

# Land use and the extent of roadsalt contamination in surface water and groundwater, Eastern, Massachusetts

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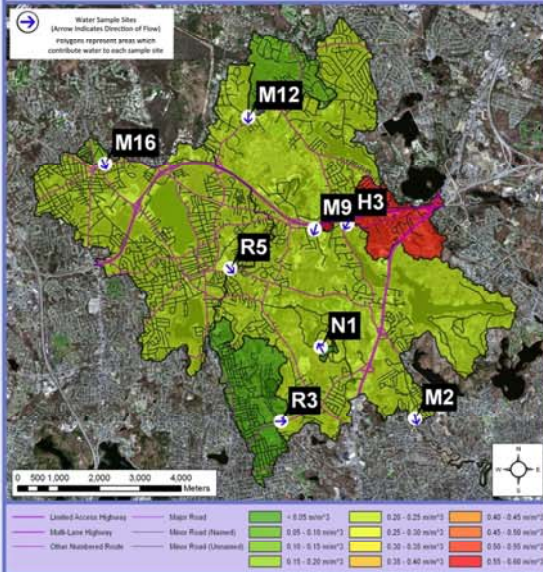
2011

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# LAND USE AND THE EXTENT OF ROADSALT CONTAMINATION IN SURFACE WATER AND GROUNDWATER, EASTERN, MASSACHUSETTS

## ROADWAY DISTRIBUTION

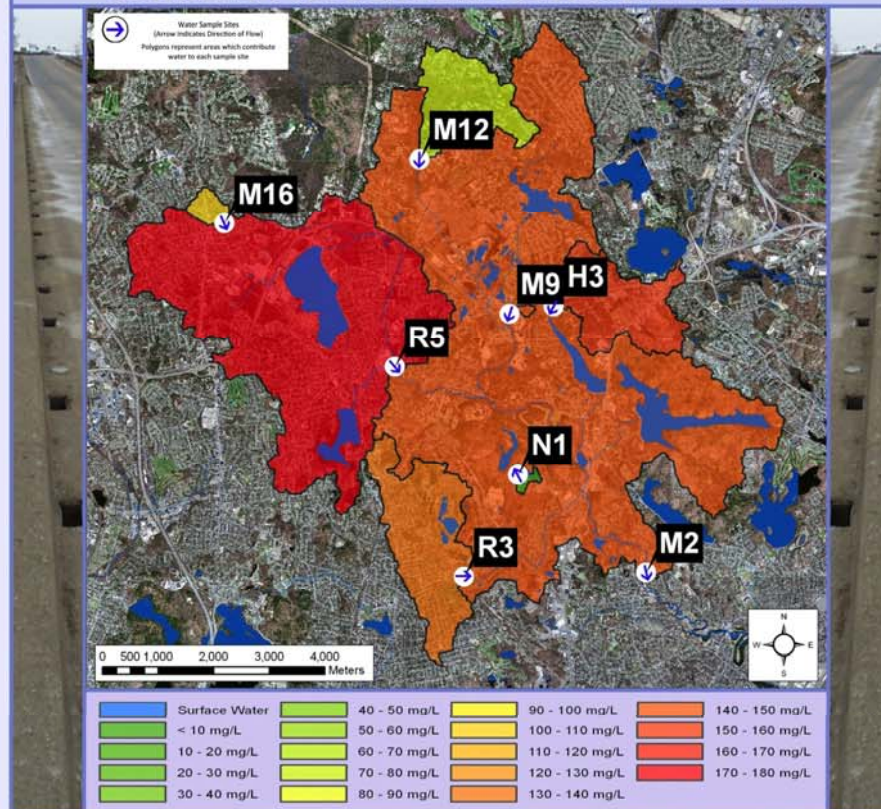


## ABSTRACT

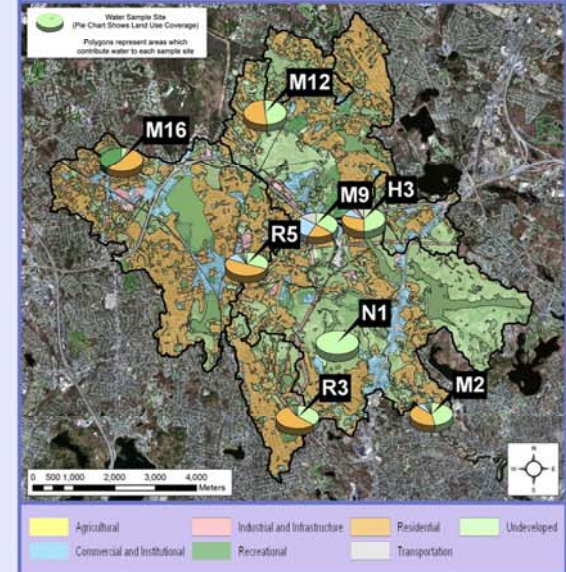
To maintain safe winter driving conditions, over 15,000,000 tons of road salt is applied to US roadways each year. Road salt, predominately sodium chloride (NaCl) contaminates surface water, groundwater, and soils. The concentration of the chloride ion in natural waters has proven to be the best indicator of road salt contamination. Road salt contamination is correlated with the depletion of soil nutrients, the release of other contaminants, damage to infrastructure and vehicles, decreases in native animal, plant, and bacteria populations, the proliferation of invasive species, water body stratification and stagnation, and a decrease in water quality. This study evaluated the extent of road salt contamination throughout the Saugus Watershed, a semi-urban watershed, and quantified the correlations between the extent of contamination and many land use factors.

This study showed that the concentration of chloride in surface and groundwater throughout the Saugus Watershed is frequently observed above the Environmental Protection Agency's secondary maximum contaminant level (sMCL) of 250 mg/L. Road salt contamination has increased the background concentration of chloride in surface water and groundwater from natural levels as low as 3 mg/L to as high as 200 mg/L, an increase of approximately 6700 %. The extent of contamination is not uniform throughout the watershed. Areas with high densities of impervious surfaces, major highways, and commercial, industrial, and institutional practices were found to be the most contaminated. Most importantly, it was found that the level of contamination throughout the watershed is increasing with every road salt application. While the use of deicers is a vital practice to modern society, the results of this study suggest that it is becoming increasingly important that we consider preventative and remedial action to prevent further, and possibly irreversible, damage to our water supply.

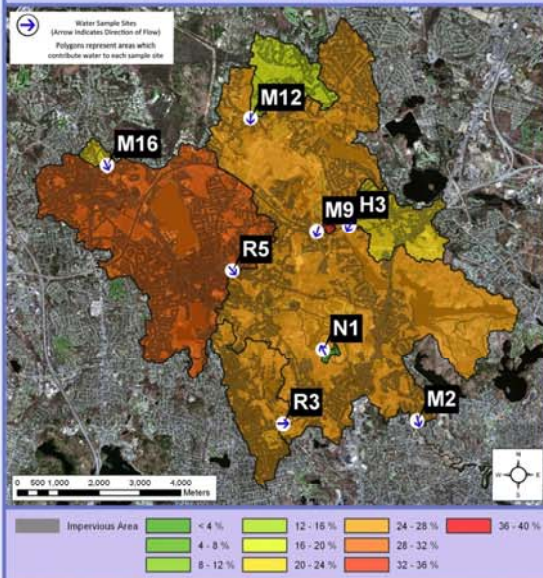
## CHLORIDE CONTAMINATION IN SURFACE WATER AND GROUNDWATER



## LAND USE DISTRIBUTION



## IMPERVIOUS SURFACE DISTRIBUTION



## DEVELOPED LAND DISTRIBUTION

