

# Welcome to *The Current*, the North Central Region Water Network's Speed Networking Webinar Series

### **Private Well Water Quality**: 2PM CT

- 1. Submit your questions for presenters via the chat box. The chat box is accessible via the purple collaborate panel in the lower right corner of the webinar screen.
- 2. There will be a dedicated Q & A session following the last presentation.
- 3. A phone-in option can be accessed by opening the Session menu in the upper left area of the webinar screen and selecting "Use your phone for audio".

This session will be recorded and available at northcentralwater.org and learn.extension.org.



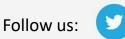




## Today's Presenters:

- Matthew Kirk, Associate Professor, Department of Geology, Kansas State University
- Linda Lee, Professor of Agronomy, Purdue University
- Katie Buckley, Water Resources Outreach Specialist, Illinois State Water Survey at the Prairie Research Institute

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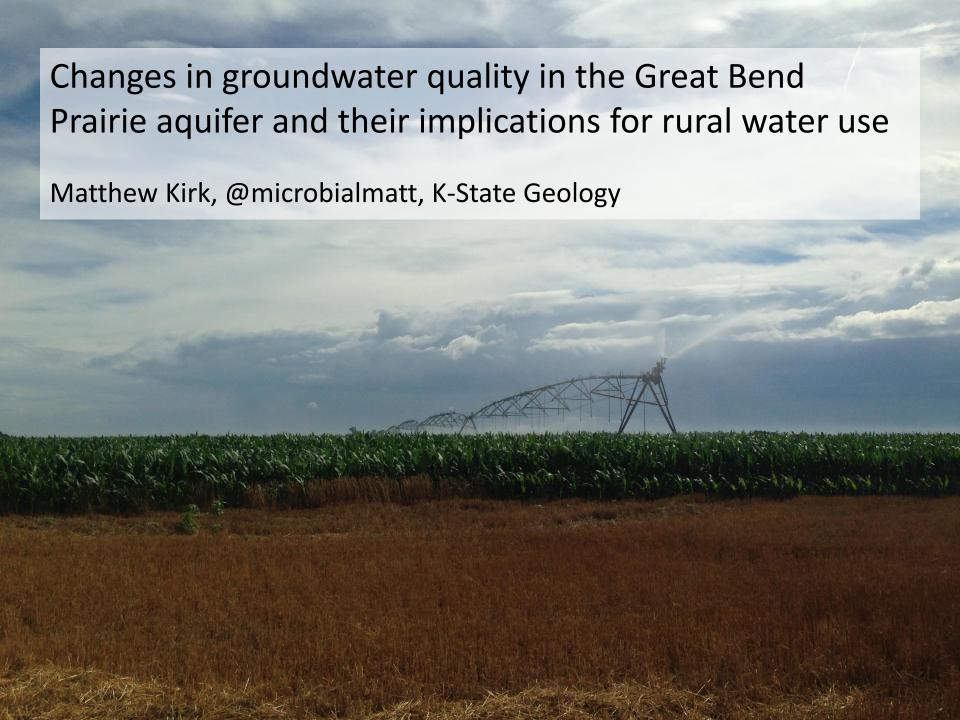
#### Matthew Kirk



Matthew Kirk is an Associate Professor in the Department of Geology at Kansas State University. He earned a PhD in Earth and Planetary Sciences at the University of New Mexico in 2008, a MS in Geology at the University of Illinois in 2004, and a BS in Geological Sciences from Bradley University in 2001. His primary area of research is groundwater chemistry and microbiology.







# The Great Bend Prairie aquifer is part of the High Plains aquifer in Kansas



Image: USGS

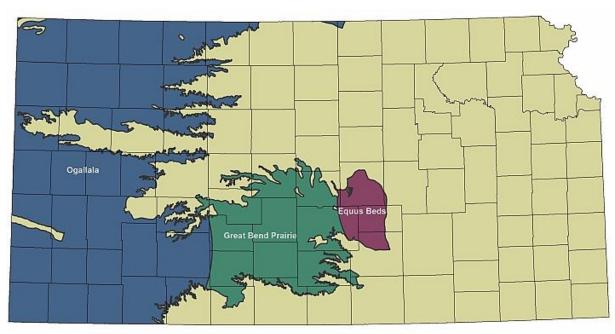
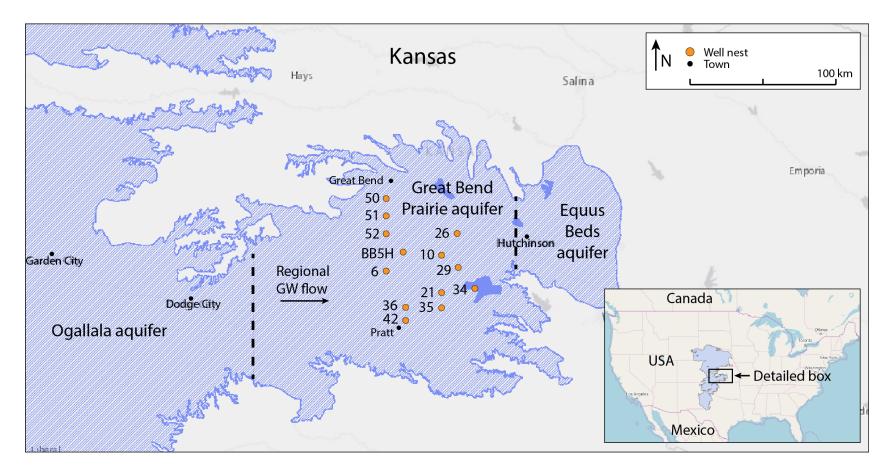


Image: KGS



### Research questions:

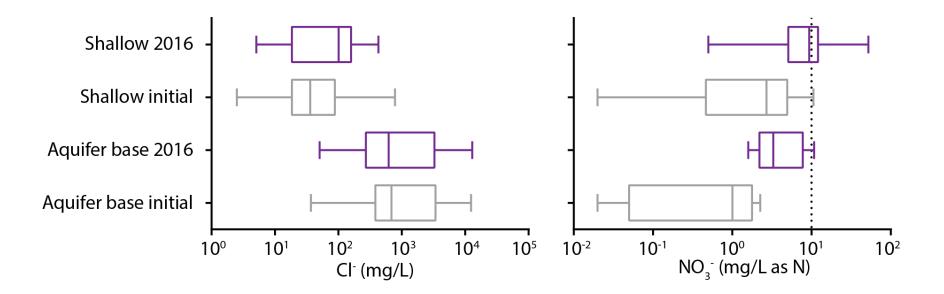
- Is groundwater quality changing?
- If so, how do changes vary with land use?



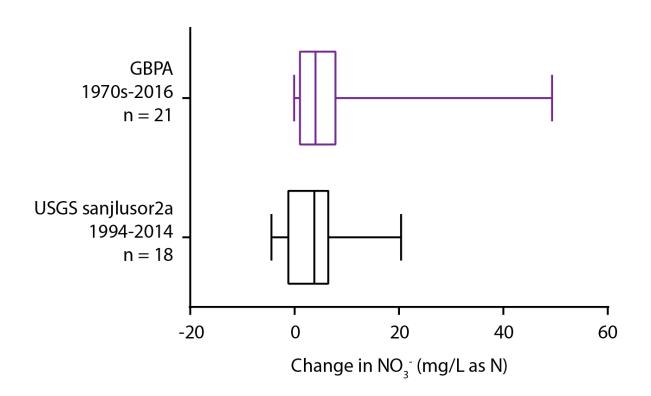
Lane et al., (2020) Hydrogeology Journal



### Most parameters changed little except for nitrate



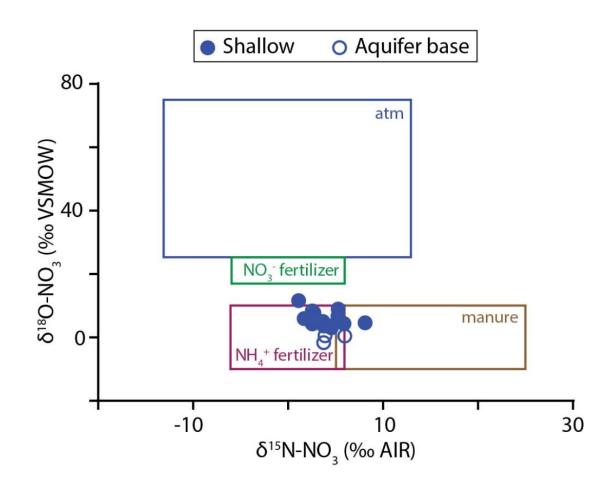
#### Observed change in nitrate is relatively large



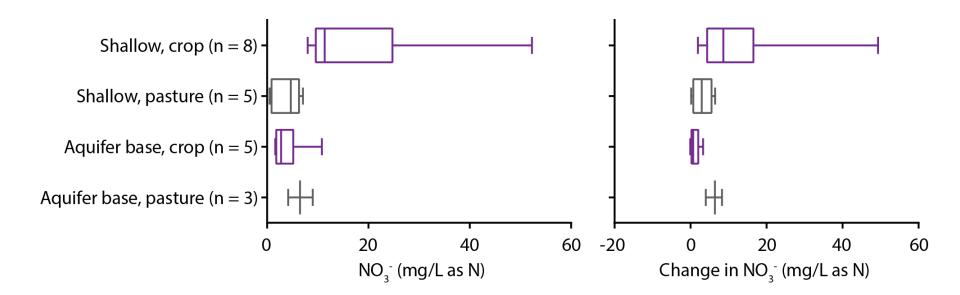
#### **USGS** data

Lindsey, B.D. and Johnson, T.D., 2018, Data from Decadal Change in Groundwater Quality Web Site, 1988-2014, Version 2.0: U.S. Geological Survey data release, https://doi.org/10.5066/F7N878ZS

## Main nitrate source is nitrification of ammoniumbased fertilizer



# Increases were largest in shallow wells located in areas with crops





- Irrigation = 0.67 MAFY
- Industrial + stock use = 50,000 AFY
- Public water supply = 29,000 AFY (130,000 people)
- Domestic use = 3,000 AFY (33,000 people)

Data: final report for Hydrologic model of Big Bend Groundwater Management District No. 5 (2010) Balleau Groundwater, Inc. <a href="https://gmd5.org/district-hydrologic-model">https://gmd5.org/district-hydrologic-model</a>

### Implications for public health

- More data needed to assess exposure in private wells
- Well owners should periodically check water quality
- Local resources:
  - Kansas Department of Health and Environment, Topeka, KS http://www.kdheks.gov/wellwateraware/guidance\_documents.htm
  - Barton County Environmental Management Division, Great Bend, KS https://www.bartoncounty.org/vnews/display.v/ARTEXP/517ae9525474c

### Acknowledgements

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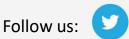




#### Linda Lee



Linda Lee is a professor at Purdue University in the Agronomy Department. She joined Purdue in 1993 after completing a BS (Chemistry), MS (Environmental Engineering) and PhD (Soil chemistry & Contaminant hydrology, Soil & Water Sciences Dept.) at the University of Florida. Her research focus is on understanding the processes that govern environmental fate and remediation of contaminants in various media for use in contamination mitigation, decision tools and management guidelines in both industrial and agricultural settings. For the past 15 years, she has focused on PFAS research in the environmental behavior, occurrence and remediation. She has served on multiple national and international advisory groups addressing water quality issues, fair land-applied biosolid policies, and chemical risk prediction and management.





# PFAS Sources, Conduits and Impacts to Private Well Water Impacts

Linda S. Lee

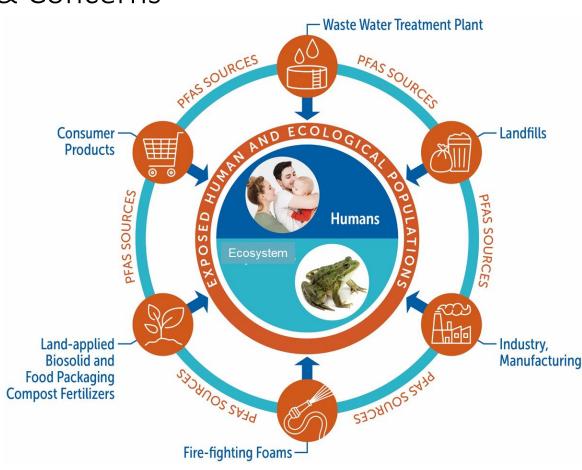


March 11, 2020

North Central Region Water Network Speed Networking Webinar Series

# Per & polyfluoroalkyl substances (PFAS) PFAS Sources, Conduits & Concerns

- For most rural communities, sources are typically:
  - Atmospheric deposition
  - Land application of biosolids or composted material
  - Treated municipal effluent irrigation
  - Pesticide applications



What are PFAS?  Numerous subclasses  Numerous perfluoroalkyl acids  (PFAAs)	Sub-classes of PFASs		peer-reviewed es since 2002**
What are PFAS?		• PFBA (n=4)	928
		o PFPeA (n=5)	698
	•	o PFHxA (n=6)	1081
1.0(05)		O PFHpA (n=7)	1186
TIPCIO 1	ICEO	O PFOA (n=8)	4066
as Sub a sund!	PFCAso	o PFNA (n=9)	1496
TAC DIO	(C <sub>n-1</sub> F <sub>2n-1</sub> -COOH)	o PFDA (n=10)	1407
alimely a DEAJ P	11-1 211-1	O PFUNA (n=11)	1069
NUI AND FIRE		o PFDoA (n=12) o PFTrA (n=13)	1016 426
A SUO		o PFTeA (n=14)	587
> 410°			
		• PFBS (n=4) • PFHxS (n=6)	654
anti y	PFSAs o	O PFOS (n=8)	1081 3507
Current	$(C_nF_{2n+1}-SO_3H)$	o PFDS (n=10)	340
perfluoroalkyl acids o-	n' 2n+1 303' 17		
(PFAAs)		<ul> <li>PFBPA (n=4)</li> <li>PFHxPA (n=6)</li> </ul>	3
(FFAAS)	PFPAs •	o PFOPA (n=8)	33
	$(C_n F_{2n+1} - PO_3 H_2)$	o PFDPA (n=10)	35
	2n+1 · 3 · 2		
		<ul><li>C4/C4 PFPiA (n,m=4)</li><li>C6/C6 PFPiA (n,m=6)</li></ul>	4
	PFPiAs o	• C8/C8 PFPIA (II,III=8)	12 12
	$(C_n F_{2n+1} - PO_2 H - C_m F_{2m+1})$	O C6/C8 PFPIA (n,m=8)	8
	(-n. 2n+1 -2m. 2m+1)		-20
_		<ul> <li>ADONA (CF<sub>3</sub>-O-C<sub>3</sub>F<sub>6</sub>-O-CHFCF<sub>2</sub>-COOH</li> <li>GenX (C<sub>3</sub>F<sub>7</sub>-CF(CF<sub>2</sub>)-COOH)</li> </ul>	
/ P	PFECAs & PFESAs	• EEA (C <sub>2</sub> F <sub>5</sub> -O-C <sub>2</sub> F <sub>4</sub> -O-CF <sub>2</sub> -COOH)	26
/ (C_F_	$_{n+1}$ -O-C <sub>m</sub> $F_{2m+1}$ -R)	F-53B (CI-C <sub>6</sub> F <sub>12</sub> -O-C <sub>2</sub> F <sub>4</sub> -SO <sub>3</sub> H)	14
/ \-n 2	n+1m· 2m+1 ··/		
		<ul><li>MeFBSA (n=4,R=N(CH<sub>3</sub>)H)</li><li>MeFOSA (n=8,R=N(CH<sub>3</sub>)H)</li></ul>	25
		• EtFBSA (n=4,R=N(C,H <sub>c</sub> )H)	134
	PASF-based	• EtFOSA (n=8,R=N(C <sub>2</sub> H <sub>e</sub> )H)	259
PFASs •		MeFBSE (n=4,R=N(CH <sub>3</sub> )C <sub>2</sub> H <sub>4</sub> OH)	24
$(C_nF_{2n+1}-R)$	substances	MeFOSE (n=8,R=N(CH <sub>2</sub> )C <sub>2</sub> H <sub>4</sub> OH)	116
(Cn. 2n+1 1)	$(C_n F_{2n+1} - SO_2 - R)$	EtFBSE (n=4,R=N(C,H,OH)	- 4
		o EtFOSE (n=8,R=N(C <sub>2</sub> H <sub>5</sub> )C <sub>2</sub> H <sub>4</sub> OH)	146
> over 3000		O SAMPAP {[C <sub>8</sub> F <sub>17</sub> SO <sub>2</sub> N(C <sub>2</sub> H <sub>6</sub> )C <sub>2</sub> H <sub>4</sub> O] <sub>2</sub> -PO <sub>2</sub> H}	- 8
PFASs may PFAA		o 100s of others	
have been precursors		○ 4:2 FTOH (n=4,R=OH)	106
on the global		6:2 FTOH (n=6,R=OH)	375
market	fluorotelomer-based	0 8:2 FTOH (n=8,R=OH)	412
market	substances	0 10:2 FTOH (n=10,R=OH)	165
		0 12:2 FTOH (n=12,R=OH)	42
	$(C_n F_{2n+1} - C_2 H_4 - R)$	6:2 diPAP [(C <sub>6</sub> F <sub>13</sub> C <sub>2</sub> H <sub>4</sub> O) <sub>2</sub> -PO <sub>2</sub> H]	23
		<ul> <li>8:2 diPAP [(C<sub>8</sub>F<sub>17</sub>C<sub>2</sub>H<sub>4</sub>O)<sub>2</sub>-PO<sub>2</sub>H]</li> <li>100s of others</li> </ul>	25
		o polytetrafluoroethylene (PTFE)	
	fluoropolymers	o polyvinylidene fluoride (PVDF)	
otherso	•	<ul> <li>fluorinated ethylene propylene (FEP)</li> <li>perfluoroalkoxyl polymer (PFA)</li> </ul>	
others			
	o perfluoro	polyethers (PFPEs)	

\* PFASs in **RED** are those that have been restricted under national/regional/global regulatory or voluntary frameworks, with or without specific exemptions (for details, see OECD (2015), Risk reduction approaches for PFASs. http://oe.cd/1AN). \*\* The numbers of articles (related to all aspects of research) were retrieved from SciFinder® on Nov. 1, 2016.

Source: Wang et al., 2017, ES&T, 51:2508-2518

## Examples of state-specific reactions to PFAS in water sources, effluent, biosolids and soils

- Recent CA proposed drinking water (dw) notification limits of 6.5 PFOA and 5.1 PFOS
- Michigan\* Surface water for human fish consumption PFOS limit: 12 ppt Clean, typical

Alaska, 2016 - Proposed migration-to-groundwater soil cleanup levels:

PFOA:  $1.7 \mu g/kg$  (ppb)

PFOS: 3 µg/kg

effluent can't meet that.

- New York interim preliminary screening level for one specific permit: PFOA + PFOS: 72 μg/kg Typical biosolids *can* meet this.
- Maine sludge/biosolids program licensees and sludge/biosolids composting facilities

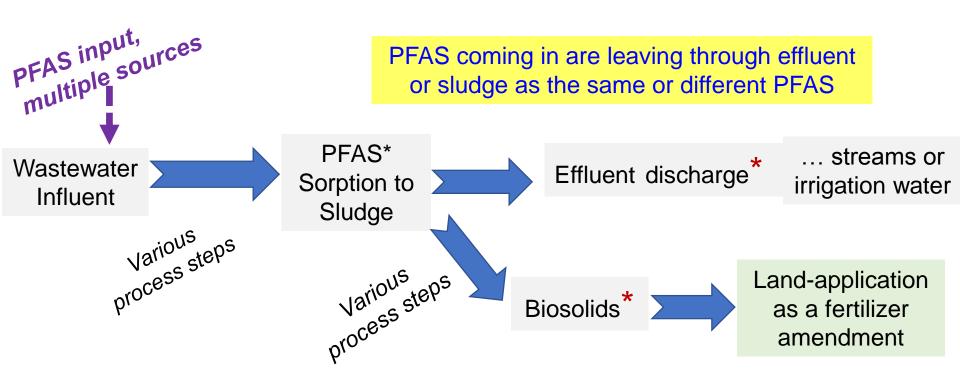
PFOA: 2.5 μg/kg Typical biosolids or commercial OFMSW

PFOS: 5.2 μg/kg **←** composts can't meet these levels.

PFBS: 1900 μg/kg

\*Michigan - about to adopt 8 ppt PFOA for drinking water limit - will lead to a default soil screening value of 0.16 ppb PFOA

#### **WWTPs** as Conduits



<sup>\*</sup> Quantified PFAS levels often higher due to 'precursor' degradation to what is commonly quantified: PFAA subclass

#### PFAS Subclass Perfluoroalkyl acids (PFAAs) vs Other PFAS

# OTHER PFAS: PFAA Precursors



In soils, during composting, in WWTP processes, etc.

PFAS Intermediates (multiple steps)

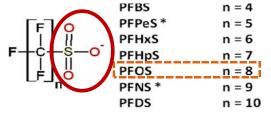
**PFAAs** 



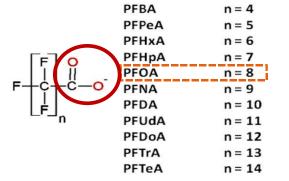
Persistent
Anionic (-), low pK<sub>a</sub>
More soluble
More mobile

PFAAs = PFCAs + PFSAs terminal microbial metabolites

#### Perfluoroalkylsulfonic acids



#### Perfluoroalkylcarboxlic acids



C1 Methane

C2 Ethane

C3 Propane

C4 Butane

C5 Pentane

C6 Hexane

C7 Heptane

C8 Octane

C9 Nonane

C10 Decane

C11 Unodecane

C12 Dodecane

C13 Tridecane

C14 Tetradecane

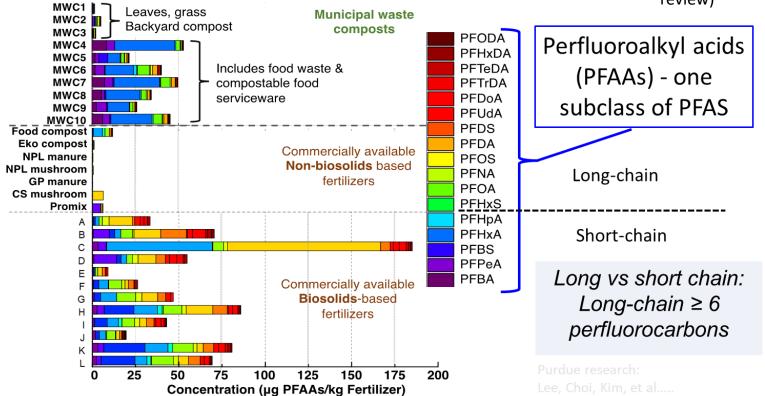
Source: Backe et al., 2013

➤ Short vs long terminology (perfluoroalkyl carbons)

Long-chain have 6 or more perfluoro carbons

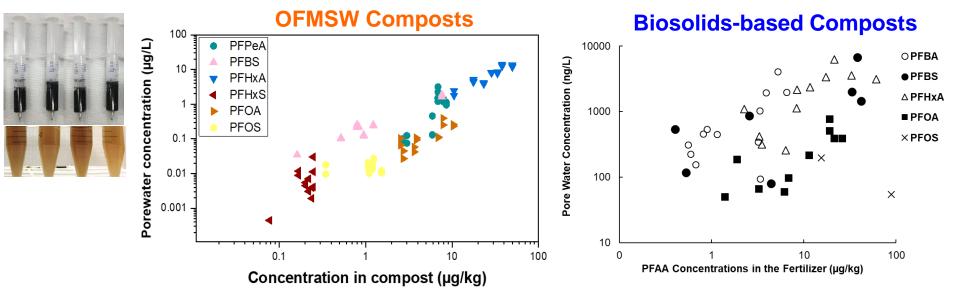
#### PFAS in Waste-based Fertilizers

Choi, Lee et al., 2018 (EST Letters) Kim Lazcano, Lee et al., (EST in review)



Concerns of PFAS in packaging especially food packaging is leading to some statespecific actions but not at the Federal level yet (this would be under FDA ruling)

#### Release to porewater: Subset of PFAA Pore-water Concentrations



- Overall increasing PFAA 'release' concentrations with increasing PFAA load
- Some PFAA pore-water concentrations >> provisional guidance levels
- HOWEVER, PFAAs will be *diluted* and *attenuated* depending on the application site characteristics, management and chain length.

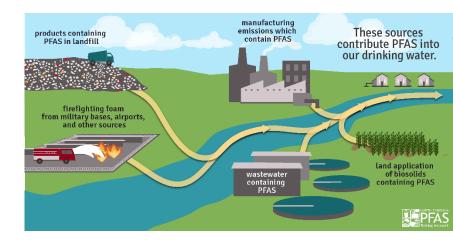
# Precautionary Principle? Given that PFAS are 'Forever' Chemicals, should we just ban composts and biosolids from land-application?

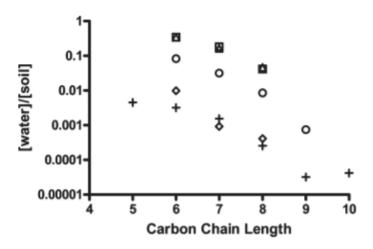


- Good carbon source and slow release nitrogen to soils and reduce wastes going to landfills, etc.
- Banning places a heavy burden on public municipalities and up to an order of magnitude in cost
- Banning could lead to numerous unintended consequences
  - Incineration we don't know if our current incinerators actually breakdown PFAS, thus we could be spewing partial breakdown products in the atmosphere (creating more PFAS that we have now)
  - Landfilling legacy and then we have to deal with PFAS in leachate which often goes right back to the municipal water treatment plants
  - Focus on regulating nonessential uses of PFAS & ban them from use in food packaging, carpets, etc.

# Transport to Water Supplies

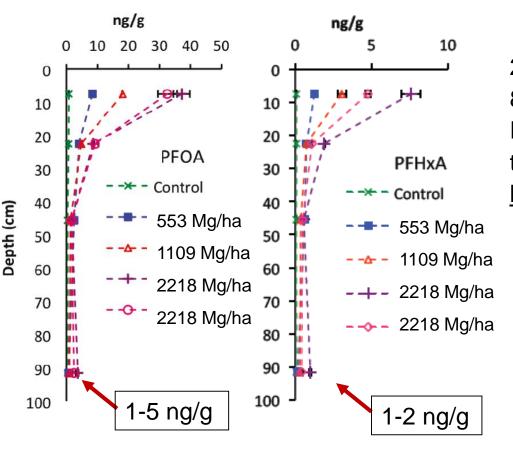
- Migration from contaminated soil to groundwater acts as a major exposure pathway
- Precursor transformation to more mobile PFAAs can occur during transport
- Dilution and attenuation typically occurs during transport
- Attenuation dependent on PFAS subclass
  - · Chain length dependent
  - · Longer chains move slower
  - Shorter chains more mobile and current 'dose' levels expected to cause adverse effects are substantially higher
- Surface water to groundwater complicated





Lindstrom et al., 2011 (EST, Industrial-impacted biosolids)

# Field studies are limited and mostly to industrially-impacted sites, but once land-applied.....



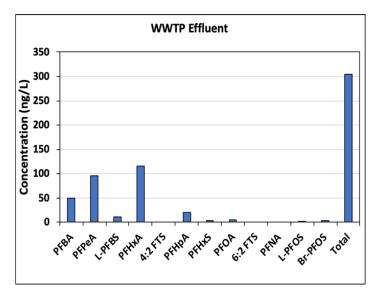
2004-2007 Chicago MWWTP biosolids 8-68 ng/g PFOA & 80-219 ng/g PFOS PFOA & PFHxA with depth in long term plots at various <u>cumulative</u> loading

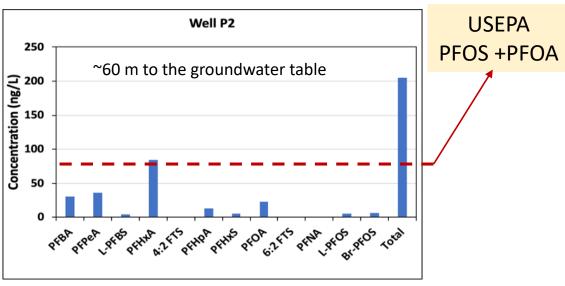
- PFAA transport does occur
- Dilution does occur

Sepulvado et al., 2011, EST, 45:8106-8112 (IL, USA)

#### Spray Irrigation with Municipal Treated Wastewater

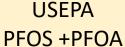
Transport Example: Penn State Living Filter, 2019 preliminary data Preisendanz and Lee

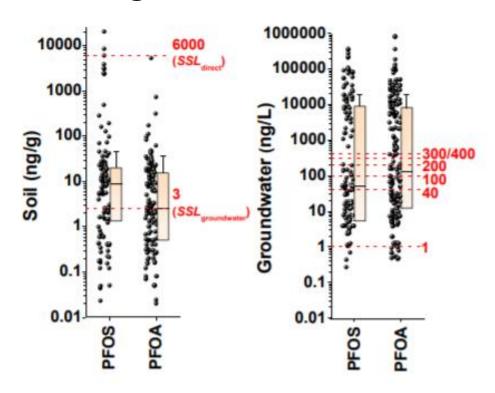


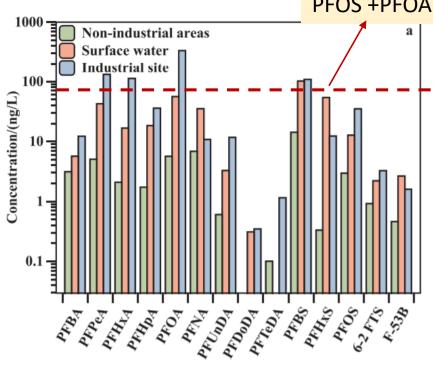


- PFAS in effluent sample likely typically of most municipal WWTPs not receiving AFFFs, industrial inputs or landfill inputs
- PFAAs do transport to groundwater with shorter chains more mobile
- PFOS and PFOA values: Well > effluent likely due to precursor degradation

## Soil to groundwater (example using data from China)





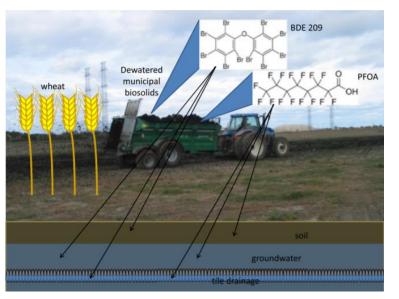


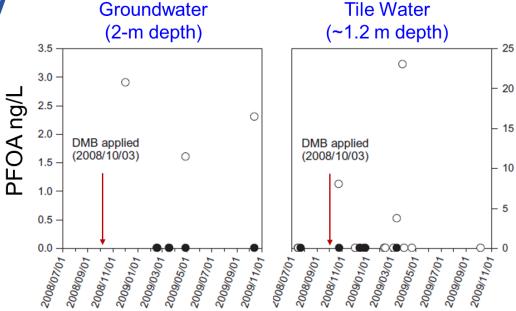
ppb (μg/l) levels to ppt (ng/L)

 Non-industrial levels: generally < guidance levels

Wei et al., 2018 (Ecotox & Environ. Safety)

#### Tiled-drained field study





- Dewater Municipal Biosolids (DMB), 22 Mg dw ha<sup>-1</sup>
- PFAAs in DMB were in the low ng/g dry weight levels
- Other than PFOA, other PFAAs general < 2 ng/L (ppt)</li>

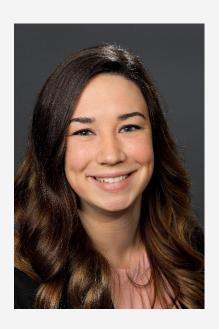
Gottschall, Topp et al, 2017, Sci. Total Environ. 574:1345–1359 (Ottawa, Canada)

#### Measurable ≠ Toxic

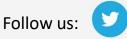
- Innovations have resulted in the ability to measure chemicals at very low levels - parts per trillion (ppt) and even per quadrillion (ppq)
- Detecting more now does not mean our environment is more dangerous now then before....
- Surface water to groundwater interactions are complex – source may be large distances from where PFAS are found in wells
- Acceptable levels of PFAS in our water with regards to human health are still not clear......
- Data are sparse for private wells



## Katie Buckley



Katie Buckley is a Water Resources Outreach Specialist with the Illinois State Water Survey at the University of Illinois Urbana-Champaign. She has been working on the Private Well Class program (privatewellclass.org) since 2015. The Private Well Class program uses a combination of online and in-person methods to boost knowledge and competency of private well owners and professionals that serve well owners' day to day. Katie has a Master's Degree in Environmental Science from the University of Illinois at Springfield and a Bachelor's Degree from Ohio University. She has previously worked with the Illinois Environmental Protection Agency and Illinois Water Resources Center.





# Resources to Support Private Well Owners & Stakeholders

Katie Buckley, Water Resources Outreach Specialist
Illinois State Water Survey at the Prairie Research Institute
University of Illinois
PrivateWellClass.org









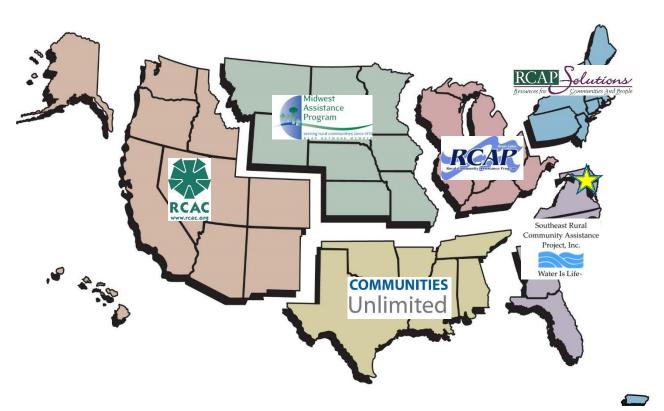
This program was developed by the University of Illinois for RCAP and is Sponsored, Funded, & Supported By the Above Organizations





#### **Rural Community** Assistance Partnership

Practical solutions for improving rural communities



#### **RCAP National Office**

1701 K St. NW, Suite 700 Washington, DC 20006 (800) 321-7227 www.rcap.org | info@rcap.org

#### Western RCAP

**Rural Community Assistance Corporation** (916) 447-2854 www.rcac.org

#### Midwest RCAP

**Midwest Assistance Program** (952) 758-4334 www.map-inc.org

#### Southern RCAP

**Communities Unlimited** (479) 443-2700 www.communitiesu.org

#### Northeast RCAP

**RCAP Solutions** (800) 488-1969 www.rcapsolutions.org

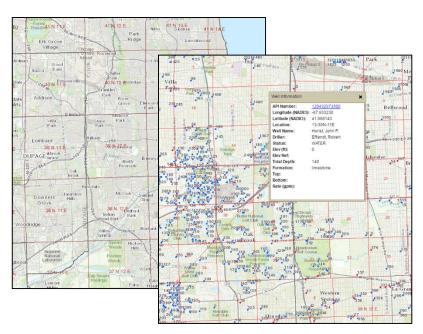
#### **Great Lakes RCAP**

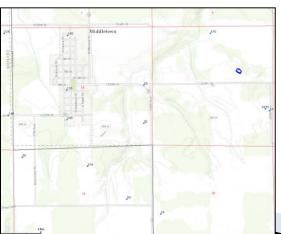
**WSOS Community Action Commission** (800) 775-9767 www.glrcap.org

#### Southeast RCAP

**Southeast Rural Community Assistance Project** (866) 928-3731 www.southeastrcap.org

## Who are Well Owners?





- Come from every social, economic, and educational class.
  - Demographic differences
  - Behavior differences
- May have been on a well for their entire life or could be new to well ownership.
- Could be in a very rural area, or in a completely urban setting like Cook County, Illinois (Chicago).

# No "One Size Fits All" Approach

- How do we reach well owners?
- Understanding local context.





# Overall Goal of Educating Well Owners/Stakeholders

• Public Health Protection

Source Water Protection





# Biggest Issues Affecting Private Well Drinking Water Quality

Poor Well Construction

 Lack of Well Owner Knowledge and Education



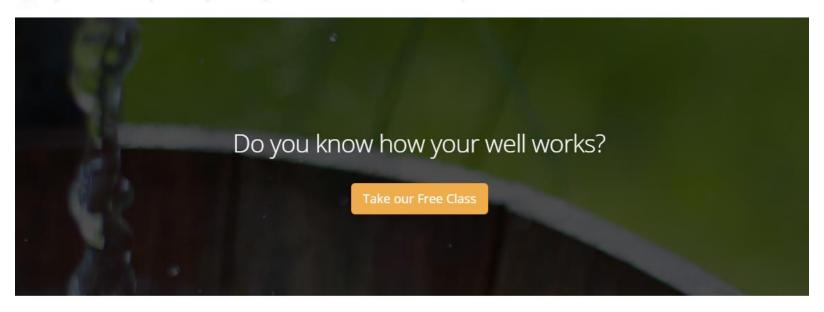
# The Private Well Class

- A series of 10 lessons sent to participants via email over 10 weeks. Self-paced.
- Webinars that will provide specific information supporting the 10 lessons, giving participants a chance to ask questions. (6 topic centered)
- The website, <u>www.PrivateWellClass.org</u>, serves as a resource to private well owners.
- Multimedia lessons (videos, podcasts, webinars)





▲ Did your well **flood**? Boil your drinking water until you can follow these instructions to ensure your well water is safe.





CLASS

#### LEARN BY EMAIL

Take our flagship course to get 10 lessons in your email inbox, one per week.



#### LEARN BY AUDIO

Subscribe to our podcast to learn about private well care while on the go.



#### LEARN BY VIDEO

Get answers to specific questions with video lessons and webinar recordings.

### Why It's Important

Now that we have an idea of how water is stored in the ground and how geology affects its movement and availability, we are going to look at how it moves to your well and what can happen as it does. In particular, we'll discuss how water level, flow, and water quality can be affected when pumping a well. You'll also learn how contaminants can move with groundwater, or be affected by groundwater flow and pumping. This lesson will give you the background to understand how pumping your well can influence groundwater flow. It will also give you a better idea of the value of source water protection.

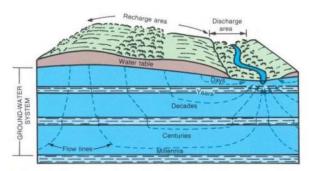


Figure 2.1 Recharge. Waller, Roger M., Ground Water and the Rural Homeowner.

#### Groundwater Flow

In a groundwater system, water flows naturally according to the hydraulic pressure put on the system. The flow can be horizontal through a geologic unit, or vertical through several different geologic units, or sometimes some of both. In Lesson 1, we used Figure 1.1 to show natural groundwater movement. The thin layers with horizontal dashes in Figure 2.1 represent confining layers (aquitards) that separate the aquifers, shown in blue. As you can see in the figure, because the high point of the water table is near the left edge, water is flowing downward from the high point toward areas of lower water levels in both directions (lower levels = less pressure).

If separated by confining layers, water levels in different aquifers at a single location can be very different. When an aquifer has the water table as its upper saturated surface, that aquifer is called a water table aquifer. Water table aquifers aren't completely saturated in there is air in the pore spaces in the aquifer material above the water table. In other words, the water level in a water table well is at the water table elevation, which is below the top of the aquifer.

When an aquifer is below a confining unit, the situation is different. Wells in confined aquifers can have water levels above the top of the aquifer. This happens when the confined aquifer is getting recharge from a location with a much higher water level. Figure 2.2 shows a simple system with a water table well in a shallow

## 2. Groundwater and Well Contamination

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## 1. The Science of Groundwater

- · Water Quality Information for Consumers, Cornell University Cooperative Extension.
- Well Owner's Guide to Water Supply, Texas Well Owner Network, Texas A & M AgriLife Extension.
- Raymond, Lyle S. What is Groundwater? Bulletin No. 1, July 1988, New York State Water Resources Institute, Cornell University Center for Environmental Research.
- Raymond, Lyle S. Aquifers. Bulletin No. 3, August 1992, New York State Water Resources Institute, Cornell University Center for Environmental Research.
- · Well Owner's Handbook, Environmental Health Division, Minnesota Department of Health.
- Waller, Roger M., Ground Water and the Rural Homeowner, USGS, 1994.
- Groundwater Hydrology, National Ground Water Association Website.
- Iowa's Groundwater Basics, Iowa Geological Survey Educational Series 6, Iowa Department of Natural Resources.
- Groundwater in Ohio, Feb 2010, Ohio EPA.

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## 2. Groundwater & Well Contamination

- Gaber, Michael S. Michigan Flowing Well Handbook, March 2005, Michigan DEQ.
- Raymond, Lyle S. Aquifers. Bulletin No. 3, August 1992, New York State Water Resources Institute, Cornell University Center for Environmental Research.
- Raymond, Lyle S. Groundwater Contamination. Bulletin No. 2, November 1988, New York State Water Resources Institute, Cornell University Center for Environmental Research.
- . Trautman, N., K. Porter, and R. Wagenet. Groundwater: What It Is and How to Protect It, December 1985, Cornell Cooperative Extension Service.
- · Groundwater Study Guide, 2006, Wisconsin Department of Natural Resources.
- · Waller, Roger M., Ground Water and the Rural Homeowner, USGS, 1994.
- Water Well Owner's Handbook, March 2010, Oregon Water Resources Department.
- Sources of Groundwater Contamination, The Groundwater Foundation.
- State Water Quality Profiles, WellOwner.org.



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### Well Care Videos

## What Environmental Health Professionals Need to Know about Private Wells - Recorded Live on March 3, 2020

This webinar recording discusses private well topics that environmental health professionals might encounter in the field. The webinar will answer questions such as:

- · Challenges and issues that environmental health professionals face,
- · Groundwater, wells, and well owner attitudes, and
- · Gaps between groundwater and health professionals.



### Categories

- Training Videos (21)
- Webinar Recordings (65)
- ▶ For environmental health professionals (13)
- ▶ For laboratory professionals (3)
- For real estate professionals (7)
- For septic system owners (6)
- For well owners (39)



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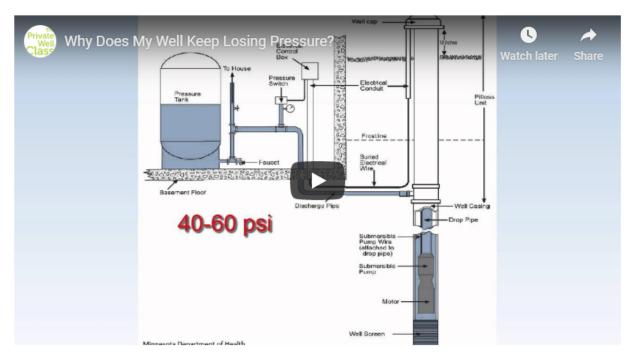
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## Why Does My Well Keep Losing Pressure?

Private water systems rely on pressure tanks to supply pressurized water to the home. Incorrect tank sizing and other tank problems can lead to loss of water pressure at the faucet. Watch the video to learn more.



### Categories

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  - ▶ For well owners (39)
- Visit our YouTube channel

Click here to sign up for our free well care e-course.







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## 2019 Private Well Conference - Recorded Live May 21-23, 2019

Maugust 30, 2019 By & Katie Buckley

E For environmental health professionals, For laboratory professionals, For real estate professionals, Webinar Recordings

Svideo 90

The 2019 Private Well Conference, held May 21-23, 2019 in Harrisburg, PA, was a national workshop that united the private well community and emphasized the importance of collaboration and partnerships.

The conference is a one of a kind event with national scope and exclusive focus on private wells. The 126 attendees from 33 states at the two and a half day event included educators, public health professionals, drillers, researchers, and other stakeholders who shared new ideas in outreach and experiences with private wells and private well owners. The conference included 25 presentations, a driller's panel, and twelve 5-minute lightning talks!

The 2019 Private Well Conference Presentations playlist.

This is the 2nd National Private Well conference, the 2017 Private Well Conference presentations are also available online.



#### Categories

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  - ▶ For well owners (39)
- Visit our YouTube channel

# **Assessment Tool**

- The U of I put together a national workgroup of experts from extension and public health; also groundwater hydrologists and drillers, to develop a tool to assess risk of an individual well.
- The goal was to create a tool that can be used by a qualified health, groundwater or extension person to help a well owner understand their potential risks and vulnerabilities.
  - Site assessment
  - Well assessment
  - Geologic assessment
  - Recommendations
- Plus opportunity to raise awareness about testing, BMP's understanding vulnerable geologies or well construction.



# **Assessments Provide Support For Well Owners**

- Assessment tool to evaluate risk and well vulnerability
- Like a sanitary survey for private wells
- Educate well owners about their specific situation and well
- Promote best practices
- Encourage communication and increase well owner awareness of issues





#### PRIVATE WELL/SPRING ASSESSMENT

Date					
	D	А	٠	ρ	×

SECTION 1: ASSESSOR INFORMATION	
Name: Affiliation:	
Email:	
Phone:	O Mobile O Home O Work
SECTION 2: WELL/SPRING PARTICIPANT INFORMATION	
Name: Address:	
Email:	
Phone: Alt. Phone:	
Reason for Assessment:	
Well/Spring Address (if different):  Owner Nam	e (if different):
Owner Address:	
Owner Phone: Send Copy?	? O Yes O No Years at address:
Well/Spring Location (latitude/longitude preferred):	
How was the location determined?	le Mape / Google Farth
Water Source: O Well O Spring State/Count	ty Wel THE PRIVATE WELL  CLASS  HOME AROUT US ENROLL IN CLASS V WEBINARS & EVENTS V RESOURCE LIBRA
SECTION 3: WATER USE	HOME ABOUT US ENROLL IN CLASS V WEBINARS & EVENTS V RESOURCE LIBRA
Does the participant drink this water? O Yes O No Animal cons	WellAssess Mobile App
If no, why not?	- Well/ Bacas Mobile / Op
Any history of water loss or supply interruption? O Yes O No	Do you help private well owners? The Well/Assess app provides an electronic assessment form for professionals to evaluate potential risks to public health and safety of the well user.
If yes, please explain:	WellAssess is a companion to our paper-based risk assessment tool, which outlines a comprehensive process for evaluating private well owner public health risks based on geology, well and well system construction, site factors, well owner practices, and nearby land use.
Is the well shared with any other homes or properties? $ \hbox{O Yes}  \qquad \hbox{O No}  \qquad \hbox{If yes,} $	how n  Effective use of the app requires the user to have substantial private well experience. Both the paper-based form
Is the home served by both a private well or spring and a public water system?	and this app are designed to support one-on-one work with a well owners, as it is necessary to explain what the collected information means in relation to health and safety risks.
If PWS, which one?	TECHNICAL INFORMATION GET IT ON
List water use for this well/spring (check all that apply and describe):	The app is available for Android and iOS devices. It has been optimized for use on a tablet and may not perform as expected on a mobile phone.
☐ Household (total number of people served by well/spring):	HOW TO CET HELD
☐ Livestock (type and total number of each type):	1-866-522-2681 App Store
☐ Garden (approximate area in square feet):	☐ info@privatewellclass.org

SECTION 2: WELL/SPRING PARTICIPANT INFORMATION			
Name: Dan	Address:		
Email: @ illinois. edu			
Phone:	Alt. Phone:		
Reason for Assessment: Cuniosity			
Well/Spring Address (if different):	Owner Name (if different):		
Owner Address:			
Owner Phone:	Send Copy? Yes □ No		
Well/Spring Location (latitude/longitude preferred): 40 · 1925	32, -88. 433393		
	GPS Google Maps / Google Earth		
Water Source:	State/County Well ID:		
SECTION 3: WATER USE			
Does the participant drink this water? 💢 Yes 🗆 No	Animal consumption? XYes \( \subseteq No \( \rho \) Pets		
If no, why not?	•		
Any history of water loss or supply interruption?	(No		
If yes, please explain:			
Is the well shared with any other homes or properties?	No If yes, how many homes?		
ls the home served by both a private well or spring and a public water s	system? 🗆 Yes 💢 No 🗆 Don't know		
If PWS, which one?			
List water use for this well/spring (check all that apply and describe):			
Household (total number of people served by well/spring):			
를 하는 사람이 되고 있다면 보다는 이 사람들이 가지 않는데 함께 되었다. [20] 이 사이를 하는데			

# The Impact of the Private Well Class

- Over 8,000 class participants in 5+ Years
- 20,000 webinar attendees
- 300 webinar views a month
- 30,000 video views a month
- We answer questions daily, phone & email





# **Contact Information**





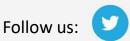


## **Question and Answer Session**

We will draw initial questions and comments from those submitted via the chat box during the presentations.

## **Today's Speakers**

Matthew Kirk – <u>mfkirk@ksu.edu</u> Linda Lee – <u>lslee@purdue.edu</u> Katie Buckley – <u>kholl5@illinois.edu</u>







## Thank you for participating in today's *The Current*!

Visit our website, northcentralwater.org, to access the recording and our webinar archive!



