OXBOW ASSOCIATES, Inc.

Wetlands Delineation and Permitting - Wildlife Studies - Herpetology - Vernal Pool Ecology

Vernal Pool Habitat Survey
Jackson Technology Park and North Post
Devens, Massachusetts

May 25, 2001

Prepared for:

Devens Enterprise Commission
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Introduction

Oxbow Associates, Inc. (OA) conducted a vernal pool habitat evaluation of a portion of Jackson Technology Park of Devens and approximately 100 acres of Open Space and Recreation-zoned land along Bishop Road, to the southwest of the old Moore Airfield. Lots 6, 8A, 16, 14, 13, 2, 14, and 15 within Jackson Technology Park of Devens were included in the evaluation.

The objectives of the evaluation were to examine specific areas and open space parcels to determine the locations and status of vernal pools and to record the presence / abundance of obligate and facultative vernal pool species. Additionally, OA noted specific habitat features within the survey area that are strongly suggestive of the presence of state listed rare and endangered wildlife.

Methods

OA divided the survey area into two functional physiographic areas for purposes of discussion and site evaluation. These areas are the North Post and Jackson Technology Park of Devens. Furthermore, wetland areas and potential vernal pools were given unique identification numbers for reference (see Appendix A and B). The North Post subject area consists of the open space parcels west and south of the old Moore Airfield and the open space east of the Nashua River. The Jackson Technology Park subject area consists of lots 2, 6, 8A, 13, 14, 15, and 16.

Figure 1. Two spotted salamander adults

OA staff conducted approximately 42 hours of on site field review during which time isolated wetlands and various other wetlands on the site were evaluated. Field investigations were conducted from April 24, 2001 through May 18, 2001. OA utilized dip netting and visual inspections to survey potential vernal pool breeding habitat.

Figure 2. Spotted salamander egg mass (below) and blue-spotted salamander egg mass (above) found in Wetland # 12

Prospective survey sites were determined utilizing a variety of resources including aerial orhtophotographs, USGS maps, the NHESP Aerial Survey of Potential Vernal Pools, and prior field notes and observations made by OA personnel in previous work on and around the Devens properties.

Wetlands that were known to contain fish were not surveyed. Visual surveys and egg mass counts were conducted to determine the presence and status of species including: blue-spotted salamander (*Ambystoma laterale*), four-toed salamander (*Hemidactylium scutatum*)

and spotted salamander (*Ambystoma maculatum*). Dip-net surveys for aquatic invertebrates were also conducted to survey for the presence of state listed rare invertebrates, such as Mystic Valley amphipod (*Crangonyx aberrans*).

Additionally, air and water temperatures, pH measurements, and prevailing weather conditions at the time of survey were recorded. OA also utilized Global Positioning System (GPS) and Geographic Information Systems (GIS) to field survey and map the locations of observed rare wildlife, evaluated wetlands, and important habitat features. These locations have been overlayed on aerial orthophotographs of the subject area.

Our findings with regard to vernal pool status and rare species occurrences are discussed below.

North Post Evaluation

The North Post study area consists of approximately 100 acres of Open Space and Recreation-zoned land not within Fish and Wildlife jurisdiction east of the Nashua River and south and west of the old Moore Airfield. Much of the land adjacent to the Nashua River and Nonacoicus Brook is within flood plain to these rivers effectively precluding vernal pool breeding habitat as well as local terrestrial habitat for mole salamanders. OA was able to evaluate a number of isolated wetlands in this area that did meet the Natural Heritage and Endangered Species Program (NHESP) criteria for certified vernal pools, however.

OA noted the location of each pool, dominant vegetation present, and the number of obligate and facultative vernal pool species found. Descriptions of each wetland are found below. Obligate vernal pool species, including; spotted salamander (*Ambystoma maculatum*), blue-spotted salamander (*Ambystoma laterale*), wood frog [egg masses/ tadpoles] (*Rana sylvatica*), and fairy shrimp (*Eubranchipus vernalis*), present in each wetland are noted in the text below. Complete inventories of amphibian and invertebrate species present in each wetland can be found in Appendix C and D. Additionally, non-biologic criteria including pool dimensions, pH, maximum depth, and instantaneous water temperature can be found in Appendix E.

Wetlands 1-8 lie in flood plain to the Nashua River and they may be variously overtopped by flood water depending on the river flood stage in any given year. This is based on the elevation of this area in relation to the Nashua River, evidence of silt stained leaves and the presence of dead adult yellow perch (*Perca flavescens*) in the forested area adjacent to these wetlands. It is OA's opinion that the pools within this flood plain provide marginal breeding habitat for salamanders and wood frogs and that the flood regime may be responsible for the relative low diversity and low productivity for these species in that area.

Prospective vernal pool sites investigated are enumerated below and located on Appendices A and B. Following each wetland number below is a notation as to whether the site meets the NHESP criteria for certification based upon our observations during 2001. Appendixes C through E provide tabular data on faunal elements and physical characteristics of the respective wetland sites.

Wetland #1 – Vernal Pool

This isolated wetland is located east of the Nashua River (see Appendix A). Dominant vegetation includes red maple (*Acer rubrum*) with an understory of poision ivy (*Toxicodendron radicans*). This wetland contains fairy shrimp, an obligate vernal pool species, and meets NHESP certification criteria.

Wetland #2 – Vernal Pool

This isolated wetland is located east of the Nashua River and is devoid of vegetation. This wetland contains fairy shrimp and meets NHESP certification criteria.

Wetland #3 – Vernal Pool

This isolated wetland also located east of the Nashua River, contains a number of mature hardwoods including red maple. Wood frog adults and tadpoles were found in this wetland. It was also found to contain fairy shrimp and meets NHESP certification criteria.

Wetland #4 – Vernal Pool

This isolated wetland is located east of the Nashua River and North of the aforementioned wetlands. Wood frog adults (non-breeding) were observed in this pool, but no tadpoles were found. OA believes this pool may provide marginal wood frog breeding habitat in some years. This wetland contained fairy shrimp and meets the NHESP certification criteria.

Wetland #5 – Vernal Pool

Isolated wetland # 5 contains mature hardwoods and is located east of the Nashua River and west of a large shrub swamp. This pool consists of two, approximately 30 meter in length, manmade trenches and was found to contain four spotted salamander egg masses, wood frog tadpoles and fairy shrimp. This pool meets NHESP certification criteria.

Wetland #6 – Vernal Pool

Wetland # 6 at the time of evaluation was an isolated wetland, but it was apparent that in the early part of the spring with higher water levels, this pool was contiguous with the shrub swamp to the north that contains a breeding population of yellow perch. Wood frog tadpoles were present at the time of the evaluation and the pool contained approximately 1 meter of water. OA believes this wetland provides marginal breeding habitat for wood frogs in most years. This pool appears to meet the criteria for certification based on the evidence collected this season. However, it should be noted that this pool may contain fish on a somewhat regular basis depending on the frequency with which it is confluent with the shrub swamp.

Wetland #7

Wetland # 7 at the time of evaluation was an isolated wetland, but appears to be contiguous with the shrub swamp to the northwest in most years. This two-acre wetland is dominated by buttonbush (*Cephalanthus occidentalis*), but also has areas of open water approximately 1.5 meters deep. At flood stage this wetland may contain up to 3 meters of water based on observations of stranded material suspended in overhanging tree branches above the pool.

OA documented two spotted salamander egg masses in this wetland, but also documented abundant eggs of yellow perch (*Perca flavescens*), clear evidence of fish reproduction. Based

on the evidence of perennial presence of finfish, this wetland does not meet NHESP certification criteria.

Additionally, snapping turtle (*Chelydra serpentina*) and painted turtle (*Chrysemys picta*) were documented in this wetland. It is OA's opinion that this wetland may also provide habitat for Blanding's turtle (*Emydoidea blandingii*), a Massachusetts threatened species, based on the proximity of documented Blanding's turtle habitat to the west, in the Sewage Plant Pond (see Appendix A) and elsewhere in the Devens/Nashua area. The occurrence of Blanding's turtle habitat on the subject property is discussed in the rare species section of this report, below.

Wetland # 8 – Vernal Pool

Wetland # 8 at the time of the evaluation was an isolated wetland. OA believes that this pool also lies within the flood plain of the Nashua River based on the silt stained leaves and dead fish adjacent to this pool. This pool contains a number of hardwood tree species as well as emergent shrub meadow vegetation (dominated by broadleaved meadowsweet, *Spirea latifolia*). Fairy shrimp were present in this pool and based on evidence colleted this season, this pool meets NHESP certification criteria.

Wetland #12 – Vernal Pool

Isolated wetland # 12, located east of the Nashua River and south of Moore Airfield, contains open water with mature red maple in the northern portion and buttonbush dominating the southeastern portion of the pool. OA observed one spotted salamander egg mass and fairy shrimp in this pool. We also observed at least twenty-three **blue-spotted salamander** egg masses, a Massachusetts species of special concern. The presence of this species will be discussed in the rare species section of this report. Based on the presence of fairy shrimp and blue-spotted salamander reproduction this pool meets the NHESP certification criteria.

Wetland #13 – Vernal Pool

This wetland is an isolated depression within a forested area east of the Nashua River. Vegetation includes red maple and quaking aspen (*Populus tremula*). This wetland contained approximately .5 meters of standing water at the time of the evaluation. Based on the low water level in this pool at the time of the survey, OA believes this pool is too shallow and ephemeral to support amphibian breeding. This wetland did contain fairy shrimp and therefore, meets the criteria for NHESP certification.

Wetland #14 – Vernal Pool

This wetland is an isolated emergent marsh with large areas of open water and large areas dominated by buttonbush. Red maple and black willow (*Salix nigra*) dominate the northern portion of this wetland adjacent to Bishop Road. OA observed a single spotted salamander egg mass and fairy shrimp in this wetland. Due to the dense stands of buttonbush in this pool and the difficulty in surveying this type of wetland, OA expects that more egg masses were present. This wetland meets the criteria for NHESP certification.

Wetland #15

This wetland is an emergent marsh with shallow standing water and small pockets of open water. It is associated with a stream channel that flows to the east, ultimately into Nonacoicus Brook. Vegetation is dominated by cattails (*Typha latifolia*). This wetland did not contain any

obligate vernal pool species. This pool did contain a number of facultative vernal pool species (see Appendix D) and could be certified based on the presence of these species. This wetland receives protection under the Massachusetts Wetlands Protection Act and does not in our opinion warrant additional certified vernal pool protection status.

Wetland #16 – Vernal Pool

This two-lobed isolated wetland adjacent to Bishop Road is separated from Perch Pond (a permanent pond containing fish) to the north by a steep forested ridge. Vegetation includes red maple, highbush blueberry (*Vaccinium corymbosum*) and common winterberry (*Ilex verticillta*). OA observed fairy shrimp and one **blue-spotted salamander** egg mass in this wetland. The presence of blue-spotted salamander will be discussed in the rare species section of this report below. This pool meets the NHESP certification criteria.

Wetland #19 – Vernal Pool

This isolated wetland, located west of the Devens sewage treatment facility, consists of three (possibly four) lobes and has wetland delineation flags (LEC) hung within the basin of the pool. It is located on Parcel No. 14 (260 Acres) and east of Walker Road. Vegetation includes red maple, quaking aspen and willow (*Salix sp.*). This wetland contains wood frog tadpoles and fairy shrimp, two obligate vernal pool species, and meets the NHESP certification criteria.

Certification materials for this pool may have been submitted to NHESP (by others). OA contacted NHESP regarding the status of this pool and at the time of this report preparation had not received a response.

Wetland #21 – Vernal Pool

This isolated wetland east of the Nashua River and south of the railroad tracks (see Appendix A) contains open water with buttonbush along the edges. OA observed fairy shrimp and wood frog tadpoles in this wetland as well a diverse array of aquatic invertebrates. We observed one spotted salamander egg mass, but we expect more were present, but may have been difficult to observe because of timing and dense stands of buttonbush. This area meets the criteria for NHESP vernal pool certification.

Jackson Technology Park of Devens

The Jackson Technology Park of Devens study area consists of approximately 91 acres (see Appendix B). Lots 2, 6, 8A, 14, 13, 15, and 16 were included in the evaluation. Most of the lots included in the evaluation or adjacent lots have been developed recently or exhibit signs of development/ use during the past decade. A number of isolated wetlands and wetland systems throughout the Jackson Technology Park were evaluated.

Wetland #9 – Vernal Pool

Isolated wetland # 9 is located east of Jackson Road and is surrounded by steep ridges. This wetland is found in a dense stand of mature hardwoods, but does not contain a substantial vegetation community. OA observed eighty-six spotted salamander egg masses that represents a terrestrial population of 300 – 400 adult salamanders. This is a particularly

productive pool. This pool also contained wood frog tadpoles and adults, fairy shrimp and a number of facultative vernal pool species and therefore meets the criteria for NHESP certification.

Wetland #10 – Vernal Pool

Wetland # 10 is located east of Jackson Road and is northeast of wetland # 9. This wetland contained approximately 1 meter of water in an area 10 x 10 meters. The basin surrounding this wetland was approximately three times the size of the area that contained water at the time of the survey. This wetland and the basin surrounding the standing water contained a thick layer of silt and was devoid of vegetation. The standing water contained suspended particulates throughout the water column. OA believes that this wetland is receiving runoff from the developed area to the northwest and has been filling up with silt for a number of years.

Most of the seventeen spotted salamander egg masses that were observed were found out of the water adjacent to the standing water, covered in silt. This wetland also contained wood frog tadpoles and therefore meets the criteria for NHESP certification.

Wetland # 11 – Vernal Pool

This wetland is located on lot 6 and 7 in the Jackson Technology Park, adjacent to the American Superconductor building. This wetland consists of small standing - water pockets within a forested wetland. Two wetland pockets were approximately .3 to .5 meters in depth. Dominant herbaceous and shrub species in this wetland include; skunk-cabbage (*Symplocarpus foetidus*), sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmunda cinnamomea*), sphagnum moss, tussock sedge, highbush blueberry, speckled alder (*Alnus rugosa*), and N. arrowwood (*Viburnum recognitum*). Dominant tree species include; green ash (*Fraxinus pennsylvanica*) and red maple. One of the wetland pockets contained wood frog tadpoles and therefore, meets the criteria for NHESP certification. J. Petit provided us photographs of a single spotted salamander egg mass observed in this wetland in April of this year as well.

Recent conversations with the Devens Enterprise Principal Planner, Sharon Wason, indicate that hydrology of this wetland may have been recently altered, therefore changing the wetland's characteristics and drainage. Whether wood frogs and spotted salamanders are capable of attaining metamorphosis in this pool under current conditions is uncertain.

Wetland #17 – Vernal Pool

This wetland is an isolated depression within a forested area north of Patton Road (see Appendix B). Vegetation includes red maple, gray birch (*Betula populifolia*), highbush blueberry, sphagnum moss, and tussock sedge. This wetland contained wood frog tadpoles, an obligate vernal pool species and therefore, meets the criteria for NHESP certification.

Wetland #18 – Vernal Pool

This area is a two-lobed wetland south of Patton Road and northeast of Mirror Lake. Vegetation includes red maple, tussock sedge, and sphagnum moss. The wetland contained wood frog tadpoles and juveniles. This area meets the criteria for NHESP certification.

Wetland #20

This wetland is located north of Patton Road adjacent to wetland # 17 and has been impacted by beaver activity. It contained suspended particulates throughout the water column. Vegetation has been inundated by increased water levels, with red maple, quaking aspen, and gray birch as the dominant canopy vegetation. We did not observe any obligate vernal pool species in this wetland during our evaluation.

Rare Species

Blue-spotted Salamander Occurrences

Direct observations or evidence of blue-spotted salamanders were observed in three locations. OA observed a juvenile blue-spotted salamander on April 24, 2001 approximately 25 meters east of a dirt road, east of the Nashua River and 12 meters from wetland # 1 (see Appendix A). This juvenile was found under a piece of plywood in an open area. Additionally, OA observed blue-spotted salamander egg masses in Wetland #12 and Wetland # 16.

Figure 3. Juvenile blue-spotted salamander found east of the Nashua River

OA believes additional populations or subpopulations are likely to occur in any of the suitable habitat between wetlands # 12 and # 16, near wetland # 1, and throughout the Nashua River drainage. OA personnel have documented this species at various sites within the former Fort Devens property and adjoining area.

These salamanders are state-listed as a species of Special Concern. The MA NHESP generally protects breeding habitat as well as a 1,000-foot radius from the edge of the vernal pool-breeding habitat. In general, ambystomatid salamanders spend the majority of their time in small-mammal burrows in the forest floor, beneath the leaf-litter. Therefore, preservation of upland forest contiguous with the breeding habitat is an integral component to maintain the longevity of any breeding population. Ideally, upland forest contiguous between multiple potential breeding locations would maintain gene flow between different breeding populations and/or opportunities for dispersal.

Blanding's Turtle Habitat

Blanding's turtles (*Emydoidea blandingii*) have been documented in numerous wetlands in and around the Nashua River. OA has previously documented Blanding's turtles in the Sewage Plant Pond. Therefore, OA believes there is a high probability that Blanding's turtles use Wetland 7 and the shrub swamp north of Wetland 7, and Wetland 14. These areas contain suitable habitat for the species and are proximate to previous observation loci (Sewage Pond, Bishop Rd.).

Figure 4. Blanding's Turtle adult

These turtles are state-listed as Threatened and the MA NHESP is normally concerned with protecting both wetland and upland nesting habitat. Blanding's turtles regularly use emergent marshes, shrub swamps, flood plain wetlands, and vernal pools. These turtles use open, sandy areas for nesting and are known to travel over one km to nest. Therefore, conservation plans associated with these turtles must incorporate connectivity between wetland habitat and potential nesting sites.

Spotted Turtle Habitat

OA observed several areas that we believe would provide suuitable habitat for spotted turtles (*Clemmys guttata*), if present in the vicinity. Specifically, we believe the Walker Road Marsh is a strong candidate area for this species. This wetland contains scattered shrubs and emergent marsh vegetation with interspersed open water. OA conducted a preliminary trapping effort (6 traps x 2 nights = 12 trap nights), but did not capture any turtles. However, we believe this habitat is ideal for spotted turtles. These turtles are state-listed as species of Special Concern and the MA NHESP generally requires protection of the wetlands and encourages protection of the 100-foot buffer zone for nesting habitat.

Blanding's and Spotted Turtle Habitat

OA believes spotted and Blanding's turtles may co-occur in several wetlands not thoroughly evaluated for turtles during our vernal pool evaluation. These wetlands include three wetland areas south of Robbins Pond. These areas contain a mix of open water and emergent marsh and appear to provide turtle habitat. The proximity of these areas to the Nashua River suggests that there is a high probability of turtles using these wetlands for a portion of their activity season. In addition, the wetland just north of Patton Road is surrounded by a steep hillside with open sandy areas that appears to be ideal nesting habitat.

Wood Turtle Habitat

Sections of the Nashua River provide habitat suitable for wood turtles (*Clemmys insculpta*). According to our records, one individual was found killed on McPherson Road at the Rail Road crossing (ca. 1993). OA believes wood turtles could be using the Nashua River and its local tributaries, Nonacoicus Brook and Walker Brook.

Appendix A. North Post Wetland Locations

Appendix B. Jackson Technology Park Wetland Locations


Robbins Pond
Potential Blanding's &
Spotted Turtle Habitat
10
9
11
Jackson Road
#20
17
18
Patton Road
Mirror Lake
Little Mirror Lake

Appendix C. Amphibian Species Present

Pool Number	Spotted Salamander*	Blue-Spotted Salamander*	Wood Frog*		Green Frog	Pickerel Frog	N. Leopard Frog	Bull Frog	Spring Peeper	Gray Treefrog
	Ambystoma maculatum	*Ambystoma laterale*	*Rana sylvatica*		*Rana c.melanota*	*Rana palustris*	*Rana pipiens*	*Rana catesbeiana*	*Pseudacris crucifer*	*Hyla versicolor*
			Adult	Tadpoles						
1					X					
2						X				
3			X	X				X		
4			X		X					
5	4 masses			X						
6				X						
7	2 masses									
8										
9	86 masses			X	X	X				
10	17 masses			X						
11				X						
12	1 mass	>23 masses			X	X				
13					X					X
14	1 mass					X			X	
15					X		X	X	X	
16		1 mass					X			X
17				X						
18			X	X	X				X	
19				X				X		
20										
21	1 mass			X						

* Obligate Vernal Pool Species

Appendix D. Invertebrate Species Present

Species	Scientific Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Fairy Shrimp*	**Eubranchipus vernalis**	X	X	X	X	X			X	X			X	X	X		X			X		X
Isopod	**Caecidotea communis**							X	X						X	X		X				
Amphipod	**Hyaella azteca**			X	X	X	X	X								X						X
Caddis Fly larvae**	**Limnephilidae**									X	X		X	X	X	X	X	X	X	X	X	X
Crawling wtr Beetle	**Haloplidae**											X			X	X			X			X
Predaceous Beetle Larvae**	**Dytiscidae**	X		X	X	X				X	X		X	X				X	X	X	X	X
Mosquito Larvae	**Culicidae**		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Midge larvae	**Chironomidae**				X			X			X	X		X		X	X	X	X		X	X
Worm	**Lumbricid**		X	X																		
Seg. Worm	**Tubificidae**												X			X					X	X
Snail	**Stagnicola sp.**							X								X						
Snail**	**Planorbidae**							X		X		X	X		X	X	X				X	X
Fingernail Clam**	**Sphaeriidae**									X	X	X	X			X						X
Water boatman	**Corixidae**			X							X			X	X		X			X	X	X
Flatworm	**Phagocata sp.**			X	X																	
Backswimmer	**Notonectidae**							X													X	X

* Obligate Vernal Pool Species
** Facultative Vernal Pool Species

Appendix E. Wetland Descriptions

Pool Number	Dimensions (meters)	pH	Appox. Max Depth (meters/ft.)	Air Temp. (°C)	Water Temp. (°C)	Date Last Observed	Notes
1	10x20	4.6	.83/ 2.5	32	21	4/24	Isolated Wetland
2	5x5	5.5	.83/ 2.5	32	19	4/24	Isolated Wetland
3	40x8	5.4	1.3/ 4	32	19	4/24	Isolated Wetland
4	50x20	5.0	1.2/ 3.5	32	19	4/24	Isolated Wetland (2 lobes)
5	60x5	6.0	1.5/ 4.5	32	18	4/24	Isolated Wetland
6	50x10	6.4	1/ 3	32	20	4/24	Contiguous with shrub swamp and River
7	Approx. 2 acres	4.3	1.6/ 5 (9 ft in flood)	32	21	4/24	Contiguous with shrub swamp and River
8	20x40	4.7	1.5/ 4.5	32	20	4/24	Flood Plain (2 lobes)
9	15x20	7.6	1.3/ 4	31	15	5/3	Isolated Wetland
10	10x10	7.4	1/ 3	31	27	5/3	Isolated Wetland, very silty, large dry basin area
11	5x5 and 10x5	6.5	.33/ 1	31	25	5/3	Small wetland pockets within BVW
12	Approx. 2 acres	6.2	1.7/ 5	31	22	5/3	Isolated shrub/Maple swamp
13	60x60	6.2	.67/ 2	31	19	5/3	Isolated Wetland
14	Approx. 4 acres	6.3	1.6/ 5	31	19	5/3	Permanent shrub swamp
15	60x30	5.8	.5/ 1.5	28	23	5/4	Emergent marsh with pockets of open water
16	20x40	6.2	1.5/ 4.5	31	19	5/3	Isolated Wetland (2 lobes)
17	50x20	5.5	.5/ 1.5	14	13	5/17	Isolated Wetland
18	150x20	6.3	1/ 3	14	13	5/17	Isolated Wetland
19	60x30	6.7	2/ 6	31	19	5/17	Isolated Wetland (3 lobes)
20	30x30	7.1	1/ 3	15	14	5/18	Beaver Influenced Wetland
21	30x30	5.5	1/ 3	16	13	5/18	Isolated Wetland