



A New View of Produced Water: Resource, Not Waste

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What's the Produced Water "Problem"?



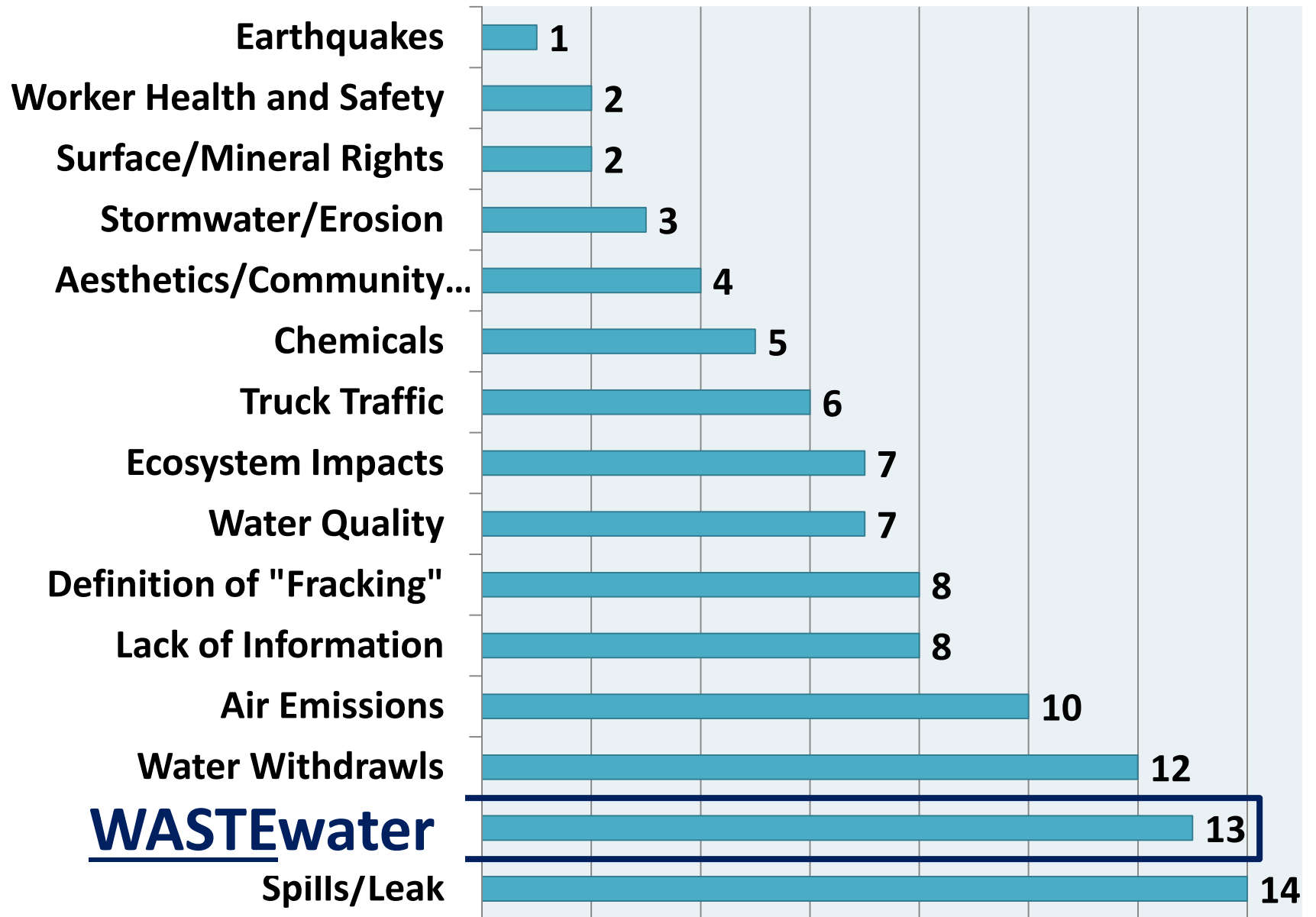
- Large volumes of water produced during unconventional oil and gas exploration and production
- Typically saline and may contain metals
- Regulated as a "waste"



What's a Produced Water Solution?

- Produced Water Management Plans
- Beneficial Reuse
- Demonstrate Success through Case Studies

Areas of Concern



Number of Respondents Expressing Concern

Definition: Waste /wāst/ (n)

United States

ALL produced water considered a waste

Prohibition on surface discharge (unless benefits to habitat or agriculture can be demonstrated)

Australia

Most states define produced water as a waste

Queensland redefinition: Beneficial if “no harm” can be demonstrated

From Wastewater to Drinking Water

Beneficial re-use of treated wastewater
gaining acceptance

Singapore NEWater



Treated wastewater
bottled and sold

Orange County, CA



World's largest wastewater
purification plant

How to Develop a Produced Water Management Plan

FOUR STEPS

1. Understand the source
2. Understand the local water needs
3. Evaluate Water Quality
Compatibilities
4. Determine
Treatment Options



Step 1: Understand the Source

- Salinity
- Naturally Occurring Metals
- Volume
- Change over time

Produced Waters Not Created Equal



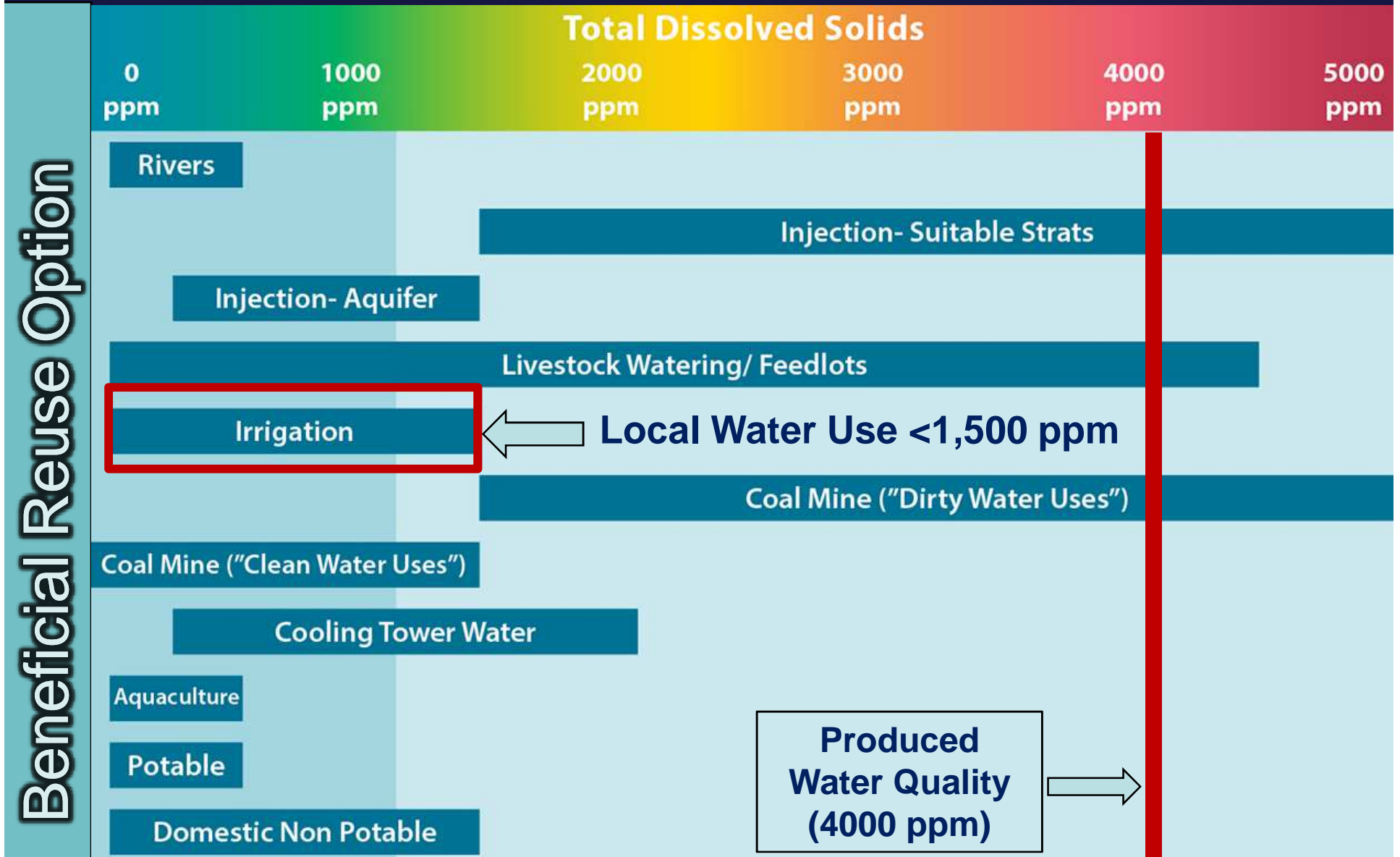
Step 2: Understand the Local Water Needs

- Local water users
- Water Quality and Quantity needs
- Local Regulations

**Highly
Site-Specific**



Step 3: Evaluate Compatibilities



Step 4: Determine Treatment Options



Different Levels of Treatment

Variety of Treatment Options

A New Source of Water

- Livestock Watering
- Industrial Washdown
- Reuse on Field

- Crop Irrigation
- Golf Course Watering
- Wildlife and Habitat Support

- Recycling for Hydraulic Fracturing
- Cooling Tower water

Can Reduce Demand on Potable Water Supply and Improve the Community Relations

California Oil and Gas Example



California's Wine Regions



Reinjected for
aquifer recharge
in wine country

Discharge water
into creek to
support critical
habitat for
federally
endangered
species

Australia Example

Menu of Beneficial Reuses

No Treatment:

- Stock watering
- Industrial wash-down
- Dilution/
- discharge

Treated:

- Irrigation
- Stream discharge

- Limited opportunity for injection
- Mechanical Vapor Recompression selected for treatment

Summary

- A new view of produced water: New resource, not a waste
- Local solutions needed
- Regulatory hurdles easing as the beneficial uses are demonstrated





**Thank You
Questions?**

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