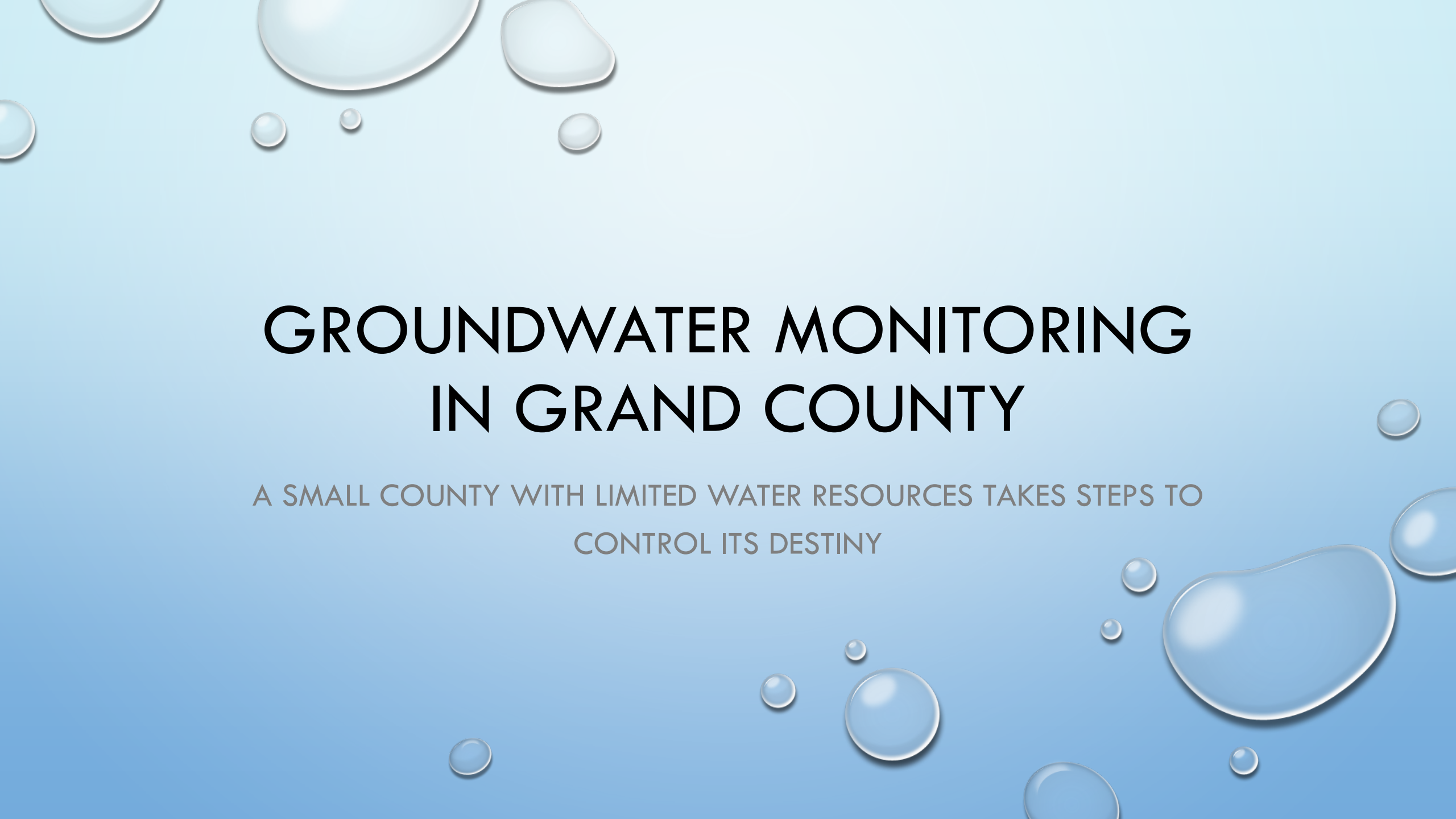


The background is a light blue gradient with several realistic water droplets of various sizes scattered across it. Some droplets are at the top, some at the bottom, and some in the middle. They have highlights and shadows, giving them a 3D appearance.

# GROUNDWATER MONITORING IN GRAND COUNTY

A SMALL COUNTY WITH LIMITED WATER RESOURCES TAKES STEPS TO  
CONTROL ITS DESTINY

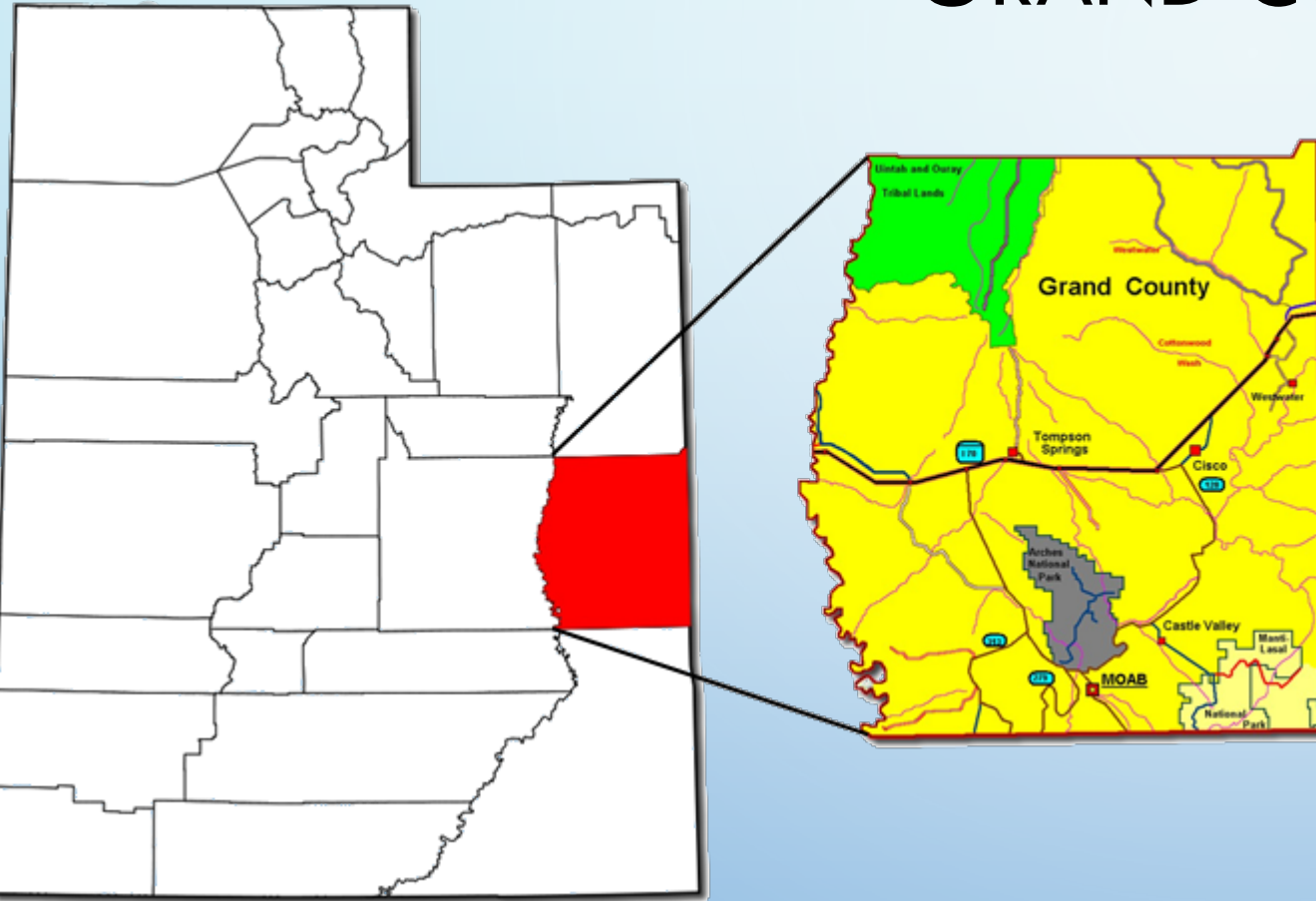
# GRAND COUNTY

Grand County is home to several outstanding recreational opportunities and is a world wide tourist destination. The number of permanent residents is under 10,000.

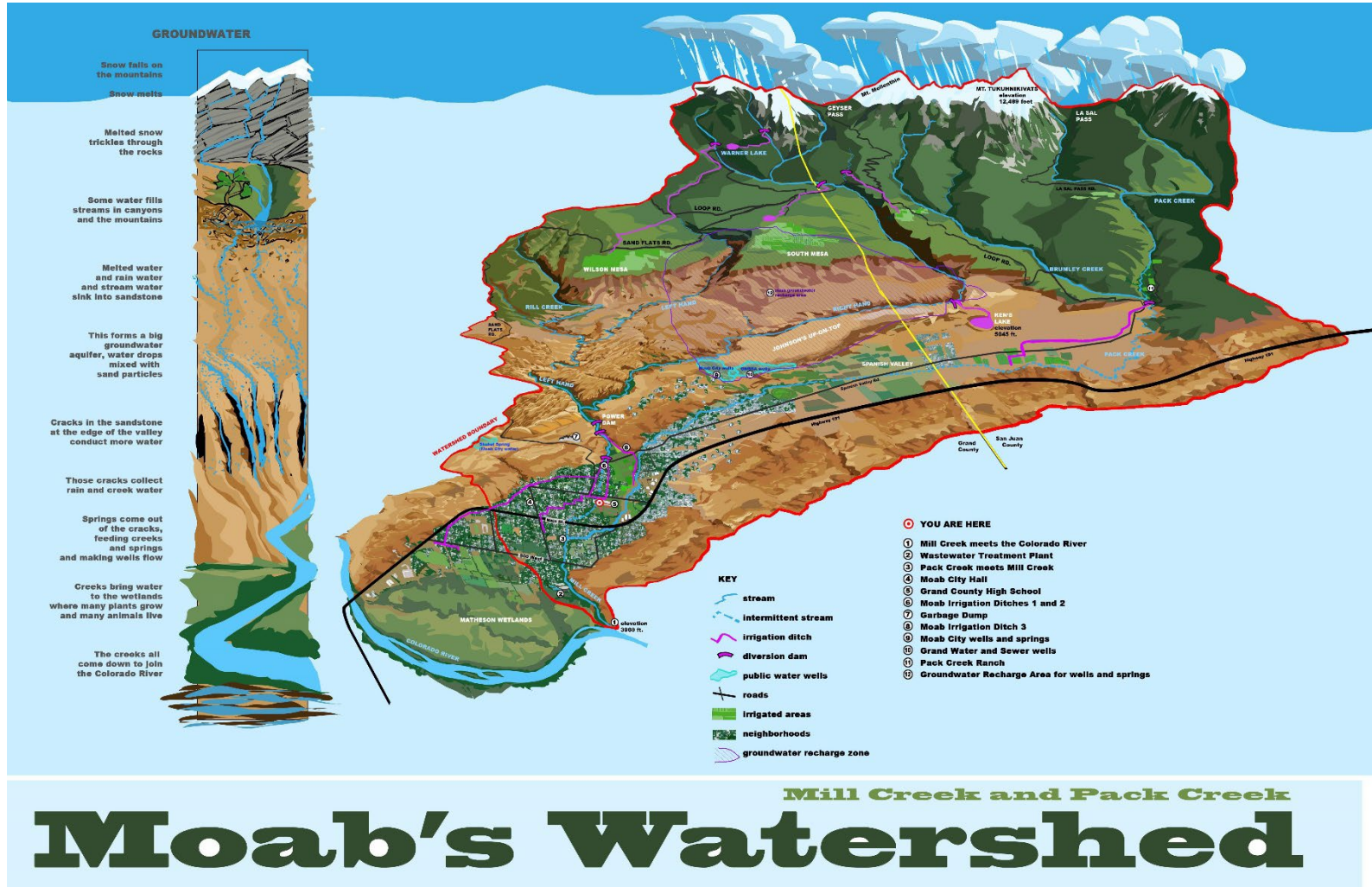
Domestic and most agricultural water is supplied by groundwater.

Several water studies have determined we are reaching the limit of our groundwater resources.

The most populated areas in the County are Spanish and Castle Valley



# This block model is a simplified picture of Spanish Valley Hydrology



Groundwater budget =  $R1 + R2 - D1 - D2 - D3 - D4 - D5$

R1 = Recharge from precipitation

R2 = Recharge from runoff, losing reaches of streams, and unconsumed surface water and groundwater irrigation

D1 = Discharge to gaining reaches of streams

D2 = Discharge to springs

D3 = Discharge to well withdrawals

D4 = Discharge to evapotranspiration

D5 = Discharge to subsurface outflow to Colorado River

EXPLANATION

← Recharge  
← Discharge  
← Direction of groundwater flow

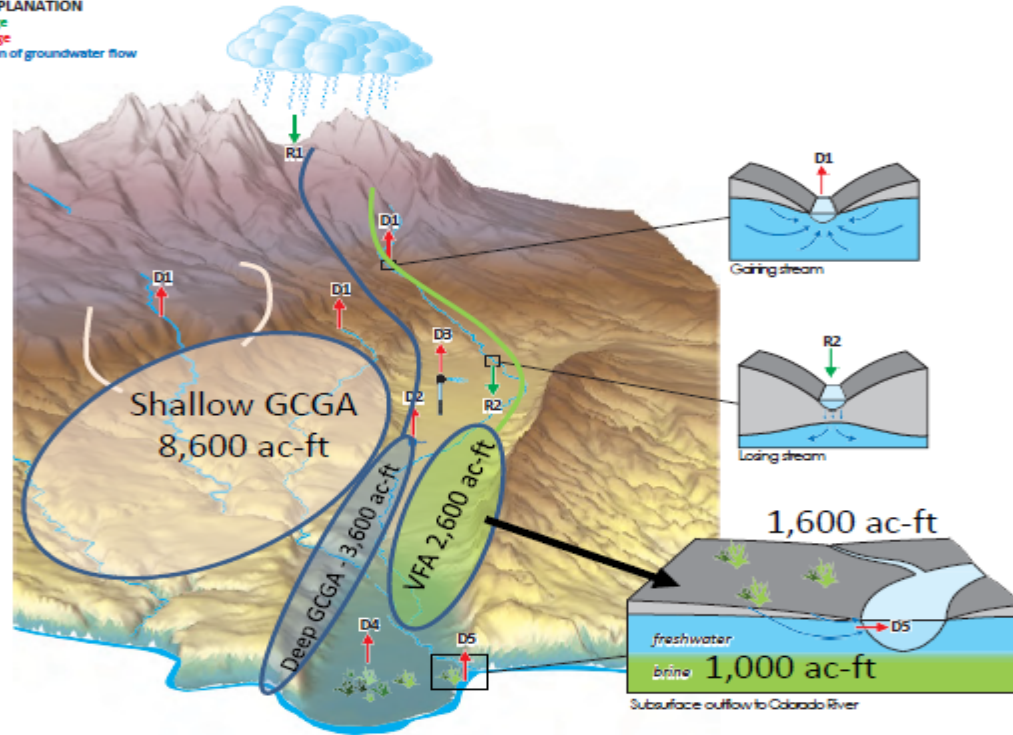
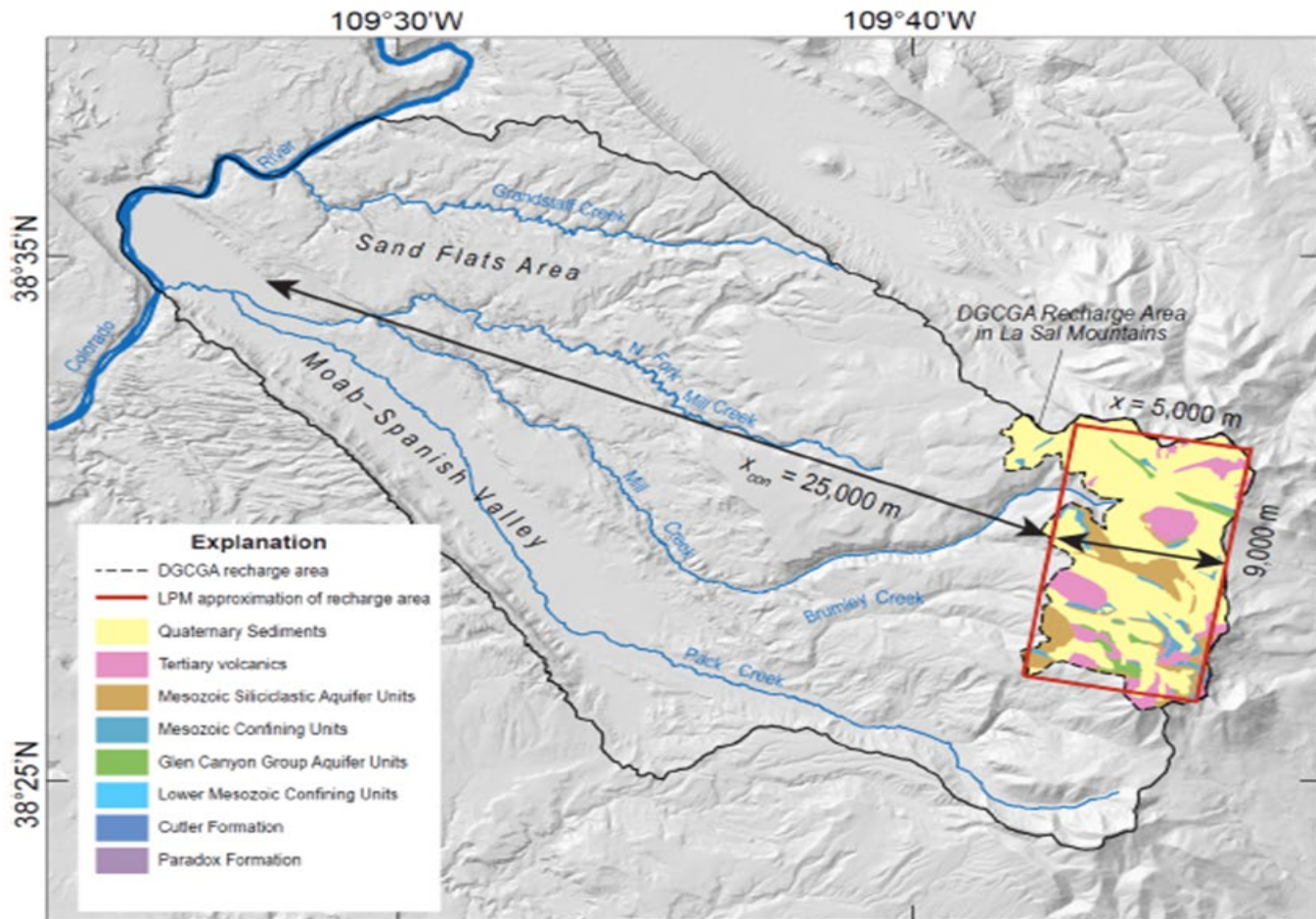


Figure 18. Conceptualization of the groundwater flow system and budget components for the Spanish Valley study area, Utah.

- Shallow GCGA are springs and baseflow discharge to upper Mill creek
- Deep GCGA is discharge to Moab City wells and springs
- VFA is Valley Fill Aquifer
- Total=14,800 ac-ft per yr

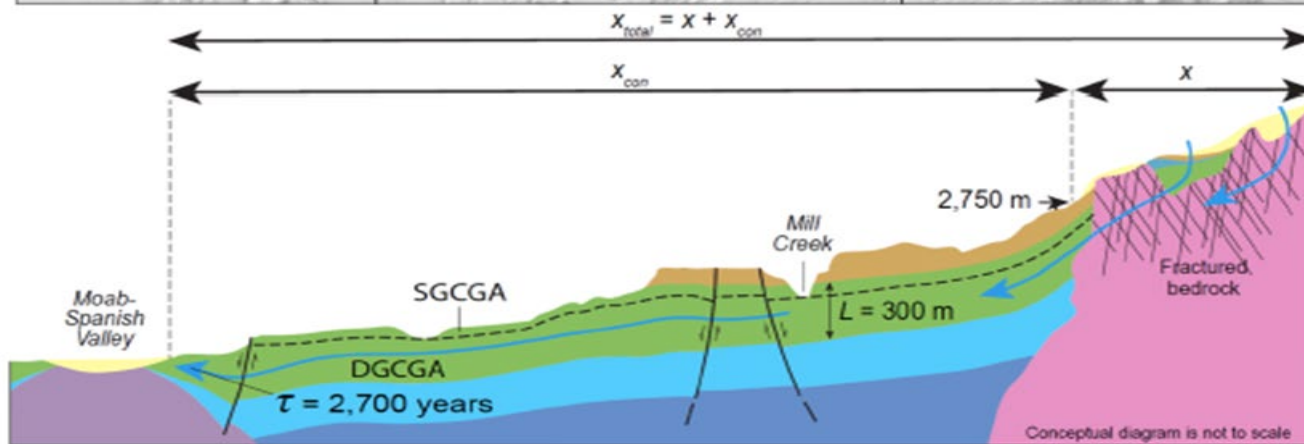
Spanish Valley's groundwater is more complex than most. You can see we have three different pathways for groundwater. The "Deep" Glen Canyon Group aquifer has the highest quality water and has been targeted by water providers for domestic use.

That use is close to its "safe yield" and the others are used close to their extent also.



This slide is for the hydrogeologists in the group!

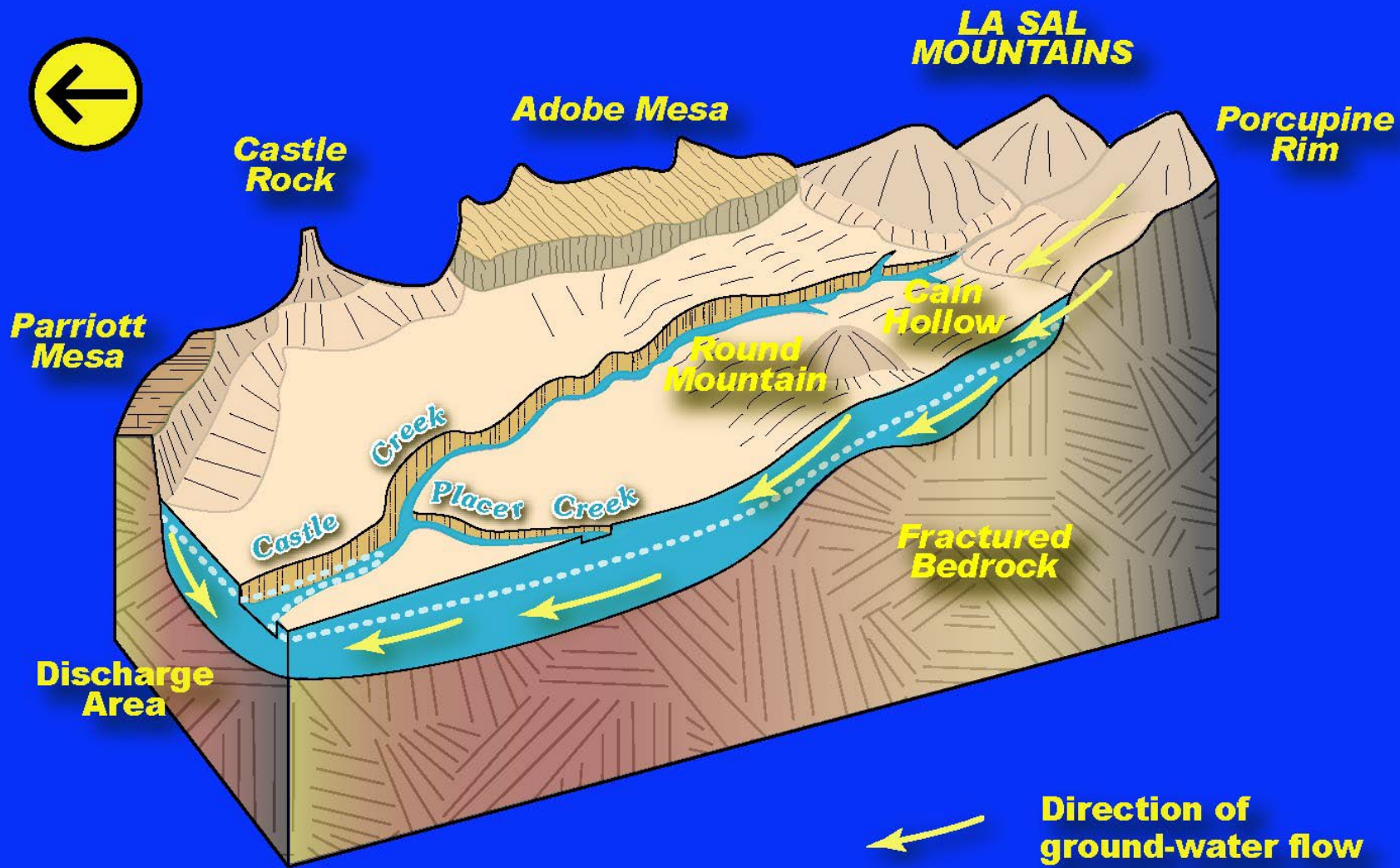
The recharge for the Deep Glenn Canyon Group aquifer comes from high elevation in the La Sal mountains



Shaded relief from U.S. Geological Survey National Elevation Dataset, 1 arc-second scale Universal Transverse Mercator projection, Zone 12 North American Datum 1983.

Hydrogeology modified from Doelling et al., 2002 and Doelling 2004.

Thanks Phillip Gardner from Journal of Hydrology, Rethinking a groundwater flow system using a multiple-tracer geochemical approach: a case study in Moab-Spanish Valley, Utah



# Castle Valley

Castle Valley's groundwater is also sourced from the La Sal mountains. The Hydrology is a little over simplified in this diagram. However, the situation is the same, the resource is limited and we are approaching its limits

# GROUNDWATER MONITORING

- SEVERAL ENTITIES MONITORING GROUNDWATER FOR A VARIETY OF REASONS
- DATA IS SCATTERED IN SEVERAL DATA BASES, NOT ALL AVAILABLE TO THE PUBLIC
- UTAH DIVISION OF WATER RIGHTS (UDWRI) IS CONCERNED WITH THESE AQUIFERS
- THERE HAS BEEN INCREASING PUBLIC AWARENESS ABOUT THE RESOURCE LIMITS
- FUTURE DEVELOPMENT COULD PUSH THE COMMUNITY OVER “SAFE YIELD”
- THERE HASN’T BEEN ONE ENTITY/AGENCY/INSTITUTION RESPONSIBLE TO “CARE FOR” THE COUNTY’S GROUNDWATER RESOURCES
- FUTURE MONITORING WILL REQUIRE A FEW NEW MONITORING WELLS

Grand County has stepped up to lead a coordinated monitoring effort

# A COORDINATED MONITORING EFFORT

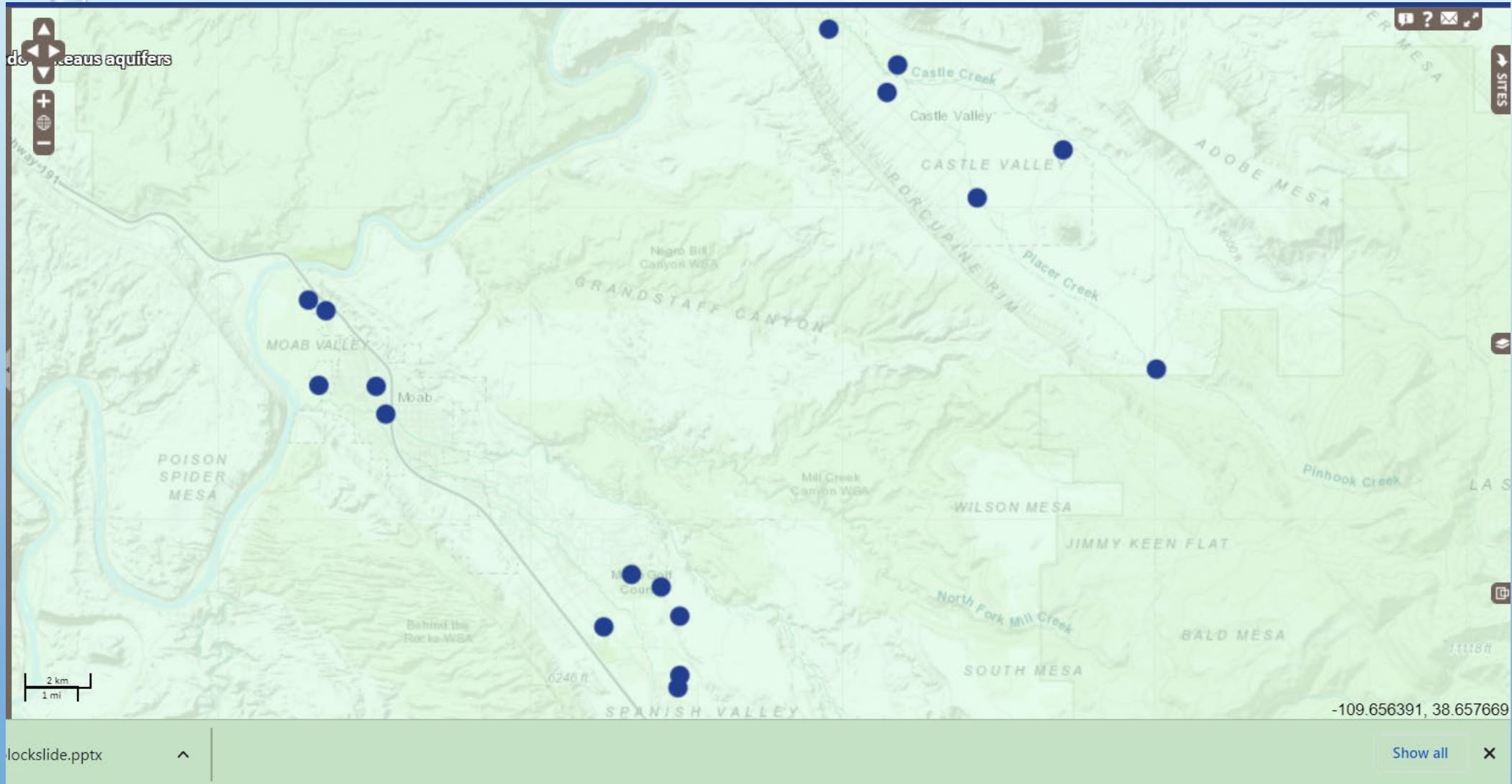
## Castle Valley's Current and Future Plan

- THE TOWN OF CASTLE VALLEY HAS HAD A MONITORING PLAN IN PLACE SINCE THE LATE 1990'S
- IT CONSISTS OF SIX WELLS SAMPLED BI-ANNUALLY FOR DEPTH AND BASIC CHEMISTRY
- THE TOWN OF CASTLE VALLEY WOULD LIKE TO HAVE ITS AQUIFER CLOSED TO NEW APPROPRIATIONS BUT UDWRI NEEDS MORE DATA TO JUSTIFY THAT.
- A WATER BUDGET STUDY HAS BEEN PROPOSED FOR THE VALLEY AND THAT GROUNDWATER DATA AND THE HISTORIC DATA IS PROPOSED TO BE CONTRIBUTED TO THE NETWORK
- CONTINUOUS MONITORING HAS BEEN A MISSING COMPONENT WE ARE ADDING TO THE MONITORING PLAN
- THIS EFFORT ALSO ENGAGES THE COUNTY IN THE MANAGEMENT OF RESOURCES IN THE COUNTY

# SPANISH VALLEY'S CURRENT AND FUTURE PLAN

- PREVIOUSLY NOT AN ORGANIZED MONITORING PLAN
- SEVERAL ENTITIES TAKING WATER DEPTH AND SOME CHEMICAL CHARACTERISTICS
- AT THIS TIME THERE ARE AT LEAST FIVE MONITORING WELLS WITH CONTINUOUS DEPTH DATA AND 10 TO 15 WITH ANNUAL DATA
- BRING ALL DATA HISTORIC OR CURRENTLY BEING COLLECTED INTO AN ACCESSIBLE CENTRAL LOCATION (THE UGS'S DATA BASE THROUGH THE NETWORK)
- COMPILE MONITORING EFFORTS INTO ONE PLAN
- DETERMINE WHERE MONITORING IS MISSING
- DEVELOP A GROUNDWATER MODEL FOR THE VALLEY
- THIS EFFORT ALSO ENGAGES THE COUNTY IN MANAGEMENT OF ITS RESOURCES
- UDWRI AND OTHERS ARE ASKING FOR MORE DATA TO MAKE MANAGEMENT DECISIONS
- THE HYDROLOGISTS HAVE ALREADY DETERMINED THAT WE NEED AT LEAST ONE MORE WELL IN A SPECIFIC LOCATION.

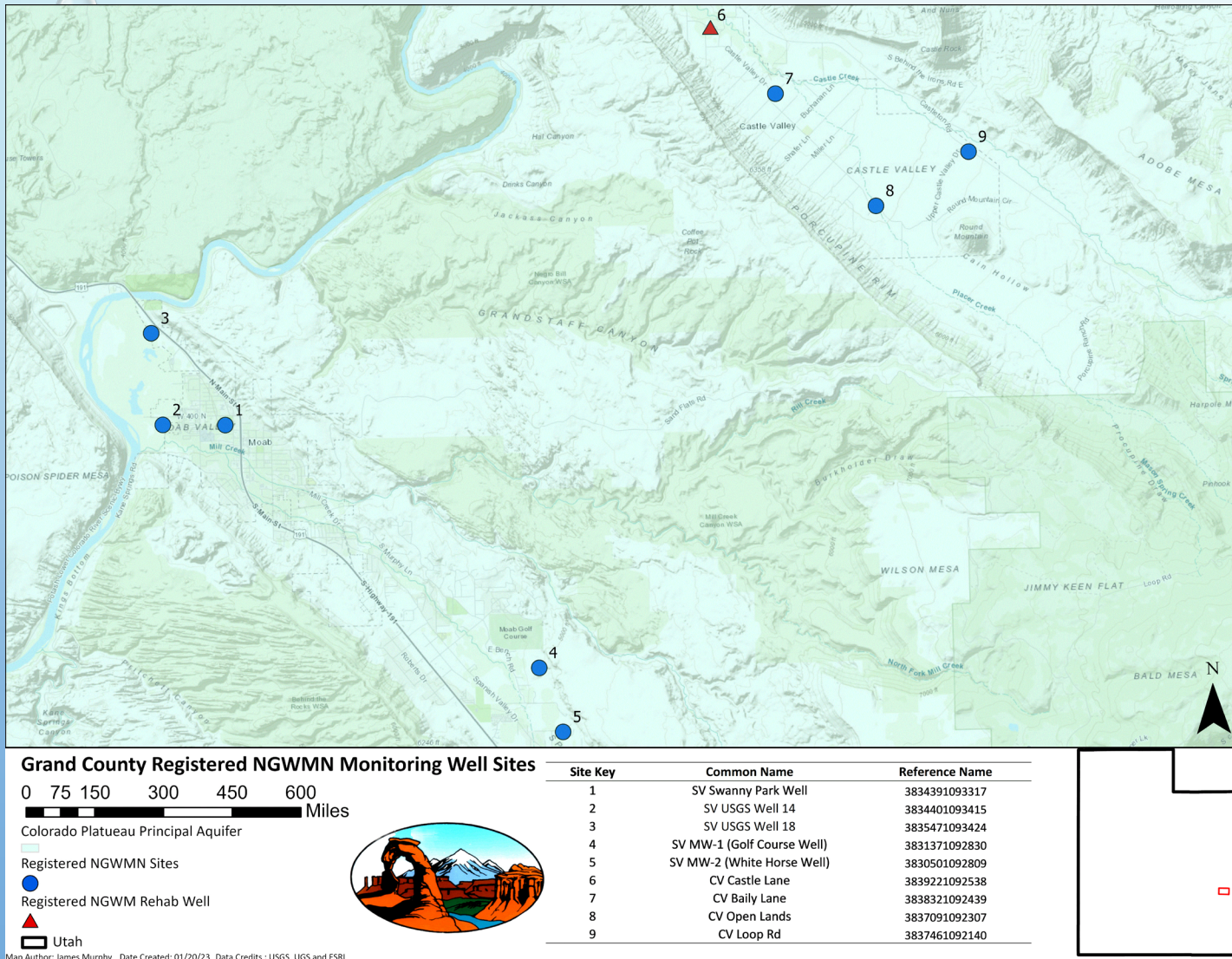
# CURRENT NETWORK SITES FOR THE VALLEYS



The six in Castle Valley are shown. Four are UGS's sites. Several in Spanish valley are either USGS annual sites or UGS water quality sites.

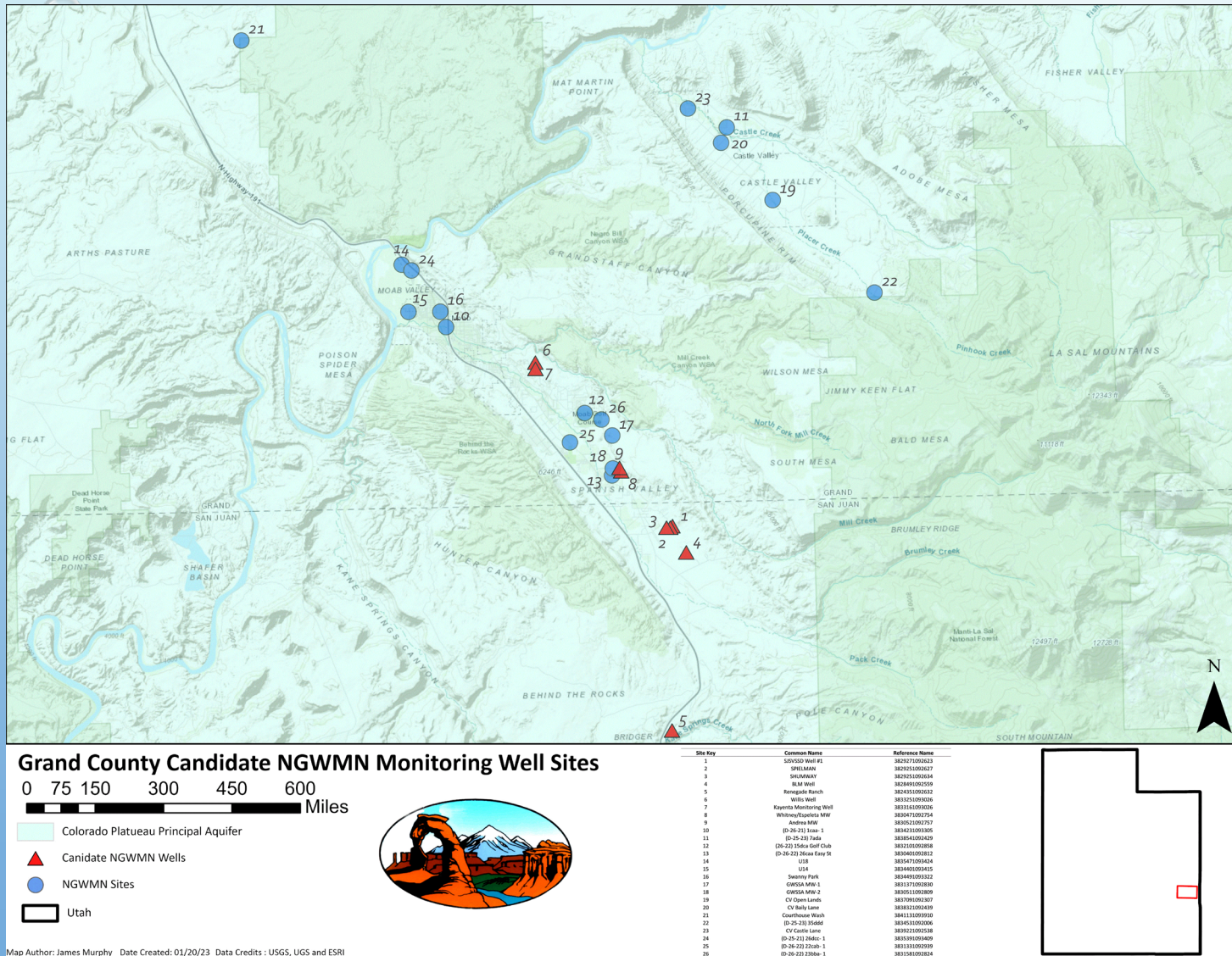
# REGISTERED GRAND COUNTY WELLS

Wells currently registered on the Network with either bi-annual or continuous date that has been delivered to UGS. The ones that have biannual data are hopefully being converted to continuous data



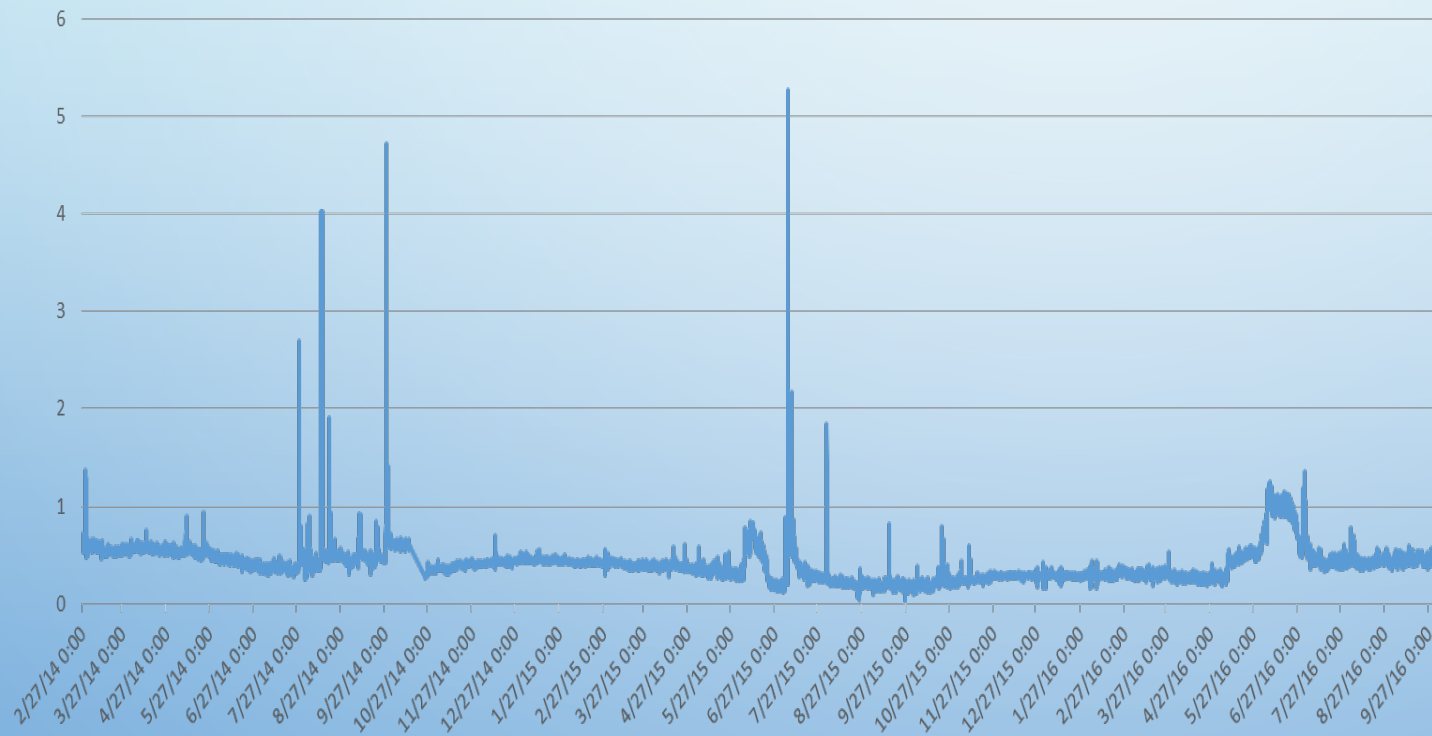
# CANDIDATE NETWORK WELLS

The Red Triangles are the candidate wells. These wells are already in place and have some data associated with them. Some of them are currently being occasionally pumped.



# CONTINUOUS DEPTH PROBE DATA

Depth of Water in Pack Ck ab Mill Ck



This is a stream site where I had a pressure transducer measuring depth. The point is that our streams generally run on base flow, surface water is intricately tied to groundwater. Of course the flow in our streams comes from springs and someone told me the NGWMN wasn't interested in flow data from springs. Is that really true?

# IN CONCLUSION

- GRAND COUNTY IS A LARGE AREA WITH A SMALL RESIDENT POPULATION AND A LARGE TOURIST ECONOMY.
- GRAND COUNTY'S MONETARY AND GROUNDWATER RESOURCES ARE LIMITED
- GRAND COUNTY HAS SOME DATA AND ARE LOOKING TO COLLECT MORE TO DEVELOP A BETTER RESOURCE MONITORING AND MANAGEMENT PLAN
- GRAND COUNTY NEEDS THE SERVICES OF THE UGS DATA BASE AND THE NGWMN PORTAL TO STORE, MANAGE AND USE GROUNDWATER RESOURCE DATA.
- GRAND COUNTY ALSO BELIEVES THAT FLOW VOLUMES FROM OUR SPRINGS ARE IMPORTANT TO MONITORING AND MANAGING THE RESOURCE. WE HAVE CONTINUOUS DATA ON SEVERAL SOURCES AND WOULD ALSO LIKE TO ACCESS THAT THROUGH THE PORTAL ALSO.