MIRASOL SPRINGS MODELING STUDY
DRAFT RESULTS

INTERA

Presented to Southwestern Travis County GCD and

Hays Trinity GCD | March 2023

Introduction

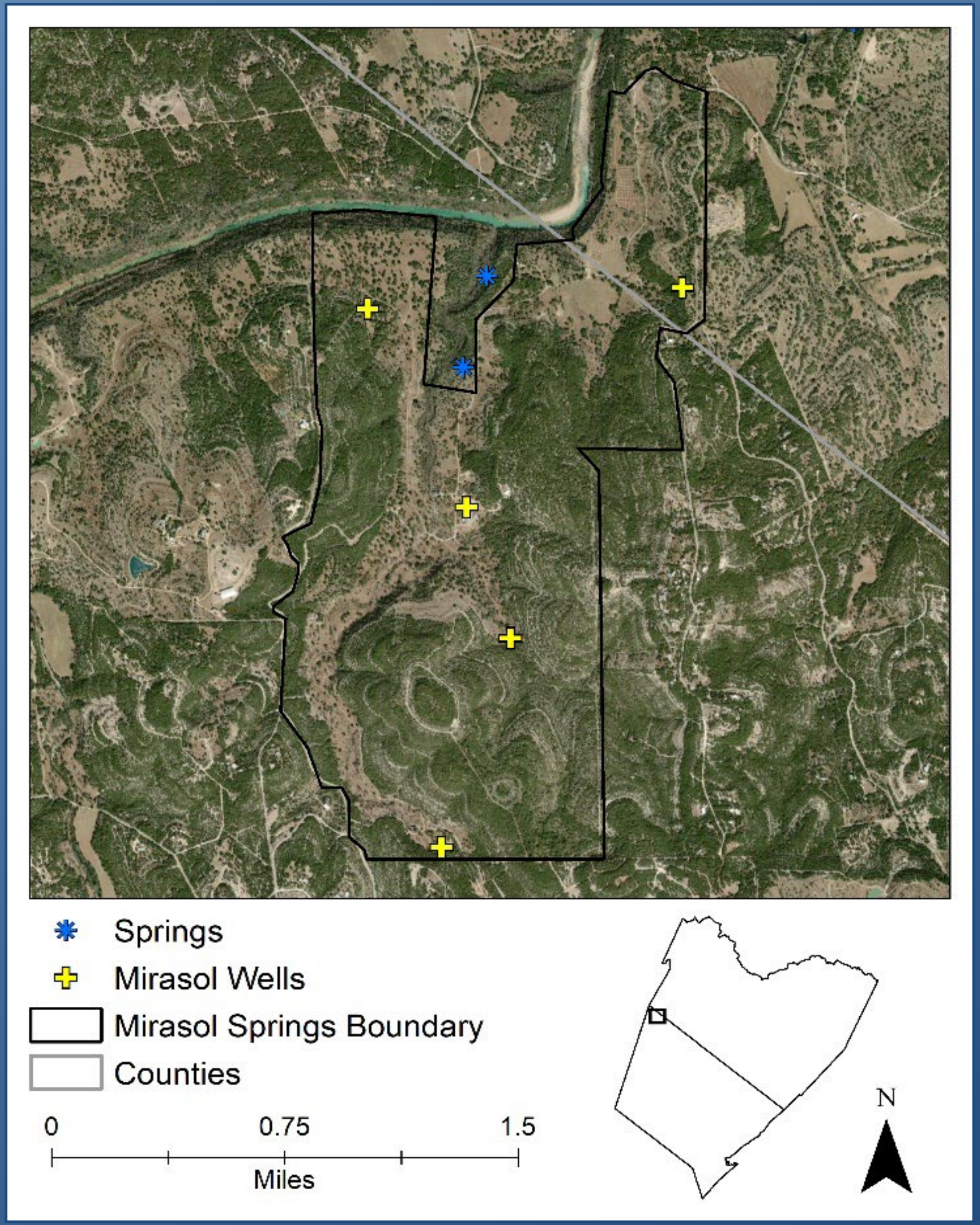
- INTERA was tasked to evaluate the expected impacts of proposed pumping from the Mirasol Springs Development submitted by Clancy Utility Holdings, LLC

- Mirasol Springs is a 1,401-acre development in both Travis County and Hays County that borders the Pedernales River and Roy Creek

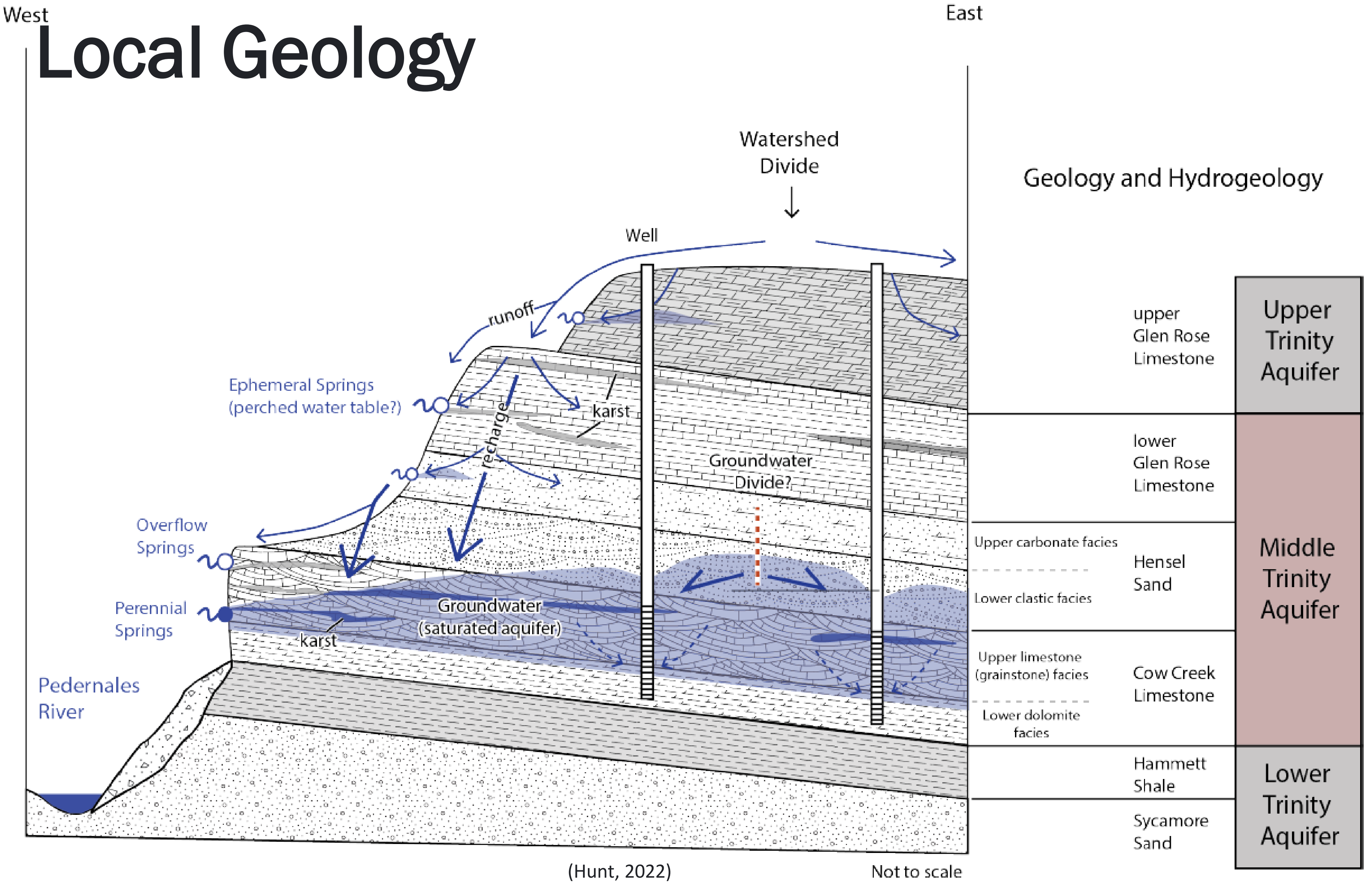
- There are five proposed wells totaling 85 acre-feet per year of production, four of which are in Hays County

Study Area

- 1,401-acre development, 169 acres in Travis County and 1,232 in Hays County
- Multiple springsheds in the local area, including Roy Creek Springs and Hamilton Springs
- Seeps in outcrops along the Pedernales River



Local Geology



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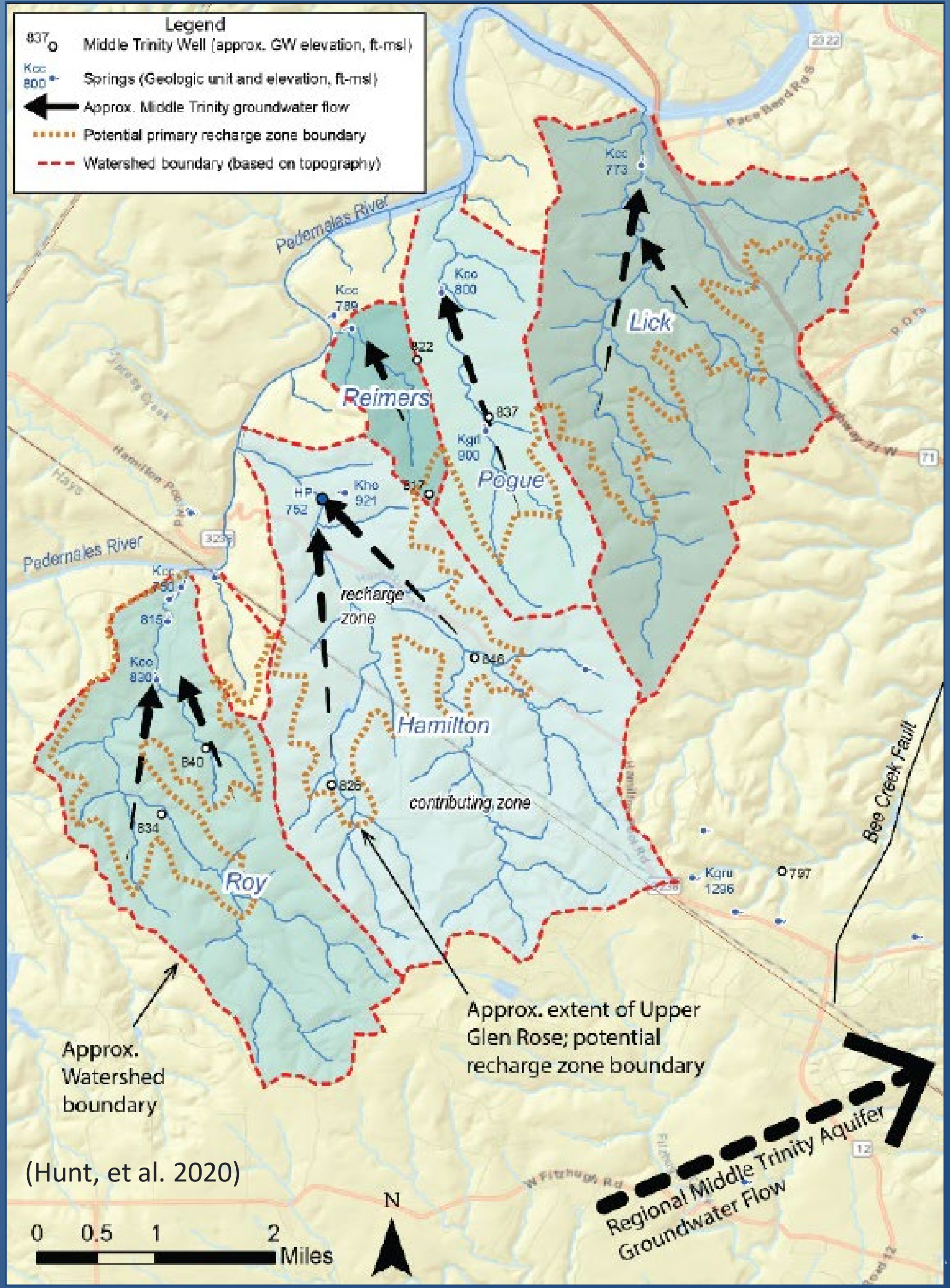
Local Hydrogeology

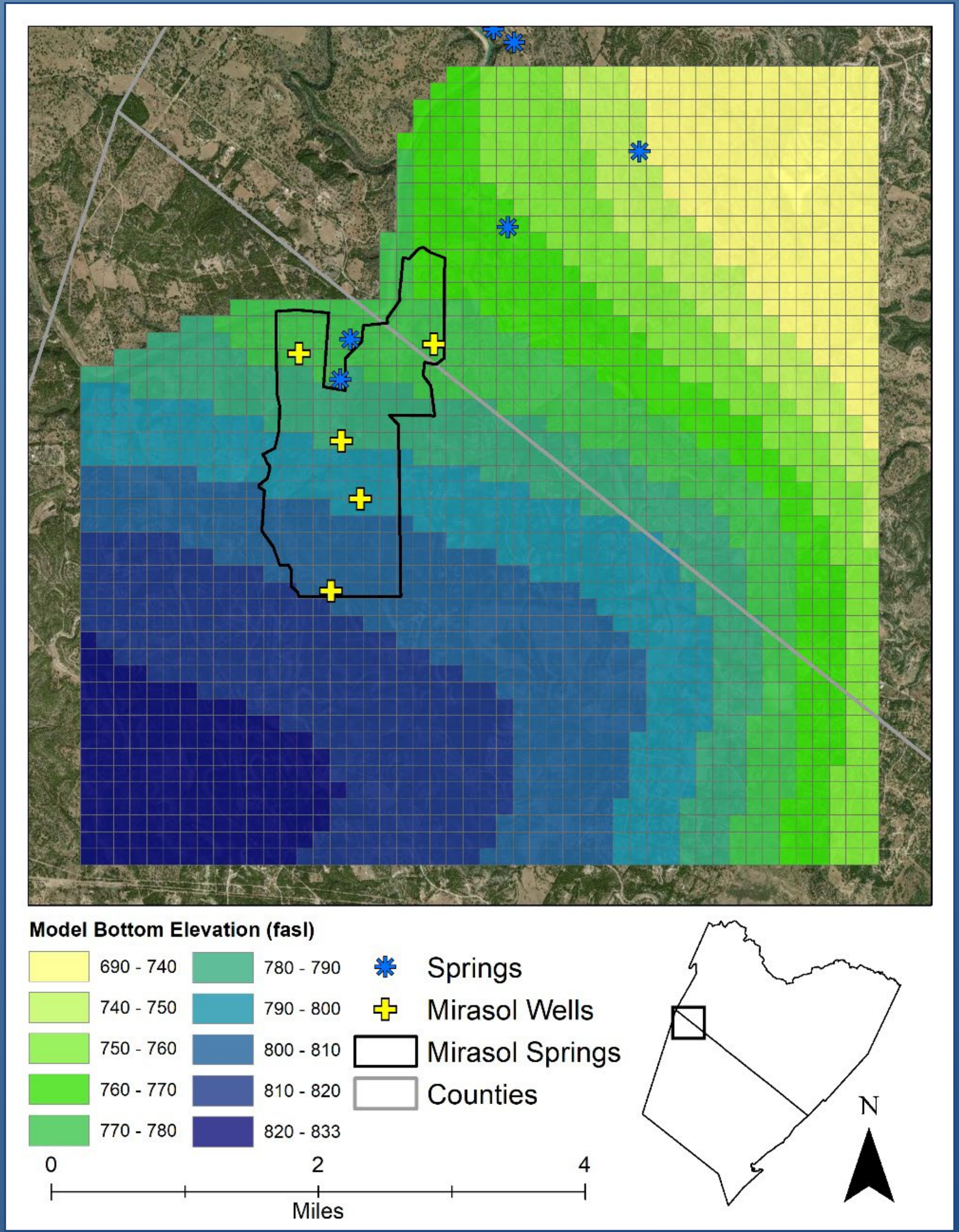
- The only fully saturated unit in the study area is the Cow Creek
- The Lower Cow Creek is a dolomite which, with the underlying Hammett Shale, serves as a vertical barrier to flow
- There are springs and seeps where the upper limestone facies of the Cow Creek and the partially saturated Hensell Sand are exposed at the surface
- The regional hydraulic gradient in the Middle Trinity is East-Northeast



(Hunt, et al. 2020)

Model Grid and Layering

- The model grid is a spatial refinement of the Trinity Hill Country Groundwater Availability Model (GAM). Layering is unique.
- 48 x 48 grid: 1/8th–mile grid cells (6 miles x 6 miles)
- Two-layer model with constant thicknesses:
  - Layer 1: Hensell Sand (30 feet)
  - Layer 2: Cow Creek Limestone (100 feet)
- Model bottom is interpolated from the GAM and represents the contact between the Cow Creek Limestone and the Hammett Shale



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Hydraulic Parameters

	Horizontal Conductivity	Vertical Conductivity
Hensell Sand	1 foot/day	0.01 foot/day
Cow Creek Limestone	11 feet/day	.1 feet/day

- Values are constant throughout each model layer
- Parameters are within the range of conductivities shown in pump tests provided by Tarver Geologic Services, LLC
- Storativity values were provided as well, though are not used in steady-state simulations

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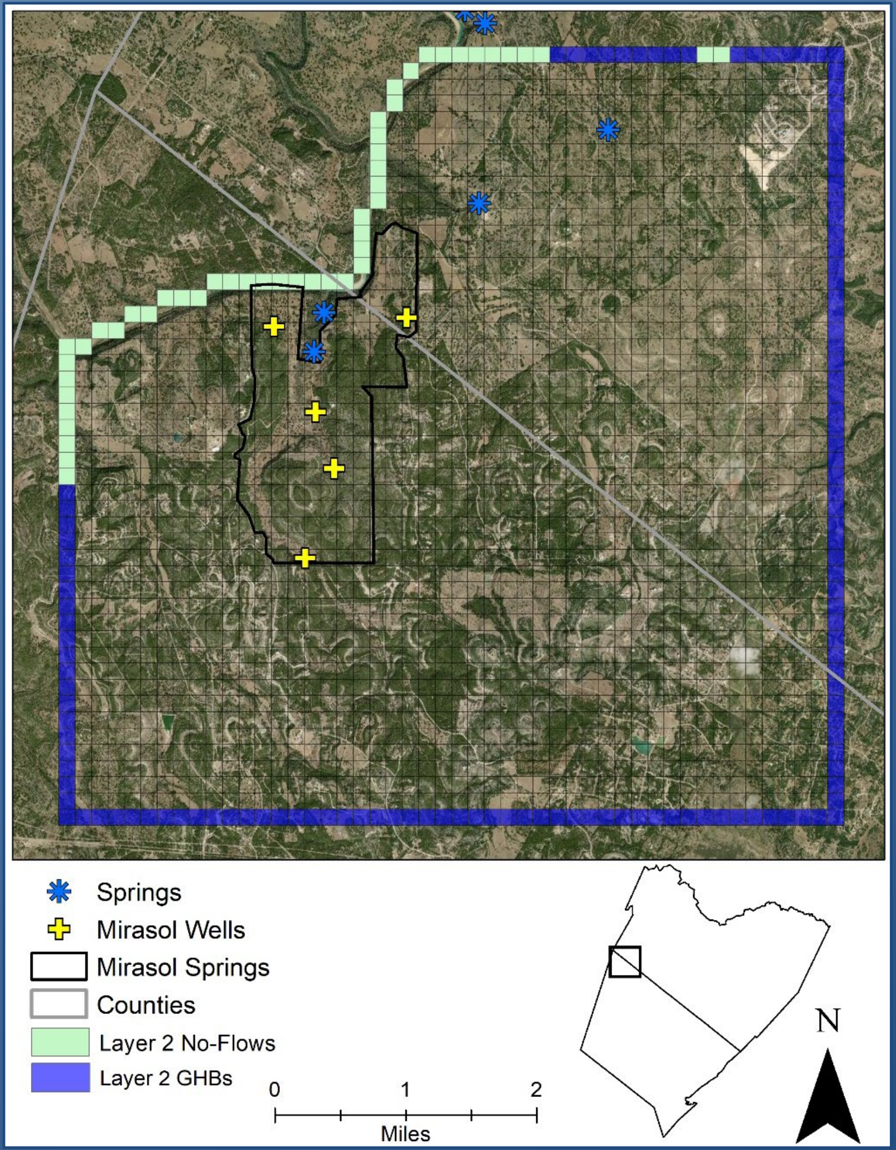
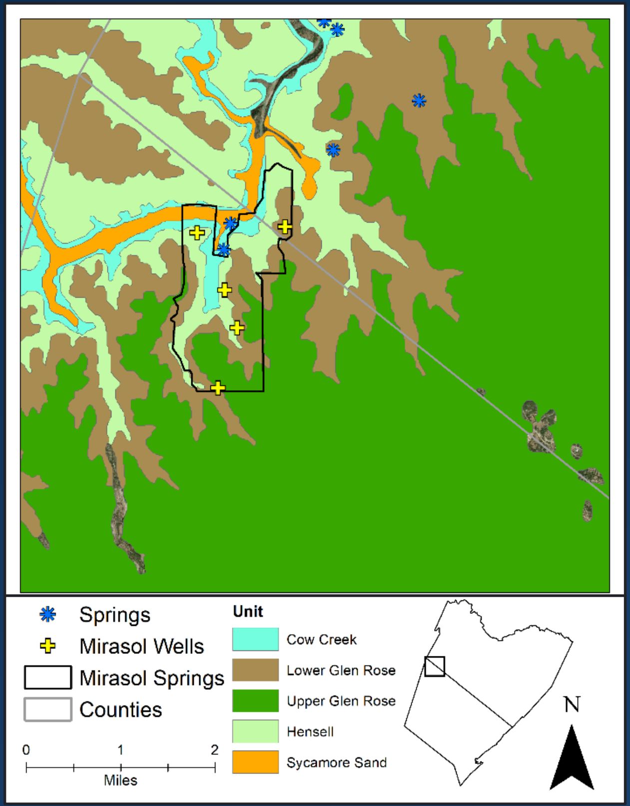
Boundary Conditions

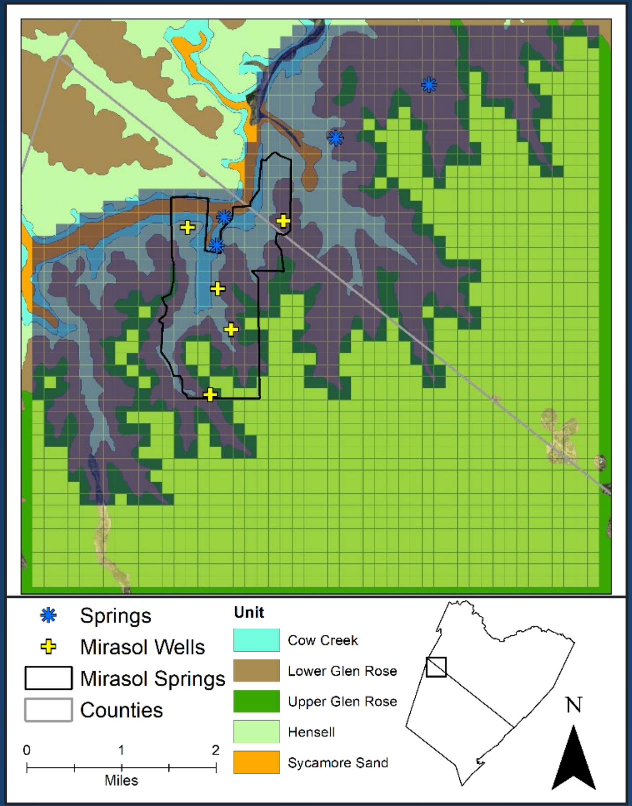
- Cells on the model boundary are defined as either a No-Flow or a General Head Boundary (GHB)
- No-Flow cells do not allow water to exit the model along its outer edge
- GHB cells have a dynamic head value along the outer edge which allow water to enter and exit the model according to the simulated hydraulic gradient
- All boundary cells in Layer 1 are No-Flow cells



Recharge

- We utilized the Geologic Database of Texas (GAT) to determine the study area's surface geology and assign recharge on a cell-by-cell basis
- If the Upper Glen Rose was the only outcropping unit, the cell received no recharge
- If the Cow Creek outcropped in a cell, recharge was applied only to the Cow Creek (Layer 2)
- Otherwise, recharge was applied to the Hensell (Layer 1)
- Calibrated recharge is 10% of the average annual rainfall (PRISM) where it is applied





Blue areas represent areas receiving recharge.

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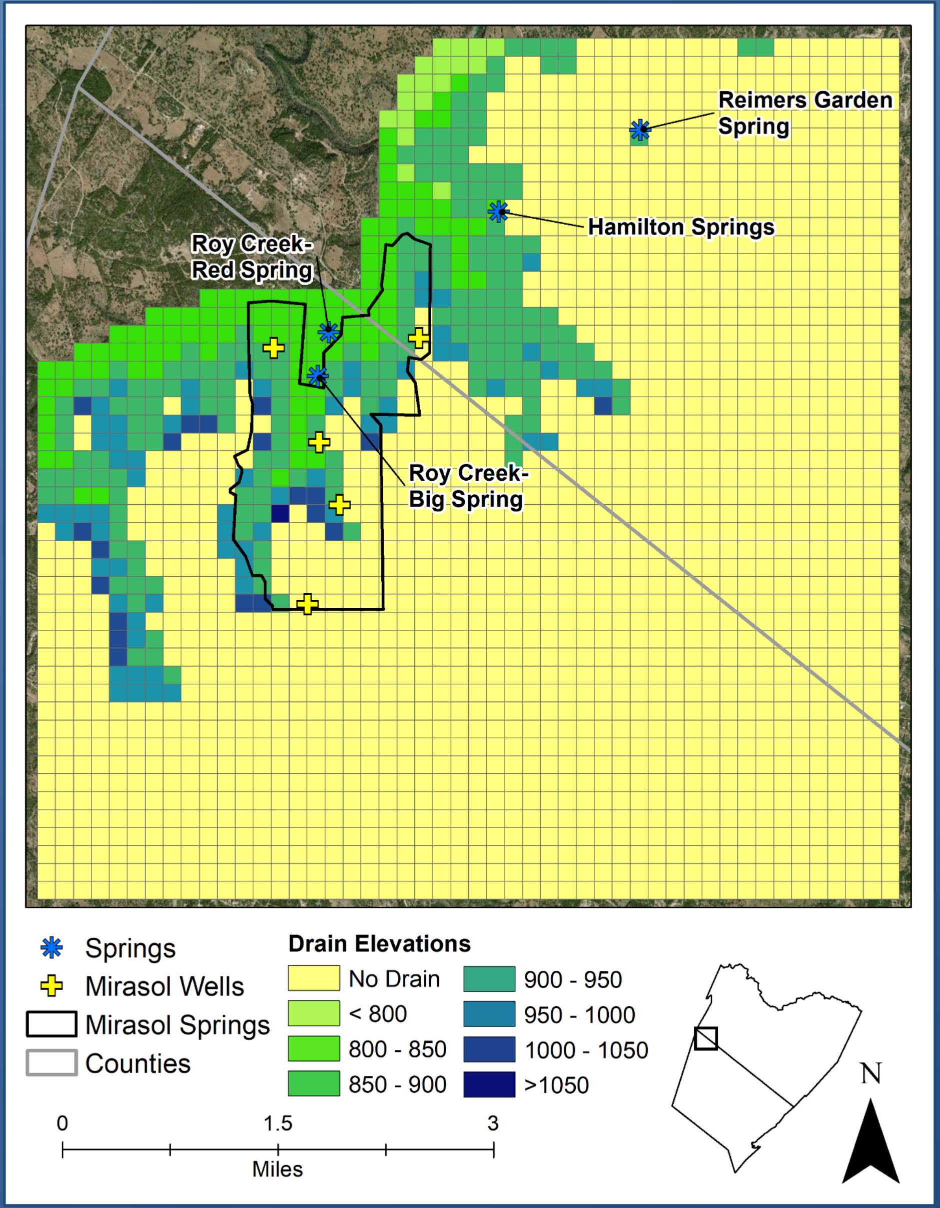
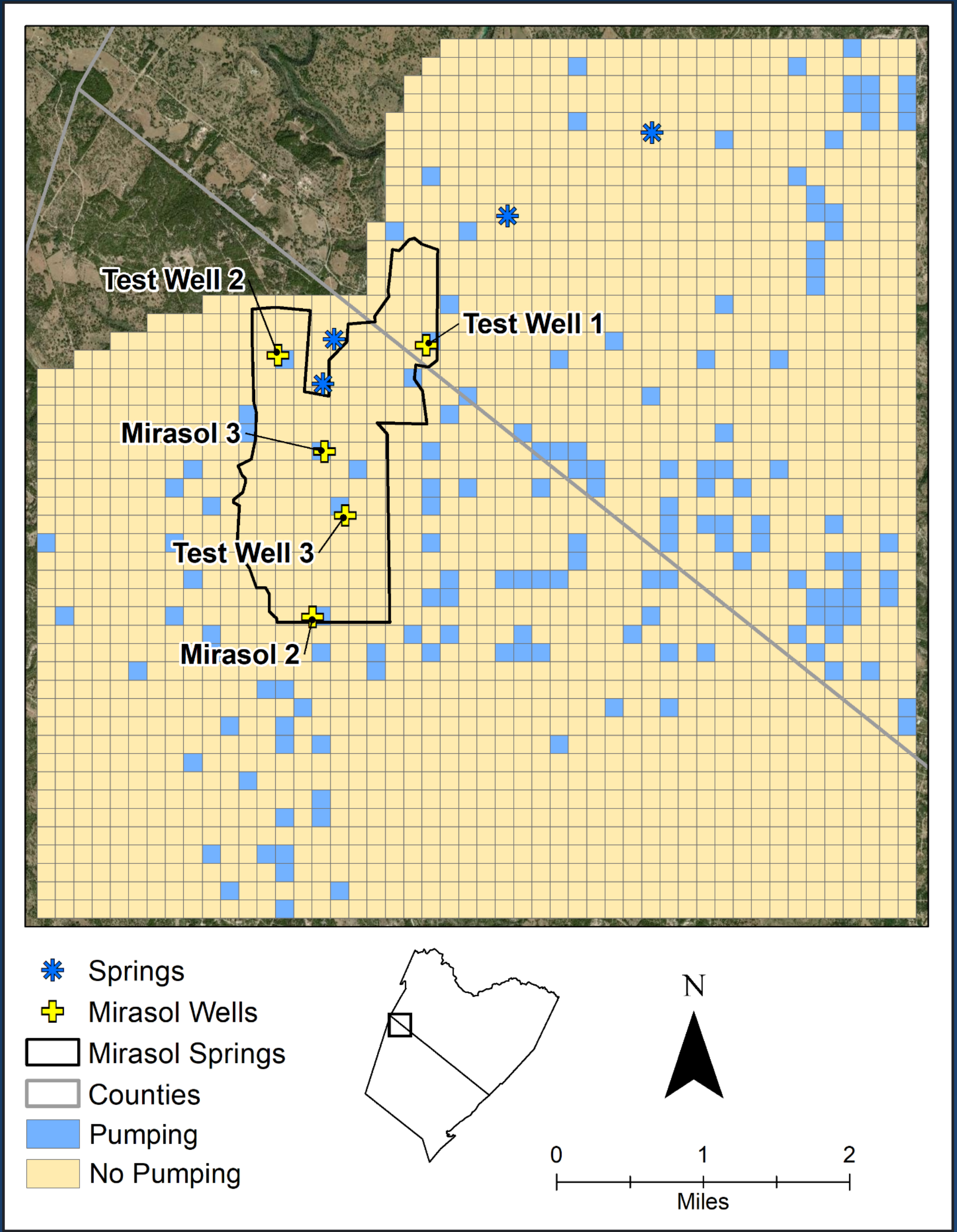
Springs and Seeps

- Springs and seeps are represented by Drain Cells in MODFLOW, which allow water to exit the model when the water level reaches a specified elevation
- Drains were assigned to the model grid where the Hensell or Cow Creek outcropped according to the GAT
- Drain cell elevations were determined based on the model bottom's elevation and the Digital Elevation model (DEM) from the GAM
- Not all drains are active during the simulation, only those where the hydraulic gradient exceeds the drain elevation in a cell



Pumping Wells

- Both existing and proposed production wells were included
- Approximately 332 acre-feet per year of water is withdrawn from existing wells in the Middle Trinity (data provided by the Districts)
- The additional 85 acre-feet of production was applied to the corresponding model grid cells during the predictive simulations. Travis: 28 afy; Hays 57 afy.
- Performed runs both with and without the additional Mirasol pumping to analyze the additional impact



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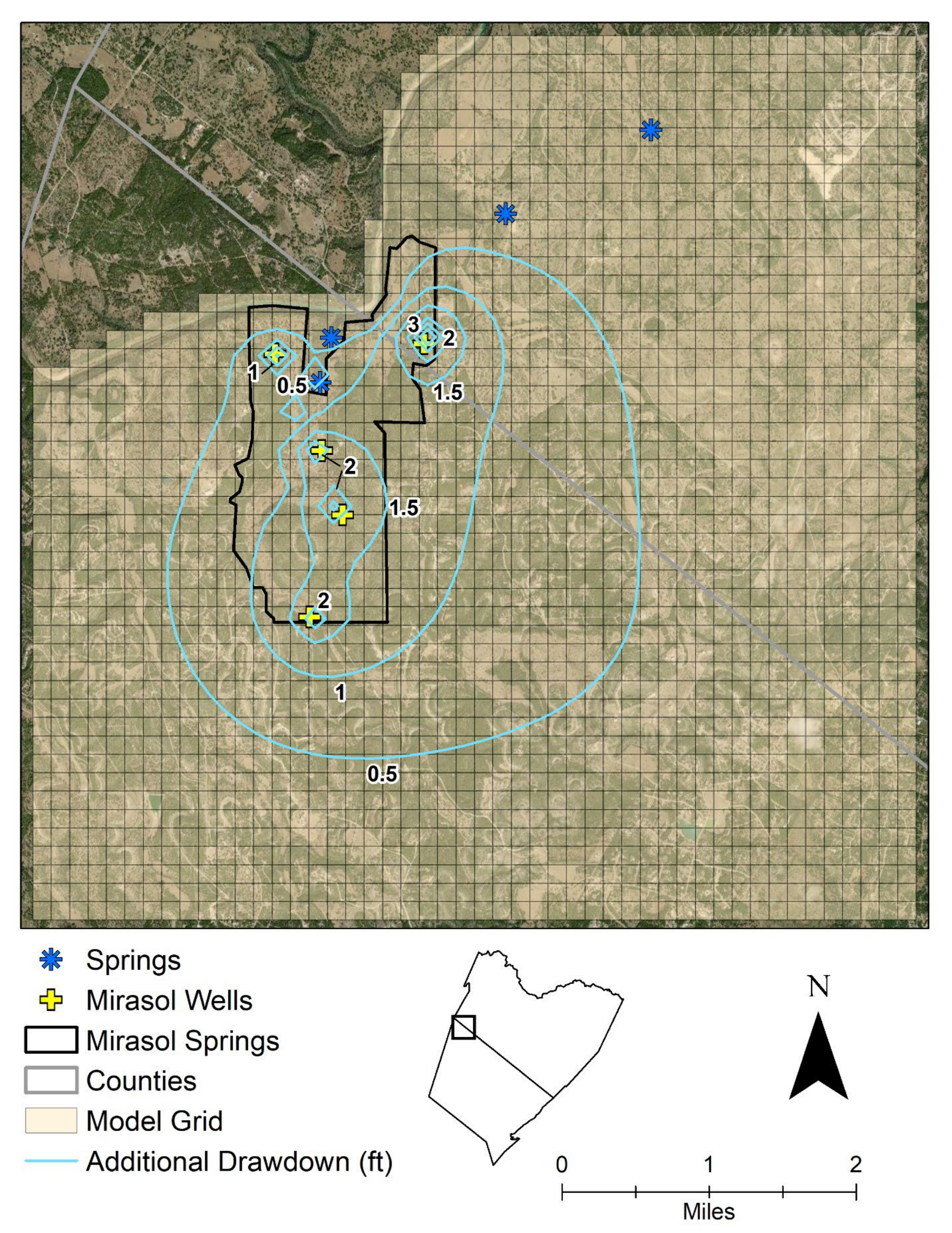
Water Levels and Drawdowns

- During average rainfall conditions, water level impacts from the proposed Mirasol pumping wells reach a maximum of 3.5 feet of additional drawdown

- Water level impacts will likely be greater at the wellheads than those represented in the figure shown



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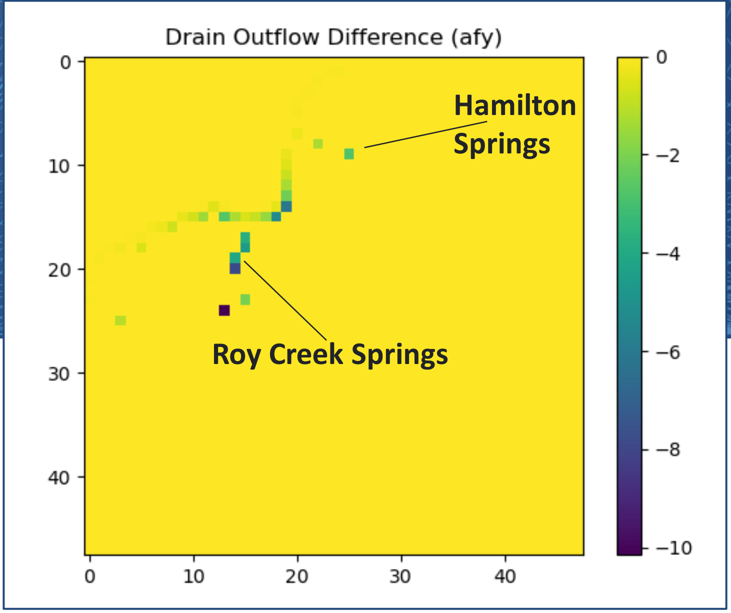
Springs and Seeps

	Hamilton Springs	Roy Creek Springs/Seeps	Pedernales River Seeps	Other Springs/Seeps	GHB's (Regional Flow)
Baseline Total Flow (afy)	93.6	244.2	1,218.3	521.5	-
Total Reduction in Flow (afy)	2.7	20.4	30	14.7	17.2
Percent reduction	2.9%	8.4%	2.5%	2.8%	-
Percent of Mirasol Pumping	3.2%	24%	35.3%	17.3%	20.2%



- The table shows impacts of the proposed production on different sources and sinks of groundwater in the study area during average rainfall conditions
- The figure shows volumetric impacts on different drain cells in the model area

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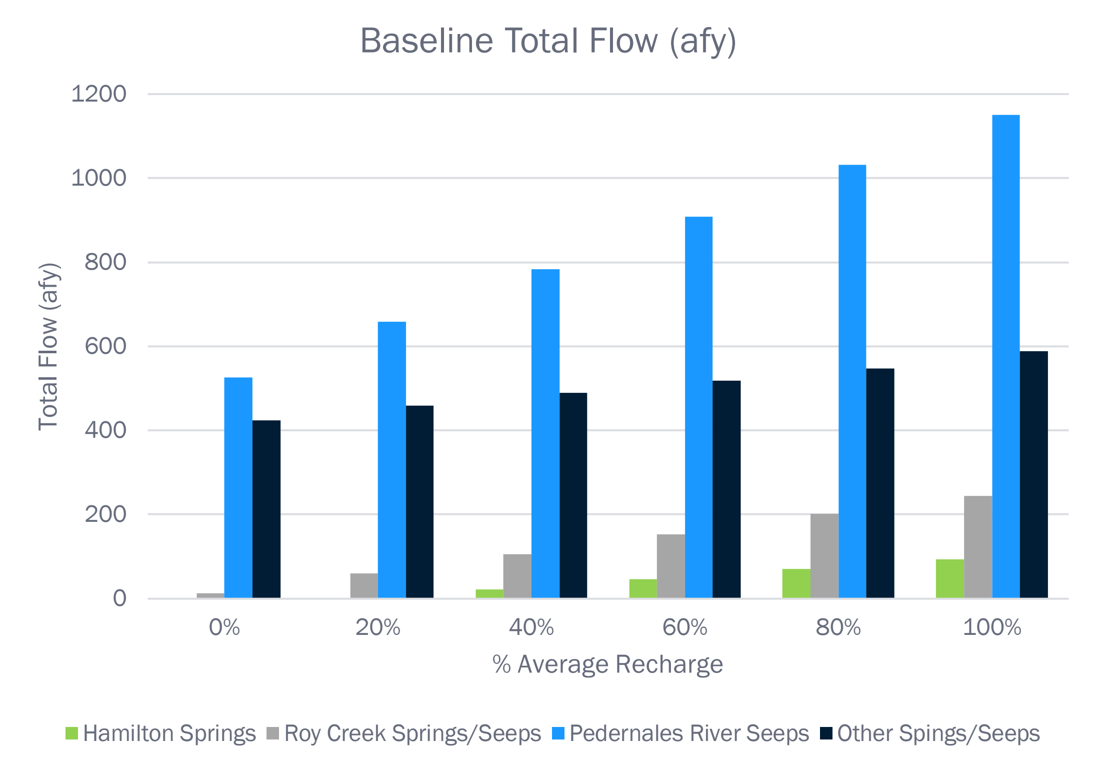
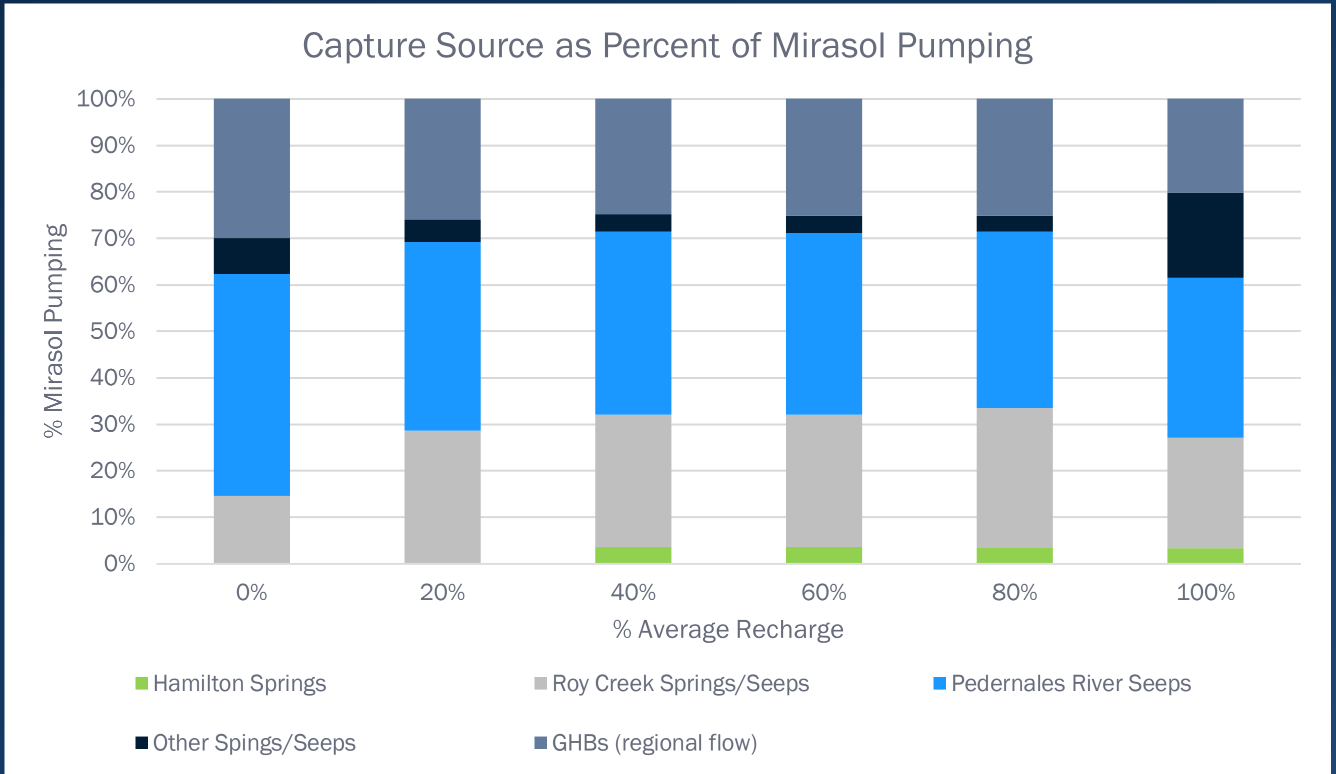
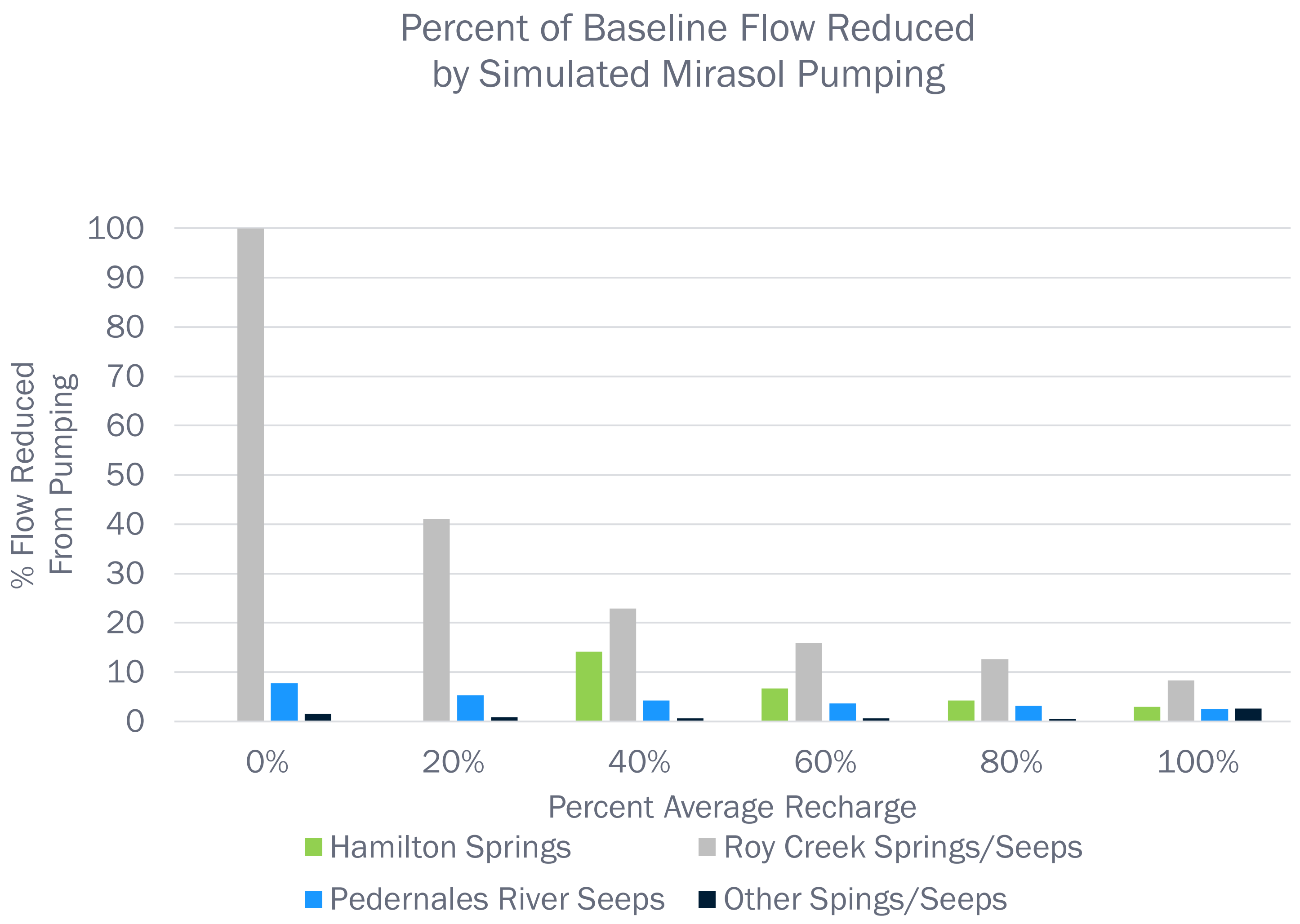
Impacts During Drought Conditions

- Five additional scenarios, applying recharge of 80%, 60%, 40%, 20%, and 0% of the average recharge





Capture Attributable to Simulated Mirasol Pumping (afy)



The volume of capture for each source/sink remains relatively constant, though the capture expressed as a proportion of the baseline flow increases as recharge decreases

Conclusions and Future Steps

- Mirasol production wells expected to reduce water levels at local wells by approximately 2 – 3.5 feet and reduce flow from local springs and seeps by 3.3% at average rainfall conditions

- Volumetric impacts from pumping at springs and seeps in the study area remain relatively constant during different rainfall conditions, though the proportional impact of the production increases as precipitation decreases

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