BUREAU OF RECLAMATION

West Valley Water Association

West Salt River Valley (WSRV) Basin Study

Findings & Recommendations

September 2021

Study Partners

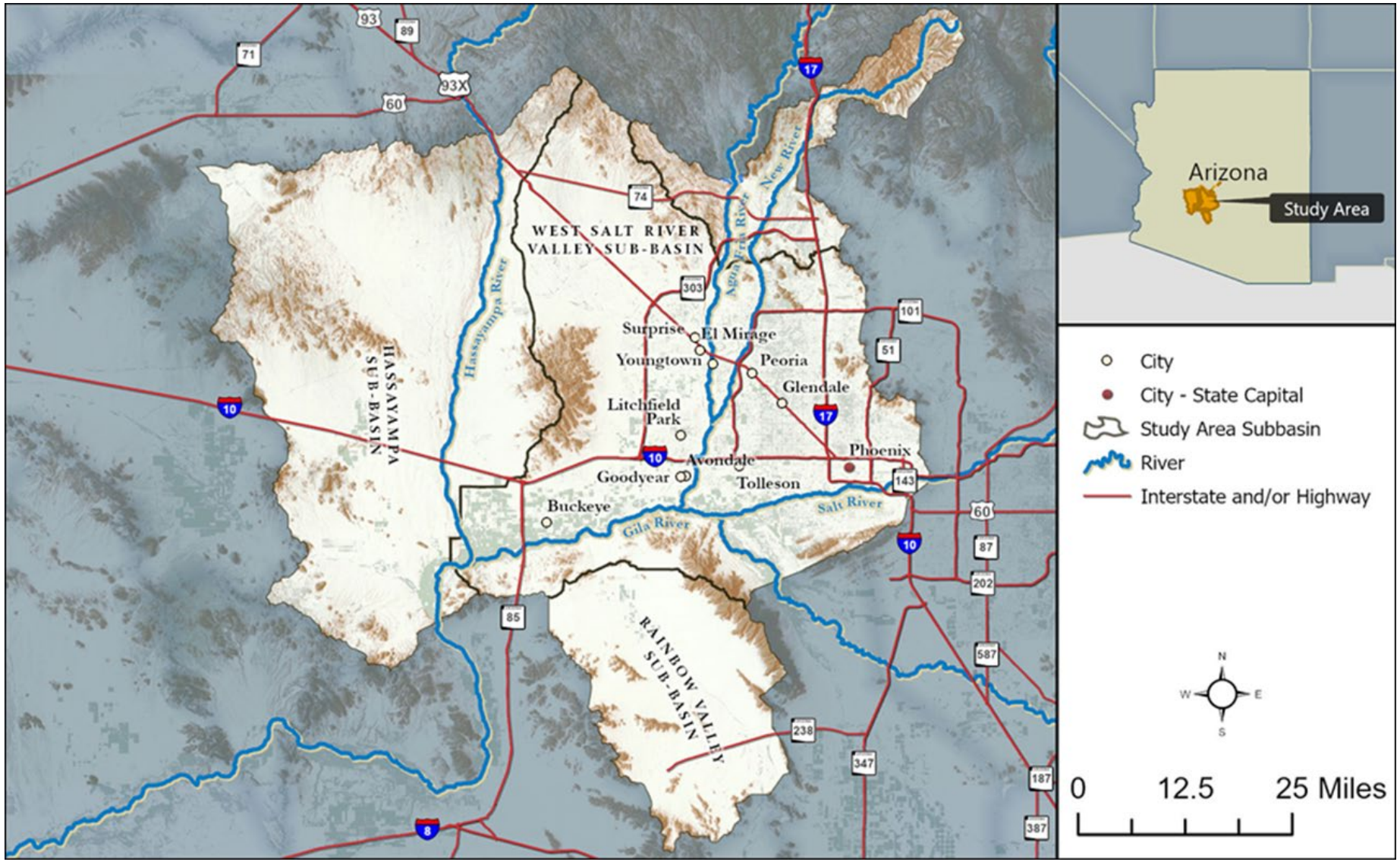
Members:

- Cities of Avondale, Buckeye, El Mirage, Glendale, Goodyear, Peoria, Phoenix, Surprise, and Tolleson
- Arizona Water Company
- EPCOR Water
- Liberty Utilities
- Salt River Project (SRP)
- Arizona Public Service (APS)
- Maricopa Water District (MWD)
- Buckeye Water Conservation & Drainage District (BWCDD)
- Roosevelt Irrigation District (RID)

Interested Parties:

- US Bureau of Reclamation
- AZ Dept of Water Resources (ADWR)
- Central AZ Water Conservation District (CAWCD)
- AZ State Land Dept
- Central AZ Groundwater Replenishment District (CAGRD)
- Flood Control District of Maricopa County (FCDMC)

West Salt River Valley Study Area



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Why was this study important?

To provide a common understanding of issues and potential solutions and better inform decision making

- Groundwater dependent to meet the water demand for rapidly expanding populations
- Potential for Colorado River shortages affecting water users
- Lack of conveyance systems to deliver CAP & SRP water
- Develop and refine management tools (e.g., projections, models)
- Identify appropriate regional solutions
- Reduce potential conflicts and create a shared understanding

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Anticipated Challenges for the Basin

Maintaining reliable water supplies while meeting demand, regulatory requirements, and management goals.

Water supply challenges include:

- amount, location, management, & quality of groundwater;
- current and future reliability of renewable surface water supplies (e.g., CAP/SRP); and
- utilization of effluent.

Climate change and drought impacts will likely exacerbate these challenges.

Water demand challenges relate to:

- housing development,
- industrial growth,
- agriculture use & retirement,
- environmental uses, and
- demand management.

Location and timing of demand and supply availability, will impact infrastructure and operational needs and opportunities.

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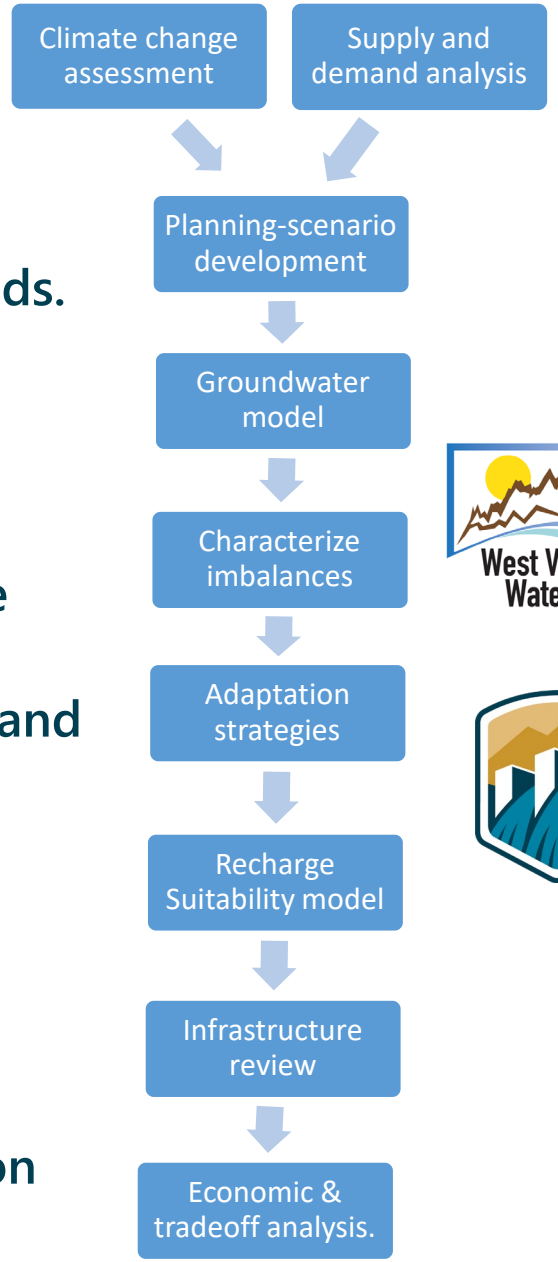
Basin Study Components

Climate change assessment – Effects of climate change.

Supply and demand analysis – Potential future water supplies and demands.

These are foundational for the following tasks

- Develop planning scenarios incorporating climate change and water supply and demands (included Colorado River shortages).
- Develop groundwater model using planning scenarios, climate change effects and water supply/demand information.
- Characterize location and magnitude of potential future water supply and demand imbalances.
- Develop possible adaptation strategies to reduce the potential imbalances.
- Evaluate/model suitable recharge facility site locations.
- Assess existing/future infrastructure needs and operational opportunities.
- Conduct an economic and tradeoff analysis to evaluate/rank adaptation strategies.



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Supply & Demand Scenarios

Future supply & demand projections (thru model year 2060) were based on the amount/location of growth, associated demand/supply, and climate variability utilizing CAP Service Area Model (scenarios included Colorado River shortages).

Groundwater scenarios modeled "Baseline" scenario (historic climate with medium growth) and two bookend scenarios to illustrate a "range" of impacts:

- Slow and compact growth with historic climate
- Rapid outward growth with hot, dry climate

Scenario ID	Name	Growth Pattern	Climate
A*	Baseline	Medium	Historic
B	Dry Baseline	Medium	Hot, Dry
C	Rapid Outward Growth	Rapid Outward	Historic
D*	Dry and Rapid Outward Growth	Rapid Outward	Hot, Dry
E	Wet and Rapid Outward Growth	Rapid Outward	Warm, Wet
F*	Slow and Compact Growth	Slow and Compact	Historic

Note: * indicates key scenario for groundwater model

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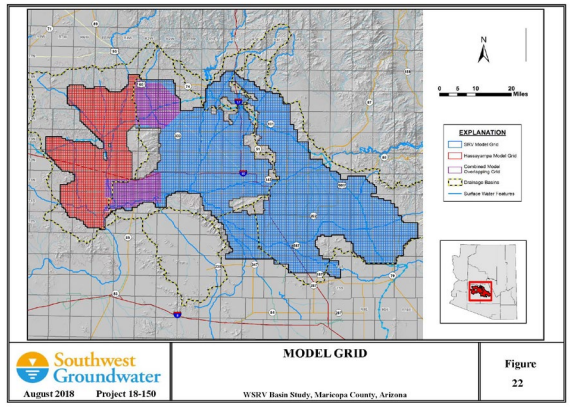

Groundwater Model Findings

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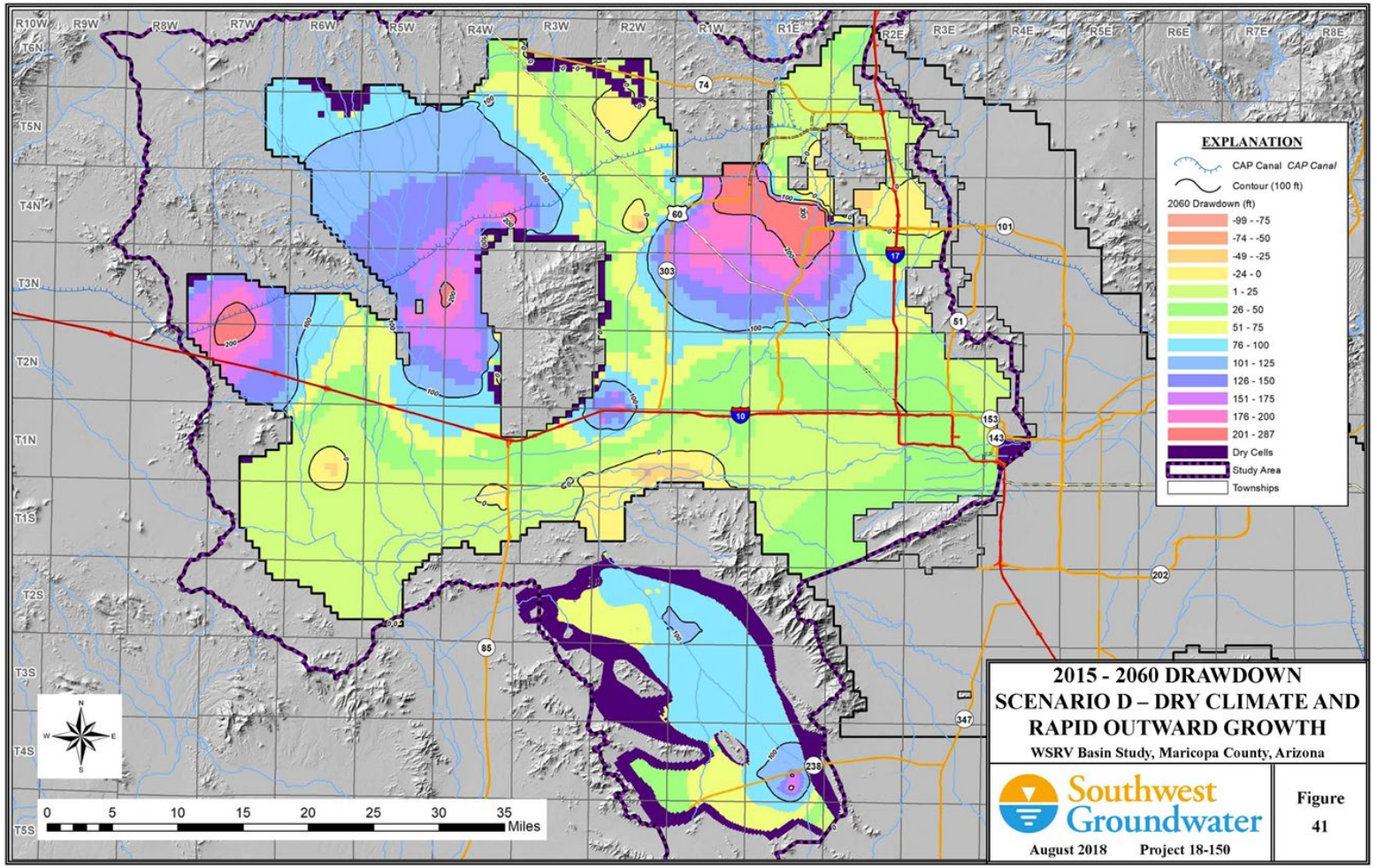
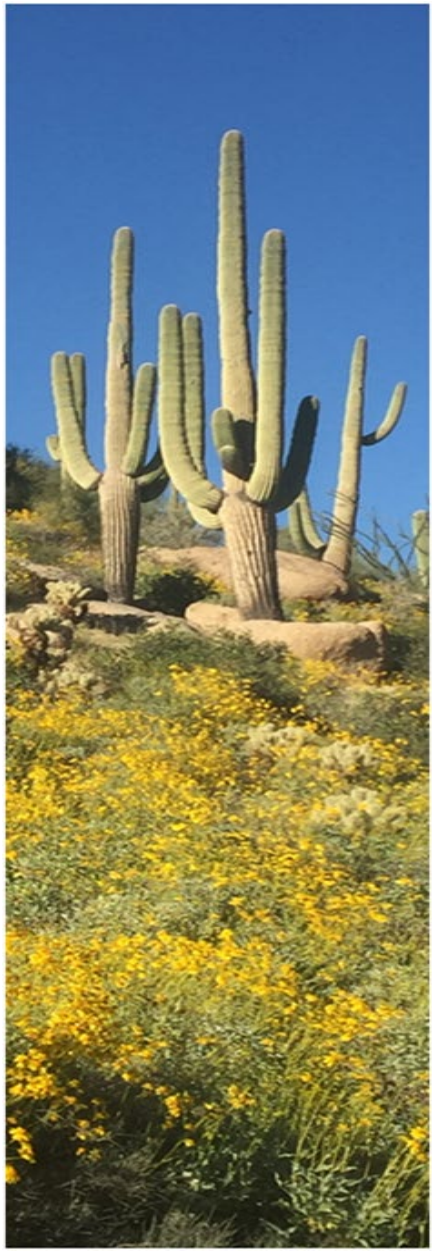
Groundwater model results found that **increased groundwater pumping to meet the 2060 demand will lead to water level declines.**

Declines vary by location and amount of pumping based on the scenario.



Summary of findings

- Study area will require additional new renewable water supplies to offset groundwater pumping impacts to meet growth projections through/beyond 2060. Groundwater may reduce rapidly after 2060, with potential for subsidence increasing.
- New water supply need (shortage) is contingent on *actual* climate effects and actions we take NOW toward securing additional water resources, demand management, and accurate planning information.
- Needed water supplies are somewhere between 47,000 and 260,000 af/yr by 2060 and best expressed as a range based on varying climate and growth scenarios.



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Adaptation Strategies to Address Imbalances

Characterized possible adaptation strategies to meet the following objectives:

- Permanent reliable water supply to meet 2060 demands (250-300KAF)
- Aquifer protection (<3 ft/yr decline; targeted recharge; mitigate pumping)
- Enact tactical (short-term) & strategic (long-term) solutions
- Apply regional solutions (water transportation network, regional messaging)

Most strategies address water shortages by increasing the available water supplies, with the exception of demand management, which decreases shortages by reducing demand through conservation and efficiency programs.

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Adaptation Strategies

Top 5 performing strategies (demand management and effluent uses) represent the most viable alternatives. Several strategies are worth studying in greater detail, especially in combinations with potential synergies, or few trade-offs associated with combined implementation.

- *Demand Management* – least-cost providing relatively large benefits
- *Effluent use* (especially recharge) – practical way to address shortages
- *Surface Water Transactions and Agreements* – dependent on legal, administrative, public perception & acceptance barriers
- *Ocean Desalination*, *Poor Quality Groundwater Treatment*, *Groundwater Transactions*, and *Inland Desalination/ Brackish Water Treatment* – relatively high cost and lower net benefit relative to other strategies

Strategy	All Criteria	Economic & Financial	Environment & Sustainability	Social & Administrative	Team Survey	Overall
(1) Demand Management	100%	100%	92%	94%	100%	**100%**
(2) Regional Effluent – Direct Potable Reuse	61%	45%	82%	51%	61%	**62%**
(3) Regional Effluent – Direct Non-Potable Reuse	81%	61%	79%	99%	79%	**81%**
(4) Local Effluent Reuse/Recharge – Potable or Non-Potable	88%	63%	100%	96%	86%	**88%**
(5) Regional Effluent Recharge	89%	64%	97%	100%	86%	**89%**
(6) Poor Quality Groundwater Treatment	62%	60%	51%	70%	59%	**61%**
(7) Ocean Desalination	67%	70%	72%	50%	71%	**68%**
(8) Inland Desalination/Brackish Water Treatment	41%	34%	43%	46%	41%	**41%**
(9) Groundwater Transactions/ Exchanges	54%	58%	41%	57%	51%	**53%**
(10) Surface Water Transactions/ Leases/Exchanges	79%	79%	79%	70%	78%	**79%**

Economic & Tradeoff Analysis

Considering all costs and benefits, a combination of supply-side and demand-side strategies is likely to be optimal for addressing future water shortages in the study area.

- Using predetermined criteria, highest ranking was Demand Management and Effluent Reuse & Recharge strategies
- Increased use of renewable supplies is needed to offset pumping impacts
- Additional replenishment and full use of reclaimed water (effluent) could positively impact water levels and supply shortages.

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Highest Ranking

Infrastructure Analysis

- All potential adaptation strategies have infrastructure requirements, except some forms of demand management (e.g., conservation).
- Infrastructure is currently working to meet demand with proper maintenance; however, expansion, upgrades, and new infrastructure will be required in the future.
- The type, location, and extent of new infrastructure depends on factors such as growth patterns and supply sources.
- System interconnects and operation agreements will benefit multiple jurisdictions and provide for flexibility and reliability.
- Regional partnerships, such as the WVWA, are essential for responding to the water resource and infrastructure challenges in the study area.

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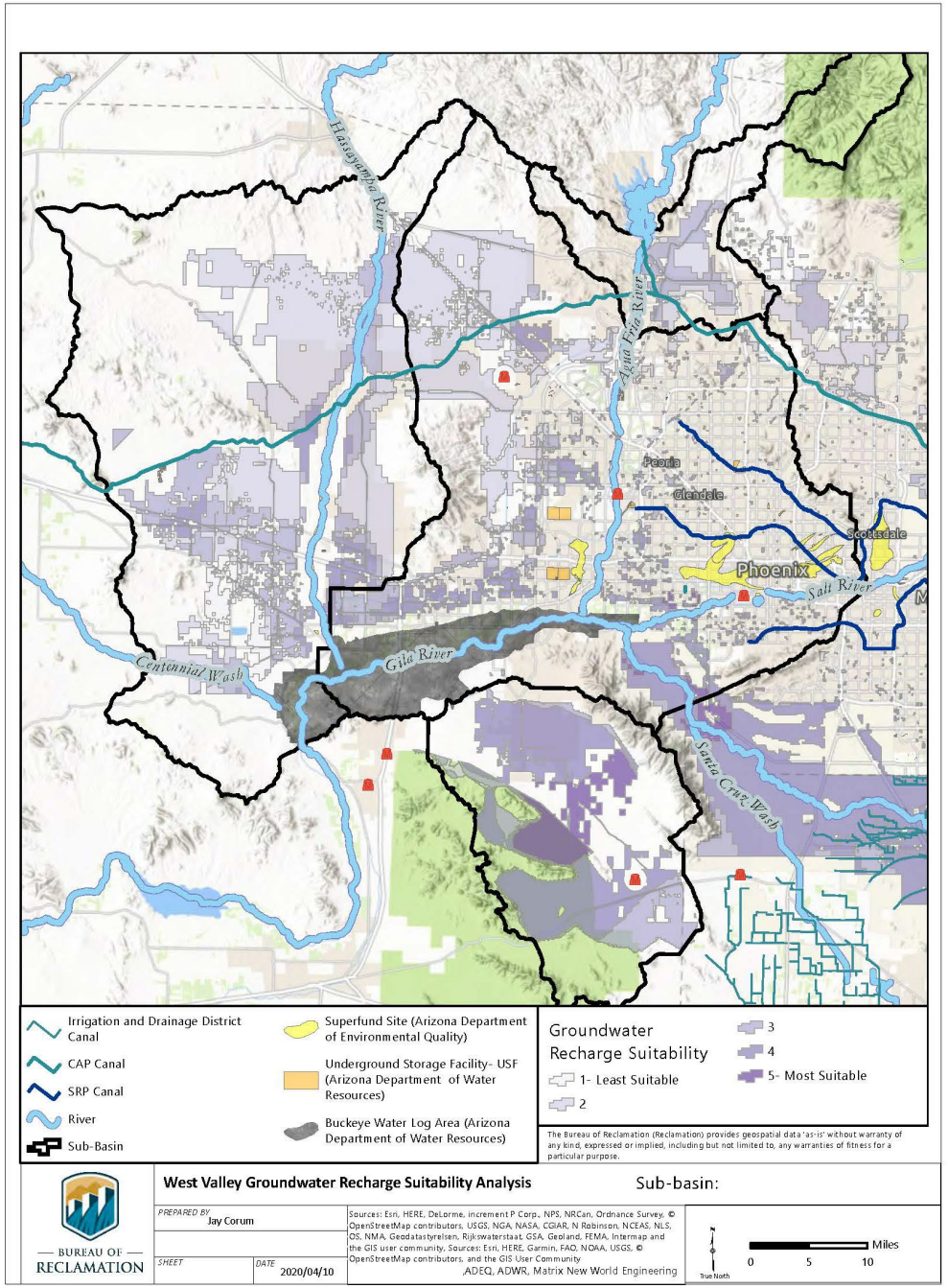
Recharge Suitability Model

- Identify optimal locations for groundwater recharge in the WVWA area of interest
- Based on set of ranking criteria (e.g., depth to water, land use, hydrogeology)
- Intended as a screening tool – more detailed investigation would be required



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Next Steps for Consideration

- Refine and update supply and demand scenarios.
- Further use of the groundwater model to incorporate:
  - Estimates of additional water through adaptation strategies.
  - Scenarios that investigate changes in pumping and recharge.
  - Pre- and post-adaptation conditions to assess effectiveness.
  - Model simulation beyond 2060.
- Refine recharge suitability model with additional criteria or area focus.
- Assess developments in technology, data, policies, or state/regional activities.
- Consider pilot project to evaluate water quality, regulations, and preliminary designs.
- Conduct a more thorough infrastructure analysis.
- Expand adaptation strategies & combinations thereof.
- Plan for implementing strategies or conducting pilot/demonstration projects.
- Follow-up on demand management strategy as a high priority.
- Seek out funding opportunities for identifying regional solutions in water resource planning and implementation.

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“Big Picture” Outcomes of the Study

- Information (tool) for planners and policy makers to plan and prioritize water resource investments.
- Quantified and focused efforts to address West Salt River Valley water resource challenges, with a shared understanding, vision and regional goals.
- West Valley Water Association’s work continues to identify future water resources and implement adaptation strategies.

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