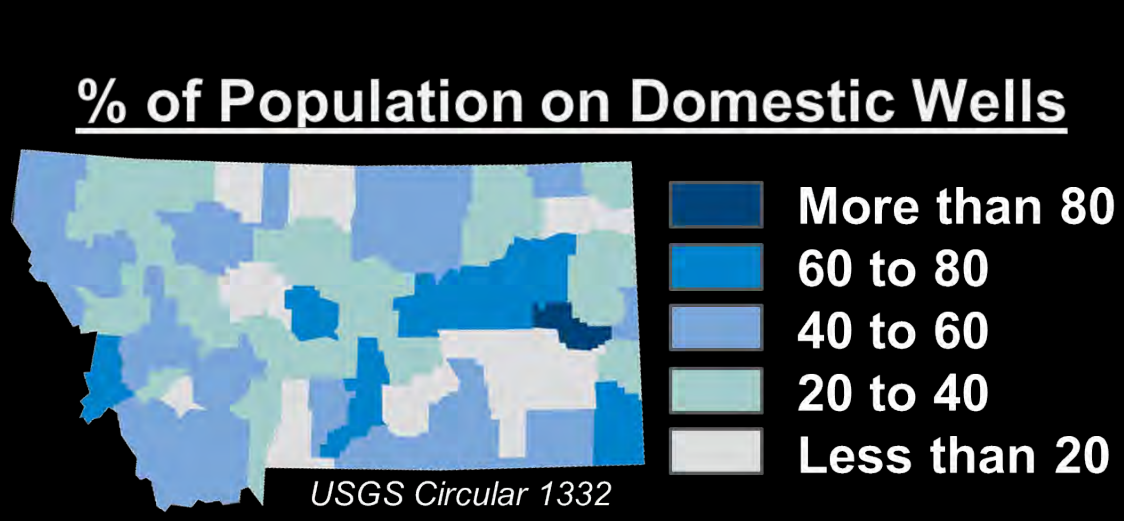
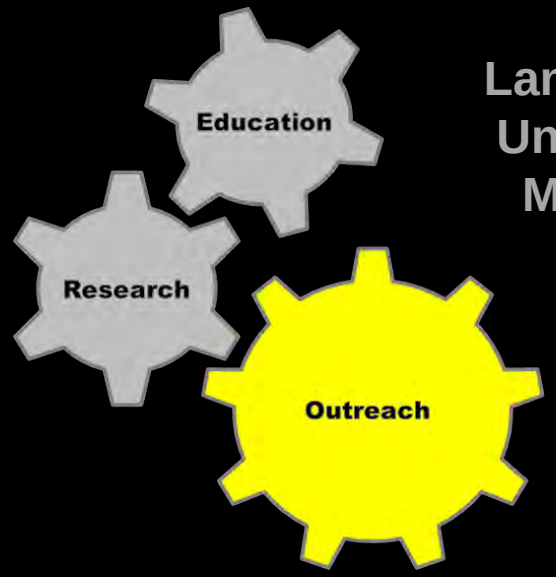
Drought Effect on Human Health a Private Well Perspective





Land Grant University Mission

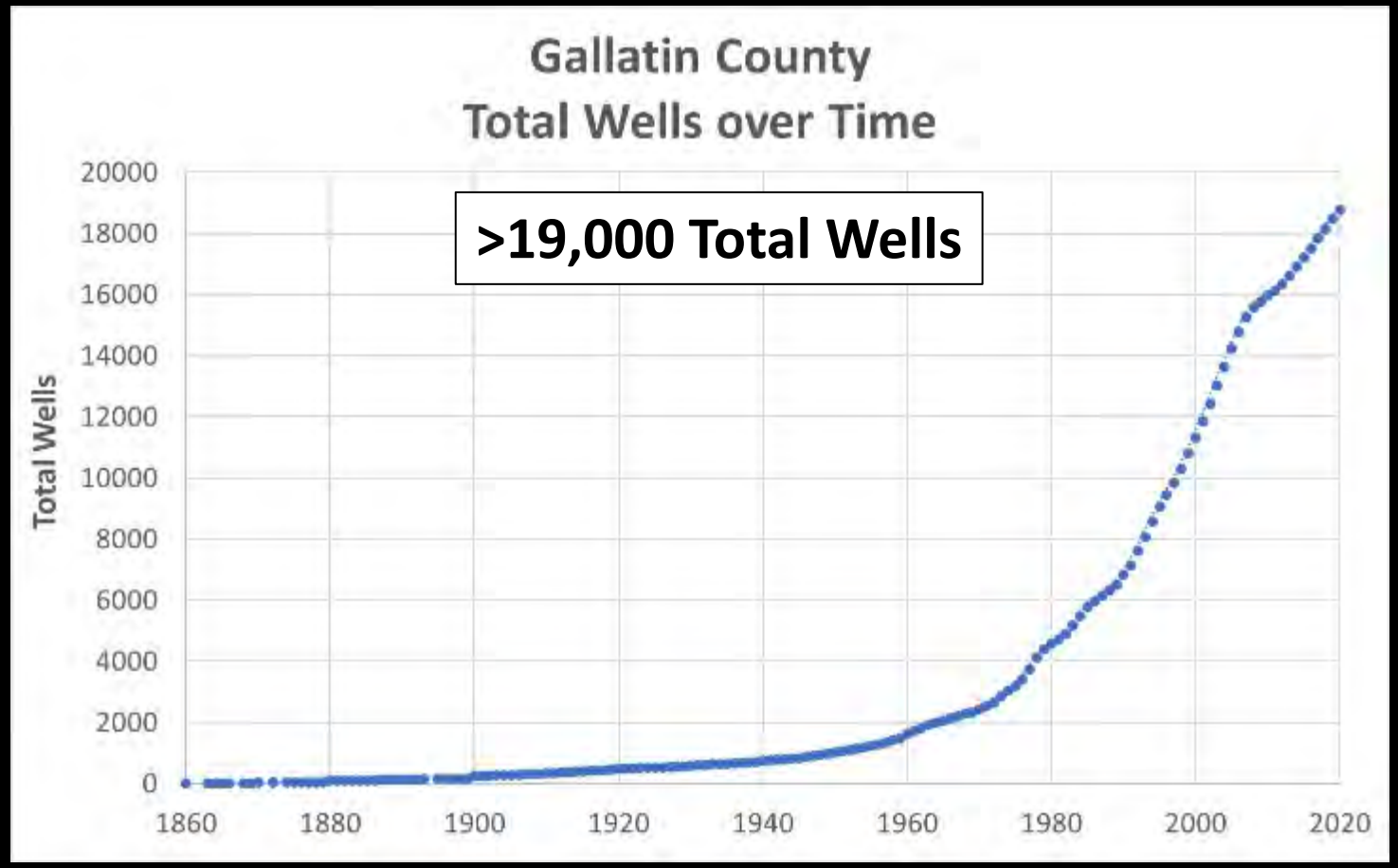
Dr. Adam Sigler
Water Quality Specialist, MSU Extension
Land Resources and Environmental Sciences
13th April 2022

MONTANA STATE UNIVERSITY EXTENSION

Well Educated

Program Goals

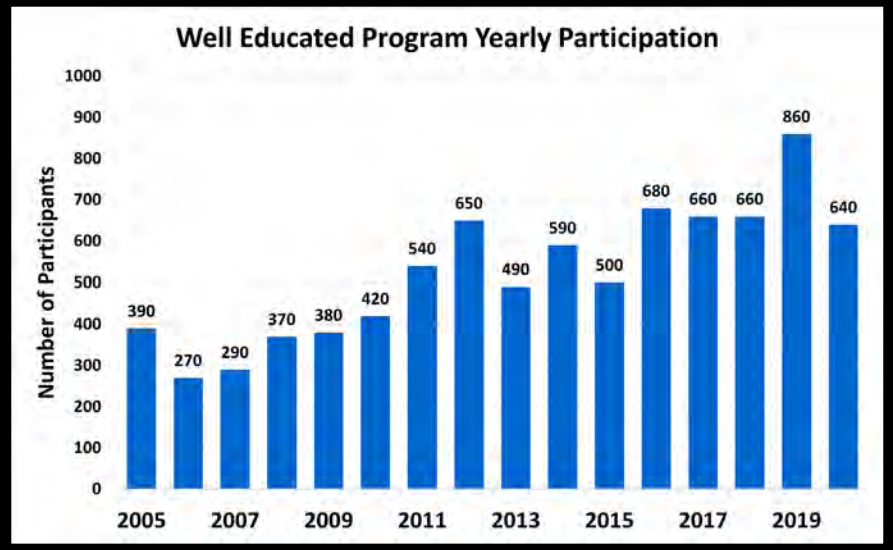
1. Well owner education: water suitability and groundwater protection
2. Centralized data resource: research and education



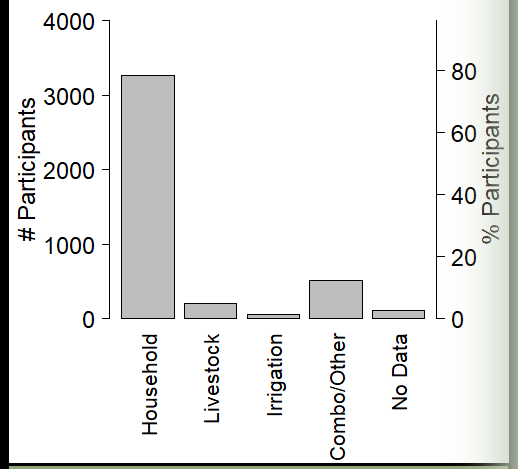
Are you familiar with the function of your well, and do you feel confident that you understand all the necessary maintenance and safety procedures to protect your groundwater?

Montana Bureau of Mines and Geology (MBMG), Ground Water Information Center (GWIC) http://mbmggwic.mtech.edu/

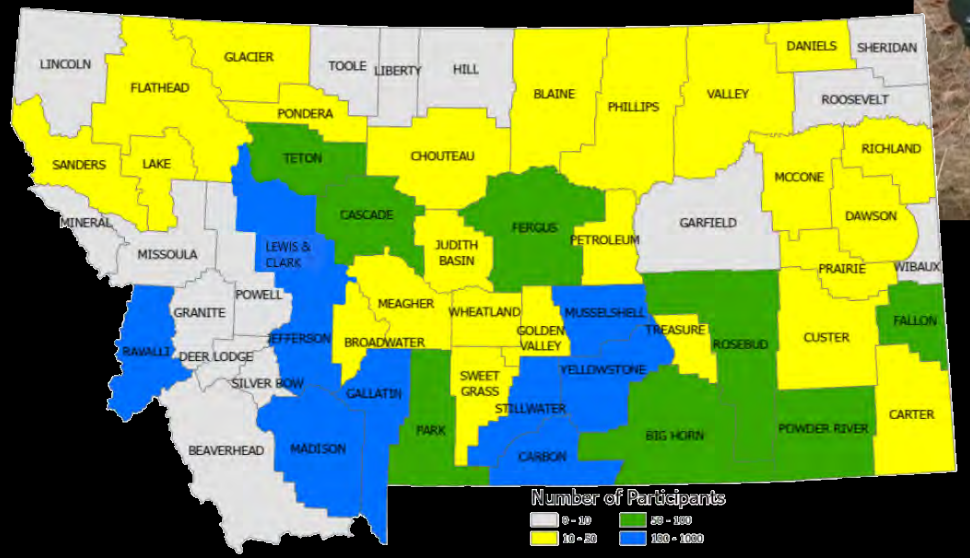
Well Test Results



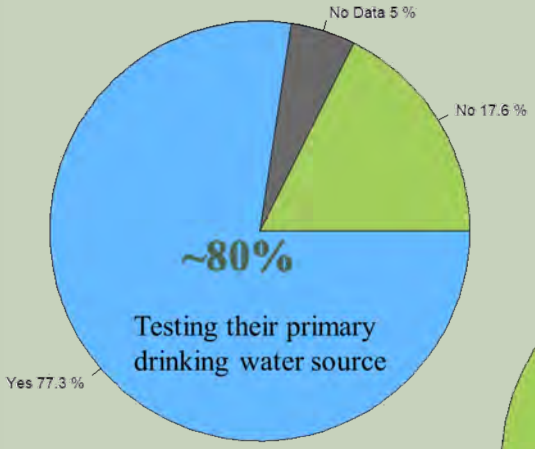
Water Use



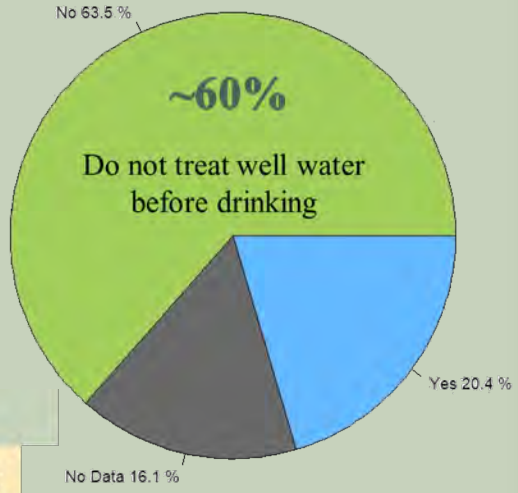
~80% use for household



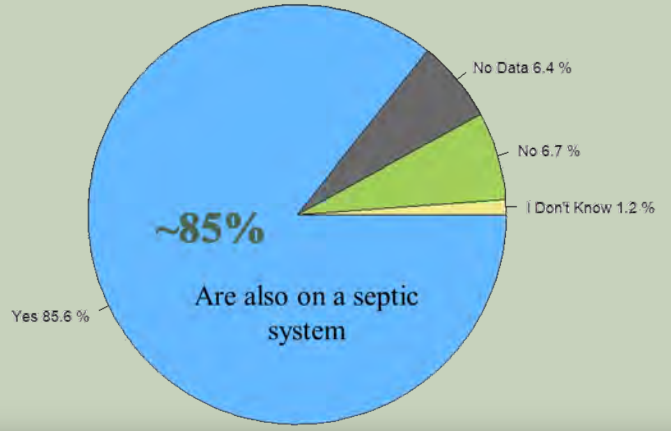
Primary Drinking Source



Treat Drinking Water



On Septic



Well Educated

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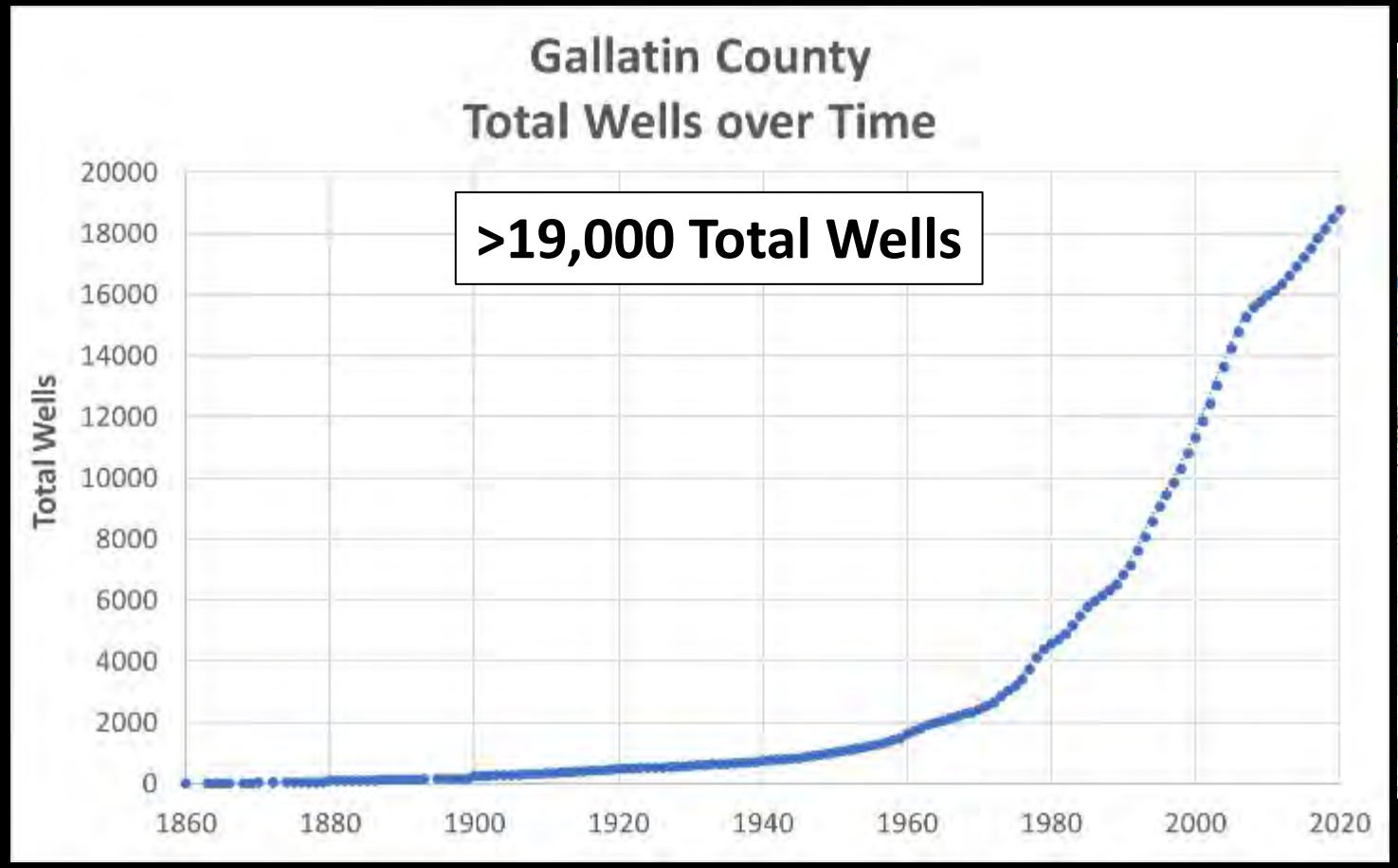
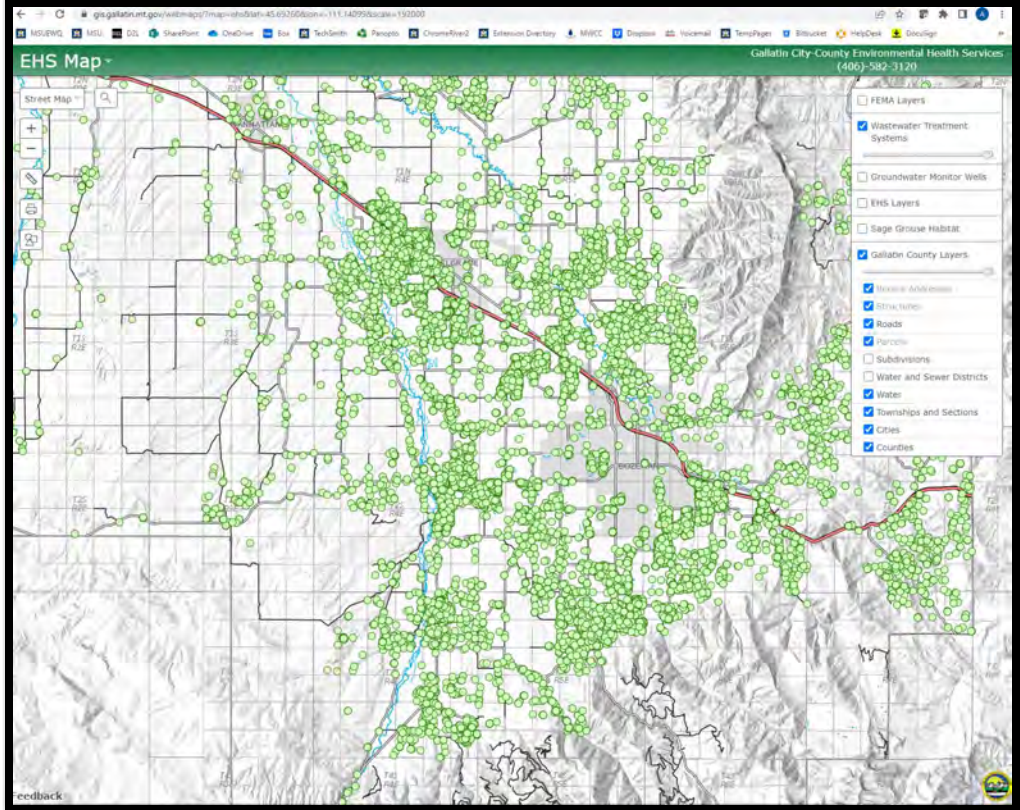
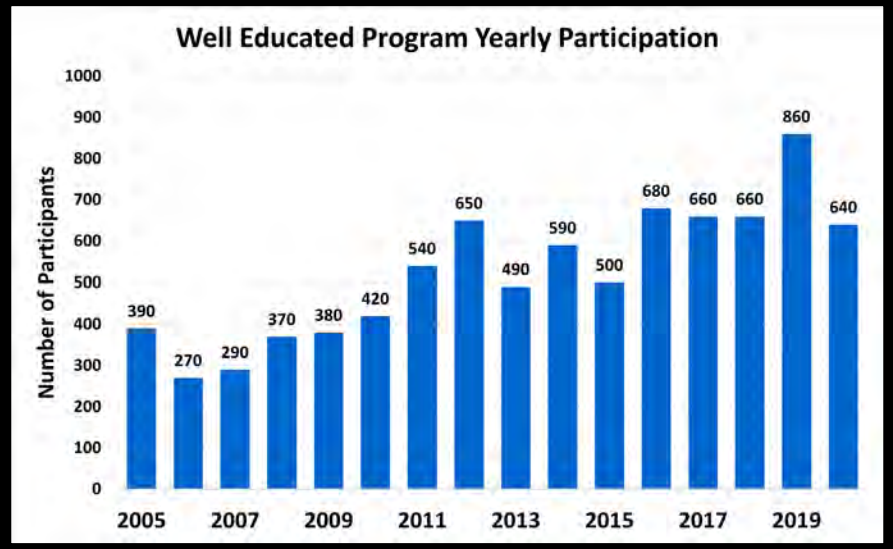


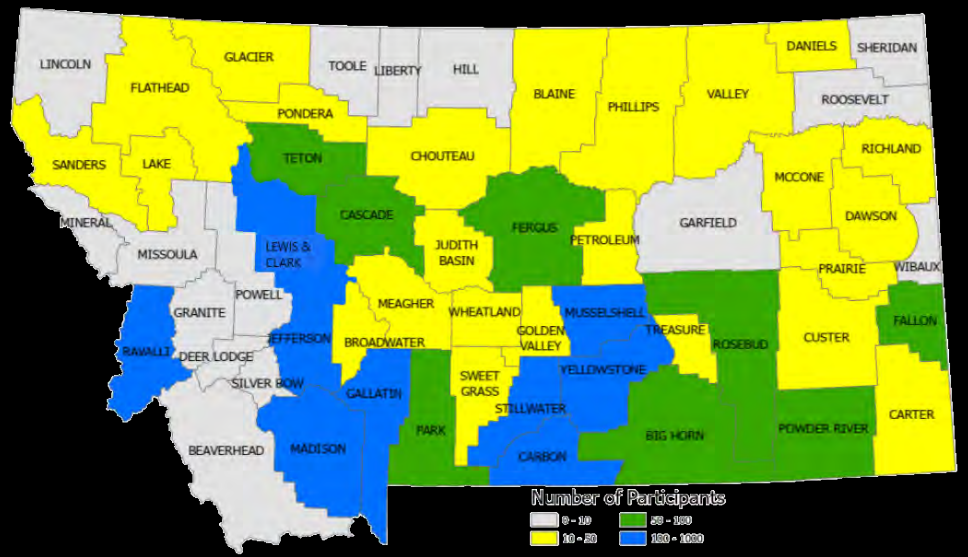
Gallatin Septic System Map



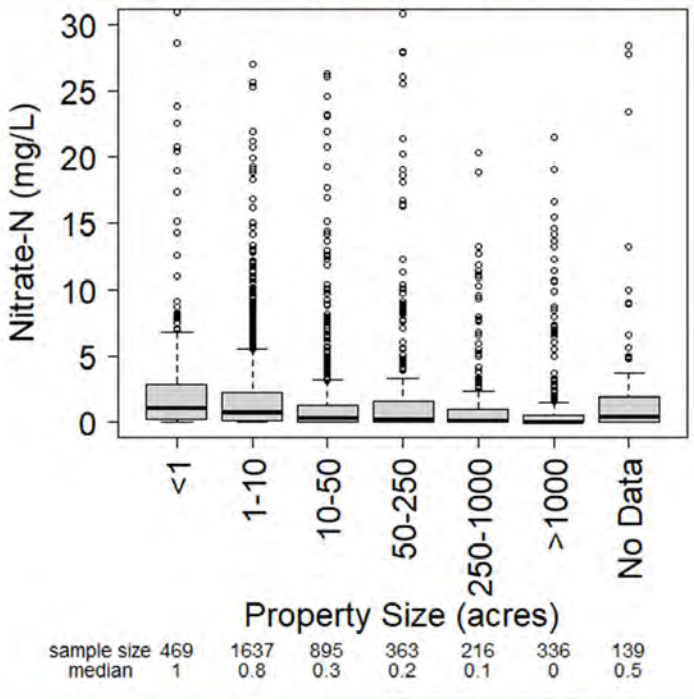
Montana Bureau of Mines and Geology (MBMG), Ground Water Information Center (GWIC) http://mbmggwic.mtech.edu/

Well Educated



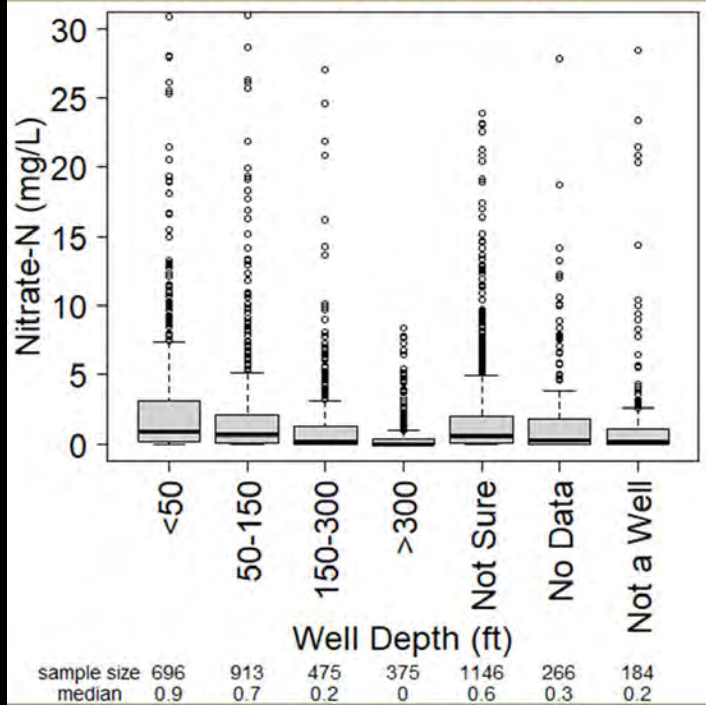


Nitrate-N by Property Size



Increasing median Nitrate-N with decreasing property size

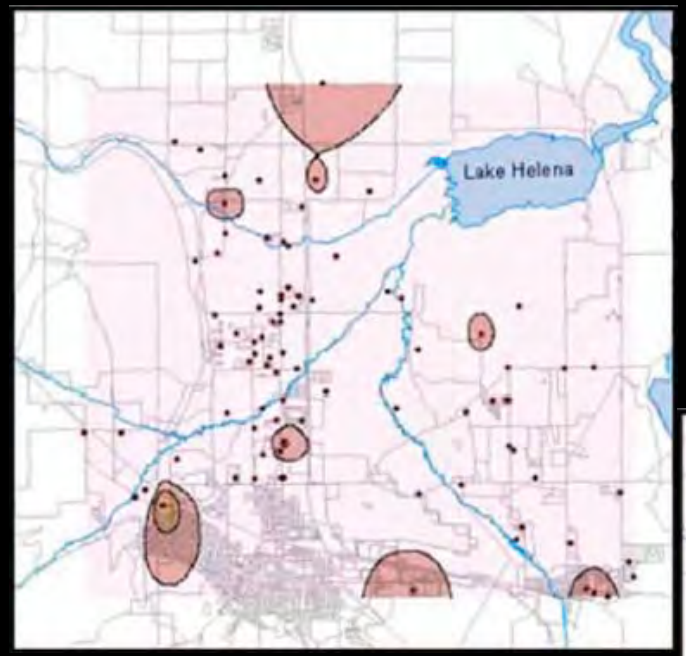
Nitrate-N by Well Depth

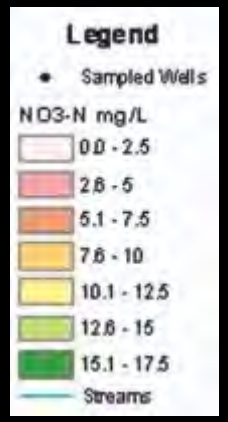


Highest median Nitrate-N seen in the shallowest wells

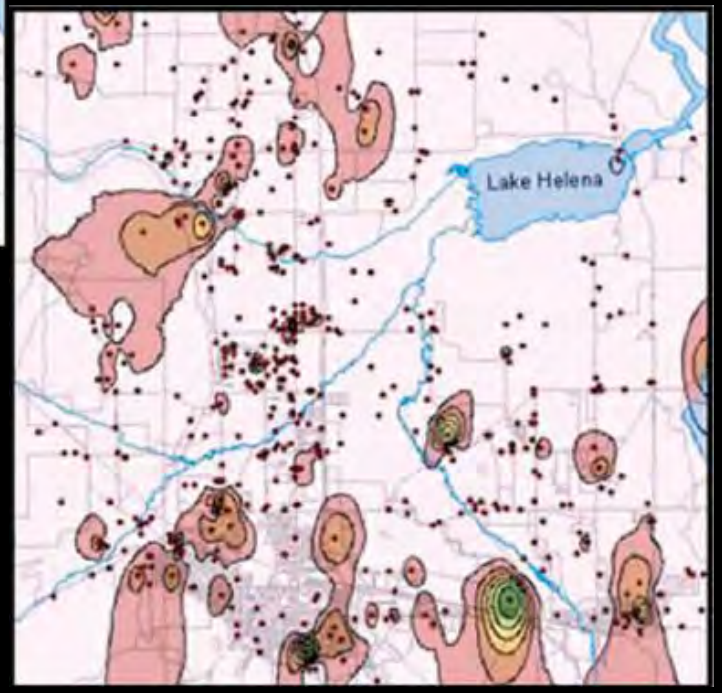
Nitrate concentrations across space and time

Nitrate – Helena, MT 1970

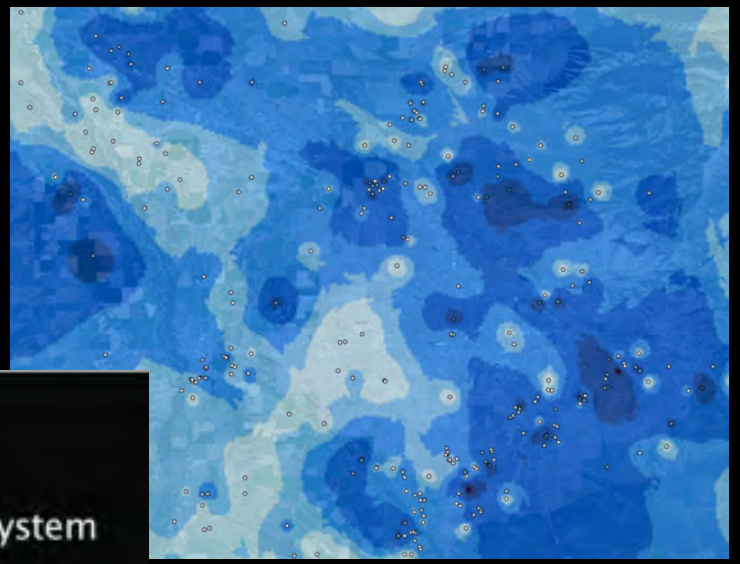


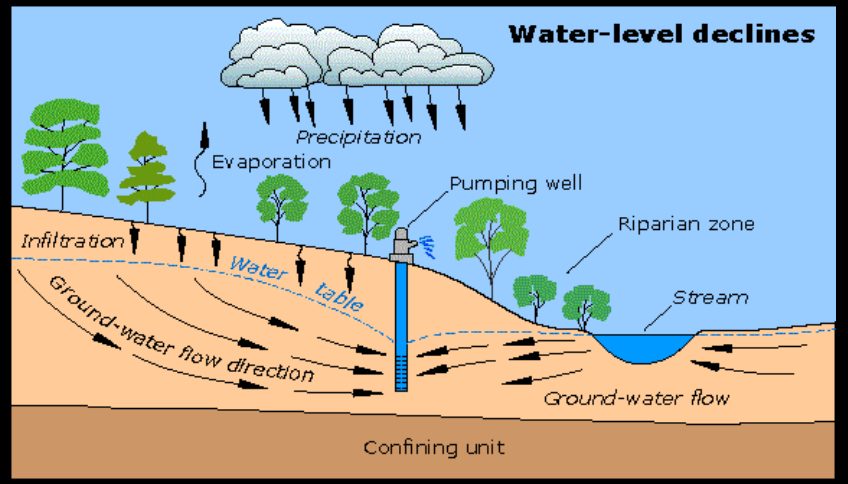


Nitrate – Helena, MT 2000



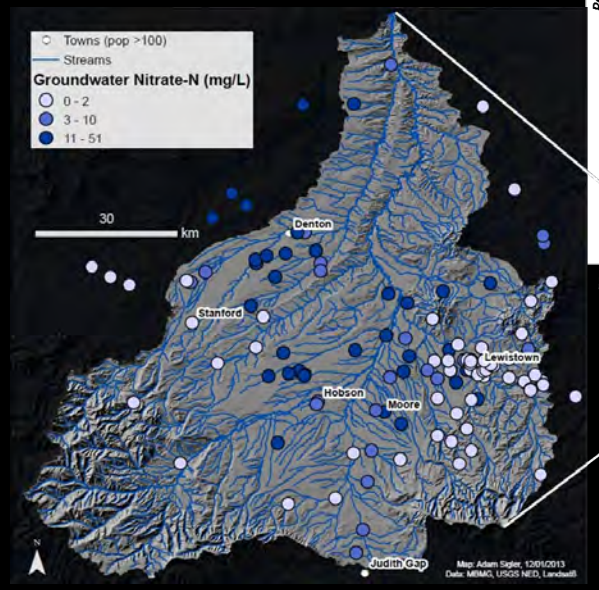
Nitrate – Gallatin 2015-2020

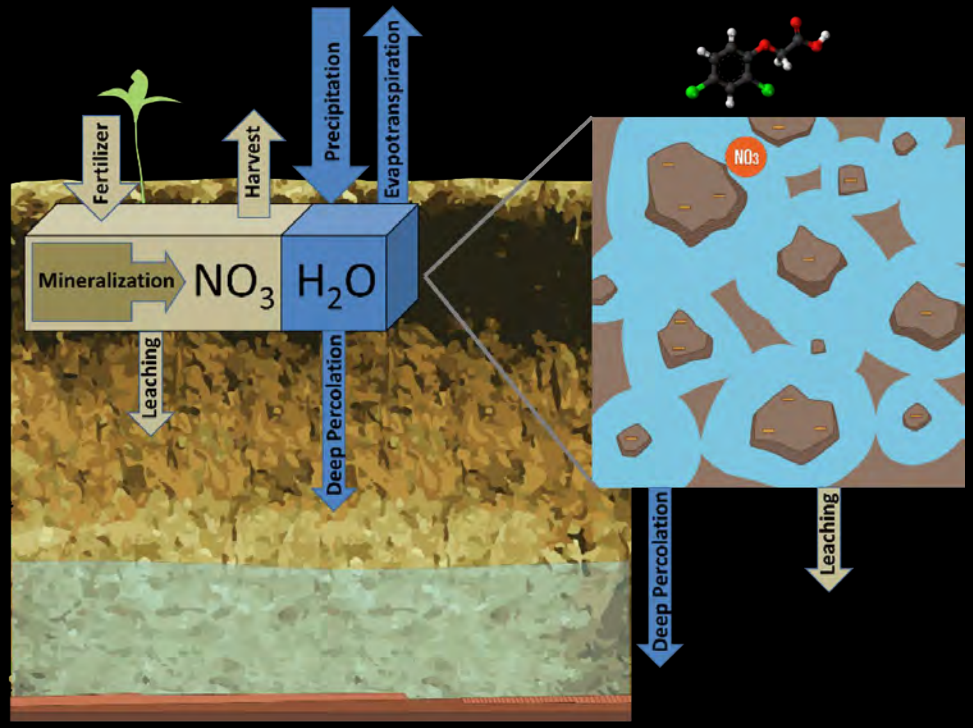


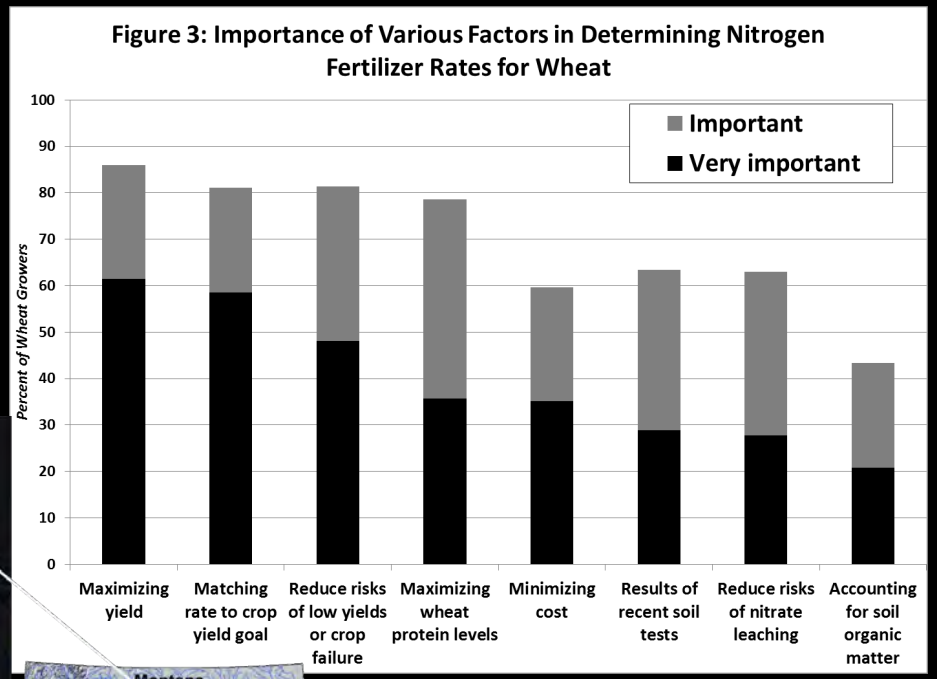


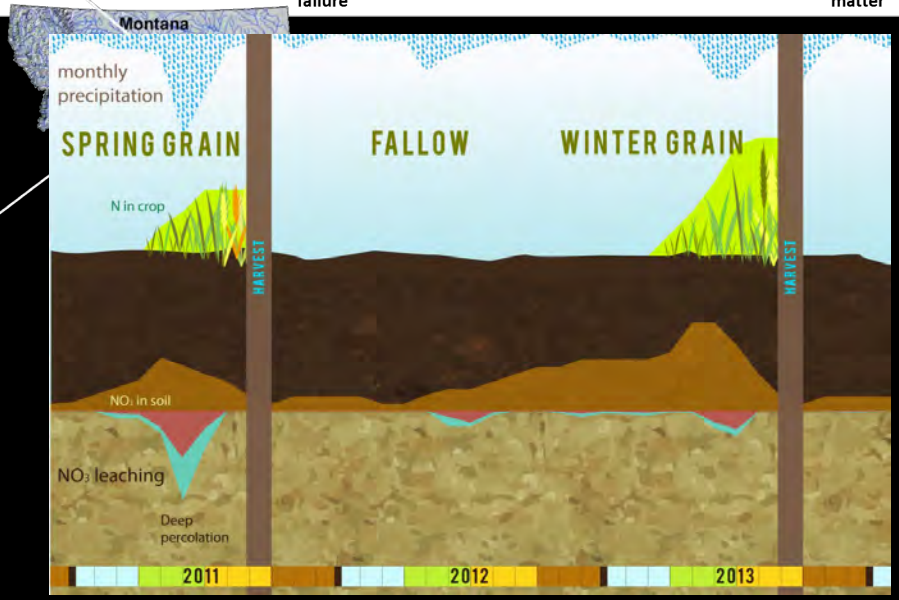
Drake and Bauder, 2005 Ground Water Monitoring and Remediation

Agriculture – Farming – Water/Solute Movement in Soil



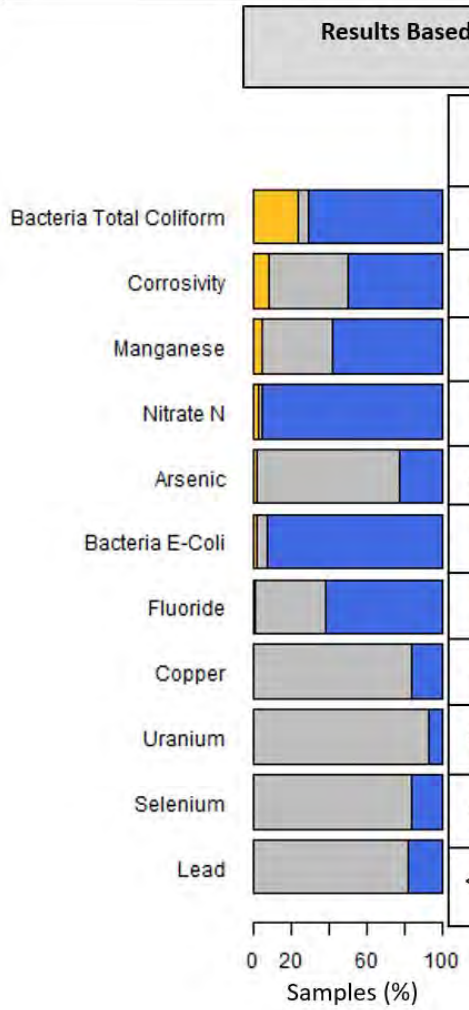


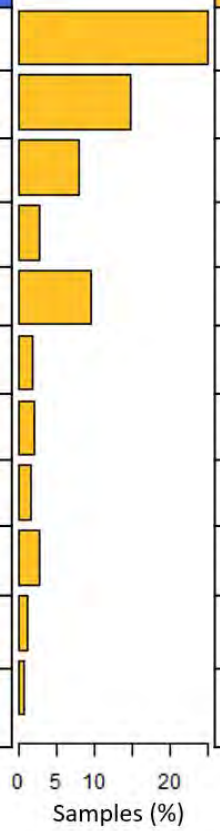




Well Educated

Health Risk Summary for 2015-2020 Well Educated Program Results Used for Drinking Water





	Results Based on Total Sample Number (n=3198)				Results Based on Samples Tested for Each Parameter		Results Based on Samples Above Threshold		
	Low Risk Range	% High Risk	% Untested	% Low Risk	% High Risk	Sample Size[1]	# High Risk Samples	# Drinking w/o Treatment[2]	% Drinking w/o Treatment[2]
Bacteria Total Coliform	Absent	23.76	5.57	70.67	27.17	3020	760	545	71.70
Corrosivity	> -0.5 mg/L	8.72	41.56	49.72	14.93	1869	279	127	45.51
Manganese	< 0.1 mg/L	5.1	37.18	57.72	8.11	2009	163	100	61.34
Nitrate N	< 10 mg/L	2.69	1.81	95.5	2.74	3140	86	52	60.46
Arsenic	< 0.01 mg/L	2.5	74.23	23.26	9.71	824	80	42	52.50
Bacteria E-Coli	Absent	1.75	5.57	92.68	1.85	3734	56	45	80.36
Fluoride	< 4.0 mg/L	1.41	37.09	61.51	2.24	2565	45	29	64.44
Copper	< 1.3 mg/L	0.28	83.43	16.29	1.70	640	9	4	44.44
Uranium	< 0.03 mg/L	0.22	92.09	7.69	2.77	253	7	3	42.86
Selenium	< 0.05 mg/L	0.22	83.21	16.57	1.30	797	7	3	42.86
Lead	< 0.015 mg/L	0.16	81.21	18.64	0.83	736	5	4	80

[1] Sample size varies by parameter, based on participant testing package selection

[2] Based on presence/absence of treatment, not system efficacy for specific parameter

2001 Drought in Ravalli County

Drought prompts redrilling - Valley drillers keep busy deepening dry wells

By JAMIE OGDEN Staff Reporter Jun 3, 2001 0

With persistent drought in the Bitterroot Valley, well drillers are responding to a high number of requests for the re-drilling of existing wells gone dry this year.

Bill Fischer of B and D Pump Service in Hamilton said Thursday that three weeks ago, before irrigation ditches were running full-speed, almost all of his business was dedicated to re-drilling and fixing existing wells.

"We're noticing wells drying up or producing very little water all over the valley," Fischer said.

2021 Drought in Butte Silver Bow

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EDITOR'S PICK TOPICAL ALERT

Drought drains private wells in Butte-Silver Bow; experts advise water conservation

MICHAEL CAST Aug 8, 2021 0

Imagine turning the handle to wash your hands or rinse a dish and nothing comes out.

"Until you turn on the faucet and there's no water, you don't really have a concept of what that feels like — especially if you have a family," Elizabeth Erickson said.

O'Keefe is busy. On average, the company drills around 75 water wells annually. The company has drilled over 100 this year, and it's only August.

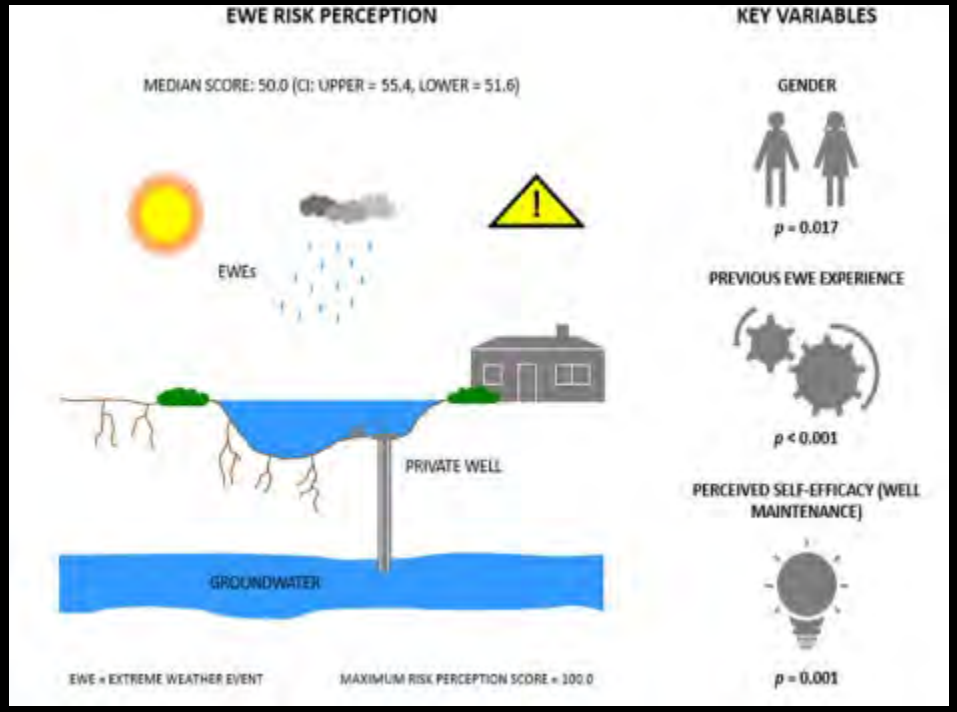
What's more, the company is drilling deeper than before. A 300-foot well was a rarity 30 years ago, Cosens said. This year, the company is drilling 300 to 500 feet regularly and sometimes up to 900 feet.

Everything's on fast forward. People usually call about well troubles in September or October. This year they started calling in June, Cosens said.

She has never seen the grass so dry, and having some green, defensible space around the house is recommended to ward off fire. Yet, her family is on a well, and would like to have water to drink this fall, she said.

Thank you

Well Owner Perceptions around Extreme Events Ireland Study



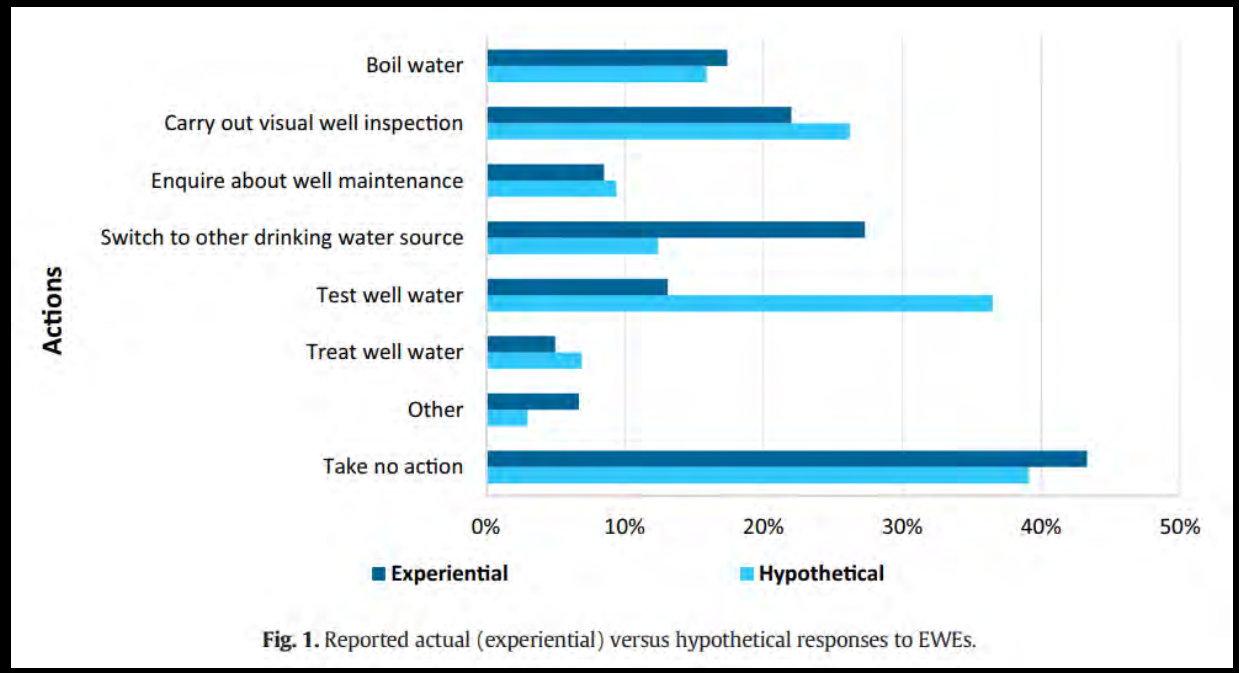


Fig. 1. Reported actual (experiential) versus hypothetical responses to EWEs.

Experience – switching to another source
Hypothetical – test water

"Beast from the East" 2018 drought event (33% of respondents experienced)

Mooney et al. 2021