Ecological Inventory of Horse Hill Nature Preserve Merrimack, NH

Final Report Submitted to:

Town of Merrimack, NH

Respectfully Submitted by:

Moosewood Ecological LLC
Innovative Conservation Solutions for New England
PO Box 9 — Chesterfield, NH 03443-0009
(603) 831-1980

Ecological Inventory of Horse Hill Nature Preserve
Merrimack, NH

Jeffry N. Littleton, M.S.
Principal Ecologist

With grateful assistance from Chris Kane, Laura Deming,
Chris Frauenhofer, Miriam Thau, and Kyle Rodd

Moosewood Ecological LLC

Innovative Conservation Solutions for New England

PO Box 9
Chesterfield, NH 03443-0009
(603) 831-1980
Jeff@moosewoodecological.com
www.moosewoodecological.com

October 20, 2015

Cover Photograph: One of several vernal pools at the Horse Hill Nature Preserve, which provides critical breeding habitat for amphibians and feeding habitat for many other species.

INTRODUCTION

In March 2015, the Town of Merrimack Conservation Commission contracted with Moosewood Ecological LLC to conduct an ecological assessment of the Horse Hill Nature Preserve (HHNP) from March-August. This property has been identified as part of the current gas pipeline route for the Northeast Direct proposal filed with the Federal Energy Regulatory Commission. At approximately 594 acres HHNP comprises two parcels, including Map 3B, Lot164 and Map 3B, Lot168 (Figures 1 and 2).

Specific inventory objectives included:

- Identifying and mapping wildlife habitats,
- Identifying significant/unique natural communities,
- Mapping and evaluating wetlands,
- Mapping soils and aquifers using existing data,
- Recording the presence of species of conservation concern (including endangered and threatened species) and their habitat associations, as well as other wildlife and unique plants,
- Assessing species composition of invasive species, and
- Identifying ecologically significant areas

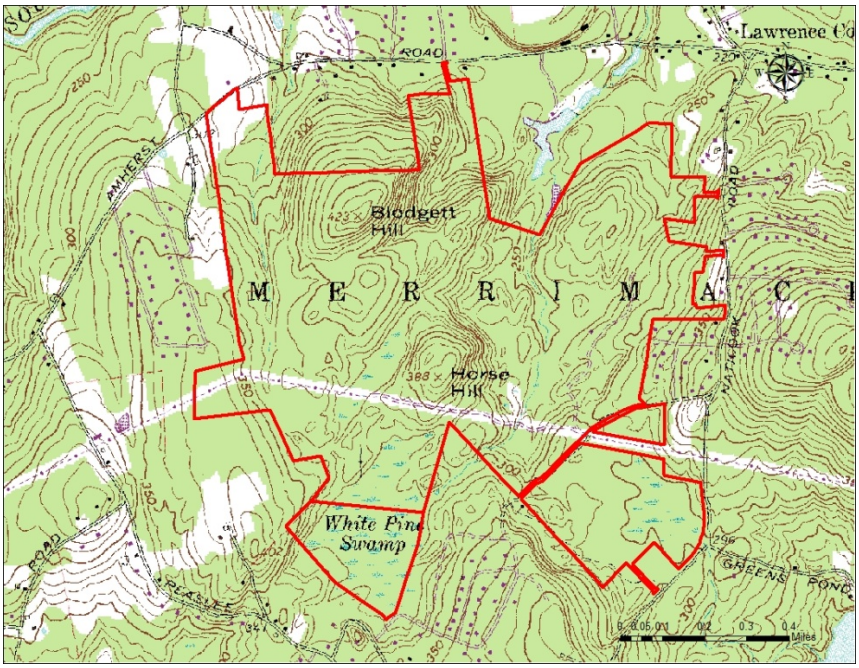


Figure 1. USGS topographic map of the Horse Hill Nature Preserve.

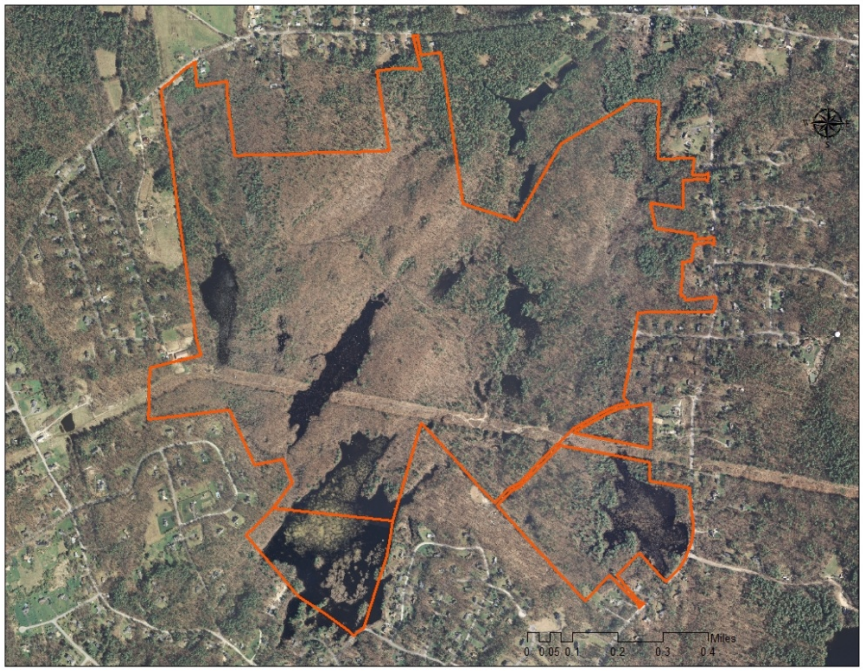


Figure 2. Aerial photography (2010) of the Horse Hill Nature Preserve.

ECOLOGICAL INVENTORY AND IMPACT ASSESSMENT

Soil Resources

Significant soil resources include productive farmland soils, productive forest soils, hydric soils, and steep slopes. These significant soil resources have been mapped by the US Department of Agriculture Natural Resources Conservation Service (NRCS).

In response to the Farmland Protection Policy Act of 1981[1], agricultural soils were mapped by the NRCS. Based on a variety of physical and chemical properties (i.e., drainage, texture, hydric regime, pH, erodibility factor), these soils have been identified as being among the most productive lands for many types of farming practices. These include prime farmland soils, farmland soils of statewide significance, and farmland soils of local significance. Approximately 360 acres (60% of the property) have been identified as having productive farmland soils (Figure 3).

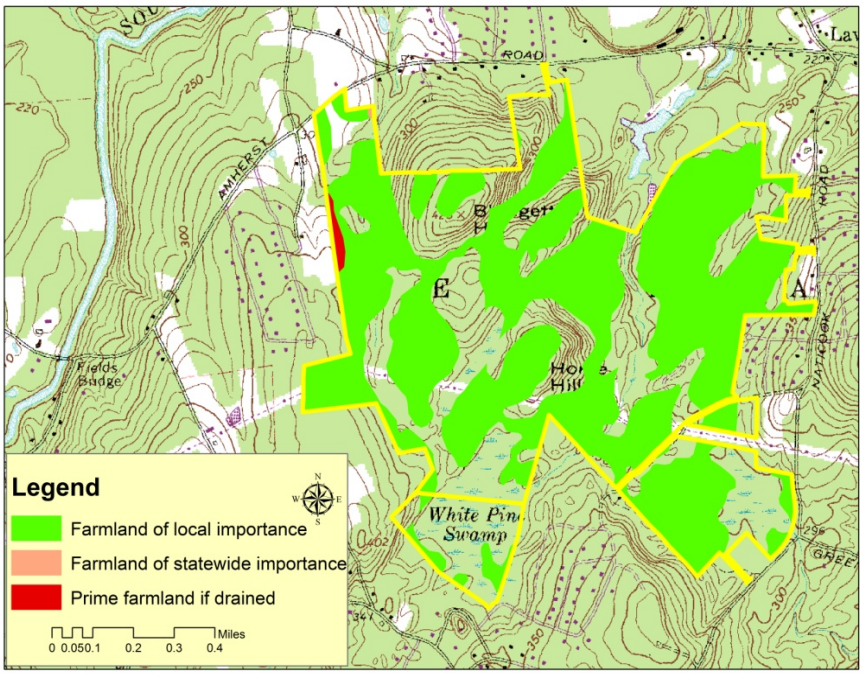


Figure 3. Productive farmland soils mapped by the NRCS.

[1] As defined by the USDA NRCS: "The Farmland Protection Policy Act of 1981 was established to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses.

The NRCS has mapped the distribution of important forest soils and has classified them according to their capacity to grow trees. These soils signify areas as providing the most productive lands for timber production. The NRCS has identified three soil groups within this category. Soil groups IA and IB represent productive soils for hardwoods, and soil group IC are productive for softwoods. Nearly 460 acres (77% of the property) have been identified as productive forest soils (Figure 4). The majority of this area represents soils that are productive for hardwoods.

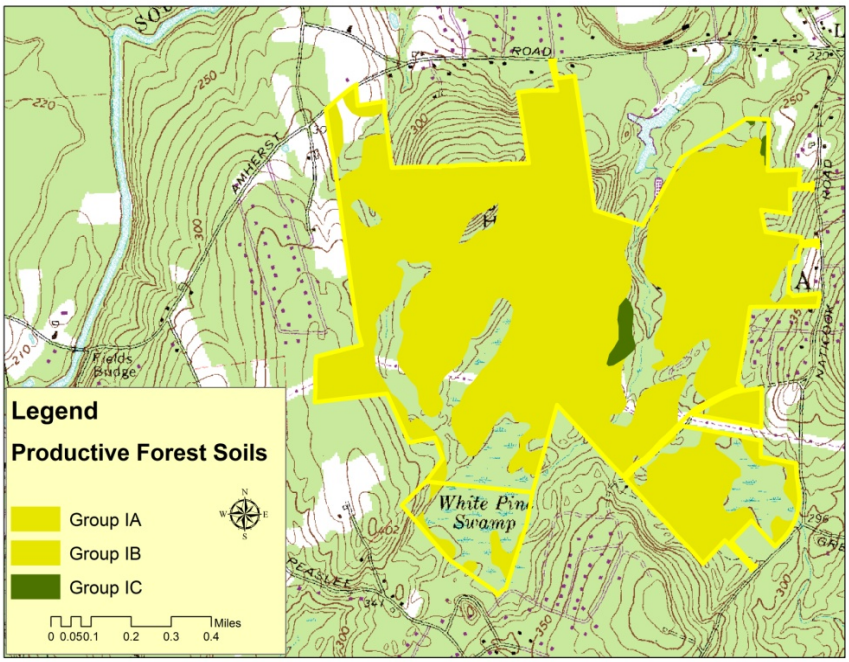


Figure 4. Productive forest soils mapped by the NRCS.

Hydric soils represent areas most likely characterized as wetlands. These include poorly drained and very poorly drained soils identified by the NRCS. Poorly drained soils represent almost 40 acres, while very poorly drained soils make up 95 acres (Figure 5). Together, they comprise nearly 25% of the property.

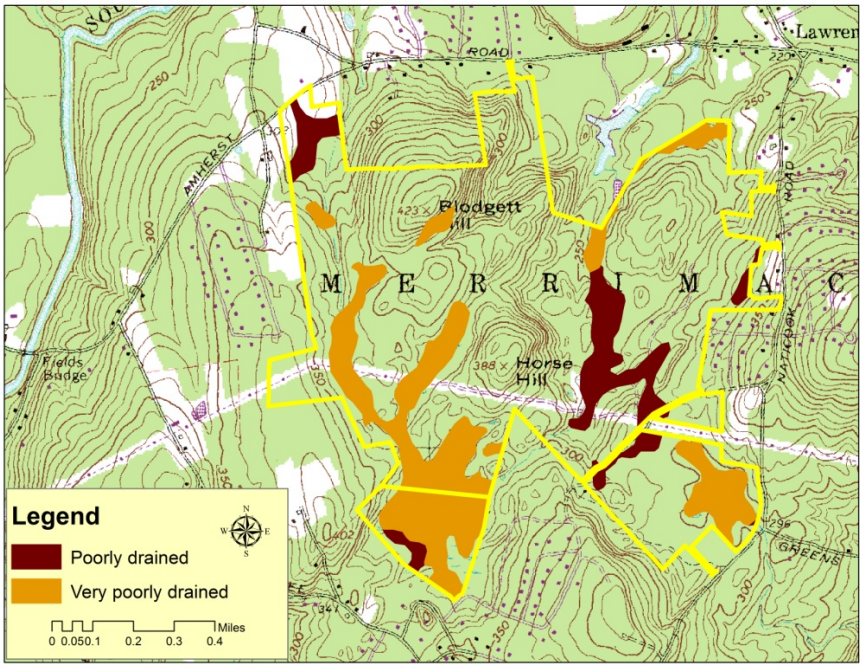


Figure 5. Hydric soils mapped by the NRCS.

Steep slopes include areas that are greater than 15%. These slopes can be prone to excessive erosion, depending upon incompatible land uses. Approximately 78 acres are considered as having steep slopes (Figure 6).

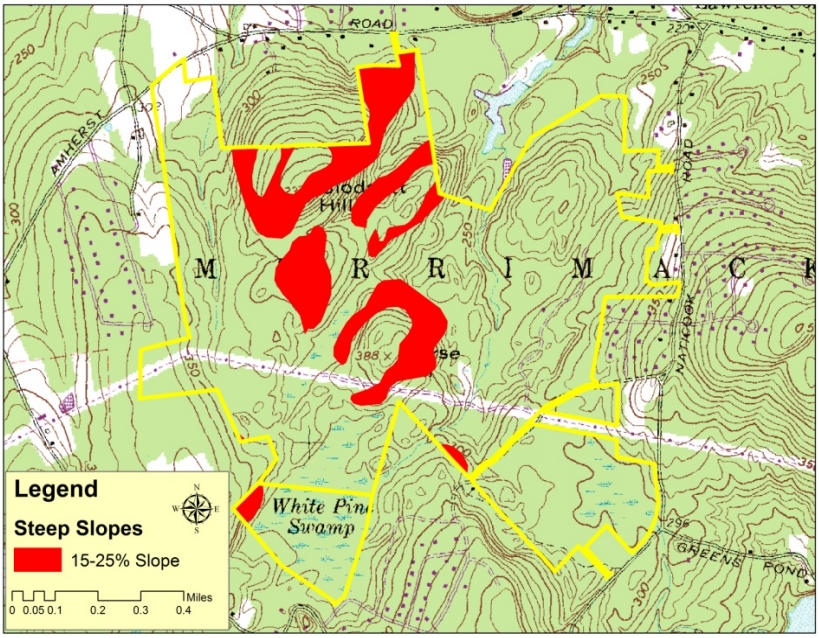


Figure 6. Steep slopes as identified by the NRCS.

Water Resources

Water resources represent some of our most fragile ecosystems and are particularly sensitive to certain types of land use. Water resources comprise a variety of natural features, which include both surface water and groundwater resources. Such features include streams and rivers, ponds and reservoirs, wetlands, and stratified drift aquifers. In terms of their importance, these resources provide a variety of ecological functions and societal values, including:

- Water quality maintenance
- Flood control
- Wildlife and fisheries habitat
- Drinking water sources
- Recreation
- Visual quality and aesthetics
- Rare and endangered species habitat and natural communities
- Groundwater recharge and discharge
- Shoreline stabilization
- Educational and scientific value
- Overall biological diversity

A total of 42 wetlands (134 acres or 22% of the property) and 3 perennial streams were mapped for HHNP (Figure 7). Of these 42 wetlands 24 were confirmed as vernal pools (see Wildlife Habitat section below for distribution). An area in the northern section of HHNP contains a small portion of a stratified drift aquifer. This aquifer has been estimated to have a transmissivity rate of less than 2,000 ft.sq./day.

All 42 wetlands were evaluated using the Method for Inventorying and Evaluating Freshwater Wetlands in New Hampshire (Stone and Mitchell 2013) using all 12 functional values. Figure 8 provides wetland numbers that correspond to the functional rankings located in Appendix A. Wetland boundaries do not constitute jurisdictional wetlands delineation as defined by the NH Dept. of Environmental Services. Wetlands were mapped using aerial photography and field checked during the wetlands evaluation process.

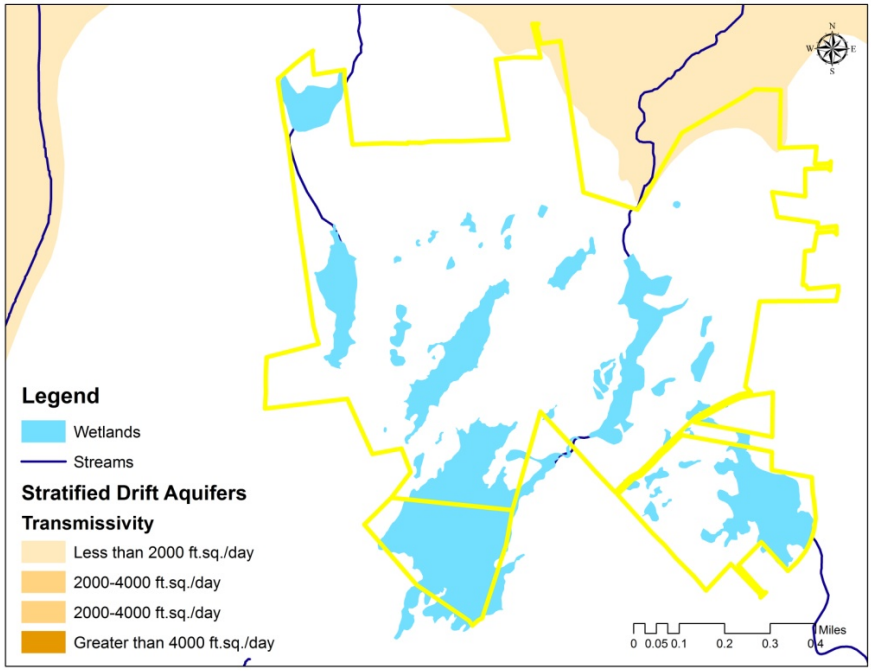


Figure 7. Surface and groundwater resources.

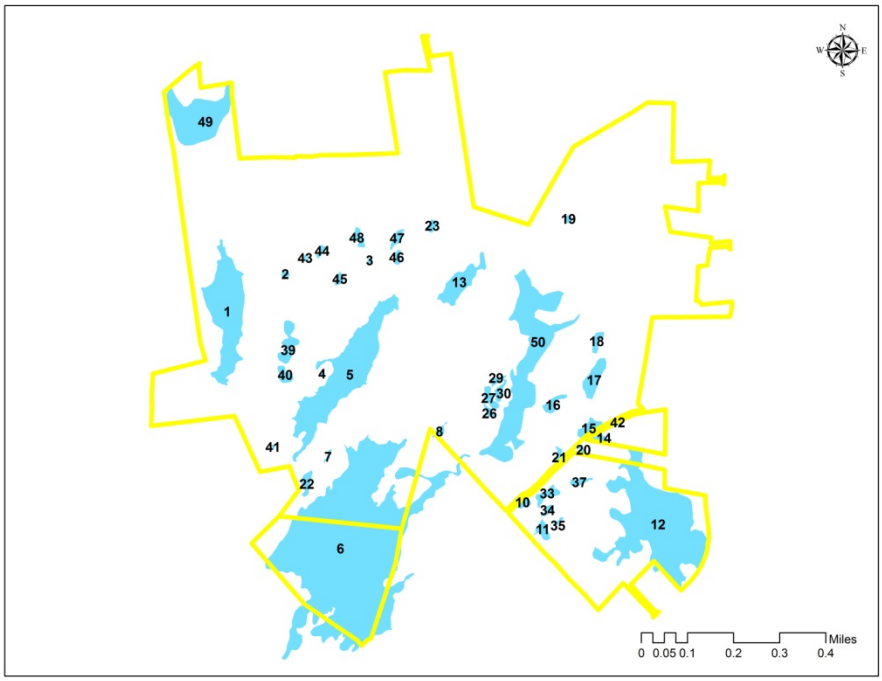


Figure 8. Wetland evaluation numbers for Horse Hill Nature Preserve.

Overall, most wetlands scored high for ecological integrity, wetland-dependent wildlife habitat, and sediment trapping. Most ranked as moderate for fish and aquatic life habitat, scenic quality, educational potential, wetland-based recreation, and nutrient trapping/retention/transformation. In addition, most wetlands provide critical habitat for rare species. Appendix A provides scores for all functional values by wetland. Appendix B provides photographic documentation of each wetland evaluated.

Wildlife Habitats and Significant Natural Communities

Wildlife habitats were mapped on the property (Figure 9). These included a variety of wetland and upland habitat types. A total of 42 wetlands, totaling 130 acres, were mapped for the property. These include a variety of beaver impoundments and vernal pools. Six beaver impoundments are scattered throughout the property. These include Lastowka Pond, Long Pond, White Pine Swamp, and the three large wetland complexes in the eastern half of the property. These beaver impoundments represent a variety of different wetland habitats, including open water, aquatic beds, marshes, and shrub and forest swamps. Other wetland-related habitats include 24 confirmed vernal pools (Figure 10) and 11 potential vernal pools, as well as a forested swamp near the Amherst Road parking area. These vernal pools and indicator species adhere to the definitions found in the NH Administrative Rules, including Sections Env-Wt 101.106 Vernal Pool, Env-Wt 101.75 Primary Vernal Pool Indicators, and Env-Wt 101.86 Secondary Vernal Pool Indicators. In addition, Long Pond hosts an active heron rookery (Figure 11) and an active osprey nest along its shoreline.

The majority of upland habitats include hardwood-dominated forests characterized as Appalachian oak-pine forest ecosystem (Figure 12). Dominated by oak trees this forest provides a good source of hard mast, an important food source for wildlife. While acorns provide the bulk of the hard mast hickory trees also contribute an important food source. Shrubland habitat is maintained within the utility right-of-way (Figure 13). This habitat type has been in decline in New Hampshire, as well as the Northeast. Approximately 139 species of birds, mammals, reptiles, and amphibians either use or prefer shrubland habitat. Shrublands also provide critical habitat for species of conservation concern, including New England cottontail, northern black racer, and hognose snake. Turtle nesting habitat was also documented within the utility right-of-

way (Figure 14). At least 3 species of turtles were documented using the utility right-of-way for nesting habitat, including Blanding's turtle (state endangered), snapping turtle, and painted turtle.

Lastly, a rare natural community was observed on the property. An example of the rich Appalachian oak rocky woods forest community was documented. Due to the last logging event this community is relatively young and is recovery. However, this is a very rare community type in New Hampshire and has been ranked as state endangered.

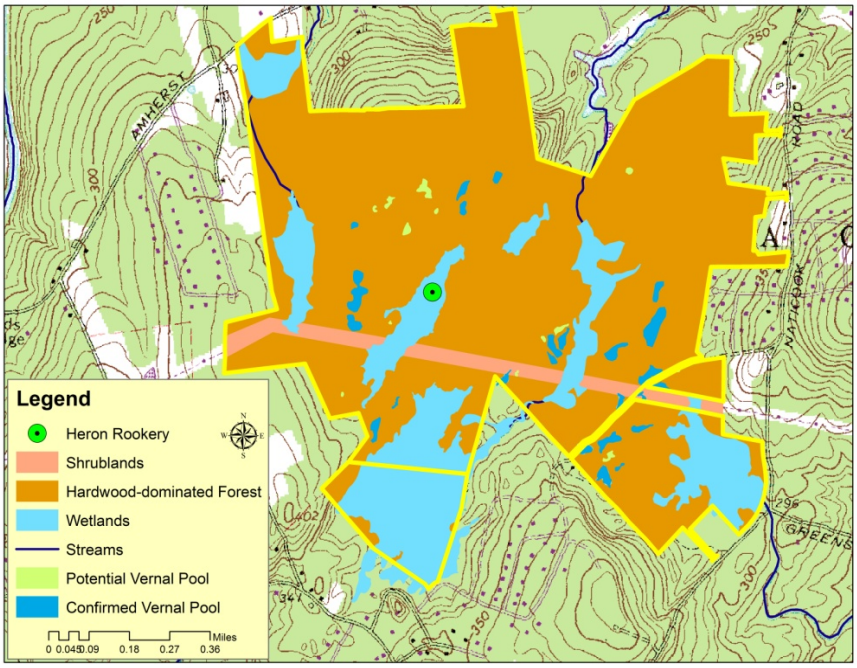


Figure 9. Wildlife habitats of Horse Hill Nature Preserve.

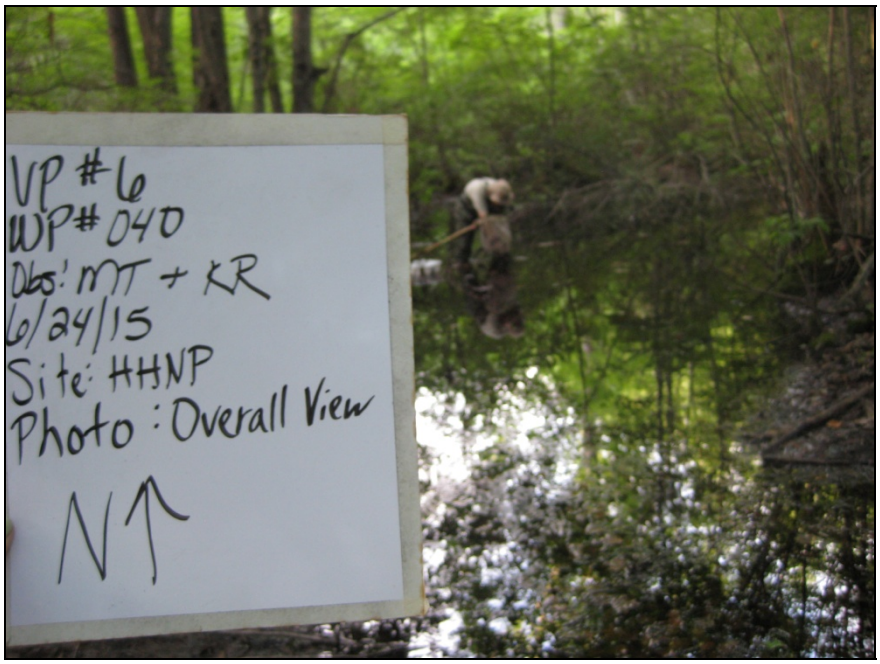


Figure 10. One of 24 confirmed vernal pools documented on the Horse Hill Nature Preserve.

Figure 11. An adult great blue heron stands on the edge of its nests with its young tucked inside. A total of 16 nests were available on Long Pond and at least 10 were active heron nests in 2015.

Figure 12. A typical example of the Appalachian oak-pine forest ecosystem at the Horse Hill Nature Preserve. The property has been heavily cut over at least twice over the past century.

Figure 13. Shrubland habitat is maintained along the utility right-of-way at the Horse Hill Nature Preserve. This habitat is declining in the state and provides critical habitat for a variety of wildlife and plants.

Figure 14. Depredated turtle nesting site within the utility right-of-way. Open, sandy sites within this area provide turtle nesting habitat.

Invasive Species

A variety of invasive plants were observed within and adjacent to the utility right-of-way in scattered locations. These included purple loosestrife, black swallowwort, bush honeysuckle, and autumn olive. Purple loosestrife was also observed in wetlands outside of the utility right-of-way. The parking area along Amherst Road represents another site associated with invasive plants. Invasives such as multi-flora rose, glossy buckthorn, and Asiatic bittersweet can be found adjacent to the parking lot and the main trail to Lastowka Pond, as well as the forested swamp just south of the parking lot. Some areas are heavily Additional locations associated with human disturbance on the property could be occupied by invasive plants.

Species of Conservation Concern

A total of 7 rare species occurrences were documented on the property. Wildlife included Blanding's turtle (*Emydoidea blandingii*; state endangered) and spotted turtle (*Clemmys gluttata*; state threatened). Plants included downy false foxglove (*Aureolaria virginica*; state endangered), skydrop aster (*Symphiotrichum patens*; state endangered), blunt-leaved woodsia (*Woodsia obtuse*; state endangered), prostate tick trefoil (*Desmodium rotundifolium*; state threatened), and

hairy stargrass (*Hypoxis hirsute*; state threatened). Two plant species were observed that are listed on the watch list, including forest licorice bedstraw (*Galium circaezans*) and rattlesnake hawkweed (*Hieracium venosum*). Additional species of conservation concern have the strong potential to occur on Horse Hill Nature Preserve, including hognose snake (*Heterodon platirhinos*; state endangered) and northern black racer (*Coluber constrictor constrictor*; state threatened), as well as additional plants.

Potential Natural Resource Impacts and Concerns

Below represents some general potential impacts and concerns based on the existing conditions documented during site assessments. More detailed comments can be provided as needed.

Soil Resources

- Loss of productive farmland and forest soils
- Removal of top soil
- Natural contours can be affected
- Natural order of soils layers will be affected
- Soil liquefaction occurring when there is a sudden change in stress condition
- Slope stability can be compromised
- Soil compaction resulting from heavy machinery
- Soil contamination: accidental release of petroleum hydrocarbons or other hazardous materials can be taken up by plants, as well as leached out into water and consumed by humans and animals.
- Increased soil erosion due to reduced vegetation, which can have negative effects on upland wetland habitats and natural communities
- Blasting of bedrock could introduce rock fragments and stones into the topsoil
- Removal of vegetation and disturbance to soils in the uplands and wetlands can provide opportunities for the establishment of new non-native, invasive plants and the spread of existing species

Water Resources

- Potential alteration of the quantity and quality of groundwater resources that currently service public water supplies, as well as those groundwater resources that could potentially provide future water supplies
- The main wetland functional values that could be impacted include:
    - Ecological integrity
    - Wetland dependent wildlife habitat
    - Fish and aquatic life support
    - Sediment trapping

    - Local, regional, and statewide significance of certain wetlands could be compromised or reduced
    - Biological significance of certain wetlands serving as habitat for rare species
- Wetland habitat disturbance, degradation, and loss
- Removal of vegetation and disturbance to soils in wetlands can provide opportunities for the establishment of new species and spread of existing species of non-native, invasive plants
- Increased habitat fragmentation, edge effects, and human activity are expected to have negative impacts to native plants and animals, as well as potentially increase local extinction rates or decrease local recolonization rates
- ROW and road construction impacts hydrological patterns that can take decades to centuries to rebound, depending on the location
- Disruption to wetland soils and the native seed and root stock within the wetland soils
- Accelerated erosion from construction sites can contribute large amounts of sediment to the stream network and degrade its water quality
- Possible vernal pool degradation, disturbance, and habitat loss, which is essential for certain obligate species
- Increased soil erosion is likely during construction due to reduced vegetation
- Soil compaction which makes it more difficult for roots to penetrate, also has the potential to increase runoff due to reduced porosity and infiltration rates
- Potential permanent long-term impacts on vegetation and shrubland cover
- Horizontal Directional Drilling (HDD) under water resources
    - HDD could cause a condition known as frac-out, which is "the unintentional or inadvertent loss of drilling fluids from the HDD borehole to the ground surface, other than at the borehole entry or exit points"
    - If used during construction, Bentonite (used in drilling mud/clay) can cause physical damage to organisms.
    - "Impurities in bentonite and barite can contain metals not readily mobilized in water, so they have limited bioavailability to organisms."
    - Bentonite and barite will prevent plant growth if dumped on the ground; new topsoil is required for new growth.
    - Drilling mud/clay (containing bentonite) will kill fish in freshwater systems by forming a viscous gel which inhibits gill action and oxygen uptake.
    - Drilling muds/clays are "responsible [for] the poor nature of plant and soil microbial life around drilling sites"
    - HDD has potential for surface disturbance through inadvertent drilling fluid releases.
    - Most likely areas for leakage are at entry and exit points where overburden is reduced

Vegetation and Wildlife Resources

- Increased habitat fragmentation, edge effects, and human activity in association with the establishment and spread of non-native, invasive plants are expected to have negative

impacts to native plants and animals, as well as potentially increase local extinction rates or decrease local recolonization rates

- Fragmenting natural areas into decreasingly smaller parcels will limit animal movements, the subsequent sharing of genes, and normal social interaction of species
- Compaction of soils from construction can affect revegetation.
- Even if revegetation is successful, it is often kept at an early successional stage by cutting, mowing, or the use of herbicides.
- Studies around the globe have shown even small cuts to impact the movements of small mammal species. Even butterflies may not fly across roads and ROW's due to the extremity of the microclimate.
- Increased soil erosion is likely during construction due to reduced vegetation, which can affect wildlife and plants, as well as their habitats
- Compaction makes it more difficult for roots to penetrate, also has the potential to increase runoff due to reduced porosity and infiltration rates
- Reduced wildlife habitat will be available during construction
- Potential permanent long-term impacts on vegetation and shrubland cover
- Long-term impacts on forested area due to the time needed for woody vegetation to recover to its preconstruction condition
- The effects of silt fencing can have negative impacts on animal movements, especially small mammals, reptiles and amphibians. Silt fencing and other methods of erosion control during construction can prevent wildlife from moving from their winter habitats to breeding, feeding, and nesting sites. This can negatively affect wildlife using wetlands, including vernal pools, and upland habitats during certain times of the year.
- Direct and indirect impacts to populations of rare wildlife and plants, as well as the rare natural community
- Cutting will effect habitat and nesting sites for birds, mammals, and insects as well as indirectly effect other organisms
- Effects may not be seen immediately and will continue to persist years after the project is completed.
- Direct mortality to wildlife and plants during construction, which can be more detrimental during particular seasons such as seasonal movements associated breeding, feeding, nesting, egg deposition, and rearing of young
- Indirect mortality→stress, avoidance of feeding due to construction (noise, increased human activity), reduced breeding success, "reduced survival or reproduction due to decreased availability of edible plants, reduced cover, and increased exotics and invasive plants, and increased predation"
- Reduced wildlife habitat will be available during construction
- Water quality degradation during and after the construction will especially impact amphibians which are especially sensitive.

LITERATURE RESOURCES

Andrews, A. (1990). Fragmentation of habitat by roads and utility corridors: A review. *Australian Zoologist, 26*(3 & 4), 130-141.

Federal Energy Regulatory Commission. 2007. Kinder Morgan Louisiana Pipeline Project: Final Impact Statement. "Environmental Analysis." 4-1-4-124.

Federal Energy Regulatory Commission. 2007. Kinder Morgan Louisiana Pipeline Project: Final Impact Statement. "Appendix I." I-1-I-37.

Findlay, C. S., & Bourdages, J. (2000). Response Time of Wetland Biodiversity to Road Construction on Adjacent Lands. *COBI Conservation Biology, 14*(1), 86–94.

Kernen, Brandon. 2010. Rock Blasting and Water Quality Measures That Can Be Taken To Protect Water Quality and Mitigate Impacts. New Hampshire Dept. of Environmental Services, Drinking Water Source Protection Program, Concord, NH.

Kinigoma, B.S. (2001). Effects of frilling fluid additives on the Niger Delta environment: -A case study of the Soku oil fields. *Journal of Applied Sciences and Environmental Management, 5*(1), 57-61.

New Hampshire Fish and Game Department. 2006. New Hampshire Wildlife Action Plan. Concord, NH.

New Hampshire Fish and Game Department. 2009. Wildlife Species of Special Concern. Nongame and Endangered Species Program. Concord, NH.

Sperduto, D.D. 2005. Natural Community Systems of New Hampshire. New Hampshire Natural Heritage Bureau, Concord, NH.

Sperduto, D.D. and W.F. Nichols. 2011. Natural Communities of New Hampshire. New Hampshire Natural Heritage Bureau, Concord, NH. Pub. UNH Cooperative Extension,
Durham, NH.

Stone, A.L. and F. Mitchell (eds.). 2013. Method For Inventorying and Evaluating Freshwater Wetlands in New Hampshire. University of New Hampshire Cooperative Extension, Durham, NH.

Zech, W.C., J.L. Halverson, & Clement, T.P. 2008. Intermediate-Scale Experiments to Evaluate Silt Fence Designs to Control Sediment Discharge from Highway Construction Sites. Journal of Hydrologic Engineering. 13:497-504

APPENDIX A

Wetland Evaluation Results
For the
12 Functional Values

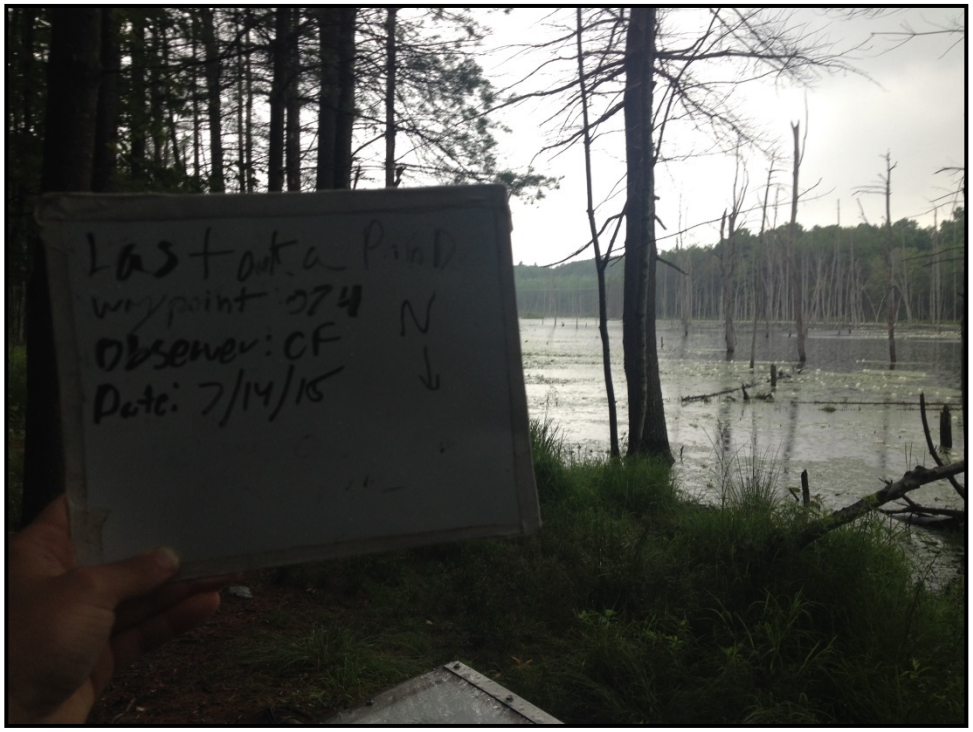
Wetland name/code	W1	W2	W3	W4	W5	W6	W7	W8	W10	W11	W12	W13	W14	W15	W16	W17	W18
Wetland Acres	9.6	0.1	0.1	0.0	13.1	55.1	0.1	0.3	0.4	0.5	20.1	2.5	0.3	0.3	0.8	0.6	1.4
Watershed Acres	51.9	3.6	0.9	0.5	41.9	159.4	1.1	3.4	7.6	3.8	70.4	28.2	1.2	1.2	2.7	4.8	11.3
Wetland Functions & Scores																	
1. ECOLOGICAL INTEGRITY	7.0	10.0	9.5	10.0	9.0	5.4	10.0	9.5	7.6	8.0	5.7	9.5	7.7	9.0	8.5	9.5	10.0
2. WETLAND WILDLIFE HABITAT	6.4	7.3	6.8	7.3	7.4	5.2	6.4	5.8	6.1	6.6	6.2	7.7	6.1	6.7	6.2	6.8	6.8
3. FISH & AQUATIC HABITAT	4.7	3.5	3.0	3.0	5.0	3.9	3.0	3.4	3.5	3.8	3.5	3.7	3.5	3.8	4.0	2.5	3.0
4. SCENIC QUALITY	8.6	6.0	5.3	5.3	7.9	7.9	3.4	6.0	6.0	6.0	6.7	6.7	4.1	4.7	5.3	5.4	4.7
5. EDUCATIONAL POTENTIAL	8.0	6.3	5.1	5.7	6.7	7.0	3.3	5.6	6.6	6.2	7.0	6.0	5.3	5.6	6.7	5.6	5.1
6. WETLAND-BASED RECREATION	8.3	4.9	5.3	4.8	6.9	8.0	4.3	4.6	6.2	7.1	8.8	6.7	5.0	5.2	4.6	4.7	4.6
7. FLOODWATER STORAGE	4.5	0.9	0.0	0.0	3.8	6.5	1.3	0.3	0.7	0.8	5.3	2.0	2.0	1.1	0.9	1.7	0.6
8. GROUNDWATER	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.0	1.0	2.8	1.6	1.0	1.0	0.8	0.8	0.4
9. SEDIMENT TRAPPING	5.9	6.0	6.6	6.6	7.1	7.4	6.8	6.5	6.0	6.7	7.9	6.7	8.1	6.6	6.0	6.8	6.5
10. NUTRIENT TRANSFORMATION	2.5	3.6	2.5	3.5	2.6	4.0	2.8	2.6	4.3	3.7	4.8	2.9	6.0	5.5	5.4	4.9	3.4
11. SHORELINE ANCHORING	2.0	2.0	2.0	4.3	3.0	4.3	3.3	3.3	3.3	3.0	4.3	3.0	2.0	3.0	3.0	2.0	2.0
12. NOTEWORTHINESS	40.0	30.0	10.0	20.0	40.0	40.0	30.0	20.0	30.0	40.0	40.0	30.0	30.0	20.0	20.0	20.0	30.0

Wetland name/code	W19	W20	W21	W22	W23	W26	W27	W29	W30	W33	W34	W35	W37	W39	W40	W41	W42
Wetland Acres	0.4	0.1	0.1	0.3	0.5	0.2	0.5	0.2	0.4	0.6	0.2	0.1	0.3	1.3	0.5	0.0	0.1
Watershed Acres	1.1	1.3	1.1	1.8	3.1	1.5	9.2	0.6	0.6	2.3	0.8	0.8	4.0	6.5	2.1	0.3	0.6
Wetland Functions & Scores																	
1. ECOLOGICAL INTEGRITY	10.0	9.0	9.0	9.5	10.0	9.0	8.1	8.6	8.1	9.5	10.0	10.0	10.0	9.5	9.0	6.8	8.6
2. WETLAND WILDLIFE HABITAT	6.8	5.3	6.7	6.8	6.4	6.7	6.6	6.7	6.6	6.8	6.4	6.4	6.8	7.7	7.1	6.8	6.3
3. FISH & AQUATIC HABITAT	3.0	3.0	3.0	3.0	3.0	3.5	3.7	3.0	4.3	3.0	3.5	3.5	3.5	4.2	3.4	3.0	3.0
4. SCENIC QUALITY	6.0	4.0	5.3	5.4	4.9	5.3	6.7	5.3	6.0	4.7	3.4	5.4	4.7	6.0	5.4	5.3	3.4
5. EDUCATIONAL POTENTIAL	5.8	3.6	5.6	4.5	4.1	4.2	6.2	5.5	6.2	5.6	3.4	3.6	4.6	6.9	6.7	5.1	5.3
6. WETLAND-BASED RECREATION	4.8	4.2	6.2	4.7	5.2	4.7	4.9	4.7	4.8	6.1	5.0	5.3	5.3	4.3	4.8	2.3	4.3
7. FLOODWATER STORAGE	0.2	0.2	0.5	1.0	0.4	0.4	0.1	0.4	0.8	0.9	0.3	0.2	0.4	1.5	0.9	0.1	0.1
8. GROUNDWATER	1.6	0.8	1.0	0.8	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
9. SEDIMENT TRAPPING	6.6	7.9	5.9	8.0	7.9	6.6	6.4	6.6	7.3	8.0	7.3	6.6	7.2	8.1	7.3	7.3	7.9
10. NUTRIENT TRANSFORMATION	2.6	5.6	2.5	5.8	3.9	1.8	2.5	1.8	2.8	4.8	2.7	2.5	4.5	5.9	4.6	2.7	4.6
11. SHORELINE ANCHORING	3.3	2.0	1.0	3.3	3.3	4.3	4.0	2.0	3.0	3.0	1.0	1.0	2.0	4.3	3.0	2.0	3.3
12. NOTEWORTHINESS	20.0	30.0	20.0	30.0	30.0	40.0	20.0	10.0	40.0	30.0	20.0	30.0	30.0	40.0	20.0	10.0	20.0

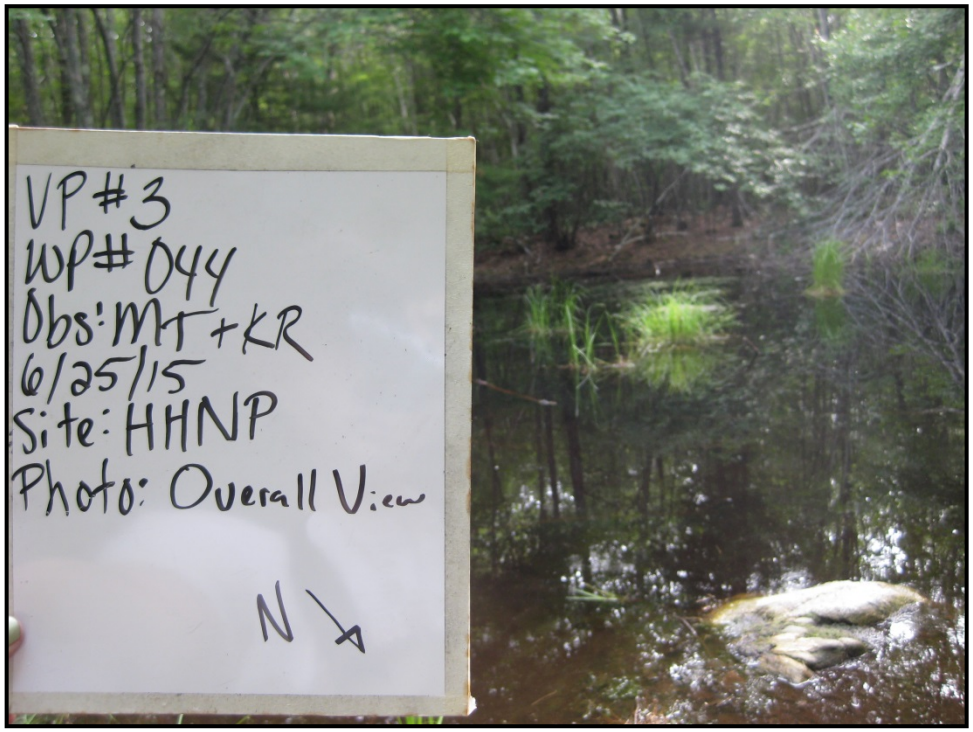
Wetland name/code	W43	W44	W45	W46	W47	W48	W49	W50
Wetland Acres	0.1	0.2	0.2	0.3	0.4	0.5	6.8	14.0
Watershed Acres	0.4	1.7	0.9	0.6	2.0	8.2	125.9	384.9
Wetland Functions & Scores								
1. ECOLOGICAL INTEGRITY	9.5	9.0	9.0	9.5	9.5	9.5	6.2	7.6
2. WETLAND WILDLIFE HABITAT	6.4	6.7	6.3	6.8	6.8	6.8	4.6	6.1
3. FISH & AQUATIC HABITAT	2.6	3.0	3.0	3.0	3.0	3.0	2.6	5.3
4. SCENIC QUALITY	4.1	4.7	3.4	5.4	4.7	4.7	5.4	8.6
5. EDUCATIONAL POTENTIAL	4.3	4.8	4.2	6.1	5.4	4.9	5.0	6.9
6. WETLAND-BASED RECREATION	4.4	4.6	4.3	4.7	4.6	4.6	5.0	6.8
7. FLOODWATER STORAGE	0.1	0.3	0.3	0.5	0.6	0.5	1.3	3.4
8. GROUNDWATER	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.8
9. SEDIMENT TRAPPING	7.2	7.2	7.3	5.9	7.9	6.5	6.8	4.9
10. NUTRIENT TRANSFORMATION	3.4	4.5	2.7	3.3	4.7	3.4	5.8	4.9
11. SHORELINE ANCHORING	2.0	2.0	2.0	2.0	2.0	2.0	3.0	6.5
12. NOTEWORTHINESS	10.0	10.0	10.0	20.0	20.0	10.0	20.0	40.0

APPENDIX B

Wetland Evaluations
Photographic Documentation

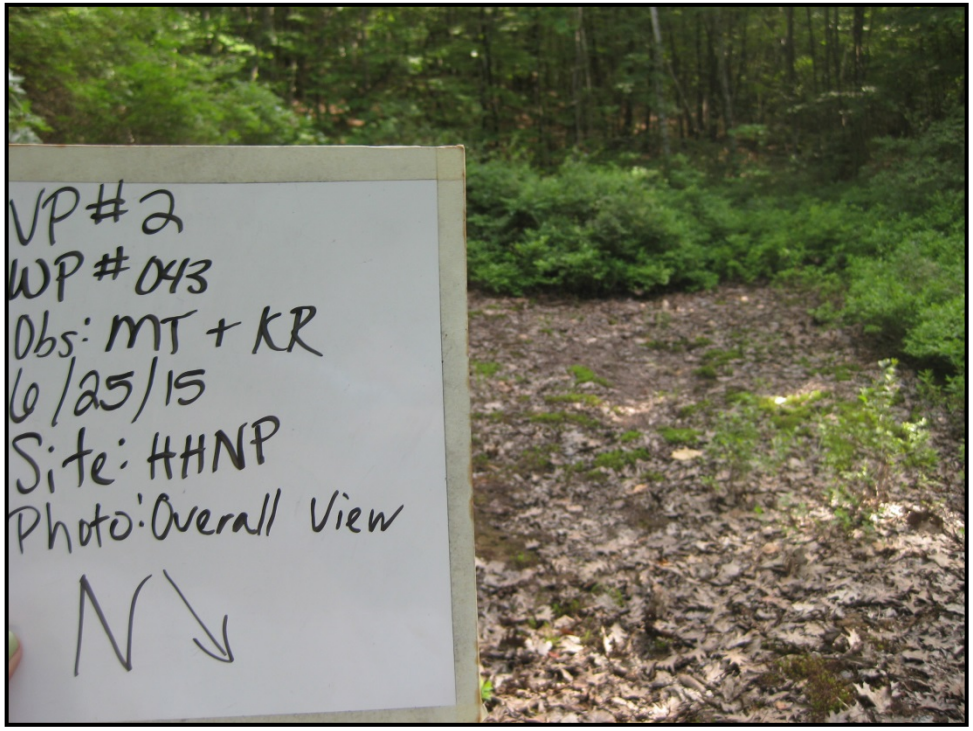


Wetland 1: Open water and aquatic bed at Lastowka Pond



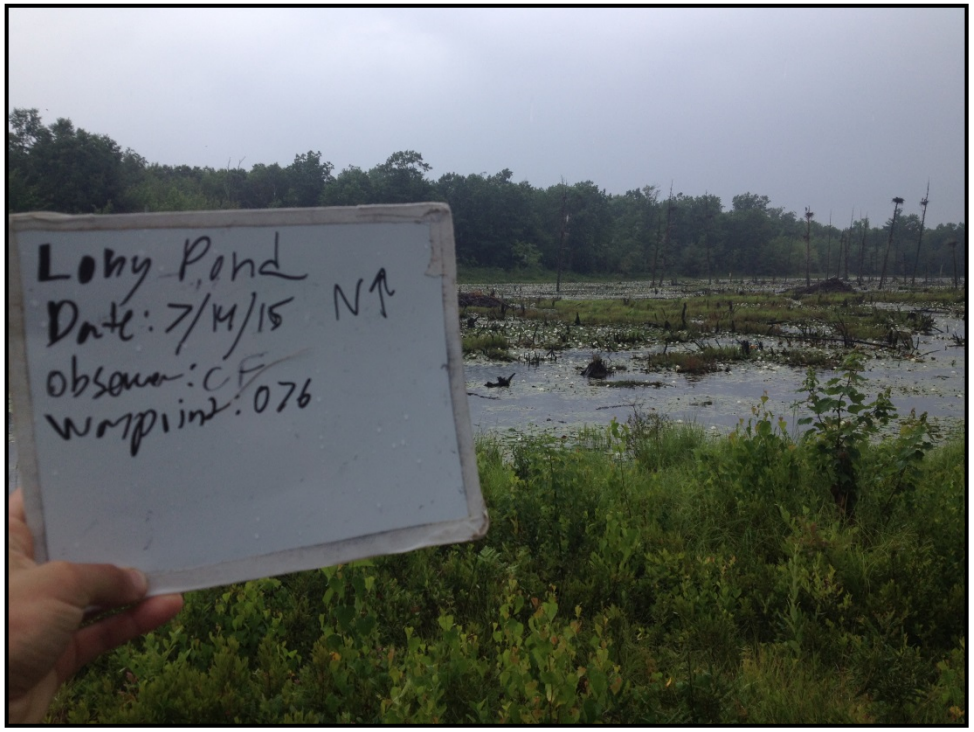
Wetland 2; Vernal Pool 3: open water

Wetland 2; Vernal Pool 3: wood frog tadpoles

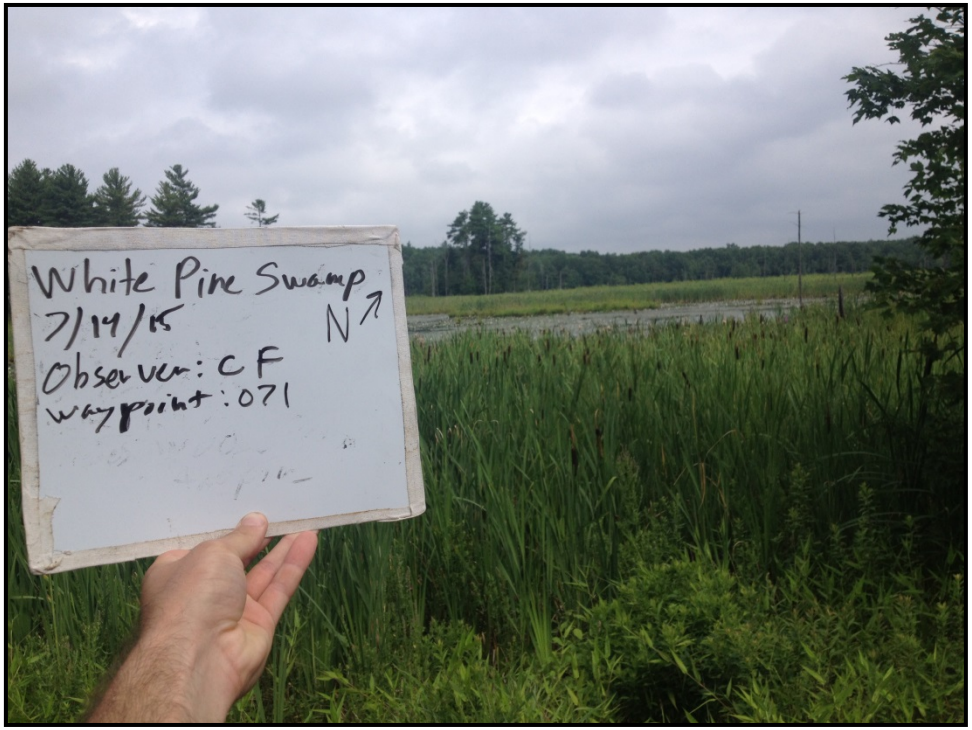


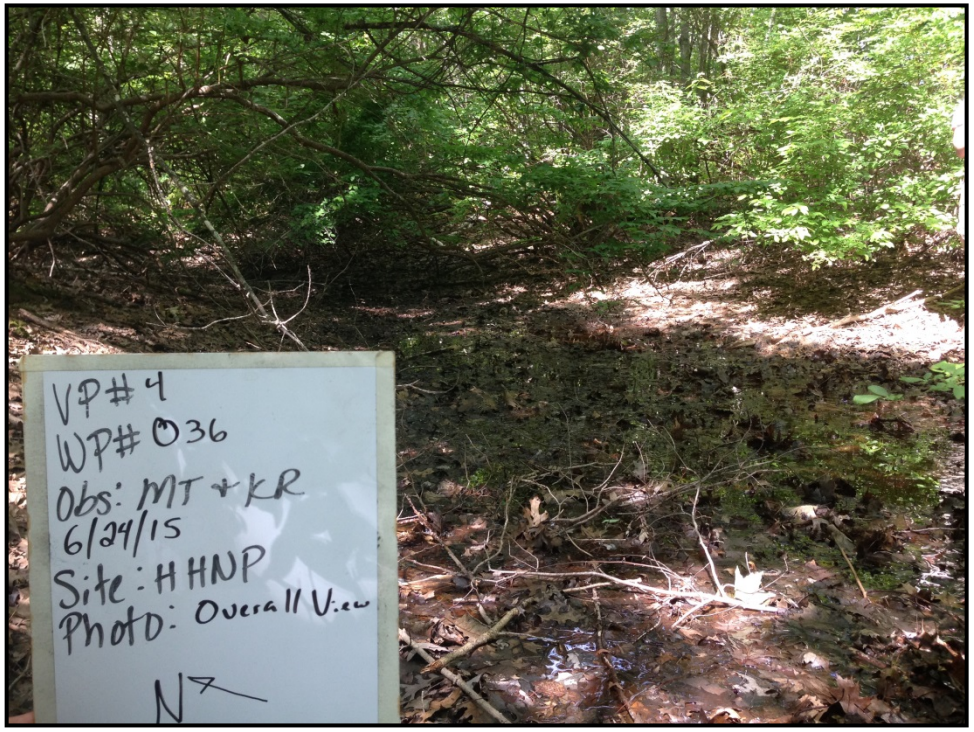
Wetland 3; Vernal Pool 2: dry

Wetland 4; Vernal Pool 1: open water and scrub shrub

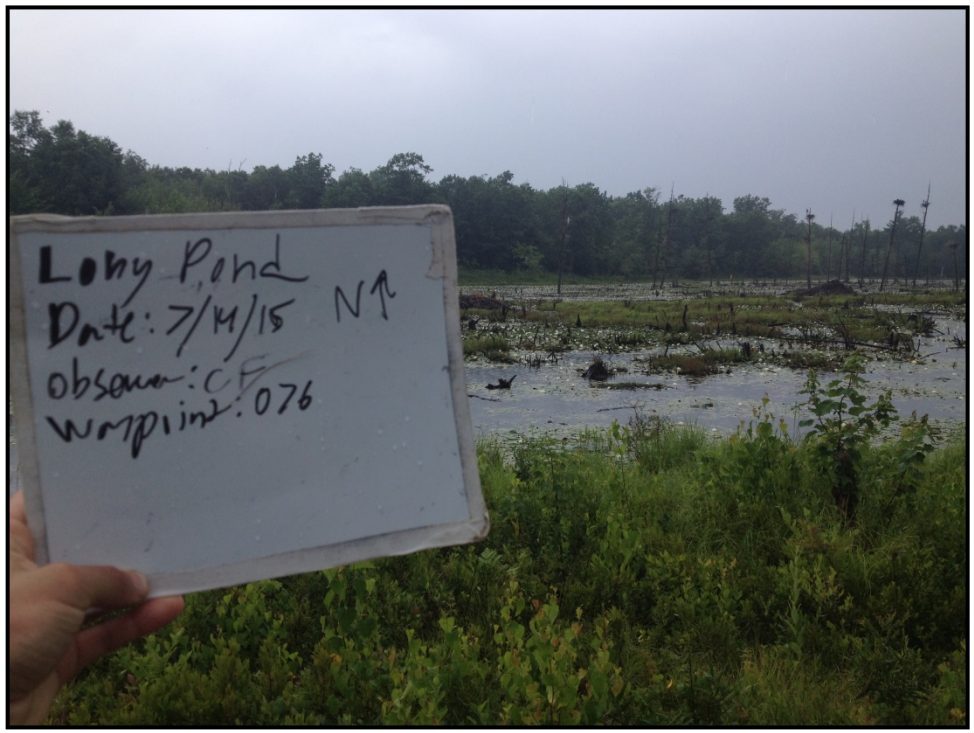


Wetland 5: Aquatic bed and emergent marsh with heron nest in background at Long Pond

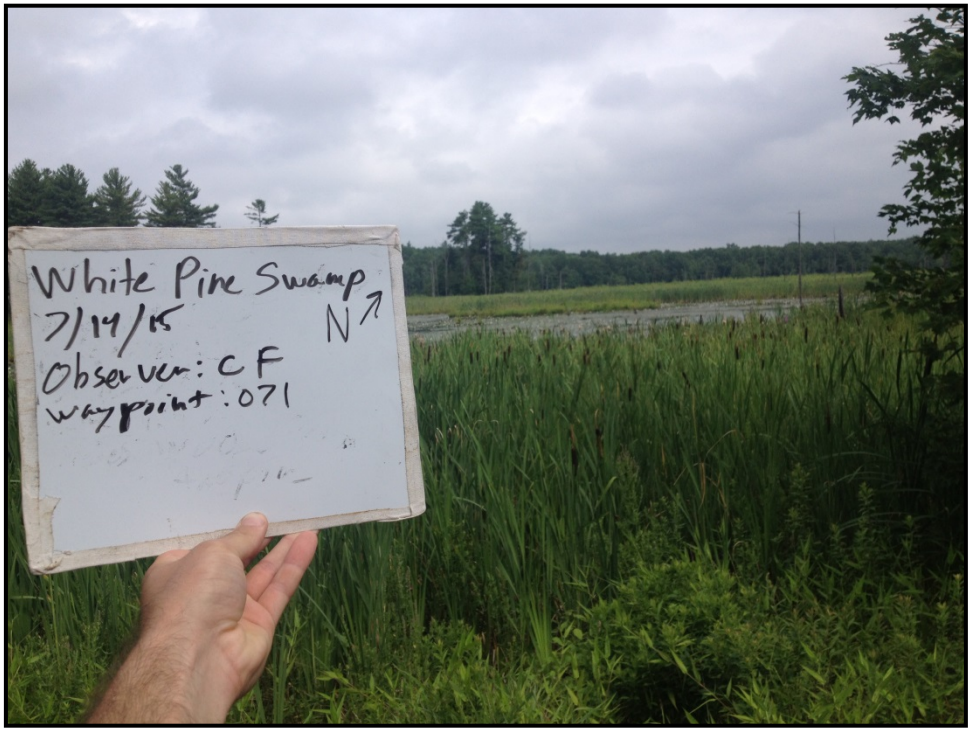




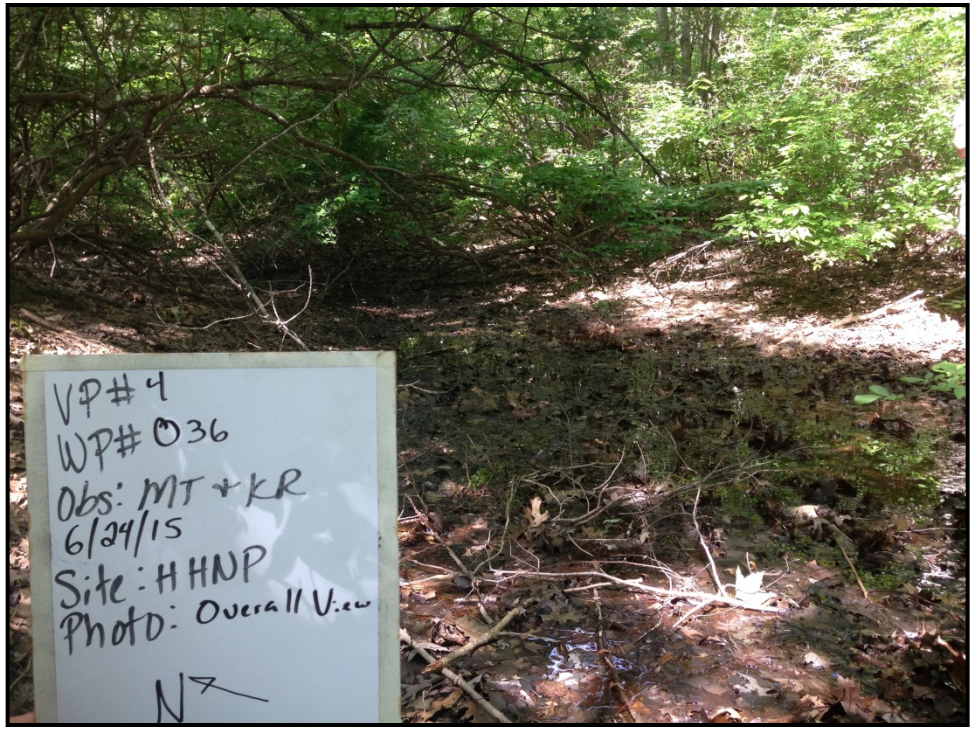
Wetland 4; Vernal Pool 1: open water and scrub shrub



Wetland 5: Aquatic bed and emergent marsh with heron nest in background at Long Pond

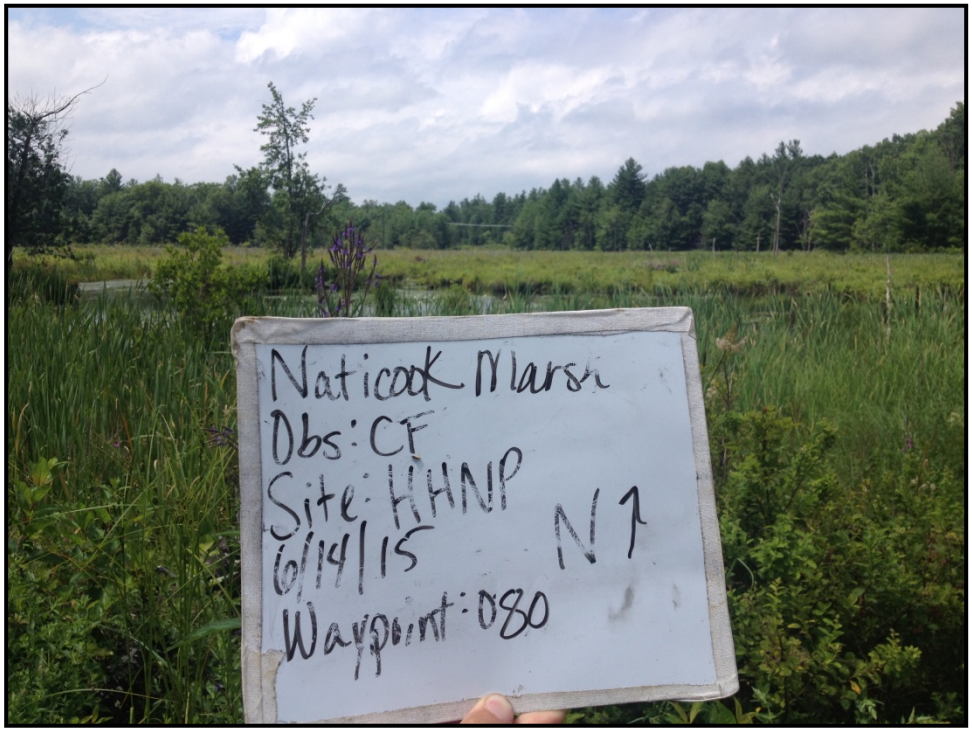


Wetland 6: emergent marsh and aquatic bed at White Pine Swamp



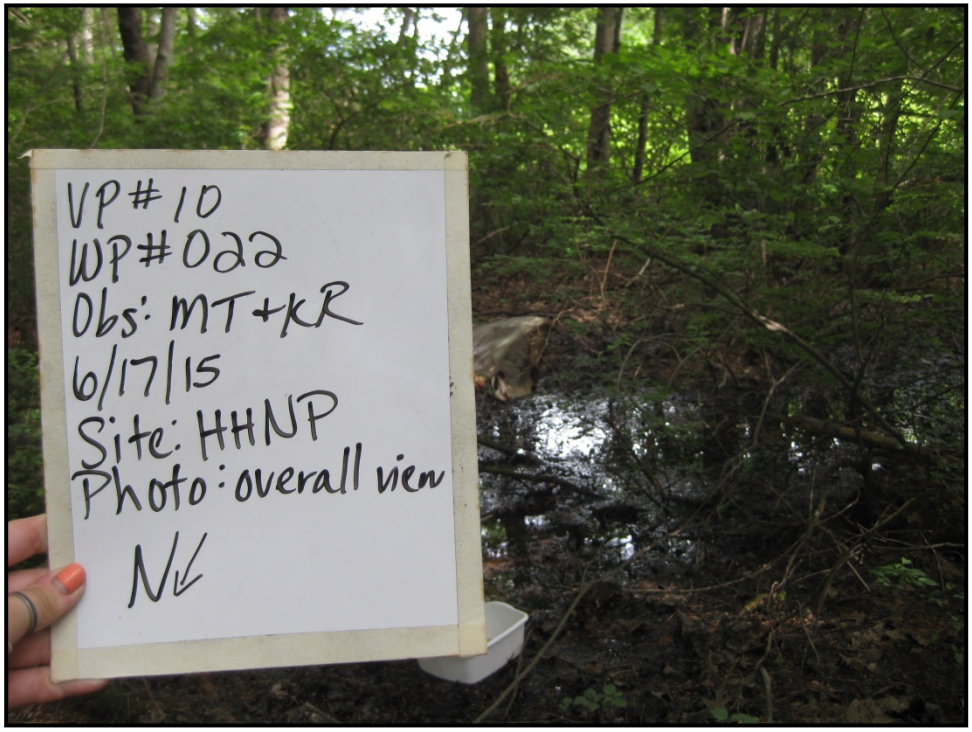
Wetland 7; Vernal Pool 4: Dry

Wetland 12: emergent marsh at Naticook Marsh

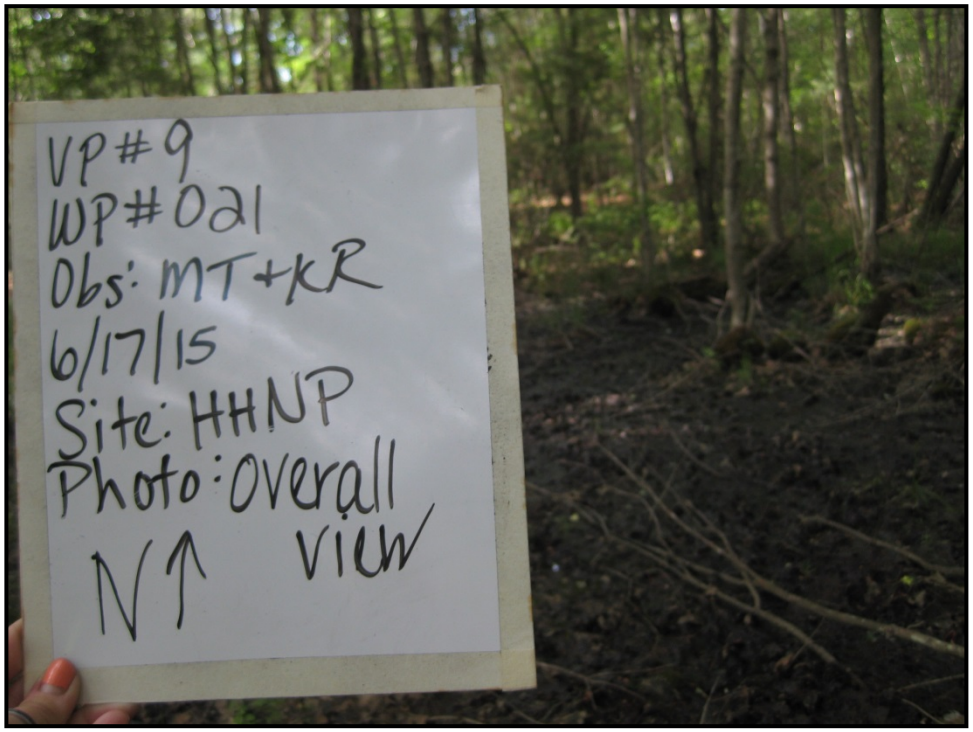


Wetland 12: emergent marsh and aquatic bed at Naticook Marsh

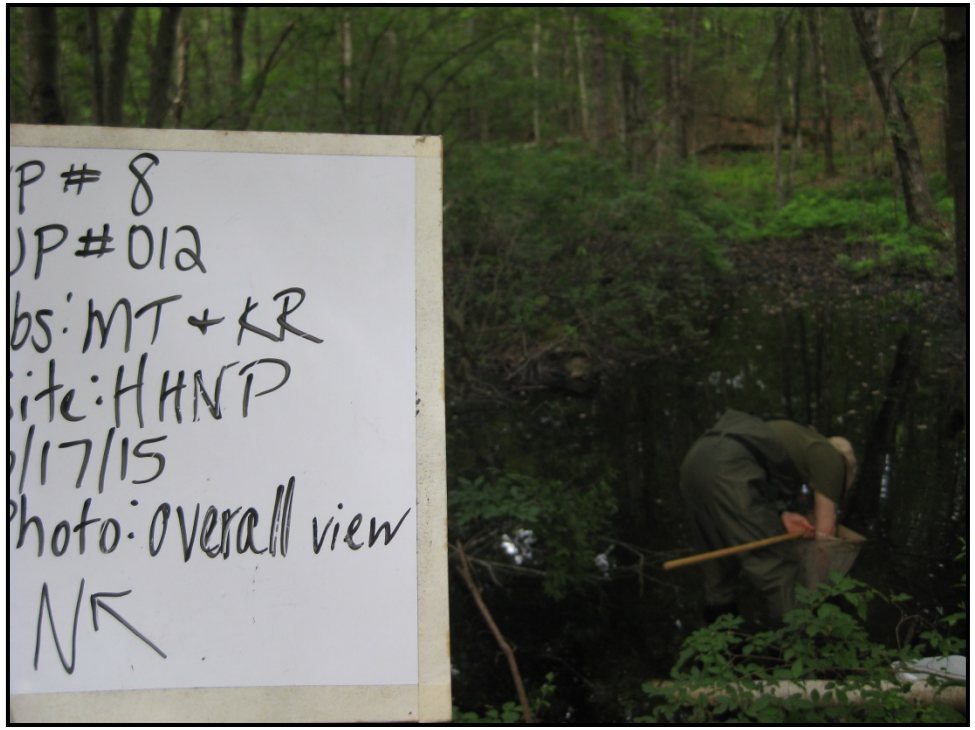
Wetland 13: emergent and aquatic bed



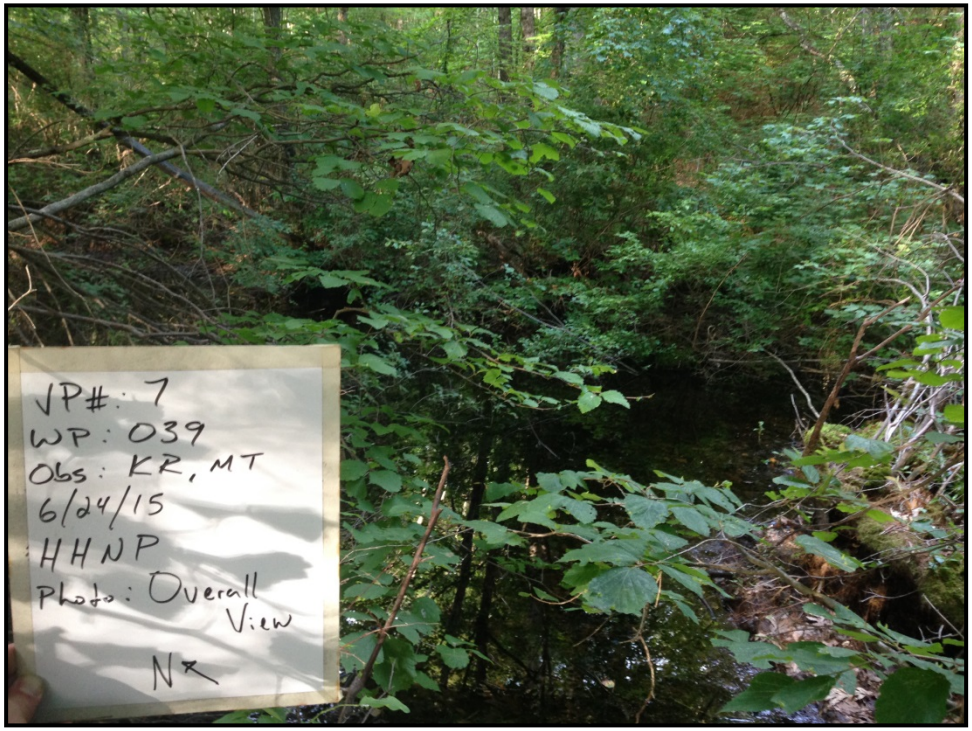
Wetland 14: Vernal Pool 10: open water



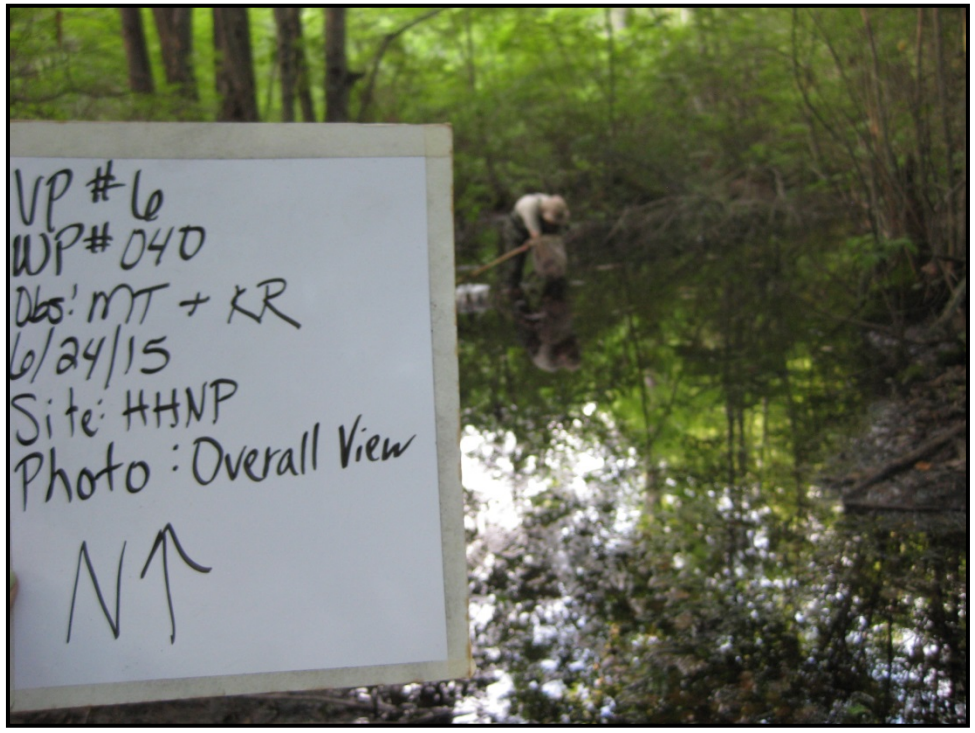
Wetland 15; Vernal Pool 9: Dry



Wetland 16; Vernal Pool 8: open water



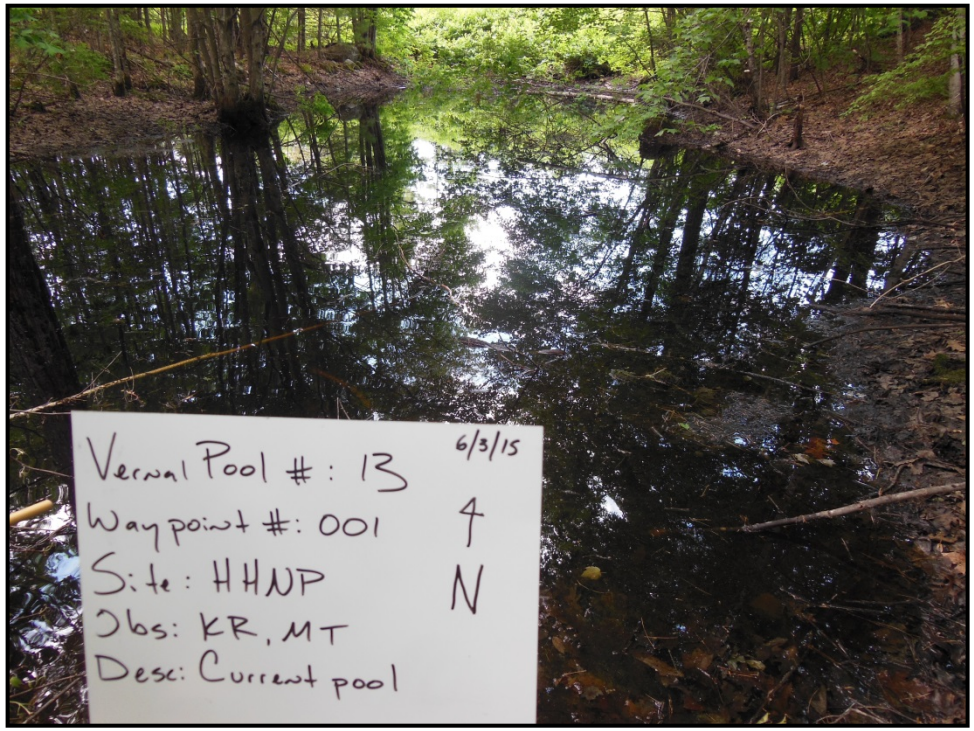
Wetland 17: Vernal Pool 7: open water



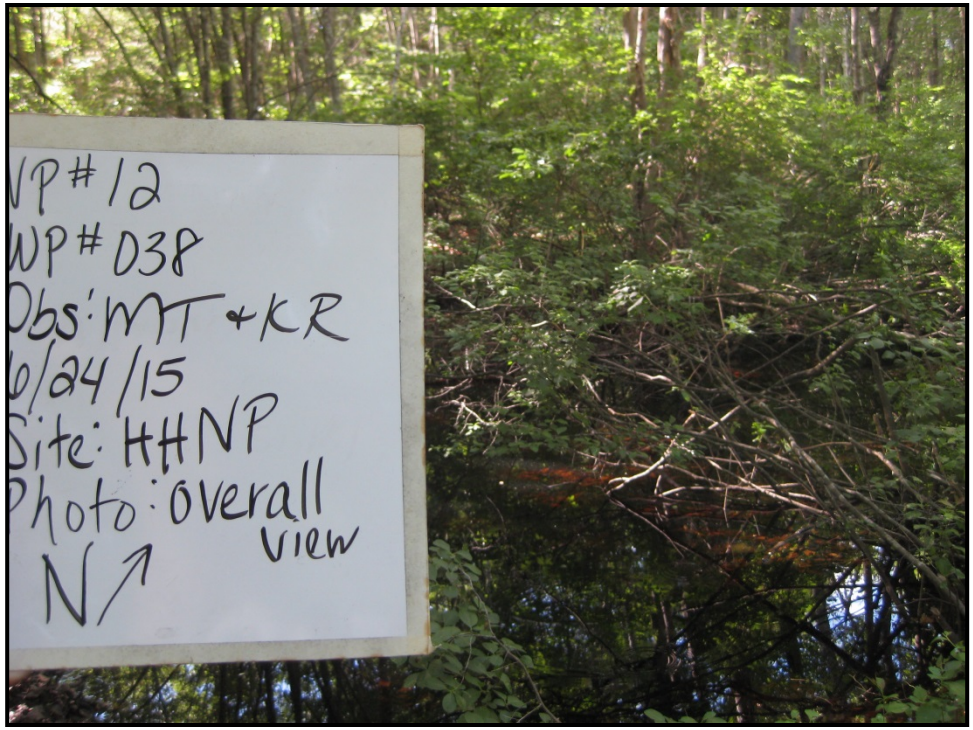
Wetland 18: Vernal Pool 6: open water

Wetland 19; Vernal Pool 5: Dry

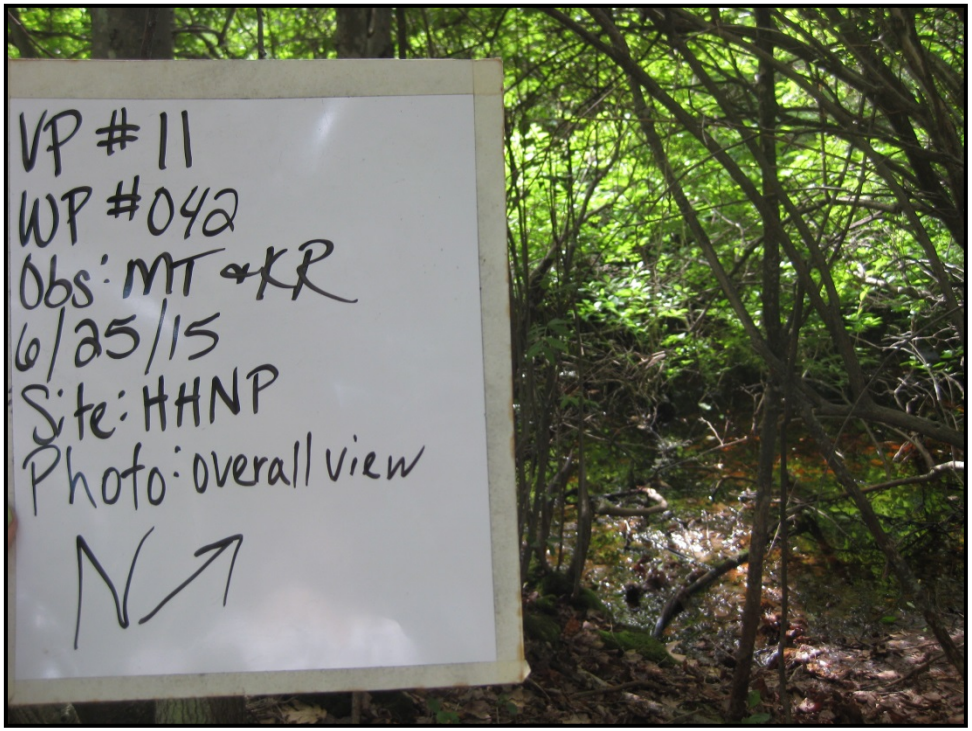
Wetland 20; Vernal Pool 15: almost dry



Wetland 21; Vernal Pool 13; open water



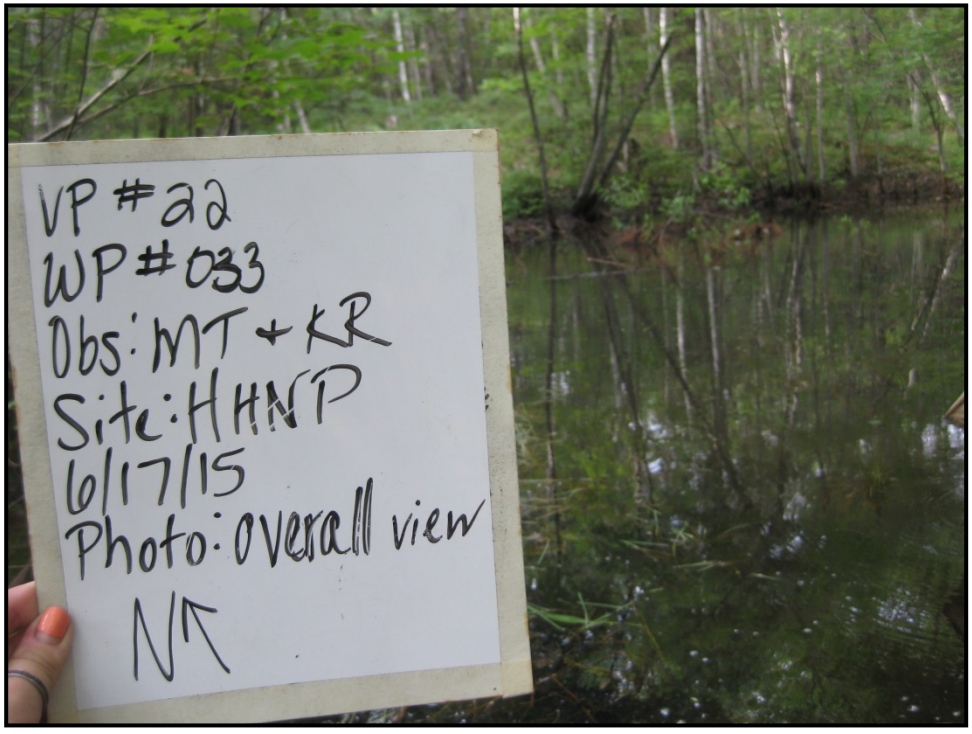
Wetland 22; Vernal Pool 12; open water and scrub shrub



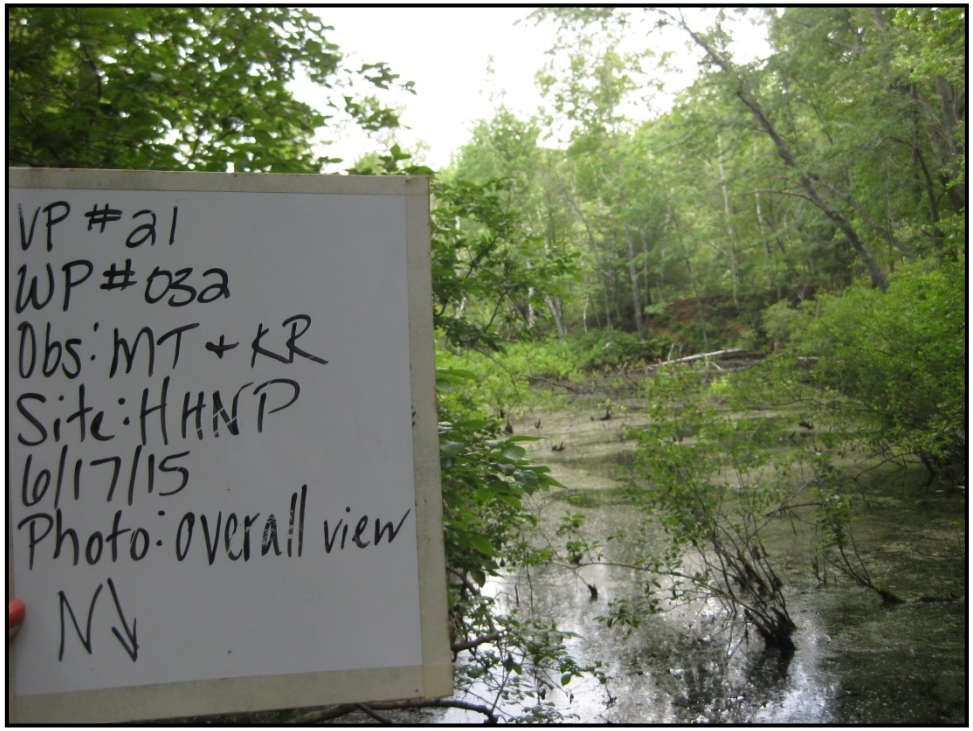
Wetland 23; Vernal Pool 11: scrub shrub

Wetland 26; Vernal Pool 25: scrub shrub

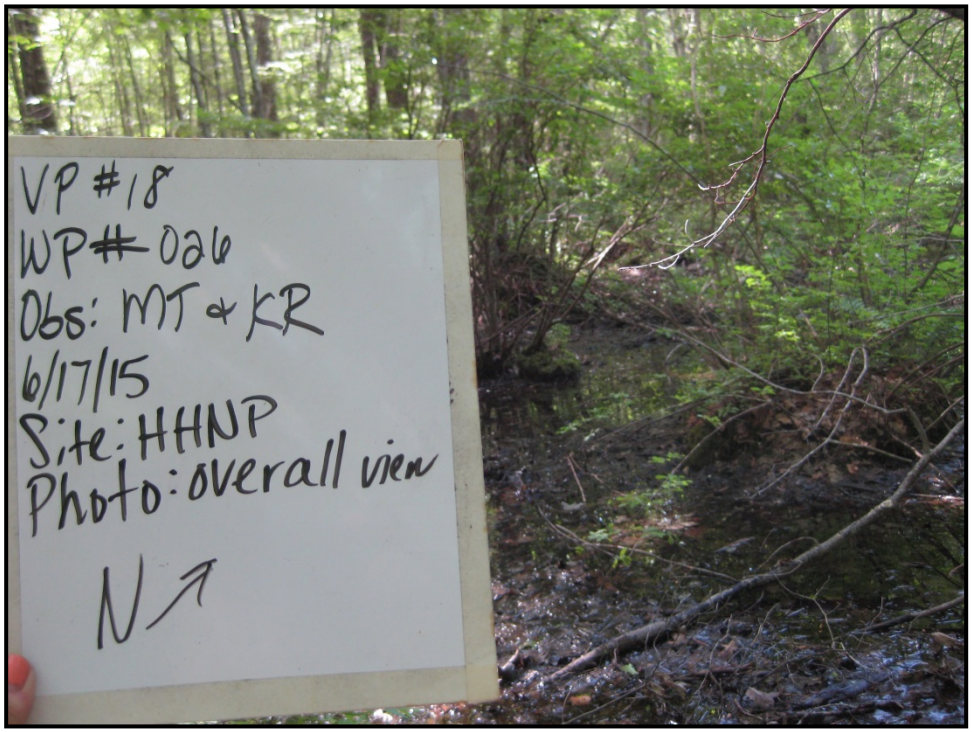
Wetland 27; Vernal Pool 24; open water and emergent marsh



Wetland 29; Vernal Pool 22; Open water

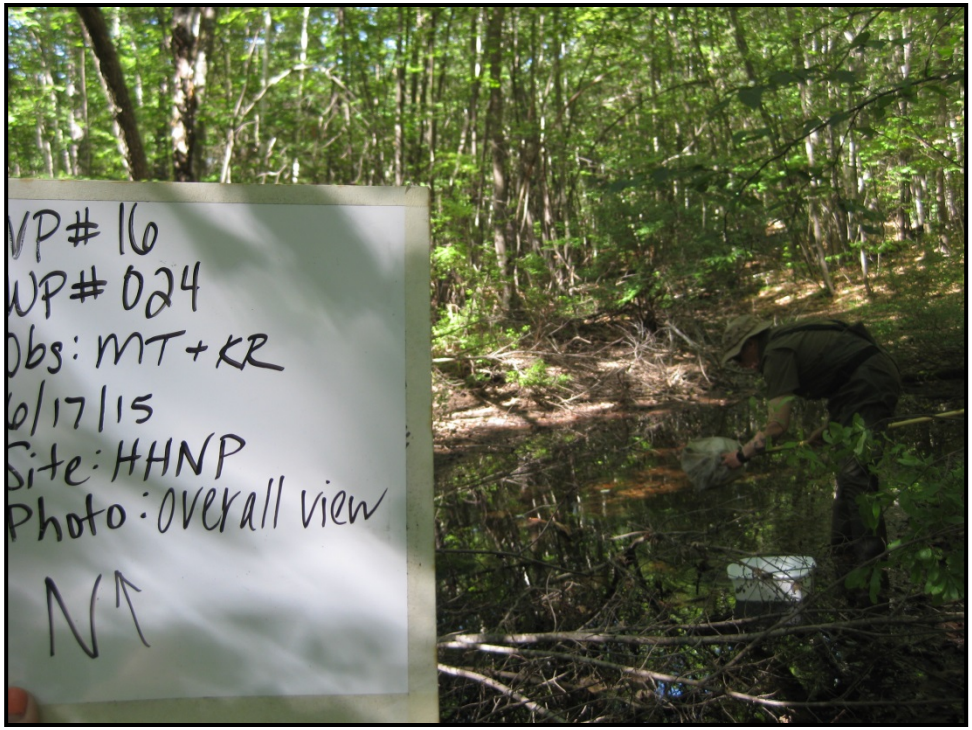


Wetland 30; Vernal Pool 21: open water and scrub shrub

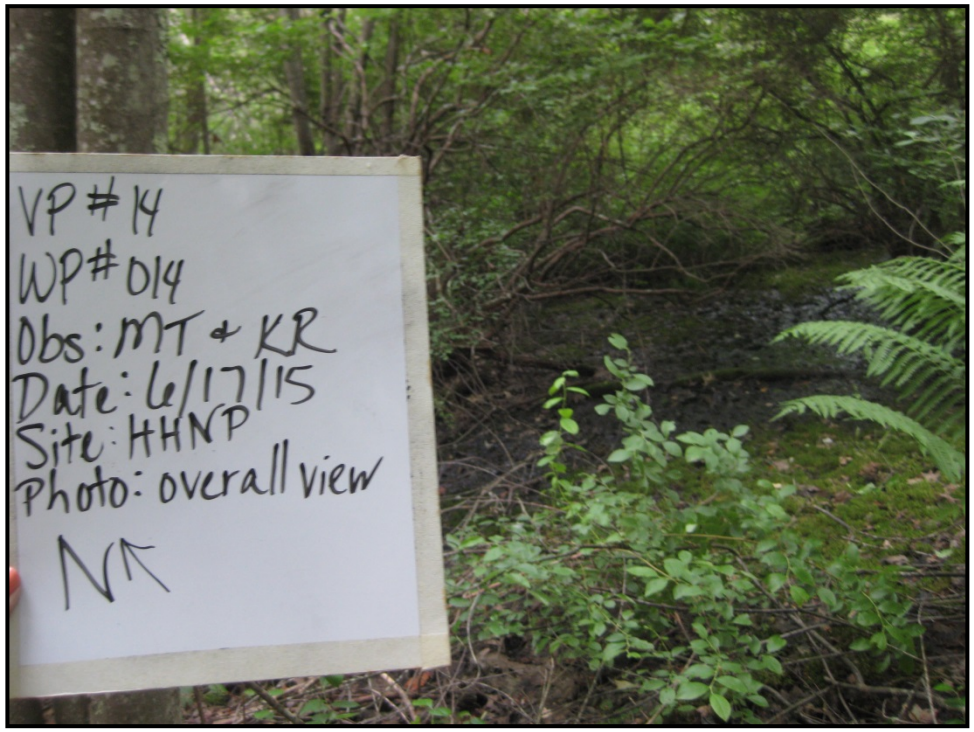


Wetland 33; Vernal Pool 18: open water and scrub shrub

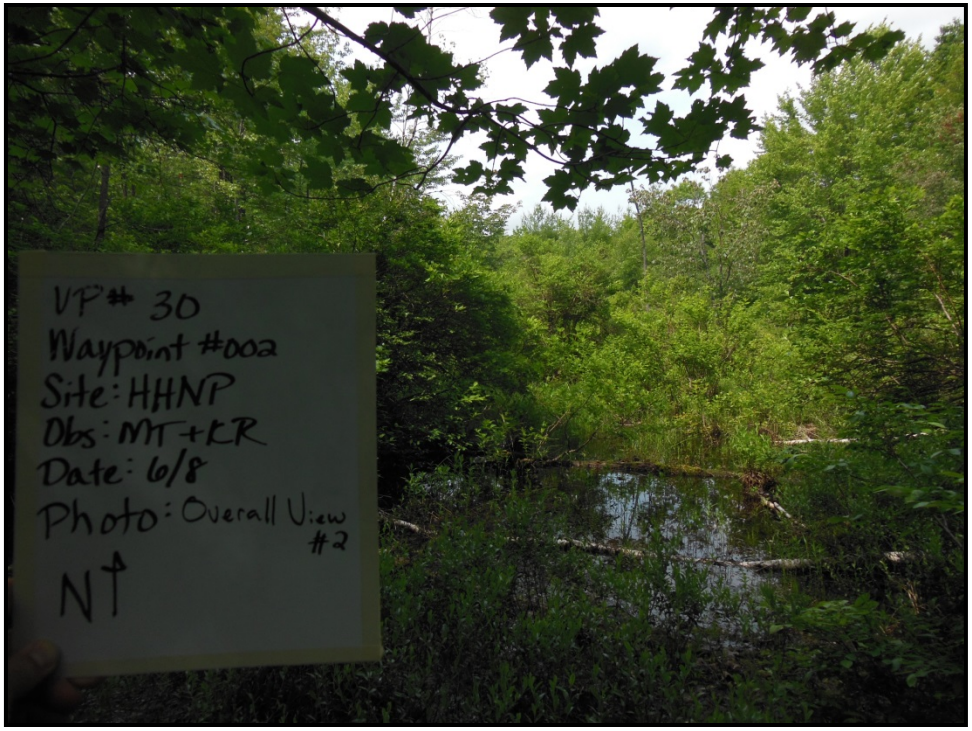
Wetland 34; Vernal Pool 17: dry



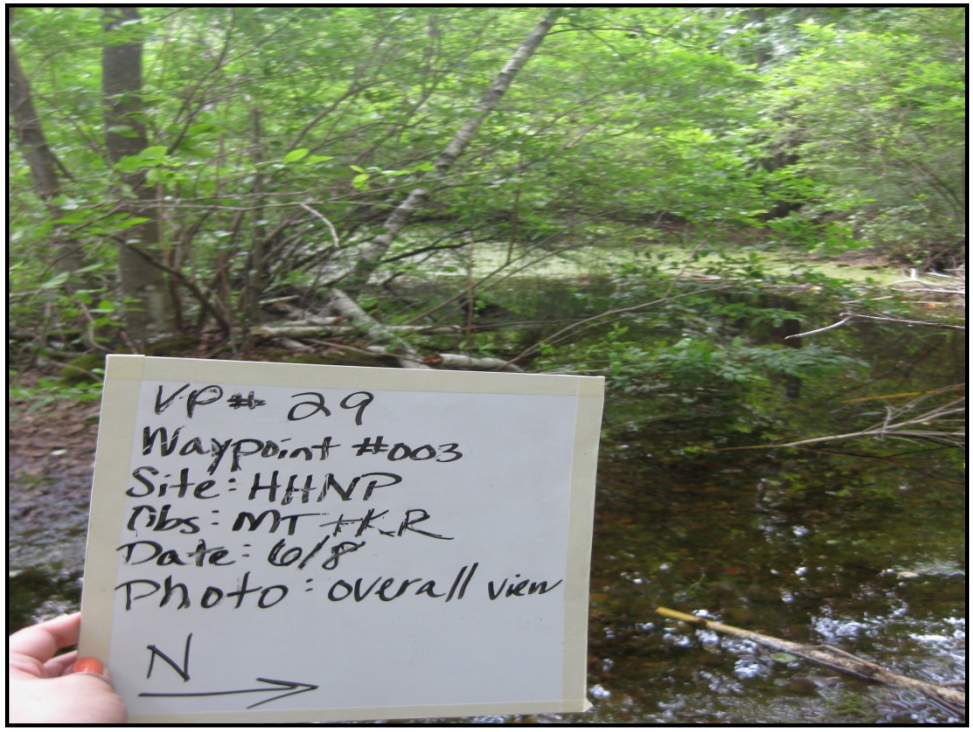
Wetland 35; Vernal Pool 16; open water



Wetland 37; Vernal Pool 14: scrub shrub



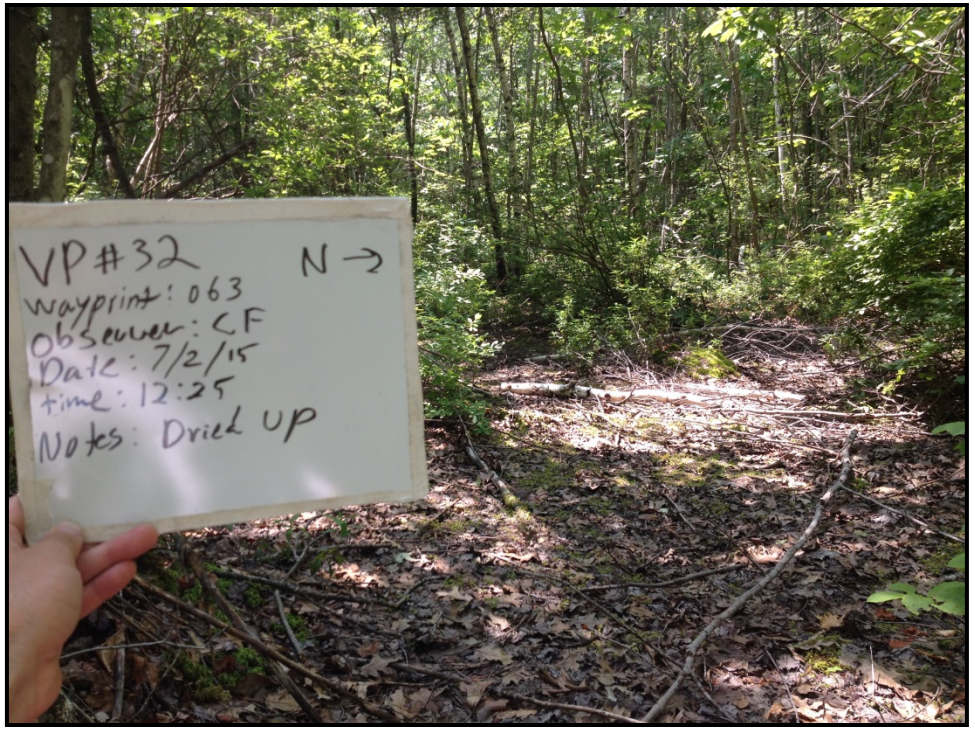
Wetland 39; Vernal pool 30: open water and Scrub shrub



Wetland 40; Vernal Pool 29; open water

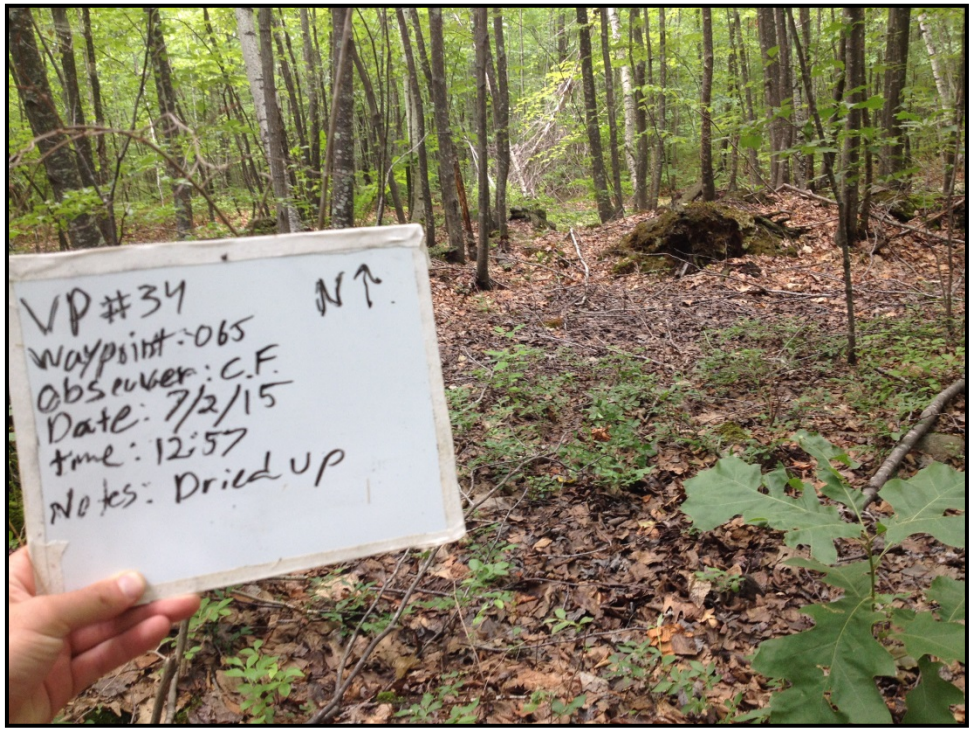
Wetland 41; Vernal Pool 28; dry

Wetland 42; Vernal Pool 31: dry

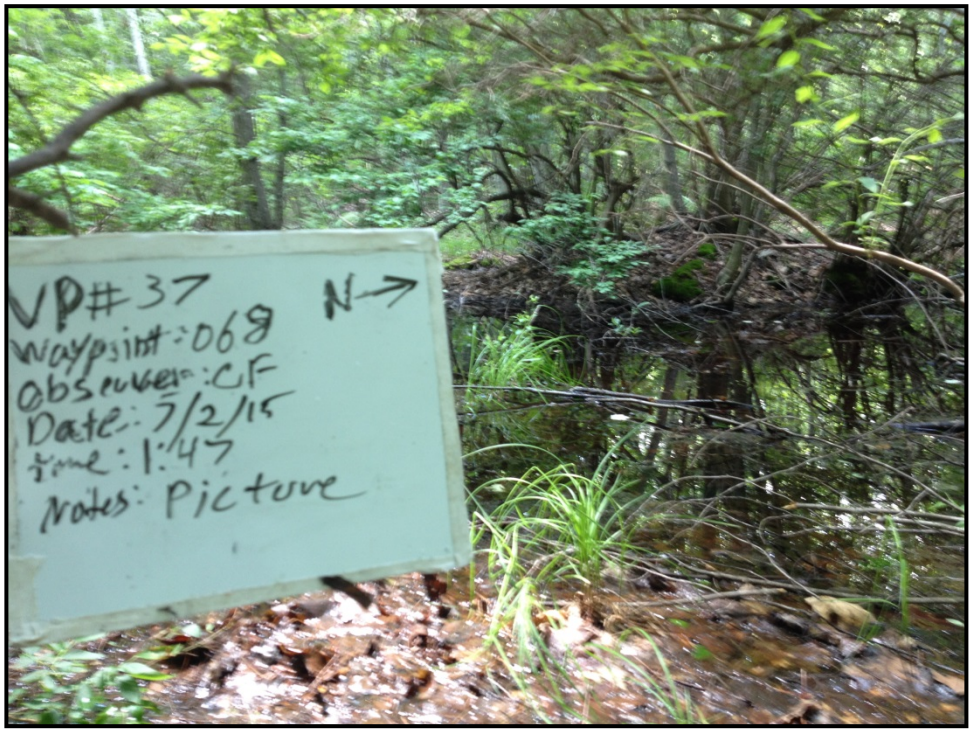


Wetland 43; Vernal Pool 32: dry

Wetland 44; Vernal Pool 33; scrub shrub

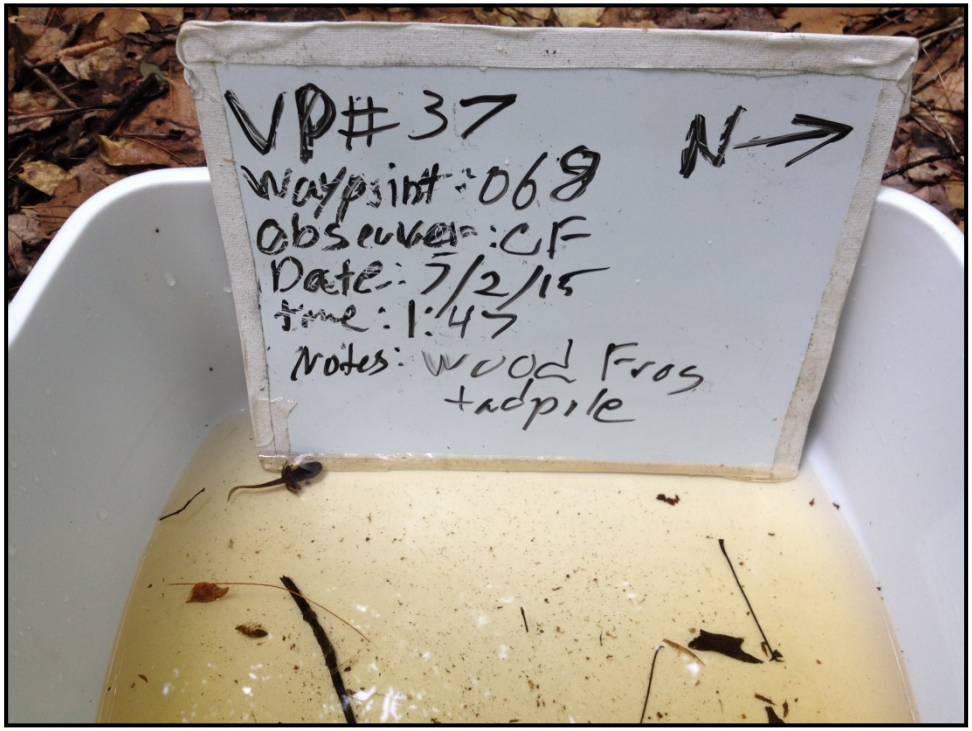


Wetland 45; Vernal pool 34; dry

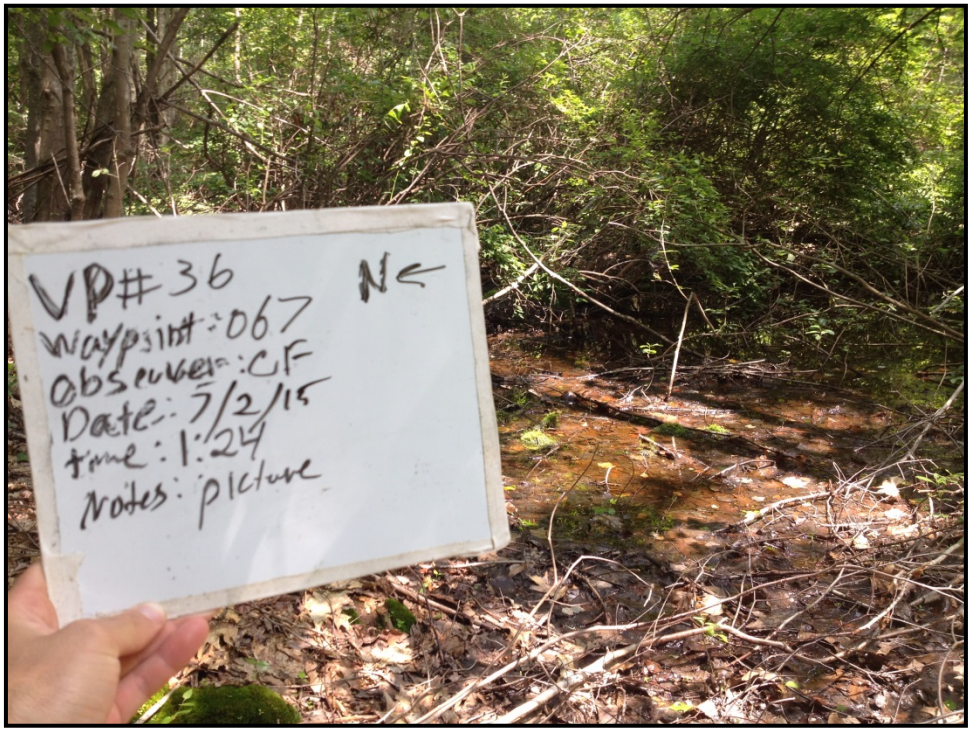


Wetland 46; Vernal Pool 37: open water and scrub shrub

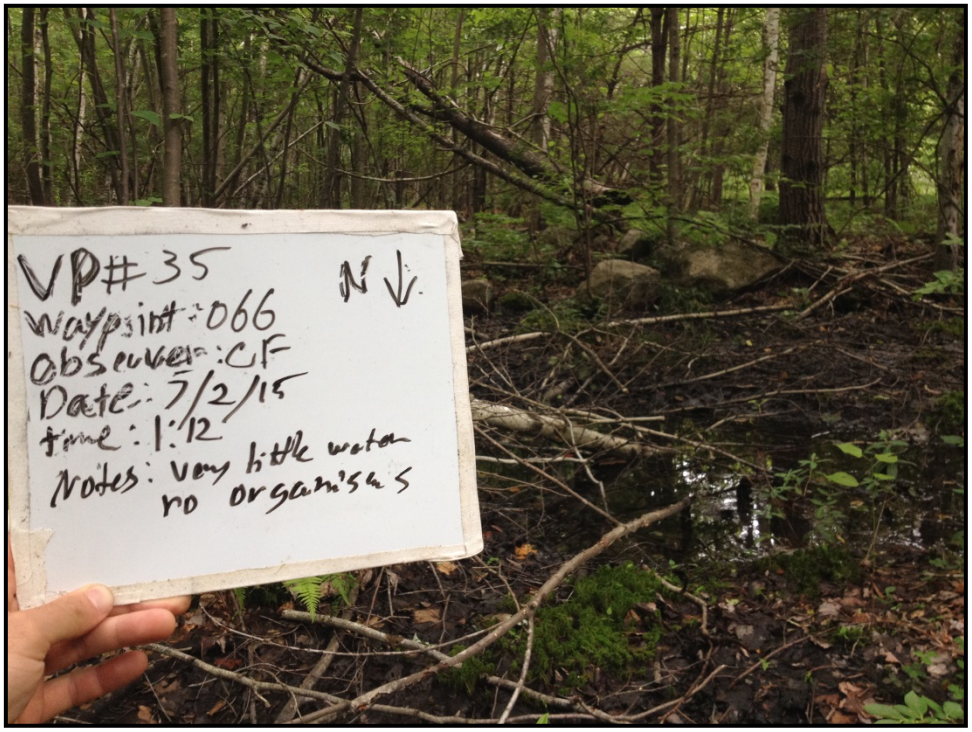
Wetland 46; Vernal Pool 37: Ambystomid salamander larva



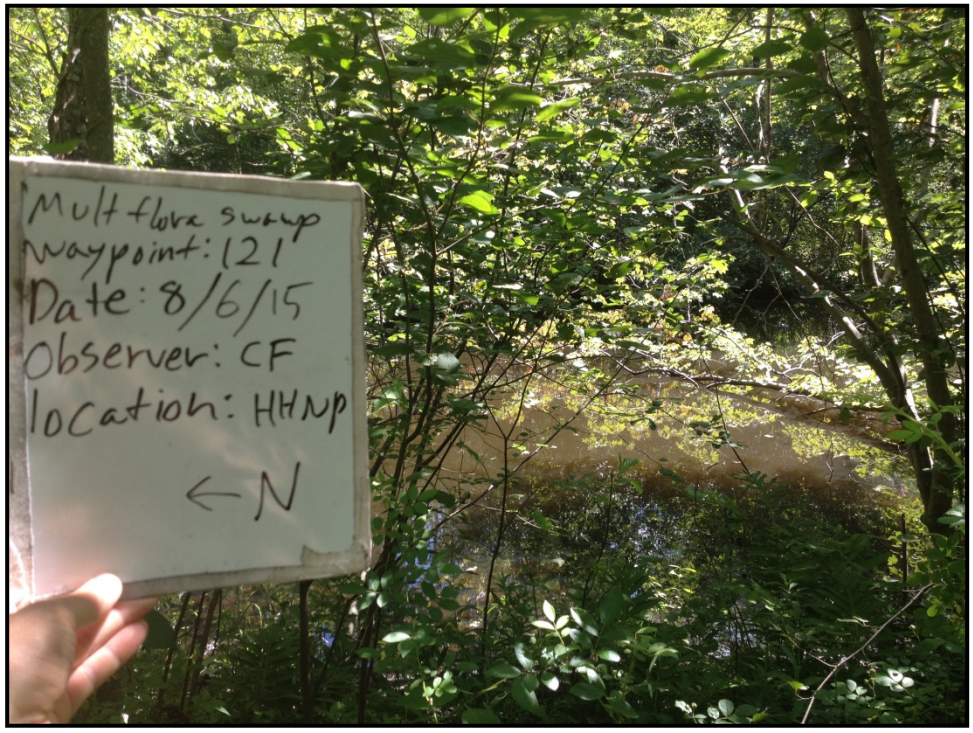
Wetland 46; Vernal Pool 37; wood frog tadpole



Wetland 47; Vernal Pool 36; scrub shrub



Wetland 48; Vernal Pool 35: open water



Wetland 49: open water

Wetland 50: aquatic bed and emergent marsh

Wetland 50: open water and emergent marsh