

Drinking Water Testing on Maine's Outer Islands Reveals Toxic Metal Contamination

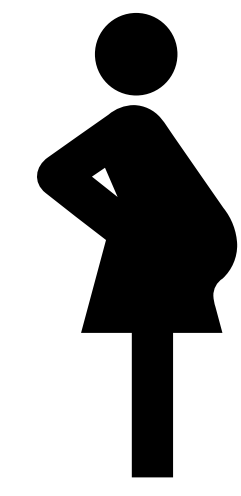
Morgan Karns^{1,2}, Douglas Cornman³, Ramsey Steiner⁴, Cait Bailey¹, Amy Steckel¹, Jane E. Disney¹

¹MDI Biological Laboratory, ²Island Institute, ³Maine Seacoast Mission, ⁴Dartmouth College

Background

New England's bedrock has naturally-occurring toxic metals that can leach into groundwater. In Maine, 56% of households are dependent on groundwater for drinking water and on Maine islands, this number increases to nearly 100%. Private water is not regulated; therefore, it is up to individuals to test and manage their drinking water. To address this issue, MDI Biological Laboratory (MDIBL) developed a citizen-science study of metal contaminants in drinking water and their impacts on health called Healthy Water, Healthy Aging (HWA) which has recently expanded to unbridged islands through a collaboration with Island Institute and Maine Seacoast Mission.

Spotlight Contaminants on Islands



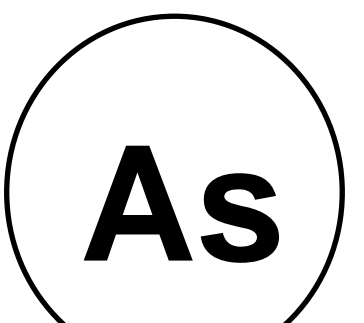
Manganese

Associated with developmental delays, decrease in motor function, and in extreme cases, Manganism.



Iron

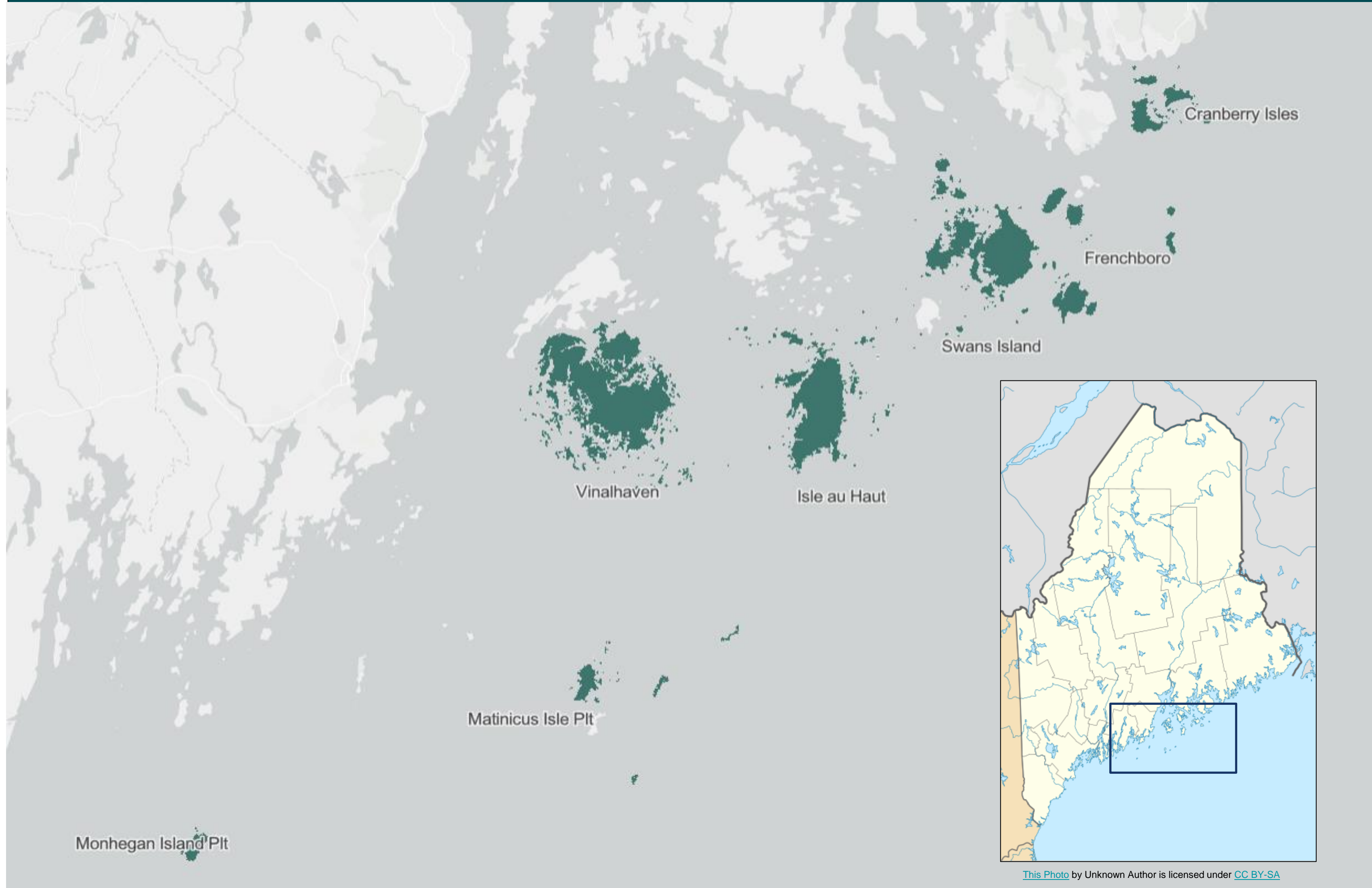
Associated with damage of property including rusting plumbing, shorter filter lifespan, and staining.



Arsenic

Associated with increased risk of cancers in the bladder, lungs, and liver, and the development of diabetes.

Participating Communities

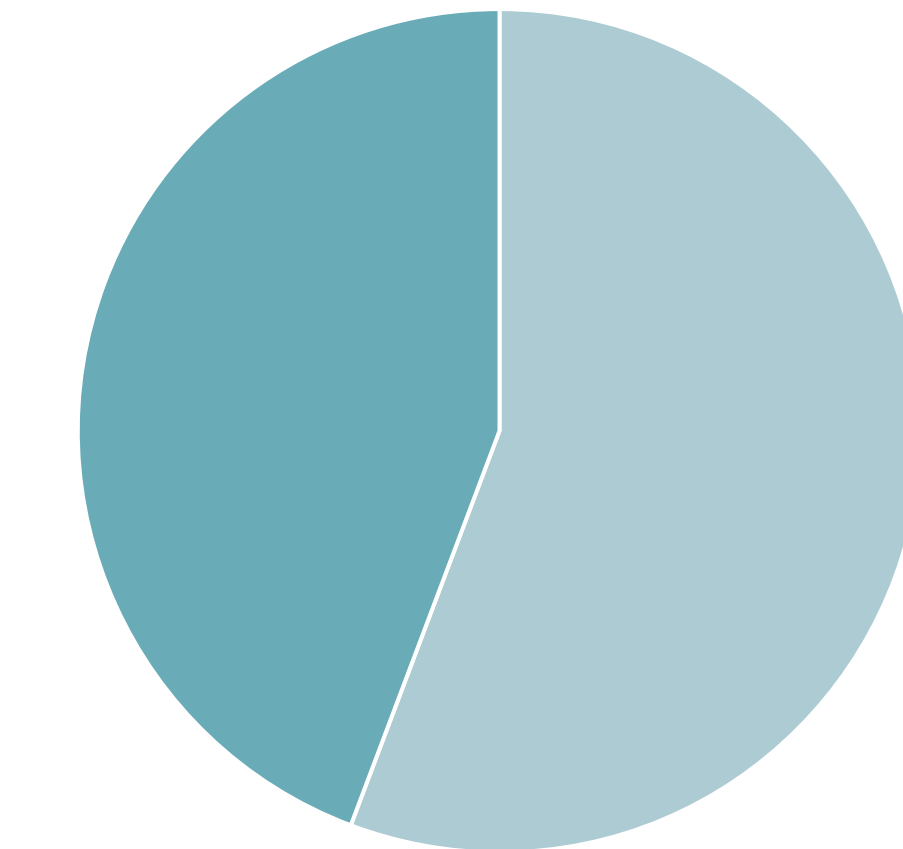


Island Profiles

# Samples Run	# Contaminated Samples	Contamination Type
Great Cranberry		
3	1	Mn, Fe
Islesford		
9	3	Mn, Fe
Sutton Island		
1	1	Mn
Frenchboro		
9	5	Mn, Fe, As
Isle au Haut		
6	2	Mn, Fe, Pb
Matinicus		
19	10	Mn, Fe, Pb, As, Cu
Vinalhaven		
3	2	Mn, Fe
Swans Island		
5	1	Mn, Fe
Monhegan		
6	2	Mn, Fe

Preliminary Findings

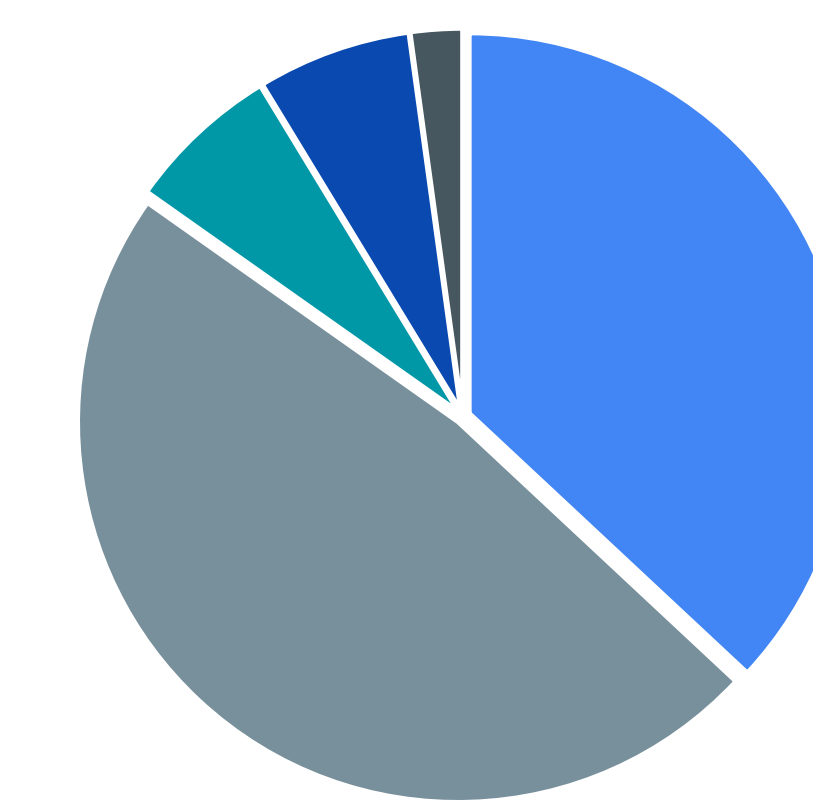
Total Island Samples



61 total island tests have been run with almost 1/2 (44%) showing at least one element above the EPA standards for public drinking water

■ No Contamination
■ Contamination

Contamination Breakdown



Of the 44% of samples that had some level of contamination, the samples showed elevated levels of the above elements.

■ Iron ■ Manganese
■ Arsenic ■ Lead
■ Copper

Considerations for Manganese

EPA's Drinking Water Health Advisory Levels

For bottle-fed infants younger than six months, EPA's 10-day HAL is 0.3 mg/L (or 300 µg/L). This level is also the Lifetime HAL for all persons.

For all persons, EPA's One-day and 10-day HAL is 1 mg/L (or 1000 µg/L).

Samples between 1 µg/L and 50 µg/L	0
Samples above 50 µg/L (EPA secondary standard) but below 300 µg/L (health advisory limit)	14
Samples above 300 µg/L (health advisory limit)	7
Samples above 1,000 µg/L	1

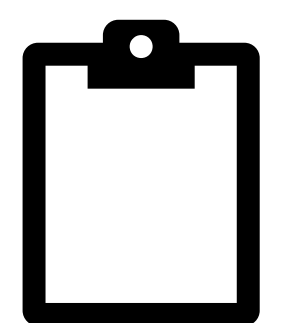
Impacts are variable but the elderly, infants, and individuals with compromised livers are more susceptible to negative health impacts including neurological damage. Oregon Health Authority

Conclusions

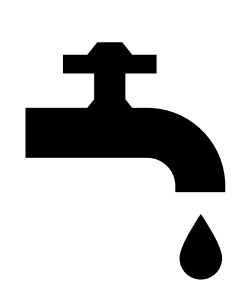
- ❖ 61 island samples have been run, with 44% showing at least one element above EPA standards for safe drinking water.
- ❖ Of the samples with contamination, we have identified manganese (n= 22), iron (n= 17), arsenic (n=3), lead (n=3), and copper (n= 1).
- ❖ Manganese is emerging as the most common contaminant on islands and increased outreach about possible impacts is essential.
- ❖ Continued widespread drinking water testing is necessary to ensure community health and water security.

Methods

Mixes Methods Research :



Administer Drinking Water Survey to record water usage and demographic data and understand participants' prior knowledge of metal contaminant risk in drinking water.



Collected drinking water samples from homes near schools for assessment of metal contamination. Samples were sent to Dartmouth Trace Element Analysis Core for analysis.

Metals Analyzed

Aluminum (Al)	Calcium (Ca)	Lead (Pb)	Uranium (U)
Antimony (Sb)	Chromium (Cr)	Magnesium (Mg)	Zinc (Zn)
Arsenic (As)	Cobalt (Co)	Manganese (Mn)	
Beryllium (Be)	Copper (Cu)	Nickel (Ni)	
Cadmium (Cd)	Iron (Fe)	Selenium (Se)	



Share results and next-step resources with participants.

Next Steps

- ❖ Continue testing and outreach on participating islands
- ❖ Expand to more islands this year, including but not limited to Monhegan, Peaks, and North Haven
- ❖ Administer Health and Wellbeing Survey

Learn More

To reach our website or learn how to test your drinking water, you can scan this qr-code or check out allaboutarsenic.org



Acknowledgments

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