

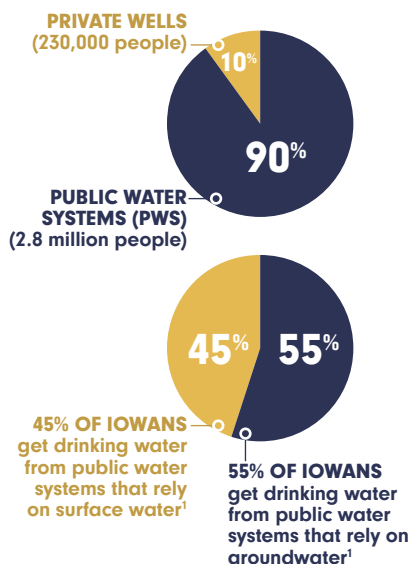
# Nutrient Pollution in Iowa's Public Drinking Water Systems

Nitrogen and phosphorus are essential nutrients for plant growth. Farmers supplement these naturally occurring nutrients in their soils with both chemical and animal fertilizer to increase crop production. When these nutrient levels exceed plant needs, water carries the nitrogen (as nitrate) and phosphorus away, leading to water pollution.

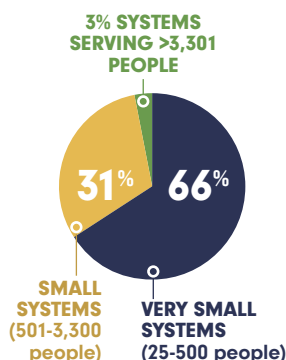


Iowa  
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Council

## Where Iowans Get Their Drinking Water<sup>1</sup>

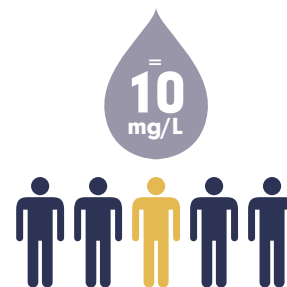


## PWS Nitrate Violations by System Size (1980-2017)<sup>2</sup>



Rural communities are disproportionately burdened by nitrate pollution.

## Legal Limit for Nitrate in Public Water Systems



**1 IN 5 IOWANS** consumed drinking water from a PWS affected by nitrate between 2012 and 2016<sup>4</sup>

## Residents served by very small systems pay

~**3x**

as much per person for nitrate treatment annually as residents of large systems (10,001 – 100,000 people)<sup>3</sup>

## Annual Expense of Nitrate Removal Technologies<sup>1</sup>

Population Size	Annual Expense	Per Person Expense
500	\$280,000 - \$1,200,000	\$560 - \$2,400 per person
10,000	\$2,400,000 - \$4,000,000	\$240 - \$400 per person
100,000	\$20,000,000 - \$40,000,000	\$240 - \$400 per person

*Nitrate removal technologies include ion exchange and reverse osmosis systems.*

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## Health Effects of Nitrate in Drinking Water



Acute consumption of nitrate can lead to blue baby syndrome.<sup>1</sup> This fatal condition is caused when red blood cells become unable to bind with oxygen, an issue that impacts infants at a higher rate.



Long-term consumption of nitrate is associated with increased risks of bladder, ovarian, and thyroid cancers in women; as well as increased risks of birth defects with prenatal exposure.<sup>5</sup>



Harmful blue green algae blooms caused by excess nutrients release toxins that can pass through standard drinking water treatment practices.<sup>6</sup> The toxins can affect the nervous system, liver, digestive system, and form tumor promoting compounds.<sup>7</sup> Algae blooms also impair the taste and odor of drinking water.<sup>8</sup>



Disinfectants used to treat drinking water can react with the algae to form byproducts, such as trihalomethanes, that harm public health. The byproducts have been linked to rectal, bladder, and colon cancers; reproductive health risks; and liver, kidney, and central nervous system problems.<sup>9</sup>

## Sources

- 1 Tang, Chuan, et al. Economic Benefits of Nitrogen Reductions in Iowa. Center for Agricultural and Rural Development, Iowa State University. February 2018.
- 2 Safe Drinking Water Information System, Federal Reporting Services. 1980-2017.
- 3 Weir Schechinger, Anne, and Cox, Craig. America's Nitrate Habit is Costly and Dangerous. Environmental Working Group. September 2018.
- 4 Calculated from Iowa Department of Natural Resources public water system drinking water compliance data: includes Iowans served by PWS that treat for nitrate (by blending, ion exchange, or reverse osmosis) and Iowans served by a PWS that had a violation between 2012-2016.
- 5 Weyer, Peter, et al. (2001). Municipal Drinking Water Nitrate Level and Cancer Risk in Older Women: The Iowa Women's Health Study. *Epidemiology*. 12. 327-338.
- 6 Proposed Water Quality Standards for the State of Missouri's Lakes and Reservoirs, 82 FR 61213 at 61216 (December 27, 2017), citing Carmichael, W.W. (2000). Assessment of Blue-Green Algal Toxins in Raw and Finished Drinking Water. AWWA Research Foundation, Denver, CO.
- 7 Proposed Water Quality Standards for the State of Missouri's Lakes and Reservoirs, 82 FR 61213 at 61216 (December 27, 2017), citing CDC. (2017). Harmful Algal Bloom (HAB)-Associated Illness, Centers for Disease Control and Prevention. <https://www.cdc.gov/habs/>. Accessed December 2017.
- 8 Dodds, Walter K., et al. (2009). Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages, *Environmental Science & Technology*. 43 (1). 12-19.
- 9 Proposed Water Quality Standards for the State of Missouri's Lakes and Reservoirs, 82 FR 61213 at 61216 (December 27, 2017), citing USEPA. (2017). Drinking Water Requirements for States and Public Water Systems, Public Water Systems, Disinfection Byproducts, and the Use of Monochloramine. U.S. Environmental Protection Agency. Accessed <https://www.epa.gov/dwreginfo/public-water-systems-disinfectionbyproducts-anduse-monochloramine>.