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Wetlands Delineation & Permitting • Wildlife Studies • Herpetology • Botany • Vernal Pool Ecology

Vernal Pool Evaluation *for* Devens RFTA Hotel Range Reconfiguration



View of Wetland 4, an anthropogenic vernal pool adjacent to Hotel Range.

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Introduction

Modernization and safety improvements are proposed to be implemented at “Hotel” Range, an automatic weapon/machine gun training facility located in the north-central portion of the Devens Reserved Forces Training Area (RFTA aka, “Range”) in Lancaster, Massachusetts. Hotel Range is oriented with live fire directed to the interior of the 1000+/- acre Impact Area. The current training mission requires advanced technological facilities and enhanced safety measures for compliance with current training objectives and standards.

A report examining the jurisdictional status of federal, state and local wetland resource areas associated with the control facilities of Hotel Range was prepared by Normandeau Associates, Inc. (July, 2018). References to wetland resource areas in that report have been adopted herein for consistency.

The Normandeau report identified three areas of potential vernal pool habitat. The criteria for vernal pool certification by the Massachusetts Department of Fisheries and Wildlife (MDFW) are generally accepted by the Army Corps of Engineers, New England Division and the Town of Lancaster under its Wetlands Protection (bylaw) Regulations. Lancaster provides protection above that afforded under the state Act in that the minimum volume of a pool subject to protection is 200 cubic feet.

The objective of this survey was to determine the status, relative to “certifiability” per the MDFW standards and criteria of three areas identified in the northern part of Hotel Range.

Site Descriptions

The Site, which in general is the northerly part of the Hotel Range facilities, was examined formerly on April 17, 2019 by B.O. Butler, following an earlier initial review under late winter (surface ice) conditions. Three areas were the objective of the site examination as identified in the Normandeau report; these were focal, sub-areas of Wetlands 1 and 2 and the entirety of Wetland 4.

The attributes of these features were described in the Normandeau report. However, they are described in brief below:

Wetland 1 is a shallow parabolic feature where groundwater discharges to the surface seasonally and discharges under the service road for Hotel Range to the north via a ditch and 12” culvert, ultimately to the BVW associated with Slate Rock Pond. The plant community there is predominantly herbaceous consisting of *Sphagnum* mosses, wool grass, tussock sedges and goldenrods, with sparse woody hydrophilic shrub species and sapling birch, red maple and white pine around its perimeter (see Photos 1, 2).

The hydroperiod of this feature is significantly influenced by plant transpiration as the vegetative community within and adjacent develops. The consistency of the benthic material suggests that the basin remains saturated through much of the season, but is unlikely to have persistent standing water after June of any typical year.

The maximum depth of this feature, established by the outlet invert at the road culvert is 14" with a mean depth estimated at 6 or fewer inches.



Figure 1. (above) View of **Wetland 1** to the NE with access road in background.
Figure 2. (below) View of **Wetland 1** showing outlet channel leading to culvert.

Wetland 2 is similarly an area of seasonal groundwater eruption with surface influence at the lower slope of a grassy field at the toe of a man made berm that drains by way of a channel to the outlet channel servicing Wetland 1. There are two minor basins, less than 200 square feet each, separated by some fill historic fill material upgradient of the main effluent channel.



Figure 3. (above) View to the SE of **Wetland 2**, swale habitat.

Figure 4. (below) View of lower basin of **Wetland 2**, with outlet channel partially obscured to the left).

This feature appears less persistent than Wetland 1 and has blue-joint grass, cinnamon fern, steeplebush and sparse hydrophilic shrub occurrences (Photos 3, 4). The maximum depth of this feature is 8". Bottom substrate characteristics indicate it is without water for an extended part of the growing season.



Figure 5. (above) View from access road NE to **Wetland 4** showing morning shaded conditions.
 Figure 6. (below) View to ESE across **Wetland 4** with location of submerged spotted salamander and wood frog eggs in the foreground.

Wetland 4 is an excavated, anthropogenic feature; probably a borrow pit used to build up the service road in an earlier iteration (> 30 years B.P.) of Hotel Range. Its outline is an ellipse with a long axis (NW- SE) of approximately 60 feet and a short axis of approximately 30 feet. The maximum depth of the basin is 38" and mean depth is estimated at greater than 2 feet.

Due to its positioning adjacent to the service road to the south and a stand of tall white pines to its southeast, east and northwest, this pool experiences limited insolation through much of the spring daylight period. With no significant surface or apparent groundwater inflow it probably remains frozen later than typical for vernal pools in the area and is probably not available for breeding for the normal or early waves of

amphibians. Nonetheless, it meets the MDFW criteria for certification based upon current year observations as described below (Photos 5, 6; Table 1).

Methods

The investigation of these prospective vernal pool areas was conducted in a manner standardized over more than two decades and through amendments to the MDFW Certification Criteria during that interval. The features were examined initially from landward positions and thereafter using chest waders and polarized sunglasses. Temperature corrected pH was measured as was the depth and other abiotic features. Egg masses of obligate vernal pool amphibians were enumerated prior to clouding the water column by movement in the basins.

Indicator (“obligate”) species of amphibians were searched for using visual cues given the early point in the season during which amphibian egg masses are still intact in vernal pools. One meter (approx.) dipnet sweeps were conducted in benthic litter material in representative areas of all potential vernal pools, and particularly in sunny shallows. Shallows were typically examined prior to entering the pool to increase the probability of capturing previous year frog or salamander larvae, if present. Similarly, emergent, or erect herbaceous vegetation patches were sampled to reveal the invertebrate species often found occupying three-dimensional structure in a lentic wetland system.

Results

Of the three sites examined, only Wetland 4, an excavated, anthropogenic crater to the northeast of the service road was found to meet current MDFW Vernal Pool Certification criteria. Specifically, this pool had greater than five egg masses each, of two obligate vernal pool species (Table 1); spotted salamander (*Ambystoma maculatum*) and wood frog (*Lithobates sylvatica*). These are two of the more common obligate species found in vernal pools within the Commonwealth.

The quantities of egg masses of both species (Table 1) were lower than might be expected in a pool of similar dimensions. We attribute this shortfall in one sampling season to the likely delayed availability of this pool for breeding due to its shading by the adjacent pine canopy which results in delayed ice-out and lower ambient temperature than comparable pools with more favorable insolation.

In addition to 7 spotted salamander egg masses and 32 wood frog egg masses, the pool was found to have a modest invertebrate diversity, though amphipods (presumed *Hyalella azteca*) and isopods (*Caecidotea communis*) were relatively abundant in benthic leaf litter.

No fairy shrimp (*Eubbranchipus vernalis*) were observed. We attribute this absence as possibly being due to an extremely wet fall and early winter which lead to early hatching and development of this species elsewhere in the area. This species may have completed its cycle for the year prior to ice-out in this, and other pools in eastern Massachusetts.

Wetlands 1 and 2 were both determined not to meet the MDFW criteria for certification (Table 1). Neither of these features had any obligate species which was not unexpected given the shallow and ephemeral nature of both poorly defined basins. Invertebrate diversity therein was as expected, though in Wetland 1, two “log cabin” (Limnephilidae) caddisfly nymphs were observed. Efforts to demonstrate more individuals were unsuccessful. These were not observed in the more persistent Wetland 4 basin.

Conclusions

Wetland 4 meets the applicable criteria for vernal pool under various regulatory requirements. It does not appear to meet the criteria for Isolated Land Subject to Flooding (BLSF, 310 CMR 10.57) as defined in the Wetlands Protection Act Regulations. However, from an ecological perspective it functions as a vernal pool, albeit one of relatively low amphibian productivity given current season observations.

The Devens RFTA has numerous mapped, “Potential Vernal Pools” (PVP) and a greater number of features functioning as vernal pools that are not inventoried in the PVP mapping program. Many of these pools have more typical aspects relative to insolation and temperature characteristics, and virtually nowhere on the base is there significant impediments to migration nor perennial sources of road mortality impacting surface movements by vernal pool amphibians.

Wetlands 1 and 2 do not meet certification criteria, nor do they present unique ecological attributes distinct from other permanent or ephemeral surface wetlands within the Range. Both show evidence of being historically manipulated, or created by anthropogenic activities and support limited hydrophilic plant communities at loci that represent the seasonal intersection of surface water and groundwater discharges.

Table 1. Vernal Pool Data

(following page)

Table 1. VERNAL POOL DATA • DEVENS RFTA, HOTEL RANGE • APRIL 17, 2019

SPECIES	Latin Name	WET 1	WET2	WET 4
Spotted Salamander	<i>Ambystoma maculatum</i>	-	-	7(e)
Blue-Spotted Salamander	<i>Ambystoma laterale</i> **	-	-	-
Red-spotted Newt	<i>Notopthalmus viridescens</i>	-	-	-
Wood Frog	<i>Rana sylvatica</i>	-	-	32(e)
Green Frog	<i>R. c. melanota</i>	-	-	2 (juv)
Spring Peeper	<i>Pseudacris crucifer</i>	-	1 (juv)	-
Gray Treefrog	<i>Hyla versicolor</i>	-	-	-
American Toad (Fowler?)	<i>Bufo americanus</i>	-	-	-
Fairy Shrimp	<i>Eubrachipus vernalis</i>	-	-	-
Clam shrimp	<i>Lynceus brachyurus</i>	-	-	-
Isopod	<i>Caecidotea communis</i>	-	-	X
Amphipod	<i>Hyalella azteca</i> (?)	X	X	X
Caddis Fly larvae	Limnephilidae	X	-	-
Caddis Fly Larvae	Phryganiidae	-	-	-
Predaceous Beetle Larva	Dytiscidae	-	-	-
Crawling Water Beetle	Halopliidae	-	-	-
Alderfly larvae	Megaloptera	-	-	-
Mosquito larvae	Culicidae	-	-	-
Midge larvae	Chironomidae	-	-	X
Odonate larvae	(?) <i>sp.</i>	-	-	-
Water Mite	<i>Hydrachna sp.</i>	-	-	-
Seg. Worm	Tubificidae	-	-	-
Seg. Worm	Lumbricidae	-	-	-
Leech	Hirudinea	-	-	-
Pill Clam	Sphaeriidae	-	X	-
Snail	<i>Stagnicola sp.</i>	-	-	-
Snail	Planorbidae	-	-	-
Flatworm	<i>Phagocata sp.</i>	-	-	X
pH		4.8	4.9	6.2
Dimensions - feet		20 x 20	15 x 30	30 x 60'
Max. Depth –(est. mean) inches		14 (<6)	10 (<6)	38 (24)