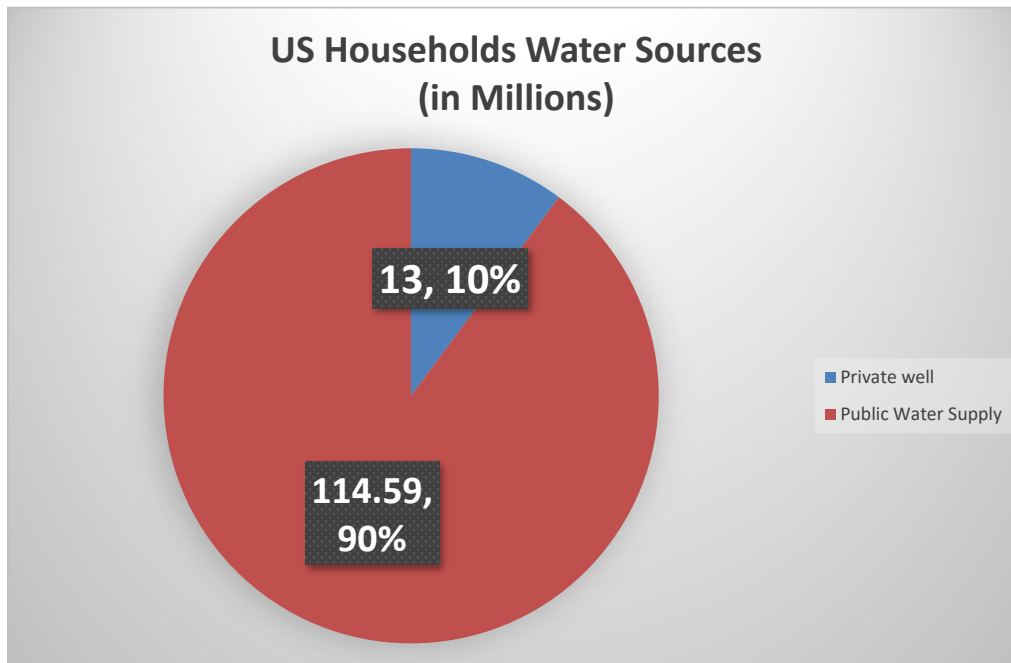


Public Health Environmental Laboratories Challenges and Opportunities for Private Well Water Quality

Susie Dai PhD

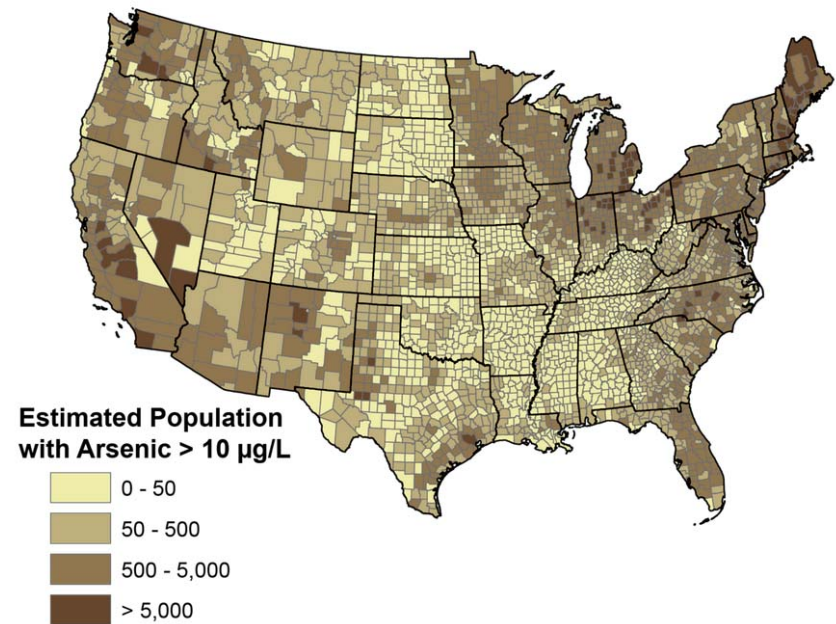
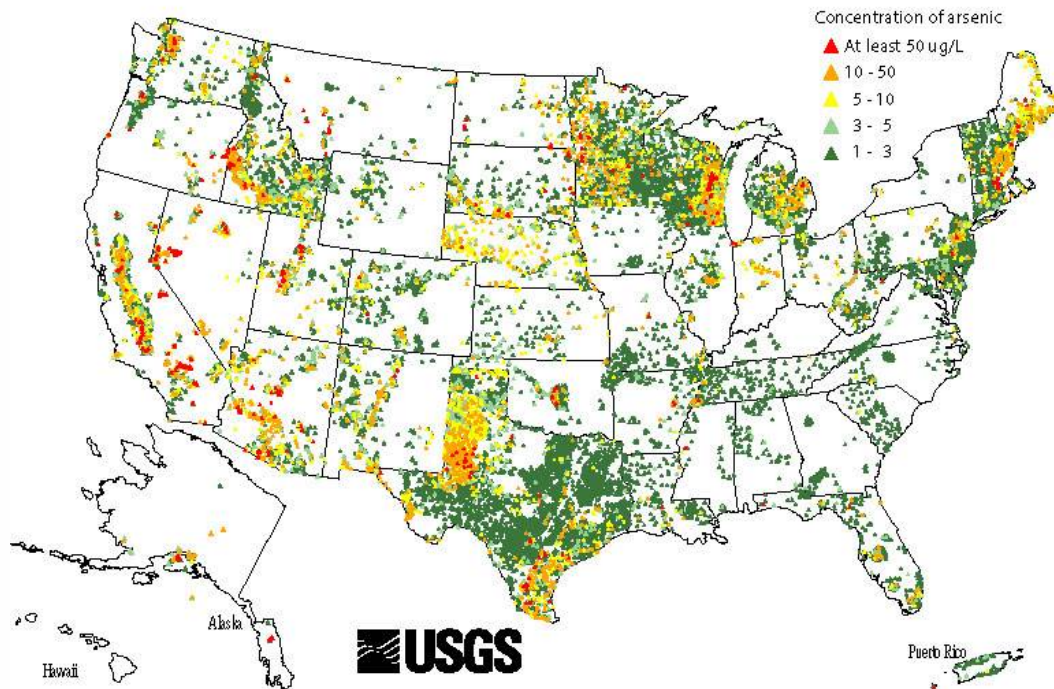
08/08/2019

Private Well Water Testing Status



US Census American Housing Survey 2017
<https://www.epa.gov/privatewells>

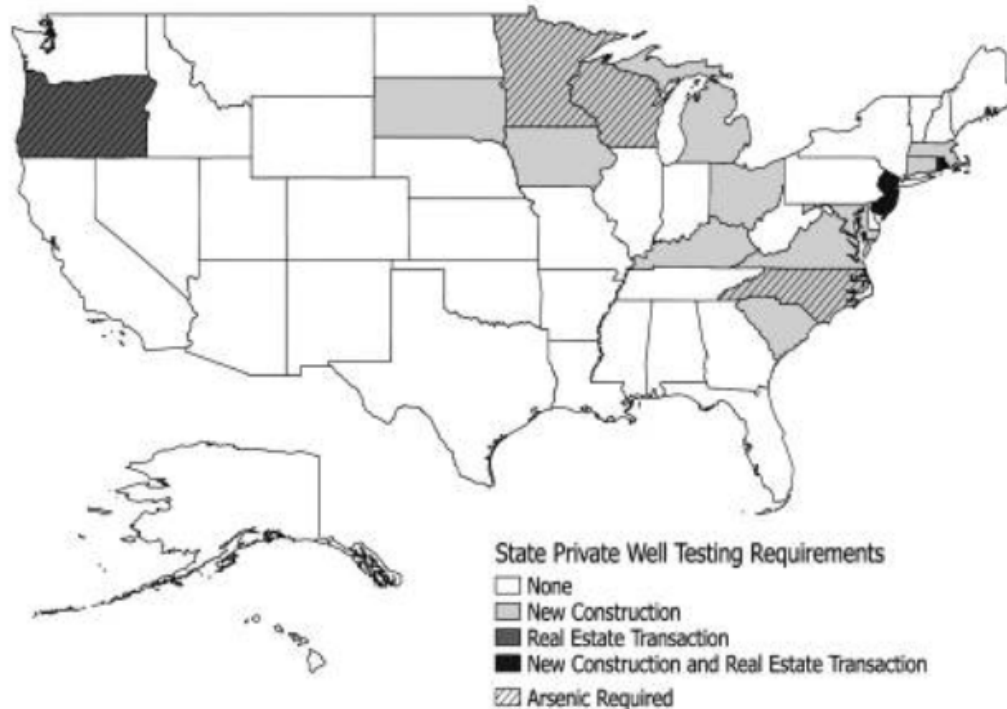
Case: Arsenic



https://water.usgs.gov/GIS/metadata/usgswrd/XML/arsenic_map.xml

https://www.usgs.gov/mission-areas/water-resources/science/arsenic-and-drinking-water?qt-science_center_objects=0#qt-science_center_objects

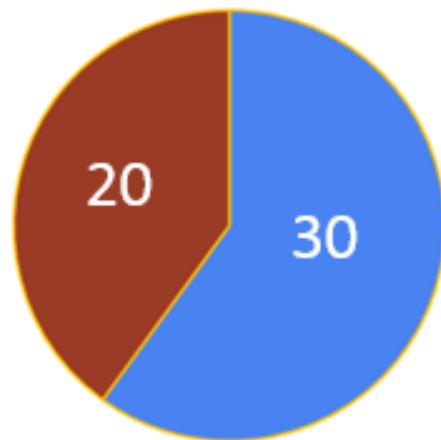
State Private Well Testing Requirements



Zheng et al. The Case for Universal Screening of Private Well Water Quality in the U.S. and Testing Requirements to Achieve It: Evidence from Arsenic, [Environ Health Perspect](#). 2017 Aug; 125(8): 085002.

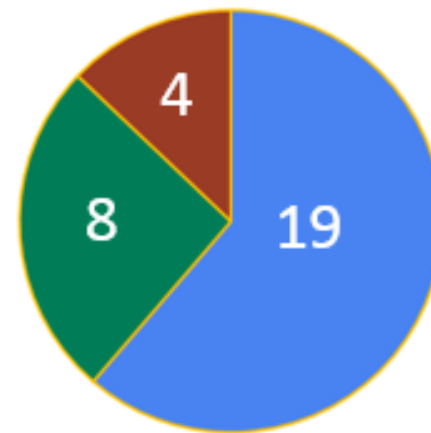
Well Water Quality Testing Regulations*

State Testing Requirement
(n=50)



■ No ■ Yes

Type of Testing Requirement
(n=20)**



■ Construction ■ Repairs ■ Real Estate

*The data for both pie charts is still being verified and may not be completely accurate at this time.

**Some states have more than one testing requirement therefore total is greater than 20.

Testing Decision

Factors that impact the testing decision

- Regulation
- Risk awareness
 - Optimistic biases
- Perceived time for testing
- Financial burden
- Identification/Trust of the testing service
- Miss follow-ups

Response Rate	
Free of Charge	\$40
42%	12%
P<0.001	

Zheng et al. [Environ Health Perspect](#). 2017 Aug; 125(8): 085002.

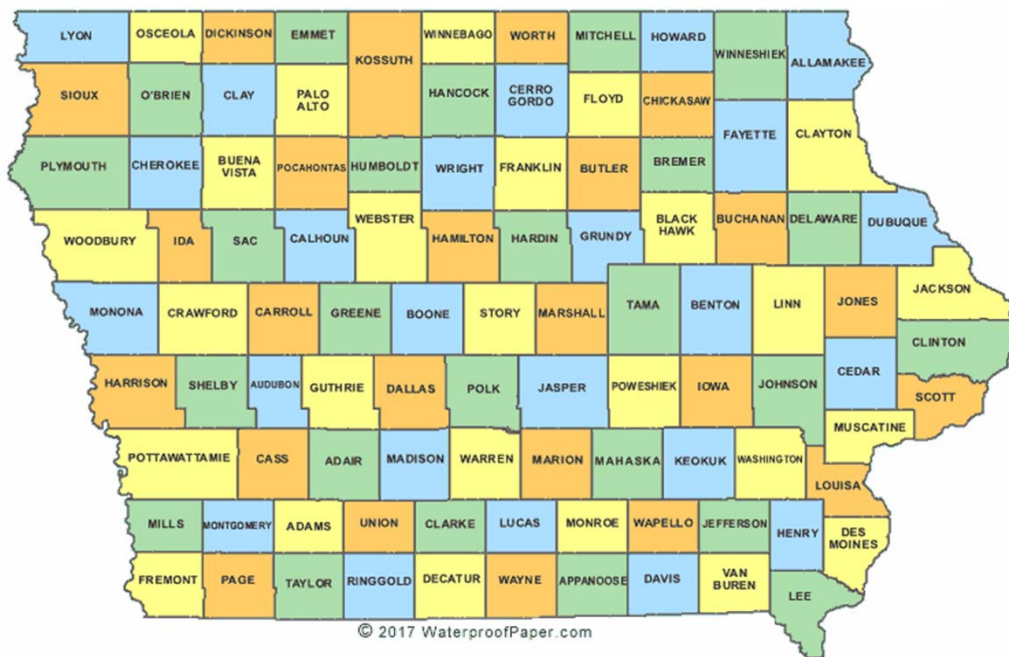
Iowa Grants-to-Counties Program

IAC 6/8/16

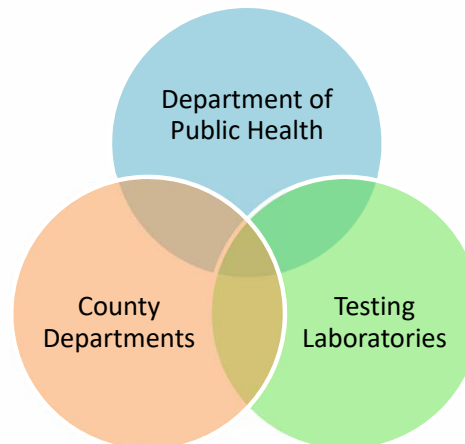
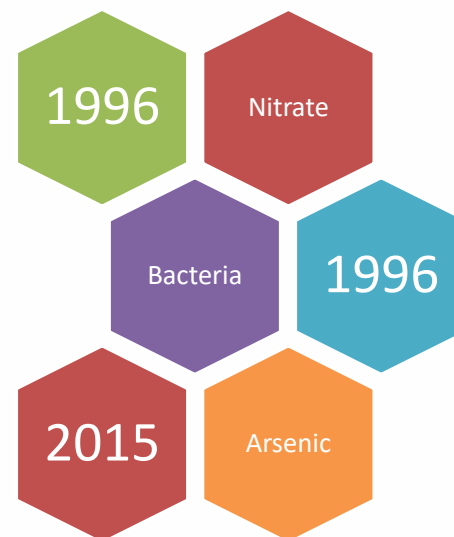
Public Health[641]

Ch 24, p.1

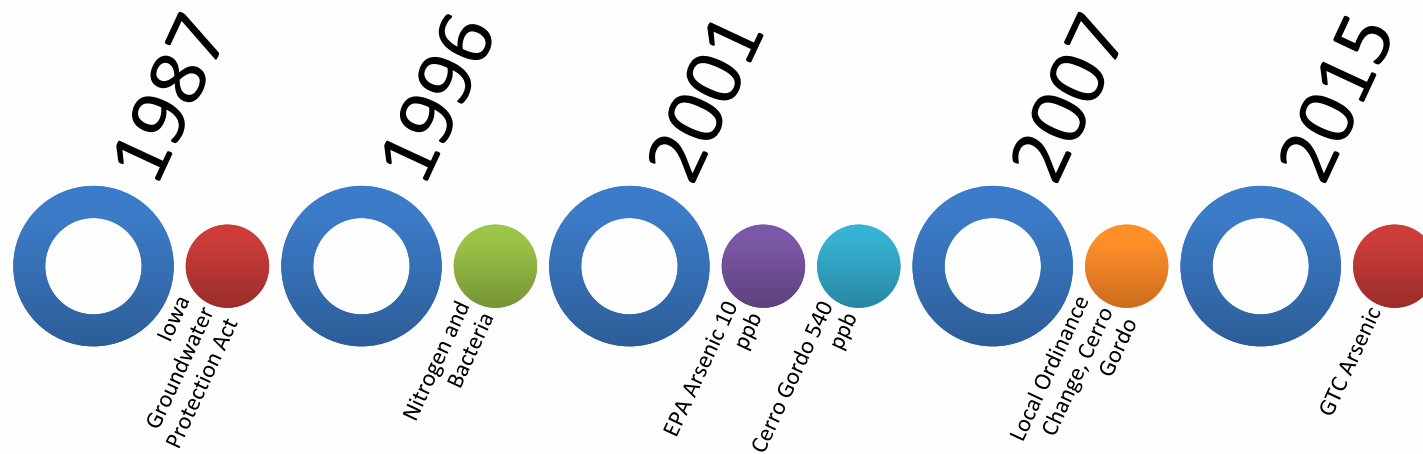
CHAPTER 24
PRIVATE WELL TESTING, RECONSTRUCTION, AND
PLUGGING—GRANTS TO COUNTIES
[Prior to 3/29/06, see 567—Ch 47]



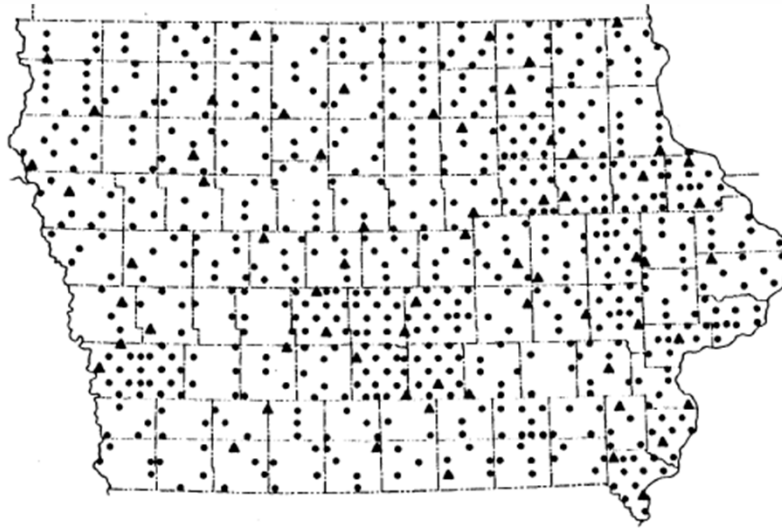
© 2017 WaterproofPaper.com



Reimbursable Testing Timeline

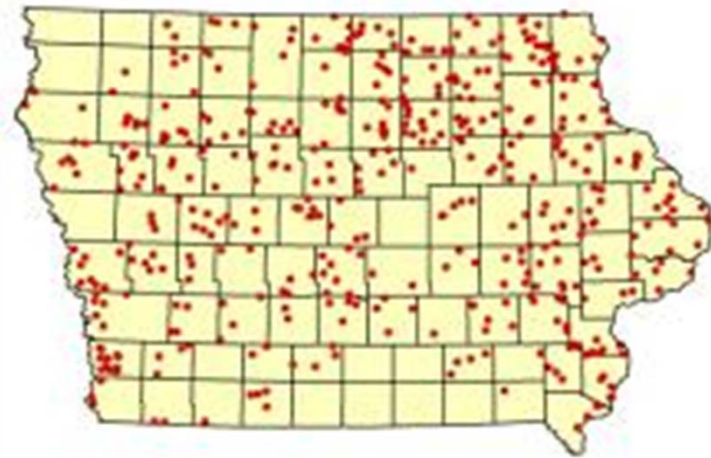


History



- Sample point locations
- ▲ 10% repeat locations

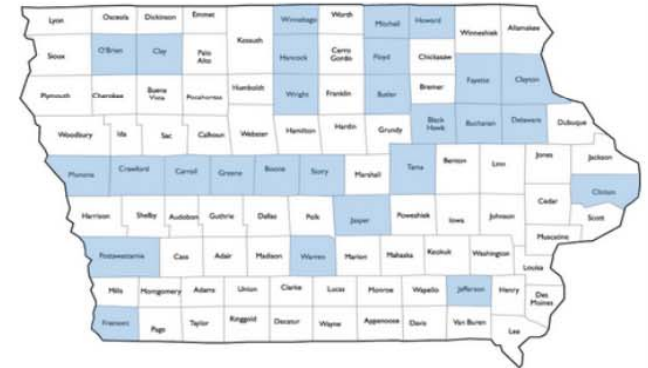
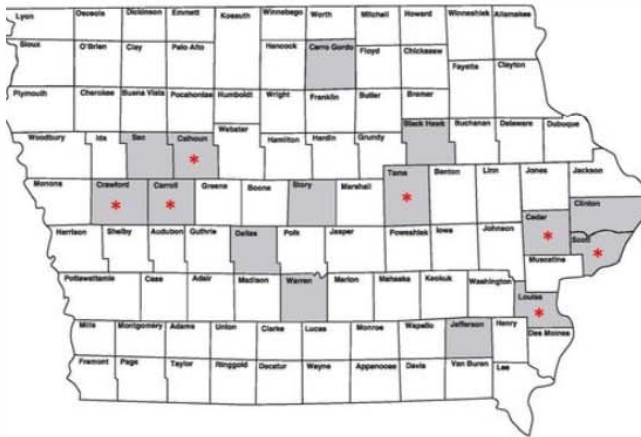
SWRL 1 (State-wide Rural Well-water Survey)
April 1988 – June 1989
686 “sites” and 1,048 water samples



SWRL 2 well sampling sites

SWRL 2
May 2006 – December 2008
473 wells distributed across 89 counties

Iowa Well Survey: Safeguarding Public Health in Rural Community

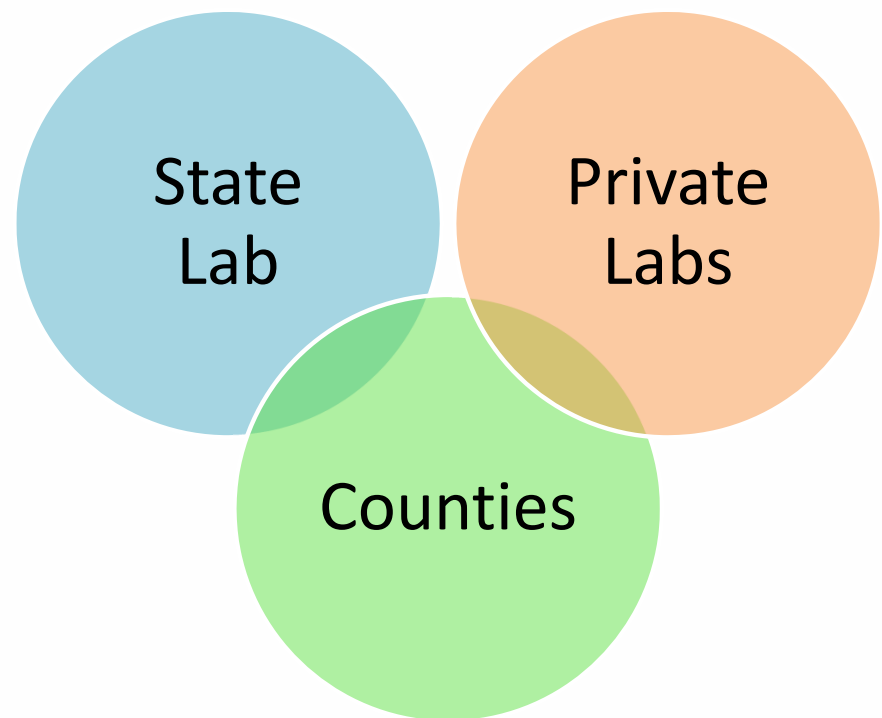
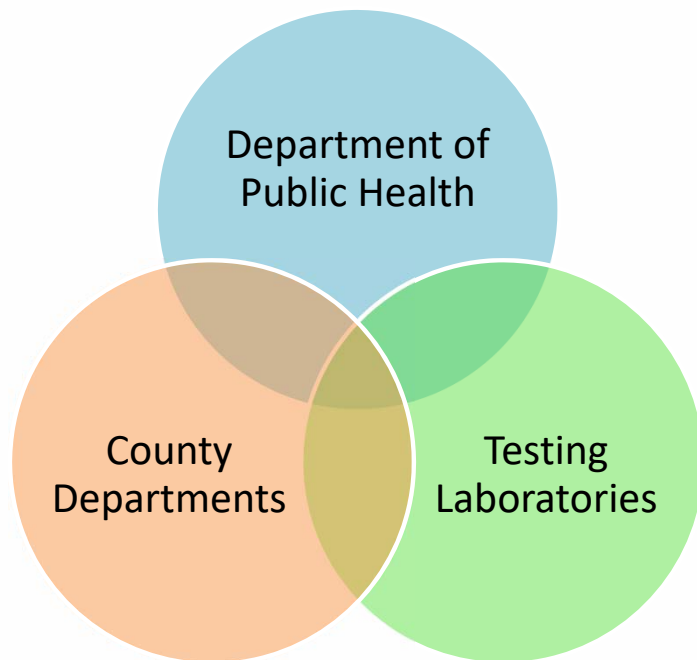


2017 Fall

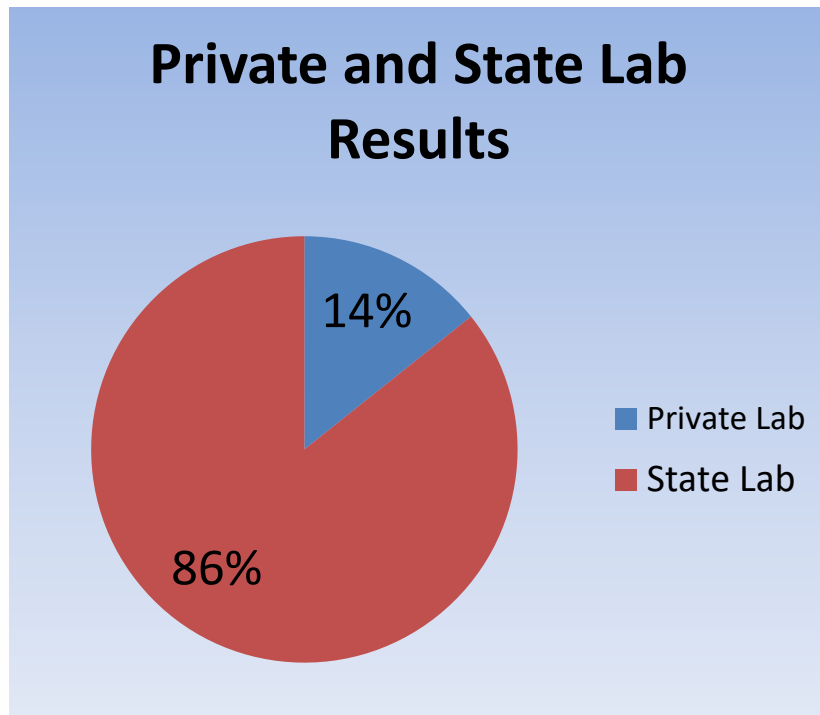
2018 Spring

2018 Fall

Testing and Reporting

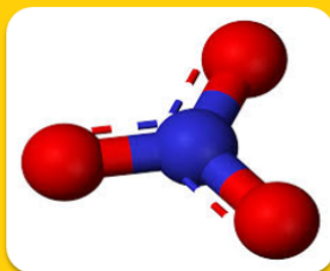


State Lab and Private Labs



One laboratory detects positive for every private well sample

Chemicals in Water: Environmental Health



Pesticides

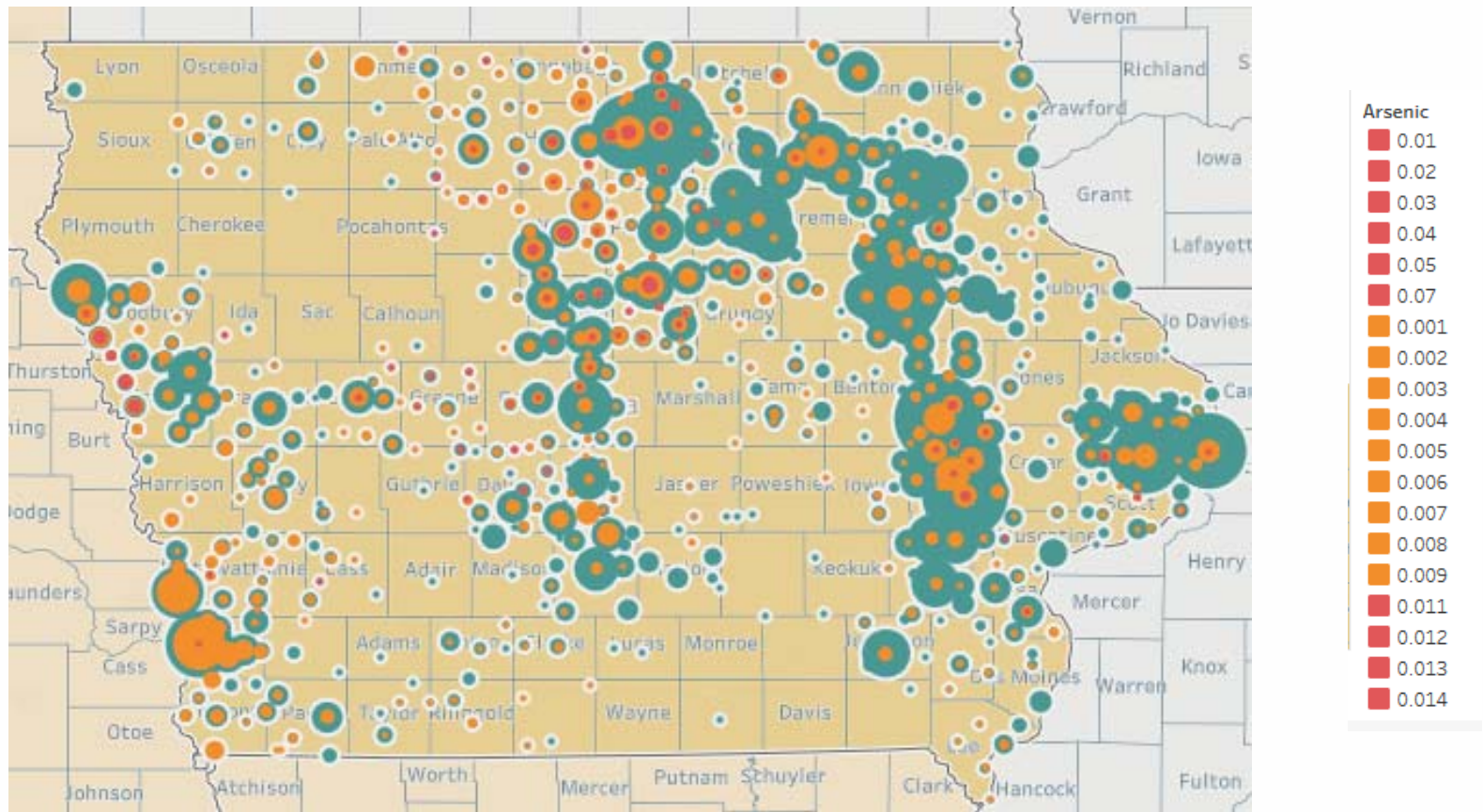
Nitrate

Arsenic

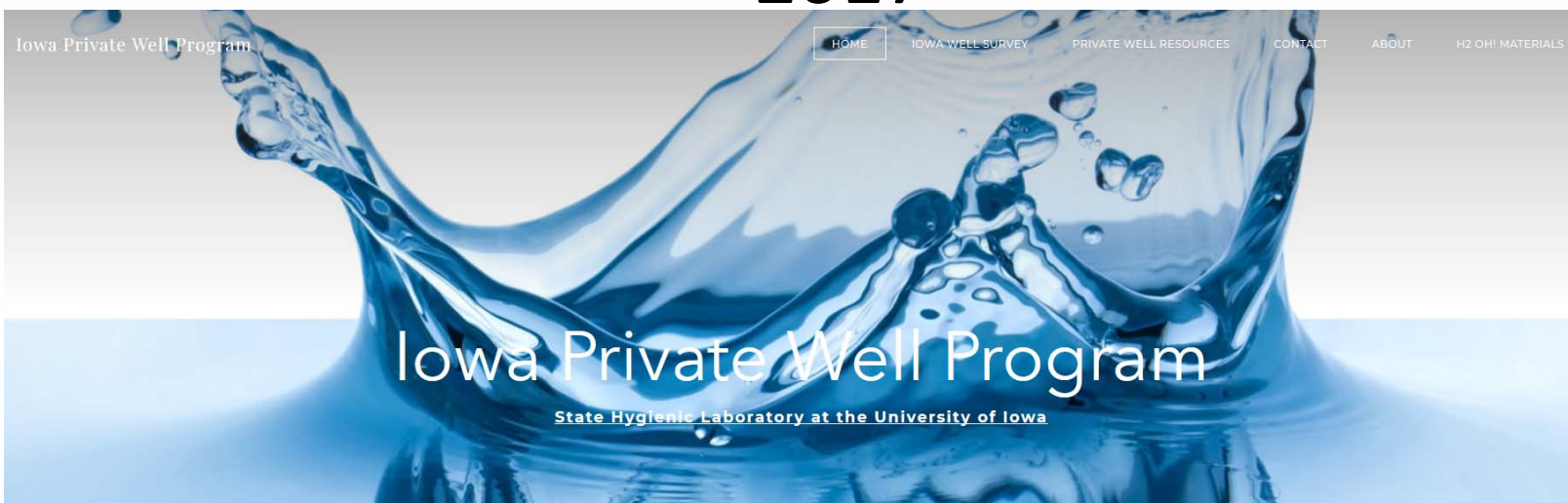
Emerging
Contaminants

Compound	Total Wells Tested	Total with Quantifiable Concentration	Total with Concentration above MCL *	% with Detected Contamination
Total Coliform Bacteria	280	100	100	36%
<i>E. coli</i>	257	9	9	4%
Nitrate as N	279	125	33	45%
Nitrite as N	282	3	1	1%
Total Arsenic	273	94	9	34%
Neonicotinoids†	280	4	4	1%
Acetochlor ESA†	116	27	27	23%
Acetochlor OXA†	116	4	4	3%

Arsenic



Iowa Well Survey 2017



Serving and supporting citizens who utilize private wells for their drinking water source.

Iowa Well Survey



Private Well Resources



Water Tests



State Hygienic
Laboratory

Iowa's Environmental and Public Health Laboratory

Sample Collection Instructions

A guide to properly collecting a drinking water sample for the Spring 2019 Iowa Well Survey.

NOTE: Always review the instructions provided with the water sampling kit. Some tests require different collection methods.



Home Buyer's Guide to Private Wells



Home Owner's Guide to Private Wells



DID YOU KNOW?

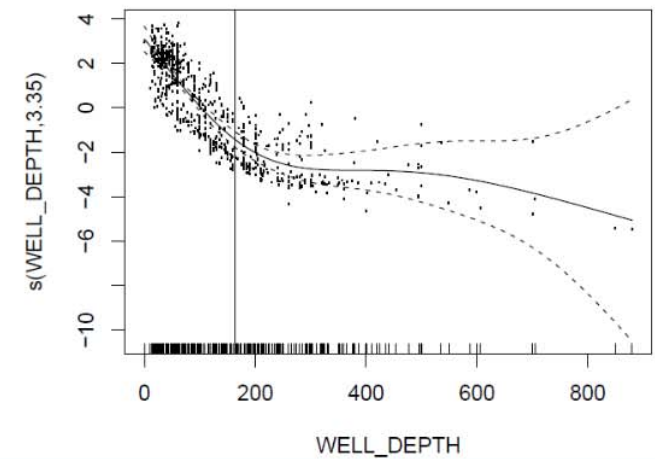
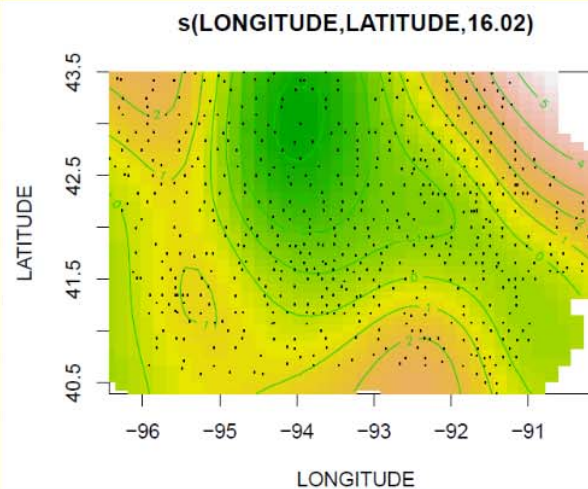
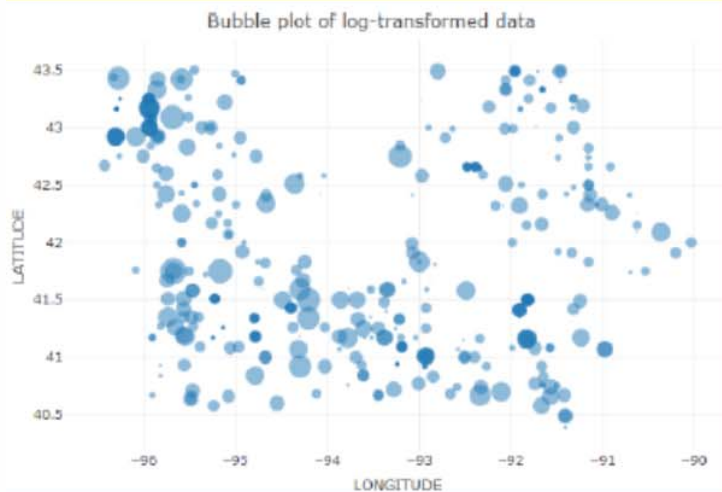
Approximately a quarter million people in Iowa depend on private wells for their household water supply.

Private well water is unregulated, and testing is not required as it is for municipal water systems.

The well owner is responsible for maintaining their well and testing the water supply.

Routine laboratory analysis can determine the presence and concentration of various contaminants in a private drinking water supply.

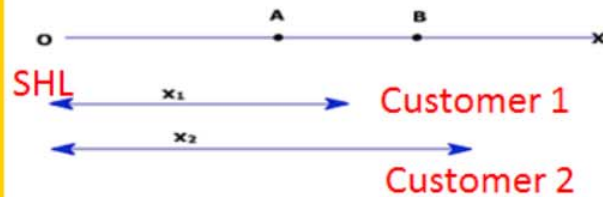
Hypothesis for Trends in Groundwater



Deep well should be >50 meters

Grants-to-Counties

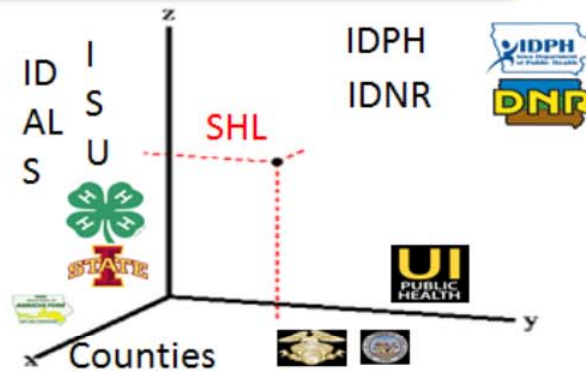
One Dimension



- Nitrogen
- Bacteria
- Arsenic

Iowa Well Survey

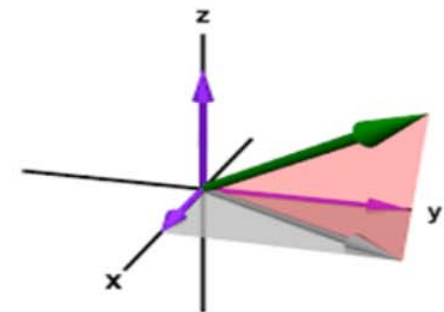
Three Dimensions



- Finance
- Scientific
- Education/Training
- Nitrogen-Nutrient Reduction Need
- Bacteria
- Arsenic
- Pesticides

A Sustainable Program

Multiple Dimensions



Research

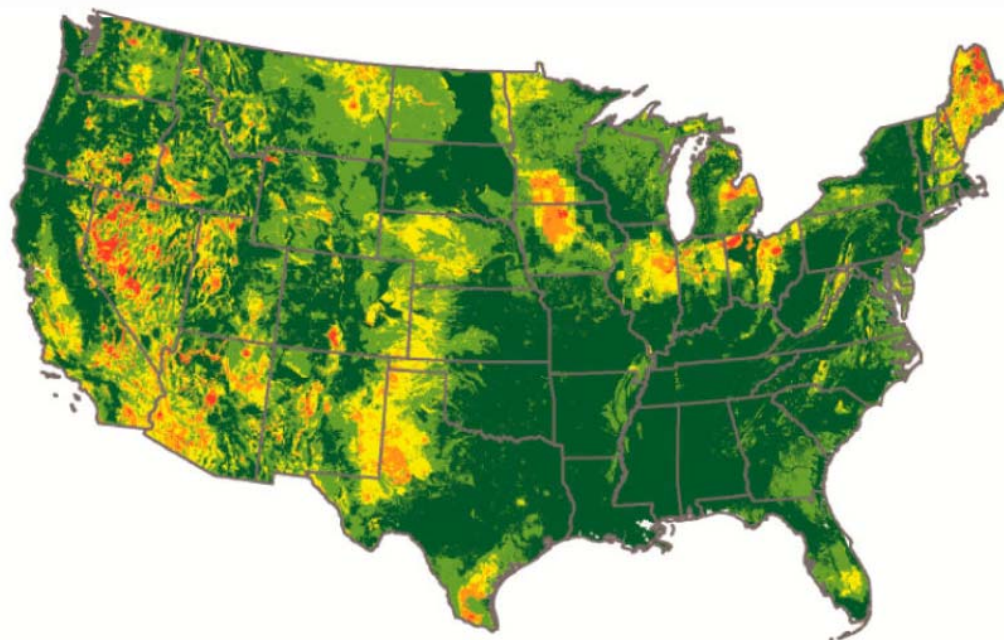
One Emerging Analyte
is One Extra
Dimension

Statistical Modeling

Neonics

Iowa Well Survey

<https://youtu.be/ZmPI9xtfR3A>



Probability of arsenic > 10 µg/L in domestic wells

Avotte et al, Environmental Science & Technology 2017 51 (21), 12443-12454

State Hygienic Laboratory



Milford



Ankeny



Coralville

State Hygienic Laboratory



State Hygienic Laboratory





HELPING KEEP **IOWANS HEALTHY** *for more than a century*

Mission: The State Hygienic Laboratory at the University of Iowa protects and improves quality of life by providing reliable environmental and public health information through the collective knowledge and capabilities of our organization.