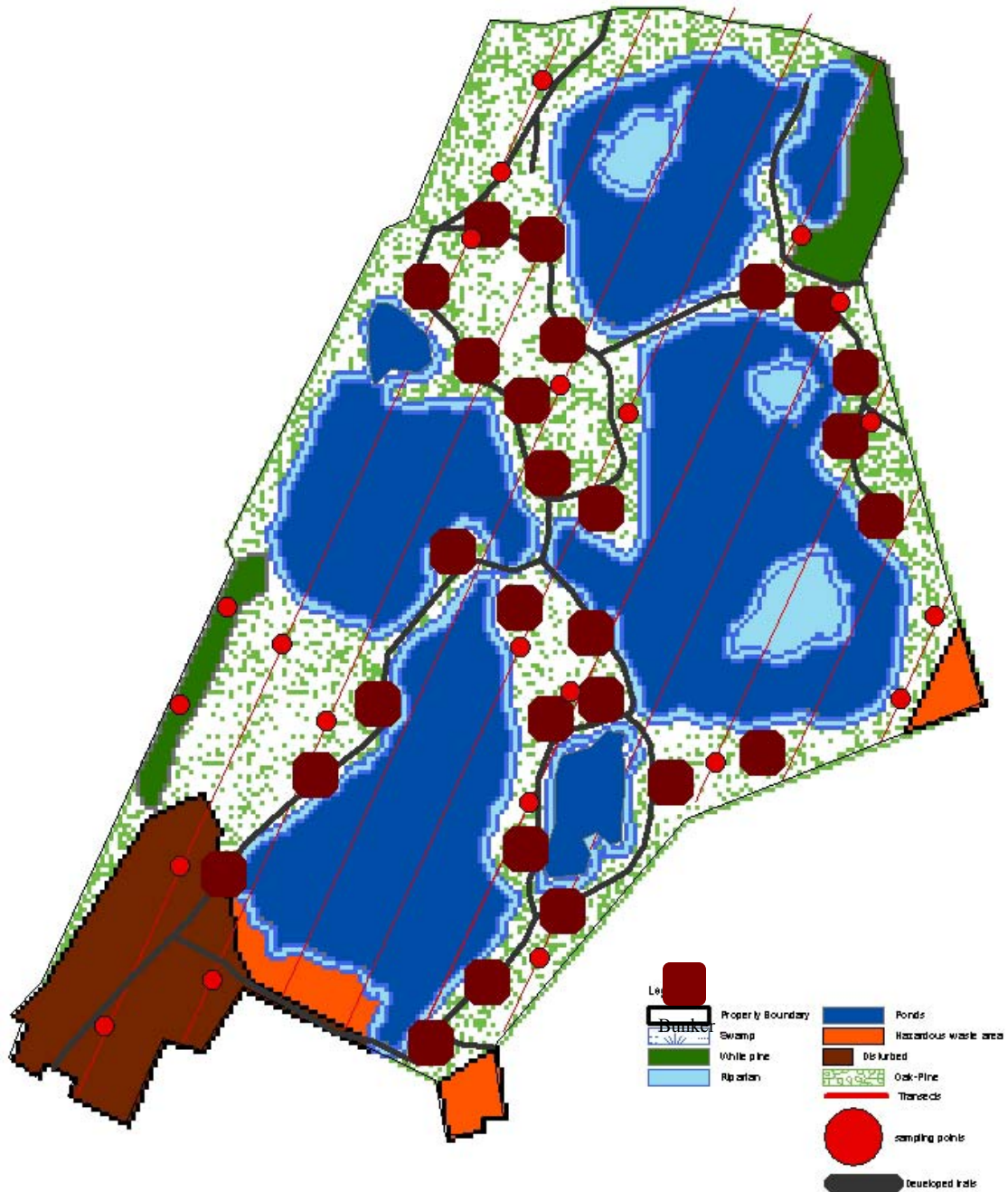
In the 6-ft radius plot the following data was collected:

- i) Percent coverage by species of plants in the <1" size class.
- ii) Percent coverage of bare ground

- On the 60-ft transect, for all coarse woody debris greater than 3.6" diameter and 6' long :
- i) Species (if possible; else hardwood/softwood/unknown)
 - ii) Diameter and longest length
 - iii) Decay class

Figure M24: Biophysical Sampling Plot Locations

This map depicts the transects used in systematic sampling of the property. Plots are depicted by small red dots and the large brown circles on the map represent bunkers, which were classified as disturbed.



Crown Consulting

0 0.0007 0.0014 0.0021 0.0028
 Decimal Degrees



Appendix B: Social Assessment Methodology

The Hamden Land Conservation Trust has requested that our management plan include the following social components: prescriptions for improved aesthetics, public safety, and vehicular access; connections to other trails; a narrative of the land use history; and a plan to provide facilities desired by neighborhood residents. In addition to this, we recognized that it is important to know who is currently affected by the site management, and who may be affected in the future. Our analysis relied on mapping of applicable social institutions, gathering of information on abutters, informal interviews with community leaders and officials, participant observation of current site users and community meetings, literature searches, focus groups, and surveys to address these requests.

- To address which aesthetic features and passive recreation facilities appeal most to local residents and what public safety concerns they have regarding the property, we used a triage approach. We did not have time to conduct an extensive, statistically significant survey of local residents, and have instead identified and mapped out local social institutions and community leaders in the Highwood, Newhall, Hamden Plains, and Whitneyville neighborhoods, which surround the Powder Farm site.
- We conducted a series of informal interviews with City Council members, teachers, and the presidents of Community Associations and grass roots environmental organizations in this area.
- We organized stakeholder meetings with members of the Land Trust, community, and city government, including the mayor.
- Focus groups were held for the land trust, the Whitney Center and local teachers.
- Formal surveys were distributed to community members who toured the property on October 26, 2003 and to attendants at a Whitneyville neighborhood association meeting. We received approximately 30 responses.

We combined information gathered through the surveys, interviews, participant observation on-site and focus group meetings to make recommendations regarding aesthetics, facilities, and on-site recreation. Information from participant observation at community meetings, such as the November Hamden Natural Resource and Open Space Commission meeting, and at our own events, such as the tours of the property hosted by the Land Trust at the end of October, stakeholder meetings, and focus groups is also utilized.

- Our land use history analysis relied heavily on literature from the Hamden historical society and information from the Hamden tax assessor's office.
- Information on abutting properties also relies heavily on documents at the Hamden tax assessor's office
- Trail connections and vehicular access were mapped out after talking to key persons involved in the Farmington Canal Trail and Mill River Trail projects. We spoke to the landscape architect responsible for designing the section of the canal trail that runs past the Powder Farm site, and the president of the Mill River

Watershed Association. A complete walk-through of the property also provided information for mapping the already-existing unpaved trail network on the site.

Olin Powder Farm Property Tour Survey, Oct. 26, 2003

1. How did you hear about this year's tour?

Hamden Land Trust	5/13
Sign on Swiss cleaners	3/13
Word of mouth	3/13
Orange card on bulletin board at Whitney Center	1/13
Radio station	1/13

2. Which neighborhood do you live in?

Mt Carmel	1/13
Whitneyville	6/13
New Haven—Westville	1/13
Spring Glen	1/13
Whitney Center	2/13
Ridgehill	1/13
Third District	1/13

3. How did you get here today?

Car	11/13
Walked	2/13

3a. If you drove, where did you park?

Good Year Tire	6/13
Atlantic Film	1/13
Across the street in old driveway	1/13
Parking lot	3/13

4. How long did you have to travel?

7 miles	1/13
3 miles	3/13
1 mile	6/13

5. What age range are you in?

Under 13 (0/13) 21-30 (2/13) 31-40 (2/13) 41-50 (4/13)
 51-60 (3/13) 61-70 (1/13) 71-80 (2/13) 81-90 (0/13)

6. If the site were open to the public, would you go there to...? (please circle all that apply.)

Hike/walk	13/13
Picnic	5/13
Bird watch	8/13
Sit	9/13
Rollerblade	3/13
Enjoy the scenery & nature	13/13
Bike	6/13
Fish	2/13
Canoe	2/13

Other:

Photography and history of Winchester/Olin 1/13

7. Where do you go to do these things now?

Farmington Canal	5/13
East Rock Park	5/13
Sleeping Giant Park	4/13
Edgerton Park	2/13
West Rock Park	1/13
RWA	1/13
Whitney Museum and Trails	1/13
New Haven area	1/13
Bantam Lake	1/13
Backyard	1/13
Garden	1/13
Neighborhood	1/13
Lyme	1/13
Wintergreen Lake	1/13
Cared path	1/13
Nowhere	1/13

7a. How often do you go?

2-3 times a month	3/13
N/A	2/13
Every day	2/13
Once a month	1/13

Not enough	1/13
5-20 times a year	1/13
A lot	1/13
3 times a week	1/13

8. Do you use the Farmington Canal?

No 5/13 –too crowded 1/13
 Yes 8/13

8a. For what?

N/A	2/13
Walking	5/13
Walking dog	1/13
Bike	4/13
Nature	1/13
Running	1/13

8b. How often?

N/A	2/13
Weekly	2/13
Once a month	1/13
2 times a month weather permitting	3/13
2-3 times a year	1/13
5-13 times a year	1/13

9. Please rank the following aspects of today’s tour according to what interests you most about the Powder Farm site. (Most interesting—1, least interesting—4)

Information about the history of the site

1 (5/13) **2** (2/13) **3** (4/13) **4** (1/13)

Information about the ecology of the site

1 (5/13) **2** (3/13) **3** (2/13) **4** (2/13)

Being outside/opportunity to hike

1 (7/13) **2** (4/13) **3** (2/13) **4** (1/13)

Community interaction

1 (1/13) **2** (5/13) **3** (0/13) **4** (3/13)

13. Do you have any concerns about the site that you would like to see addressed before it became a park?

- DEP clean-up (4/13)
- Security (3/13)
- Passive open space (2/13)
- Keep it natural (1/13)
- I would like to see very limited use to avoid damage to wildlife and natural area (1/13)
- Making sure it is not abused and developed, make it natural and safe. (1/13)
- Bikes only on paved roads (1/13)
- Pave existing walkways (1/13)
- ??? to make it a park [*sic.*] (1/13)
- Would like more information on contamination issues (1/13)
- Provide information and disclosure about materials used as a powder farm (1/13)
- Maps provided (1/13)
- None (1/13)

11. Do you think it would be worthwhile investing city money in Powder Farm site for future public use? Why or why not?

- Yes (12/13)
- Yes and No –I think limited use would be good. Overuse would endanger the inhabitants. (1/13)
- Greater New Haven/Hamden area should pay (1/13)
- Money should be used for purchase and possibly security. (1/13)
- More open space is needed in Southern Hamden, especially space accessible to residents of the Dixwell Avenue Corridor (1/13)
- Yes! Too many reasons. S. Hamden deserves this gem. Good for kids/good for air/greenhouse effects/beautiful resource/preservation/land values (1/13)
- Any place for some activity for families is good for the town (1/13).

12. Any additional comments about the tour and/or site?

- A spring tour would be great as well. It would be great to have a map and written history of the site. (1/13)
- Pictures of the site when it was in use would be great (maybe a website). (1/13)
- It is such a beautiful view, and I think we should be able to enjoy it! (1/13)
- Beautiful Spot! (1/13)
- Thank you for a wonderful experience! (1/13)
- Keep it going! (1/13)
- Would like better weather. Have been curious for years. Knew history but hadn't seen it. (1/13)
- Great in spite of rain. (1/13)
- None (1/13)

Whitneyville Civic Association Meeting, November 12, 2003

What age range are you in?

Under 10 (0/20) **11-20** (0/20) **21-30** (1/20) **31-40** (2/20)
41-50 (8/20) **51-60** (3/20) **61-70** (1/20) **71-80** (4/20)
81-90 (0/20) **over 90** (0/20) **blank** (1/20)

Have you heard of the Olin Powder Farm, also called Pine Swamp?

Y 18/20
N 2/20

If yes, what do you know about the property?

- It is contaminated.
- Just what was talked about tonight.
- Toured area ~10 years ago.
- Toured site as a school child (Church Street School) -- a lot of years ago!
- I took a tour several years ago.
- Previously used for storage and testing of ammunition and firearms by Winchester, currently owned by Olin Corp, and pursued by Hamden Land Trust.
- Owned by Olin Firearms, beautiful lakes, undeveloped land, contaminated by previous dumping by Olin.
- It was used as a place to store gunpowder for an arms maker. It should be made into a public park of some sort.
- Ammunitions factory and the land has sat idle for a LONG time.
- There was a firing range and storage area for Olin/Winchester.
- It is owned by Olin Corp. and may have pollution from gunpowder testing, etc.
- CN.
- it's a swamp.
- developers were interested in building condos but now it is in "capable hands" for preservation.
- Extensive wooded area with ponds and paths, oasis in a developed area.
- Interesting natural features, including ponds, wetland, trees, shrubs, some wildlife, walking trails. Borders public water supply area. Heavily polluted with industrial waste.

Do you feel that there is currently enough open green space in your neighborhood?

Y 1/20
N 18/20

Why or why not?

- There can never be enough (11/20)
- Always need more. (1/20)

- Never enough! (1/20)
- Look around! There appears to be enough. (1/20)
- No room. (1/20)
- Whitneyville is very developed. (1/20)
- Land developed as soon as it is available, such as Daddio Farm. (1/20)
- b/c very densely populated, Leeder Hill Dr. area undergoing more development, and Daddio Farm pursued by residential develop. (1/20)
- More green space is needed to protect quality of life in this neighborhood (1/20)
- Whitneyville is a beautiful neighborhood but house lots are small. We need more community open space to complement this densely populated part of town. (1/20)
- Low priority given to green space, mini-parks, etc. Commercial development seems to have highest priority. (1/20)
- Other than Sleeping Giant and the Farmington Trail, there's no place to hang out and hike
- There should be a park near the Farmington Canal and water company property

If a wooded area with lakes and trails were opened in your neighborhood, would you go there to....? (Circle all that apply)

Hike/walk	19/20
Bird Watch	13/20
Rollerblade	1/20
Bike	8/20
Canoe	9/20
Picnic	16/20
Sit	15/20
Enjoy the scenery	16/20
Fish	2/20

Other (please explain)

Sketch/draw	2/20
Paint	1/20
Photography	1/20
Education	1/20
Ice Skate on Ponds	1/20
Dog walking	1/20

I would not go there 2/20
 1 /20 (unless it were other users there—"fairly busy")

Where do you go to do these activities now?

Mill River	2/20
East Rock	6/20
Sound	1/20
West Rock	2/20
Eli Whitney	1/20
Southford Falls	1/20
Lake Wintergreen	2/20
Sleeping Giant	7/20
Farmington Canal	4/20
Hammonasset State Park	1/20
Other parks	1/20
Walk in neighborhood	1/20
Walk at Albertus track	1/20
Neighborhood and dog park	1/20

How often do you go?

Daytime	1/20
Walk daily	2/20
4xweek	1/20
3xweek	1/20
Monthly	3/20
1xweek	1/20
1-2 times a month	4/20
3 weekends a month	1/20
In good weather, Spring-Summer-Fall	1/20
Fairly often	1/20
Several times a year	1/20

Do you use the Farmington Canal Greenway?

Y	15/20
N	4/20

If yes, what do you use it for?

Running	3/20
Biking	8/20
Walking	8/20
Hiking	1/20
Bird watching	1/20

Which section do you use?

Mt Carmel and South

In Mt. Carmel
 Connelly Parkway to Dixwell
 Connelley Parkway entrance to Cheshire line
 Near Skiff
 All
 Hamden/Cheshire (2/20)
 Area near Sleeping Giant Park
 Sometimes bike to work using southern Hamden section
 Entire stretch beginning at Brooksvale
 Cheshire and Stop and Shop on Dixwell and Skiff
 Near Todd Street
 Near Brooksvale

How often do you use the trail?

At least once a week	1/20
Monthly	4/20
1-2x month	2/20
2-3x year	2/20
3xyear	1/20
4xyear	1/20
Occasionally	1/20
Rarely	1/20

Do you drive or walk to the trail?

Either	4/20
Drive	8/20
Bike	1/20
Walk	1/20

If you drive, where do you usually park?

Stop and Shop parking lot	4/20
[Parking] area in Mt. Carmel	1/20
Todd Street (or adjacent lot)	2/20
At Aunt Chilada's area	1/20
Sherman Ave.	1/20
Brooksvale	1/20
Along the road near Brooksvale	1/20
Off Whitney on Route 10	1/20

If no, why don't you use it?

No bike (1/20)
 Rather walk on a rocky, dirt trail than a paved one with much pedestrian traffic (1/20)

Rank the following topics according to how interesting you find each. (extremely interesting = 1, not interesting =4)

Information on local and regional history

1 (12/20) 2 (4/20) 3 (1/20) 4 (3/20)

Information on local plants and plant ecology

1 (9/20) 2 (5/20) 3 (2/20) 4 (4/20)

Information on local wildlife

1 (11/20) 2 (3/20) 3 (2/20) 4 (4/20)

Information on local water supply systems

1 (8/20) 2 (6/20) 3 (2/20) 4 (4/20)

Do you think it is worthwhile to invest city money in providing passive recreation-green space for the public? Why or why not?

-I'm a tree-hugger

-Yes, health.

-Yes, Green spaces give citizens a chance to breath [sic], increases residential values.

-Yes, to provide relaxation and peace.

-Yes, it is important anywhere, but more so near cities.

-Yes! Where can you go to think and hang out without distraction (TV, computers) or traffic?

-Yes.

-Yes – not enough local historical/preservation.

-YES, too much development is overwhelming.

-Yes, open green space improves quality of life, especially in this neighborhood [where] most people either don't have a back yard or have a very small one.

-Both city money and other sources of funds need to be explored.

-Yes. It's for all generations for all time.

-Yes.

-Yes, because of need for recreational venues.

-Yes, important to maintain greenspace.

-Yes, need more green space for passive enjoyment—look at Edgerton Park.

-Yes, quality of life. Best cities have nice parks.

If you are familiar with the Olin Powder Farm property, do you have any concerns about the site that you would like to see addressed before it became a park and/or once it became a park (safety, wildlife disturbance, access)?

-No poison ivy!

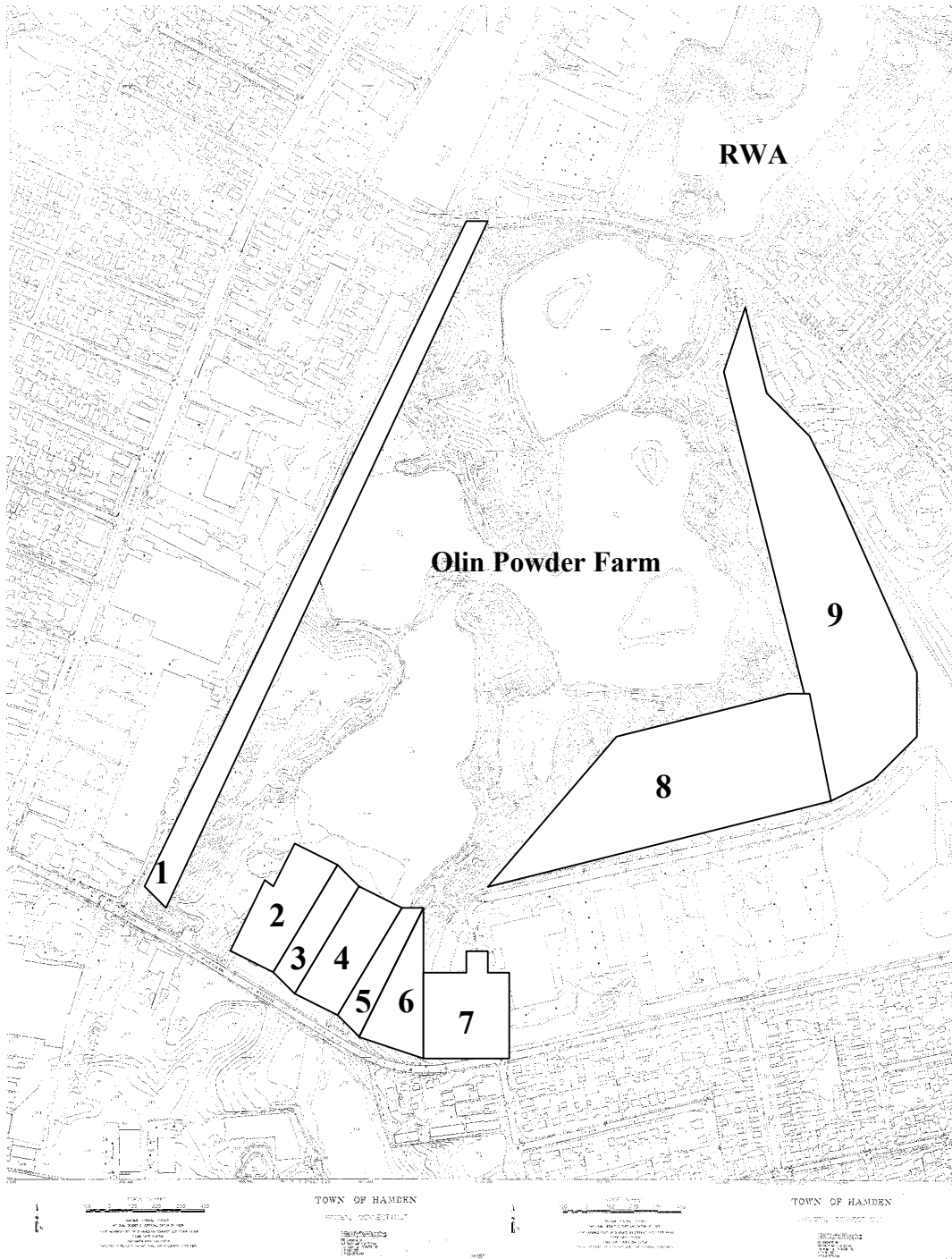
-Make sure no contamination.

- Pollution.
- Safety of the soil and water.
- DEP needs to clean up contamination.
- Olin must clean up the entire site.
- Address contamination . If lake is part of RWA, I am concerned that it will be fenced off like the rest of Lake Whitney – “you can look but you better not touch”
- Liability issues w/ lake.
- Security and destruction – as in certain areas of Farmington Canal Line.
- There is no danger of live ammo being disturbed, set off.
- Concerns about safety of people and wildlife.
- Safety, muggings, drug use. Wildlife disturbance.
- Safety.
- Preservation, safety (the intersection of Putnam and Dixwell is dangerous). Sidewalk construction, better lighting, use of solar and “green” ideas.
- Parking space nearby would be helpful.
- Access, parking.

Any additional comments about the Olin site or open space issues in your neighborhood?

- I am an East Side resident. On the east side of Lake Whitney there isn't much concern for open space issues (that I am aware of).
- Since this area is already overdeveloped, I believe any potential open green space should be given top priority and protection.
- We support all efforts to improve access and for the maintenance of open space.
- Could be a tremendous asset to the neighborhood.

Appendix C: Properties Abutting the Olin Powder Farm¹



¹ Source is Vision Appraisal Web page, <http://www.visionappraisal.com>

- 1 Farmington Canal**
(This is actually divided into several parcels, most of which belong to the City. According to findings at Milone and MacBroom, and a Hamden Town Hall employee in the tax assessor's office, there are a couple of parcels which were sold to Hamden Associates LLC by the Railroad company, when in fact they were not owned by the Railroad company in the first place. The Town of Hamden is in litigation over these parcels.)
Block and lot numbers: 2226/074
- 2 Goodyear—455 Putnam Avenue**
Property owner: HBG Associates LLC
Acreage: 2.18
Zoning: CDD1
Last transfer: 3.19.97
Block and lot numbers: 2226/011
- 3 Atlantic Film & Imaging—451 Putnam Avenue**
Property owner: Cuomo Anthony
Acreage: 1.23
Zoning: CDD1
Last transfer: 7.26.90
Block and lot numbers: 2226/010
- 4 Commercial Furniture Service--45 Putnam Avenue**
Property owner: Wideast LLC
Acreage: 3.01
Zoning: CDD1
Last transfer: 11.21.94
Block and lot numbers: 2226/009
- 5 Vacant land/Wetland—415 Putnam Avenue**
Property owner: 385 Putnam Avenue LLC
Acreage: .75
Zoning: CDD1
Last transfer: 2.10.95
Block and lot numbers: 2226/008
Land value: \$25,50

Putnam Avenue LLC
25 Woodstock Road
Hamden, CT 06517
- 6 Abandoned building—385 Putnam Avenue**
Property owner: 385 Putnam Avenue LLC
Acreage: 1.61
Zoning: CDD1

Last transfer: 2.10.95
Block and lot numbers: 2226/007
Land value: \$112,200
Building value: \$188,000

- 7 SBC Communications Office Building—335 Putnam Avenue**
Property owner: Three Three Five Putnam Avenue LLC
Acreage: 3.47
Zoning: CDD1
Last transfer: 11.19.98
Block and lot numbers: 2226/075

- 8 Highville Mustard Seed School—130 Leeder Hill Drive**
Property owner: Leeder Complex LLC
Acreage: 13.10
Zoning: CDD1
Last transfer: 8.5.96
Block and lot numbers: 2227/009
Land value: \$1.3 million
Building value: \$4.3 million

Leeder Complex LLC
c/o Aaron Hochna
P.O. Box 3097
Bridgeport, CT 06605

- 9 Whitney Center—200 Leeder Hill Drive**
Property owner: Whitney Center
Acreage: 15.11
Zoning: R5
Last transfer: 10.14.77
Block and lot numbers: 2227/007 and 008

Across from the Whitney Center on Leeder Hill is an 11.78-acre parcel with condos on the northern end of the block. To the south of this is a 5.31-acre parcel of land with public housing owned by the Town of Hamden. More private condos are south of the public housing.

Olin—475 Putnam Avenue

Property owner: Olin Corporation
Acreage: 102.50
Zoning: R4, with a floodplain overlay on the northern three-fourths of the property
Block and lot numbers: 2226/081

Appendix D: Timeline of Property Transfers and Deeds

- 1986** Easement on a small chunk of land sold to the Olin Corporation from the Anixter Company.
- 1969** Name changed from Olin Mathieson Chemical Corporation to Olin Corporation.
- 1954** Olin Industries, Incorporated merged with Mathieson Chemical Corporation. New corporation called Olin Mathieson Chemical Corporation
- 1945** Name changed from Western Cartridge Company to Olin Industries, Inc.
- 1939** Winchester Repeating Arms Company sells land to Western Cartridge Company.
- 1929** Winchester Repeating Arms Company (the Connecticut corporation) sells to Winchester Repeating Arms Company (the Delaware corporation) the 215-ac. parcel #26 bounded to S and SW by Putnam Ave, W by New Haven and Northampton Company, N and NE by Treadwell, and E by Clifford Street, which includes the present-day Olin Powder Farm. 146—590
- 1921** Mortgage to Mechanics and Metals National Bank, New York for 7,000,000 dollars. Parcel 29 describes a 215-ac. piece that includes the present-day Olin Powder Farm. 90—37
- 1903** Henry Munson sells to Winchester Repeating Arms Company lands that are bounded to N by Treadwell, to E by H. Munson's land, to S and W by Winchester Repeating Arms Company lands. 3 44/100 acres. 51—478
- 1902** Charles Bradley, Frederick Bradley, John McQueen, Emma Baldwin, Martha McQueen, Joseph Bradley, Robert Baldwin, William Leech and Charles Baldwin grant to Winchester Repeating Arms Company lands bounded to W by land formerly owned by Charles Shepherd, to N by an old highway, to N by an old highway (1112 ft), to E by Henry Munson's land (700 ft), and to S by Putnam Avenue (1100 ft). 50—12
- 1902** New Haven and Northampton Company and New York, New Haven, and Hartford Railroad grant to Winchester Repeating Arms Company land bounded to N and E by Lake Whitney, to S by "land of the Release" [i.e. Winchester Repeating Arms Company], to W by a line parallel to and 250 ft. E of the Easterly side line of the New Haven and Northampton Company railroad. No total acreage given in deed. 49—497

- 1902** Guardians of Samuel Baldwin grant to Winchester Repeating Arms Company lands bounded to S by Putnam Avenue, to E by lands of Robert Baldwin, to N by an old highway, to W by Martha McGreen. 3 acres. 48—236
- 1896** Thomas Sullivan sells to Winchester Repeating Arms Company lands bounded to N by Pine Swamp Road between Whitneyville and Hamden Plains, to E by lands formerly of Julia Hord [or Ford], and to S and W by land formerly of Harry Bradley. 4 acres. 44—34
- 1890** Robert Merwin sells to Winchester Repeating Arms Company lands bounded to N by a highway, to E by Lake Whitney, to S by Lake Whitney and lands formerly owned by Henry Munson, and W by New Haven and Northampton Railroad. 10 acres. 41—332
- 1889** Land between Dixwell Avenue and the New Haven and Northampton Railroad sold. 41—175
- 1889** Sidney Benham sells to Winchester Repeating Arms Company lands bounded to S by an old highway, W and N on Pine Swamp, E by land formerly owned by Sidney Benham and by Peter Holland (referred to in 38—312). 39—445

Appendix E: General Timeline of the Olin Powder Farm

9000 years ago, arrival of humans in region. Quinnipiac tribe, largely hunters and gatherers, set fires to maintain meadows and encourage wildlife.

1635 Greater New Haven watershed (including Hamden) was purchased by European traders from Native Americans.

By **1675** land in watershed largely used cleared for agriculture. Included clearing land of stones for stone walls and plowing or using marginal land for pasture.

1786 Hamden separated from New Haven and incorporated as an independent town.²

1828 Farmington Canal connecting New Haven to the Connecticut River and passing directly through Hamden opened.

1848 Farmington Canal became New Haven and Northampton Railroad. Railroad operated until 1982.

Mid 1800s population of greater New Haven population increased rapidly. In 1866 Winchester Repeating Arms Company was incorporated by purchasing the New Haven Arms Co. for the production of rifles, muskets, automatic rifles and other forms of firearms and ammunition.

Late 1800s less productive agricultural land largely abandoned and southern Hamden developed for residential and industrial uses.

1889-1915 Winchester Repeating Arms Company purchased plots to comprise a 200-acre parcel of five connecting swamps flowing into Lake Whitney, known as “Pine Swamp.”

1900s Site was used by Winchester Repeating Arms Company to store gunpowder in approximately 35 bunkers. The land came to be known as the “Powder Farm.”

Early 1900s Following complaints that a bad odor from the swamp was causing localized illnesses among neighbors, Winchester Repeating Arms Company builds a dam between the swamps and Lake Whitney near the Treadwell Road to create five ponds.

1902 Winchester Repeating Arms Company was granted rights to the easterly side line of the New Haven and Northampton Company Railroad.

1912 Chestnut Blight

² Hamden Historical Society Web page:
<http://www.hamdenlibrary.org/Historical%20Society/historicalsociety.htm>

1915-1920 White and Scotch Pine planted along road to bunkers

1929 Winchester Repeating Arms Company (Connecticut corporation) sold to Winchester Repeating Arms Company (Delaware corporation) the 215 ac. plot that includes the Powder Farm.

1931 F.W. Olin purchased Winchester Repeating Arms Company; the on-site bunkers were abandoned and powder storage moved to a central warehouse for storing the newly-developed, safer “Ball Powder TM.” Same year, Olin sells or gives away Right-of-Way to the railroad tracks abutting the Powder Farm.

1939 Winchester Repeating Arms Company (Delaware corporation) sold Pine Swamp land to Western Cartridge Company

1945 Name changed from Western Cartridge Company to Olin Industries Inc.

1954 Olin Industries merged with Mathieson Chemical Corporation to form Olin Mathieson Chemical Company.

1957 Olin Mathieson Chemical Company discontinued its production of batteries in New Haven.

1960s The Olin Mathieson Chemical Company phased out production of ammunition at its New Haven facilities.

1964 Roughly 100 acres of the Pine Swamp property sold, leaving only the present-day Olin Powder Farm. Sold land was eventually developed into commercial, institutional and residential uses. Machine gun and mortar ranges were included in the sold parcels.

1969 Name changed from Olin Mathieson Chemical Corporation to Olin Corporation; use of the land for burning and disposal ends.

1972 Boston & Maine Railroad began to operate rail service on New Haven and Northampton Company rail lines.

1973 Bunkers were demolished.

1978 Olin Corporation encouraged Town of Hamden to pursue acquisition of Olin Powder Farm.

1982 Boston & Maine Railroad discontinued service between New Haven and Cheshire. The Farmington Rail to Trail Association is formed to convert the canal/railroad route into a public recreational greenway.

1985 Site listed on the Connecticut Inventory of Hazardous Waste Sites with a Hazard Ranking Score of 21.

1986 Anixter re-sold 0.75 acres of abutting land containing contaminated soils back to the Olin Corporation for remediation.

1987 Permission granted for New Haven and Northampton Company Railroad line to become a recreational trail.

1988 A Remedial Investigation Survey of the Olin Powder Farm completed. Interim remediation measures involving excavation of contaminated soils undertaken.

1989 Tornado touched down on the property, killing several trees in the southwest corner of the property and damaging more trees throughout the property

1990 Earth Day tours of Olin Powder Farm began.

1996 First six miles of Farmington Canal Heritage Greenway opened to the public. To date 10 miles of trail restoration has been completed.

**Appendix F: Hamden Natural Resources and Open Space
Commission Contacts**

Name	Contact Information
William Dohney, Jr., D.D.S.	h: 203.288.1831 o: 203.288.3055
Dr. William Farrell	h: 203.288.3732 o: 203.281.7532 mtcvet@aol.com
Vincent Lavorgna	h: 203.288.1938 o: 203.287.2669 brooksvale@aol.com
Michael Horn	h: 203.288.1891 o: 860.583.1847, ext. 124 mhorn@rcn.com
Martin Mador	h: 203.281.4326 martin.mador@aya.yale.edu
Bonnie Winchester	h: 203.281.6497 o: 203.946.8021 cbwinchester@cs.com
Linda Zelterman	h: 203.230.9108 daniel.zelterman@yale.edu
Thomas Parlapiano	h: 203.288.1341 o: 203.946.6086 lenapepark@aol.com
Dwight Smith	h: 203.248.1934 elinor.smith@usa.net
Ronald Walters	o: 203.624.6671 rwalters@rwater.com
Leslie Creane, Acting Town Planner	o: 203.287.7077 lcreane@hamden.com
Carl Amento, Mayor	o: 203.287.7102
Holly Masi, Commission Clerk	o: 203.287.7072
Gerry Tobin, Meeting Clerk	o: 203.287.7102

**Appendix G: Hamden Government Agency,
Neighborhood Association, and Environmental Organization Contacts**

Inland Wetlands and Watercourses Commission

Holly Masi
Planning and Zoning
(203) 287-7070
<http://www.hamden.com>

Department of Parks and Recreation

Frank Rizzuti
Director
(203) 287-2584
<http://www.hamden.com>

Office of Economic and Community Development

Dale Kroop
Director
tw.n.hmdn.edc@snet.net
(203) 287-7033
<http://www.hamden.com>

City Council

Ann Altman
City Council representative, District 5 (Whitneyville)
aaltman@snet.net
(203) 776-6596
<http://www.hamden.com>

Valerie Cooper
City Council representative at-large
(203) 248-2051
<http://www.hamden.com>

Curtis J. Leng
City Council representative at-large
councilmancurtleng@sbcglobal.net
(203) 288-6258
<http://www.hamden.com>

Whitneyville Civic Association

Lane Driscoll
President
president@whitneyville.org
<http://www.whitneyville.org>

Highwood Neighborhood Revitalization Zone

Lyndon Pitter
Chairman
highville1@aol.com
(203) 287-0528

Newhall Coalition

Elizabeth Hayes
Vice President
(203) 624-9336

Hamden Plains Neighborhood Association

Susan Hutchinson
President
(203) 562-5129

Farmington Canal Heritage Greenway

Leslie Lewis
Greenways Assistance Center
Greenways Small Grants Program
CT Department of Environmental Protection
leslie.lewis@po.state.ct.us
(860) 424-3578

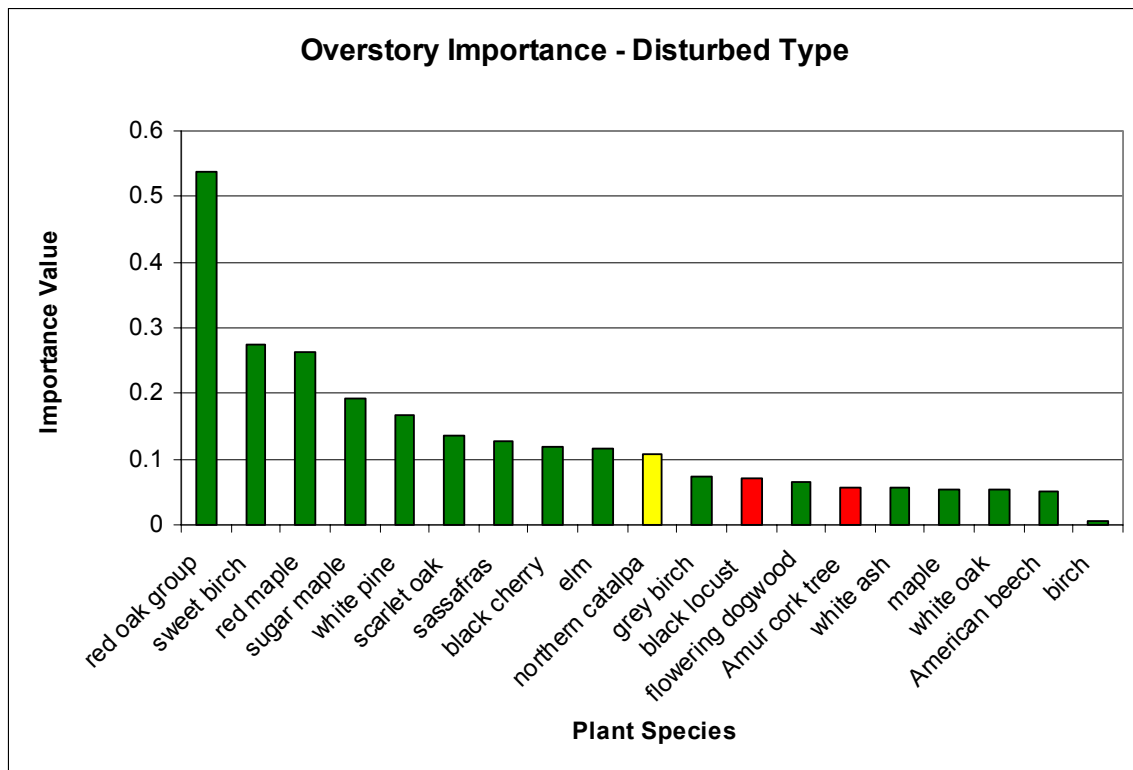
Mill River Watershed Association

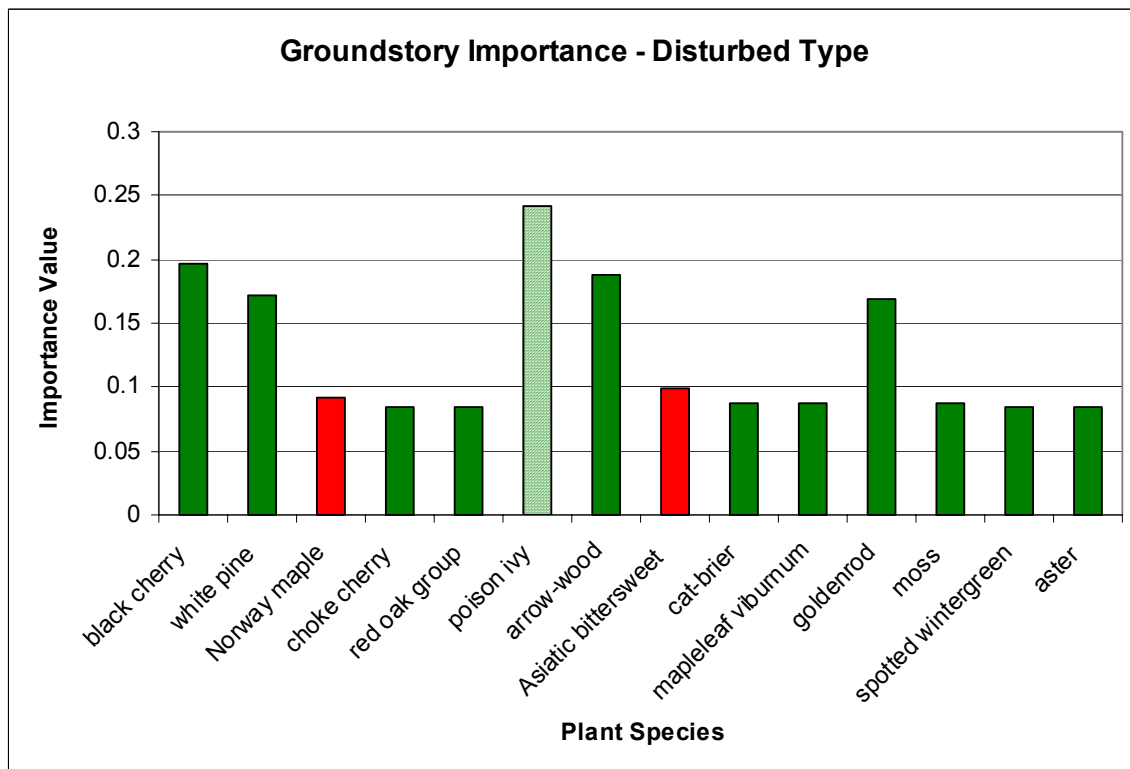
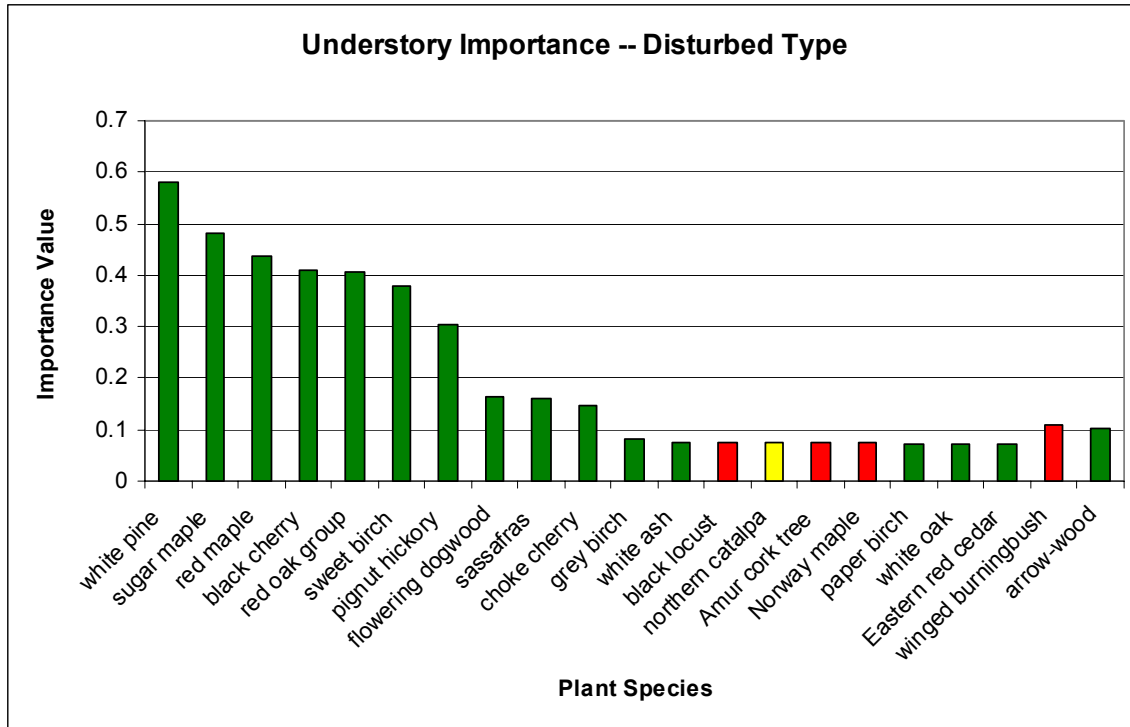
Tom Holahan
President
thomas.holahan@snet.net
(203) 467-8691

Appendix H: Forest Resources Graphs and Charts

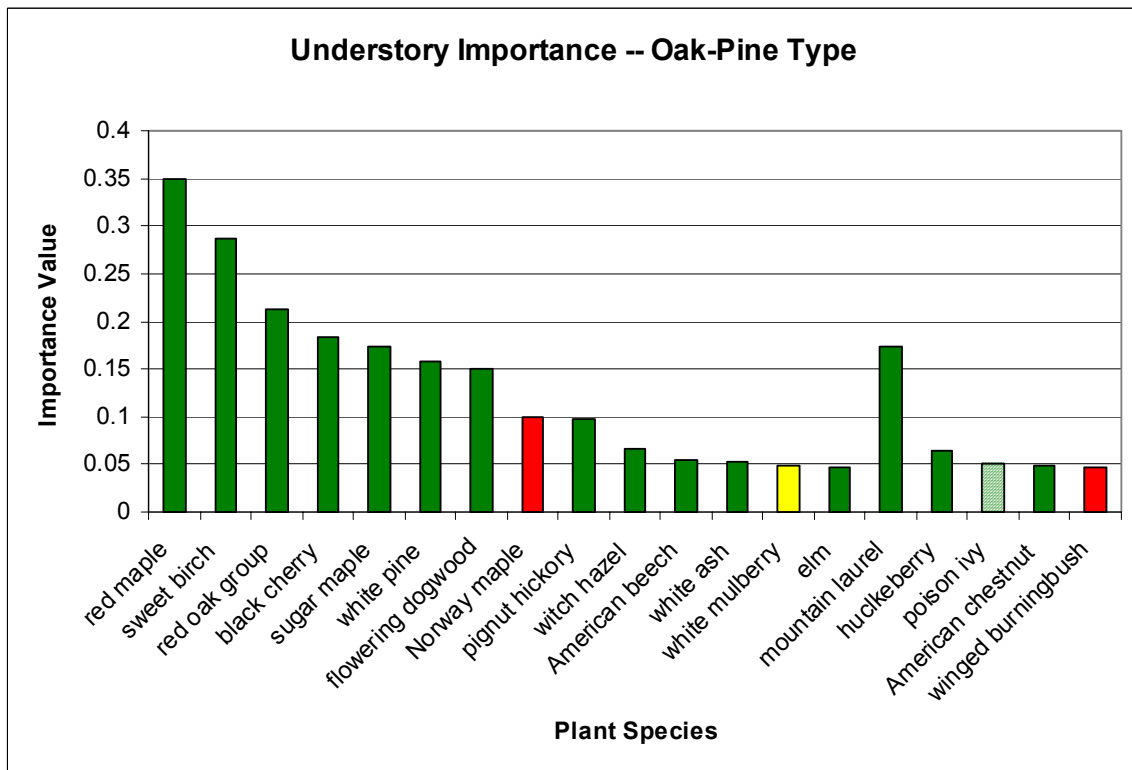
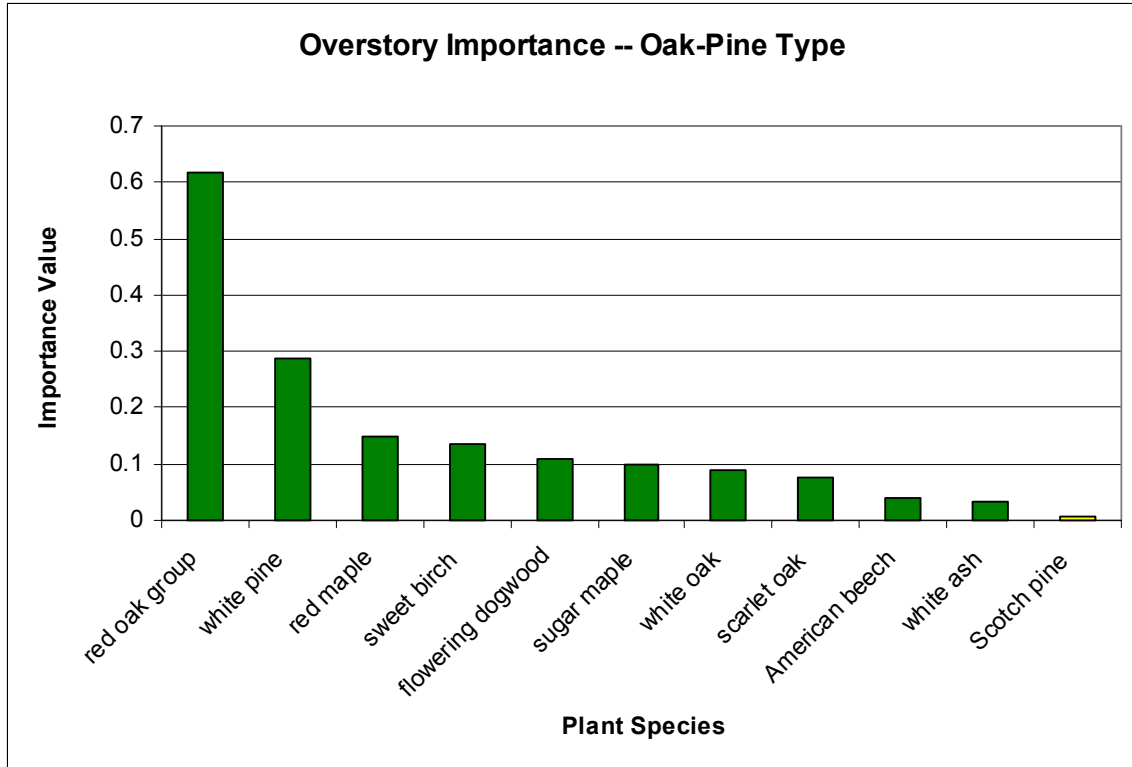
Accompanying graphs summarize importance values of plant species in each layer of each cover type. Importance is a composite metric that describes presence of a species; it is the mean of relative density (number of stems), relative dominance (basal area – only calculated for overstory), and relative frequency (fraction of plots with species present), and paints a more accurate picture of plant presence than any of these alone. On understory and groundstory charts plants are grouped by form, with trees presented first, then shrubs, then herbs and vines. Columns are color coded: red species are those classified by the Connecticut Invasive Plants Working Group (CIPWG) to be widespread and invasive, orange for potentially invasive, yellow for exotic and green native. Poison ivy, a native plant of special interest to stakeholders, is marked with green and white striping. It is hoped that this presentation will facilitate interpretation of the charts by those unfamiliar with the plant names.

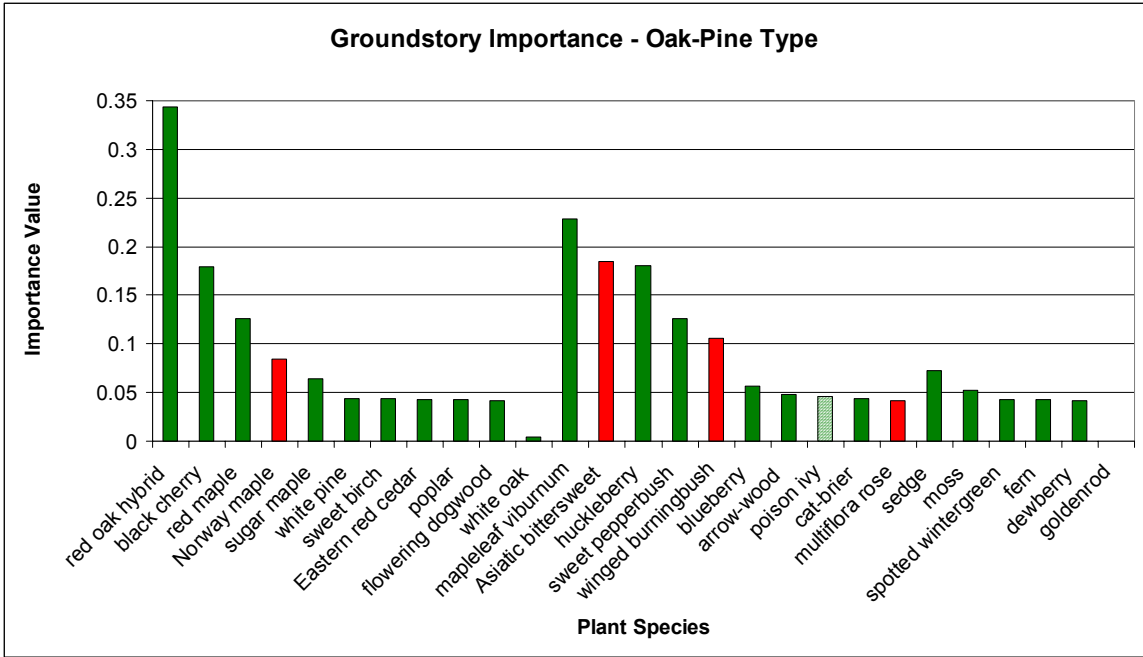
Disturbed Stand



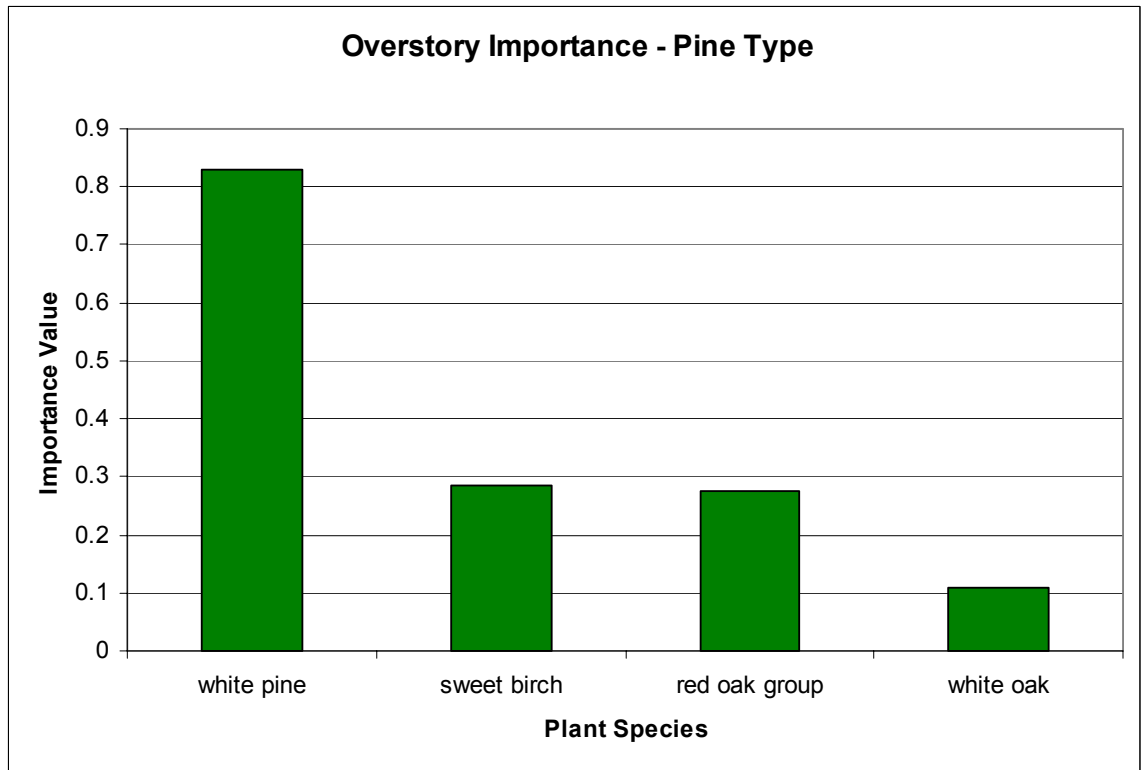


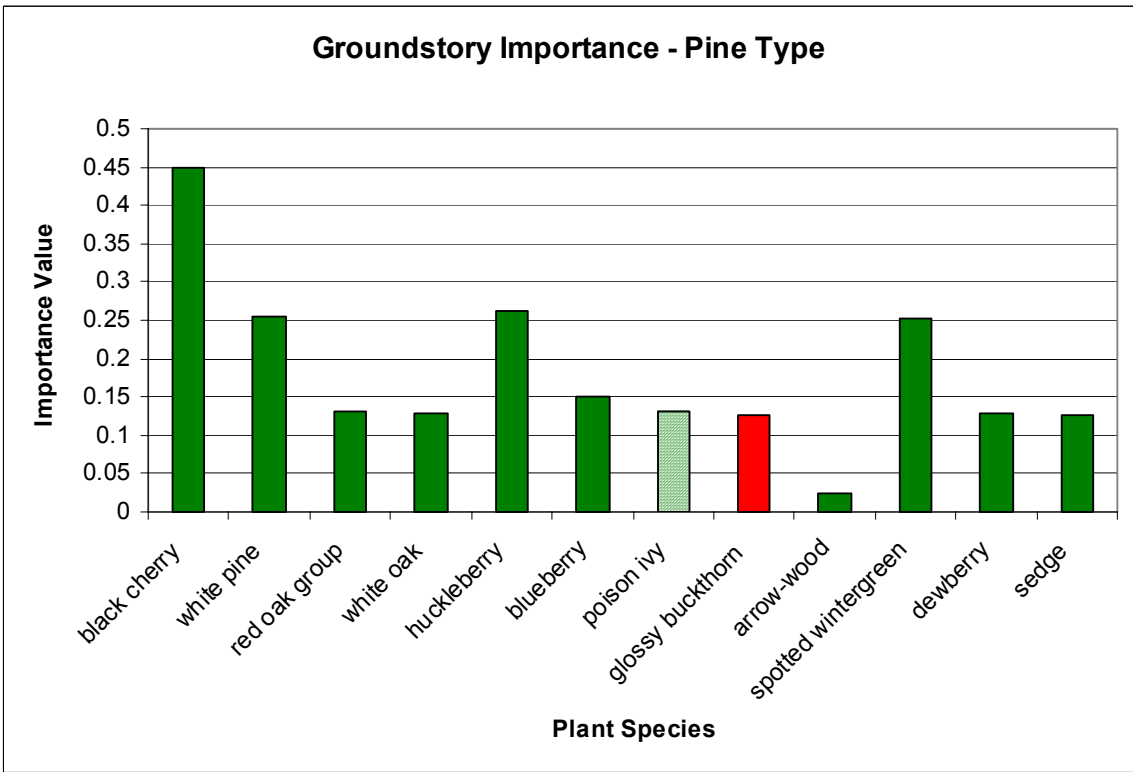
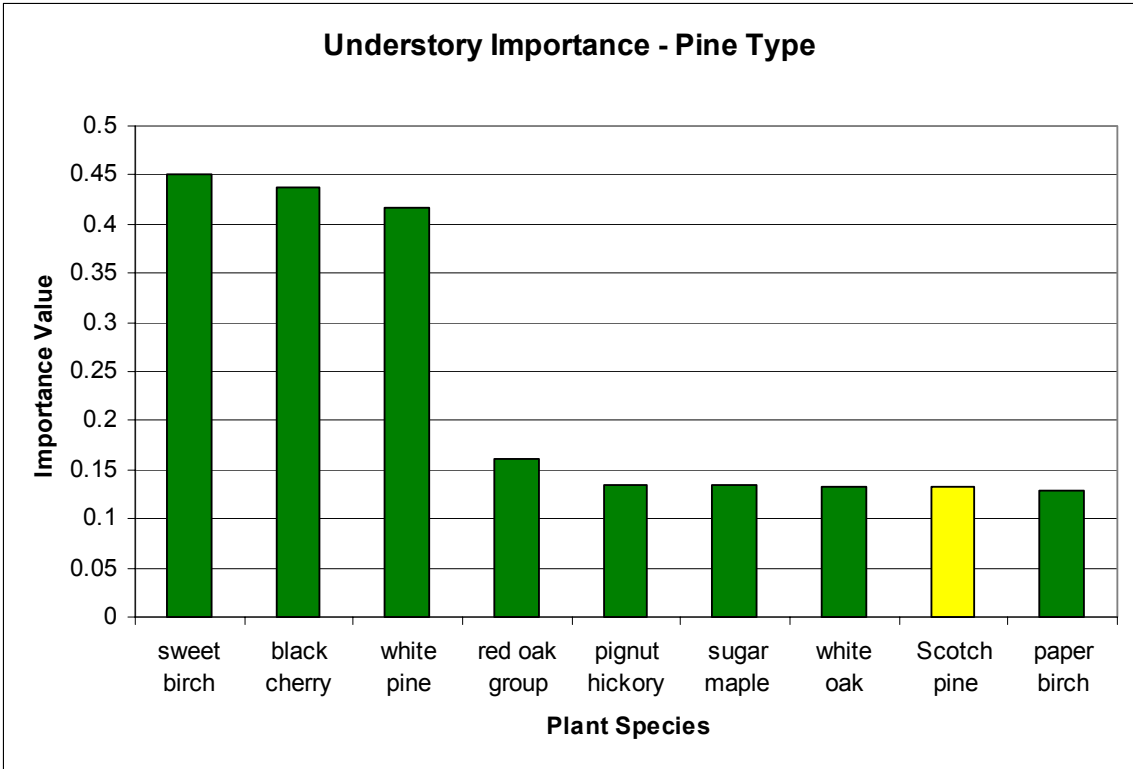
Oak-Pine Stand





Pine Stand





Appendix I: Plant Species Observed³

Scientific Name	Family	Common Name
<i>Acer pennsylvanicum</i> L.	Aceraceae	striped maple
<i>Acer platanoides</i> L.	Aceraceae	Norway maple
<i>Acer rubrum</i> L.	Aceraceae	red maple
<i>Acer saccharinum</i> L.	Aceraceae	silver maple
<i>Acer saccharum</i> Marshall	Aceraceae	sugar maple
<i>Ailanthus altissima</i> (Miller) Swingle	Simarubaceae	tree-of-heaven
<i>Alnus incana</i> (L.) Moench	Betulaceae	speckled alder
<i>Aralia nudicaulis</i> L.	Araliaceae	wild sarsaparilla
<i>Aster</i> sp. L.	Asteraceae	aster
<i>Berberis thunbergii</i> DC.	Berberidaceae	Japanese barberry
<i>Betula alleghaniensis</i> Britton	Betulaceae	yellow birch
<i>Betula lenta</i> L.	Betulaceae	sweet birch
<i>Betula papyrifera</i> Marshall	Betulaceae	paper birch
<i>Betula populifolia</i> Marshall	Betulaceae	gray birch
<i>Buxus sempervirens</i> L. ⁴	Buxaceae	boxwood
<i>Carex</i> sp. L.	Cyperaceae	sedge
<i>Carpinus caroliniana</i> Walter	Betulaceae	musclewood
<i>Carya cordiformis</i> (Wagenh.) K. Koch	Juglandaceae	bitternut hickory
<i>Carya glabra</i> (Miller) Sweet	Juglandaceae	pignut hickory
<i>Castanea dentata</i> (Marshall) Borkh.	Fagaceae	American chestnut
<i>Catalpa speciosa</i> Warder	Bignoniaceae	Northern catalpa
<i>Celastrus orbiculatus</i> Thunb.	Celastraceae	Asiatic bittersweet
<i>Cephalanthus occidentalis</i> L.	Rubiaceae	buttonbush
<i>Chelone glabra</i> L.	Scrophulariaceae	turtlehead
<i>Chimaphila maculata</i> (L.) Pursh.	Pyrolaceae	spotted wintergreen
<i>Clethra alnifolia</i> L.	Clethraceae	sweet pepperbush
<i>Cornus amomum</i> Miller	Cornaceae	silky dogwood
<i>Cornus florida</i> L.	Cornaceae	flowering dogwood
<i>Corylus cornuta</i> Marshall	Betulaceae	beaked hazelnut
<i>Decodon verticillatus</i> (L.) Elliott	Lythraceae	water-willow
<i>Dennstaedia punctilobulia</i> (Michx.) Moore	Dennstaediaceae	hay-scented fern
<i>Desmodium</i> sp. Desv.	Fabaceae	tick-trefoil
<i>Elaeagnus umbellata</i> Thunb.	Elaeagnaceae	autumn olive
<i>Euonymus alatus</i> (Thunb.) Siebold	Celastraceae	winged burning-bush
<i>Equisetum hyemale</i> L.	Equisetaceae	scouring-rush
<i>Fagus grandifolia</i> Ehrh.	Fagaceae	American beech
<i>Gaylussacia bacatta</i> (Wangenh.) K. Koch	Ericaceae	black huckleberry
<i>Hamamelis virginiana</i> L.	Hamamelidaceae	witch-hazel
<i>Ilex verticillata</i> (L.) A. Gray	Aquifoliaceae	winterberry
<i>Lemna minor</i> L.	Lemnaceae	small duckweed

³ Nomenclature follows Gleason, H. A. and A. Cronquist. 1991. **Manual of Vascular Plants of Northeastern United States and Adjacent Canada**. New York: New York Botanical Garden. 910 p.

⁴ Authority here is from the American Boxwood Society, <http://www.boxwoodsociety.org>.

<i>Ligustrum vulgare</i> L.	Oleaceae	privet
<i>Lonicera japonica</i> Thunb	Caprifoliaceae	Japanese honeysuckle
<i>Lycopodium complanatum</i> L.	Lycopodiaceae	northern ground-cedar
<i>Lycopodium obscurum</i> L.	Lycopodiaceae	ground-pine
<i>Mainthemum Canadensis</i> Desf.	Liliaceae	Canada mayflower
<i>Monotropa uniflora</i> L.	Monotropaceae	Indian pipe
<i>Montropa hypopithys</i> L.	Monotropaceae	pinemap
<i>Morus alba</i> L.	Moraceae	white mulberry
<i>Nuphar variegata</i> Durand	Nymphaeaceae	water lily
<i>Nymphaea odorata</i> Aiton	Nymphaeaceae	water lily
<i>Nyssa sylvatica</i> Marshall	Nyssaceae	blackgum
<i>Onoclea sensibilis</i> L.	Onocleaceae	sensitive fern
<i>Osmunda regalis</i> L.	Osmundaceae	royal fern
<i>Parthenocissus quinquefolia</i> (L.) Planchon	Vitaceae	Virginia creeper
<i>Peltranda virginica</i> (L.) Schott & Endl.	Araceae	arrow-arum
<i>Phellodendron amurense</i> Rupr	Rutaceae	Amur cork tree
<i>Phragmites australis</i> (Cav.) Trin	Poaceae	common reed
<i>Picea abies</i> (L) Karst.	Pinaceae	red spruce
<i>Pinus resinosa</i> Aiton	Pinaceae	red pine
<i>Pinus strobus</i> L.	Pinaceae	white pine
<i>Pinus sylvestris</i> L.	Pinaceae	Scotch pine
<i>Polygonum cuspidatum</i> Sieb & Zucc.	Polygonaceae	Japanese knotweed
<i>Polystichum acrostichoides</i> (Michx.) Schott.	Aspleniaceae	Christmas fern
<i>Populus grandidentata</i> Michx.	Salicaceae	bigtooth aspen
<i>Populus tremuloides</i> Michx.	Salicaceae	quaking aspen
<i>Prunus avium</i> L.	Rosaceae	sweet cherry
<i>Prunus serotina</i> Ehrh.	Rosaceae	black cherry
<i>Prunus virginiana</i> L.	Rosaceae	choke cherry
<i>Pteridium aquilinum</i> (L.) Kuhn	Dennstaedtiaceae	bracken fern
<i>Ptlea trifoliata</i> L.	Rutaceae	common hop-tree
<i>Quercus alba</i> L.	Fagaceae	white oak
<i>Quercus coccinea</i> Muenchh.	Fagaceae	scarlet oak
<i>Quercus rubra</i> L.	Fagaceae	red oak
<i>Quercus velutina</i> Lam.	Fagaceae	black oak
<i>Rhamnus frangula</i> L.	Rhamnaceae	glossy buckthorn
<i>Rhododendron viscosum</i> (L.) Torr.	Ericaceae	swamp azalea
<i>Rhus glabra</i> L.	Anacardiaceae	smooth sumac
<i>Rhus typhina</i> L.	Anacardiaceae	staghorn sumac
<i>Robinia pseudoacacia</i> L.	Fabaceae	black locust
<i>Rosa multiflora</i> Thunb.	Rosaceae	multiflora rose
<i>Rosa palustris</i> Marshall	Rosaceae	swamp rose
<i>Rubus allegheniensis</i> T.C. Porter	Rosaceae	common blackberry
<i>Salix</i> sp. L.	Salicaceae	willow
<i>Sambucus Canadensis</i> L.	Caprifoliaceae	common elder
<i>Sassafras albidum</i> (Nutt.) Nees.	Lauraceae	sassafras
<i>Smilacina</i> sp. Desf	Liliaceae	false Solomon's seal

<i>Smilax glauca</i> Walter	Smilacaceae	cat-brier
<i>Solidago</i> sp. L.	Asteraceae	goldenrod
<i>Taxus Canadensis</i> Marshall	Taxaceae	American yew
<i>Thuja occidentalis</i> L.	Cupressaceae	Northern white-cedar
<i>Toxicodendron radicans</i> (L.) Kuntze	Anacardiaceae	poison ivy
<i>Tsuga Canadensis</i> (L.) Carriere	Pinaceae	Eastern hemlock
<i>Typha</i> sp. L.	Typhaceae	cat-tail
<i>Ulmus Americana</i> L.	Ulmaceae	American elm
<i>Uvularia</i> sp. L.	Liliaceae	bellwort
<i>Vaccinium angustifolium</i> Aiton	Ericaceae	lowbush-blueberry
<i>Vaccinium corymbosum</i> L.	Ericaceae	highbush-blueberry
<i>Viburnum acerifolium</i> L.	Caprifoliaceae	maple-leaf viburnum
<i>Viburnum dentatum</i> L.	Caprifoliaceae	arrow-wood
<i>Viburnum lentago</i> L.	Caprifoliaceae	nannyberry
<i>Vitis</i> sp. L.	Vitaceae	grape
<i>Wolffia</i> sp. Horkel	Lemnaceae	water-meal

Appendix J: Guide to Invasive Plant Species

Species Descriptions⁵

Tree-of-heaven (*Ailanthus altissima* [Miller] Swingle) is a deciduous broadleaved tree native to central China. The tree can be distinguished by its tall stature, and pinnately compound leaves that smell of peanut-butter when crushed. The species was broadly available commercially by 1840, promoted throughout the mid-nineteenth century for use in the incipient silk industry here,⁶ though initial introduction to the United States in Philadelphia dates to 1784. It is extremely successful in urban areas, establishing in very small patches of soil, and also spreading in from edges of natural areas.

Japanese barberry (*Berberis thunbergii* DC) is a small broadleaved shrub native to Asia. Introduced to the United States as a specimen in the Arnold Arboretum at Harvard University, the plant has spread easily and quickly, helped along by humans who find its colorful foliage and ease of cultivation desirable and by birds that eat and disperse its shiny red fruits. It is very sparsely distributed on the property.

Asiatic bittersweet (*Celastrus orbiculatus* Thunb.) Is a climbing woody vine native to eastern Asia, which was introduced to the United States in the 1860s as an ornamental. Prized as a garden plant, bittersweet is especially popular in fall and winter for its showy red and orange fruits. In the northeastern US and lake states it displaces the native American bittersweet (*Celastrus scandens* L.) through competition and hybridization, and outcompetes other species by aggressive growth over them, forming dense thickets and casting deep shade.

Winged burningbush (*Euonymus alatus* (Thunb.) Siebold), or winged wahoo, is a deciduous shrub best known for its vivid red foliage in fall. Introduced from eastern Asia in the mid-nineteenth century as an ornamental species, it remains a popular landscape planting. Its popularity with human populations, paired with the desirability of its red fruits to birds – that go on to disperse the seeds – have led to a wide distribution of the plant. When it escapes from cultivation and into wooded natural areas, it can form thickets that preclude the growth of native herb species.

Japanese knotweed (*Polygonum cuspidatum* Sieb. & Zucc.), also called Mexican bamboo, is an herbaceous perennial, similar to true bamboo in having hollow stems and swollen jointed nodes. Native to eastern Asia, as are many of the invasive species on the Olin Powder Farm, Japanese knotweed is unusually successful in colonizing and persisting under a wide range of environmental conditions including shade, drought, and flooding. It produces many small fruits each year, and spreads primarily by stout underground stems called rhizomes. Likely introduced in the late 1800s as a landscaping plant, Japanese knotweed escapes quickly from gardens into nearby woodlands, rights-of-

⁵ The Alien Plants Working Group of the National Park Service provides histories and descriptions of invasive plants described here on <http://www.nps.gov/plants/alien>

⁶ United States Department of Agriculture. 1863. **Handbook of Agriculture for 1862.**

way, and other natural areas. Thickets of Japanese knotweed line the road in from Putnam Avenue, and it is abundant in old bunker sites.

Privet (*Ligustrum vulgare* L.) is a broadleaved evergreen shrub with small white flowers. It is in the Olive family, and is native to Europe. Commonly trimmed and used as a hedge in landscaping, it can escape cultivation and establish in natural forests. Privet is common around the cattail marsh in the northwestern portion of the property.

Japanese Honeysuckle (*Lonicera japonica* Thunb.) is a semi-evergreen trailing woody vine native to Japan and Korea. Introduced in the mid-nineteenth century for use as an ornamental, for erosion control, and for wildlife forage, the plant has been extremely prolific in the United States where it has few natural pests. Its abundance and competitive success have been harmful to native plant communities where its dense mat of leaves shades the ground much of the year, preventing native species' germination and growth. Stout honeysuckle specimens, climbing on stems of trees, can girdle them. The bright red fruits of the honeysuckle are eaten and dispersed by birds.

Common reed (*Phragmites australis* [Cav.] Trin.), known colloquially as phragmites or phrag. is a colonial grass of wet places. There is some debate over its nativity; it is native to North America and often exists in natural, stable populations in wetlands here. Very aggressive strains have emerged, however, and most think that this is the result of hybridization between our native *P. australis* and European varieties. One solution to this ambiguity is to make a determination of the threat posed by populations only after several years of monitoring. Populations that spread aggressively should be controlled.

Glossy buckthorn (*Rhamnus frangula* L.) is a woody shrub native to Europe, Asia, and north Africa, and is thought to have been introduced to North America before 1800.⁷ It establishes in moderate to full light conditions and areas of at least moderate soil moisture as dense thickets. Because it is light limited, canopy closure overhead can lead to diminished prominence of buckthorn. Another management option is girdling. By cutting all the way around the stem and through the phloem each individual can be killed without resprouting, disturbing soil, or affecting negatively wetlands.⁸

Multiflora rose (*Rosa multiflora* Thunb.) is an aggressively colonial thorny shrub introduced to the United States from eastern Asia in the 1860s. Originally used as rootstock for ornamental rose cultivars, it was from the 1930s promoted for agricultural uses such as living fences and erosion control. Its use was further encouraged by state and federal agencies, until recently, as cover for wildlife and in highway plantings. Now several states classify it as a noxious weed for the economic losses sustained to grazing and ranching industries.

⁷ Wyman, D. 1971. **Shrubs and Vines for American Gardens**. New York: MacMillan Co. Cited in Element Stewardship Abstract for *Rhamnus frangula* and *R. cathartica*, accessible at: <http://tncweeds.ucdavis.edu/esadocs/documnts/franaln.pdf>

⁸ Reed, D. 1983 Dec. 12. Principle biologist, SE WI Regional Planning Commission. Telephone conversation with C.K. Converse, TNC, MRO. Cited in Element Stewardship Abstract for *Rhamnus frangula* and *R. cathartica*, accessible at: <http://tncweeds.ucdavis.edu/esadocs/documnts/franaln.pdf>.

Norway maple (*Acer platanoides* L.) is a deciduous broadleaved tree native to Europe, where it is a major timber species. Its success in the United States has been due to other advantages; both its tolerance of poor sites and environmental pollution and the plasticity of its leaf coloration have made it a desirable tree for urban and landscaping cultivation. Its persistence on poor sites and the deep shade it casts, both desirable in urban plantings, lead to its success as an invader in natural areas.

Amur cork tree (*Phellodendron amurense* Rupr.) is not the source of commercial cork (which is harvested from an oak), but related botanically to citrus fruits such as oranges and limes. It is a deciduous broadleaved tree, with thickly-ridged corky bark and pinnately compound leaves that turn yellow in fall. Native to eastern Asia, the Amur cork tree was introduced to the United States as an ornamental tree in 1856. Based on its drought and pollution tolerances and ornamental value it has remained a popular landscaping tree in the eastern United States. Although CIPWG does not yet recognize Amur cork tree as an invasive, cities of New York and Philadelphia have identified it as such, able to disperse many seeds and then establish in intact and minimally-managed urban parks and woodlands. Few individuals of this species were seen in the disturbed/bunker areas in the southern portion of the property, and one was spotted as part of a landscape planting behind the Whitney Center.

Appendix K: Invasive Plant Species Management Recommendations

Invasive and otherwise undesirable species management comprises three methods: prevention, eradication, and control. Managers desire to prevent the influx of new weedy species, to eradicate from the property what undesirable species they can, and, in the majority of cases, control the extent and overall effect of undesirable plants that cannot be kept from entering the site or eliminated completely.

It is recommended that managers proceed with control and eradication efforts from the peripheries of infestations – areas of scattered invasive plants in mostly native vegetation – toward areas of high infestation. This technique first isolates invasive species and allows managers to focus intensive monitoring and control efforts on specific areas of the property. Because managerial control includes increasing the vigor of the native species so that they can competitively exclude invasives, it is important that control efforts proceed in such a way that adjacent areas can provide high-quality seed source and shading. For this reason the managers should work from the interface of disturbed forest and oak-pine cover type into the disturbed stand. It is understood that immediate adjacency is not the only concern. As many of the invasive species on site are dispersed by birds, ongoing extensive monitoring of plant invasion is recommended.

Although it is difficult at this time to know what management options will be most desirable because future ownership is unknown, the recommendations in this section can be followed with schedule accelerated and technique modified as suits the owner. We assume limited financial and personnel resources, and so emphasize physical control methodologies. Certain public and private owners that could fold this property into existing invasive species eradication programs on existing properties, and would therefore have access to licensed pesticide applicators, will find the chemical control methods described possible as well, and likely more desirable. Thermal and biological control methods are not considered due to the small size of the property and its urban context.

Unless otherwise noted, control efforts should be focused in the early spring. Ecologically this is favorable because it is a time when many invasive species will have leafed-out and begun to produce new growth. Perennial species tap nutrients and energy stored in roots for the first flush of growth in spring, whereas a plant in mid-summer will have replenished those reserves to its belowground biomass. In spring it is uniquely uneven in its resource allocation. Plants cut in early spring, therefore, will be less able to resprout than those cut at any other time of the year. Aside from this efficiency rationale, invasive species typically flush earlier in the season than native species, and will therefore be easily spotted at that time of year. Follow-up monitoring and retreatment are important throughout the growing season.

Species-specific eradication recommendations follow, and it is further recommended that managers refer to the often updated policies of state and private landowners with existing eradication programs.

Priorities:

Priority species are those for which management is likely to have a big impact, especially those predicted to spread most aggressively on the site and to disperse out from the disturbed area at the south end of the property and into the native forest. Because many invasive and weedy species are specialists on disturbed sites characterized by open, high-light conditions and disturbed mineral soil, it is expected that as the forest matures they will be less problematic than they are now. The most pernicious species are those that can invade native, intact forests and then competitively exclude native species, either by killing them (shading, strangulation) or by preventing regeneration (shading, allelopathy). The two whose control is most critical are Norway maple and Asiatic bittersweet. If resources allow, control of more species would be desirable. Species are listed in order of priority.

Norway maple grows to be a large tree. Because it is often found as individual stems, manual control – careful hand-pulling of stems when they are young enough to be removed in their entirety – has the highest success rates for eradication. This method is labor-intensive, but is desirable in that it does not disturb the soil as much as digging would, and requires little specialized safety training for managers compared to what herbicide application or cutting might. Furthermore, none of the associated dangers of persistence or spread that are associated with foliar herbicide application or thermal methods of control (e.g. heat girdling, prescribed burning) apply.

It is important that all of the rootstock be removed from the ground, or there is danger of resprouting. Loose, coarse-textured soils on site make this task relatively easy. In areas of dense infestation, or for older and well-established individuals with taproots, mechanical cutting is recommended, and repeated cuttings may be necessary to eliminate sprouts.

Older stems should be girdled or sawn. If herbicide application is acceptable to RWA and DPH, application of a product containing as an active ingredient the plant growth hormone trypcolopyr ester (Dow sells this under the name Garlon 4) to a cut stump or girdled stem will reduce the need for follow-up cutting. This herbicide is desirable because it affects dicots only (not grasses), and its application is targeted to stems rather than broadcast across the canopy. Slash from stem cuttings that does not contain flowers or fruits can be left behind as cover for small animals where it does not block trails; slash with reproductive materials must be removed from the site and destroyed.

Because trees can often repair wounds and reconnect vasculature following girdling and because maples often sprout, follow-up visits should be made for monitoring several times in the growing season in the first few years following initial eradication efforts.

Asiatic bittersweet, a vine which often grows in thickets of several stems, is best controlled by repeated cutting, or, where possible, cutting followed by herbicide treatment. Immediately after using resources to flush out new growth, the plants will be quite vulnerable to the second assault, and weak to rally following it. Bittersweet

tolerates glyphosate (which Monsanto sells labeled as both Roundup and Rodeo), so a trypclopyr ester is recommended. Slash need not be removed where it does not contain fruits, but in areas where the bittersweet has formed impenetrable thickets that exclude light from reaching the groundstory, removal or piling of slash may be desirable to facilitate recolonization of the area by native plant species. Climbing mats of Asiatic bittersweet, especially once dead, can act as ladder fuels and should be cut or pulled down as possible. Elsewhere it can be left behind as cover for small animals, as long as seed is not left behind.

Japanese knotweed is an herbaceous plant that grows in colonies of many stems, and spreads mostly via underground stems (also called rhizomes), though it is a prolific seed producer as well. Repeated cutting or mowing is the recommended treatment for knotweed infestations, in excess of three times in a growing season. Attempts to dig out rhizomes are not typically complete, so they result in broken pieces being left behind to sprout, in addition to major soil disturbance; digging is strongly discouraged. Installation of shade cloths or black plastic above the infestations can weaken knotweed resistance via depletion of rhizomatic reserves. Although the plant can persist for some time under shaded conditions, it cannot do so indefinitely. Eventually, intact forest canopy can provide a natural source of shade that will inhibit new knotweed incursions. Coupling shading with cutting would be suitable, and if herbicide use (e.g. glyphosate) is possible it is recommended as well. Japanese knotweed is one of the more aggressive invaders on site and must be treated aggressively in kind.

Ailanthus can be removed as recommended for Norway maple.

Autumn-olive is an unarmed shrub. Repeated cutting may limit its extent somewhat, but it resprouts readily after cutting, so herbicide use is important in its sustained control. In late summer glyphosate applied to cut stumps has been successful in preventing resprouting; late in the growing season plants are translocating to their roots, and this timing facilitates effective kills. Trypoclyr applied basally in very early spring while plants are still dormant is also effective. Foliar application should be avoided if possible because of its effects on non-target plants. Because it will contain fruits, the slash should be removed from the site.

Winged burningbush can be eradicated by digging, perhaps with a grubbing hoe or small shovel. Small individuals can be pulled by hand.

Multiflora rose can be controlled by cutting followed by basal-bark treatment of cut stumps with glyphosate or trypclopyr ester. Slash can be left on site so long as it does not include fruits.

Japanese barberry

Because so few individuals exist on site at present, Japanese barberry is best removed by digging – hand-pulling is undesirable because of the spines on its stems – and followed monitoring.

Phragmites

No action should be taken on phragmites yet but to monitor populations each year to see if they are spreading. Until proven to be otherwise, it should be regarded as a stable and natural population.

Appendix L: Wildlife Species

The following list of wildlife species was generated by NEWILD⁹, a software program developed for forest management decision support by the United States Department of Agriculture, Forest Service, Northeastern Forest Experiment Station in Burlington, Vermont. Based on forest structure and location data entered, the program produced the list of potential species on site. Those species marked with an asterisk (*) were actually observed on site.

Common Name	Scientific Name
<i>Amphibians and Reptiles</i>	
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>
Spotted Salamander	<i>Ambystoma maculatum</i>
Red-spotted Newt	<i>Notophthalmus v. viridescens</i>
Northern Dusky Salamander	<i>Desmognathus fuscus</i>
Northern Redback Salamander	<i>Plethodon cinereus</i>
Four-toed Salamander	<i>Hemidactylium scutatum</i>
Northern Two-lined Salamander	<i>Eurycea bislineata</i>
Eastern Spadefoot	<i>Scaphiopus holbrookii</i>
Fowler's Toad	<i>Bufo fowleri</i>
Eastern American Toad	<i>Bufo a. americanus</i>
Northern Spring Peeper*	<i>Pseudacris c. crucifer</i>
Gray Treefrog	<i>Hyla versicolor</i>
Bullfrog	<i>Rana catesbeiana</i>
Green Frog	<i>Rana clamitans melanota</i>
Wood Frog	<i>Rana sylvatica</i>
Pickerel Frog	<i>Rana palustris</i>
Common Snapping Turtle	<i>Chelydra s. serpentina</i>
Common Musk Turtle	<i>Sternotherus odoratus</i>
Spotted Turtle	<i>Clemmys guttata</i>
Wood Turtle	<i>Clemmys insculpta</i>
Eastern Box Turtle	<i>Terrapene c. carolina</i>
Eastern Painted Turtle	<i>Chrysemys p. picta</i>
Midland Painted Turtle	<i>Chrysemys picta marginata</i>
Northern Brown Snake	<i>Storeria d. deka yi</i>
Northern Water Snake	<i>Nerodia s. sipedon</i>
Eastern Garter Snake	<i>Thamnophis sirtalis pallidulus</i>
Maritime Garter Snake	<i>Thamnophis sirtalis sauritus</i>
Eastern Ribbon Snake*	<i>Thamnophis sauritus sauritus</i>
Northern Ribbon Snake	<i>Thamnophis sauritus septentrionalis</i>
Eastern Hognose Snake	<i>Heterodon platyrhinos</i>
Northern Ringneck Snake	<i>Diadophis punctatus edwardsii</i>

⁹ United States Department of Agriculture. 1998. NEWILD Version 1.0. Forest Service, Northeastern Research Station. General Technical Report NE-242. Randor Pennsylvania.

Eastern Worm Snake	<i>Carphophis a. amoenus</i>
Northern Black Racer	<i>Coluber c. constrictor</i>
Eastern Smooth Green Snake	<i>Liochlorophis vernalis</i>
Black Rat Snake	<i>Elaphe o. obsoleta</i>
Eastern Milk Snake	<i>Lampropeltis t. triangulum</i>
Northern Copperhead	<i>Agkistrodon contortrix mokasen</i>

Mammals

Virginia Opossum	<i>Didelphis virginiana</i>
Masked Shrew	<i>Sorex cinereus</i>
Water Shrew	<i>Sorex palustris</i>
Smokey Shrew	<i>Sorex fumeus</i>
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>
Least Shrew	<i>Cryptotis parva</i>
Eastern Mole	<i>Scalopus aquaticus</i>
Star-nosed Mole	<i>Condylura cristata</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Eastern Small-footed Myotis	<i>Myotis leibii</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Eastern Pipistrelle	<i>Pipistrellus subflavus</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Red Bat	<i>Lasiurus borealis</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Eastern Cottontail	<i>Sylvilagus floridanus</i>
Snowshoe Hare	<i>Lepus americanus</i>
Beaver	<i>Castor canadensis</i>
Eastern chipmunk*	<i>Tamias striatus</i>
Woodchuck	<i>Marmota monax</i>
Gray Squirrel	<i>Sciurus carolinensis</i>
Red Squirrel	<i>Tamiasciurus hudsonicus</i>
Southern Flying Squirrel	<i>Glaucomys volans</i>
White-footed Mouse*	<i>Peromyscus leucopus</i>
Southern Red-backed Vole	<i>Clethrionomys gapperi</i>
Meadow Vole	<i>Microtus pennsylvanicus</i>
Woodland Vole	<i>Microtus pinetorum</i>
Meadow Jumping Mouse	<i>Zapus hudsonius</i>
Woodland Jumping Mouse	<i>Napaeozapus insignis</i>
Muskrat*	<i>Ondatra zibeithicus</i>
Southern Bog Lemming	<i>Synaptomys cooperi</i>
Coyote	<i>Canis latrans</i>
Red Fox*	<i>Vulpes vulpes</i>
Gray Fox	<i>Urocyon cinereoargenteus</i>
Raccoon	<i>Procyon lotor</i>
Ermine	<i>Mustela erminea</i>
Long-tailed Weasel	<i>Mustela frenata</i>
Mink	<i>Mustela vison</i>
Striped Skunk	<i>Mephitis mephitis</i>
River Otter	<i>Lontra canadensis</i>

Bobcat	<i>Lynx rufus</i>
White-tailed Deer*	<i>Odocoileus virginianus</i>

Birds

Common Loon	<i>Gavia immer</i>
Double-crested Comorant*	<i>Phalacrocoas auritus</i>
Least Bittern	<i>Ixobrychus exilis</i>
Great Blue Heron*	<i>Ardea herodias</i>
Green Heron	<i>Butorides virescens</i>
Black-crowned Night Heron*	<i>Nycticorax nycticorax</i>
Yellow-crowned Night Heron	<i>Nycticorax violacea</i>
Mute Swan*	<i>Cygnus olor</i>
Canada Goose*	<i>Branta canadensis</i>
Wood Duck*	<i>Aix sponsa</i>
Green-winged Teal*	<i>Anas crecca</i>
American Black Duck*	<i>Anas rubripes</i>
Mallard*	<i>Anas platyrhynchos</i>
Northern Pintail	<i>Anas acuta</i>
Blue-winged Teal	<i>Anas discors</i>
Gadwall*	<i>Anas strepera</i>
American Widgeon*	<i>Anas americana</i>
Canvasback	<i>Aythya valisineria</i>
Ring-necked Duck	<i>Aythya collaris</i>
Common Goldeneye	<i>Bucephala clangula</i>
Hooded Merganser	<i>Lophodytes cucullatus</i>
Red-breasted Merganser	<i>Mergus serrator</i>
Common Merganser	<i>Mergus merganser</i>
Turkey Vulture	<i>Cathartes aura</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Broad-winged Hawk*	<i>Buteo platypterus</i>
Sharp-shinned Hawk	<i>Accipiter striatus</i>
Cooper's Hawk	<i>Accipiter cooperii</i>
Northern Goshawk	<i>Accipiter gentilis</i>
Red-shouldered Hawk	<i>Buteo lineatus</i>
Northern Harrier	<i>Circus cyaneus</i>
Rough-legged Hawk	<i>Buteo lagopus</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
American Kestrel	<i>Falco sparverius</i>
Merlin	<i>Falco columbarius</i>
Peregrine Falcon	<i>Falco peregrinus</i>
Osprey*	<i>Pandion haliaetus</i>
Ruffed Grouse	<i>Bonasa umbellus</i>
Wild turkey*	<i>Meleagris gallopavo</i>
Northern Bobwhite	<i>Colinus virginianus</i>
American Woodcock	<i>Scolopax minor</i>
Mourning Dove	<i>Zenaida macroura</i>
Rock Dove*	<i>Columba livia</i>
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>

Yellow-billed Cuckoo	<i>Coccyzus americanus</i>
Virginia Rail	<i>Rallus limicola</i>
Sora	<i>Porzana carolina</i>
Common Moorhen	<i>Gallinula chloropus</i>
Spotted Sandpiper	<i>Actitis macularia</i>
Common Snipe	<i>Gallinago gallinago</i>
Eastern Screech-Owl	<i>Otus asio</i>
Great Horned Owl	<i>Bubo irginianus</i>
Northern Saw-whet Owl	<i>Aegolius acadicus</i>
Short-eared Owl	<i>Asio flammeus</i>
Common Nighthawk	<i>Chordeiles minor</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
Ruby-throated Hummingbird	<i>Archilochus colubris</i>
Belted Kingfisher*	<i>Ceryle alcyon</i>
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>
Red-bellied Woodpecker*	<i>Melanerpes carolinus</i>
Yellow-bellied Woodpecker	<i>Sphyrapicus varius</i>
Downey Woodpecker*	<i>Picoides pubescens</i>
Hairy Woodpecker	<i>Picoides villosus</i>
Northern Flicker	<i>Colaptes auratus</i>
Pileated Woodpecker*	<i>Dryocopus pileatus</i>
Eastern Wood-Pewee	<i>Contopus virens</i>
Willow Flycatcher	<i>Empidonax traillii</i>
Least Flycatcher	<i>Empidonax minimus</i>
Eastern Phoebe	<i>Sayornis phoebe</i>
Great Crested Flycatcher	<i>Myiarchus crinitus</i>
Eastern Kingbird	<i>Tyrannus tyrannus</i>
Purple Martin	<i>Progne subis</i>
Tree Swallow	<i>Tachycineta bicolor</i>
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
Bank Swallow	<i>Riparia riparia</i>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Barn Swallow	<i>Hirundo rustica</i>
Blue Jay*	<i>Cyanocitta cristata</i>
American Crow*	<i>Corvus brachyrhynchos</i>
Fish Crow	<i>Corvus ossifragus</i>
Black-capped Chickadee*	<i>Poecile atricapillus</i>
Tufted Titmouse	<i>Baeolophus bicolor</i>
Red-breasted Nuthatch	<i>Sitta canadensis</i>
White-breasted Nuthatch	<i>Sitta carolinensis</i>
Brown Creeper	<i>Certhia americana</i>
Winter Wren	<i>Troglodytes troglodytes</i>
Marsh Wren	<i>Cistothorus palustris</i>
Carolina Wren	<i>Thryothorus ludovicianus</i>
House Wren	<i>Troglodytes aedon</i>
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>
Golden-crowned Kinglet	<i>Regulus satrapa</i>
Ruby-crowned Kinglet	<i>Regulus calendula</i>

Eastern Bluebird	<i>Sialia sialis</i>
Veery	<i>Catharus fuscescens</i>
Hermit Thrush	<i>Catharus guttatus</i>
Wood Thrush	<i>Hylocichla mustelina</i>
American Robin	<i>Turdus migratorius</i>
Gray Catbird*	<i>Dumetella carolinensis</i>
Northern Shrike	<i>Lanius excubitor</i>
Brown Thrasher	<i>Toxostoma rufum</i>
Cedar Waxwing	<i>Bombycilla cedrorum</i>
European Starling	<i>Sturnus vulgaris</i>
White-eyed Vireo	<i>Vireo griseus</i>
Solitary Vireo	<i>Vireo solitarius</i>
Yellow-throated Vireo*	<i>Vireo flavifrons</i>
Warbling Vireo	<i>Vireo gilvus</i>
Blue-winged Warbler	<i>Vermivora pinus</i>
Yellow Warbler	<i>Dendroica petechia</i>
Nashville Warbler	<i>Vermivora ruficapilla</i>
Yellow-rumped Warbler	<i>Dendroica coronata</i>
Pine Warbler	<i>Dendroica pinus</i>
Prairie Warbler	<i>Dendroica discolor</i>
Black and White Warbler	<i>Mniotilta varia</i>
Black-throated Green Warbler	<i>Dendroica virens</i>
Blackburnian Warbler	<i>Dendroica fusca</i>
American Redstart	<i>Setophaga ruticilla</i>
Worm-eating Warbler	<i>Helmitheros vermivorus</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Northern Waterthrush	<i>Seiurus noveboracensis</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
Hooded Warbler	<i>Wilsonia citrina</i>
Canada Warbler	<i>Wilsonia canadensis</i>
Yellow-breasted Chat	<i>Icteria virens</i>
Scarlet Tanager	<i>Piranga olivacea</i>
Northern Cardinal*	<i>Cardinalis cardinalis</i>
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>
Indigo Bunting	<i>Passerina cyanea</i>
American Tree Sparrow	<i>Spizella arborea</i>
Chipping Sparrow	<i>Spizella passerina</i>
Field Sparrow	<i>Spizella pusilla</i>
Savannah Sparrow	<i>Passerculus sandwichensis</i>
Swamp Sparrow	<i>Melospiza georgiana</i>
Fox Sparrow	<i>Passerella iliaca</i>
Song Sparrow	<i>Melospiza melodia</i>
White-throated Sparrow	<i>Zonotrichia albicollis</i>
Snow Bunting	<i>Plectrophenax nivalis</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Rusty Blackbird	<i>Euphagus carolinus</i>
Dark-eyed Junco	<i>Junco hyemalis</i>

Common Grackle	<i>Quiscalus quiscula</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Northern Oriole	<i>Icterus galbula</i>
Pine Grosbeak	<i>Pinicola enucleator</i>
Common Redpoll	<i>Loxia curvirostra</i>
Pine Siskin	<i>Carduelis pinus</i>
Purple Finch	<i>Carpodacus purpureus</i>
American Goldfinch*	<i>Carduelis tristis</i>

Appendix M: Regional Water Authority Recreation Lands and Rules



General Rules and Regulations for Recreational Use of the Regional Water Authority Land

- I. Strictly prohibited activities except by written authorization:
 - A. Swimming in a public drinking water supply reservoir or tributary
 - B. Wading in a public water supply reservoir or tributary
 - C. Littering
 - D. Fires
 - E. Smoking
 - F. Alcoholic beverages
 - G. Cleaning of fish
 - H. Picnicking or camping
 - I. Hunting or trapping
 - J. Pets
 - K. Motorized vehicles (snowmobiles, motor bikes, etc.)
 - L. Bicycling
 - M. Activities on the ice of frozen reservoirs
 - N. Removal of trees, shrubs, flowers or other vegetation
 - O. Vendors
 - P. Disposal or discharge of wastes or other substances into reservoirs
 - Q. Carrying or discharge of firearms or dangerous weapons
- II. Persons using Regional Water Authority land:
 - A. Release the RWA from all liability relating to their presence on the RWA's property, including liability for personal injury and property damage caused by the RWA's negligence.
 - B. Will obey all orders and directions of RWA staff and police.
 - C. Will remain only in the areas designated for recreational use.
- III. Permitted hours of use are sunrise to sunset
- IV. Parking spaces are available with the applicable recreation permit on a first come-first serve basis. Violations are subject to towing at owner's expense (if parking permit is not displayed in front windshield).
- V. All permit holders must be age 16 or older and are required to display a valid RWA recreation permit. Persons under age 21 without a permit must be accompanied by and under direct supervision of a permit holder. Permits are not transferable.
- VI. All persons 16 years of age and older must possess a valid Connecticut State Fishing License for fishing.
- VII. Live bait, other than worms, is prohibited.
- VIII. Body wastes must be disposed of in sanitary facilities.
- IX. Violation of any of the above rules and regulations may result in revocation of permit and denial of future permits.

- X. Violation of federal, state, or local laws may result in arrest and prosecution.

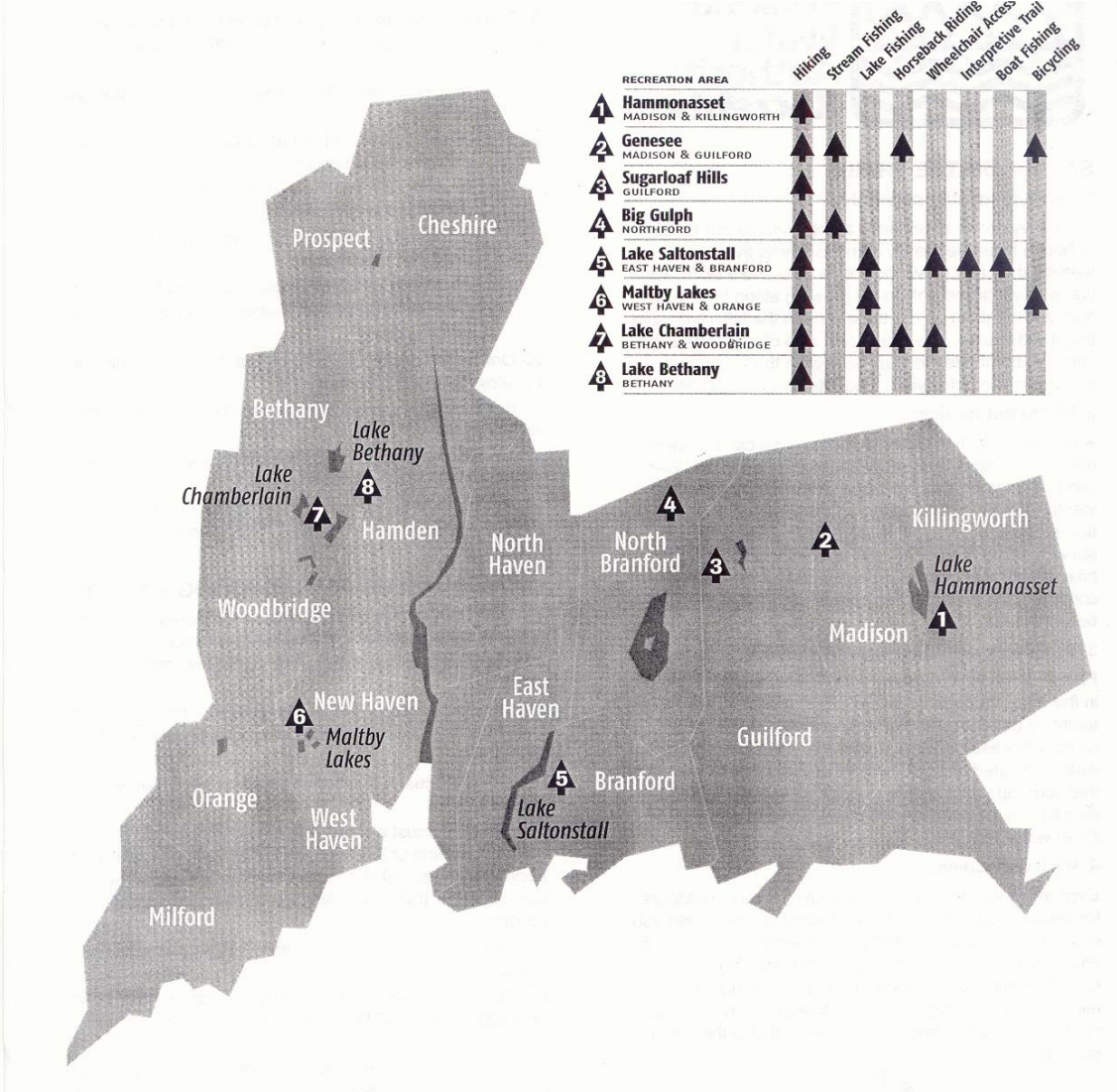
Special rules for boating safety

- I. The following are strictly prohibited except by written permission :
 - A. motors other than electric motors with sealed storage batteries
 - B. beaching of a boat at other than launch area, except in an emergency
 - C. disposal of litter, trash, bait or other material except in the receptacles provided
 - D. operation of boat south (towards I-95) of the overhead power lines
 - E. unsafe, reckless or careless operation of boats
 - F. standing in boats or sitting in red “off-balance” areas in boats.
- II. Only those boats approved by the RWA will be allowed on the reservoir.
- III. Boats may be rented only by persons 16 years of age and older.
- IV. All occupants of boats are required to wear personal flotation devices at all times.
- V. All boats will be back to the launching area no later than one hour prior to posted closing time.

Special Rules for Bicycling Safety

- I. The “General Rules and Regulations for Recreational Use of the Regional Water Authority Land” are a part of these rules and regulations.
 - II. Bicycling shall be permitted only from April 15 through December 31 of each year to prevent damage to roads and trails.
 - III. Bicycling must remain at all times on trails marked for bicycle use.
 - IV. Bicyclists must always yield to other trail users. A friendly greeting or bell is a considerate way to make your approach known. Slow to walking speed or stop while passing other trail users. Anticipate other users around corners.
 - V. Bicyclists must remain in control of their bicycle at all times.
 - VI. All persons must wear securely strapped to the head ANSI, Snell, or ASTM-approved bicycle helmets at all times.
 - VII. No persons shall carry an infant less than one year old by any means whatsoever, including a seat, back-pack or trailer while riding a bicycle.
 - VIII. Any person carried as a passenger shall be securely held in a seat designed for that purpose that will protect the passenger from the moving parts of the bicycle.
- Ride softly. Do not leave ruts in the trail. Carry the bicycle if you encounter a section that is soft or beyond your ability. Bicycling groups should consist of no more than five individuals.

Figure M25: Regional Water Authority Recreation Lands



Appendix N: Olin Powder Farm Educational Tour

December 2, 2003

Major Questions for Discussion

1. Were there any aspects of the site which you could find useful in your teaching? If yes, what were they and how might they be useful?
2. Does the site offer anything new in terms of opportunities for outdoor Science education? If yes, what and why? If no, why not and what would it need to offer something new?
3. What have been major stumbling blocks to outdoor science education in your school?
4. What kind of on-site infrastructure and personnel would you find helpful, if any?

Consulted Teachers and Administrators

The people listed below either participated in the tour and focus group session or were interviewed individually.

Name	School Affiliation	Title; Grades & Subjects Taught	Contact Information
Steve Broker	Wilbur Cross High School	Teacher; 11/12 AP Environmental Science, Macy Honors Anatomy and Physiology, 2 additional levels of physiology	Ls.broker@cox.net
Florence McBride	Hamden Public Schools	Teacher; 1-6 grades + HS Advise on Bird Ecology	j.mcbride@yale.edu 203-288-6777
Bill Harrison	Hamden High School	Teacher; AP Biology, 9 th grade introductory biology	wharrison@hs.hamden.org 203-522-0152
John Farley	Hamden High School	Teacher; Biology/AP Biology	F5280@aol.com 203-469-7217
Brenna Symonaitis	Hamden Middle School	Teacher; 7 th grade science	symonaitis@hotmail.com
Pat Frisketti	Central Office for Hamden Schools	Director of Science for Hamden Schools	pfrisketti@hs.hamden.org pfrisketti@earthlink.net 203-407-2216 or 203-407-2040 ext 1333
Lyndon Pitter	Highville Mustard Seed School	Director of Education	highville@aol.com 203-287-0528
Rebecca Upham	Highville Mustard Seed School	Teacher	203-287-0528 ext 34

Lisa Lupi	Hamden Middle School	Teacher; middle school science	203-288-7561
Cory Slifstein	Hamden Hall Country Day School	Teacher; science, especially water quality	cslif@comcast.net 203-389-6504
Chris Williams	Worthington Hooker Middle School	Teacher; 7 th and 8 th grade science	inquire@snet.net 203-946-6610 203-645-0552
Lise Orville	New Haven Science Fair	New Haven Science Fair Program Mentor Director, and retired teacher of chemistry, biology and physical science	lorville@aol.com

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