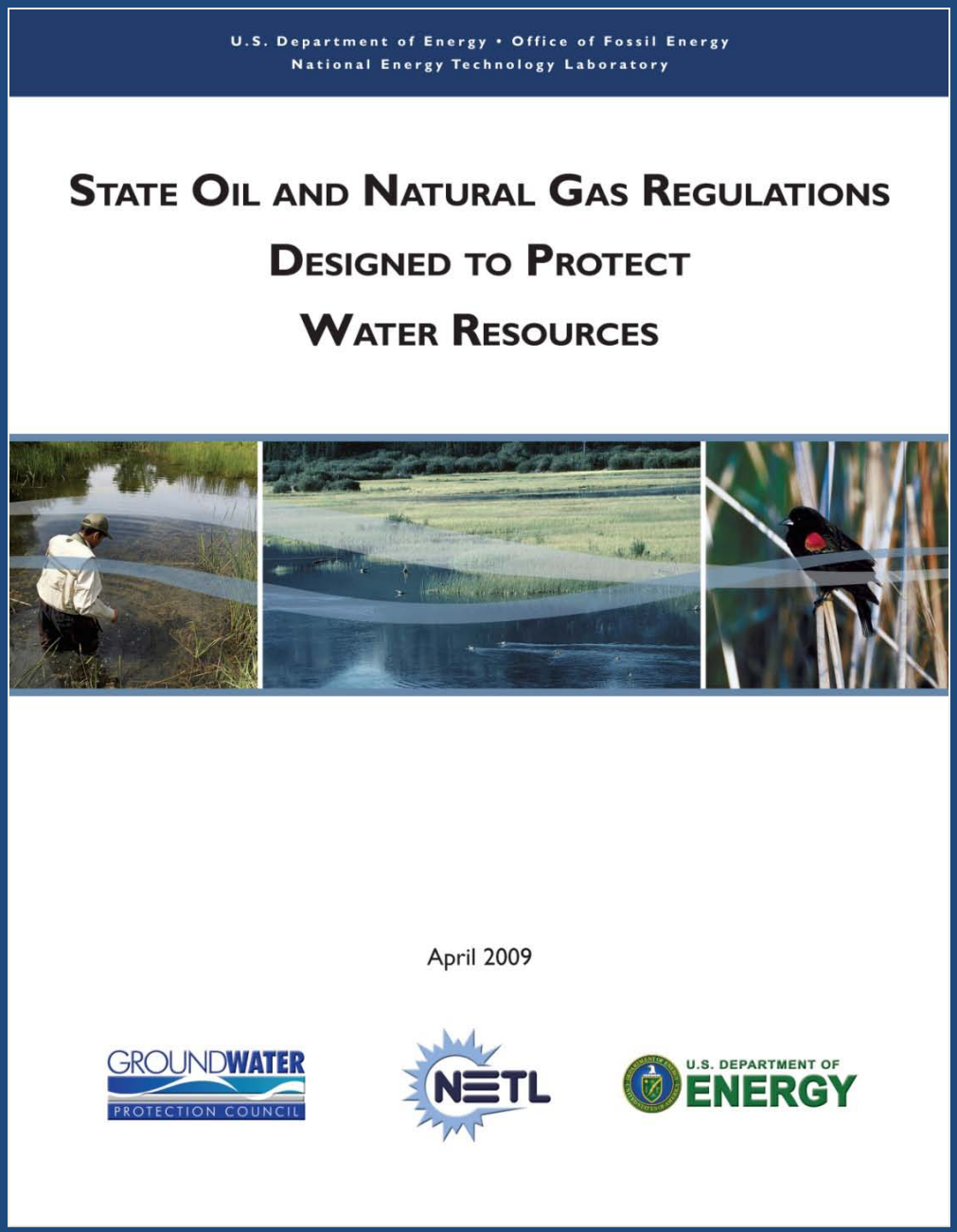
# How do States Define "Usable Quality" Groundwater?

***GWPC 2014 Annual Forum: Groundwater Sustainability***

**…a critical component of the ecosystem**

Ground Water Protection Council
Steven P. Musick, P.G.

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- **2014 Updated Report Now Available**
- **Add Review of State Water Agencies' Rules**
- **Determine which regulations are designed to protect water**
- **Describe how regulations are used to protect water**

## Companion Report

- **Compares water quality protection standards across agencies**
- **Summarizes states' groundwater protection efforts**

# Cooperative Project- Ground Water Protection Council and Environmental Defense Fund

## How do States Define “Usable Quality” Groundwater?

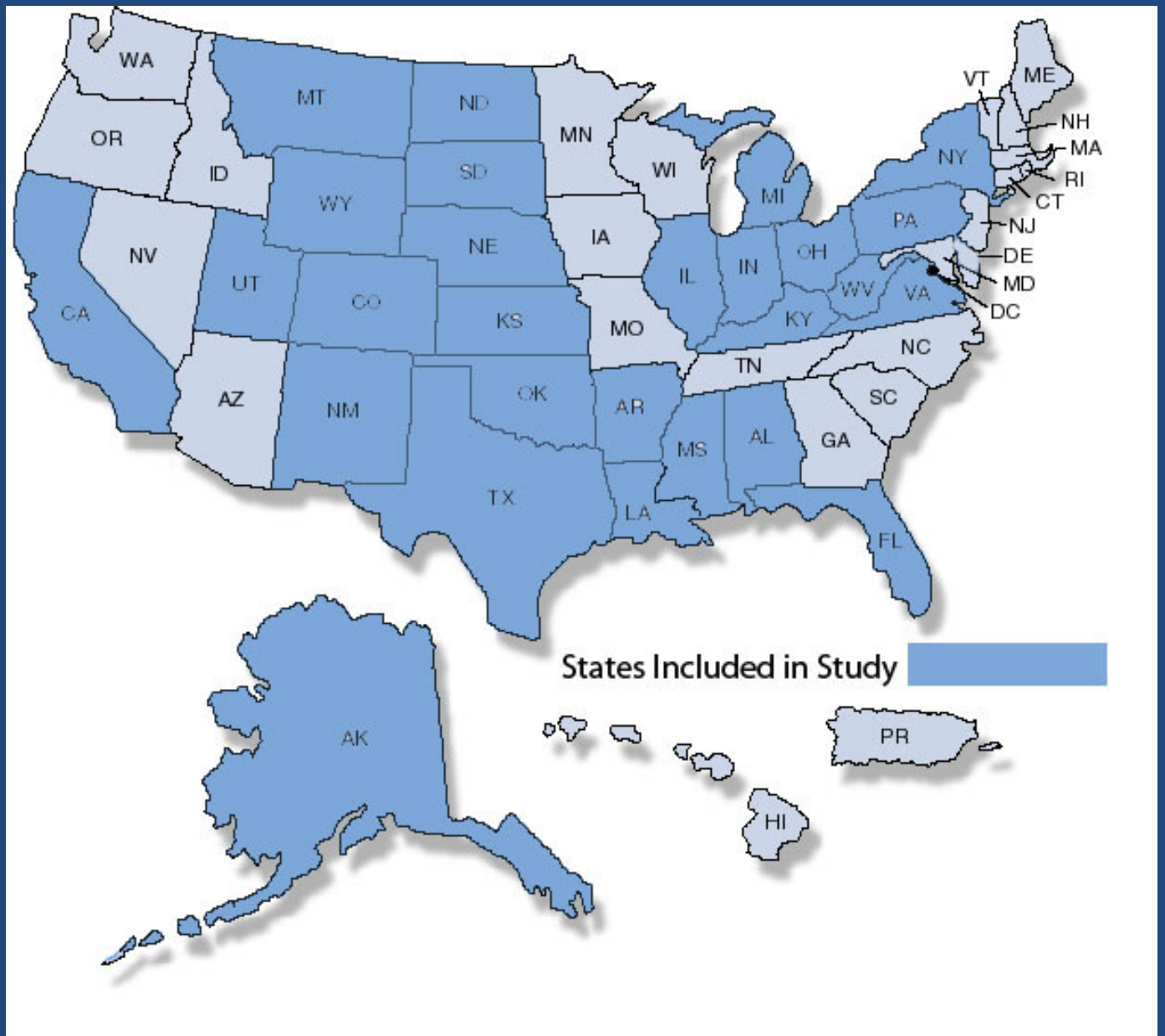
- Overview of current regulatory programs of 27 states
- Regulations of Oil and Gas state agencies
- Definitions of usable and fresh groundwater for

  Oil & Gas and Water Quality state agencies
- Groundwater protection policies
- Groundwater classification and water quality standards

# Study Assumptions

- Each state has specific regulatory language designed to address its geographic, geologic, climatic and public policy issues
- Regulations do not comprise the full scope of regulatory programs
- States only enact regulations they intend to implement

# Study States



# Groundwater Regulatory Provisions
# State Oil and Gas Agencies

- **Pollution Prevention** – An operator shall conduct all oil and gas operations in a manner so as to prevent the pollution of all freshwater resources
- **Permitting** – All of the states in the study have permitting authority and protection requirements for oil and gas drilling
- **UIC Class II Program - Injection of Produced Water**
  - 21 states in the study have delegated EPA-approved UIC primacy programs and EPA conducts the program in 6 states
  - 2 of the 6 nonprimacy states have state rules coexisting with EPA ‘s Direct Implementation program
  - Protection standard: Underground Source of Drinking Water
  - Less than 10,000 milligrams per liter total dissolved solids and is not an exempted aquifer

# Groundwater Regulatory Provisions
# State Oil and Gas Agencies - Continued

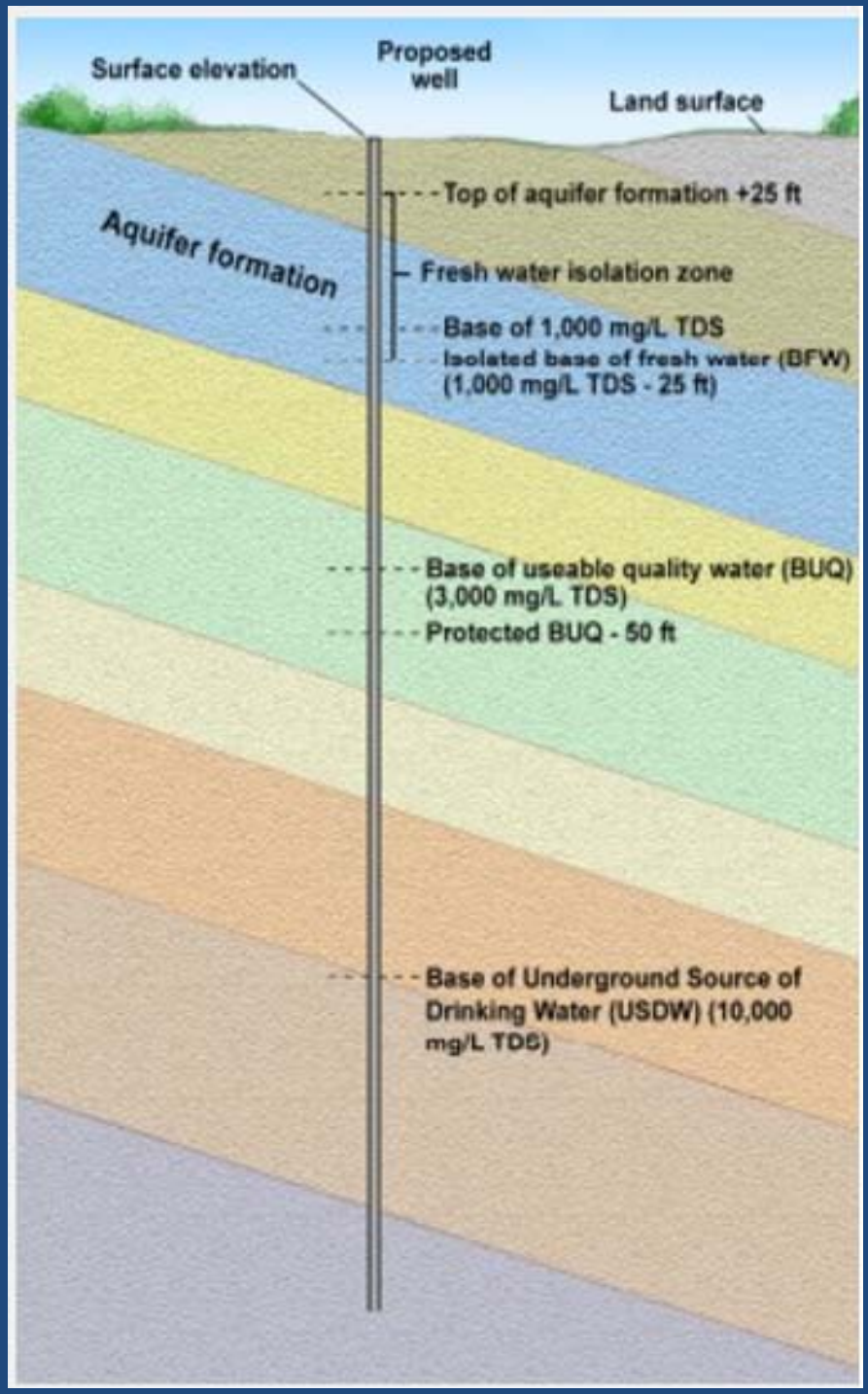
**Groundwater Protection Standard**

- Base of Usable Quality groundwater (1,000 -3,000 mg/L TDS)
- May include zones of higher TDS, if it is currently being used
- May include brackish zones hydrologically connected to zones that contain usable-quality water

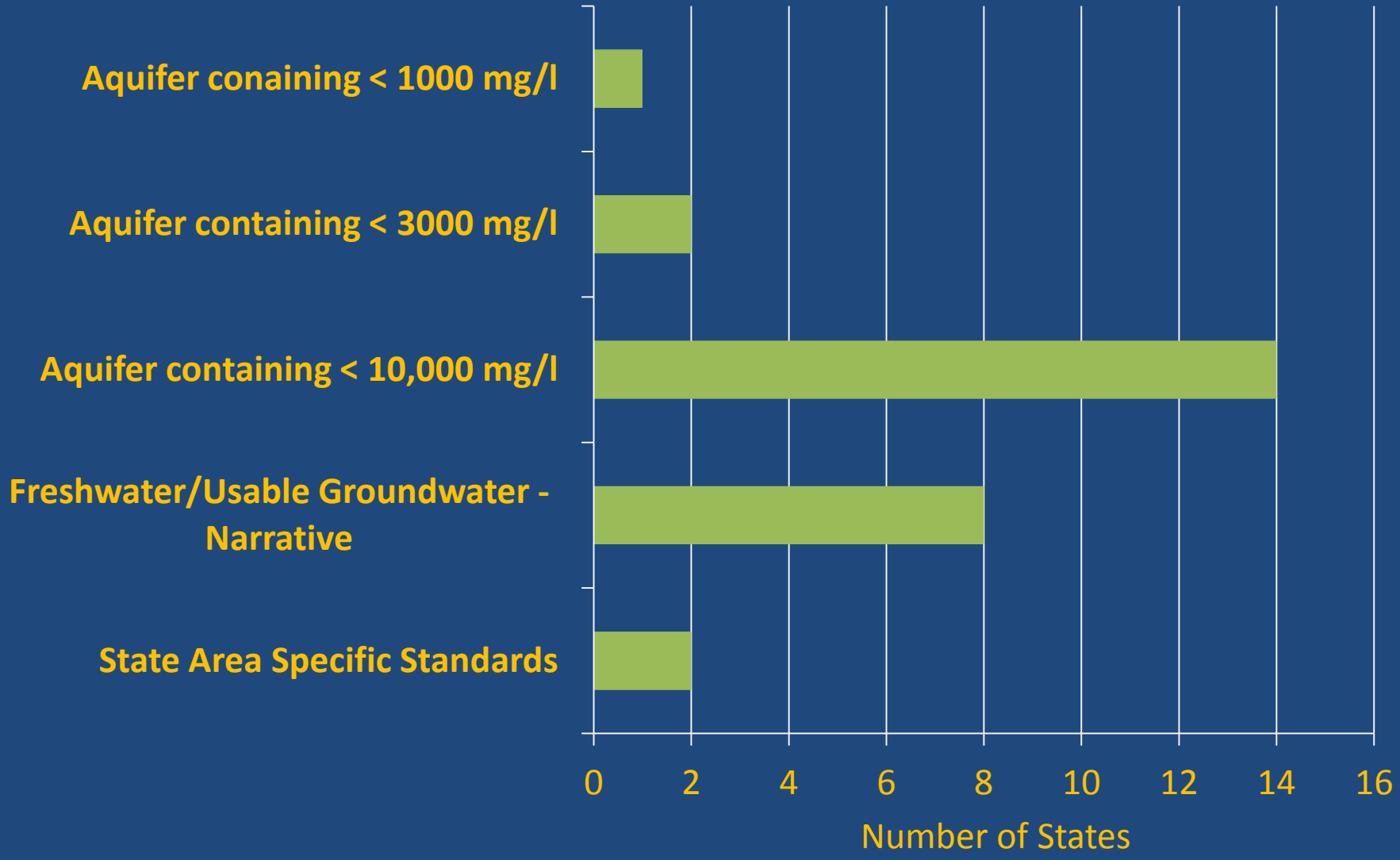
**Casing and Cementing Depth Requirement**

- Agencies often have Field-Specific Rules

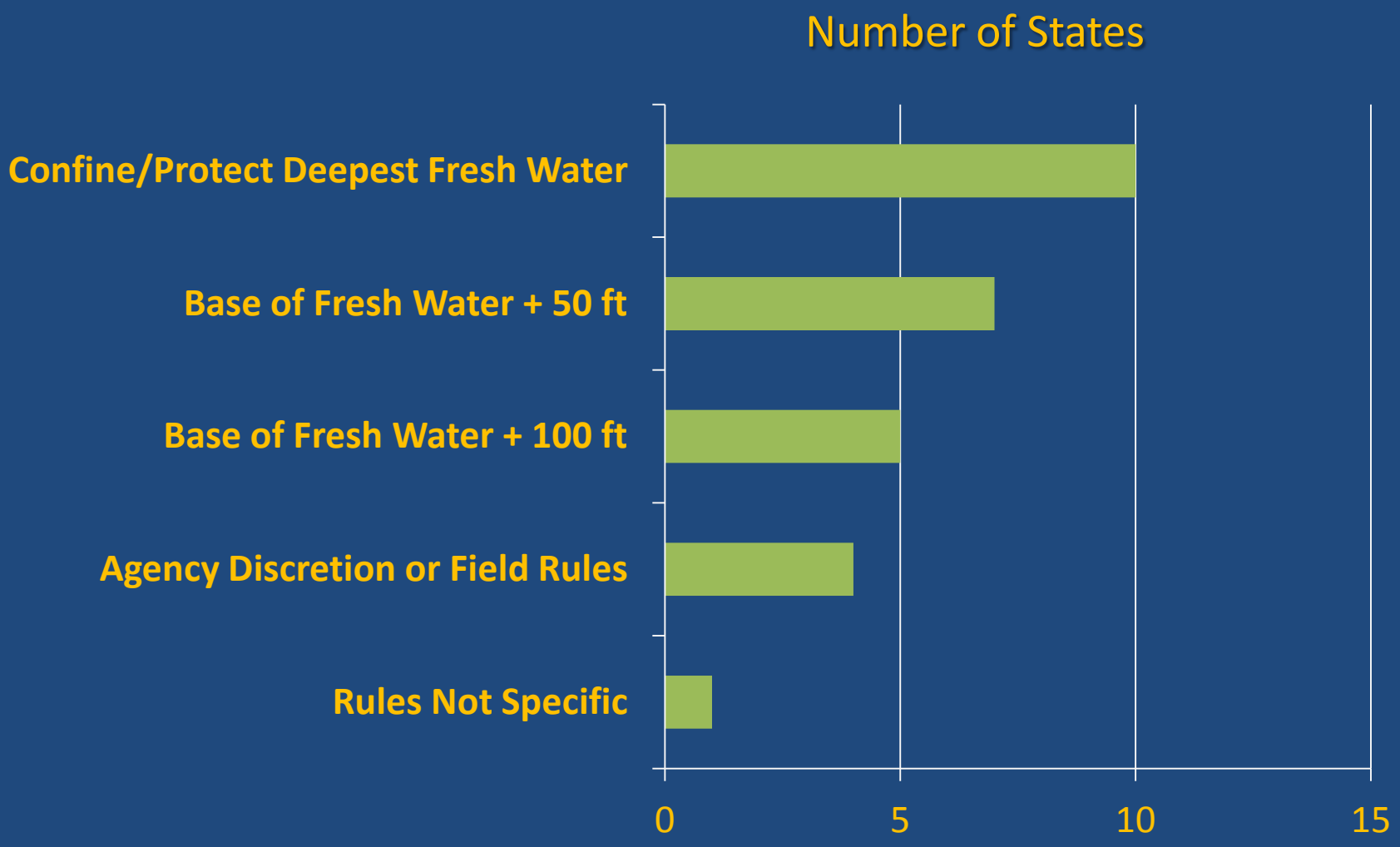
**Depths at which higher levels of groundwater protection (1,000, 3,000 and 10, 000 mg/L TDS) are applied**



# Types of Groundwater Protection Standards



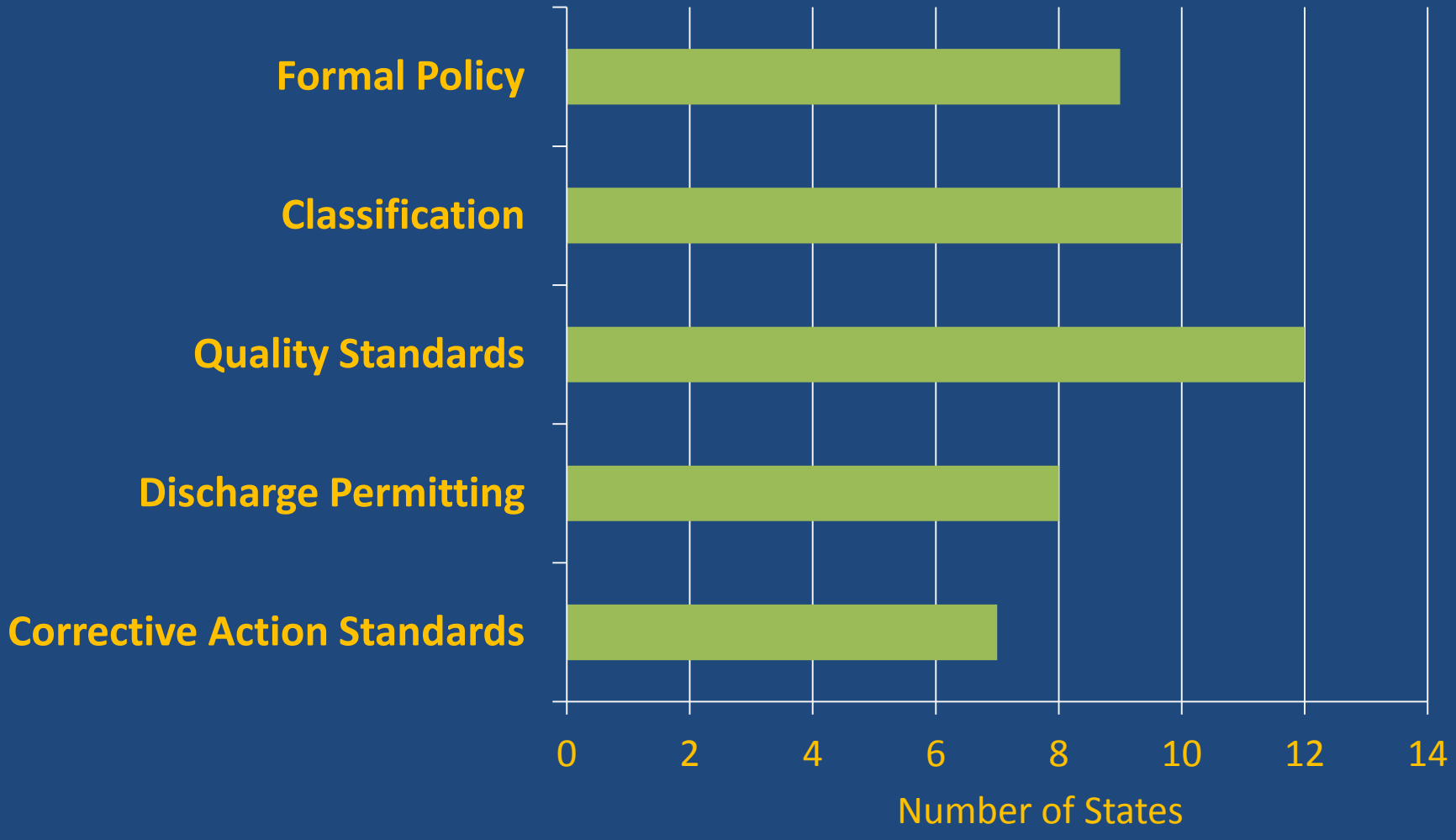
# Casing/Cementing Depth



# Groundwater Regulatory Provisions
# State Water Quality Protection Agencies

- Groundwater Protection Policy
- Identified Groundwater Classifications
- Specified (Numeric) Groundwater Quality Standards
- Groundwater Discharge Permitting with Pollution Prevention
- Programmatic permitting
- Corrective Action Standards
- Underground Injection Control Program

# Groundwater Protection Regulatory Provisions



# Future Water Supplies

- In order to further understand groundwater quality protection issues, sources of future water supplies should also be considered. These sources of groundwater may occur at greater depths or contain water with increased salinity or both.
- U.S. Geological survey and some states are or have in the past conducted studies on the occurrence and quality of saline groundwater resources.
- A general groundwater quality classification has been published by the U.S. Geological Survey in a report reviewing data from across the United States.

# General Groundwater Quality Classification
# U.S. Geological Survey

## *Based on Total Dissolved Solids Content*

| | |
|---|---|
| Fresh Water | less than 1,000 mg/L |
| Slightly Saline | 1,000 to 3,000 mg/L |
| Moderately Saline | 3,000 to 10,000 mg/L |
| Very Saline | 10,000 to 35,000 mg/L |
| Brine | greater than 35,000 mg/L |

**Milligrams per liter (mg/L) is generally equivalent to parts per million (ppm) when dissolved-solids concentrations are less than about 7,000 mg/L. For larger concentrations, a density correction should be used when converting from mg/L to ppm.**

# Issues Identified

- Definitions, such as “usable groundwater” are often not linked to a specific water quality standard
- Rationale supporting a protection standard or depth may not be in the rule or not clearly stated
- Sources of future water supplies should also be considered
- Study results suggest that states could benefit from a review of their groundwater protection regulations

# Take Away Points:

- Oil and gas producing states have rules and regulatory programs that address groundwater quality protection
- State water quality agencies utilize a variety of regulatory approaches to protect groundwater quality
- Variations are evident in regard to specificity of water quality standards
- Less than half the states in the study employ water quality classification and standards for groundwater protection

# Potential Next Steps

- Expand the review to remaining states
- Review quality concerns of state water resource and planning agencies
- Review state and federal brackish water resource assessments and mapping programs
- Develop a more detailed review of states' water quality classifications and standards
- Conduct additional review of corrective action standards in state waste management programs for comparison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