



Community exposures to produced water

Research Planning Workshop, August 6, 2024

Golden CO



How is PW currently Managed?

Injection Enhanced Oil Recovery
or Disposal

Surface Discharge into Water
Bodies or onto Land

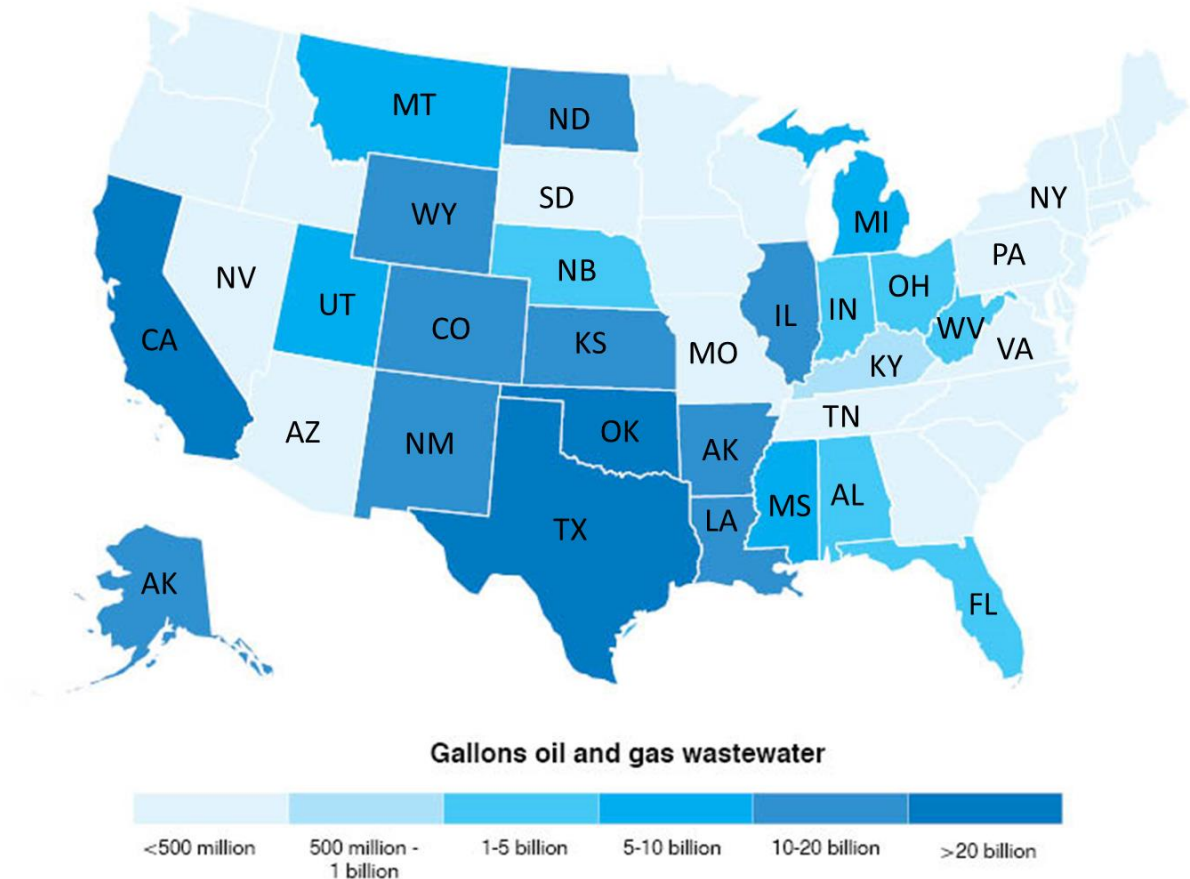
Evaporation in Lined/Unlined
Impoundments

Sale / Transfer

Use in Oil Field

Use Outside Oil Field

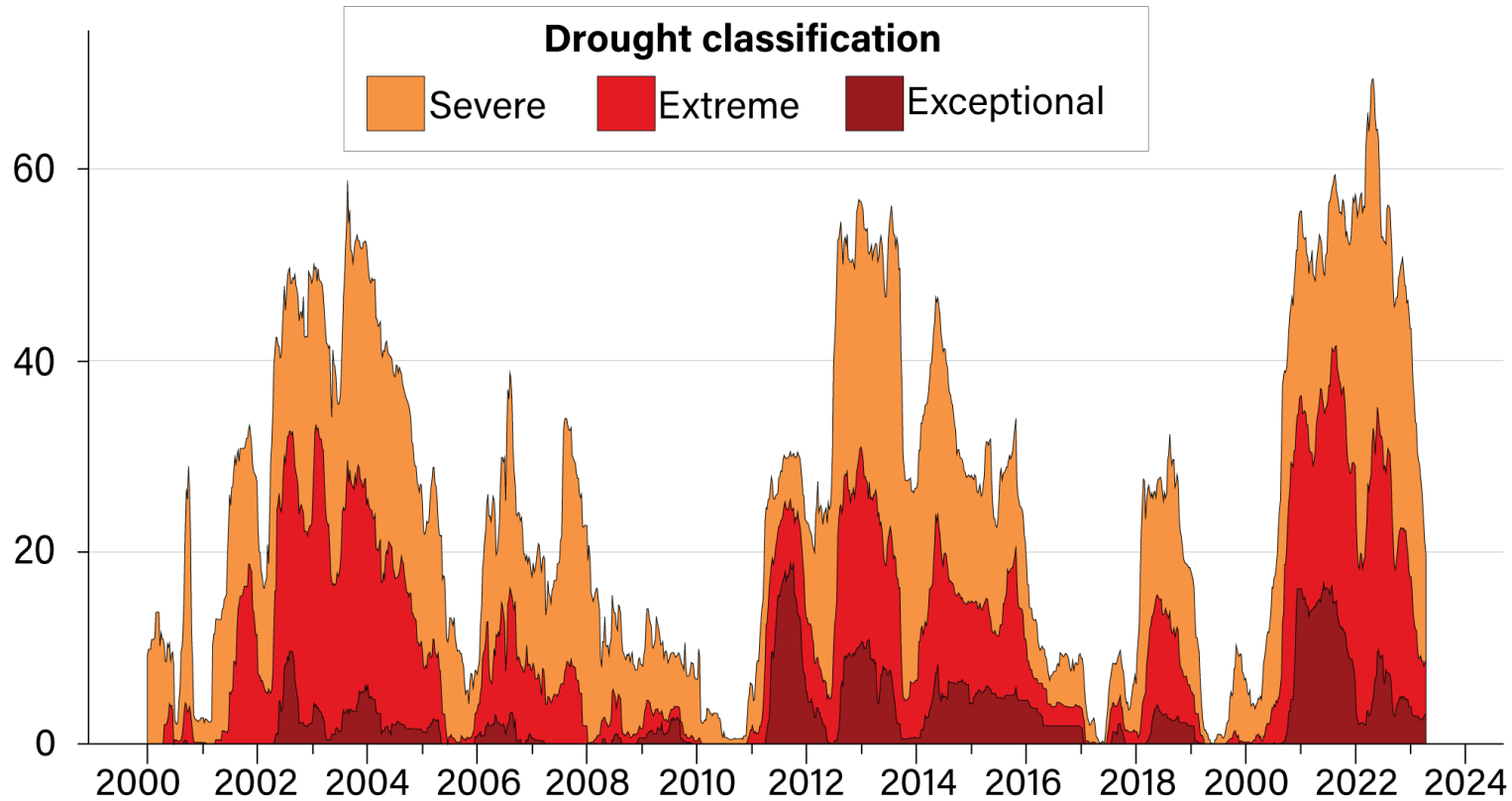
Other



2021

- **Texas** - 100% injected (68% Salt Water Disposal [SWD] Well)
- **New Mexico** - 80% injected, 20% recycled
- **Wyoming** - 100% injected (15% SWD)
- **Colorado** - 87% injected (58% SWD), 5% surface water discharge, 7% recycling
- **California** - 80% injected (20% SWD), 2% recycled, 1.6% to environment

Western States land area experiencing drought (percent)



17 western states,
including, New
Mexico, Texas,
Wyoming, and
Colorado

Source: USDA,
<https://www.ers.usda.gov/newsroom/trending-topics/drought-in-the-western-united-states/>

EPA Water Reuse Action Plan

- Security
 - 40 out of 50 state water managers expect freshwater shortages
- 2019 Draft WRAP Sources of Water
 - (1) municipal wastewater, (2) industry process water and cooling water, (3) agriculture runoff and return flows, **(4) oil and gas produced water**, and (5) stormwater



<https://www.cnn.com/2022/08/19/weather/gallery/western-united-states-drought/index.html>

Water Stress under Climate Change

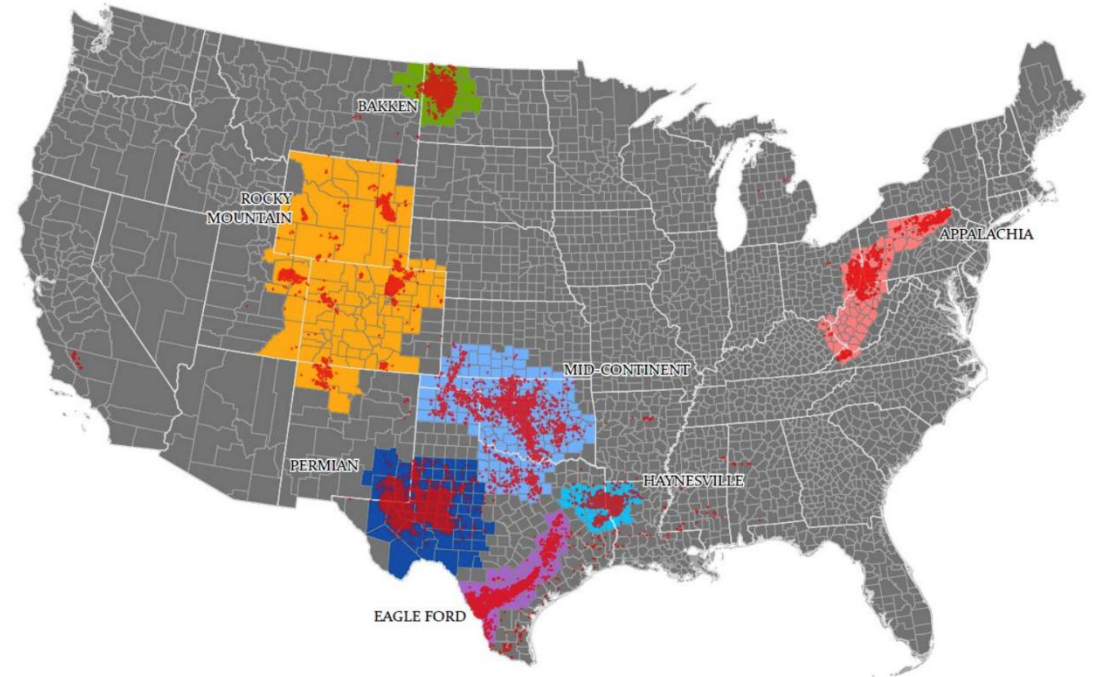
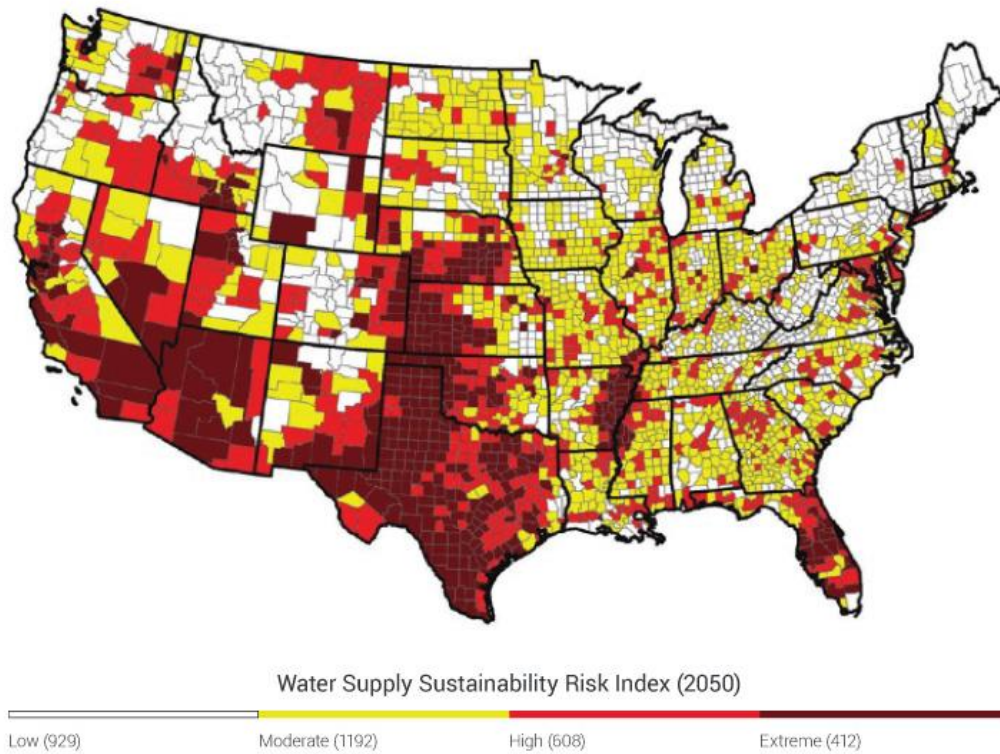


Figure 1: Seven Most Prominent Oil and Gas Development Regions in the Continental U.S.¹

Groundwater Protection Council Produced Water Report 2023

Produced Water Volumes by Prominent Development Region

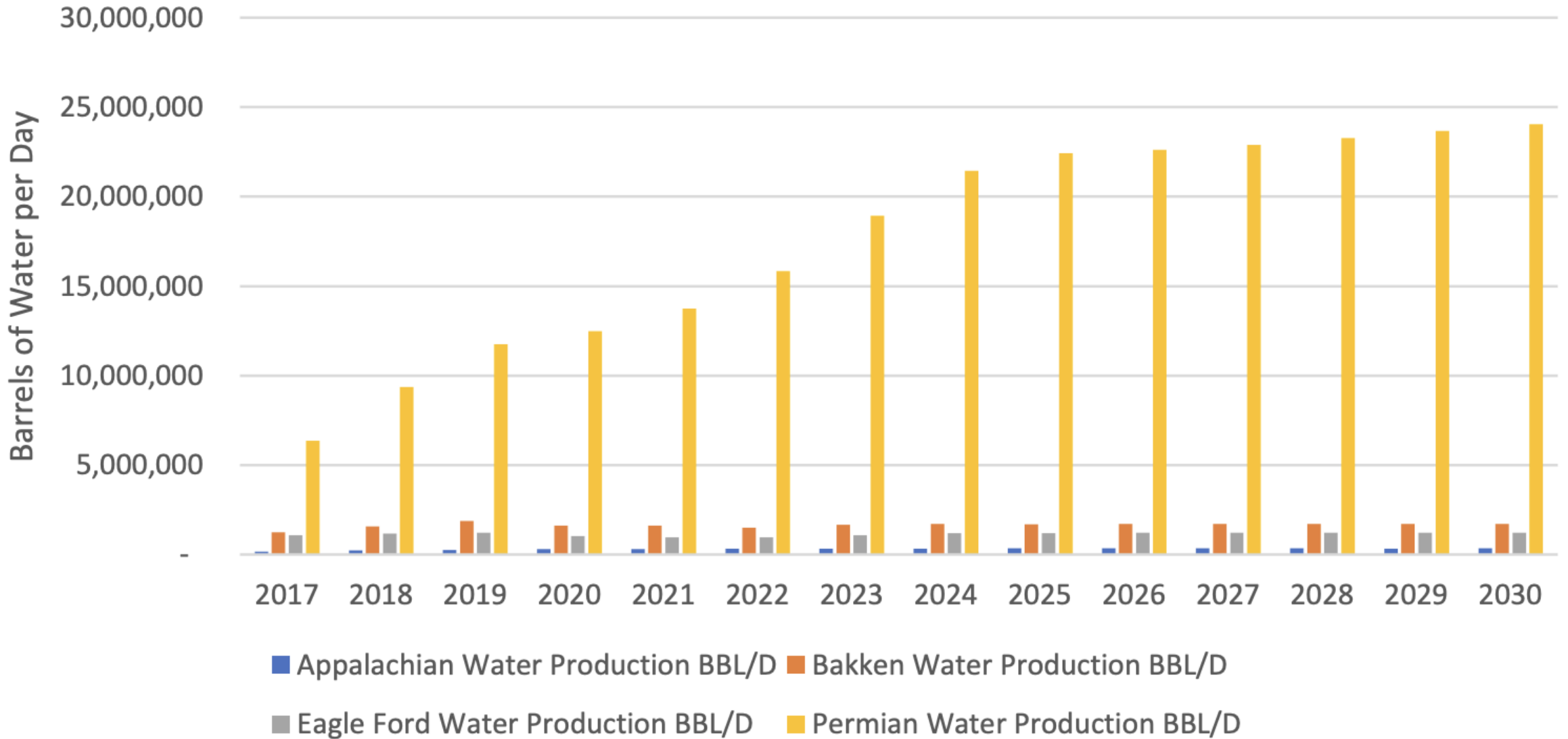
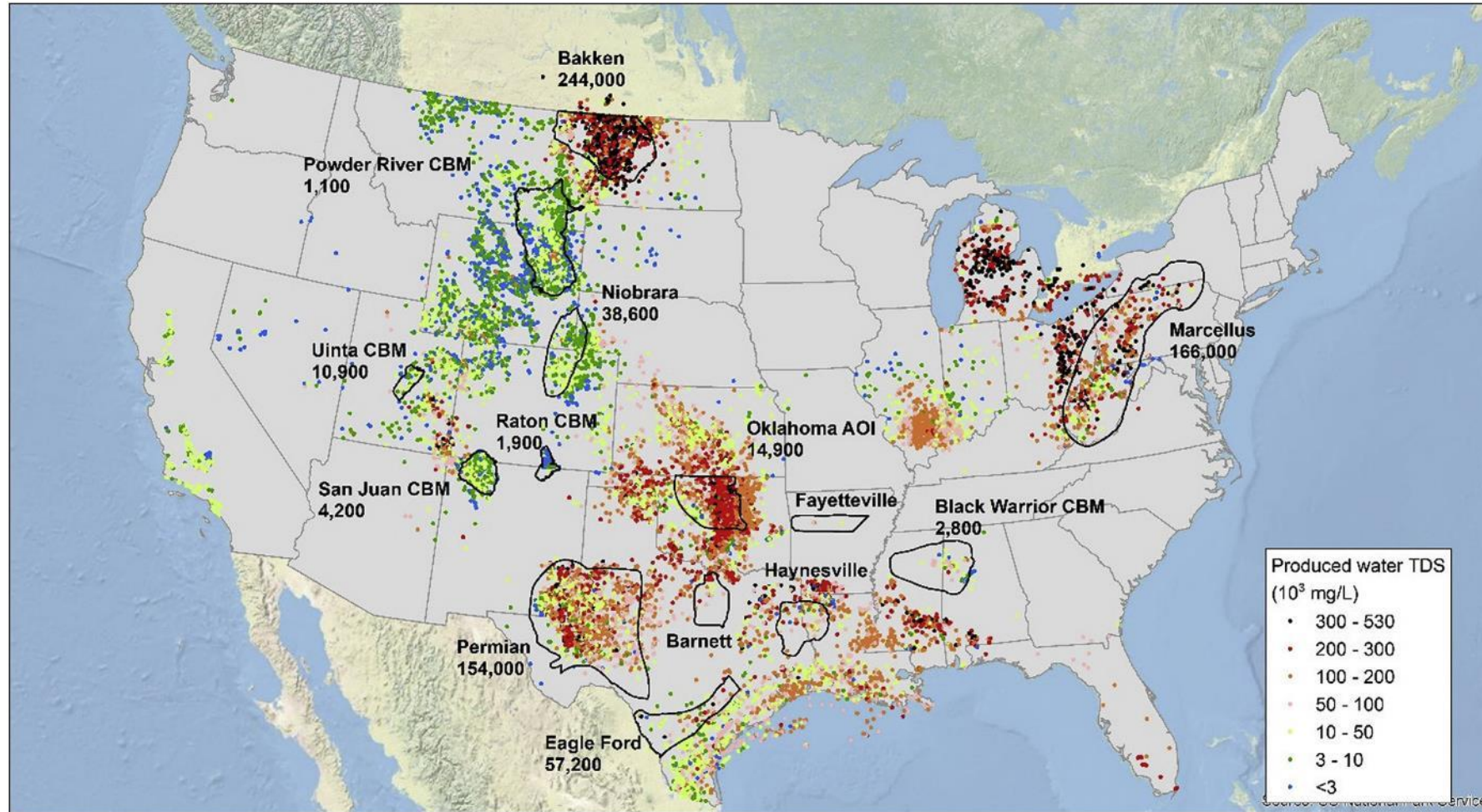
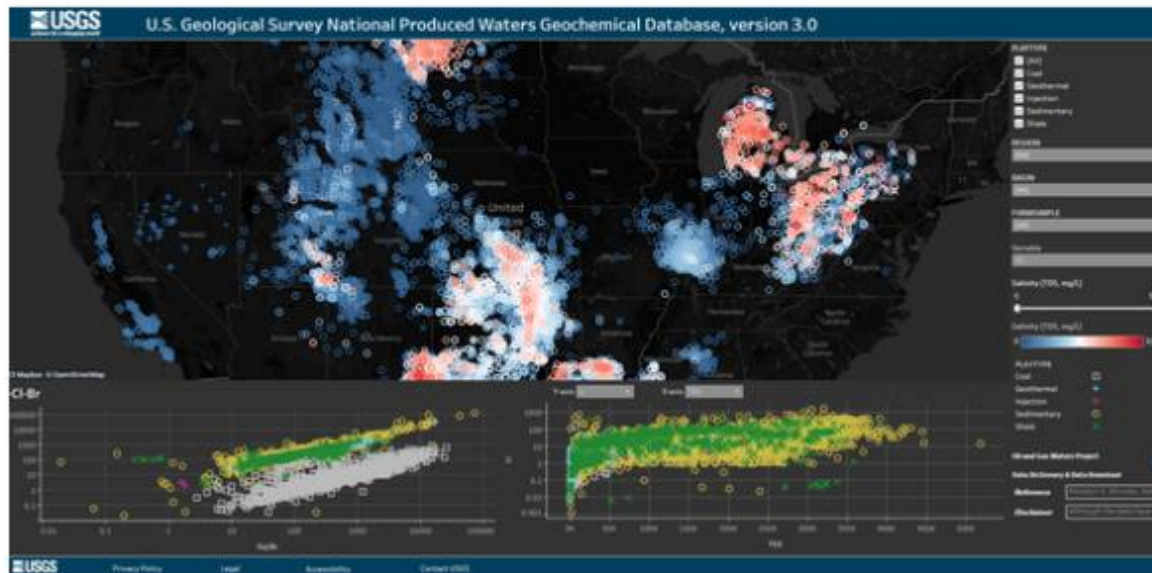


Figure 6: Produced Water Volume by Prominent Development Region⁶

Produced Water Quality Variability

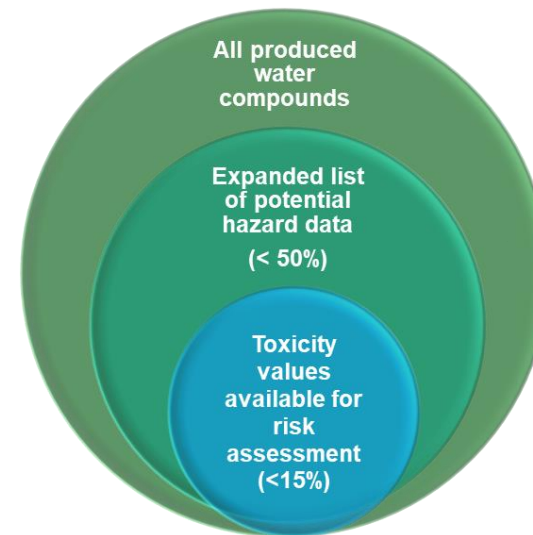


USGS National Produced Waters Geochemical Database



Blondes et al. 2023, U.S.G.S. National Produced Waters Geochemical Database (version 3.0, November 2023). <https://doi.org/10.5066/P9DSRCZJ>.

Oil and Gas Waters Project



Danforth et al. 2020. 10.1016/j.envint.2019.105280

comptox.epa.gov/dashboard/chemical-lists/PROD WATER

Search for chemical by systematic name, synonym, CAS number, DTXSID or InChIKey
Start typing or paste text to search.

Type-ahead search Identifier substring search

List Details

Description: List of chemicals identified as being present in hydraulic fracturing produced water. The chemicals were reported in the paper by Danforth et al entitled "An integrative method for identification and prioritization of constituents of concern in produced water from onshore oil and gas extraction"

Number of Chemicals: 1197

SEARCH RESULTS

Structure	DTXSID	Preferred Name	CASRN	QC Level	# Active	Total	% Active	Mono Mass	Mol. Formula
	D001015971	2,2,3,3,5,5-pentamethylhept-3-ene	116164-06-8	5				168.18761	C12H24

<https://comptox.epa.gov/dashboard/chemical-lists/PROD WATER>

Format – Facilitated Panels, Breakout Groups

- Panel 1: **What is in PW**
- Panel 2: **What uses are currently being considered for PW outside of the oilfield?**
 - Proposed or underway – CO, TX, NM consortia
- Panel 3: **What do we know about the fate and transport of produced water following release to the environment?**
 - Case studies and general experiences