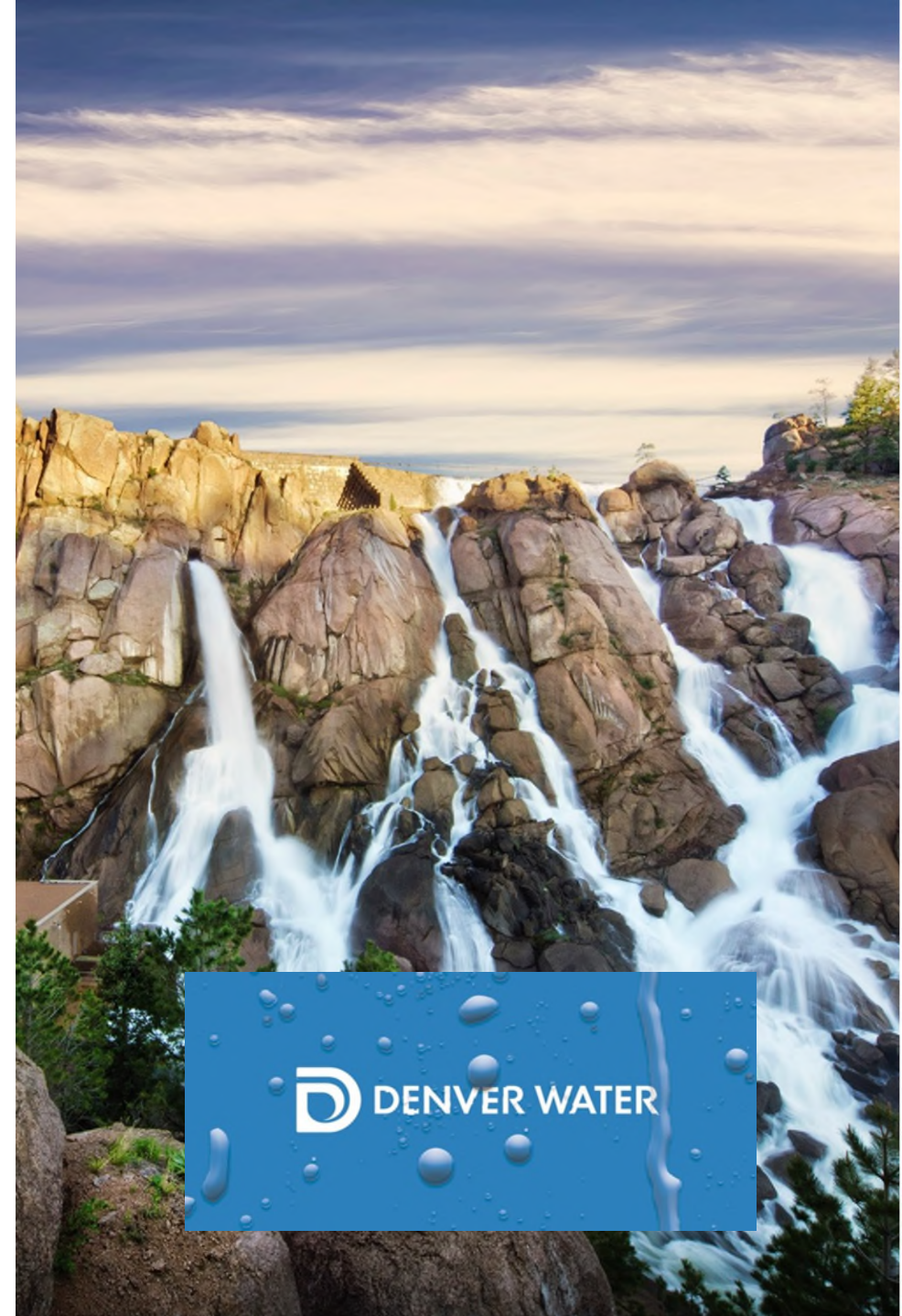


Denver Water ASR as a Potential Complement to Existing Surface Water Infrastructure

Rachel Pence, Senior Water Resource Engineer, PE
February 23, 2024



Agenda

- Why ASR?
- What is ASR for Denver Water?
- What have we done?
- What's next?



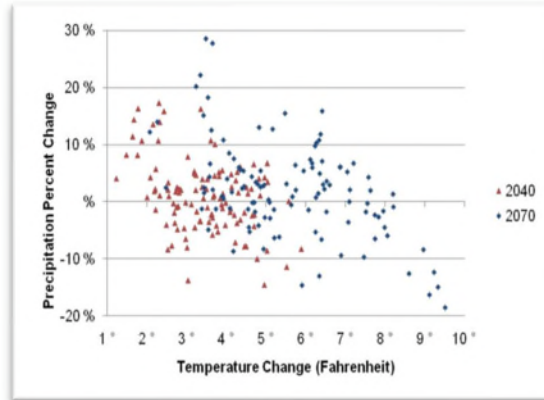
A horizontal blue banner with a background of water droplets and splashes. The text "Why ASR?" is centered in white.

Why ASR?

Water Planning Challenges



Drought



Climate Change



Beetle Kill



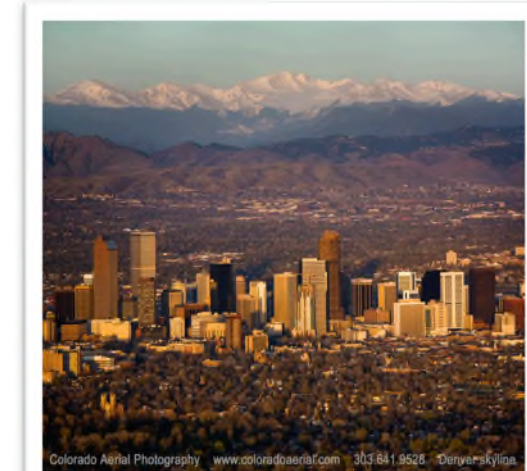
Flood



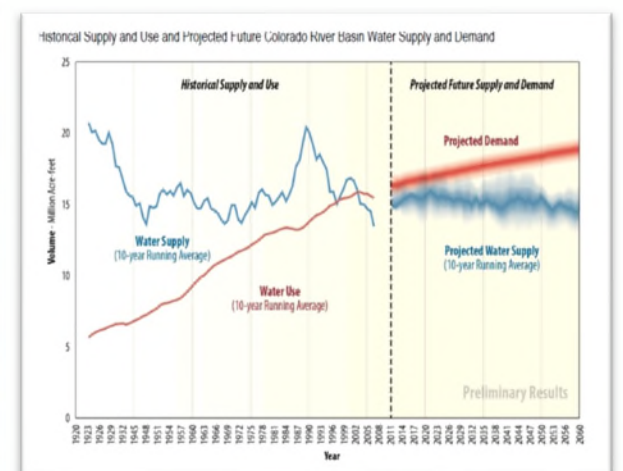
Fire



Dust on Snow

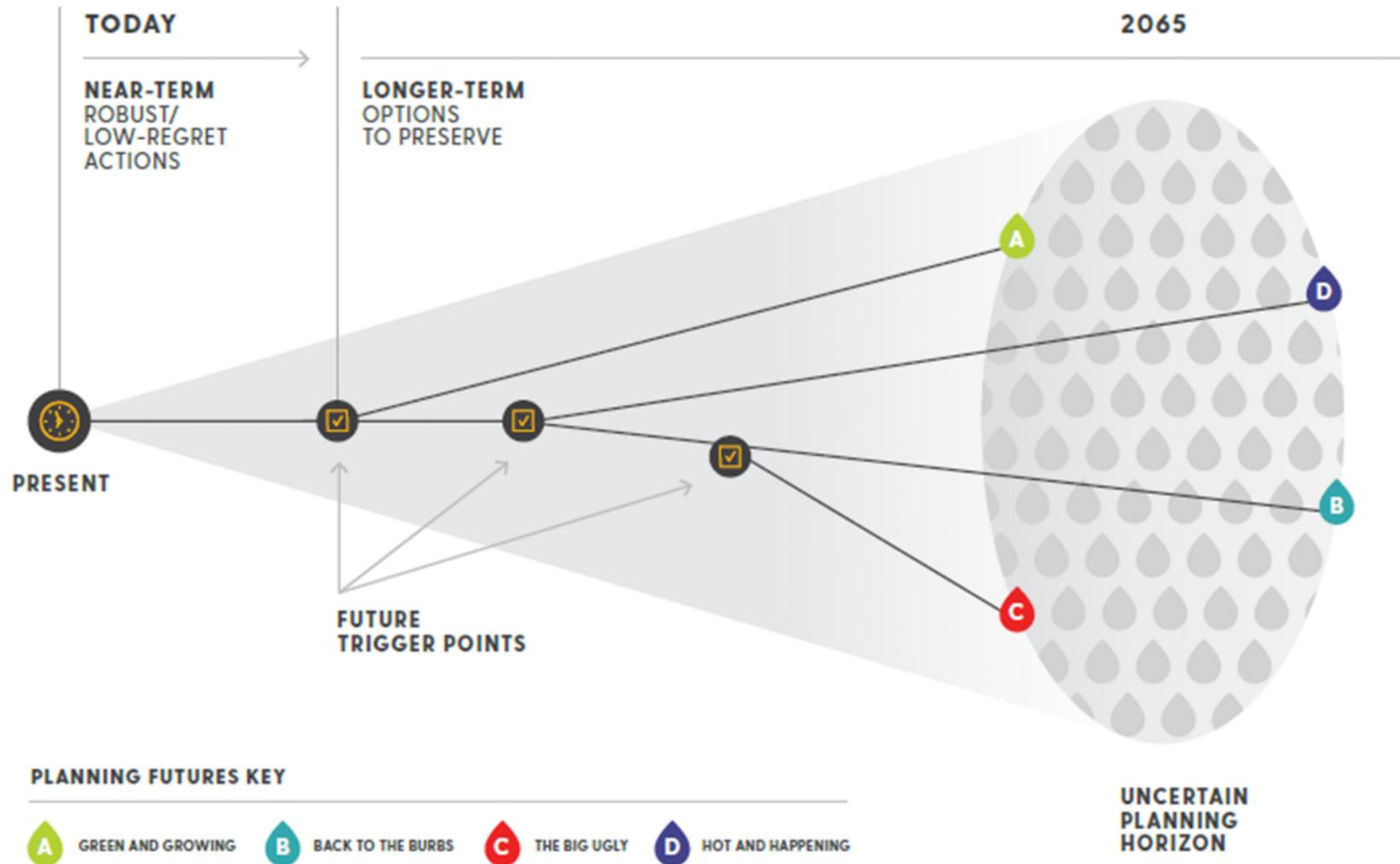


Growth Challenges



CO River Basin

Cone of Uncertainty



Why ASR?

Advantages:

- Supply diversity
- Phase-able/scalable
- Fewer environmental impacts
- Cost competitive
- No evaporation

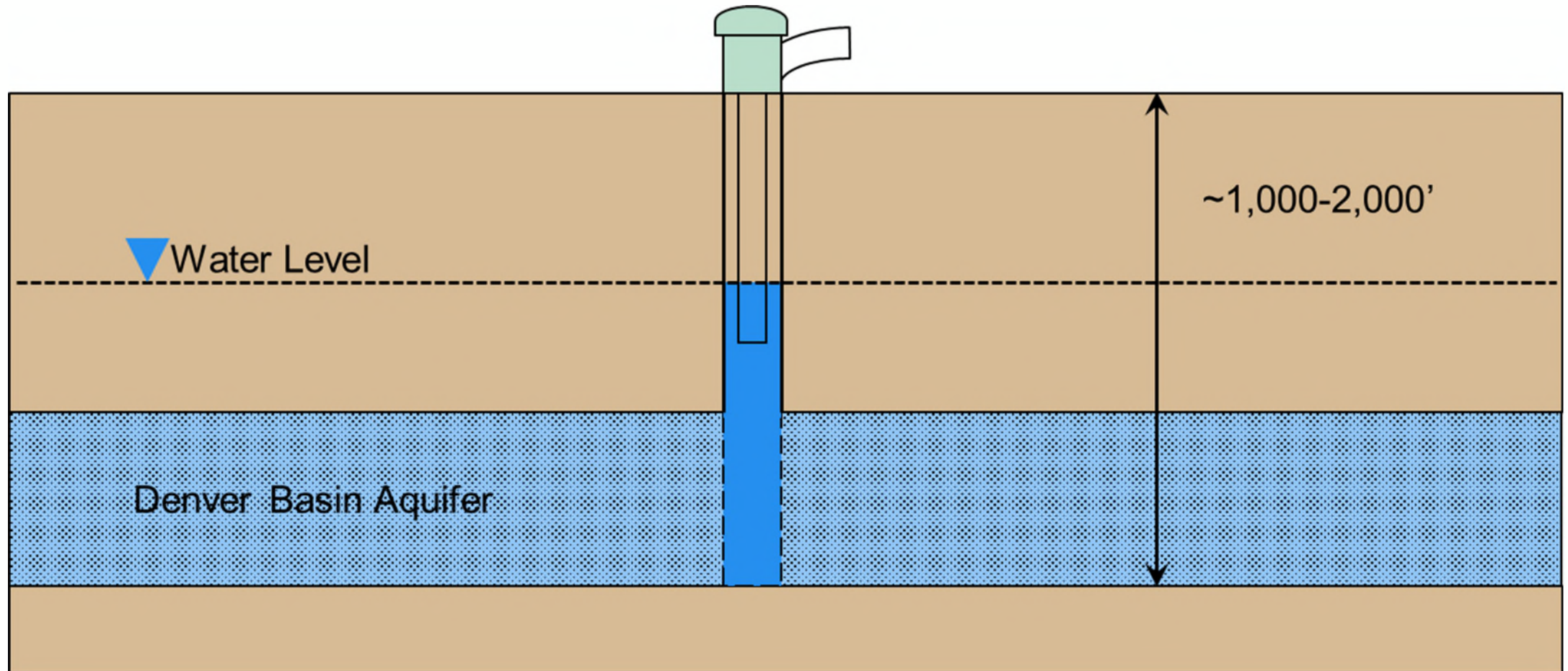
Challenges:

- Well siting in an urban area
- Water quality?
- Recoverability risks
- New operations
- Uncertainty regarding aquifer productivity

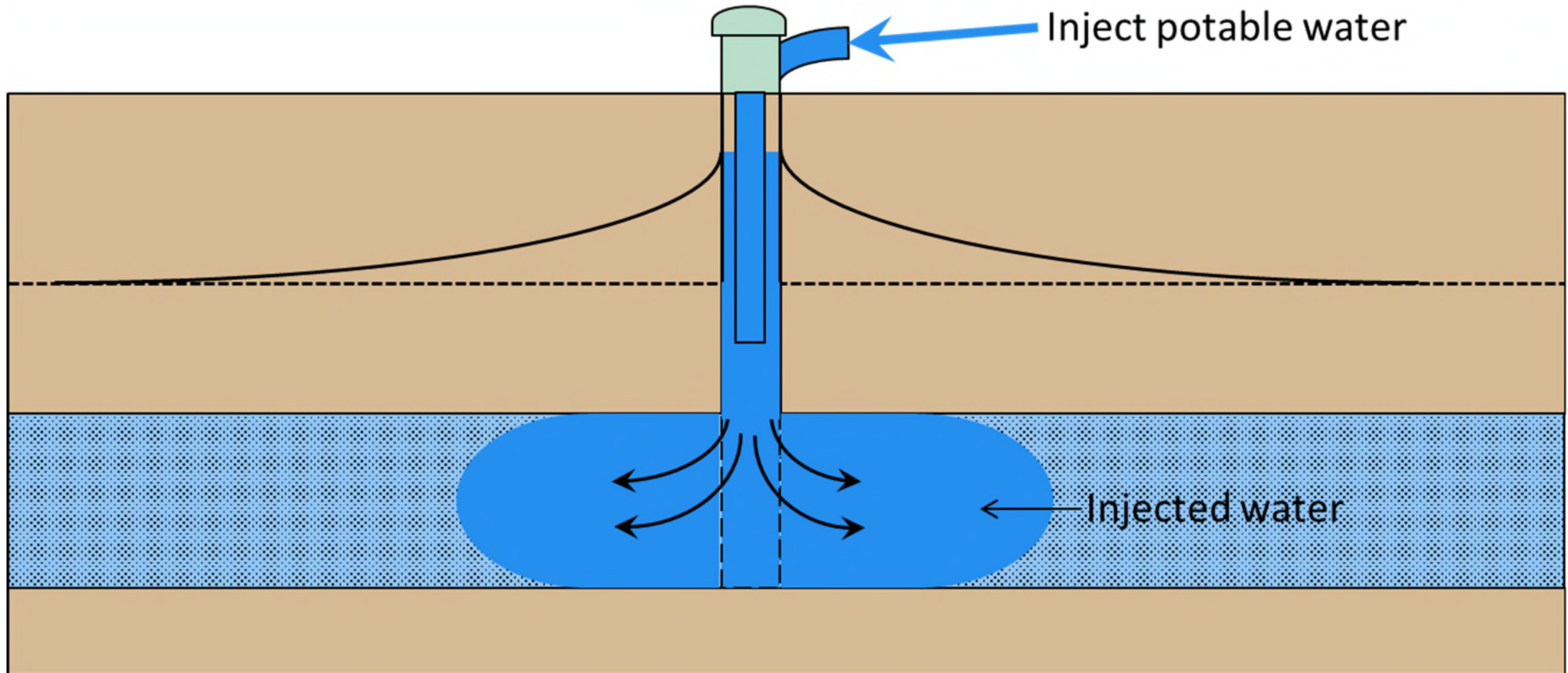


What is ASR for DW?

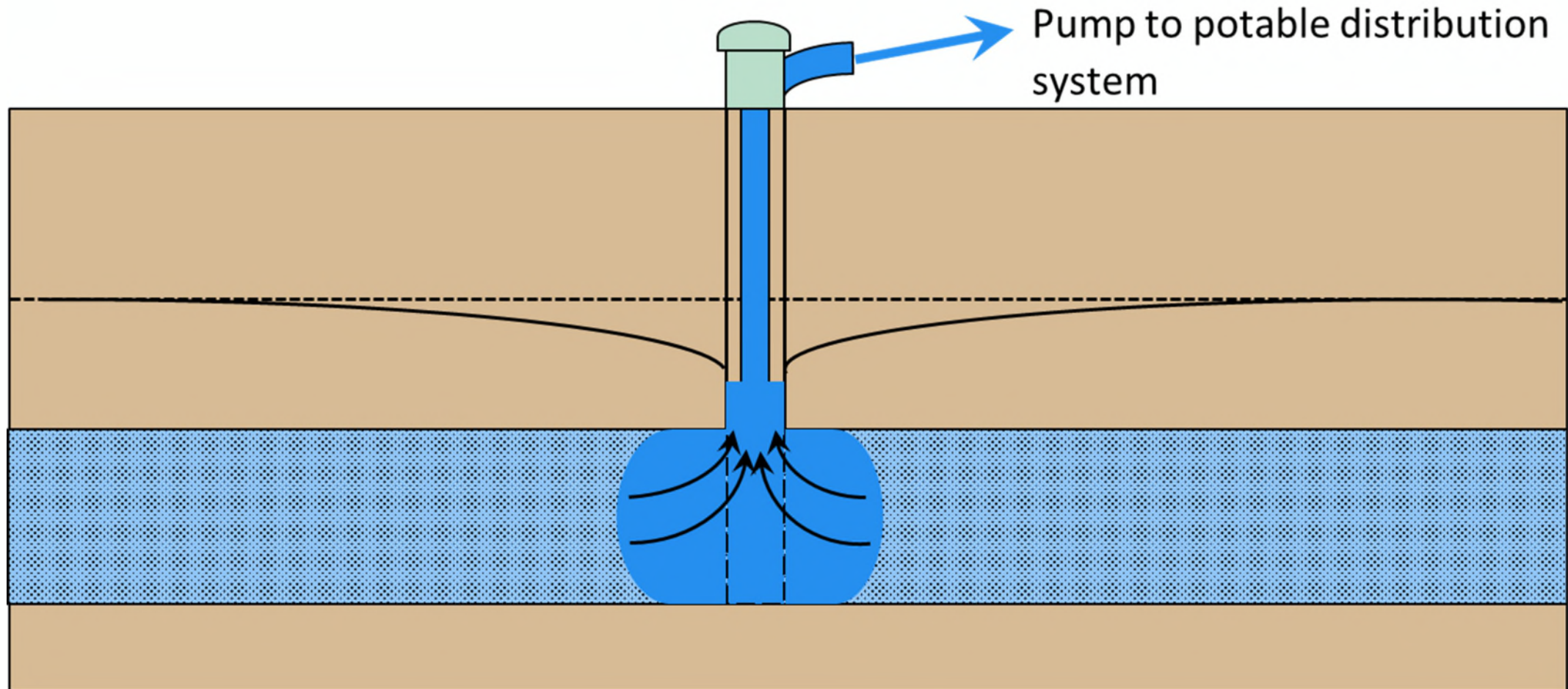
Denver Basin ASR



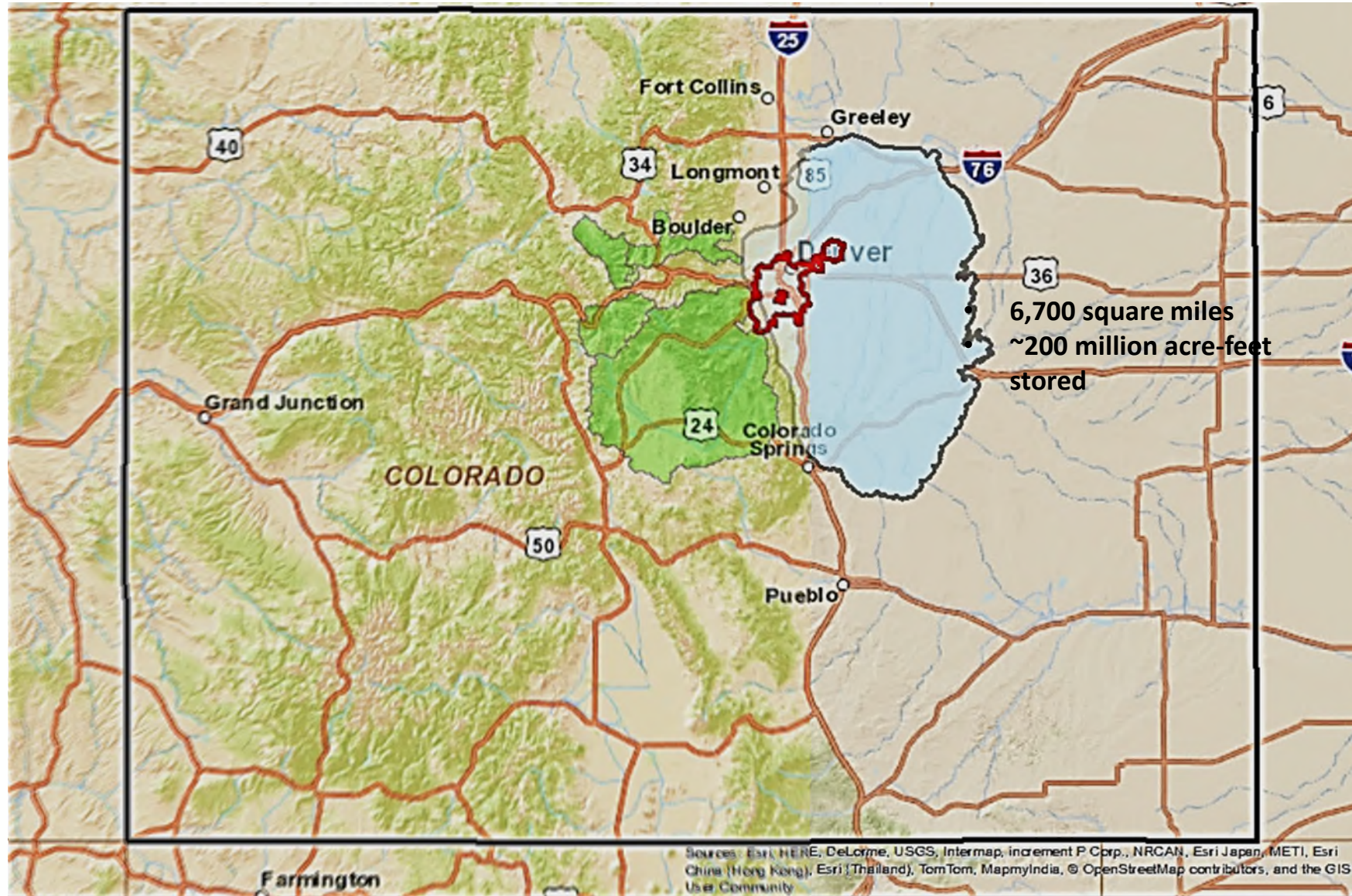
Injection / Storage Mode (Surplus Years)



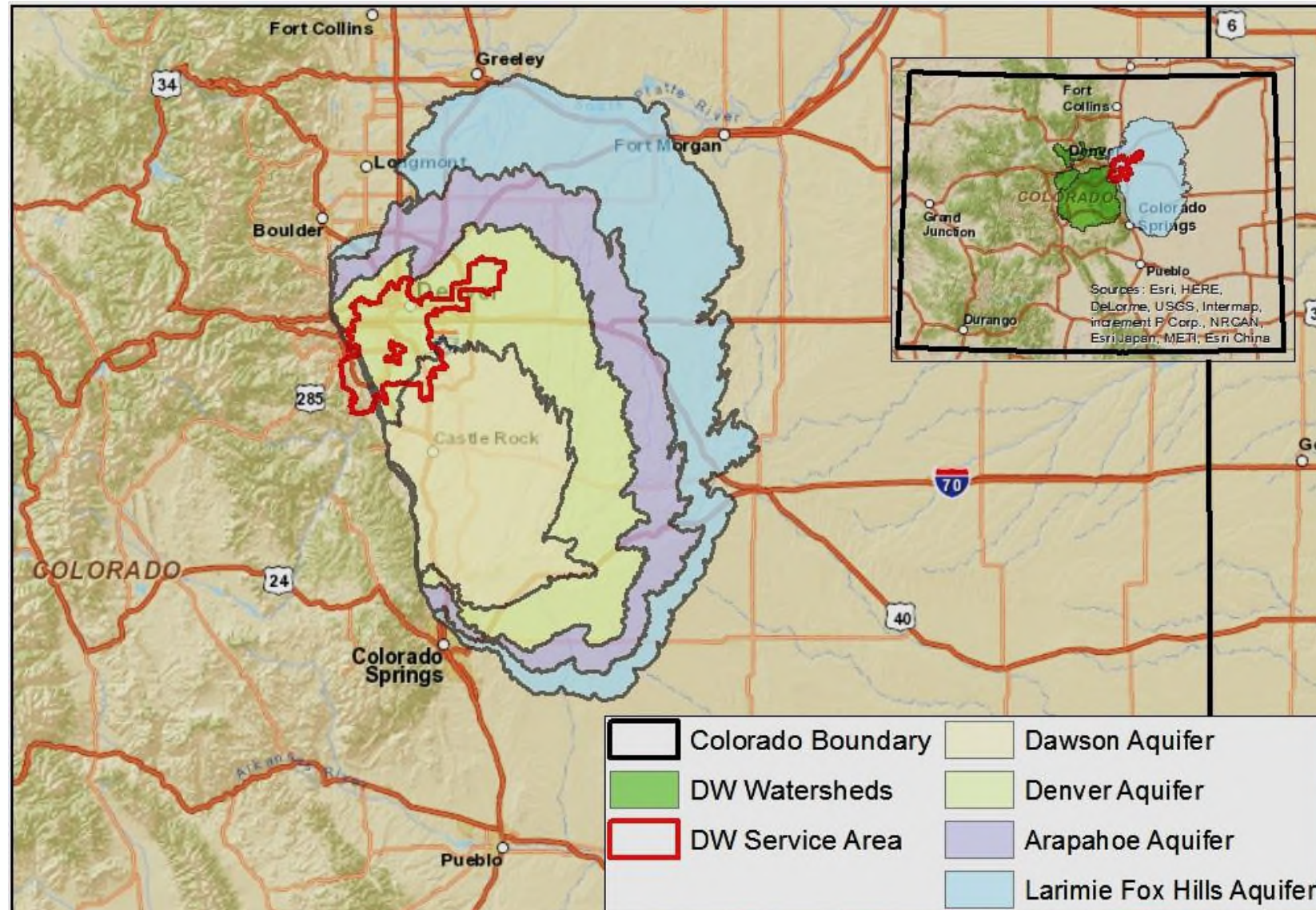
Recovery Mode (Drought Years)



Denver Basin Aquifers



Denver Basin Aquifers

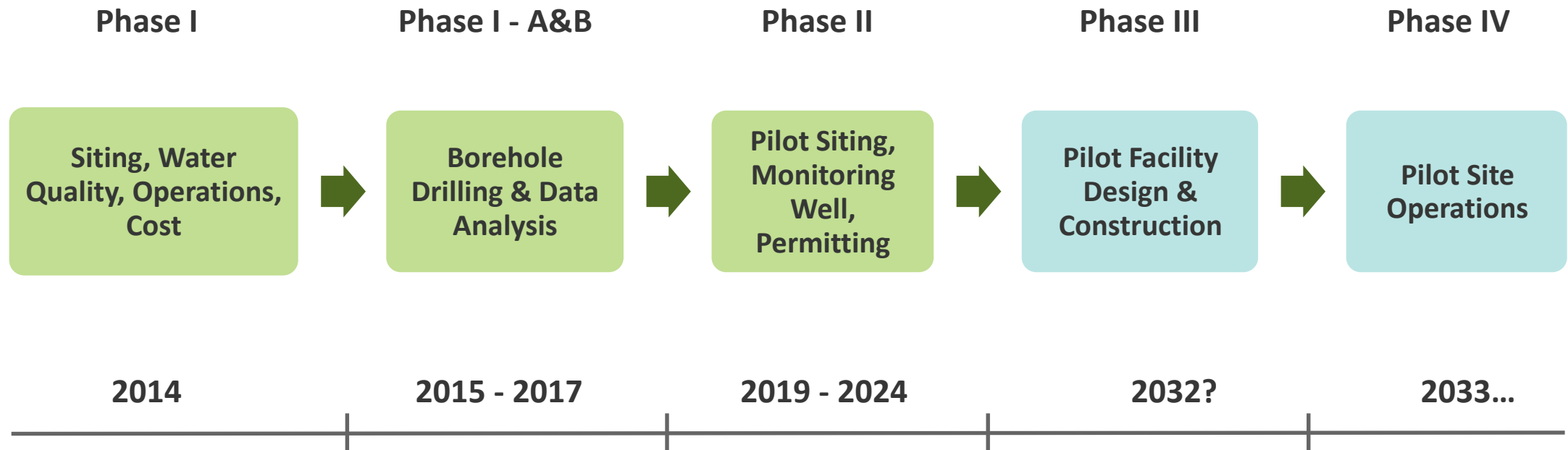


A horizontal banner with a blue background featuring a pattern of water droplets and splashes. The text "What Has DW Done?" is centered in white.

What Has DW Done?

Pilot Project Scope & Schedule

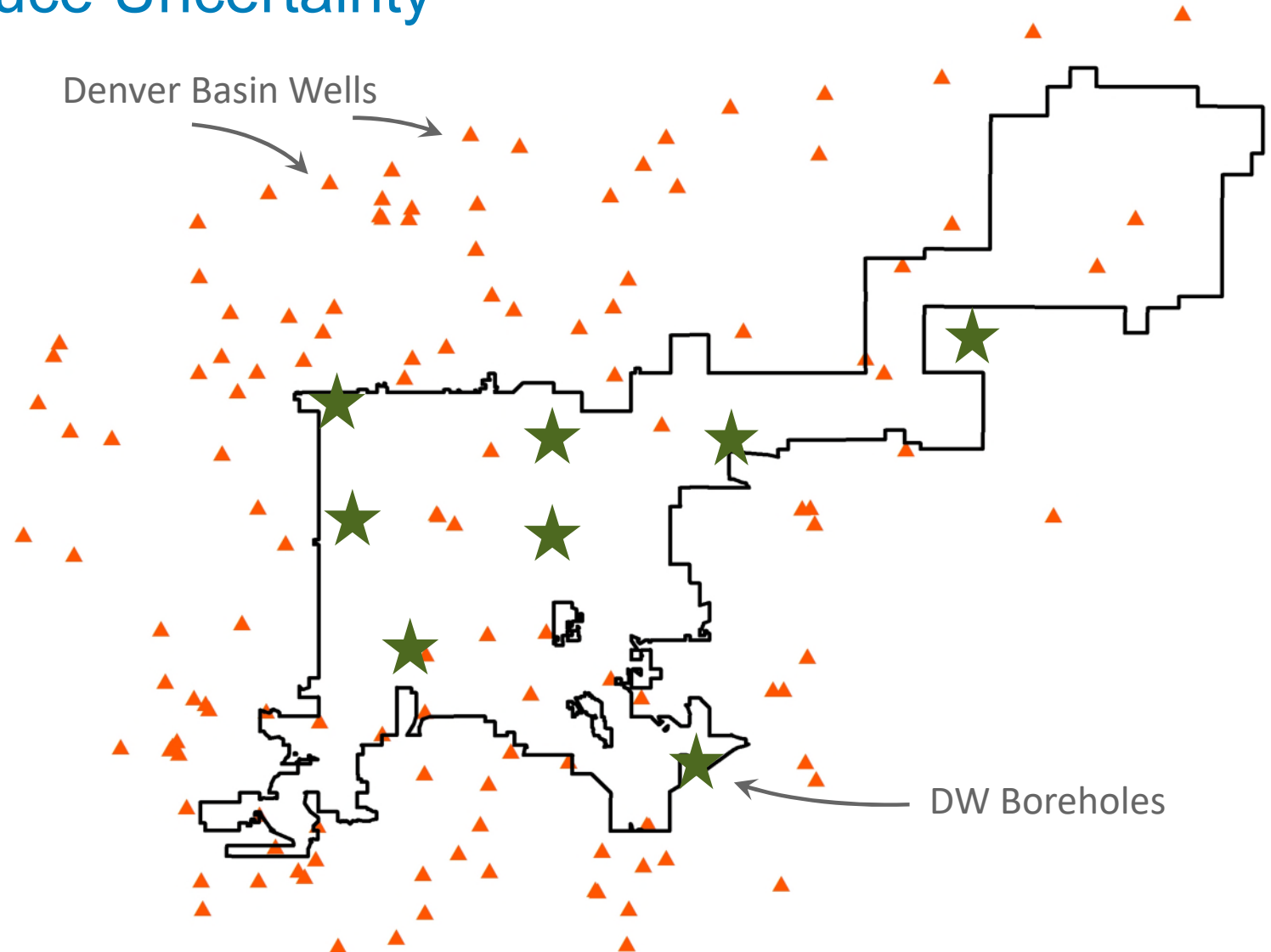
Will ASR work for Denver Water?



Borehole Drilling to Reduce Uncertainty

Siting challenges

- Negotiating access
- Neighborhood concerns
- Rapid development



A horizontal blue banner with a background of water droplets and ripples. The text "Capitol Hill Pilot Project" is centered in white.

Capitol Hill Pilot Project

Capitol Hill Pilot Project Overview

Strategic objective

- Develop DW's first operational ASR facility to verify economic and technical feasibility, as well as support investment in future ASR sites

Monitoring well completion

- Verified hydrogeologic conditions at the site through drilling & logging
- Gathered samples for testing to ensure compatibility of surface and groundwater
 - Groundwater
 - Aquifer material
 - Potable water
- Installed a Westbay System for ongoing monitoring & sampling

Draft EPA area permit

Capitol Hill Project Lessons Learned

- Upper Arapahoe and Laramie-Fox Hills should support operational wells
- Neighborhood outreach was important
- Balancing long-term & short-term capital investment is complex



A horizontal blue band with a pattern of water droplets and splashes, serving as a background for the text.

What's Next?

Capitol Hill Next Steps

- Continued operations of the Westbay System
- Apply for an EPA for injection permit
- Based on EPA feedback and analysis, plan for operational ASR site development



Questions?

