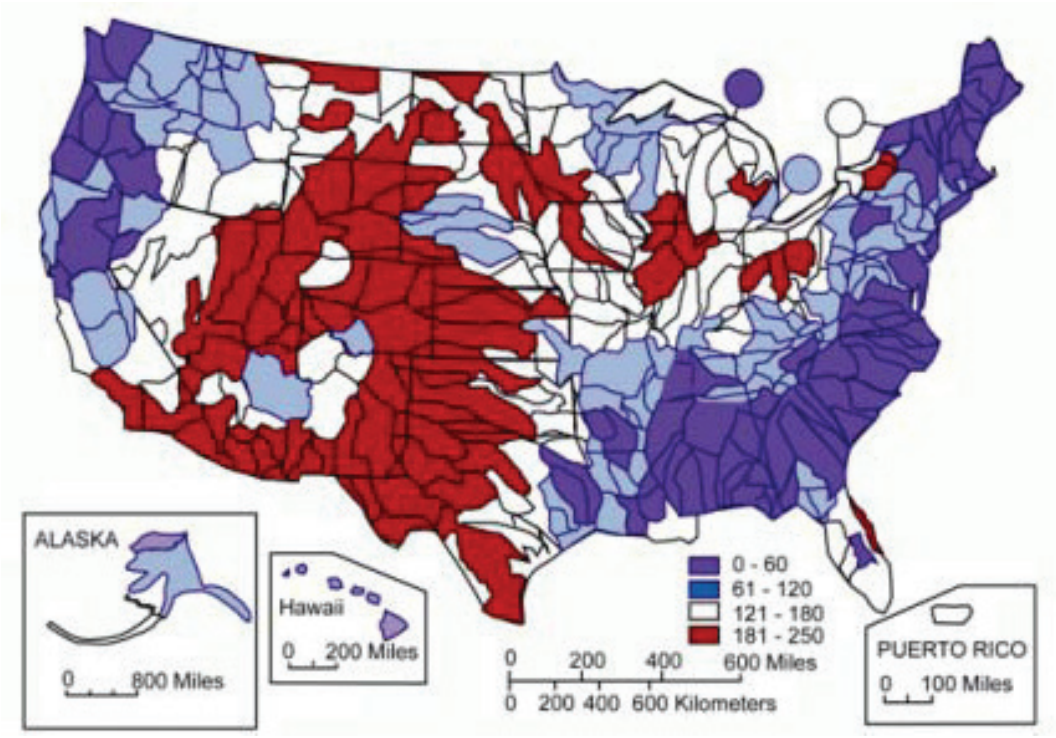
WQRF | Water Quality Research Foundation

REDUCING SALT DISCHARGE AMOUNTS BY NEARLY HALF

New independent study demonstrates successful approaches

A look at the Optimization of Water Softeners for Reduced Influent Chloride Study

US Water Hardness
Concentration of Hardness as Calcium Carbonate, in Milligrams Per Liter



Mean hardness as calcium carbonate at NASQAN water monitoring sites during the 1975 water year. Colors represent streamflow from the hydrologic-unit area. Map edited by USEPA, 2005. Modified by Briggs and others, 1977. (USGS 2013)

Interesting Insights

Optimization of water softeners can cut chlorides by more than a quarter, and replacement of older systems with newer, efficiency-rated ones can lead to a reduction of nearly half.

Goals of the Study

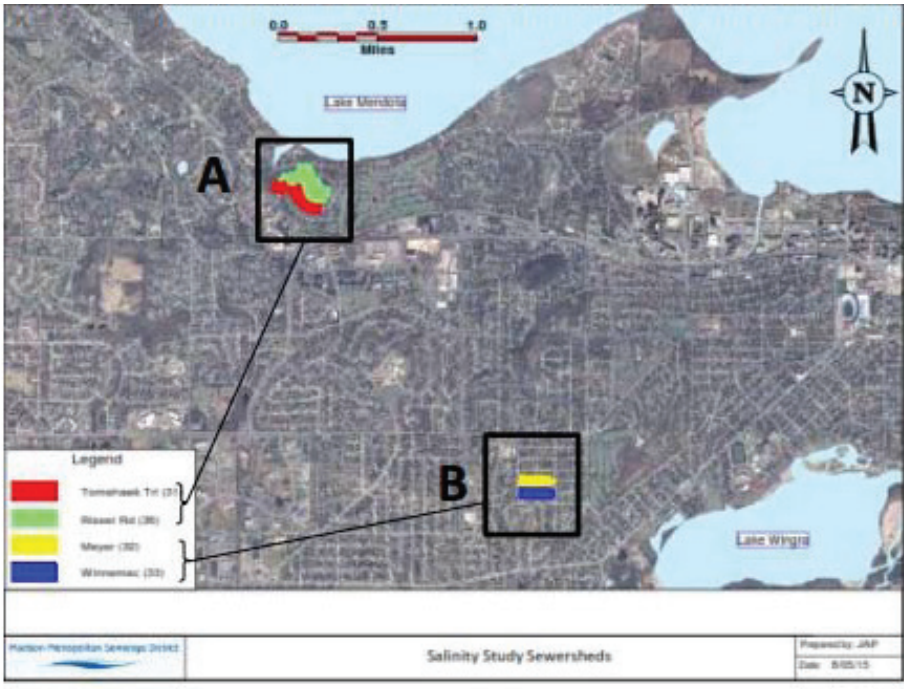
The Water Quality Research Foundation (WQRF) partnered with the Madison Metropolitan Sewerage District (MMSD), in Madison, Wisconsin, to study a potential strategy for meeting discharge requirements in areas with high chloride levels. The MMSD used the results of this study to develop a softener efficiency optimization and replacement program which can serve as a national model for other utilities facing similar challenges.

Method

Four sewersheds in two neighborhoods were studied over two periods in 2013-2014. These basins were selected to be monitored for chloride output in wastewater to local sewers. During the study, one portion of residents were offered free optimization of their existing water softeners and another was offered free replacement of their existing water softeners with a minimum efficiency of 4,000 grains hardness removed per pound of salt consumed. Comparisons were then conducted between those that received optimization and replacement and those that did not.

The neighborhoods selected were Spring Harbor and Glenway, shown in the map on page 2. In Spring Harbor, the two sewersheds used in the study were the Tomahawk and Risser sewersheds. In Glenway, the two sewersheds chosen were Meyer and Winnemac sewersheds. Risser sewershed residences were offered free optimization of their existing softener and Meyer sewershed houses were offered free replacement of their existing water softener.

Neighborhood Identification, Study Sewershed Pair Map



Results

The final conclusions were that on **average, optimization could reduce chlorides by 27% while replacement could reduce chlorides by 47%**. There are instances where there are higher or lower savings.

Chloride Mass Comparison Conclusions
Phase 2, 2014
***Average Chloride Mass in KGD per House**

Control Sewershed	Treatment Sewershed	Control Average	Treatment Average	% Change	Comment
2014 Tomahawk	2014 Risser	0.278	0.204	-27	After softener changes, lower mass in Risser
2014 Winnemac	2014 Meyer	0.232	0.124	-47	After softener changes, lower mass in Meyer

Discussion

Advances in ion exchange water softener technologies over the last few decades provide multiple benefits. Softeners provide energy savings (from reducing water heating needs), prevent scale damage to other home appliances, and can reduce detergent use by up to 70%. Softeners provide conservation benefits which have the potential to reduce a home's heating carbon footprint by as much as 14% per year (Gadkari et al., 2009). To sustain reductions in salt use and other performance benefits, maintenance by a water treatment professional is important to maintaining equipment efficiency over the long term.

The full report is on the Madison Metropolitan Sewerage District Website: www.madsewer.org

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