Recharge and Discharge in the White River and Meadow Valley Flow Systems

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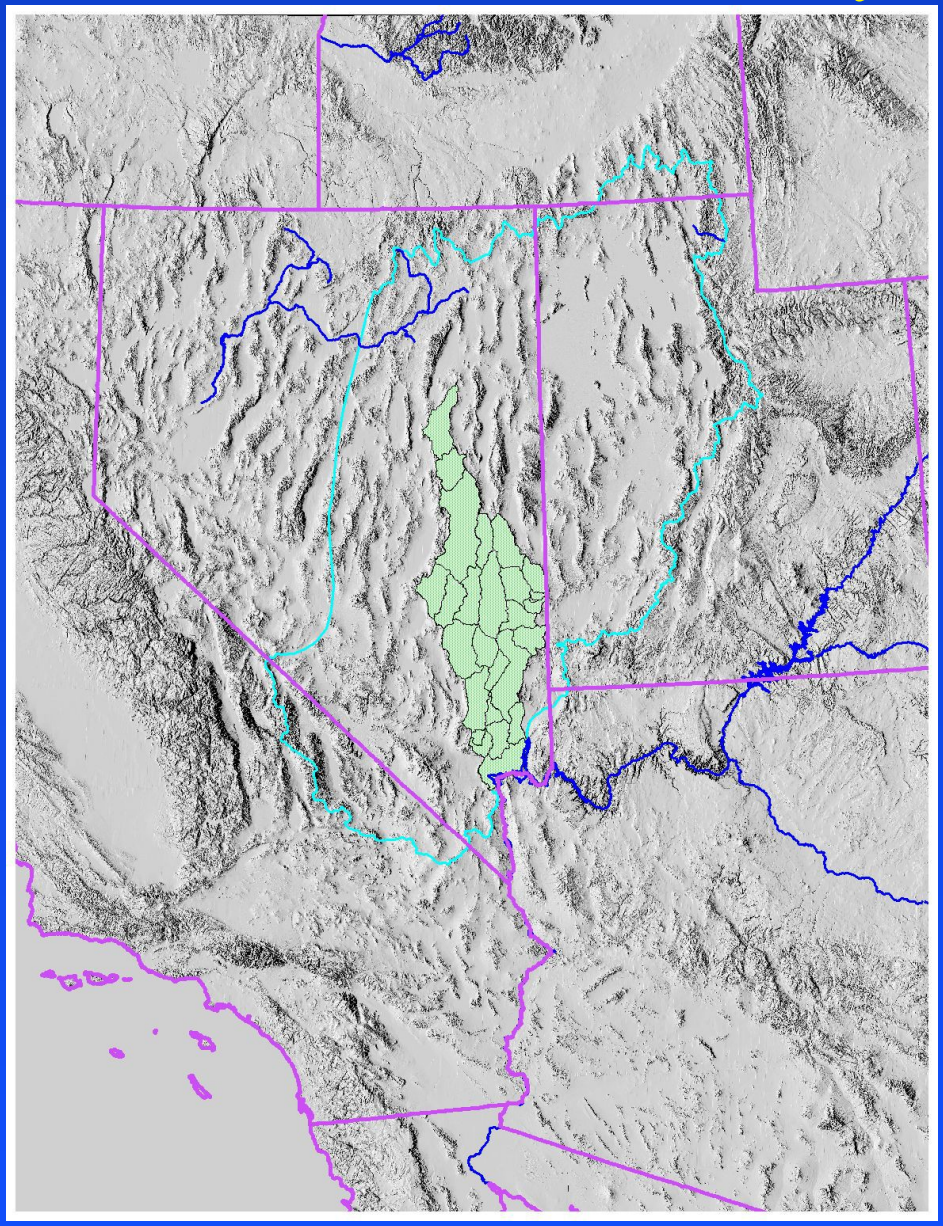
Carbonate Terrain and Study Area



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Carbonate Rock Province

- Eastern Nevada and Western Utah (eastern Great Basin, northeastern Basin and Range)
- Thousands of feet of Paleozoic carbonate rocks

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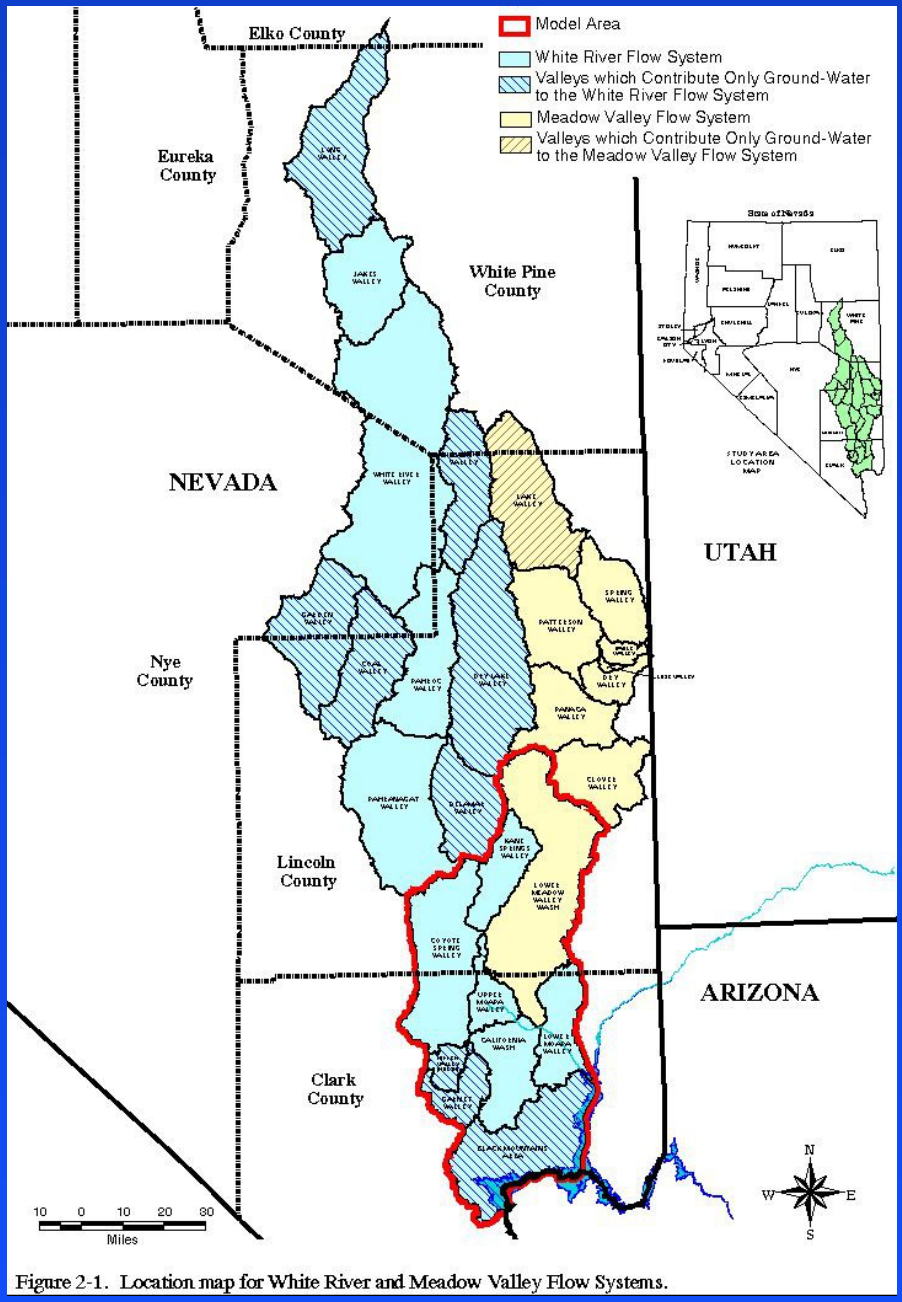

Figure 2-1. Location map for White River and Meadow Valley Flow Systems.

White River and Meadow Valley Flow Systems

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Ground-water Flow Systems

- Series of interconnected valleys
- Coyote Spring Valley in southern part of White River Flow System
- Meadow Valley Flow System adjacent and tributary to the White River Flow System

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Flow System

- Northern Valleys
  - Natural recharge generally exceeds natural discharge.
  - *Jakes and Long Valleys*
- Southern Valleys
  - Natural discharge generally exceeds natural recharge.
  - *Muddy Springs Valley*

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White River Valley

- Largest Volume of Natural Recharge (*62,000 afy*)
- Largest Volume of ET Discharge (*80,000 afy*)
- Interbasin flow from Jakes (*Maxey and Eakin, 1949*)

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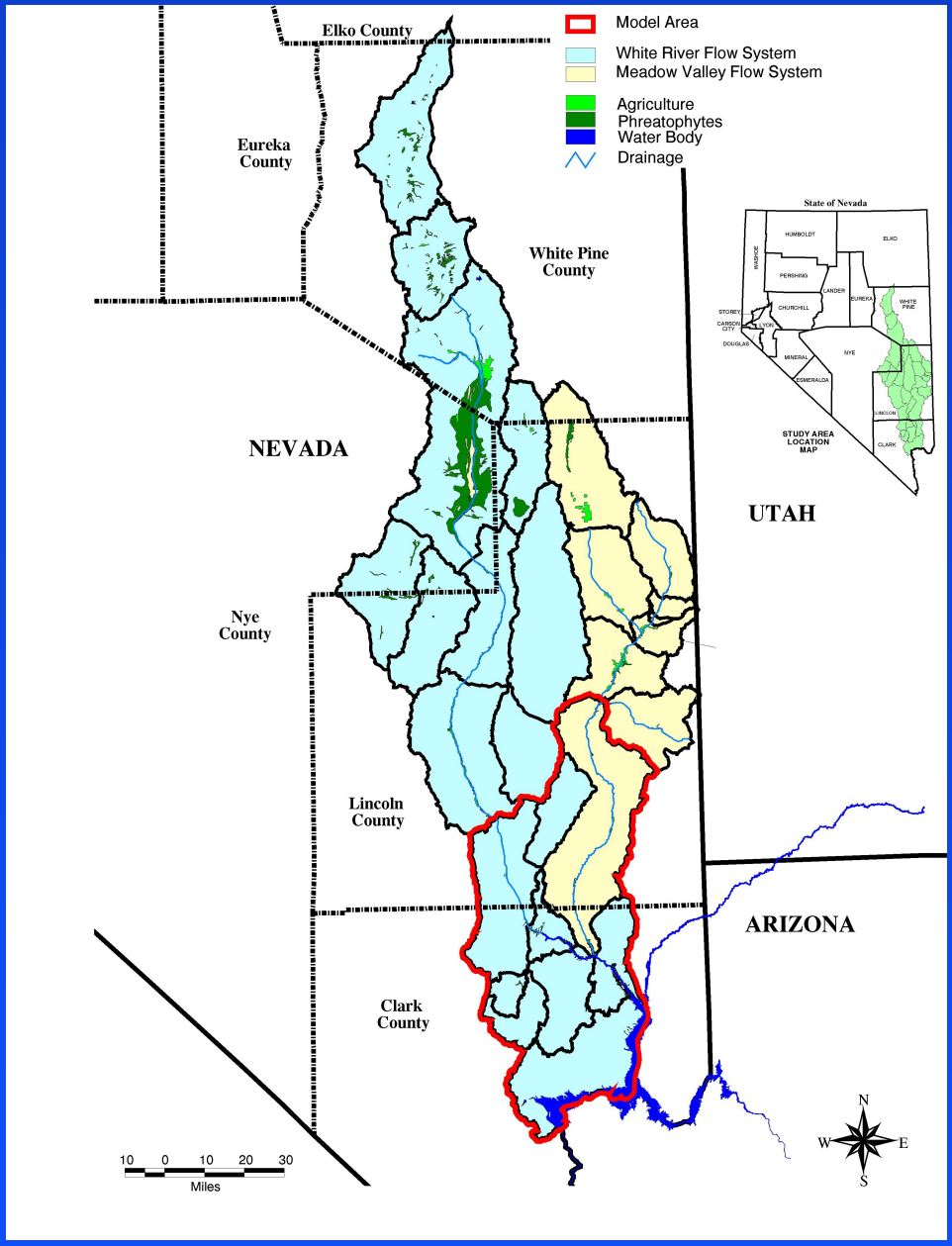
ET Discharge Areas



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Estimation of Natural Recharge

Part 1 - precipitation

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Precipitation Station Locations

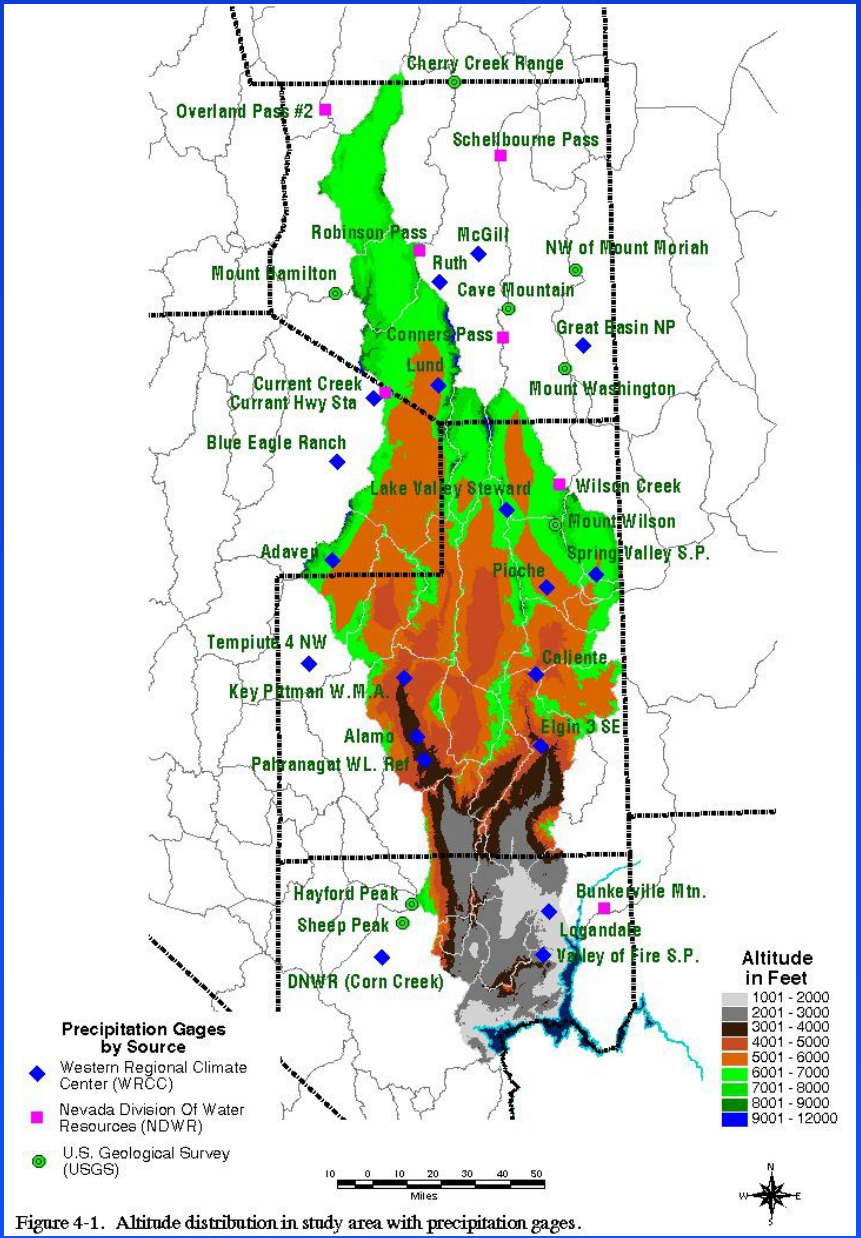

Figure 4-1. Altitude distribution in study area with precipitation gages.

-with 1,000 foot altitude intervals

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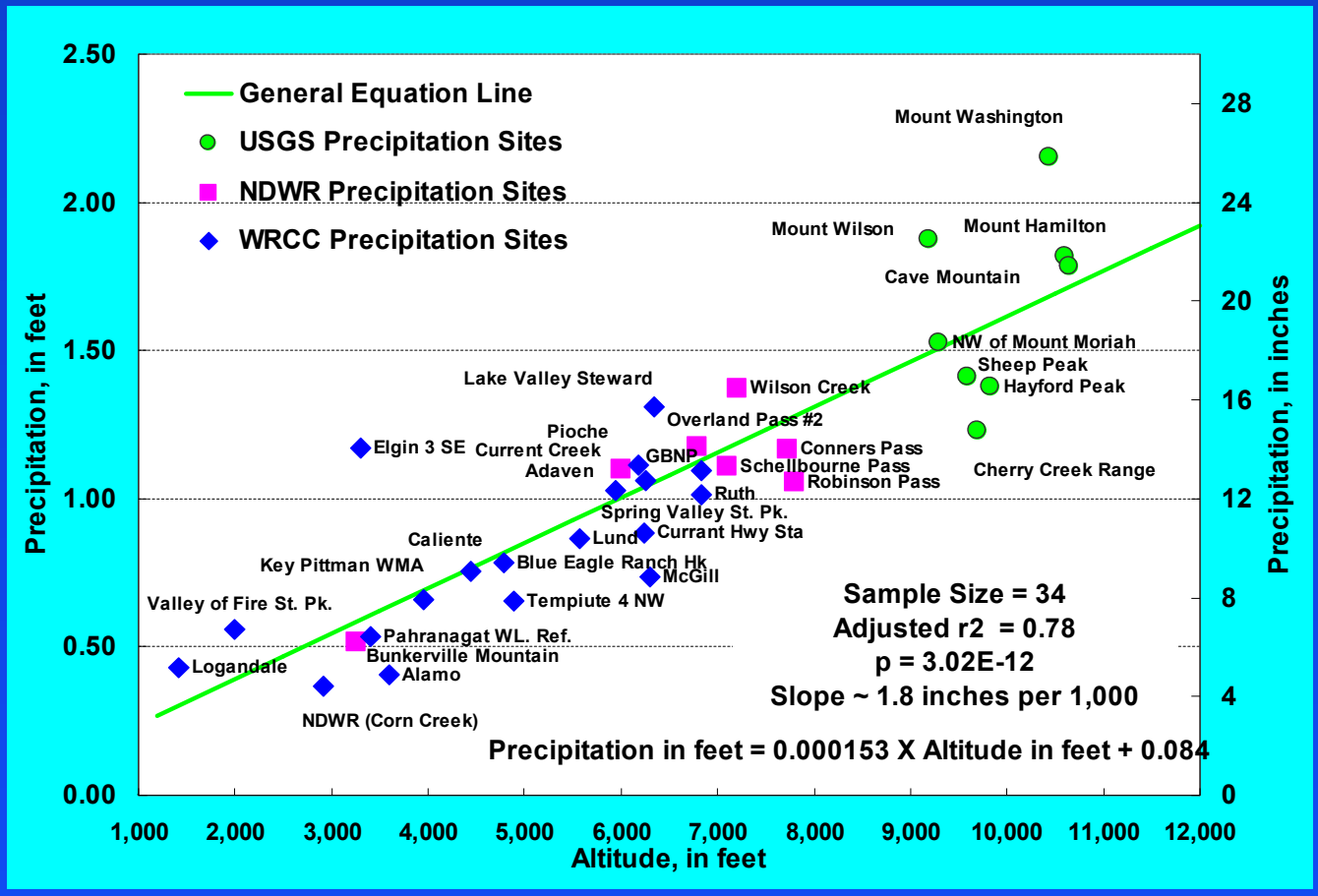
“General” altitude - precipitation relationship



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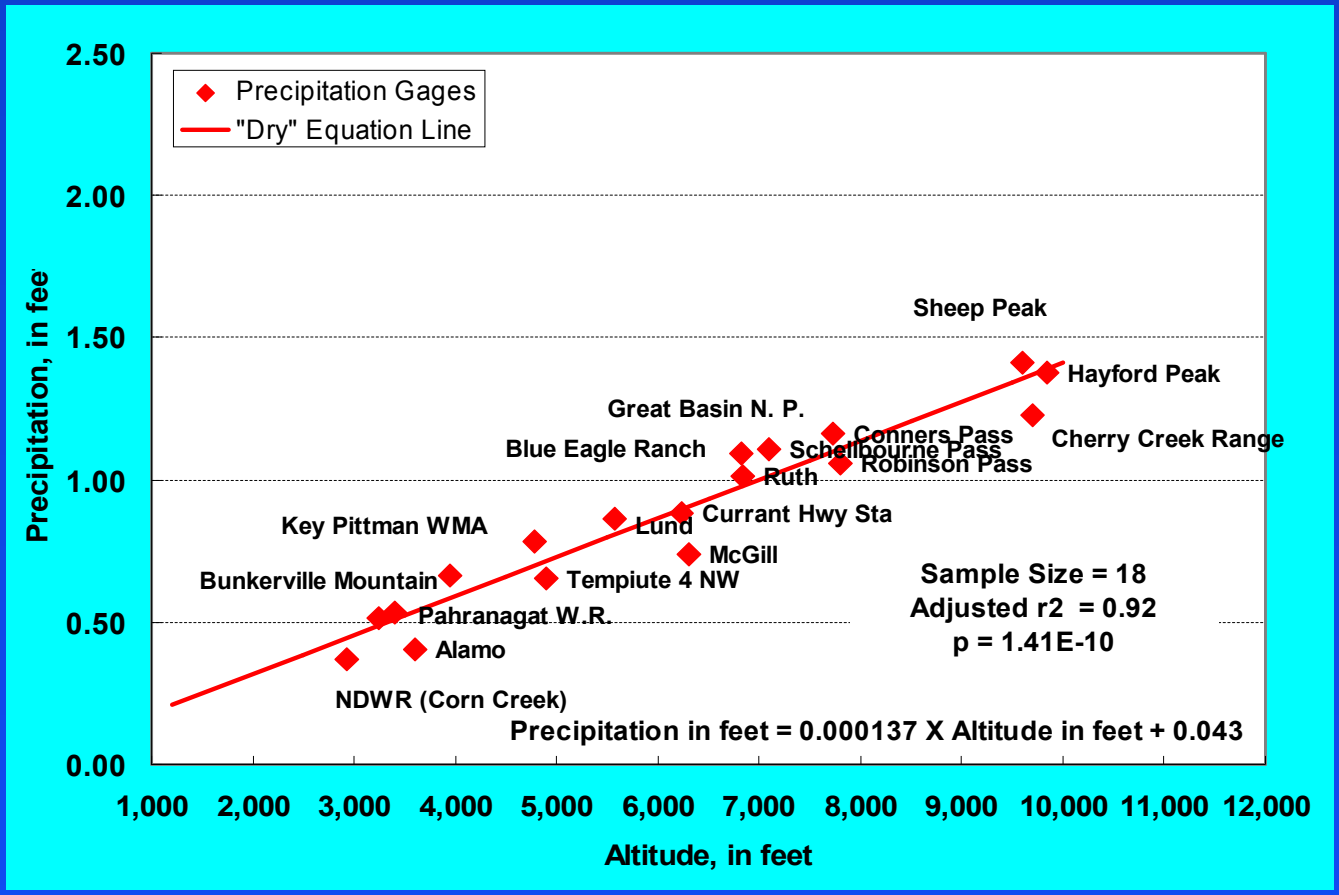
“Dry” altitude - precipitation relationship



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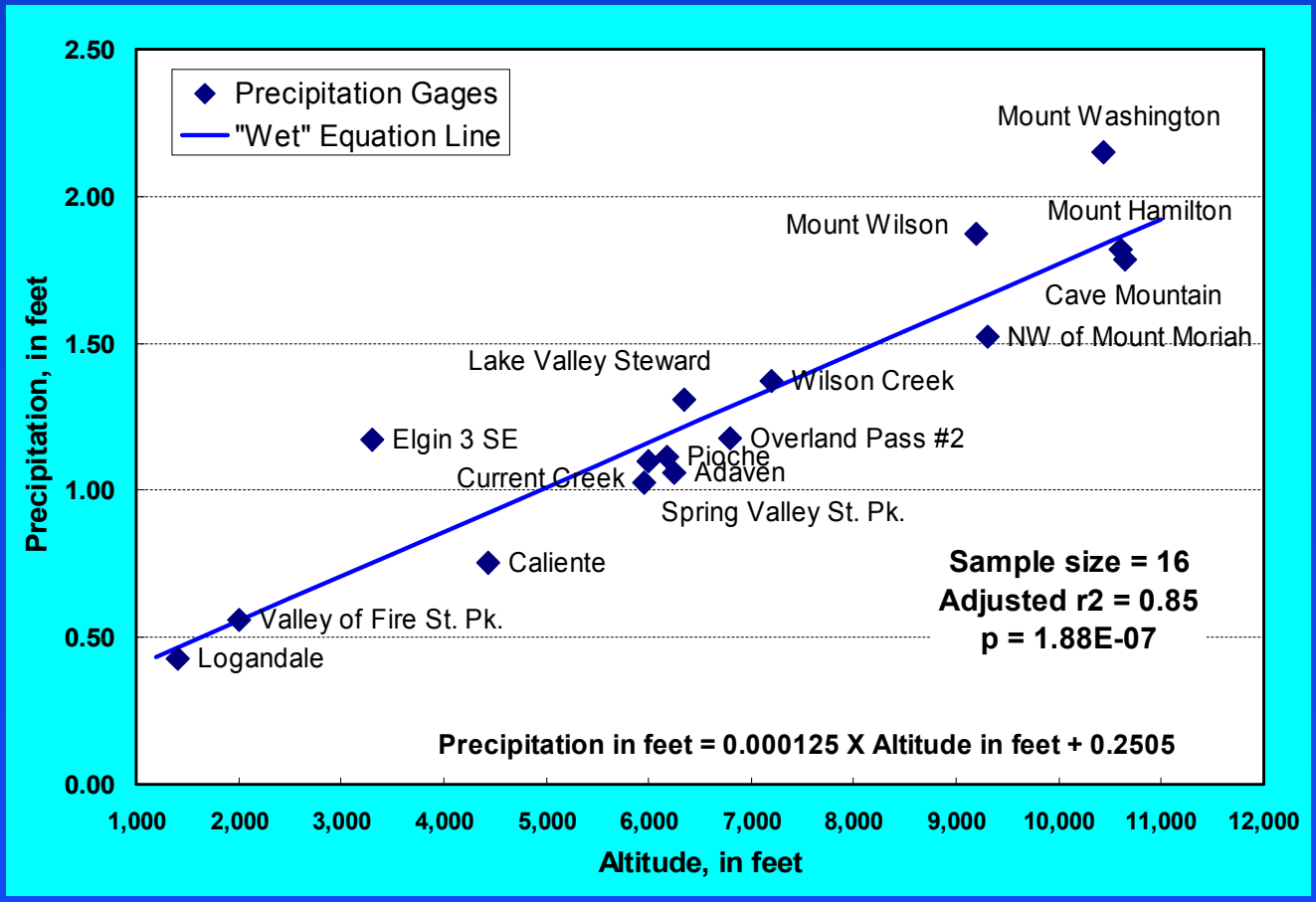
"Wet" altitude - precipitation relationship



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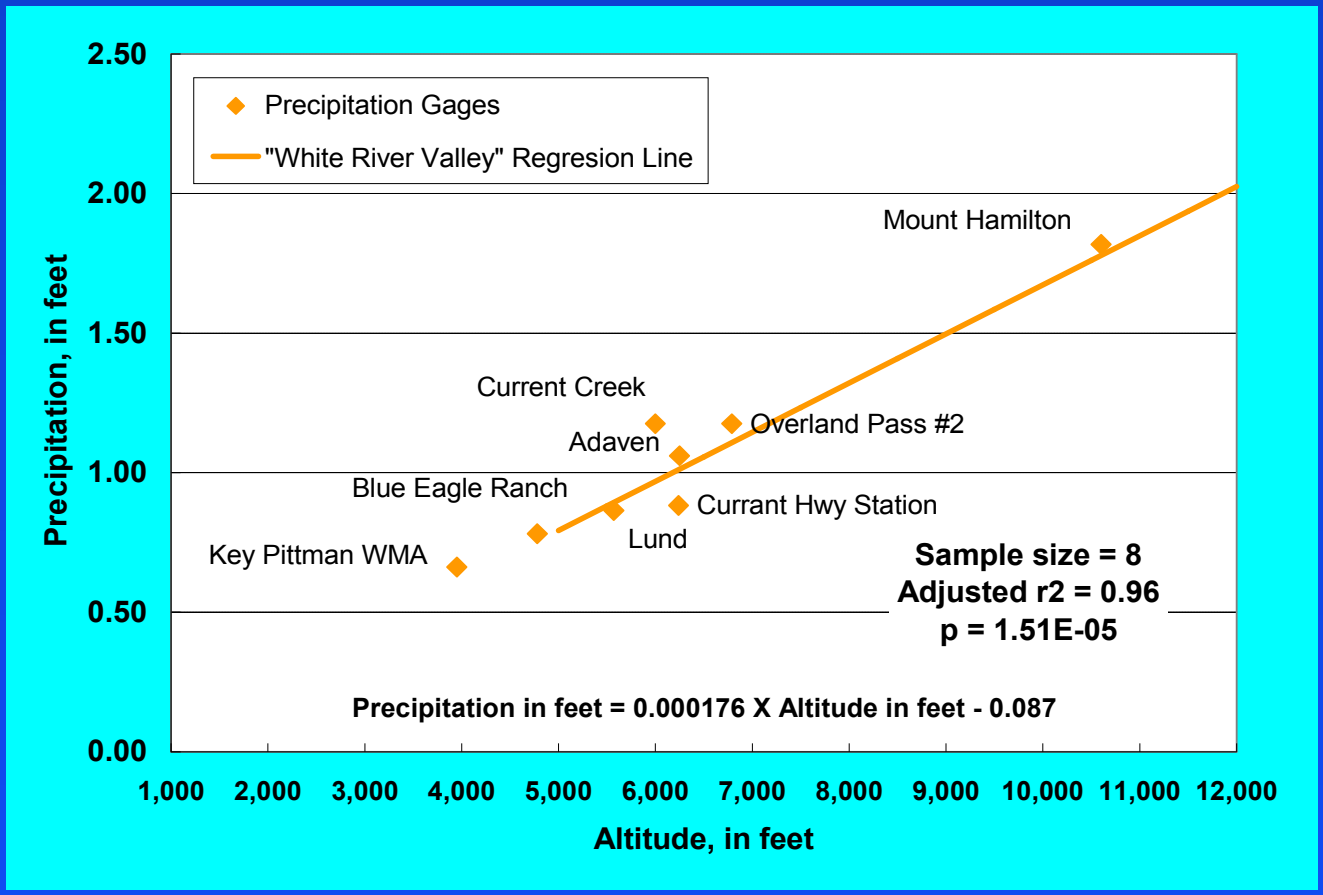
“WRV” altitude - precipitation relationship



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Precipitation Regions

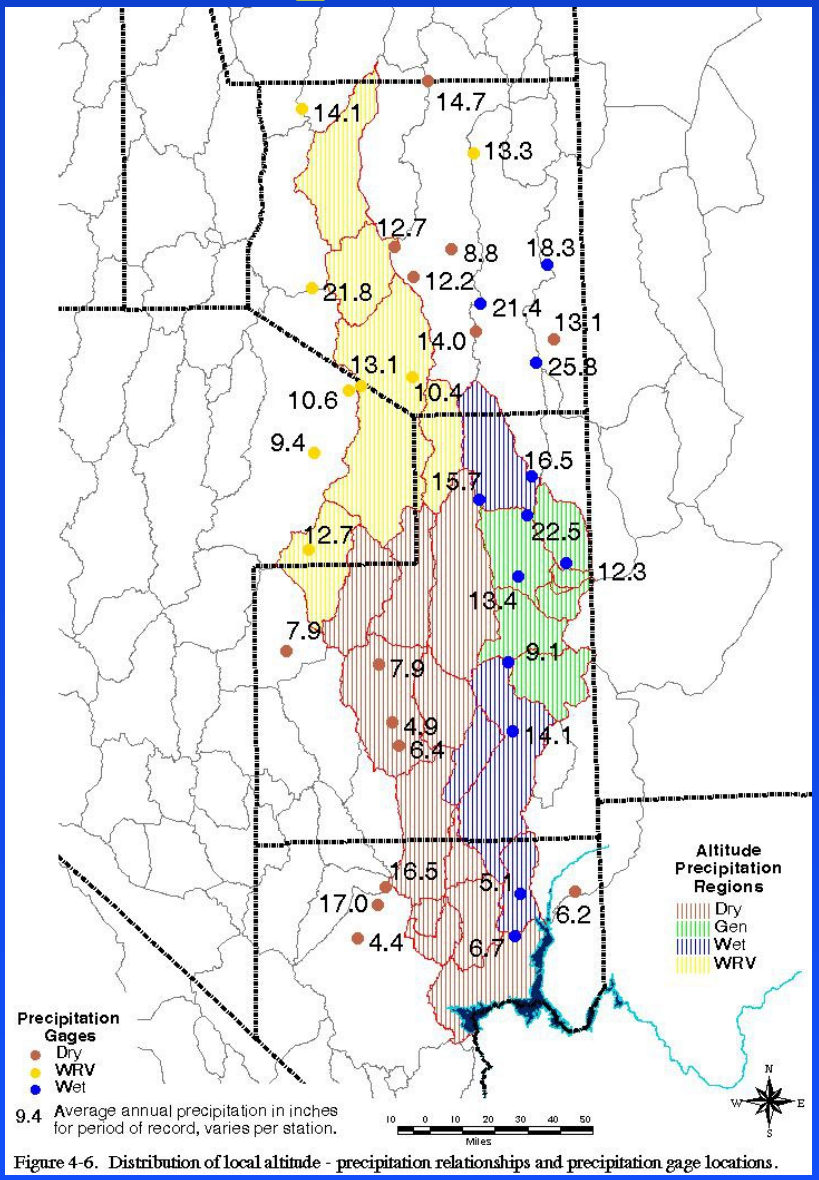

Figure 4-6. Distribution of local altitude - precipitation relationships and precipitation gage locations.

-with locations and values (*period of record averages*) of precipitation gages used in <u>this</u> analysis.

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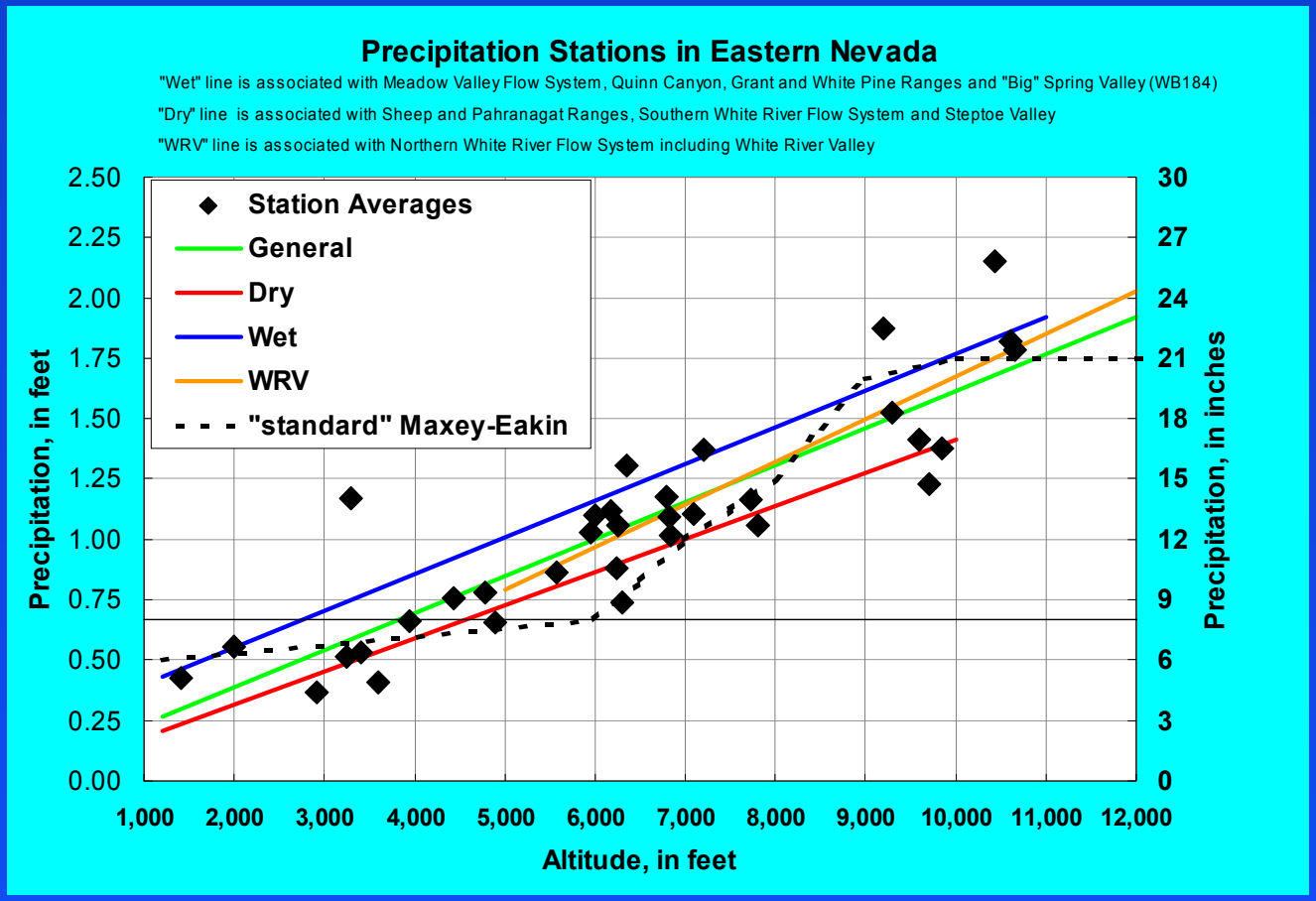
Four local altitude - precipitation relationships



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Precipitation Map

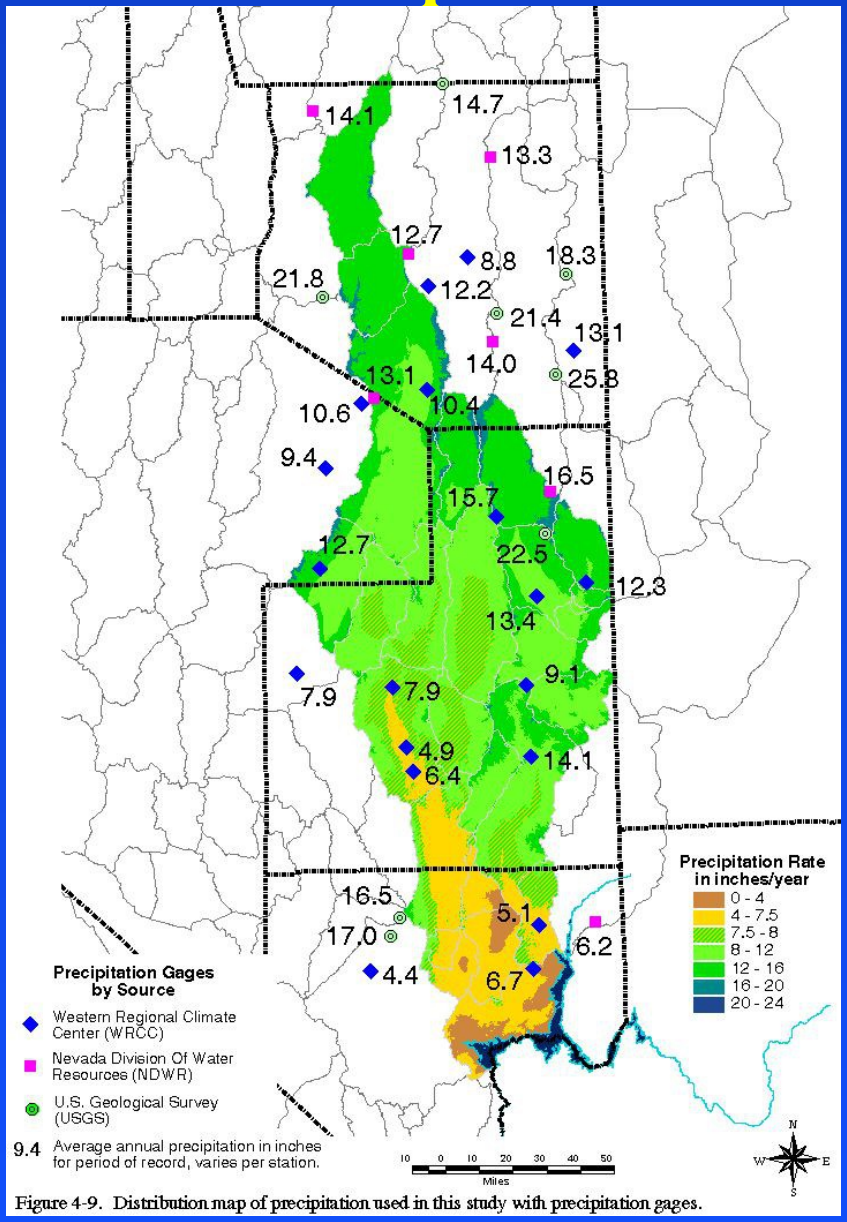

Figure 4-9. Distribution map of precipitation used in this study with precipitation gages.

-with locations and values (*period of record averages*) of precipitation gages used in <u>this</u> analysis.

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NDWR 1971

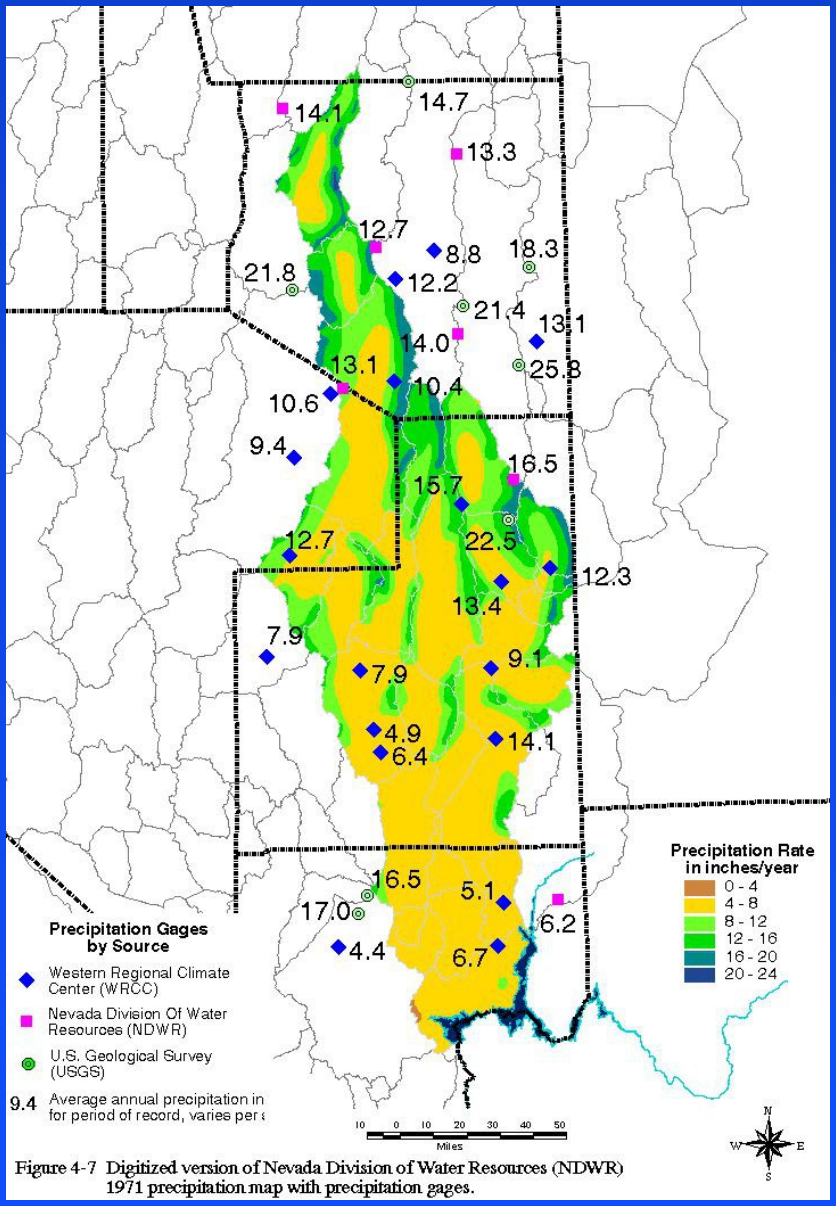

Figure 4-7 Digitized version of Nevada Division of Water Resources (NDWR) 1971 precipitation map with precipitation gages.

-with gages used in <u>this</u> analysis.

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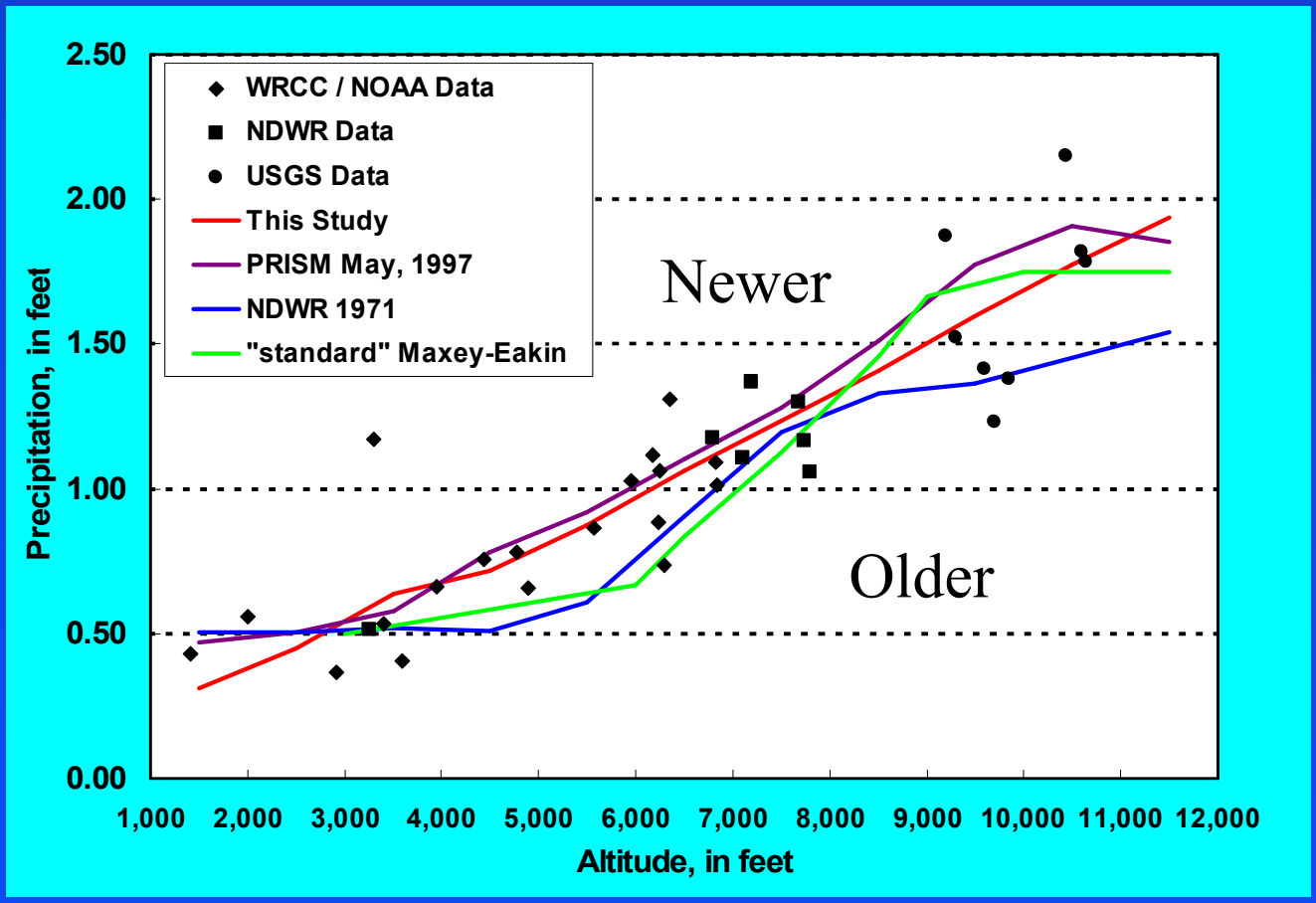
Precipitation Data Compared to Estimates



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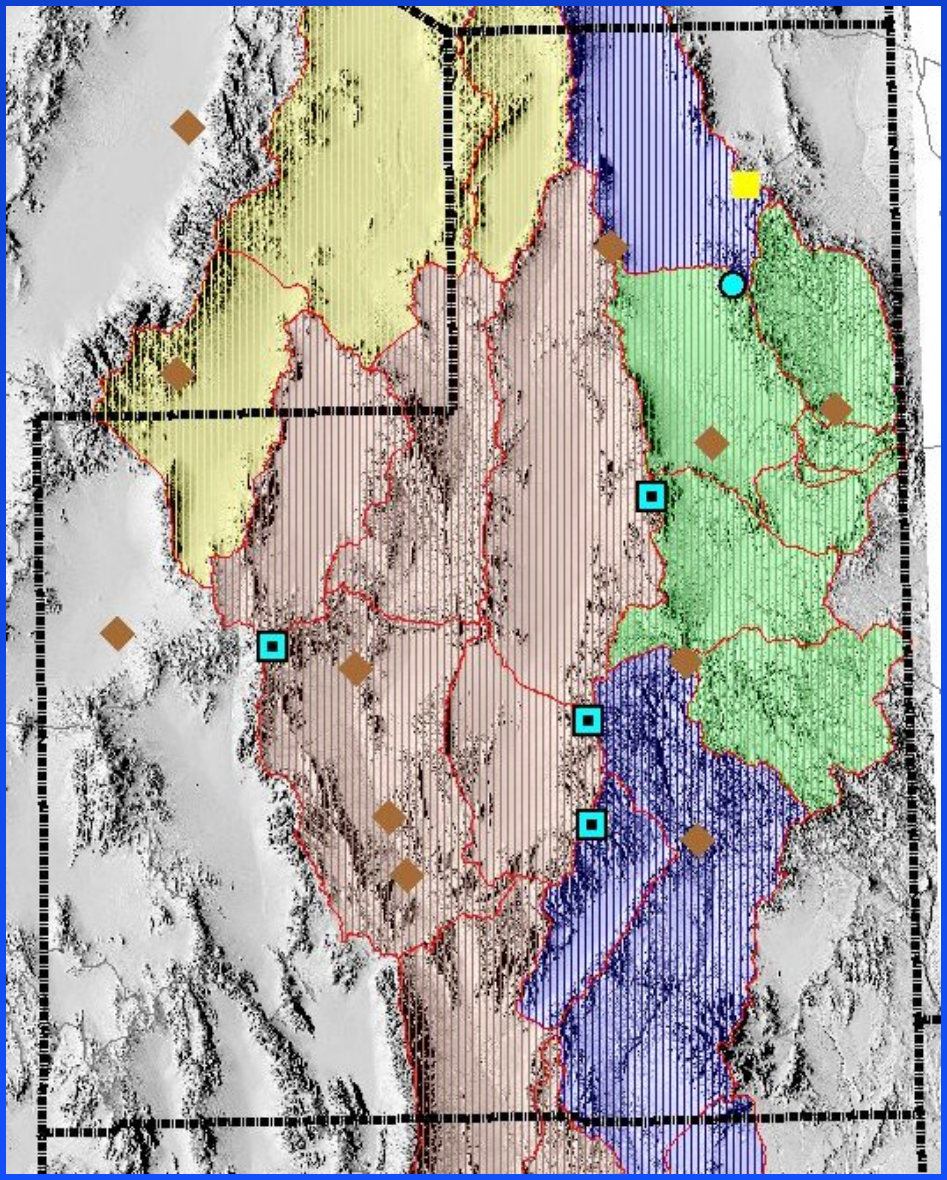
Newly installed USGS precipitation gages in Lincoln County



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Precipitation Estimation Technique

- Identify local altitude - precipitation relationships
- Geographic groupings
- Linear regression

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Alternative Precipitation Estimation Methods

- Historic precipitation maps
- Vegetation mapping
  - Field mapping
  - Satellite imagery
- Recent precipitation maps
  - PRISM

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Estimation of Natural Recharge

Part 2 - recharge

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“Standard” Maxey-Eakin Assumptions

Table 4-4. "Standard" Maxey-Eakin assumptions.

Precipitation Zone (in.)	Altitude Zone (ft.)	Average Annual Precipitation (ft.)	Recharge Efficiency (%)
< 8	< 6,000	Variable	Negligible
8 to 12	6,000 to 7,000	0.83	3
12 to 15	7,000 to 8,000	1.12	7
15 to 20	8,000 to 9,000	1.46	15
> 20	> 9,000	1.75	25

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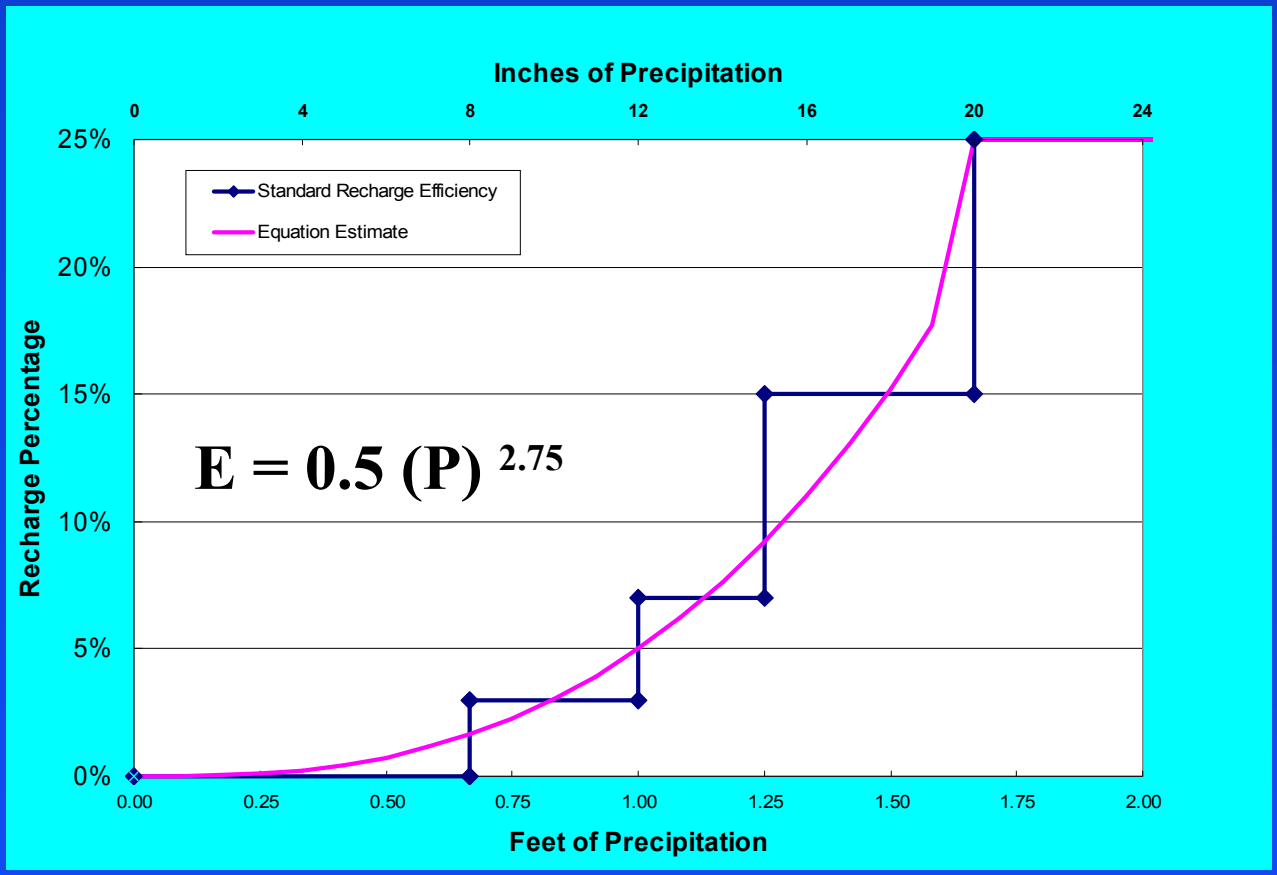
Natural Recharge Calculation Method



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Modified Maxey-Eakin

- New technology
  - GIS, DEMS, satellite imagery, slope aspect, metric maps
- Old technology
  - planemeters, standard maps, adding machines

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Increase in recharge estimates

- Primarily related to increase in precipitation estimate

- Efficiency equation developed to minimize hand calculation errors and compare precipitation maps with differing intervals

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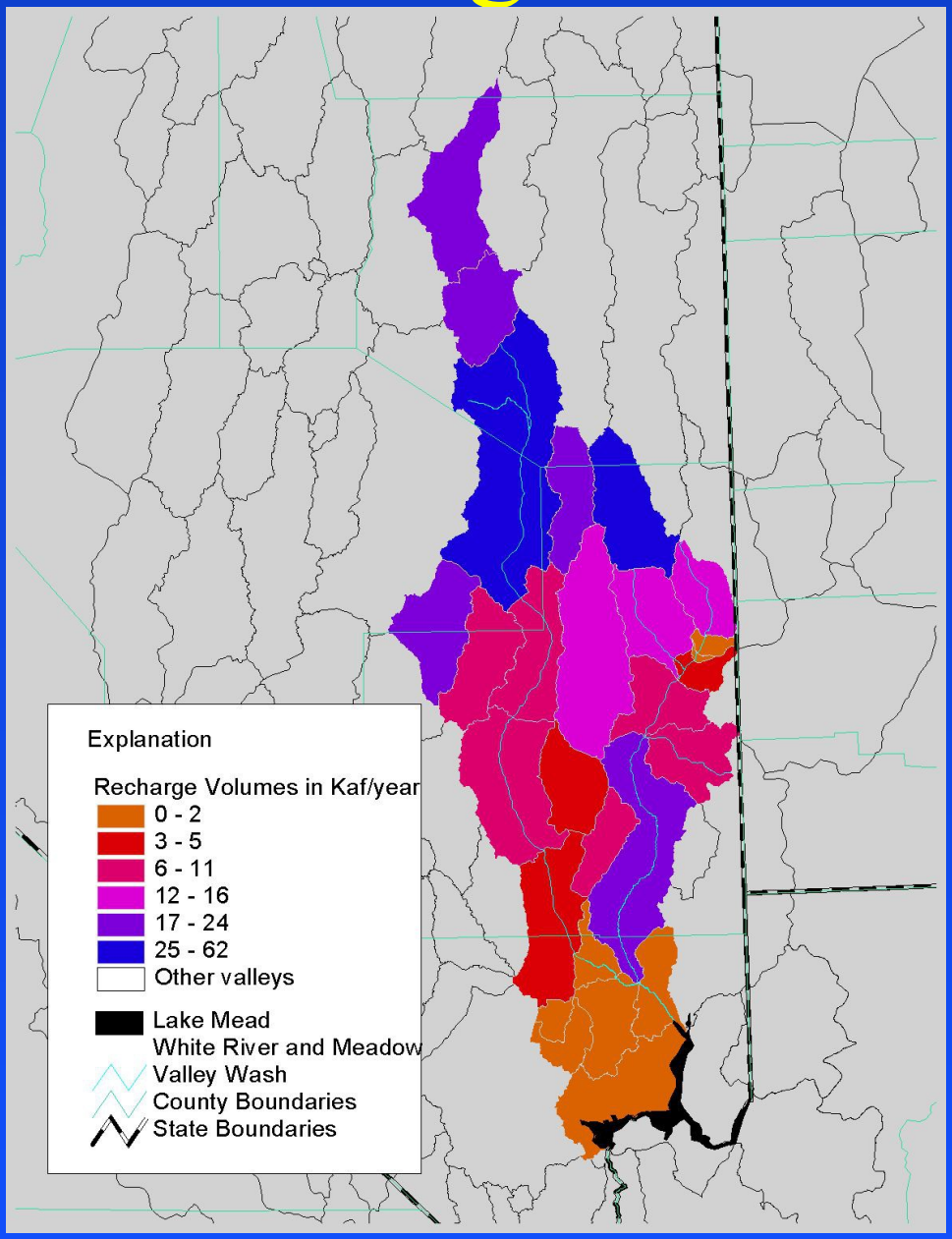
Recharge Areas



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Discharge and Flow Routing

- Review use rates and areal destinies of pheatophytes
- Estimate use
- Route interbasin flow through system

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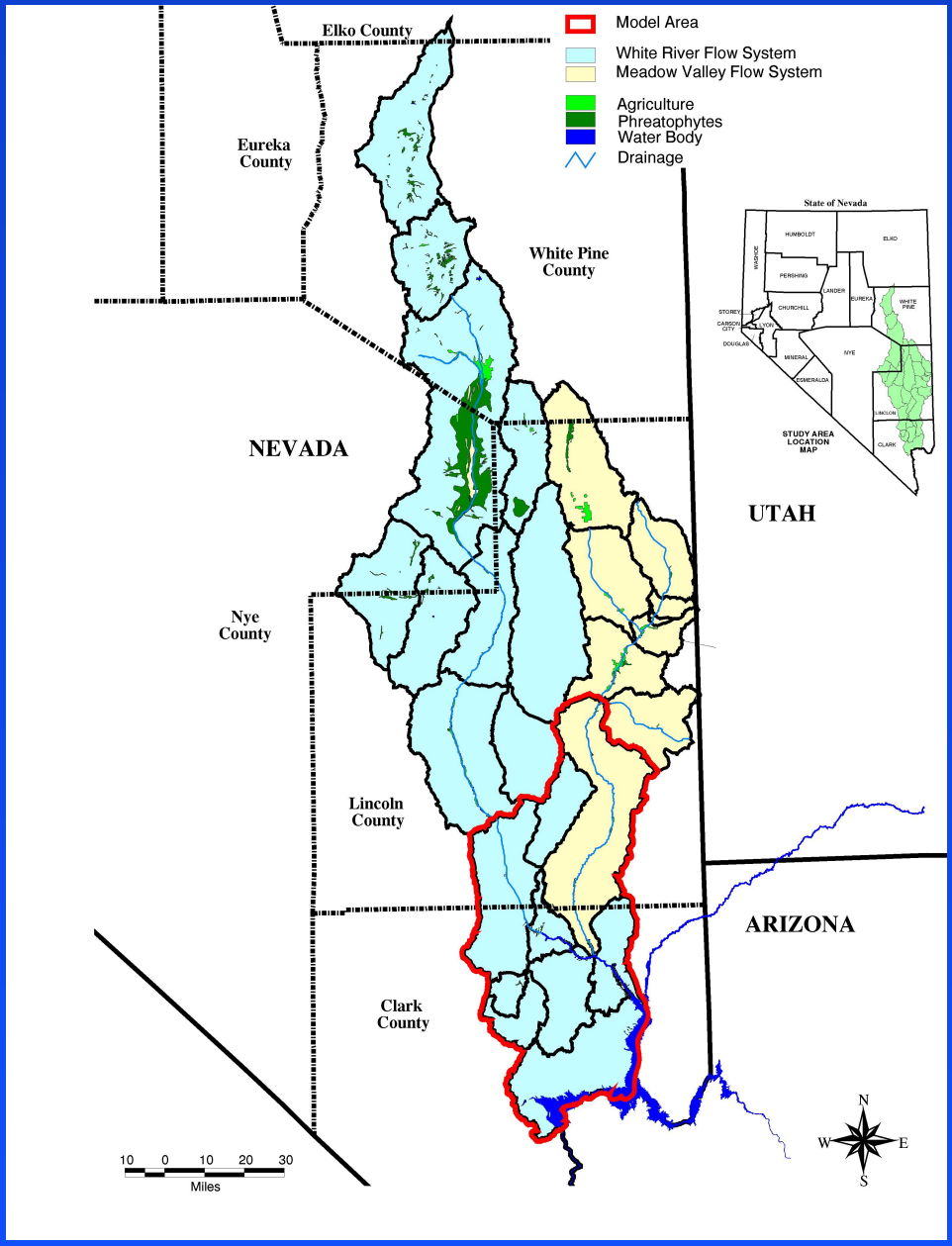
ET Discharge Areas



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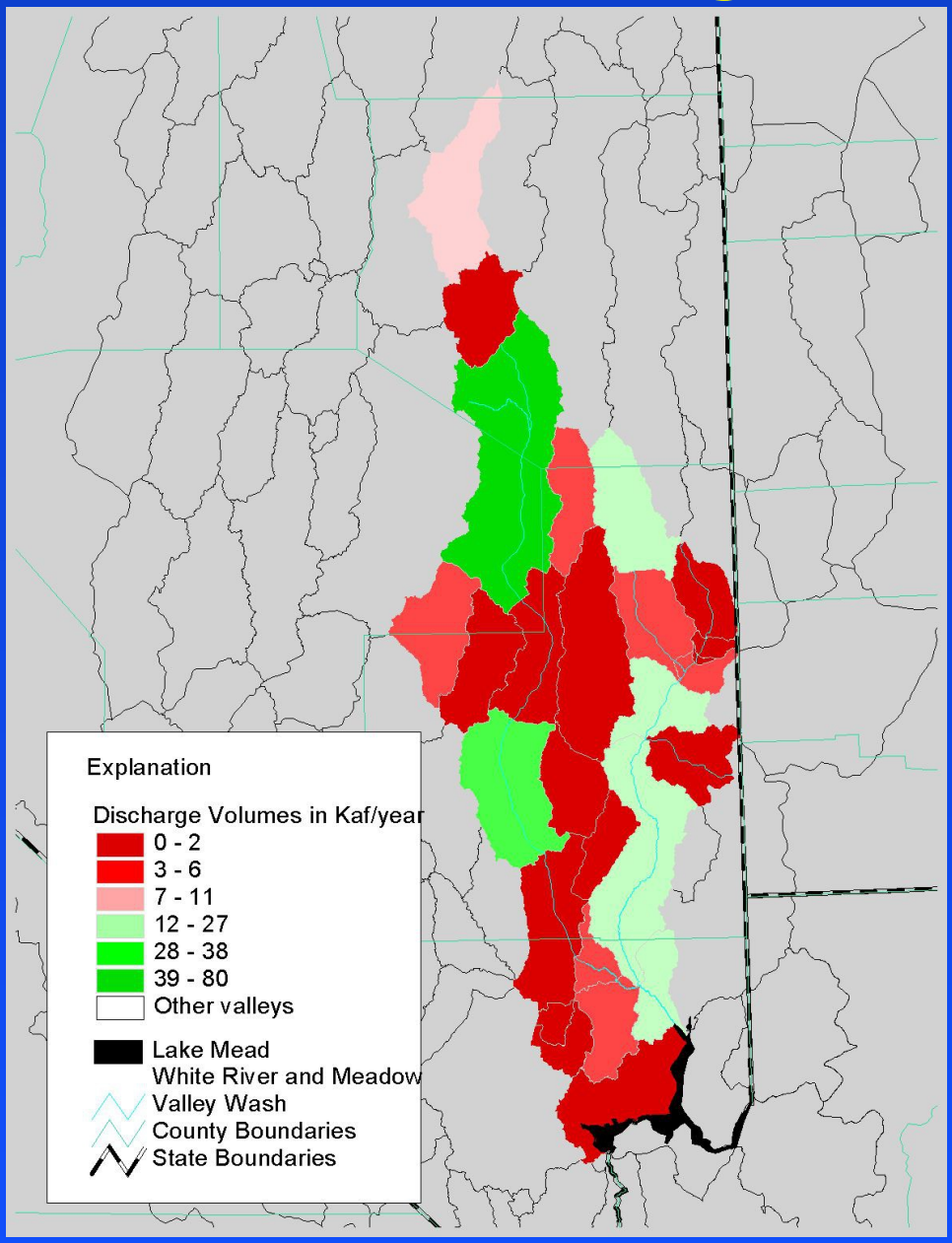
ET Discharge



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Major springs - south part

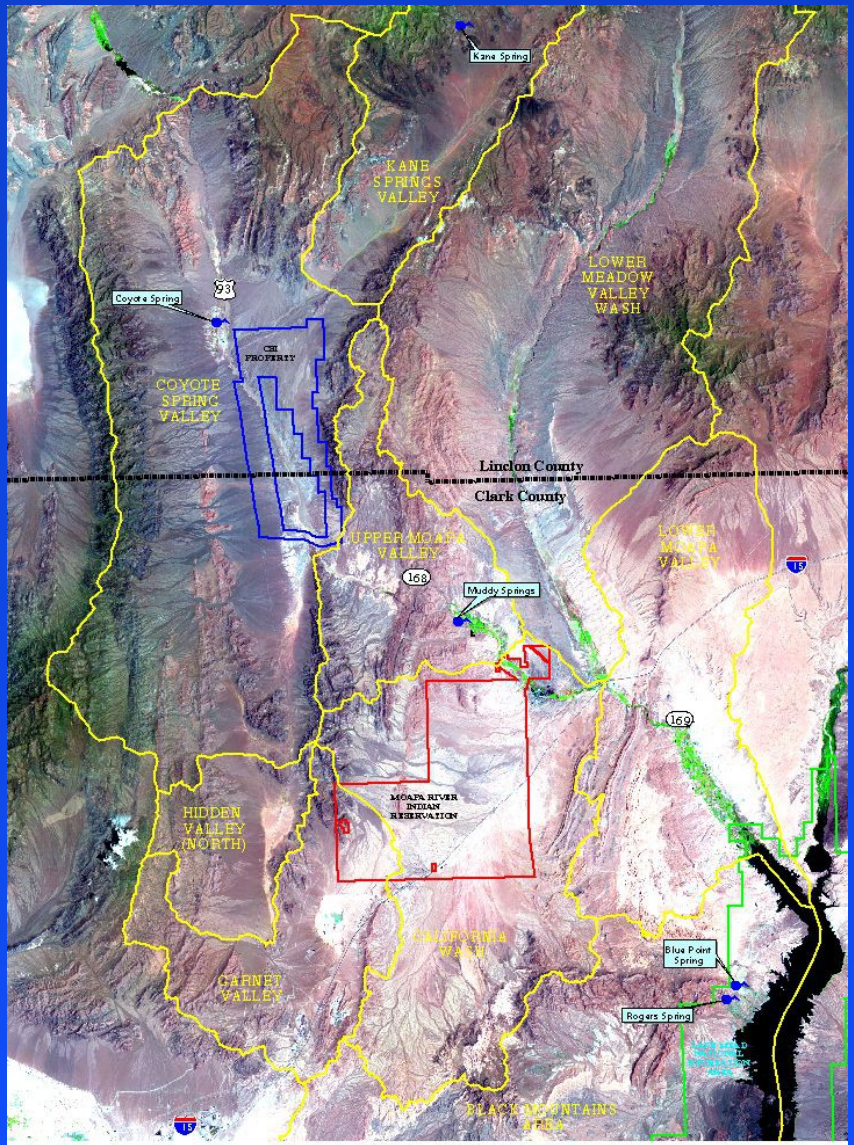

Figure 4-11. Locations of spring flow in the model area.

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Flow Routing Map

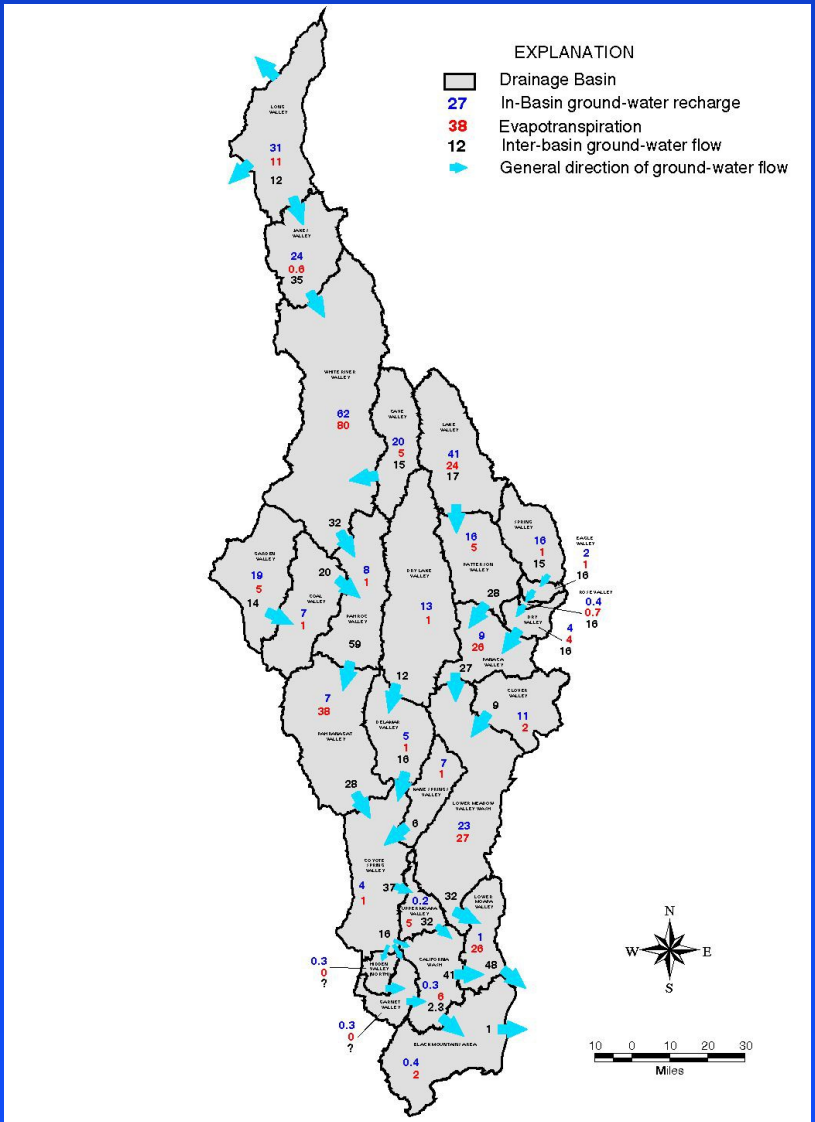

Figure 6-1. Generalized ground-water recharge, evapotranspiration, and inter-basin flow of the White River and Meadow Valley Flow Systems, units in thousands of acre-feet per year.

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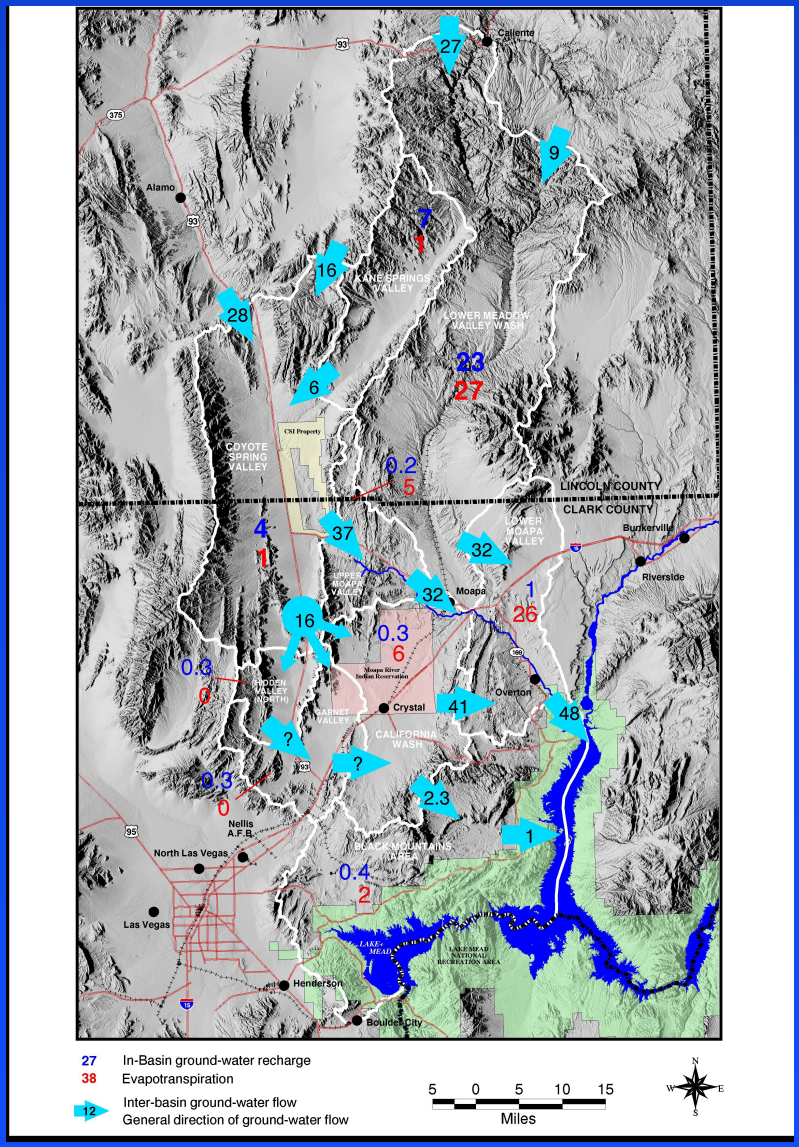
Flow Routing - South Part



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Summary

- Recharge about 5% of total precipitation volume
- Total recharge ~ 324,000 afy
- Most discharge is ET
- Model area recharge ~ 37,000 afy
- Residual outflow about 50,000 afy

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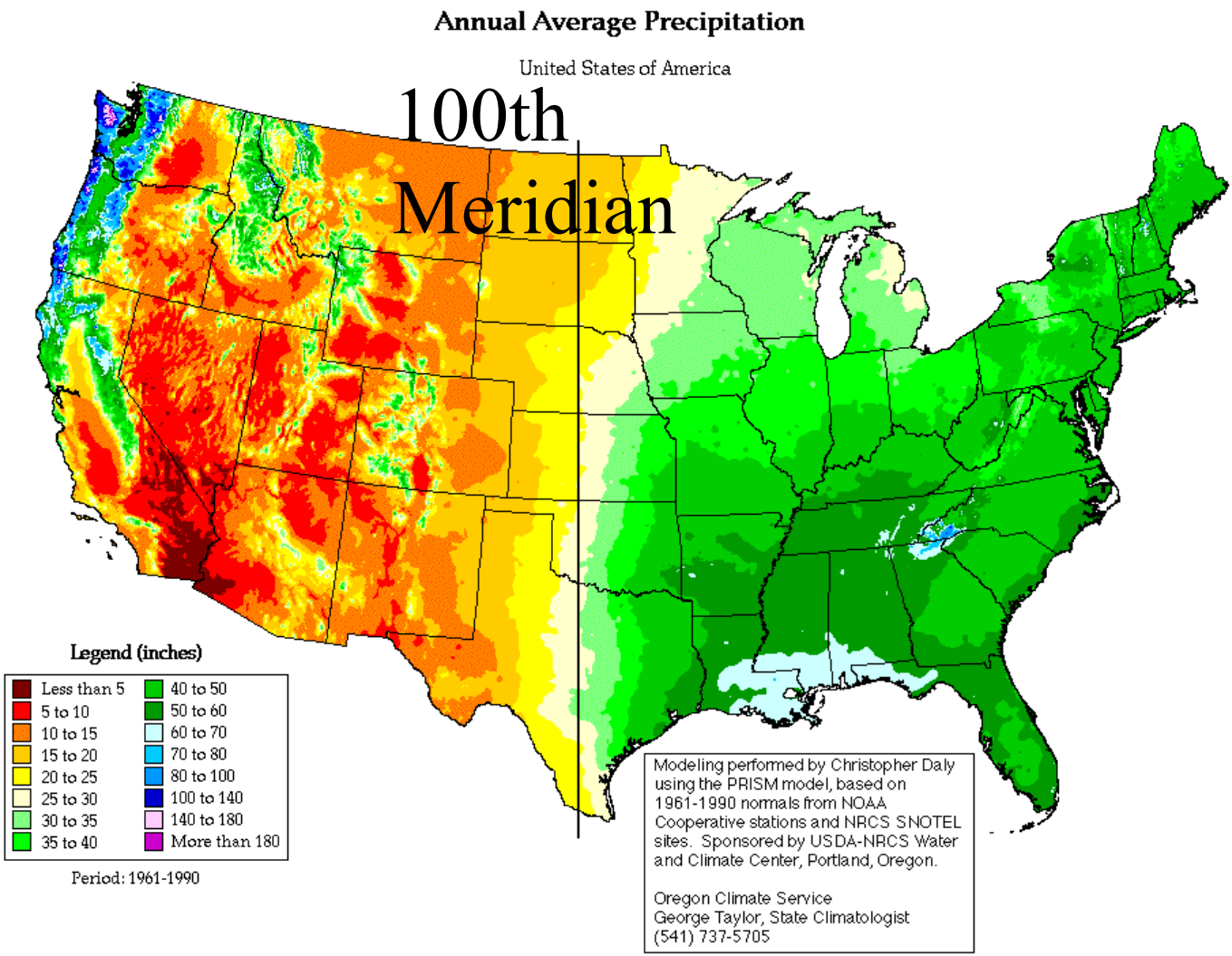

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