Potential pollution of water resources in the Boston Metropolitan Area

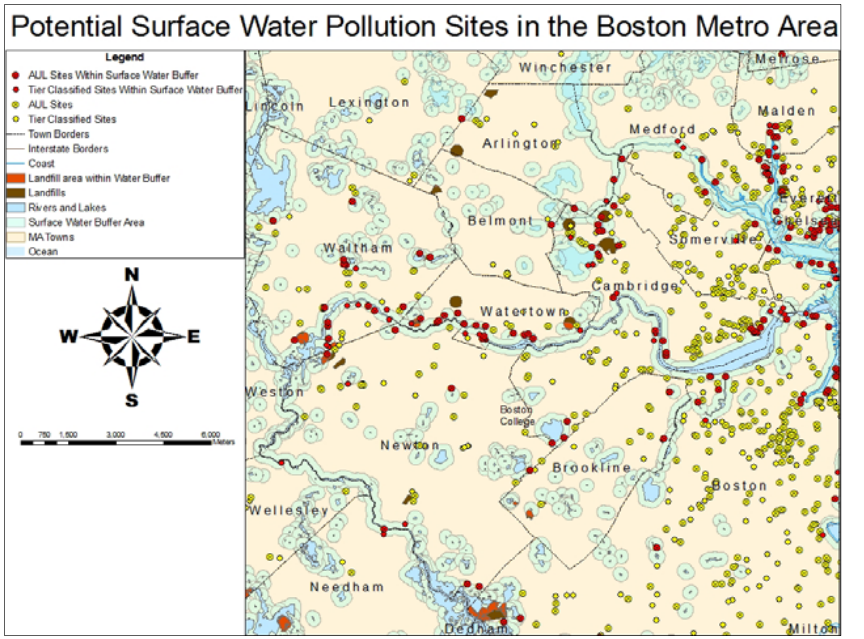
Author: Christopher Soeller

2011

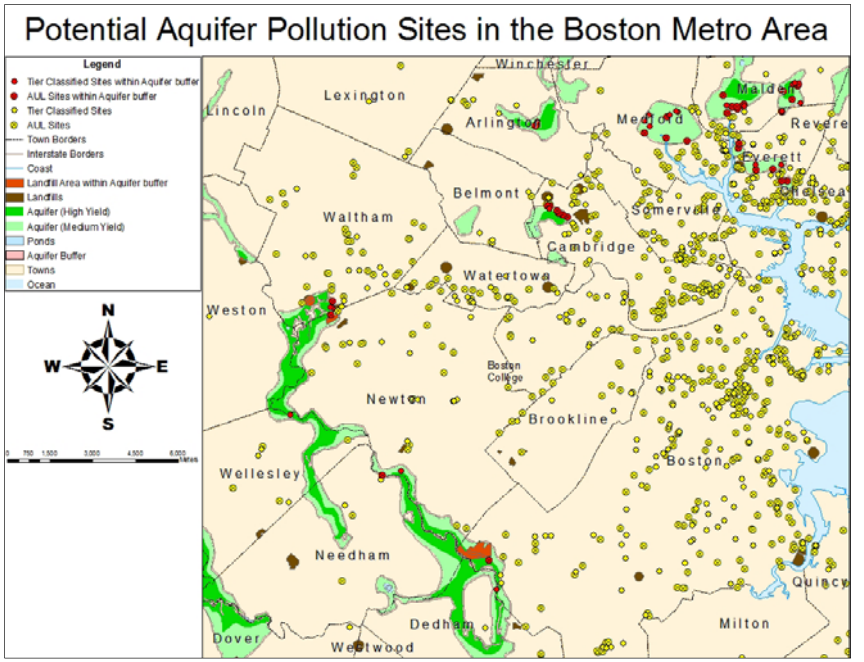
Potential Pollution of Water Resources in the Boston Metropolitan Area

Christopher Soeller

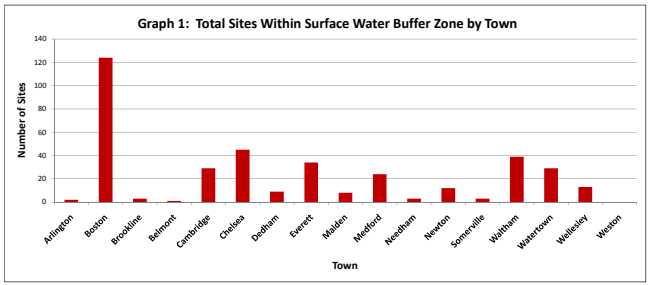
Abstract: Water pollution is a considerable problem in many urban areas worldwide. The purpose of this study was to show that, in the Boston metropolitan area, there are many hazardous material sites that could potentially contaminate the water resources of the region. Hazardous material sites include gas stations, dry cleaners, chemical manufacturers, landfills, etc. A chemical spill at many of these sites could potentially result in the chemical flowing into a surface water body such as a lake or river, or result in the chemical percolating through sediment into an aquifer, which is a geologic unit that can transmit water to wells. Using data from MassGIS, three kinds of hazardous material sites were plotted in ArcGIS. The first kind of hazardous material site plotted was an AUL oil and/or hazardous material site. AUL stands for Activity and Use Limitation and it provides notice that a particular site has remaining contamination even after a cleanup has been conducted according to Massachusetts state law. The second kind of hazardous material site plotted was a Tier Classified oil and/or hazardous material site. These sites have released pollutants in the past and have the potential to further contaminate the environment. The third kind of site plotted was a landfill, and these have the potential to contaminate water resources if the landfill's leachate comes into contact with surface water or groundwater. To see if a hazardous waste site was close enough to a water body to significantly pollute it, the buffer tool in ArcGIS was used to place a 200m buffer around all surface water bodies and a 50m buffer around all aquifers. The intersect tool was then used to see which sites actually fell into these buffer zones. The buffer distances of 200m and 50m were chosen because they represent the distances that pollution could conceivably travel from a site to a water body in a time frame of about one day to a few weeks. The results of this study show that there are a significant number of sites that fall into these buffer zones, and therefore, there is a considerable risk for pollution of the Boston area's water resources.

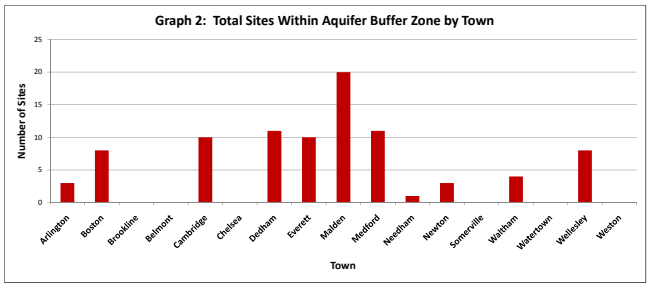


Map 1: The map above displays the hazardous material sites that are within the surface water buffer zone and are therefore sites that could potentially pollute surface water. Note the concentration of potential pollution sites along the Charles River, above Newton.



Map 2: The map above displays the hazardous material sites that fall within the aquifer buffer zone and are therefore sites that could potentially pollute an aquifer. Note the concentration of potential pollution sites in Medford, Malden and Everett.





Graphs 1 and 2: The graphs above show the total number of sites, by town, that could potentially pollute a water body.

Original data layers downloaded from MassGIS.gov