

NMPWRC

NEW MEXICO PRODUCED WATER RESEARCH CONSORTIUM

NM STATE

Produced Water in New Mexico: Risks, Realities and Possibilities

RADIOACTIVE AND HAZARDOUS MATERIALS COMMITTEE - SANTA FE

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Disclaimer: The New Mexico Produced Water Research Consortium at New Mexico State University is conducting independent, science-based research to evaluate potential environmental and health effects related to the reuse of treated produced water for fit-for-purpose applications. This work is designed to generate objective data under controlled conditions, without promoting or opposing any specific reuse practices. Our goal is to provide clear, reliable information that supports informed decision-making around the safe and responsible use of produced water in New Mexico and beyond.

This presentation includes preliminary research data from the New Mexico Produced Water Research Consortium at New Mexico State University. The information presented is subject to change and has not yet undergone formal quality assurance or quality control (QA/QC) review. Distribution or sharing of this material without prior authorization from New Mexico State University is not permitted.

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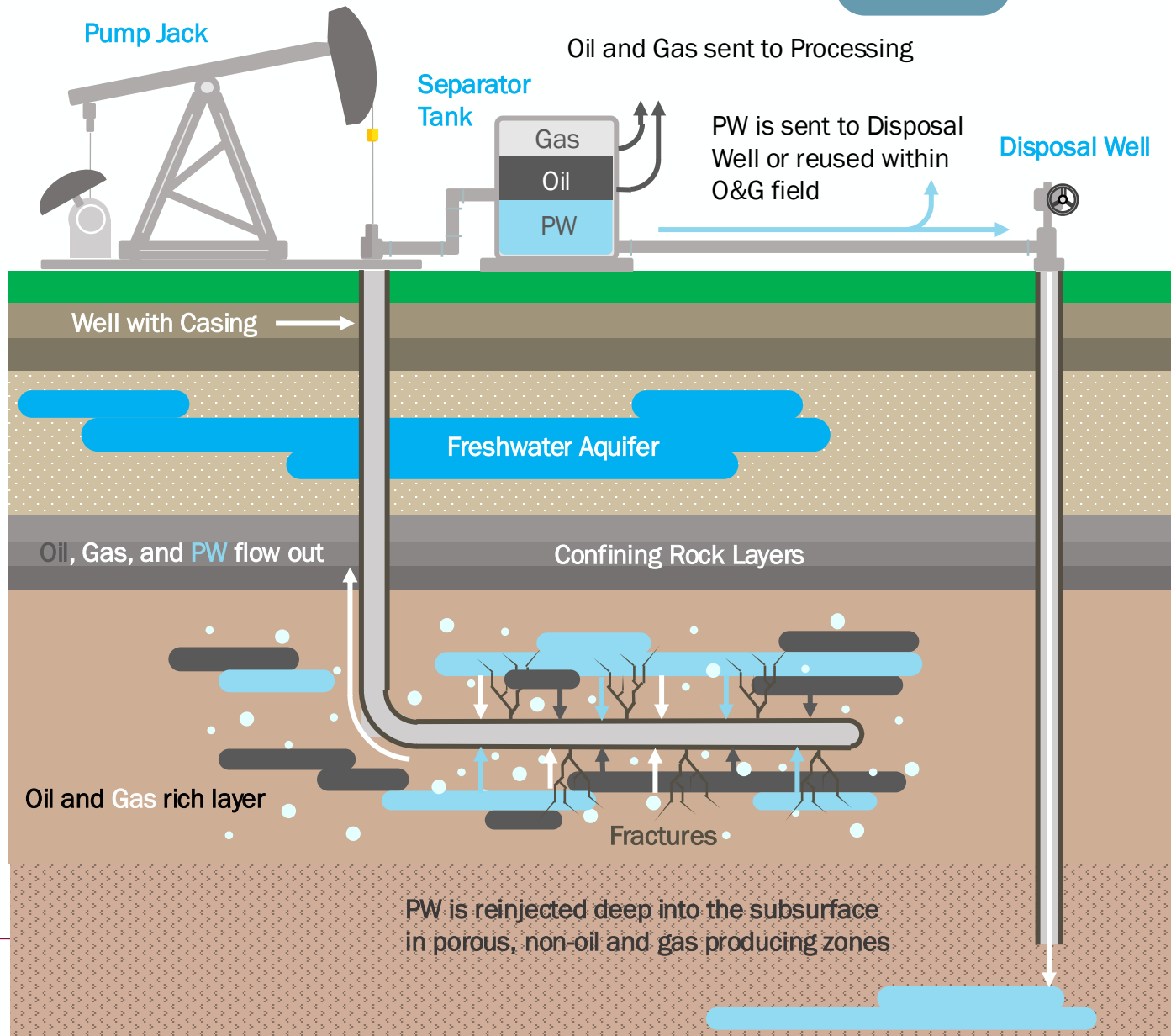
Produced Water 101

Produced water is primarily naturally occurring formation water that has been trapped underground alongside oil and gas (O&G) for millions of years, taking on the chemical characteristics of the surrounding geology.

It also includes flowback water and other fluids associated with O&G production.

In 2025, New Mexico generates substantial volumes of produced water:

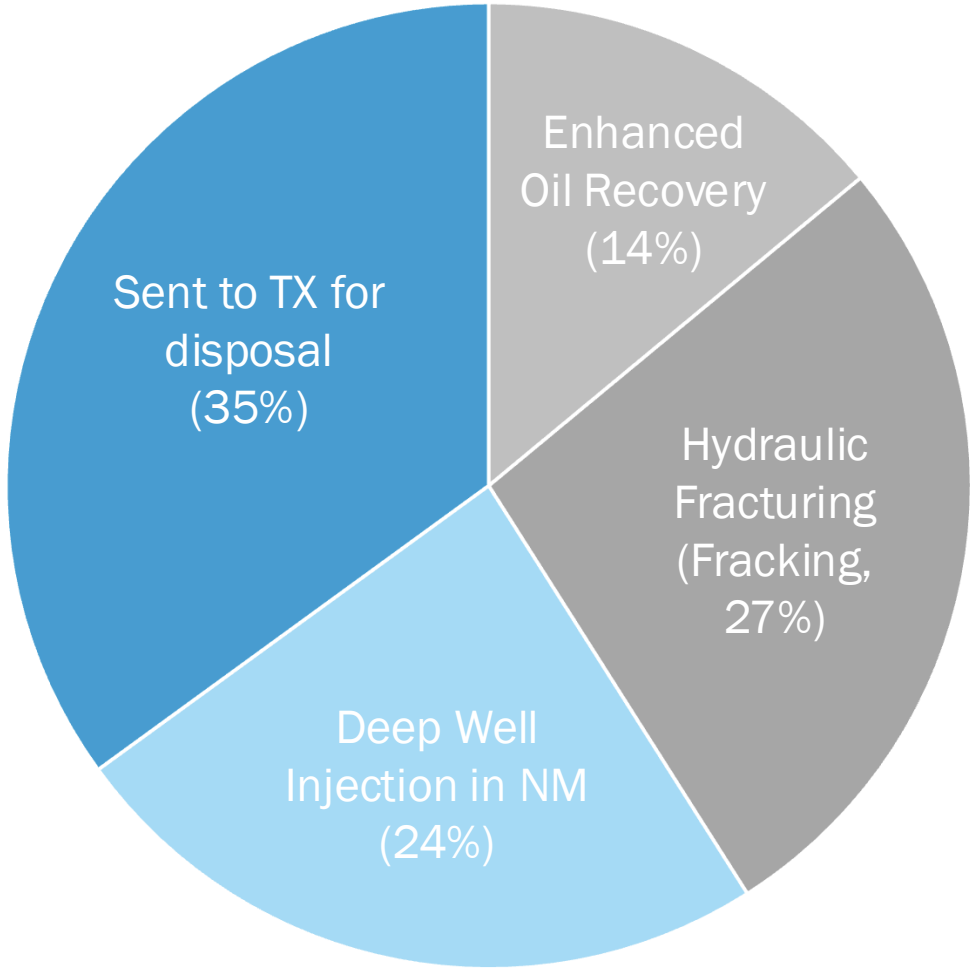
2.74 billion bbls/yr = 7.5 million bbls/day = 325 MGD = 353,000 AFY



Current Produced Water Management Strategies in NM

~60% of PW currently being disposed of (injected):

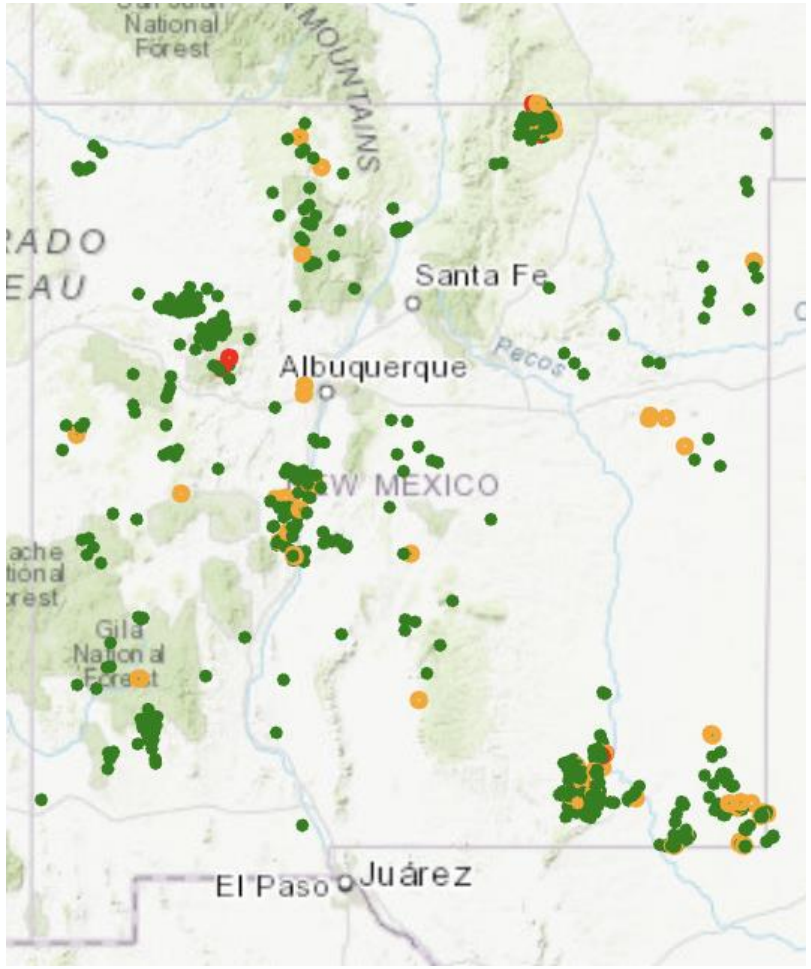
This fraction (195 MGD) is available for treatment and beneficial use *outside* the oil and gas field.



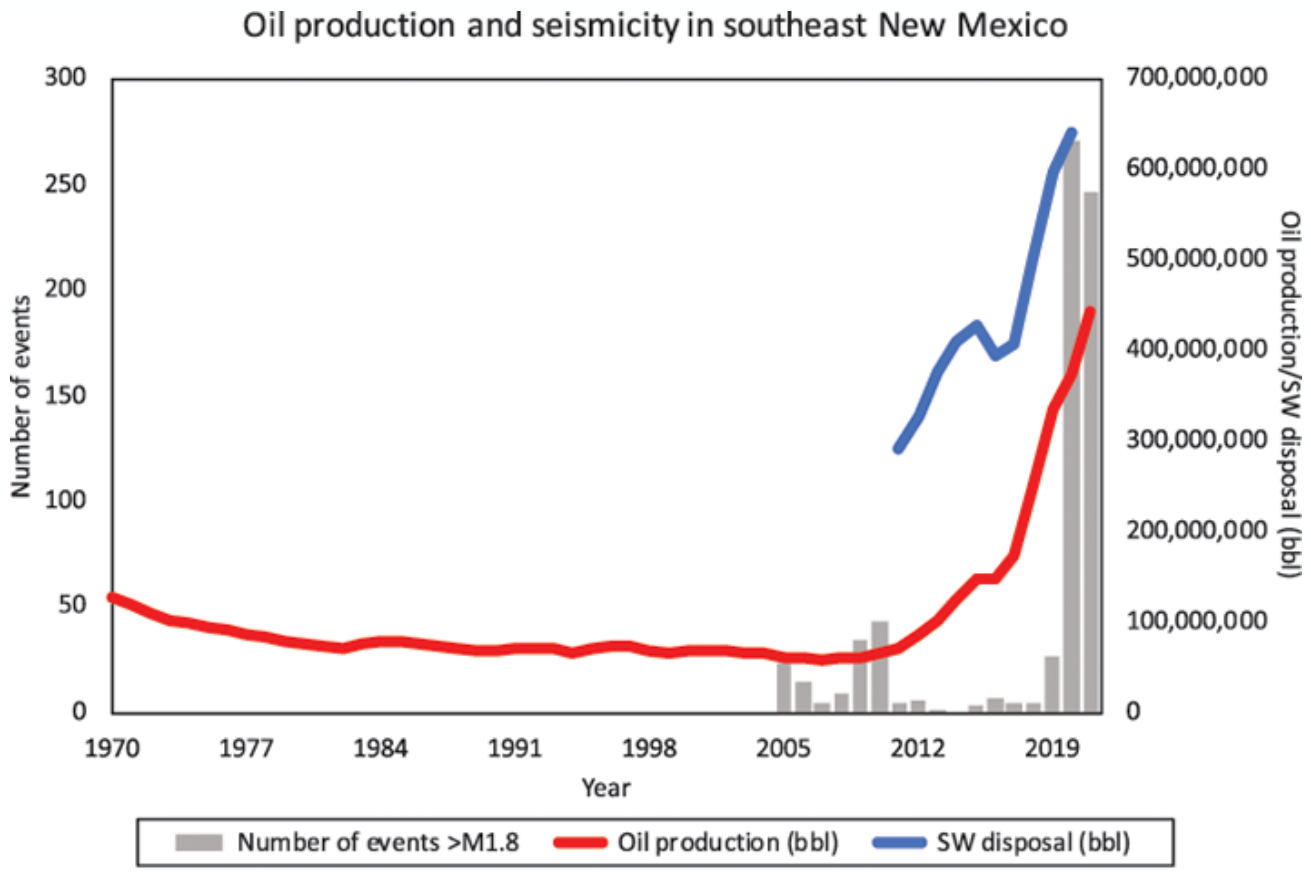
~40% of PW in NM is being reused *inside* the oil and gas field, already.

Reduces demand on already limited freshwater.

Why Can't We Just Keep Injecting?

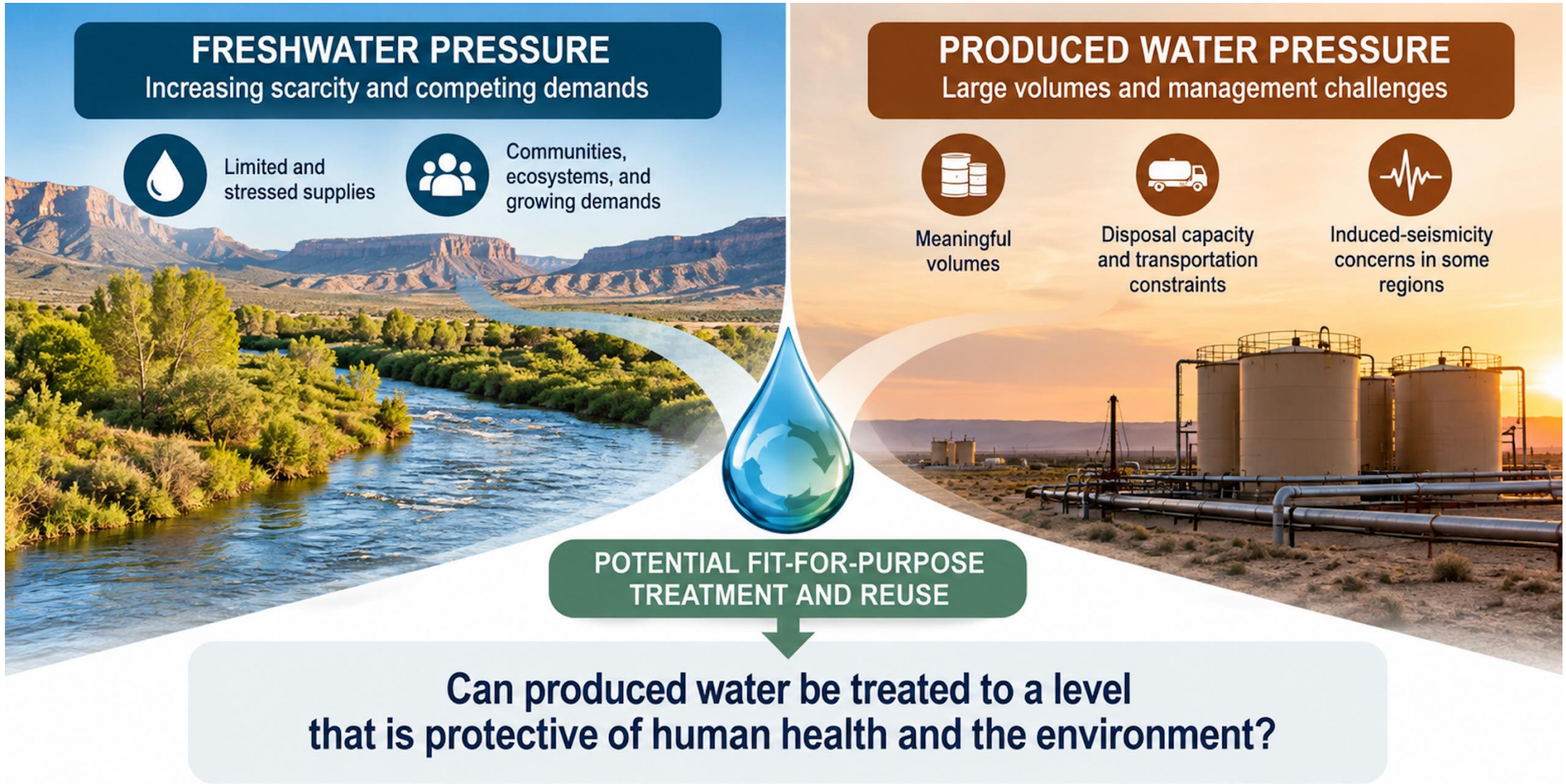


Magnitude ≥ 2 Seismic Events *from* 2022 *to* 11/3/2026



Source: NM Bureau of Geology, 2023

Why is Beneficial Use of PW Being Considered?



Source: ChatGPT generated

About the New Mexico Produced Water Research Consortium



Conducting science-based research



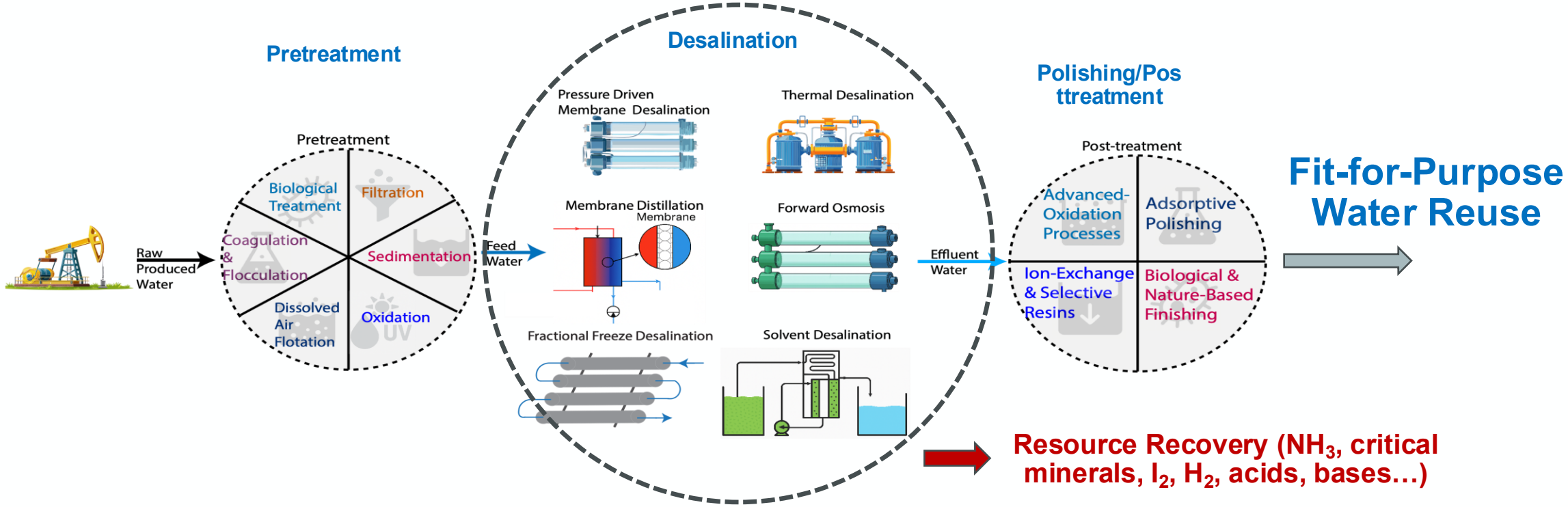
Fill key knowledge gaps



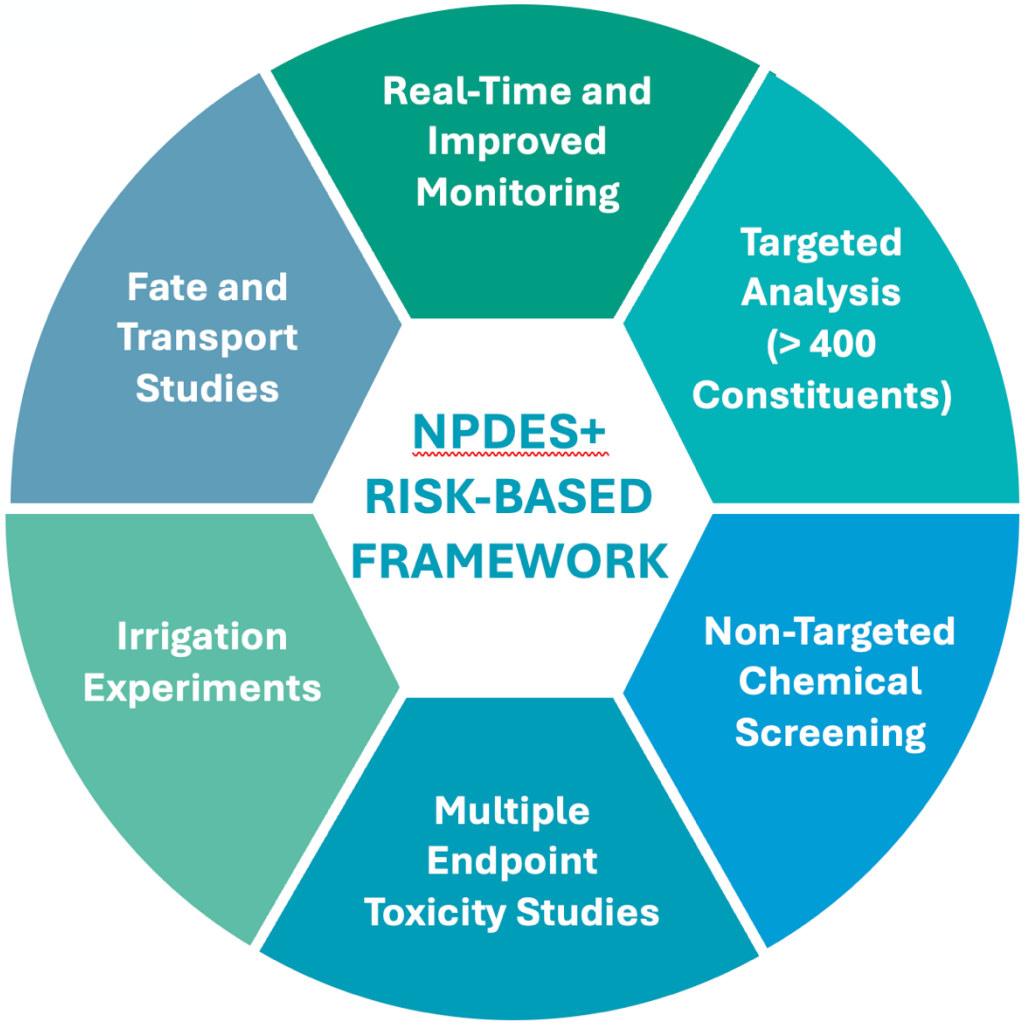
Support science-based regulations

Transforming PW from a Waste to Valuable Resources through Science & Innovation

Multi-stage, Multi-barrier Produced Water Treatment Trains



PW Characterization, Toxicity Studies, and Risk Assessment



- Use a multi-tiered approach combining comprehensive chemical characterization, toxicity testing, irrigation studies, and environmental modeling to evaluate produced water quality, treatment performance, and potential reuse risks.
- Provide guidance on real-time and routine monitoring for process control and ensuring protective reuse

The "NPDES+" List and Analytical Framework

- Major product generated in ~2022 by NMPWRC, stakeholders, and members.
- This list of > 430 analytes serves as the basis for analyses of all raw PWs and treated waters generated from pilot systems.
- Testing framework includes toxicity testing and non-targeted analysis.
- Has been adopted as a starting point by different agencies, industry, and the TxPWC.

Analytical Categories (17)
Metals/Elements - speciated
Anions
Wet Chemistry, Other
Radionuclides
Organic - VOC
Organic - VOC - TPH
Organic - SVOC - General
Organic - SVOC - TPH
Organic - SVOC - Explosives
Organic - SVOC - Agent Breakdown Products
Organic - SVOC - Pesticides/Herbicides
Organic - SVOC - PCBs
Organic - SVOC - PAHs
Organic - SVOC - Organic Acids
Organic - SVOC – Dioxins
Organics - PFAS
Toxicity Testing

What is the State of the Science on PW Toxicity?

Test (End-Use)	Raw PW	Pretreated	Desalinated	Post-Treated	[Ref.]
WET (Surface Discharge)	Toxic	Toxic	Signif. Reduced Toxicity	No Toxicity	[1, 2, 3, 4]
Bioassays (Human Exposure)	Cytotoxic	Cytotoxic	Signif. Reduced Cyotoxicity	No Cytotoxicity	[4, 5, 6]
Greenhouse (Ag/Irrigation)	[Did not test]	[Did not test]	Minimal Impacts*	No Adverse Impacts	[7]

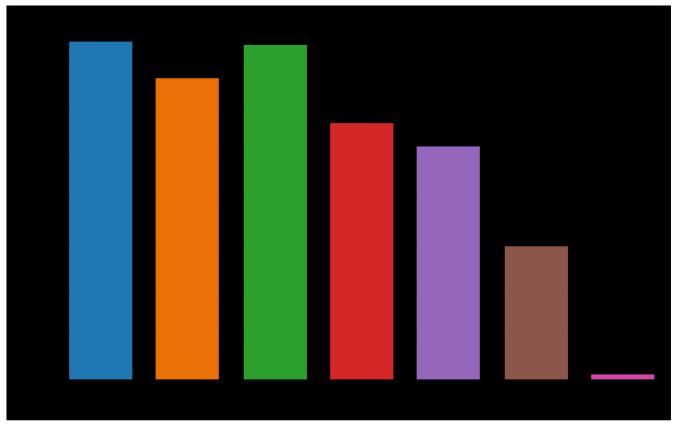
Ref: 1. USGS 2025; 2. 2024 Tarazona a; 3. 2024 Tarazona b; 4. 2026 Tarazona; 5. 2026 Edirisooriya; 6. 2025 Wijekoon; 7. 2026 Senanayake

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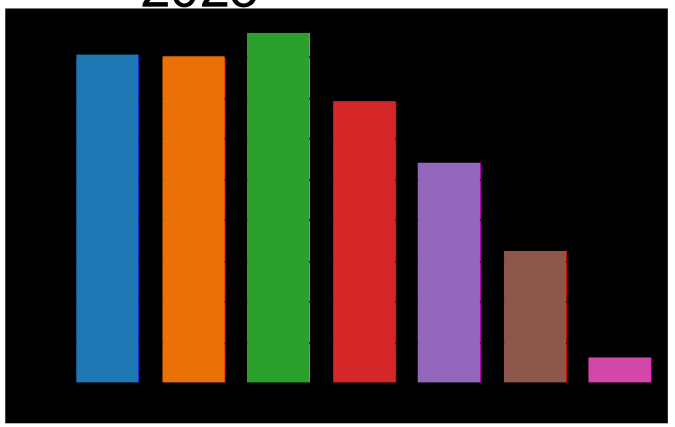
Public Perception of PW Reuse - 657 Public Questionnaire Responses

7. Identify all potential reuse applications that you would support for the use of treated produced water to conserve the use of New Mexico's freshwater supplies, if the water is treated and regulated to standards that prove it to be safe to use and to protect human health and the environment?

2022



2023



2023

a. Uses inside the oil field - such as construction, drilling and fracking, concrete mixing, and dust suppression (61%)

b. Industrial uses outside the oil field - such as construction, power generation, manufacturing, etc. (61%)

c. Agricultural uses, such as irrigation for non-edible crops (e.g., cotton) (65%)

d. Multiple agricultural uses, e.g., irrigation, rangeland restoration, livestock watering, etc. (53%)

e. Supplemental drinking water supplies (41%)

f. I need more information to support the reuse of treated produced water (25%)

g. No, I would not support the reuse of treated produced water for any use outside of the oil field (5%)

Public Outreach, Education, Data Sharing, and Workforce Development

- Provide science, data, and information to stakeholders and the public.
- >40 peer-reviewed journal publications with data, available at NMPWRC website
- Science Simplified: fact sheets, podcasts, videos
- Monthly webinars on a variety of produced water related topics, posted on NMPWRC website and YouTube channels
- Lab tours and visits of research facilities
- Bi-annual and annual review meetings
- In 2025-2026, 37 undergraduate and graduate students, 10 postdoctoral researchers, and >10 faculty members are conducting produced water research at NMSU



Key Takeaways

1. **Produced water is both a management challenge and a potential water resource**, creating a reason to evaluate additional management options.
2. **Through collaborative research and independent evaluation,** the science of produced water treatment and reuse has advanced significantly in recent years.
3. Peer-reviewed studies and pilot-scale evaluations provide **growing, multiple lines of evidence** that advanced multi-barrier treatment systems **can substantially improve treated water quality**, but treatment must be designed and validated for the intended use.
4. **The minerals in produced water provide opportunities for resource recovery,** such as ammonia, iodide, lithium, acids and bases.
5. 657 public survey responses showed >61% support of industrial reuse and irrigation of non-edible crops, 25% needs more information to support reuse.
6. The NMPWRC provides science, research data and information to stakeholders and public.

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