

Central Plains Drinking Water Quality and Rural Health Symposium

Iowa

Photo Courtesy of Shannon Meppelink, USGS

Marty St. Clair

Center for Health Effects of Environmental Contamination
IIHR-Hydroscience and Engineering



IOWA

CHEEC: Who we are

Established through the 1987 Iowa Groundwater Protection Act, CHEEC is a multidisciplinary environmental health research center that supports and conducts research to identify, measure and study adverse health outcomes related to exposure to environmental contaminants.



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DNRTM

IOWA DEPARTMENT OF NATURAL RESOURCES

Iowa is overwhelmingly agricultural

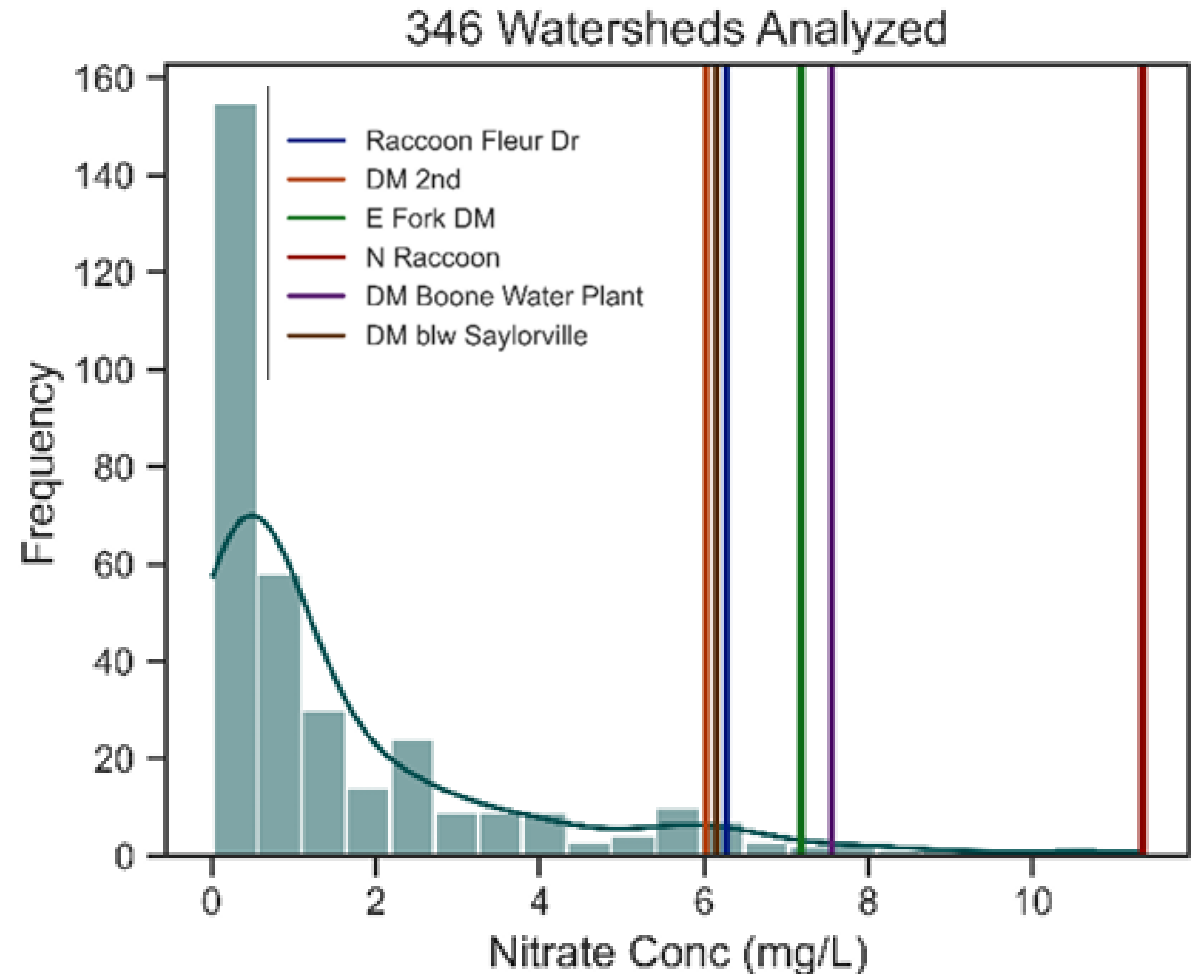
State	% row crop	# of hogs 2025 (million)	# of beef cattle 2025 (million)	Eggs 2025 (million)
Nebraska	39.5	3.65	1.6	2,643.1
Iowa	67.0	25.30	0.81	13,505.6
Kansas	45.5	1.88	1.24	not listed
Oklahoma	21.3	1.99	1.95	568.7
Missouri	30.5	3.35	1.83	5,062.3

~3.5 billion lbs. of anthropogenic N is added to Iowa's landscape each year...and a lot of it leaves in our rivers and streams



Our rivers contain some of the highest average NO_3^- -N values nationwide

- USGS dataset of long term water quality data (Murphy & Sprague, 2019)
- The Des Moines and Raccoon sites ranked in the 95th and 96th percentiles, respectively



“Iowa: The Dead Zone Starts Here”

RESEARCH ARTICLE

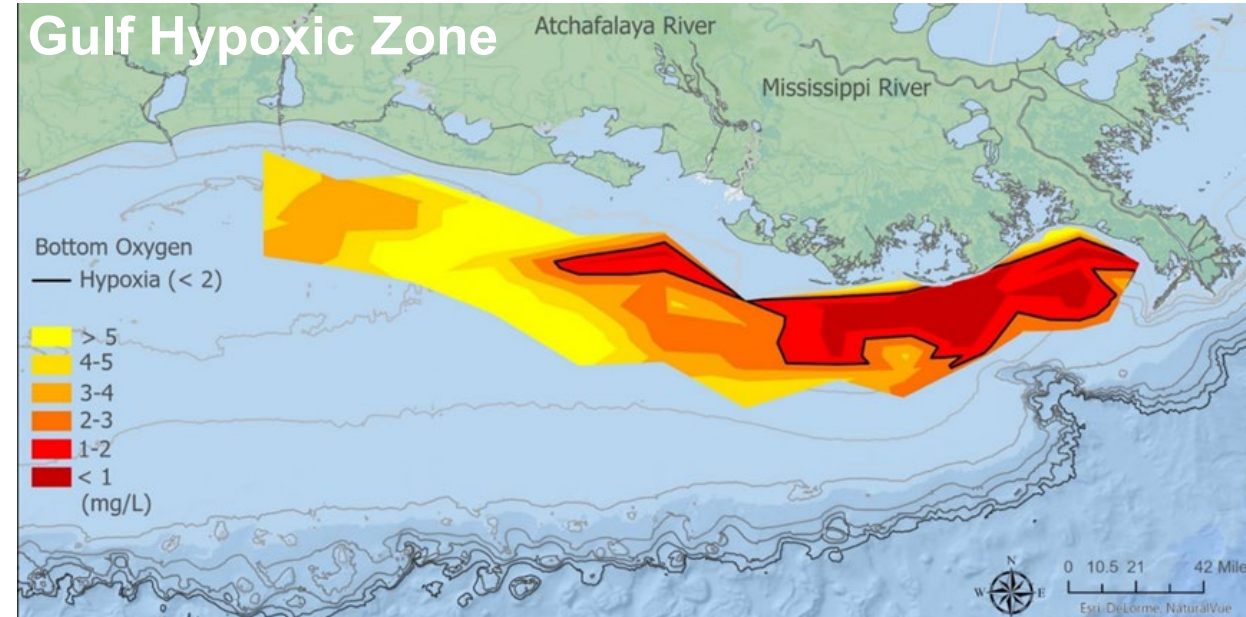
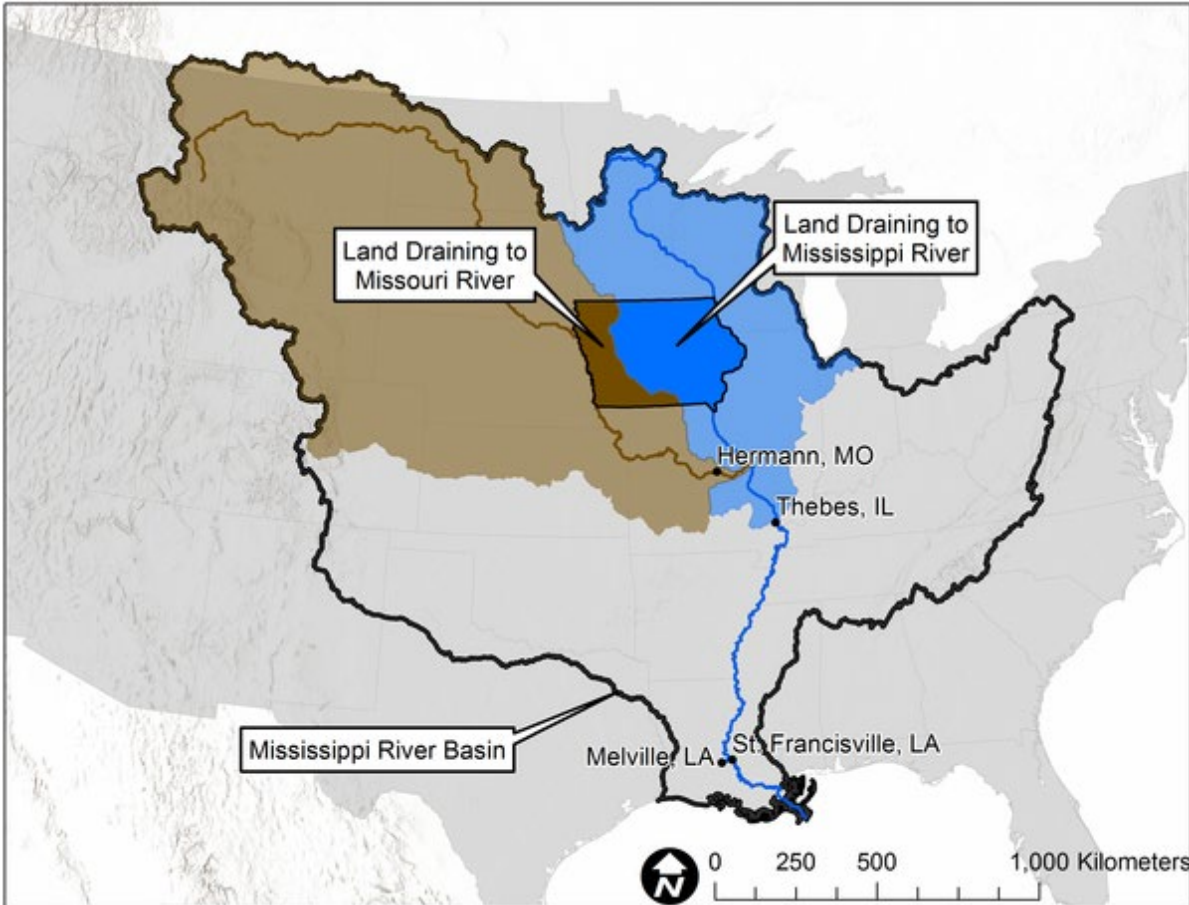
Iowa stream nitrate and the Gulf of Mexico

Christopher S. Jones^{1*}, Jacob K. Nielsen¹, Keith E. Schilling², Larry J. Weber¹

¹ IHR-Hydroscience and Engineering, University of Iowa, Iowa City, Iowa, United States of America, ² Iowa Geological Survey, Iowa City, Iowa, United States of America

These authors contributed equally to this work.

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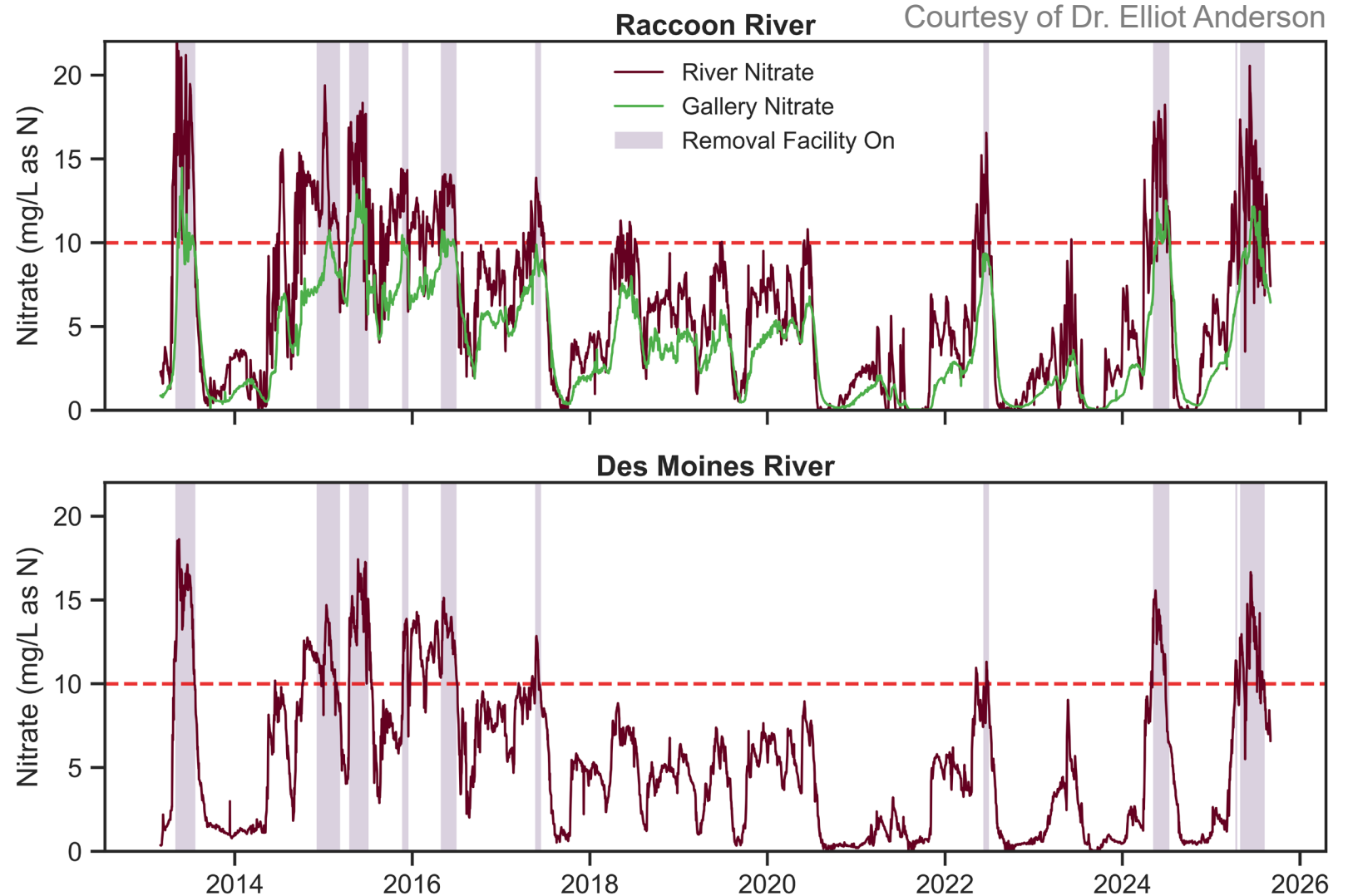


Overall Contributions (%) from Iowa (1999-2019)

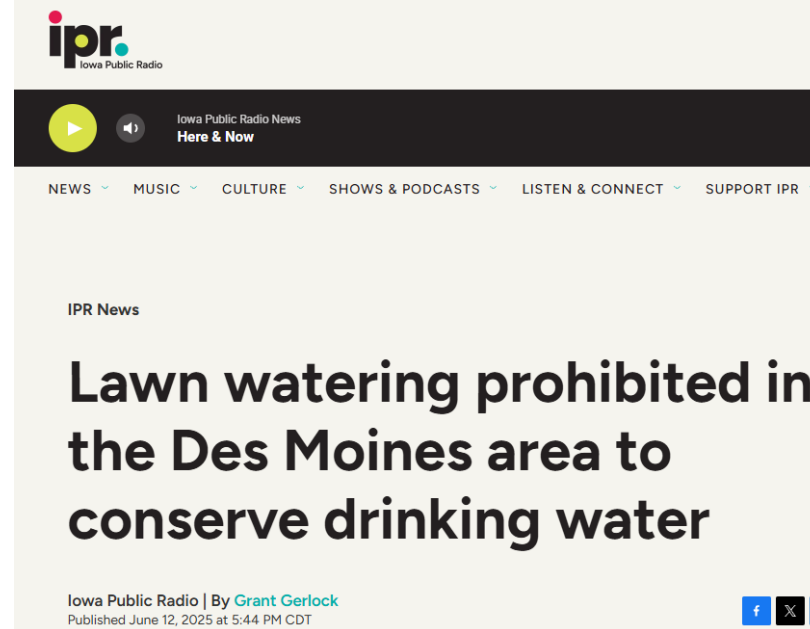
Basin	Area	Water	Nitrate
Greater Mississippi	4.5	6.0	29.5
Upper Mississippi	21	21.2	44.5
Missouri	3.3	12.2	57.2

Elevated stream nitrate poses a massive challenge to Iowa's community water systems

7% of Iowa's Community Water Systems that serve 37% of Iowans rely on surface water



The 600,000 consumers served by the Des Moines Water Works remain vulnerable to “pollution-induced water scarcity”



The screenshot shows the Iowa Public Radio (IPR) website. At the top, there is a logo for IPR Iowa Public Radio and a navigation bar with a play button icon and the text "Iowa Public Radio News Here & Now". Below the navigation bar, there are menu items: NEWS, MUSIC, CULTURE, SHOWS & PODCASTS, LISTEN & CONNECT, and SUPPORT IPR. The main content area features the text "IPR News" followed by a large headline: "Lawn watering prohibited in the Des Moines area to conserve drinking water". Below the headline, it says "Iowa Public Radio | By Grant Gerlock" and "Published June 12, 2025 at 5:44 PM CDT". There are also social media icons for Facebook, X, and Instagram.

Feb 2, 2026 - News

Des Moines asked to rethink lawn watering now to minimize nitrate crisis



Jason Clayworth

DES MOINES

As nitrates rise, Central Iowa Water Works asks for watering reduction



Donnelle Eller

Des Moines Register

Updated May 27, 2026, 4:53 p.m. CT



And it isn't just Des Moines that is vulnerable

MORE STORIES

Johnson County communities put regional transit exploration on hold

Iowa House passes casino moratorium that would block Cedar Rapids proposal

Supreme Beef water dispute heads to court

HOME / NEWS / ENVIRONMENTAL NEWS

Nitrate spiked in Cedar Rapids water this year

Level didn't exceed U.S. standard but brings health concerns

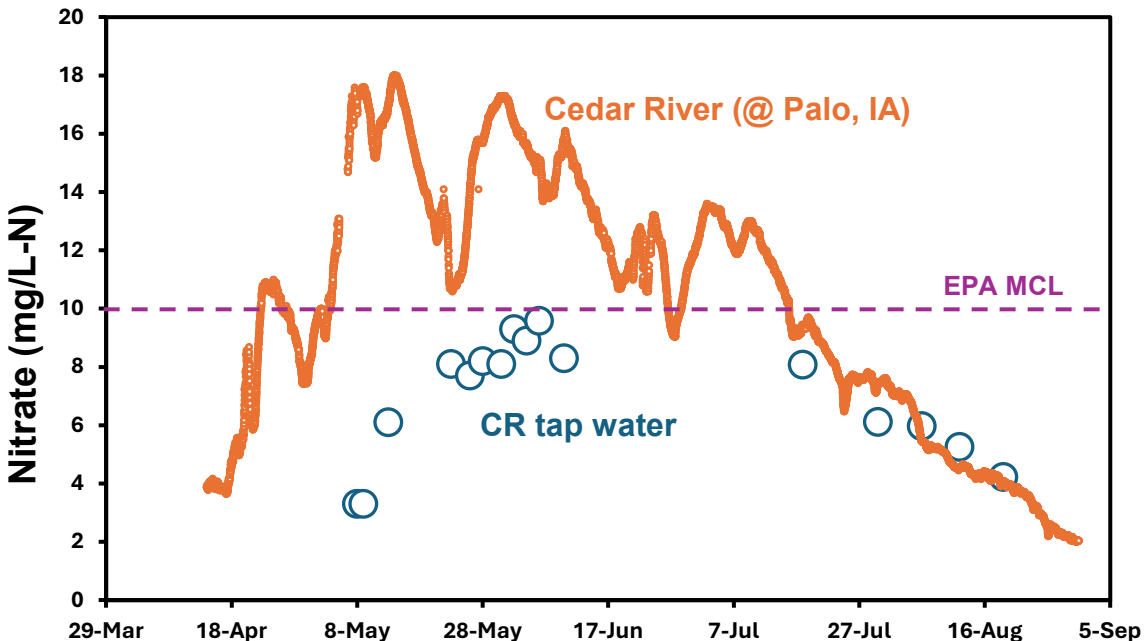


Jared Strong

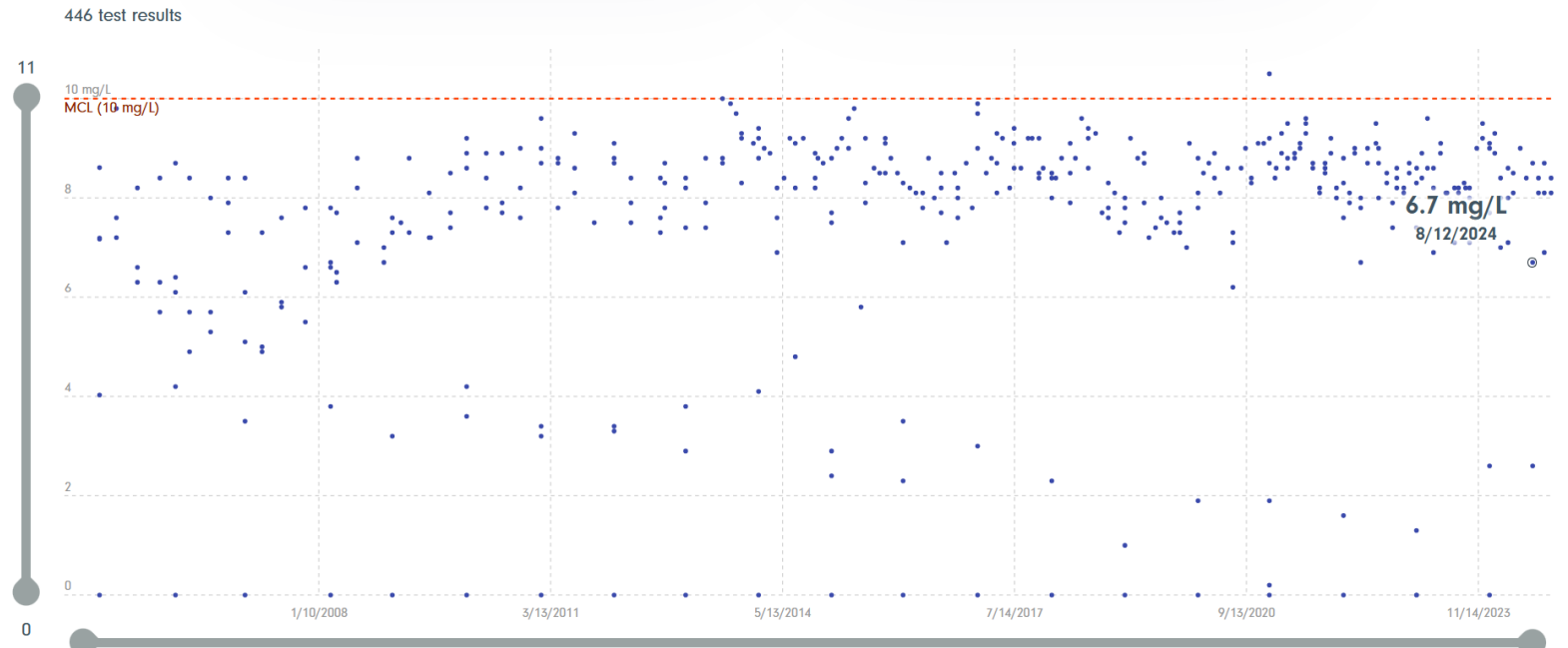


Why you can trust The Gazette

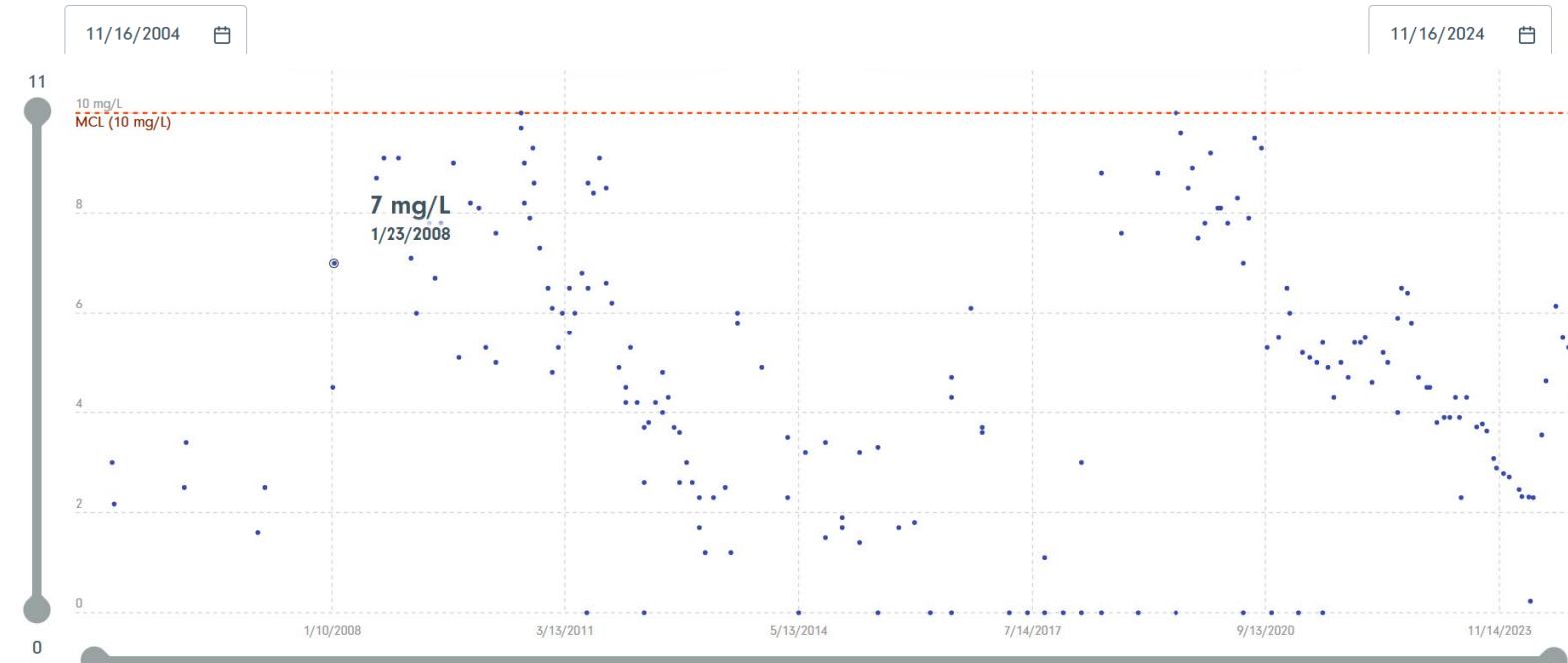
2024 5:30 am, Updated: Dec. 30, 2024 7:56 am



Cedar Falls
Customers: 40,000
Water source: GW



Nashua
Customers: 1,500
Water source: GW



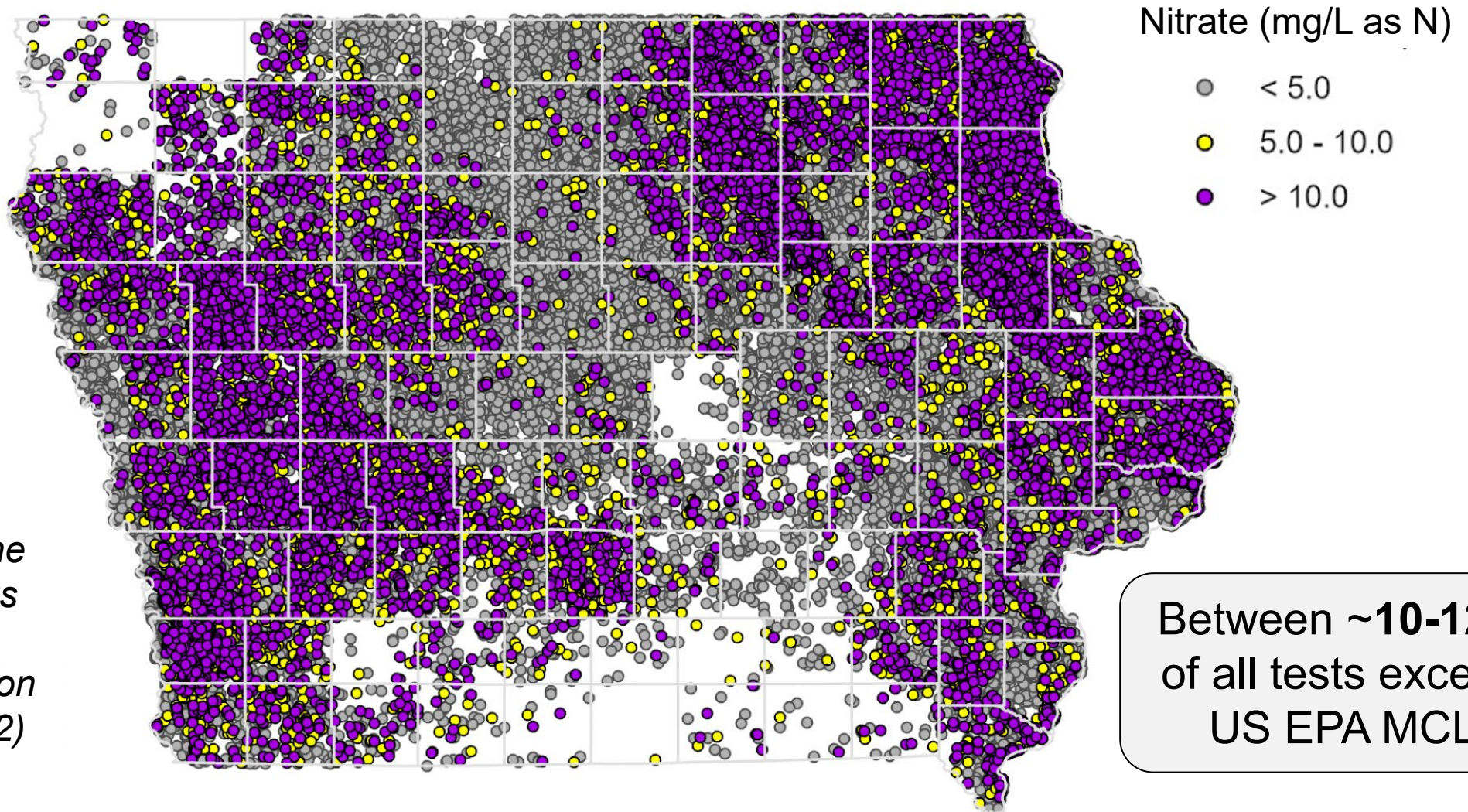
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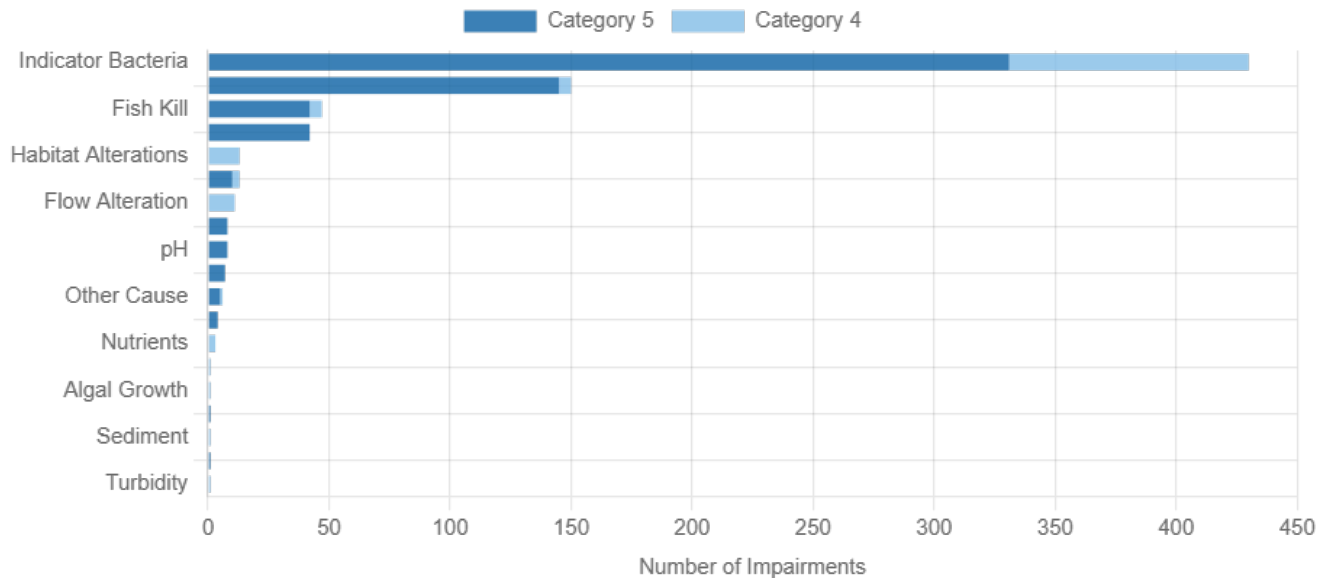
Iowa has 300,000+ private well users, with the most vulnerable in NE Iowa



*Test results from the
Private Well Grants
Program and the
Iowa Well Information
System (2013-2022)*

Our problems are more than just nitrate

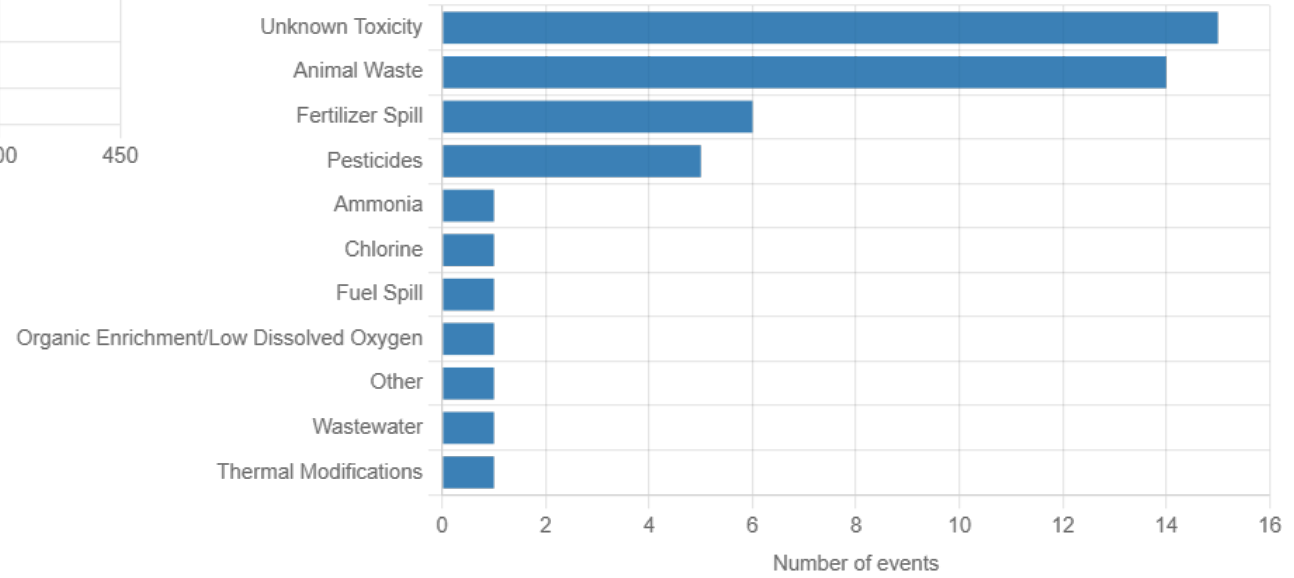
Causes of the 748 impairments of 573 stream/river segments (Categories 4 and 5)



Our streams are most often impaired by **bacteria**

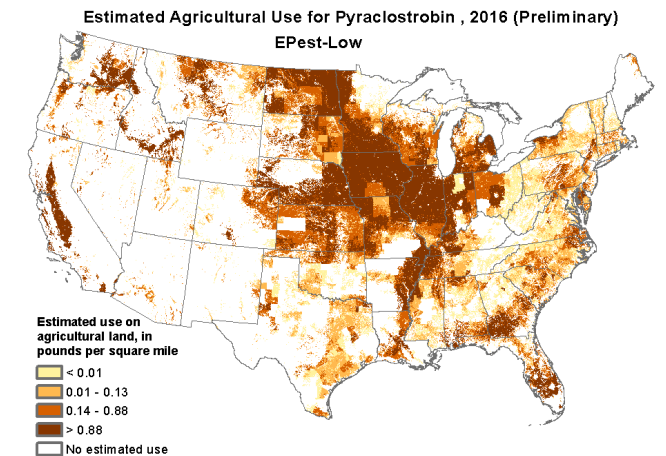
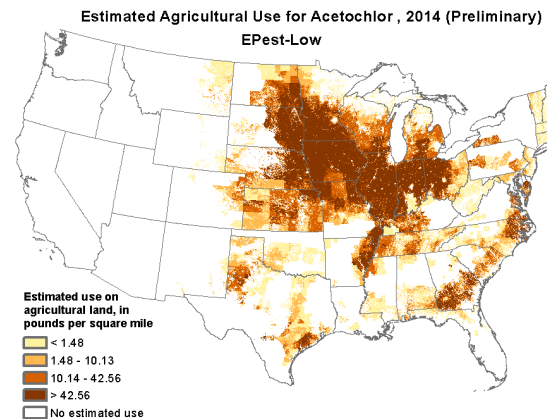
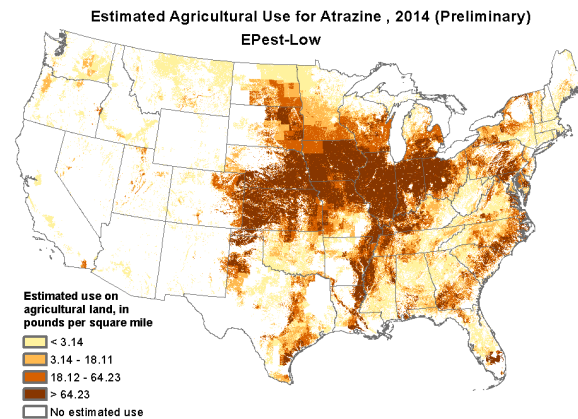
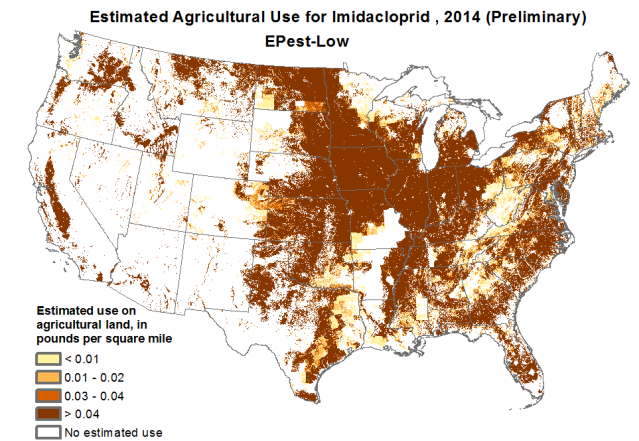
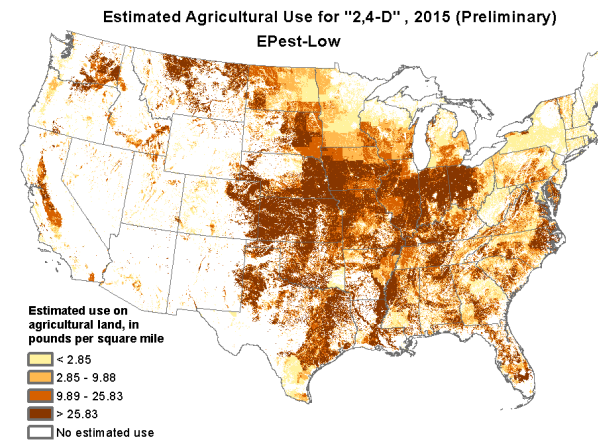
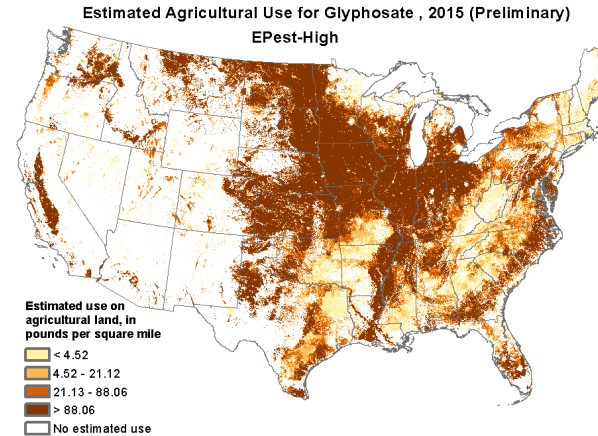
Leading causes of fish kills are **animal waste** and **pesticides**

Causes of the 47 fish kills during this cycle



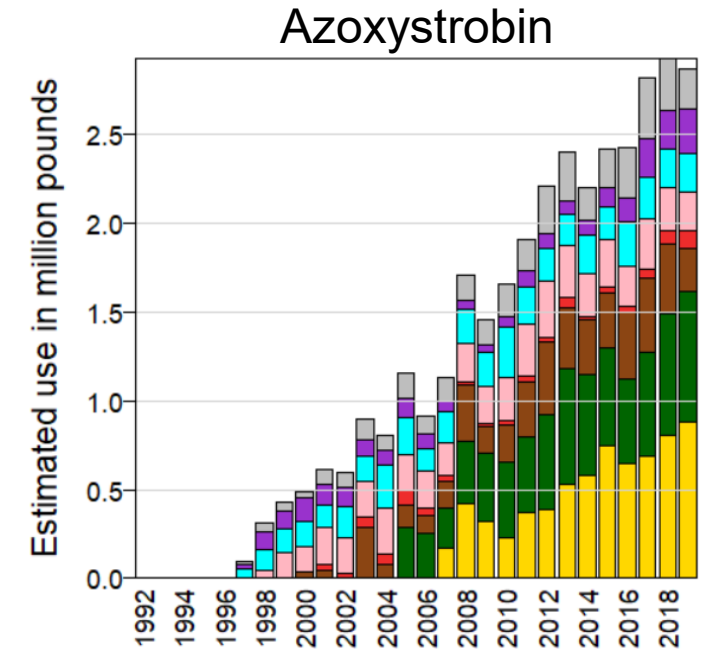
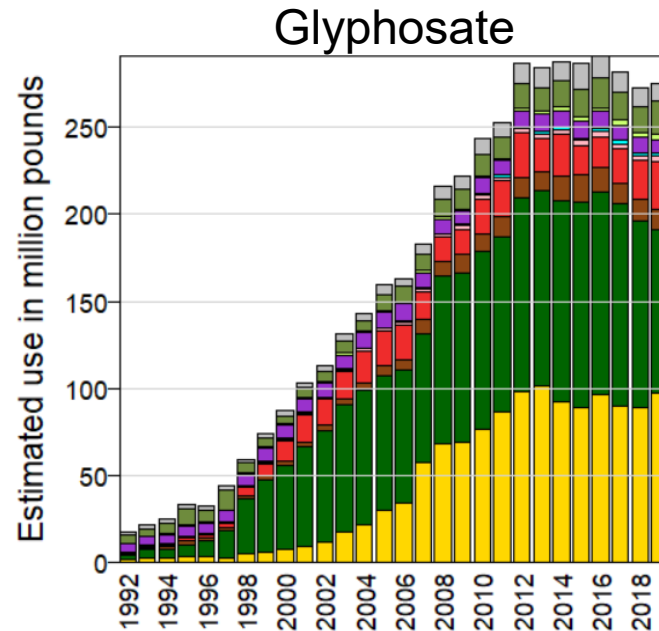
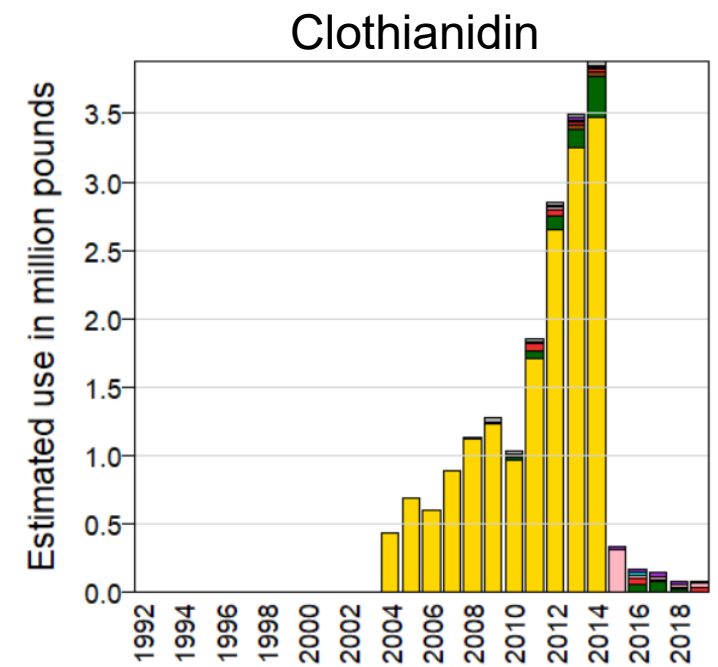
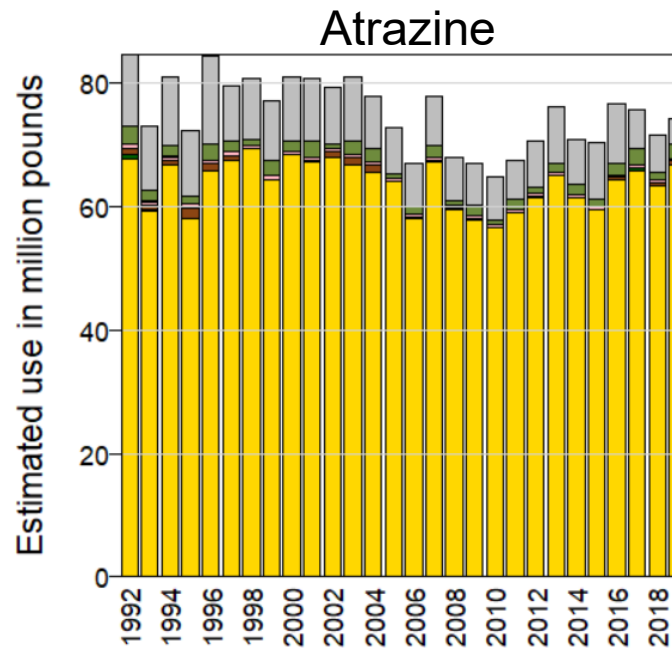
Iowa ranks fourth nationally for the amount of pesticides it used between 2015 and 2019

- Iowa applied up to 70 million pounds of 150 different pesticides (USGS - 2018 data)



The pesticides used are changing

- Use patterns show the rapid, more recent growth of certain active ingredients



Seed treatments are a major source



13.4 million corn acres planted
 35,000 plants per acre
 95% germination rate
 100% of corn seeds treated
 490 billion treated seeds planted

What's on your seed?

Seed treatments have been used for a number of years, mostly for protection against seedling diseases. However, there are a number of new seed treatments marketed for protection against a range of pests—including seedling diseases, insects and nematodes—and even improving plant health.

The purpose of this publication is to take some of the confusion of seed treatments away, giving you a better understanding of what is on your seed. The list covers seed treatments registered in the state of Wisconsin for use on corn and/or soybean seed. The seed treatments are grouped by the number of active ingredients (1-4), treatment type (fungicide, insecticide, nematicide or plant growth regulator) and then alphabetically by the product trade name. The list is not based on efficacy of the seed treatments and is not an endorsement or criticism of one product over another. You are responsible for using pesticides according to the manufacturer's current label directions.

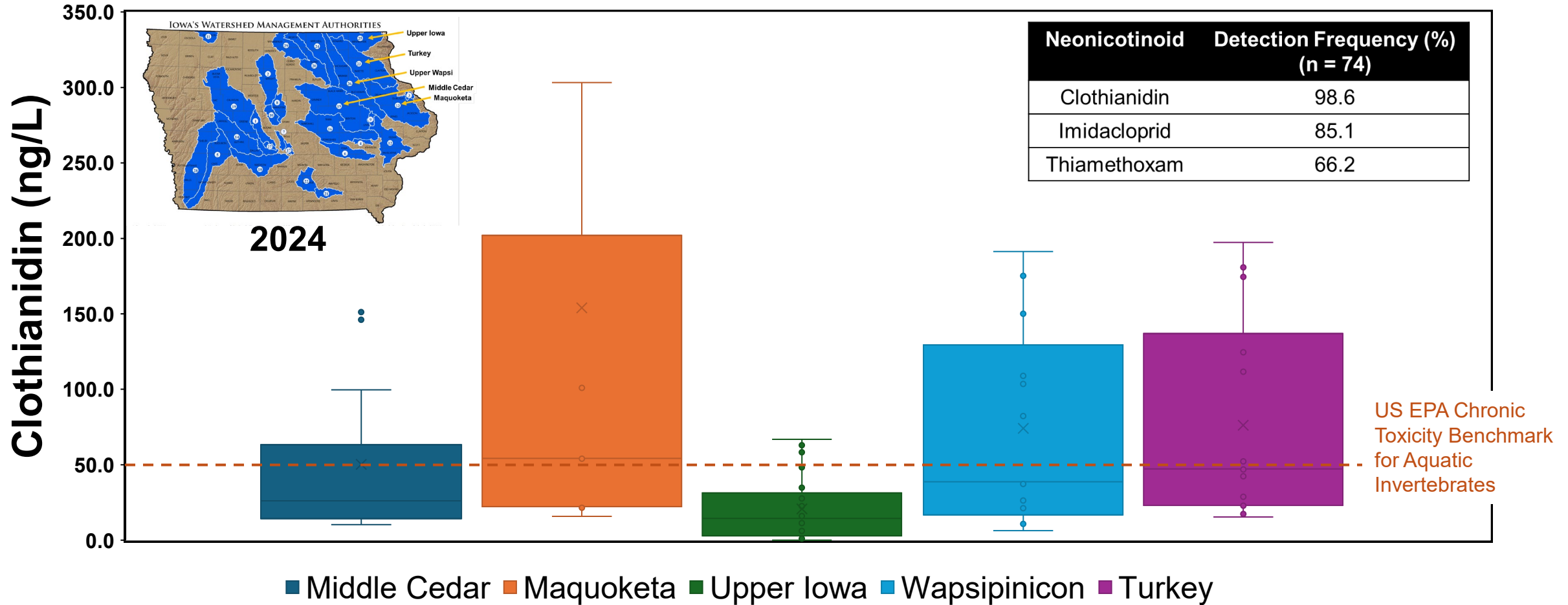
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
 University of Wisconsin-Madison
 Authors: Paul Esker, Assistant Professor of Plant Pathology & Richard Proost, Nutrient and Pest Management Program

Treatment Type **F** Fungicide **I** Insecticide **N** Nematicide **P** Plant Growth Regulator

Active Ingredient (s)	Product Trade Name	Crop
F azoxystrobin	Dynasty® Protégé™ FL	Corn, Soybean Corn
F <i>Bacillus pumilus</i>	Yield Shield®	Corn, Soybean
F <i>Bacillus subtilis</i>	HiStick® N/T Vault® Hp	Soybean Corn, Soybean
F captan	Captan 400	Corn, Soybean
F fludioxonil	Captan 400-C	Corn, Soybean
F hydrogen peroxide	Maxim® 4 FS StorOx®	Corn, Soybean Soybean
F ipconazole	OxiDate® StorOx®	Soybean
F mancozeb	Acceleron™ DC-509 Rancona® 3.8 FS Vortex®	Corn Corn, Soybean Corn
F mancozeb	Bonide Mancozeb w/Zinc Concentrate Dithane® 75DF Rainshield® Dithane® DF Rainshield® Dithane® F45 Rainshield® Dithane M45® Lesco® 4 Flowable Mancozeb	Corn Corn Corn Corn Corn
F mefenoxam	Penncozeb® 4FL Flowable Penncozeb® 75DF Dry Flowable Penncozeb® 80WP	Corn Corn Corn
F mefenoxam	Apron® XL	Corn, Soybean
F metalaxyl	Acceleron™ DC-309 Acceleron™ DX-309 Acquire™ Agri Star Metalaxyl® 265 ST Allegiance® Dry Allegiance® FL Belmont™ 2.7 FS Dyna-shield® Metalaxyl Sebring™ 2.65 ST Sebring™ 318 FS Sebring™ 480 FS Vireo™ MEC	Corn Corn, Soybean Corn, Soybean Corn, Soybean Corn, Soybean Corn, Soybean Corn, Soybean Corn, Soybean Corn, Soybean Corn, Soybean Soybean
F pyraclostrobin	Acceleron™ DX-109	Soybean

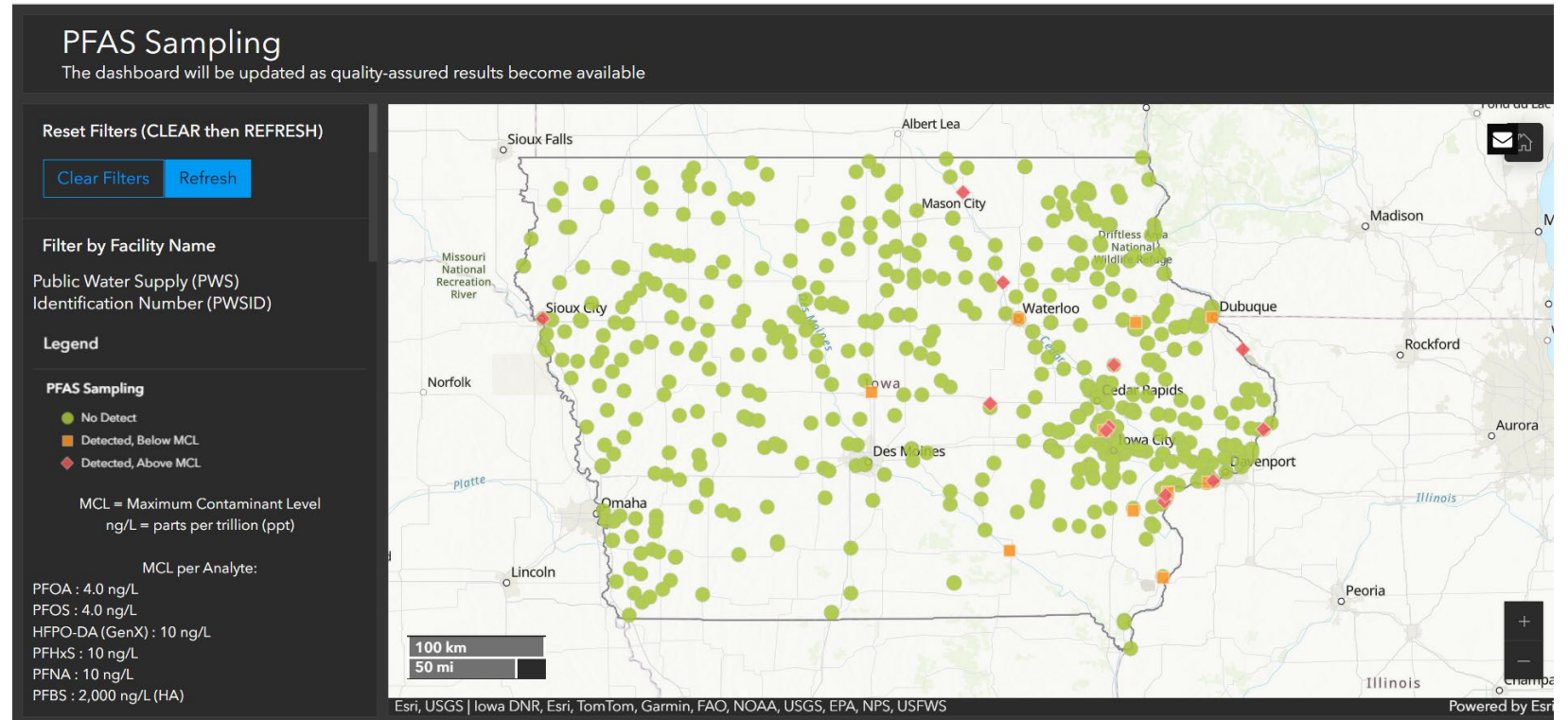
F thiram	42-S Thiram Flowsan® Signet™ 480 FS	Corn, Soybean Corn, Soybean Corn, Soybean
F <i>Trichoderma harzianum</i> Rifai	T-22™ HC	Corn, Soybean
F trifloxystrobin	Acceleron™ DX-709 Trilex® Flowable	Corn Corn, soybean
I chlorpyrifos	Lorsban® 50W in water soluble packets	Corn
I clothianidin	Acceleron™ IC-609 Nipsit INSIDE® Poncho® 600	Corn Corn, Soybean Corn
I imidacloprid	Acceleron™ IX-409 Agri Star® Macho™ 600 ST Agrisolutions™ Nitro Shield® Attendan® 600 ACCESS™ Couraze® 2F Dyna-Shield® Imidacloprid 5 Gaucho® 480 Flowable Gaucho® 600 Flowable Gaucho® 5b Flowable Nuprid® 4.6F Pro Senator® 600 FS	Corn Corn, Soybean Corn, Soybean Corn, Soybean Corn, Soybean Soybean Corn, Soybean Corn, Soybean Corn, Soybean Corn, Soybean Soybean Soybean
I thiamethoxam	Cruiser® 5FS	Corn, Soybean
N abamectin	Avicta® 500 FS	Corn, Soybean
N <i>Bacillus firmus</i>	VOTIVO™ FS	Soybean
P cytokinin	Soil X-Cyto® X-Cyte®	Soybean Soybean
P harpin alpha beta protein	Acceleron™ HX-209 N-Hibit® Gold CST N-Hibit® HX-209	Corn, Soybean Corn, Soybean Corn, Soybean
P indole butyric acid	KickStand™ PGR	Corn, Soybean
I N thiamethoxam, abamectin	Avicta® Duo Corn Avicta® Duo 250	Corn
I F clothianidin, <i>Bacillus firmus</i>	Poncho® VOTIVO™	Corn, Soybean
F F carboxin, captan	Enhance®	Soybean
I F permethrin, carboxin	Kernel Guard® Supreme	Corn, Soybean
F F carboxin, thiram	Vitaflo™ 280	Corn, Soybean
F F mefenoxam, fludioxonil	Maxim® XL Warden® RTA® Apron MAXX® RFC Apron MAXX® RTA® + Moly Apron MAXX® RTA®	Corn, Soybean Soybean Soybean Soybean
I F imidacloprid, metalaxyl	Agrisolutions™ Concur™	Corn
F F metalaxyl, ipconazole	Rancona® Summit Rancona® Xtra	Soybean
F F thiram, metalaxyl	Protector-L-Allegiance®	Soybean
F F trifloxystrobin, metalaxyl	Trilex® AI Trilex® 2000	Soybean
P P P cytokinin, gibberellic acid, indole butyric acid	Stimulate™ Yield Enhancer Ascend™	Corn, Soybean
F F I mefenoxam, fludioxonil, thiamethoxam	CruiserMaxx® Plus	Soybean

Neonicotinoids are widespread in Iowa rivers



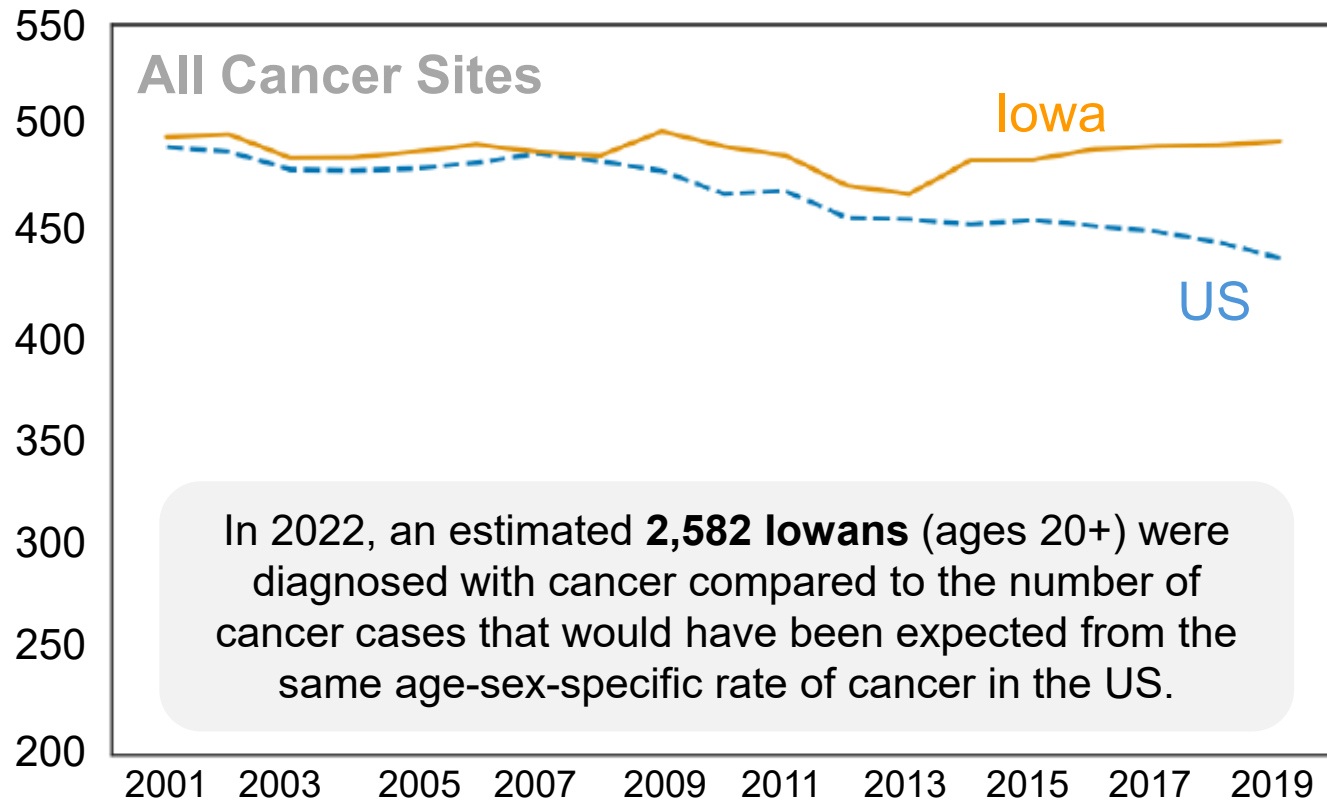
PFAS are also an issue in Iowa

- Iowa DNR testing of community water supplies found some communities vulnerable to PFAS “forever chemicals” in drinking water, with many along the Mississippi River



Iowa has a cancer problem

Age-Adjusted Cancer Incidence Trends
(per 100,000 population)



IOWA CANCER REGISTRY
CANCER IN IOWA
2026

In 2025, Iowa had the second highest age-adjusted rate of new cancers, and it is one of only three states experiencing a rising trend in cancer incidence.



Our unequal earth US news
This article is more than 9 months old

'Cancer is just everywhere': could farming be behind Iowa's unfolding health crisis?


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HEALTH

Iowa has the second-highest cancer rate in the US. What exactly does that mean?


Tim Webber
 Des Moines Register

Oct. 7, 2025 | Updated Oct. 13, 2025, 5:54 a.m. CT

NEWS SERVICE: **IOWAWATCH**

Cancer in Iowa: What role does agriculture play in Iowa's high cancer rates?


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AGRICULTURE

New report links pesticide use, nitrate levels to Iowa cancer rates


Donnelle Eller
 Des Moines Register

March 26, 2026, 6:12 a.m. CT

87 of 99 Iowa counties report higher cancer rates than national trend, new research shows



[AG + ENVIRONMENT](#)
[GOVERNMENT + POLITICS](#)

Gov. Kim Reynolds introduces 'farm to faucet' water quality package

Twelve-year, \$319M program includes water monitoring, treatment plant upgrades

BY: **ROBIN OPSAHL** - MAY 1, 2026 2:35 PM




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Oct 29, 2025 - News

Iowa's young adults are getting cancer


 Jason Clayworth, Linh Ta

Public health, environmental advocates call for action on Iowa's cancer rate

BY **READE SNELLING** reade.snelling@thmedia.com Mar 28, 2026 Updated 8 hrs ago



CHEEC epidemiological studies suggest chronic health impacts from nitrate in drinking water



Iowa Women's Health Study

Cancer Site	Increased-Risk	Nitrate drinking water concentration (mg/L as N)	Exposure (years)	Source
Bladder	1.6×	> 5	≥ 4	Jones et al., 2016
Ovarian	2.0×	> 3	≥ 11	Inoue-Choi et al. 2015
Thyroid	2.6×	> 5	≥ 5	Ward et al., 2010





Pete Weyer,
Ph.D., CHEEC (ret.)



International Journal of
*Environmental Research
and Public Health*

Review

Drinking Water Nitrate and Human Health: An Updated Review

Mary H. Ward ^{1,*}, Rena R. Jones ¹ , Jean D. Brender ², Theo M. de Kok ³, Peter J. Weyer ⁴, Bernard T. Nolan ⁵, Cristina M. Villanueva ^{6,7,8,9}  and Simone G. van Breda ³



*“....the strongest evidence for a relationship between drinking water nitrate ingestion and adverse health outcomes (besides methemoglobinemia) is for **colorectal cancer, thyroid disease, and neural tube defects**. Many studies observed increased risk with ingestion of water nitrate levels that were below regulatory limits.”*

Number one issue of concern in your state for water quality and human health?

- If we develop effective policies to reduce nitrate contamination, will likely impact other pollutants of concern as well.
- Nutrient reduction strategies:
 - Numeric targets matter (TMDLs, water-quality standards)
 - Some mandatory elements are essential, even when incentives remain important
 - Monitoring and transparency sustain political and public support
- Successful agricultural fertilizer/manure limits:
 - Mandatory nutrient planning tied to soil tests and crop uptake
 - Explicit limits on timing (e.g., no winter or fall application on vulnerable soils)
 - Escalating restrictions as environmental risk increases
 - Monitoring and enforcement, not voluntary adoption alone
- Supporting investment in community public health, the State Hygienic Laboratory, all associated testing infrastructure, data dissemination and education
- Better leverage available nitrate data to assess vulnerable communities and chronic health impacts (cancer, birth defects, etc.)

Thanks and questions

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