The Water Resources Management System (WRMS)

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Abstract

The Water Resources Management System (WRMS) began in 2020 as an initiative of the AAPG Division of Environmental Geosciences (DEG) to address the needs of finding a method to account for volumetric estimates of produced water, consider ways that produced water is either a liability or an asset (or both), and develop a common framework classification for water resources. Representatives from the Society of Petroleum Engineers (SPE) and the American Groundwater Trust (AGWT) joined the initial Ad Hoc Committee and in 2022 released the initial WRMS definitions and code.

The WRMS is an ownership based, point in time range of volumetric estimates that acknowledges a dynamic fluid system that may have recharge and is linked to accounting for consideration of "water balance", "reliable measures", the definition of "asset", and commerciality. It uses the basic framework of both the Petroleum Resource Management System (PRMS) and the Storage Resource Management System (SRMS) in defining Reserve, Contingent Resource, and Prospective Resource Categories based on level of discovery and commerciality. It is expected to be used in the accounting for such fluids as brine fluids produced from an oil and gas well, produced fresh water from a CBM well, water produced with lithium or other brine extraction methods, geothermal wells, etc.

The WRMS is considered a "Live" document with a Roundtable consisting of representatives of endorsing organizations working to keep the document current. Mr. Andy Clay of the DEG is the current Chair with representation from the SPE and AGWT plus a monitoring seat from the Society of Exploration Geophysicists (SEG).

Key Words: WRMS, water, water balance, reliable measures, asset, commerciality, PRMS, SRMS, recharge, produced water, brine, geothermal, volumetric analysis, reserves, resources.

IMAGE CONFERENCE

The Water Resources Management System (WRMS)

A Non-Prescriptive Global Standard that is Being Adopted for the Estimation and Quantification of Project Based Water Resources: A Basis for Asset Recognition and Sustainable Water Utilization

Andy Clay & Jeff Aldrich

AAPG Division of Environmental Geosciences

Presented on August 29, 2023 by Steven Golko

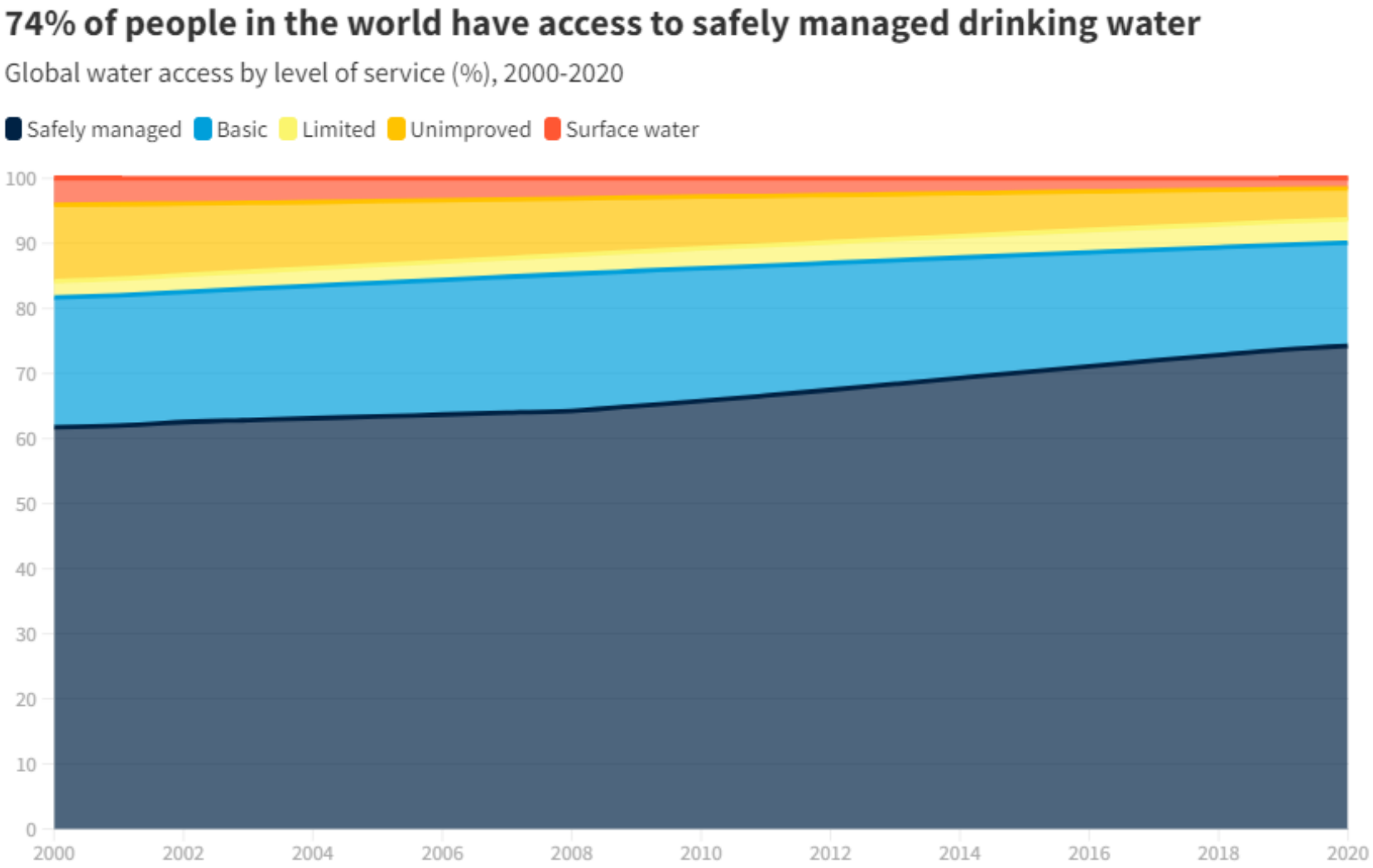
What is the Cost of Your Water?

- Dasani 16oz Bottle from Sam's Club $0.12
- Dasani 16oz Bottle at GRB $6.99
- Fiji 32oz Bottle from Amazon $2.59
- Texas Water Development Board: Graywater
    - For 1,000 gallons of graywater processing $2.46

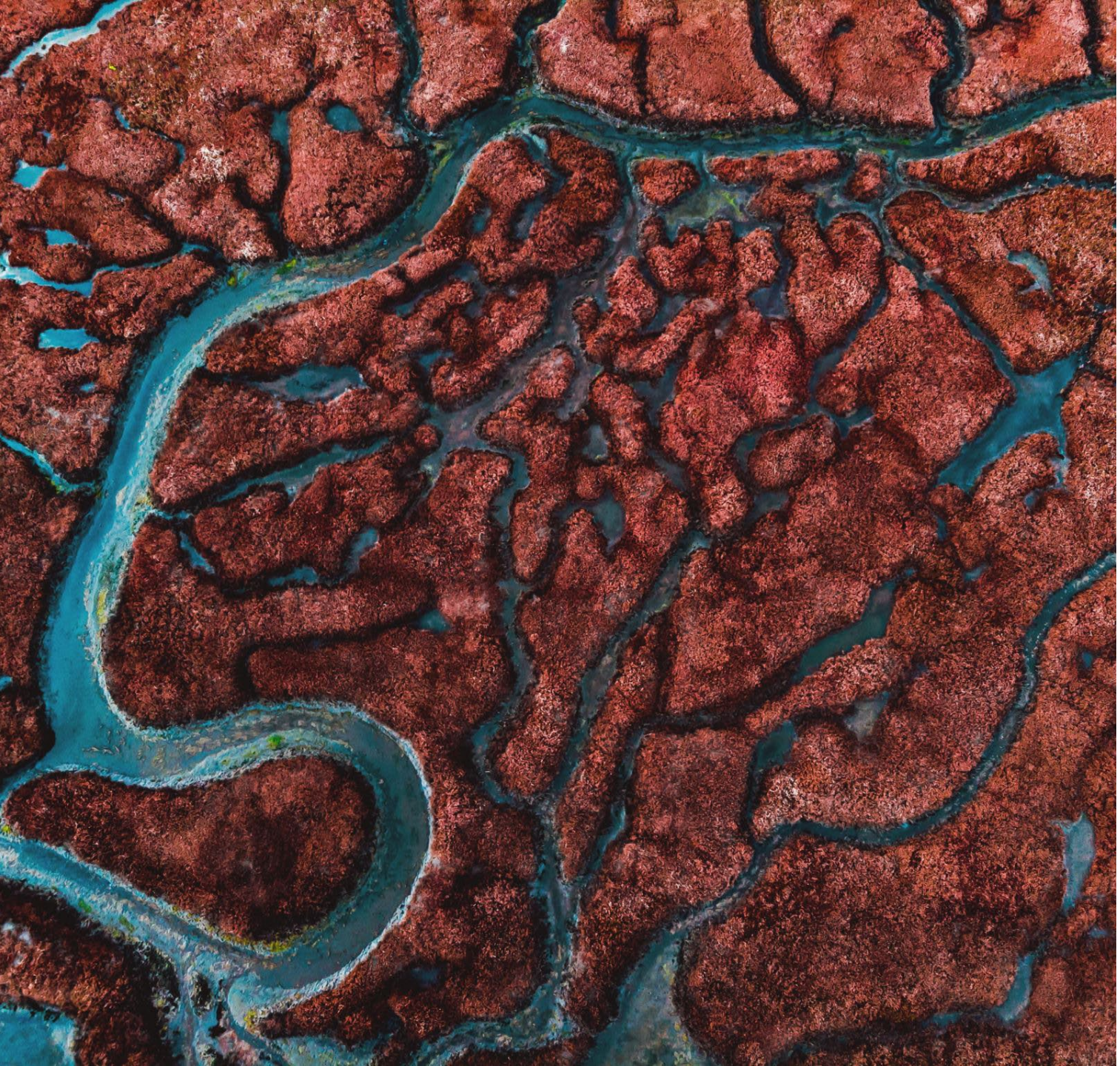
- Texas Water Development Board: Desalination
    - For 1,000 gallons of saltwater desalination $4.40

Cost of Your Water

Over 2 Billion People Do Not Have Access to Clean Reliable Water Resources



Source: WHO/UNICEF JMP; WDI (SH.H2O.SMDW.ZS)



Sproule

WATER IS A VALUABLE RESOURCE

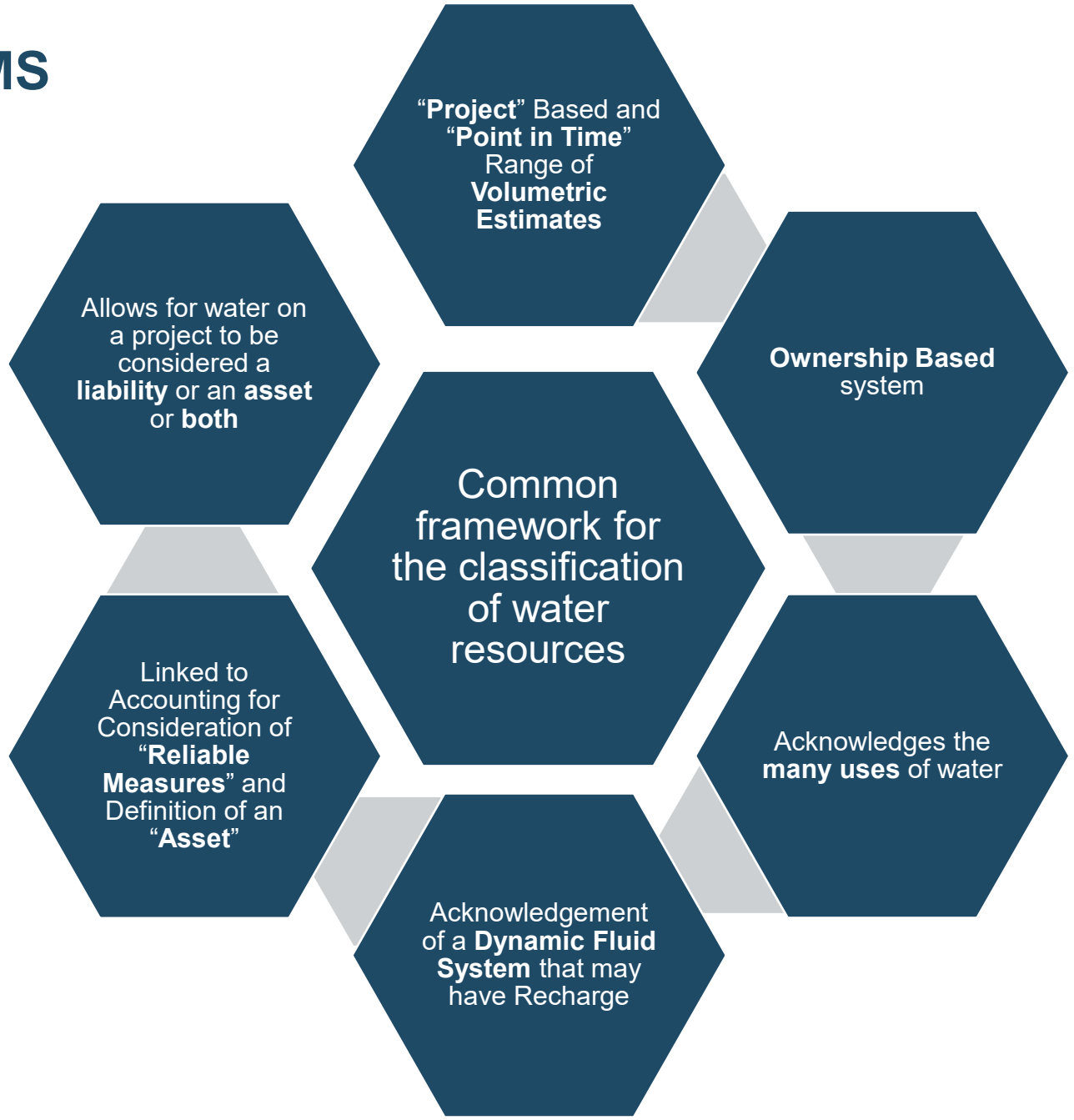
The WRMS was created to help manage **subsurface** water resources

It uses the PRMS as a Model

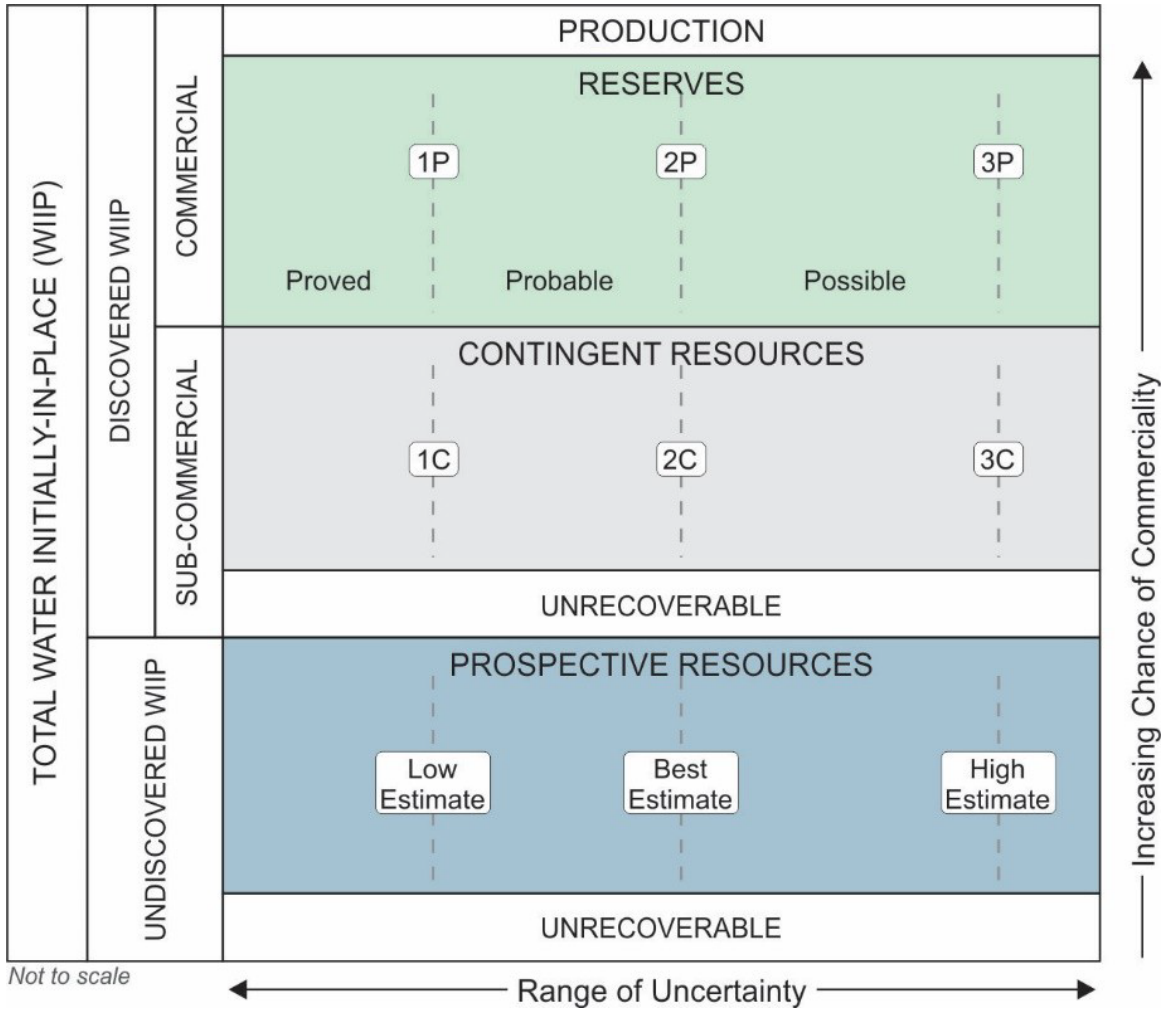
A Short History of the WRMS

- Begun in **2020** as an initiative of the AAPG Division of Environmental Geosciences (**DEG**)
  - Don Clarke (President DEG) as Chairman
  - Brought in members from Society of Petroleum Engineers (SPE) and American Water Board Trust (AWBT)
- **2021** The WRMS was issued and endorsed by the **AWBT**
  - The DEG tabled it pending approval by SPE
- **2022** The **SPE** Water Life Cycle Committee Endorsed the WRMS
- **2022** The Society of Exploration Geophysicists (**SEG)** began evaluation of the WRMS

What is the WRMS



What is the WRMS

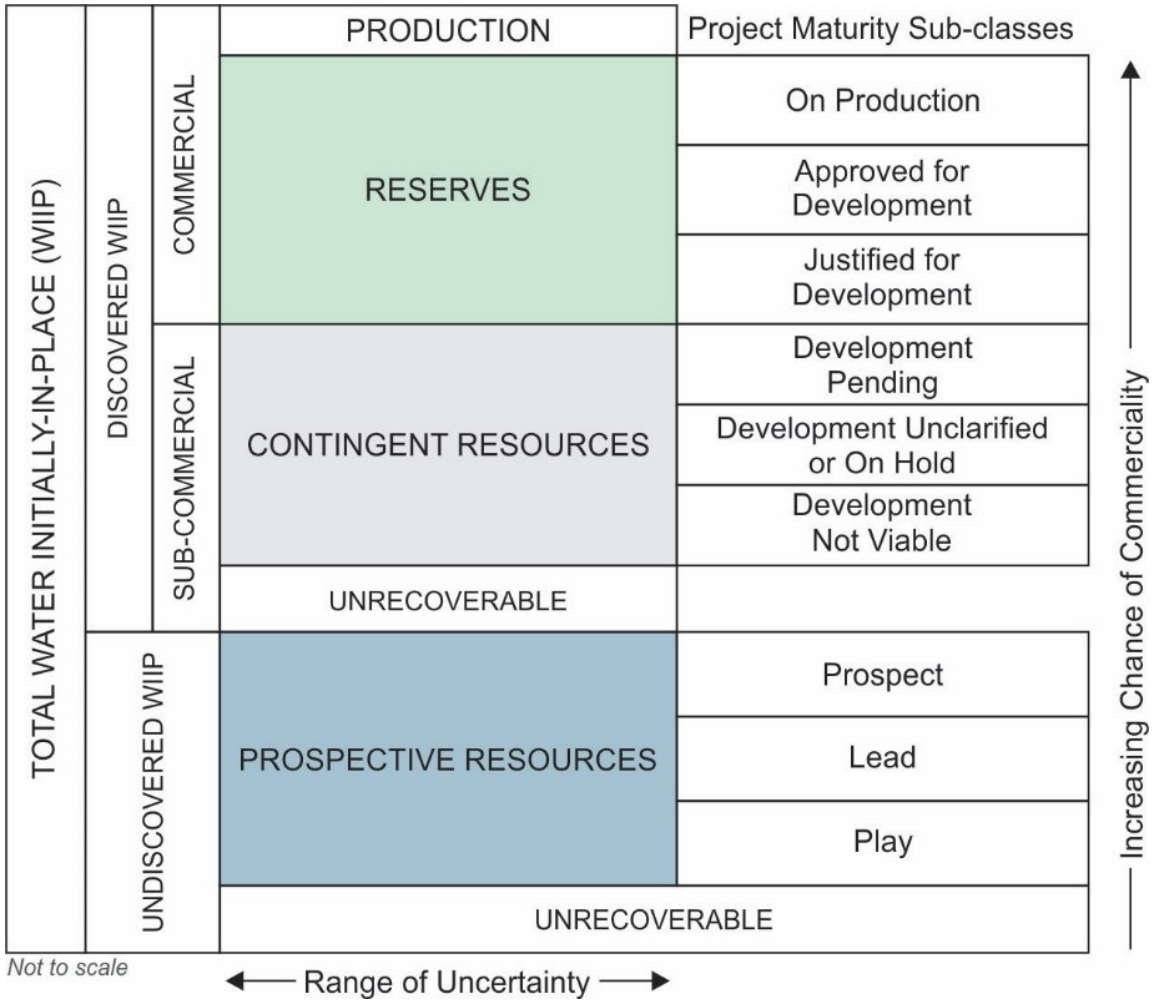


It is Very Similar to the PRMS

- Reserves are Discovered, Recoverable and Commercial
- Contingent Resources are Discovered but not Commercial
- Prospective Resources are not Yet Discovered

It does not assume ownership of water rights! Similar to the PRMS the obligation to the mineral right lies with the operator.

How Can You Use the WRMS



EXAMPLES

Brine Fluids from an O&G Well
- They can be a liability
- They can be an asset if treated
  - What volumes will be produced and what is cost to treat?

CBM wells produce lots of water
- This can be a liability
- This can be an asset

Lithium Extraction wells produce waste water
- This can be a liability
- This can be an asset if treated

Geothermal Wells need water to operate

The Concept of “Water Balance”

Term exists 96 times in the 35 page document

- The “water balance” is intended to measure inflow, outflow and **recharge**
- In **most cases recharge is a significant factor** and the impact on sustainable volumes should be clearly indicated in the Water Balance
- The estimates of **recoverable quantities** must reflect uncertainties not only in the water in place but **also in the recovery efficiency, recharge and water balance** characteristics of the development project(s) applied to the specific reservoir
- Can the ultimate recoverable water volume be greater than the Total Water Initially In Place?

Resource Management System Lifecycle

WRMS is a live document to be continuously updated

PRMS

Petroleum Resource Management System

2007 – PRMS definitions initial release

2011 – PRMS application guidelines initial release

2018 – Revised definitions release

2022 – Revised application guidelines release

SRMS

Storage Resource Management System

2017 – SRMS definitions initial release

2022 SRMS applications guidelines initial release

WRMS

Water Resource Management System

2022 – WRMS definitions initial release

What Can You Do

- Ask for a Copy of the WRMS
  - AAPG CORE Committee keeps a current version
    - Email jeff.Aldrich@sproule.com
  - AGWT keeps a current version

- Become familiar with it and look for ways to commercialize project water, turning liabilities to assets.

Contact

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The Water Resources Management System (WRMS)

Questions

IMAGE Conference

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