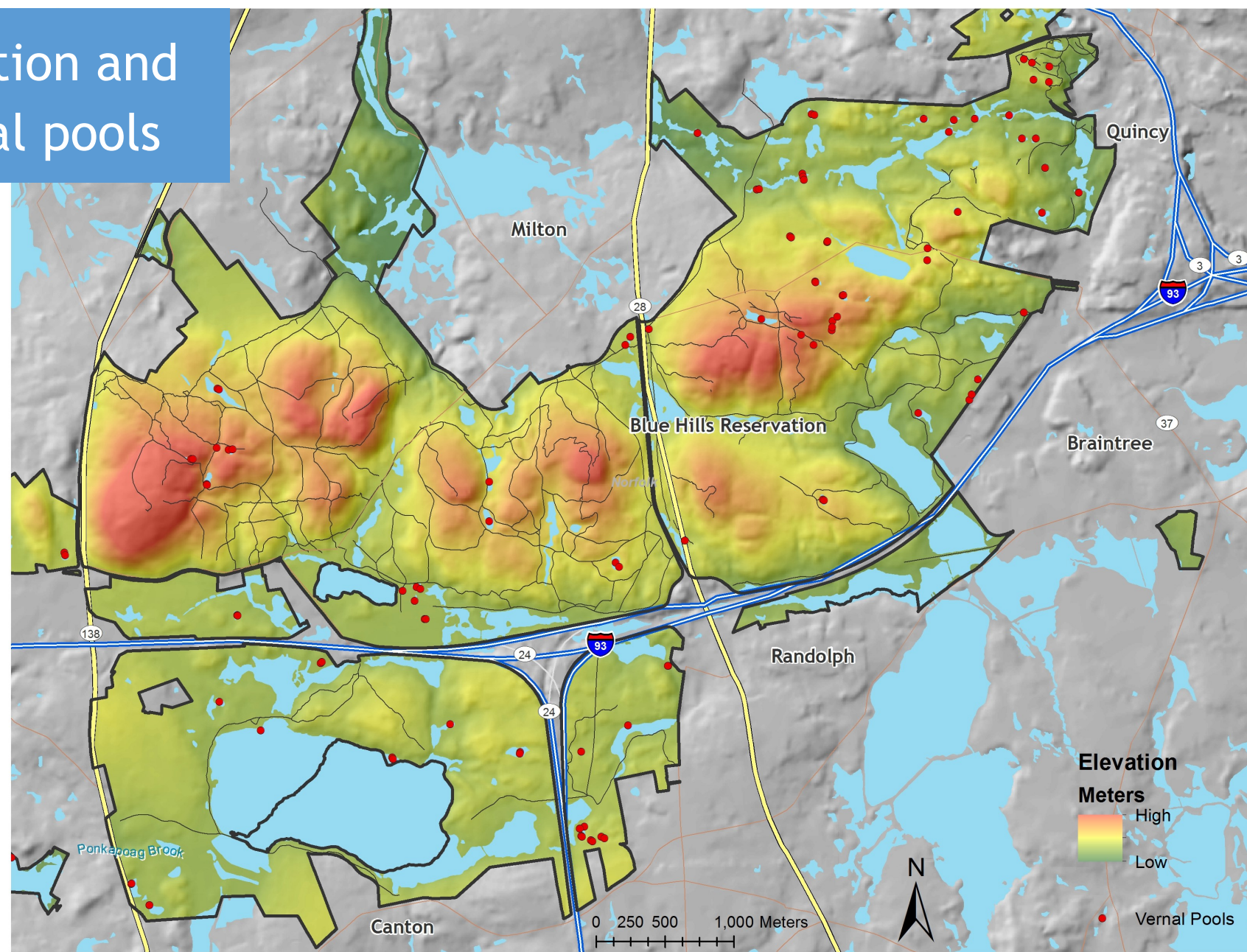
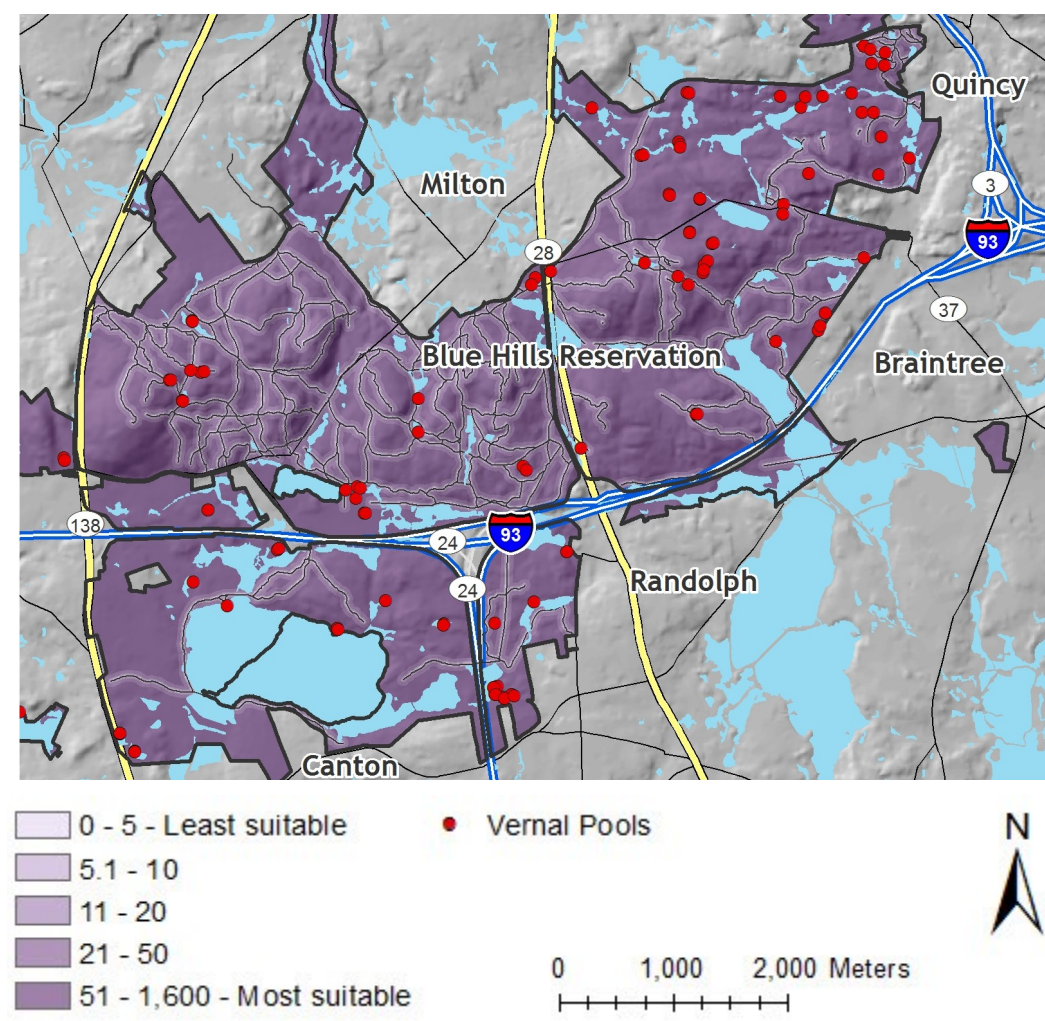


Blue Hills Reservation

Elevation and vernal pools

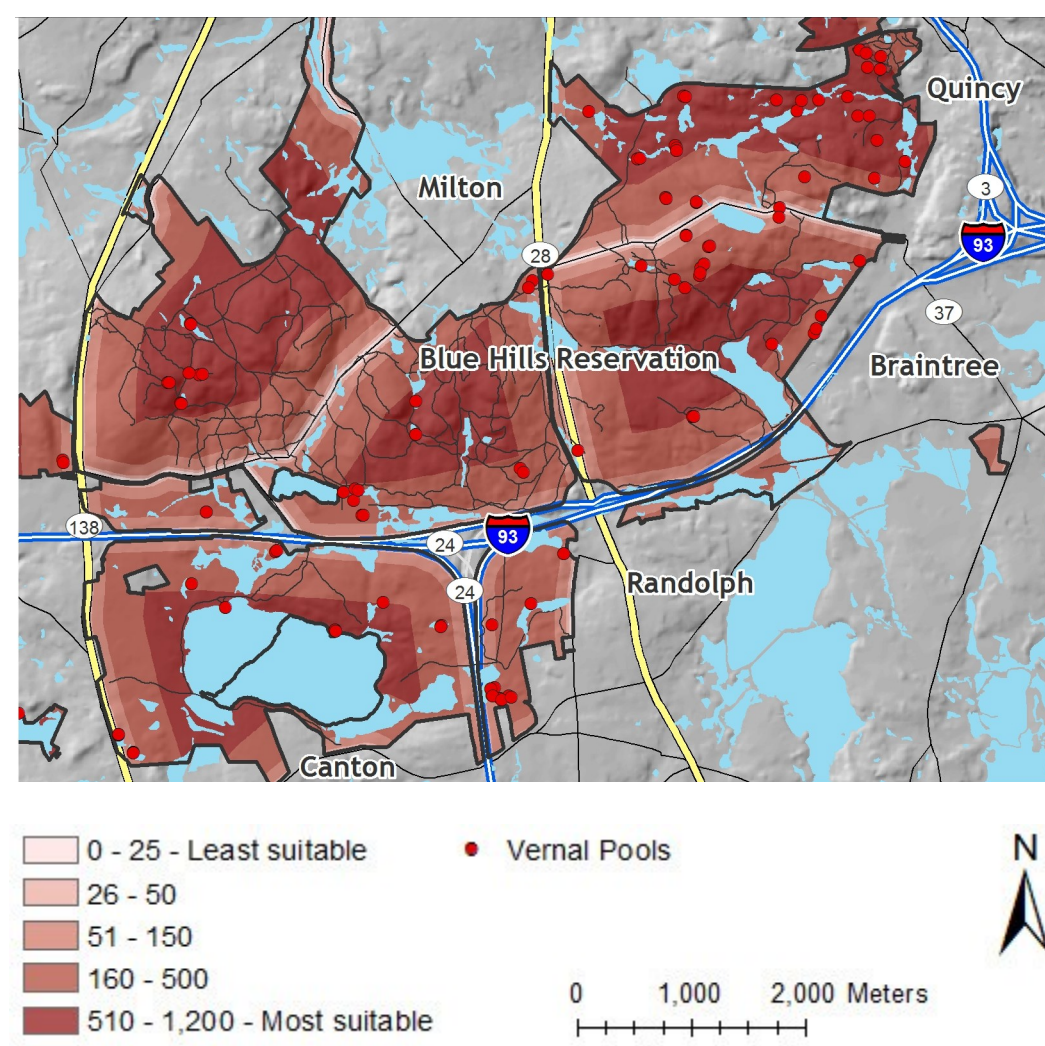


Distance from Trails in meters



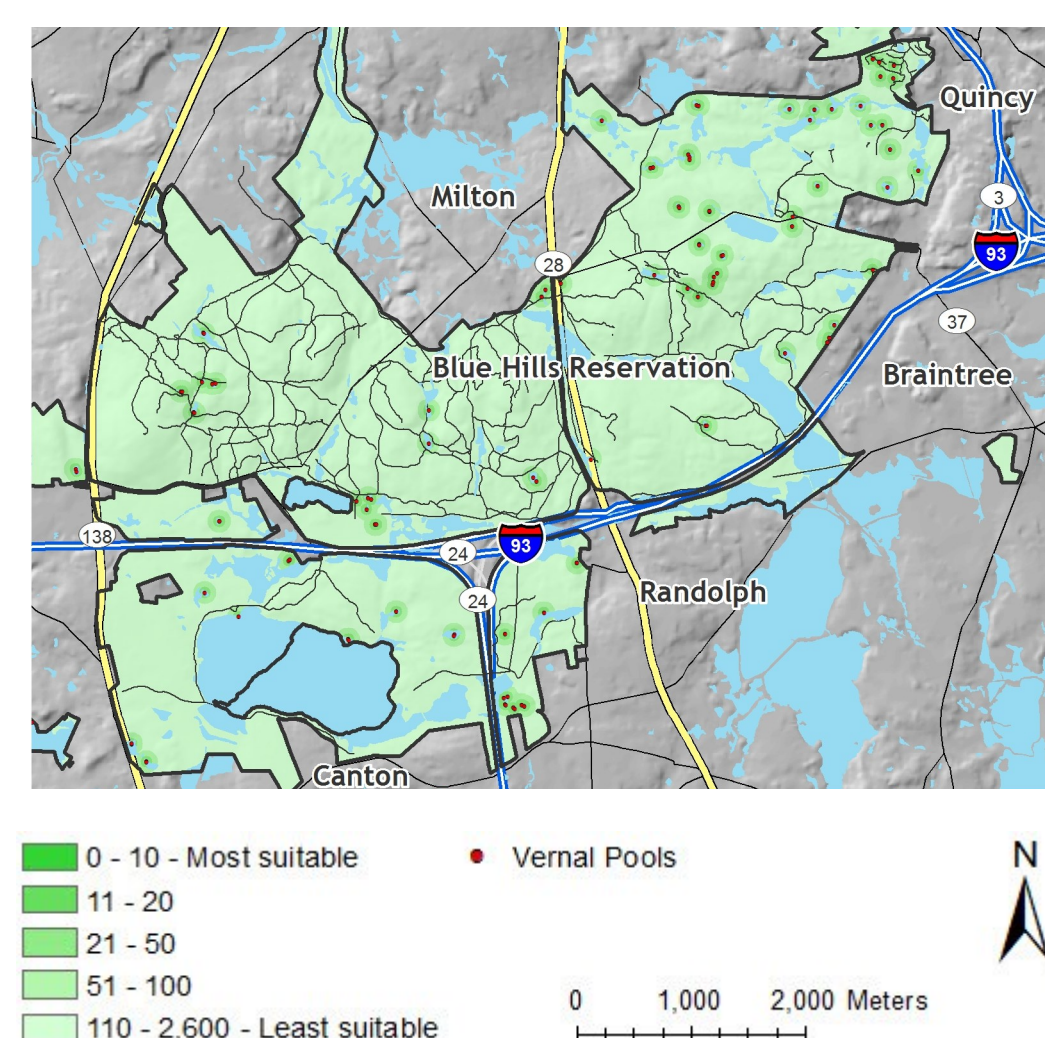
The trails of the Blue Hills Reservation used for this map were obtained from the OpenStreetMap site. The map had to be converted to a shape file then downloaded. After downloading the layer it was clipped to the study area, then the Euclidian Distance tool was used. The results were then reclassified as seen under methods, and extracted by mask in order to only pertain to the reservation area.

Distance from Roads in meters



The road map of MA was obtained from the MassGIS Data - TIGER Roads Shapefile. After downloading the layer, it was clipped to the study area, then the Euclidian Distance tool was used. The results were then reclassified as seen under methods, and extracted by mask in order to only pertain to the reservation area.

Distance from Vernal Pools in meters



The vernal pools of the Blue Hills Reservation were obtained from the MassGIS Data - NHESP Certified and Potential Vernal Pools Shapefiles. The two shapefiles were first merged together, then clipped to the reservation area. After this the Euclidian Distance tool was used. The results were then reclassified as seen under methods.

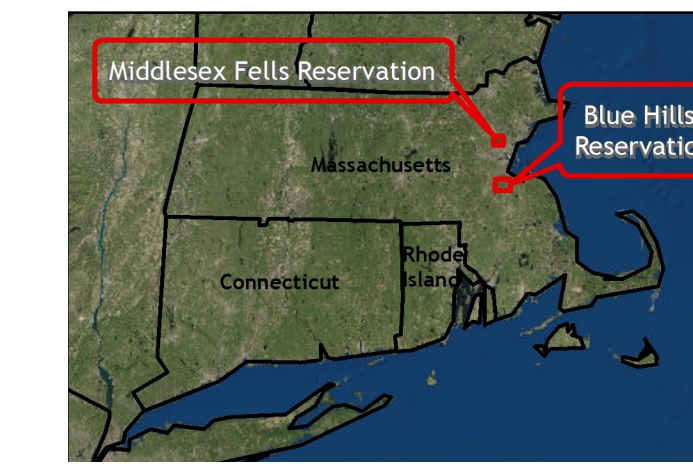


Marbled Salamander Reintroduction Suitability Analysis

Background

Marbled salamanders (*Ambystoma opacum*) are found in the eastern United States from southern New England to northern Florida, and west to Illinois and Texas, with Massachusetts being near the northern limit of their geographic range. In Massachusetts they are legally protected and listed as Threatened pursuant to the Massachusetts Endangered Species Act. The number of marbled salamander populations is declining due to habitat degradation, habitat fragmentation and habitat loss. Other issues that influence this species are road mortality and emerging infectious diseases. Since the ideal habitat for this species has not been identified, it is not well understood why they are found in one vernal pool but not in another at the same location. Once the ideal habitat is determined, the species can be successfully reintroduced into vernal pools at locations from which they were extirpated.

This project aims to compare two locations: the Blue Hills Reservation in Milton, MA, where marbled salamanders have been documented to live, and the Middlesex Fells in Medford, MA, where the reintroduction would take place. There is historical data of marbled salamander habitation at the Fells, but no proof of recent habitation.



Methods

Factors	1 Least Suitable	2	3	4	5 Most Suitable
Distance from Trails	<5 m	5.1 m - 10 m	11 m - 20 m	21 m - 50 m	>50 m
Distance from Roads	<25 m	26 m - 50 m	51 m - 150 m	160 m - 500 m	>510 m
Distance from vernal pools	>110 m	51 - 100 m	21 - 50 m	11 - 20 m	<10 m

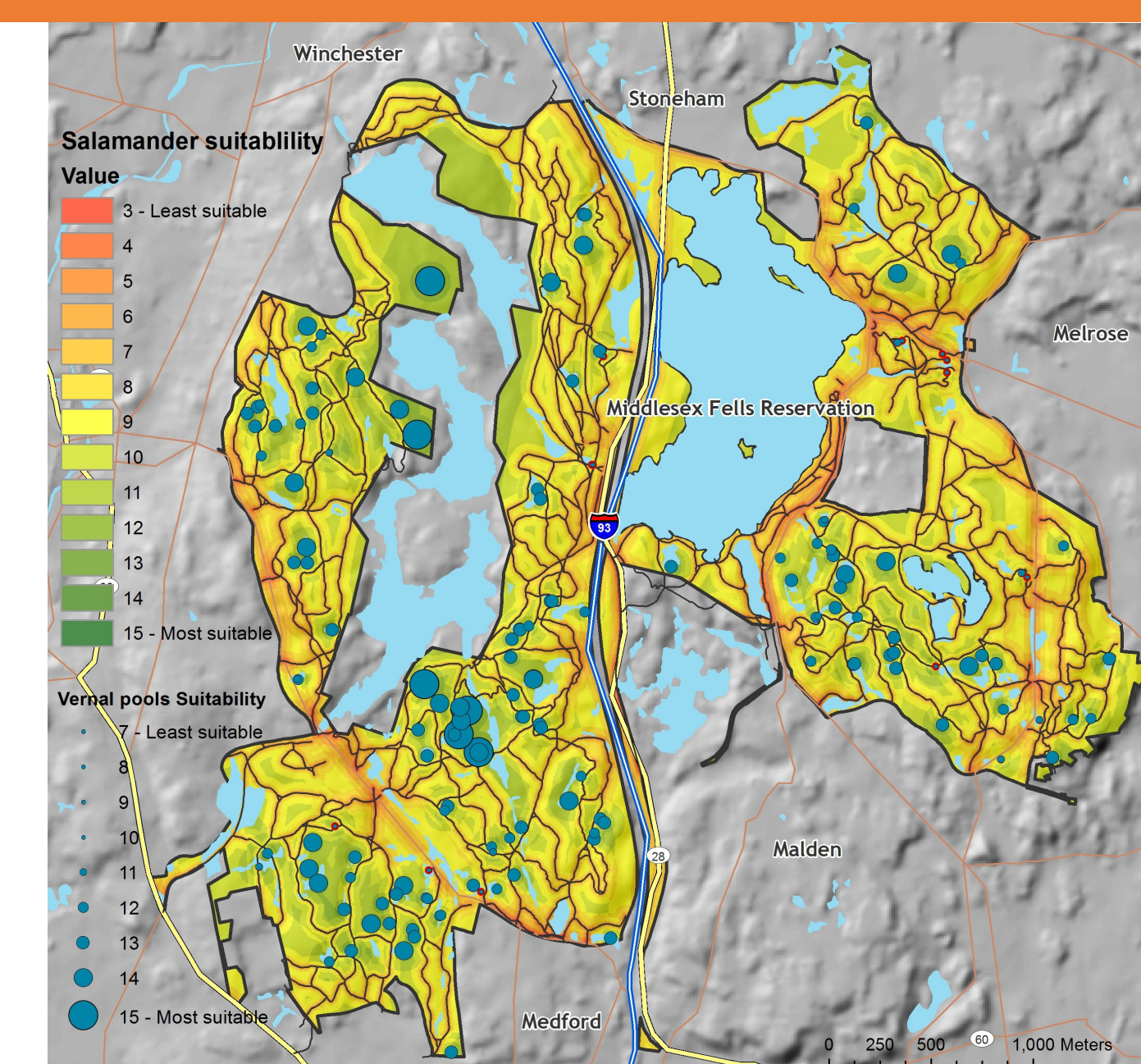
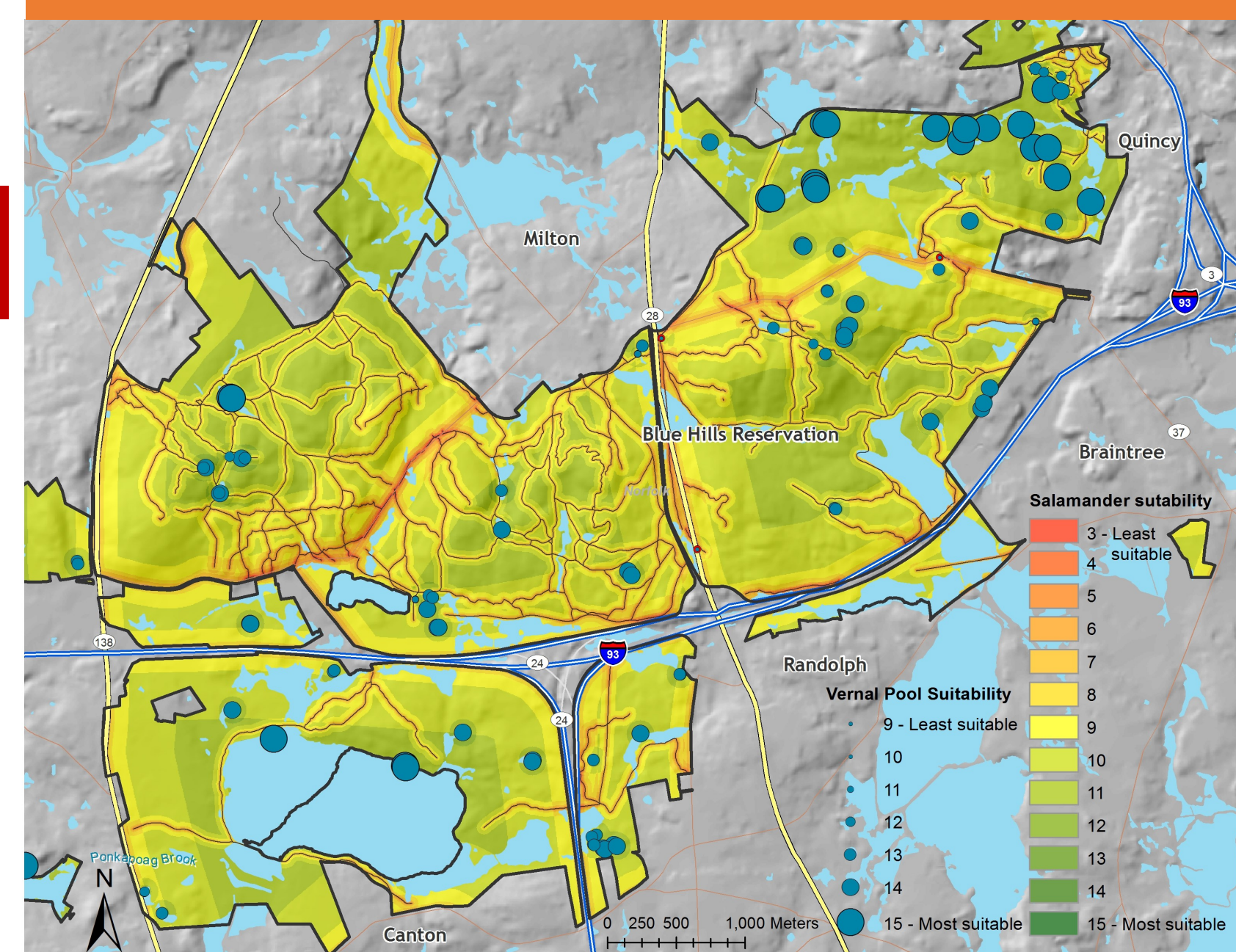
For the final analysis I took all three factors: distance from trails, distance from roads, and distance from other vernal pools, and ran a raster calculator. To better visualize the results I also extracted the raster values to the vernal pools and then symbolized them as graduated symbols.

Results

Based on the factors used for this suitability analysis the most suitable reintroduction sites for marbled salamanders at the Middlesex Fells Reservation are at the western part of the reservation. Especially around the three reservoirs, from North to South, the North Reservoir, the Middle Reservoir, and the South Reservoir.

In terms of the Blue Hills Reservation, the most suitable sites for them to hibernates are the northern most part of the reservation, as well as around Ponkapoag Pond in the Southwest corner. More research needs to be done to find out whether that is indeed the area the salamanders hibernates in the Blue Hills, as well as whether the reintroduction sites selected by this suitability analysis are viable.

Reintroduction Suitability Analysis



Sources: Mass GIS, OpenStreetMap

Projection: NAD_1983_StatePlane_Massachusetts_Mainland_FIPS_2001

Picture credit: <http://wildsouth.org>

Citations: MA Division of Fisheries and Wildlife

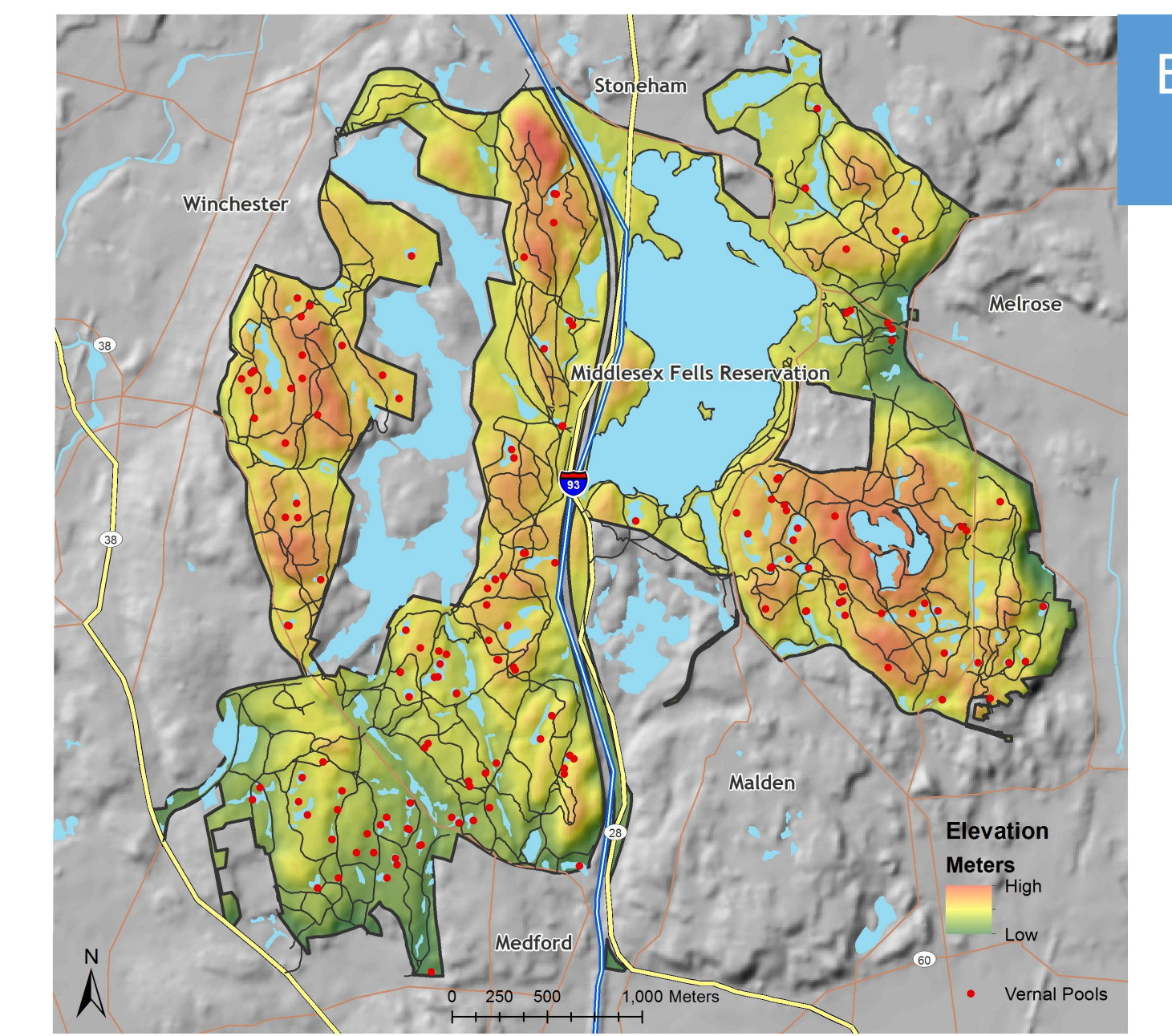
Adel M Molnar

GIS for Conservation Medicine, 2016

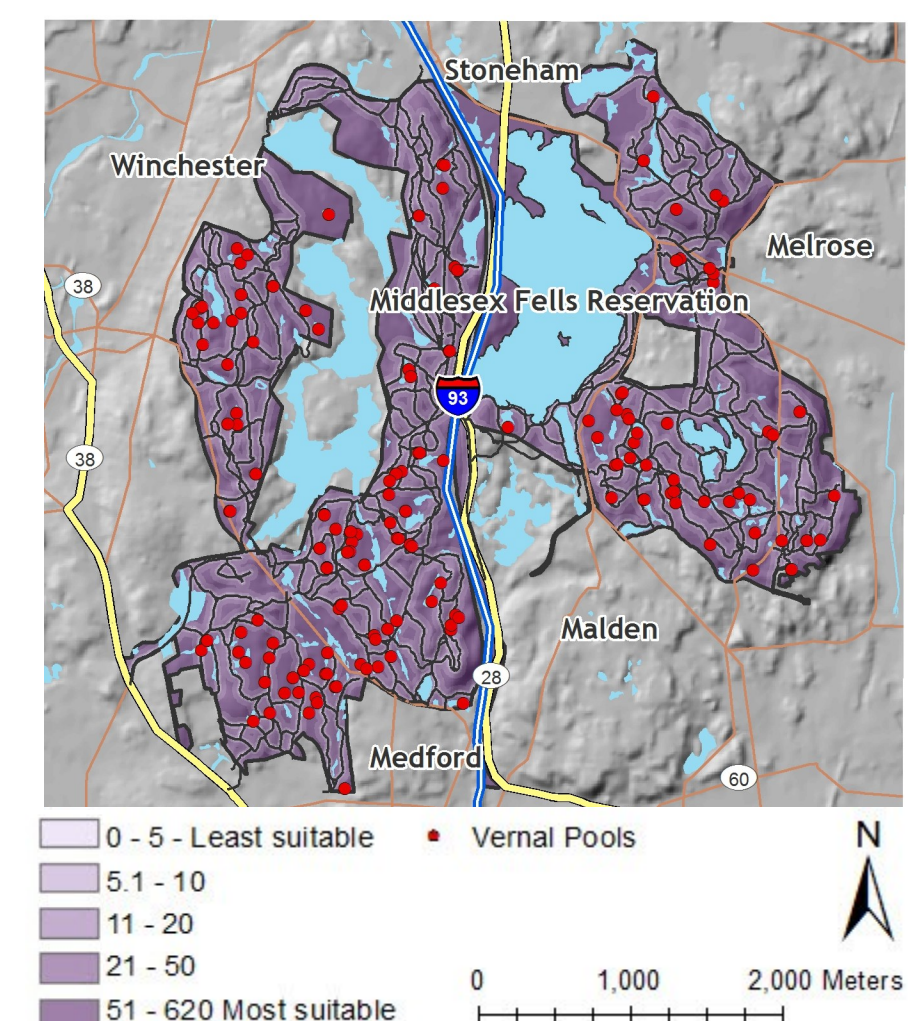
Tufts UNIVERSITY Cummings School of Veterinary Medicine

Middlesex Fells Reservation

Elevation and vernal pools

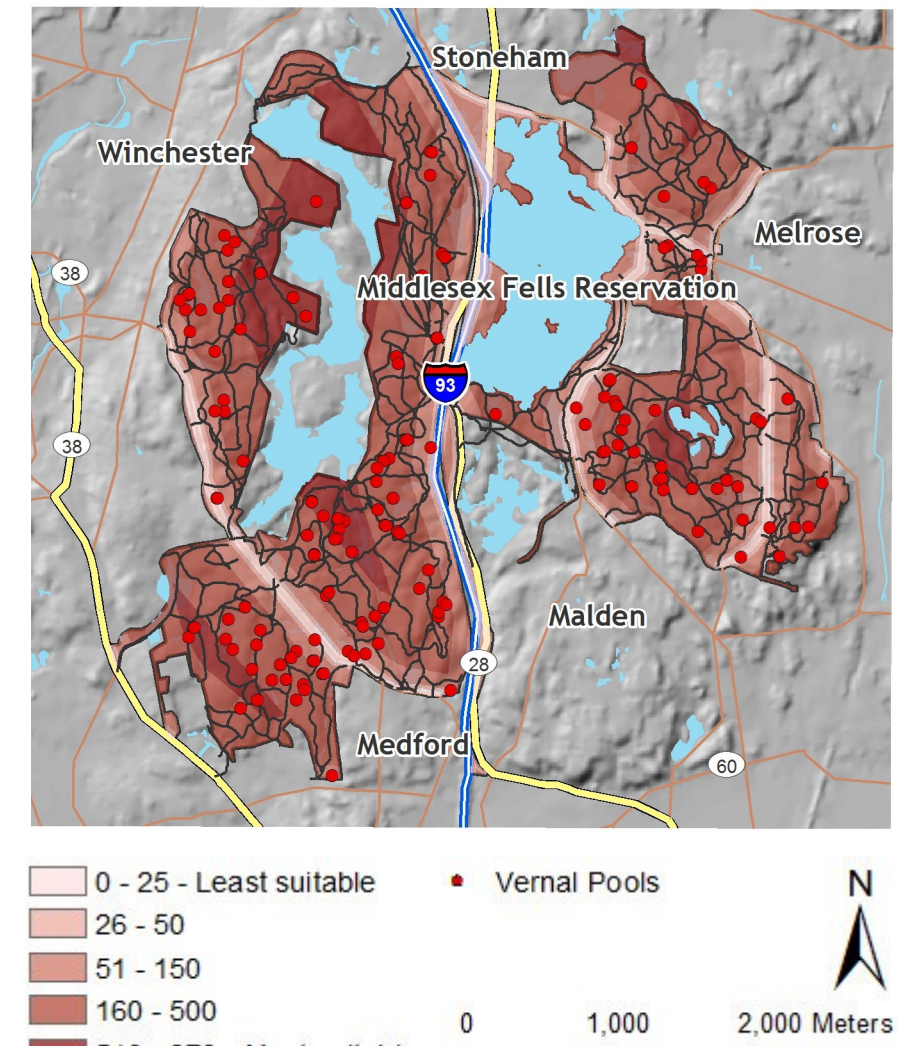


Distance from Trails in meters



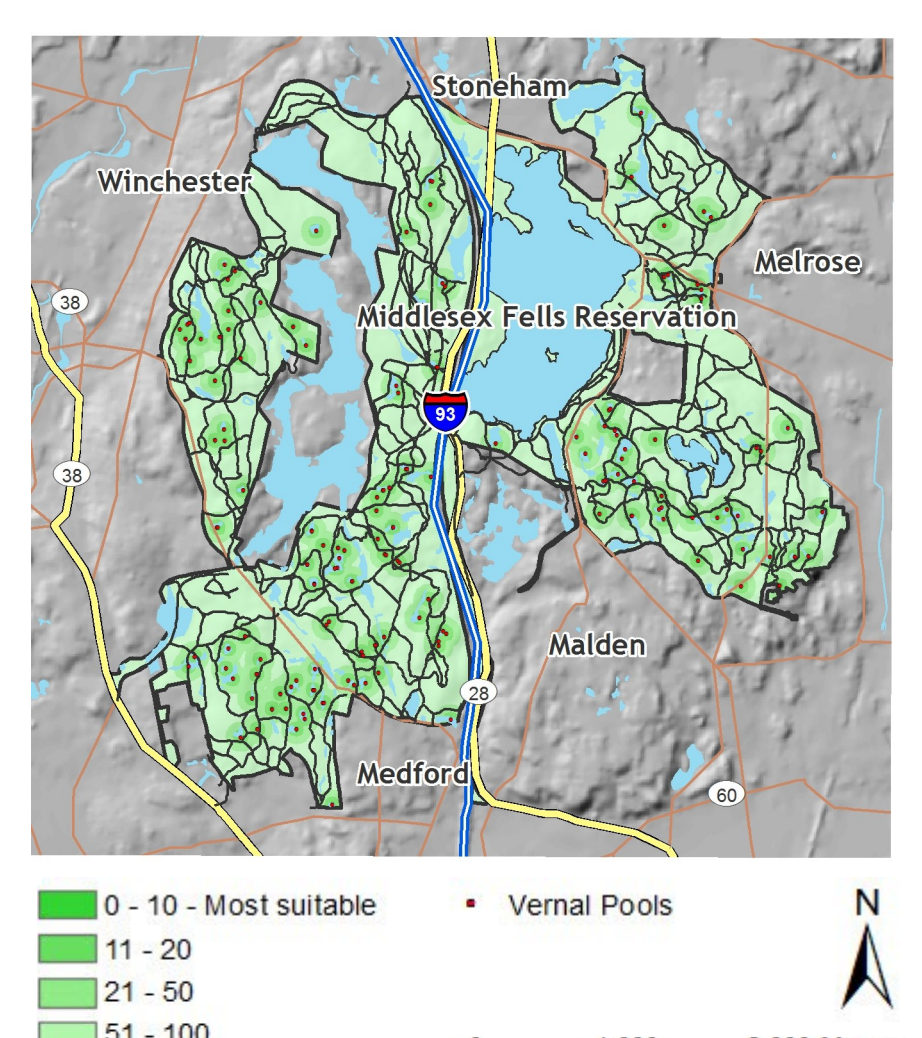
The trails of the Middlesex Fells Reservation used for this map were obtained from the MassGIS Data - DCR Roads and Trails Shapefile. After downloading the layer it was clipped to the study area, then the Euclidian Distance tool was used. The results were then reclassified as seen under methods, and extracted by mask in order to only pertain to the reservation area.

Distance from Roads in meters



The road map of MA was obtained from the MassGIS Data - TIGER Roads Shapefile. After downloading the layer, it was clipped to the study area, then the Euclidian Distance tool was used. The results were then reclassified as seen under methods, and extracted by mask in order to only pertain to the reservation area.

Distance from Vernal Pools in meters



The vernal pools of the Blue Hills Reservation were obtained from the MassGIS Data - NHESP Certified and Potential Vernal Pools Shapefiles. The two shapefiles were first merged together, then clipped to the reservation area. After this the Euclidian Distance tool was used. The results were then reclassified as seen under methods.