Recharge and Discharge in Tikaboo and Three Lakes Valleys

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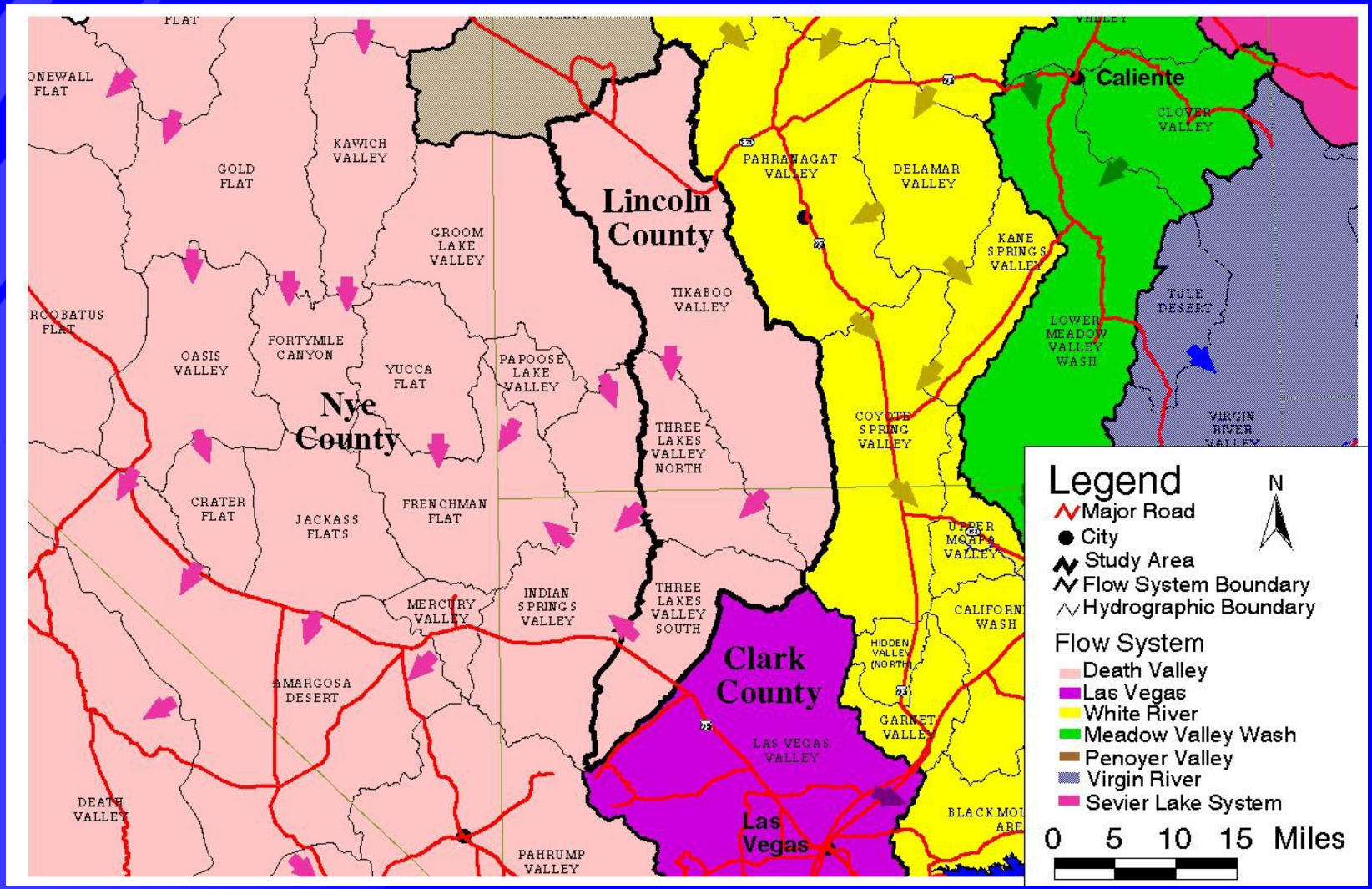
Location Map



Location

- South central part of carbonate terrain
- Easternmost part of DVFS
- Tikaboo and TLN mostly in Lincoln County
- TLS in Clark County adjacent to LVV
- Most of area located within the Desert National Wildlife Refuge (DNWR)

Recharge and Discharge

- Source of Natural Recharge is Precipitation

- Discharge is by Interbasin Flow
  - Most researchers believe these valleys are part of Death Valley Flow System
  - No ET area within the valleys
  - Ground water is > 100 ft below land surface

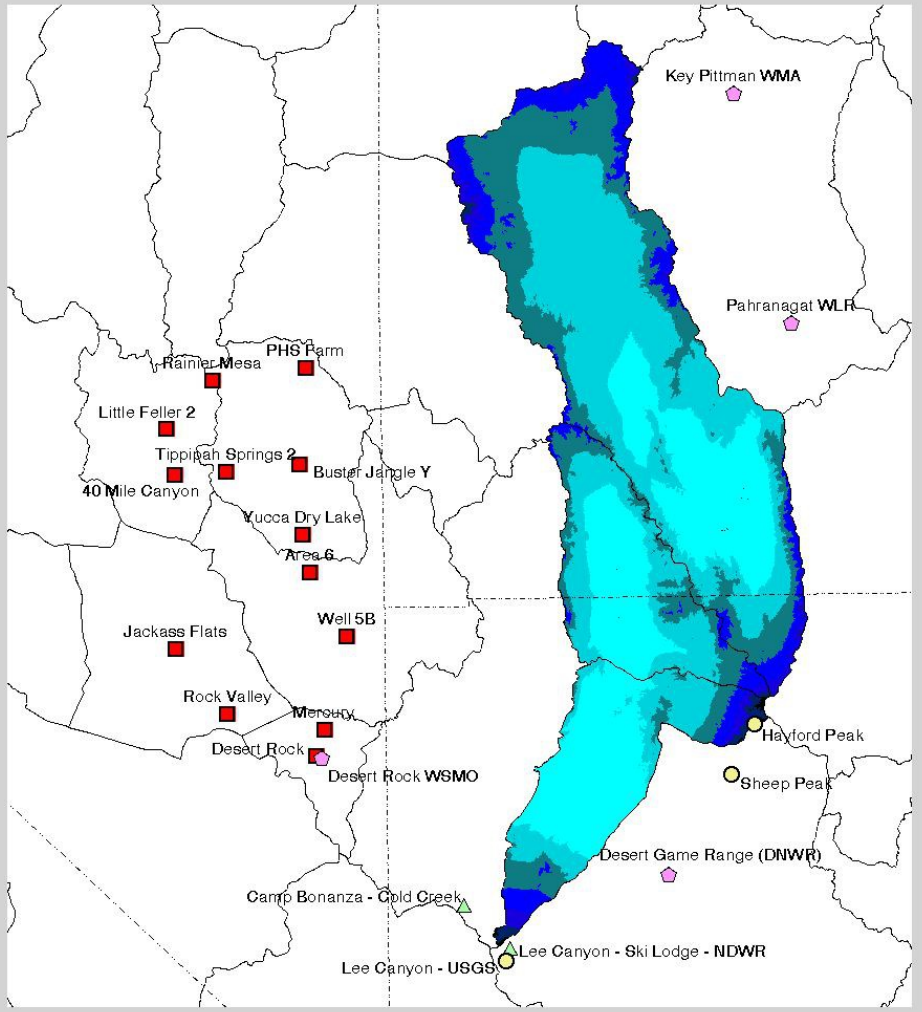
Precipitation and Recharge

- Estimates by method described in Donovan and Katzer (2000), LVVWD (2001), and Dixon and Katzer (2002)
- Method is a refined Maxey-Eakin technique designed to use current technology
- Precipitation estimated from altitude-precipitation relationship curve

Precipitation Estimate Process

- Identify and collect historic precipitation data
  - Prior analysis of this type used the following gage data: USGS high altitude, NDWR mid altitude, and WRCC database (usually low altitude)
  - This analysis also used “SORD” / NOAA data from the NTS

Precipitation Sites



Precipitation Gages by Source

- Nevada Department of Water Resources (NDWR)
- Special Operations Research Division (SORD)
- U.S. Geological Survey (USGS)
- Western Regional Climate Center (WRCC)

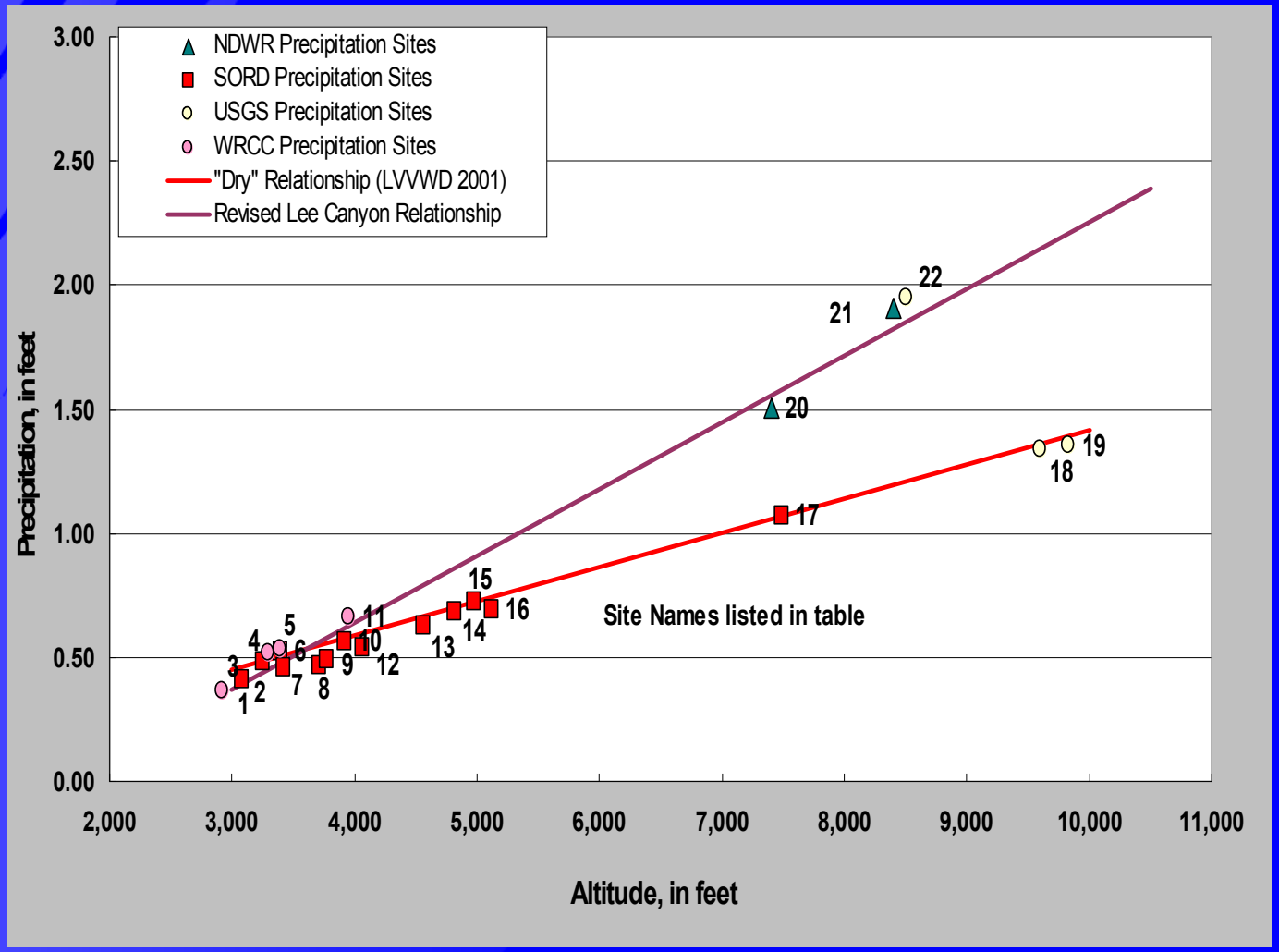
Alititude (feet) Above Mean Sea Level

- 3000 - 4000
- 4000 - 5000
- 5000 - 6000
- 6000 - 7000
- 7000 - 8000
- 8000 - 9000
- 9000 - 10000
- 10000 - 11000

Precipitation Observations

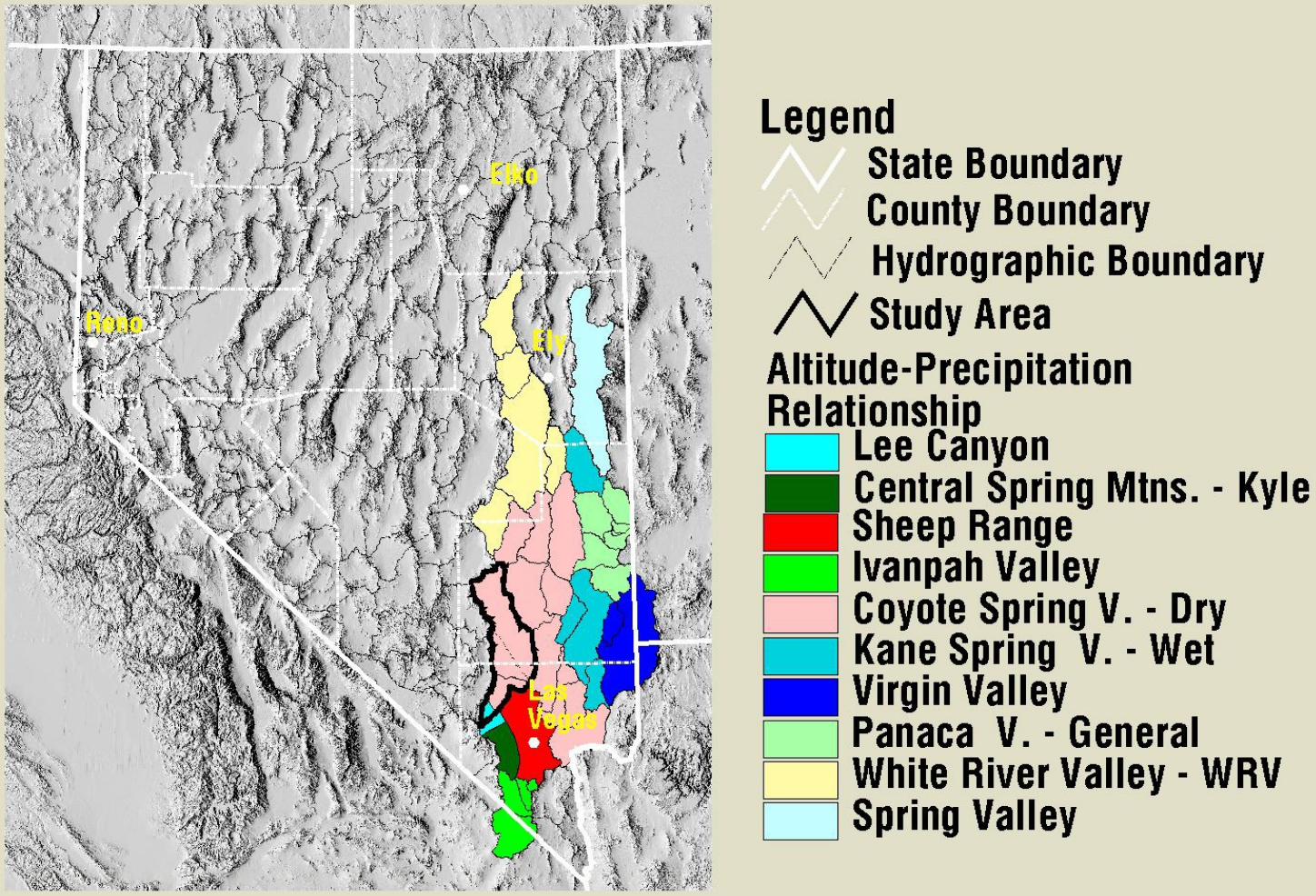
- No data within basins of interest
- Basins are adjacent to “Dry” a.k.a. “Coyote Spring” altitude-precipitation relationship of LVVWD (2001) and “Lee Canyon” of Donovan and Katzer (2000)
- “SORD” data appears to be well described by the “Dry” relationship
- No new relationship required

Altitude-Precipitation Relationships – for this study



Site #	Site Name
1	Desert Game Range (DNWR)
2	Well 5B
3	Desert Rock
4	Desert Rock WSMO
5	Rock Valley
6	Pahranagat WLR
7	Jackass Flats
8	Area 6
9	Mercury
10	Yucca Dry Lake
11	Key Pittman WMA
12	Buster Jangle Y
13	PHS Farm
14	40 Mile Canyon
15	Tippipah Springs 2
16	Little Feller 2
17	Rainier Mesa
18	Sheep Peak
19	Hayford Peak
20	Cold Creek
21	Lee Canyon - NDWR
22	Lee Canyon - USGS

Altitude – Precipitation Relationships - previously defined



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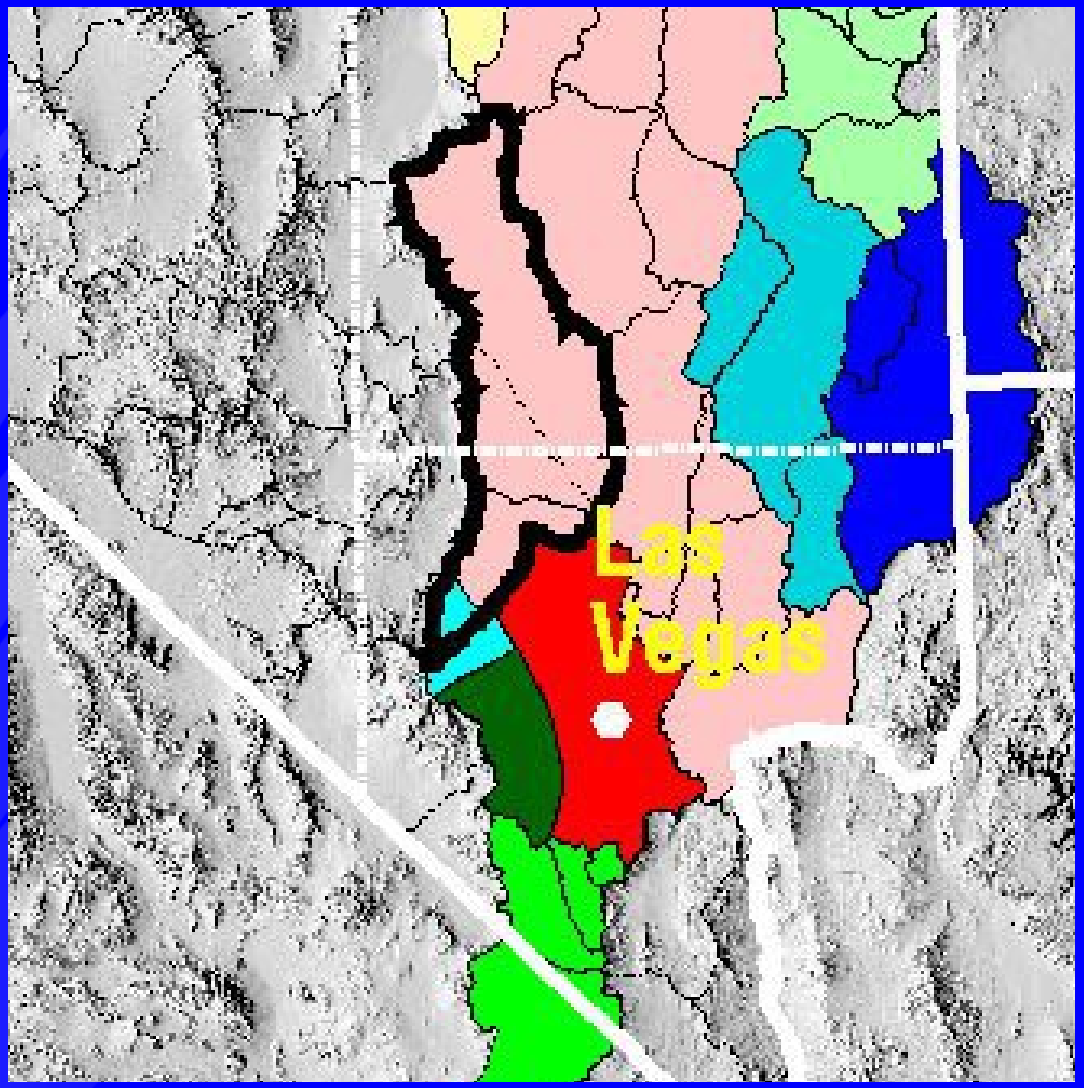
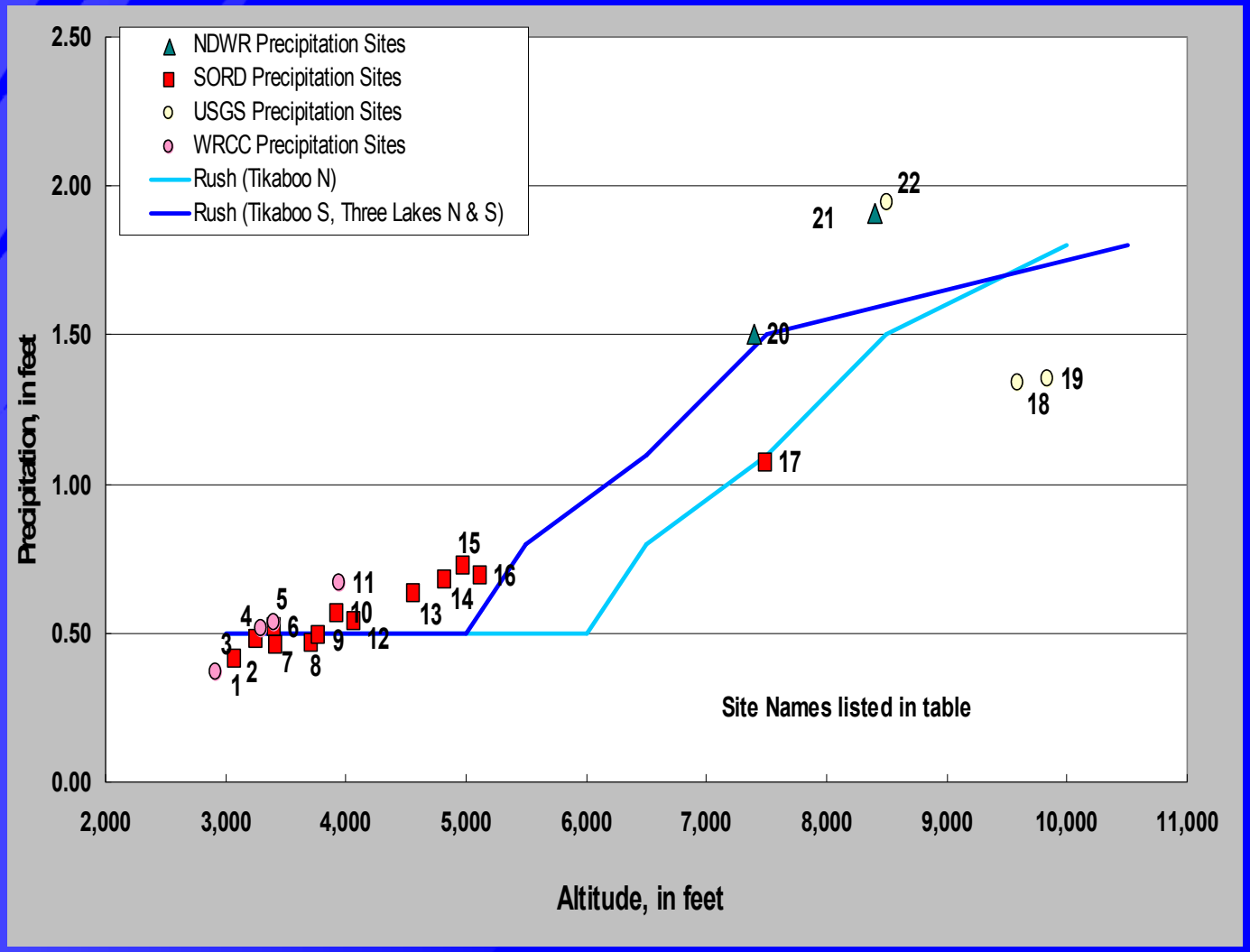


Altitude-Precipitation Relationships - original Maxey-Eakin estimate



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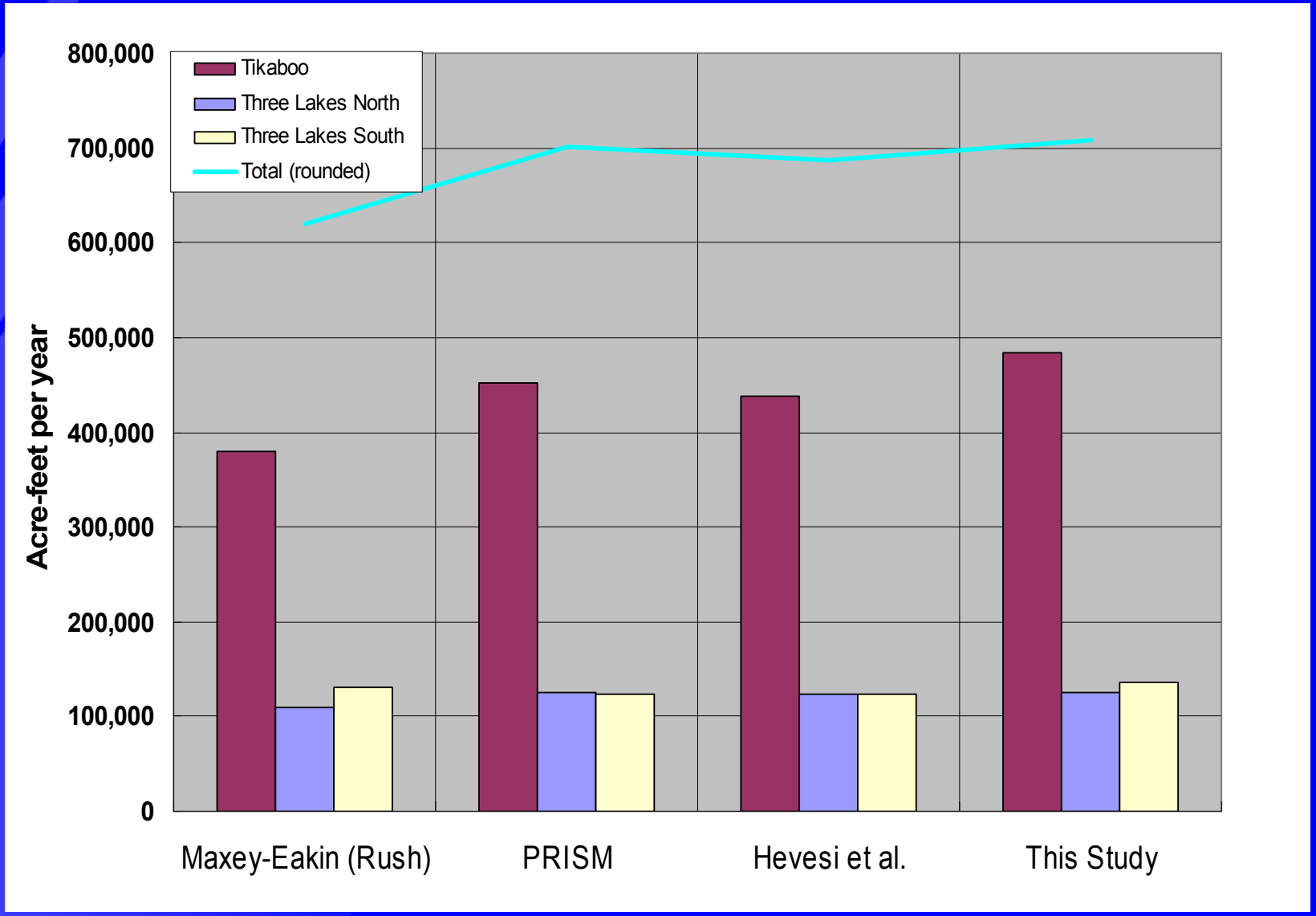
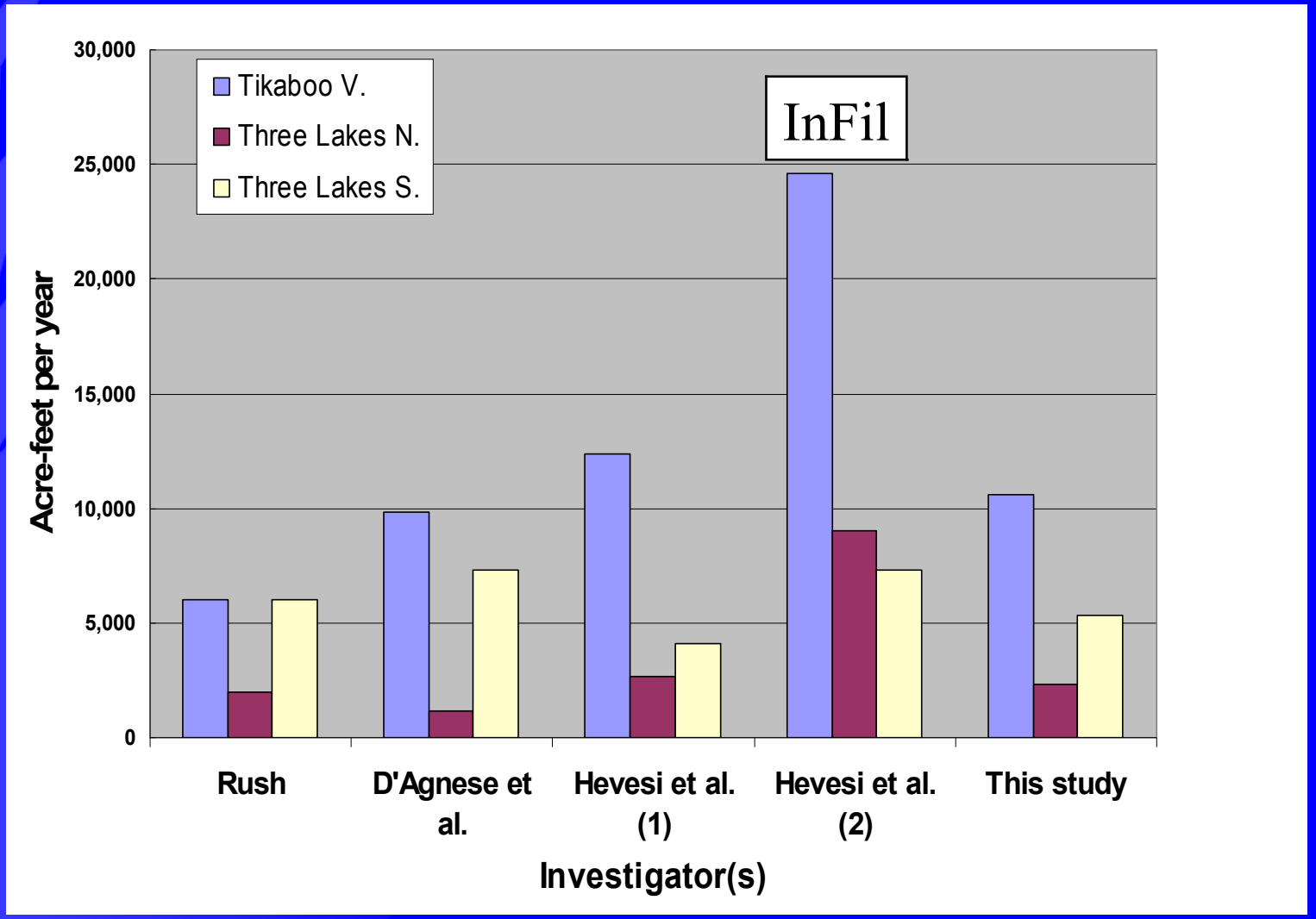
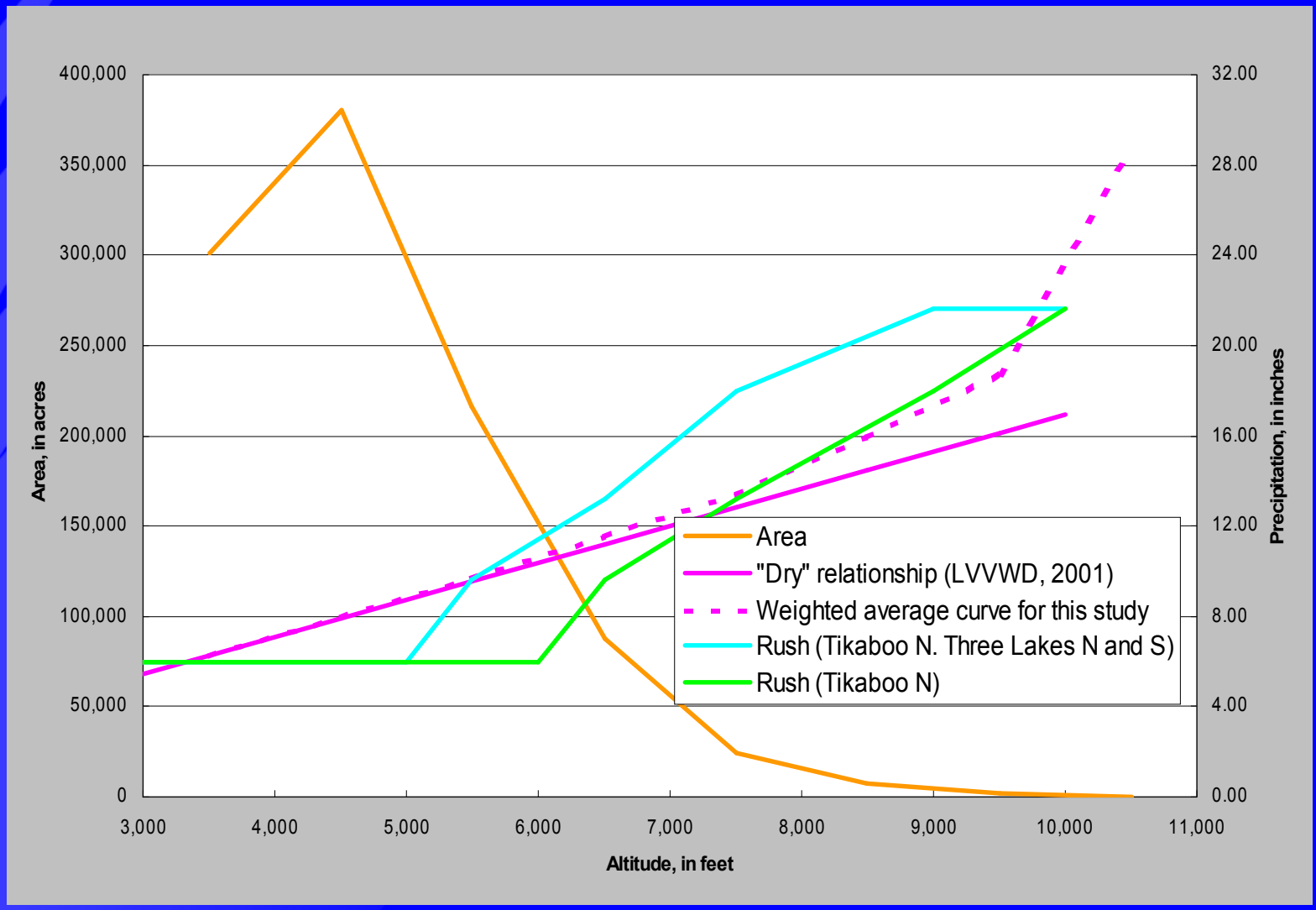
Comparison of Precipitation Estimates



Comparison of Recharge Estimates



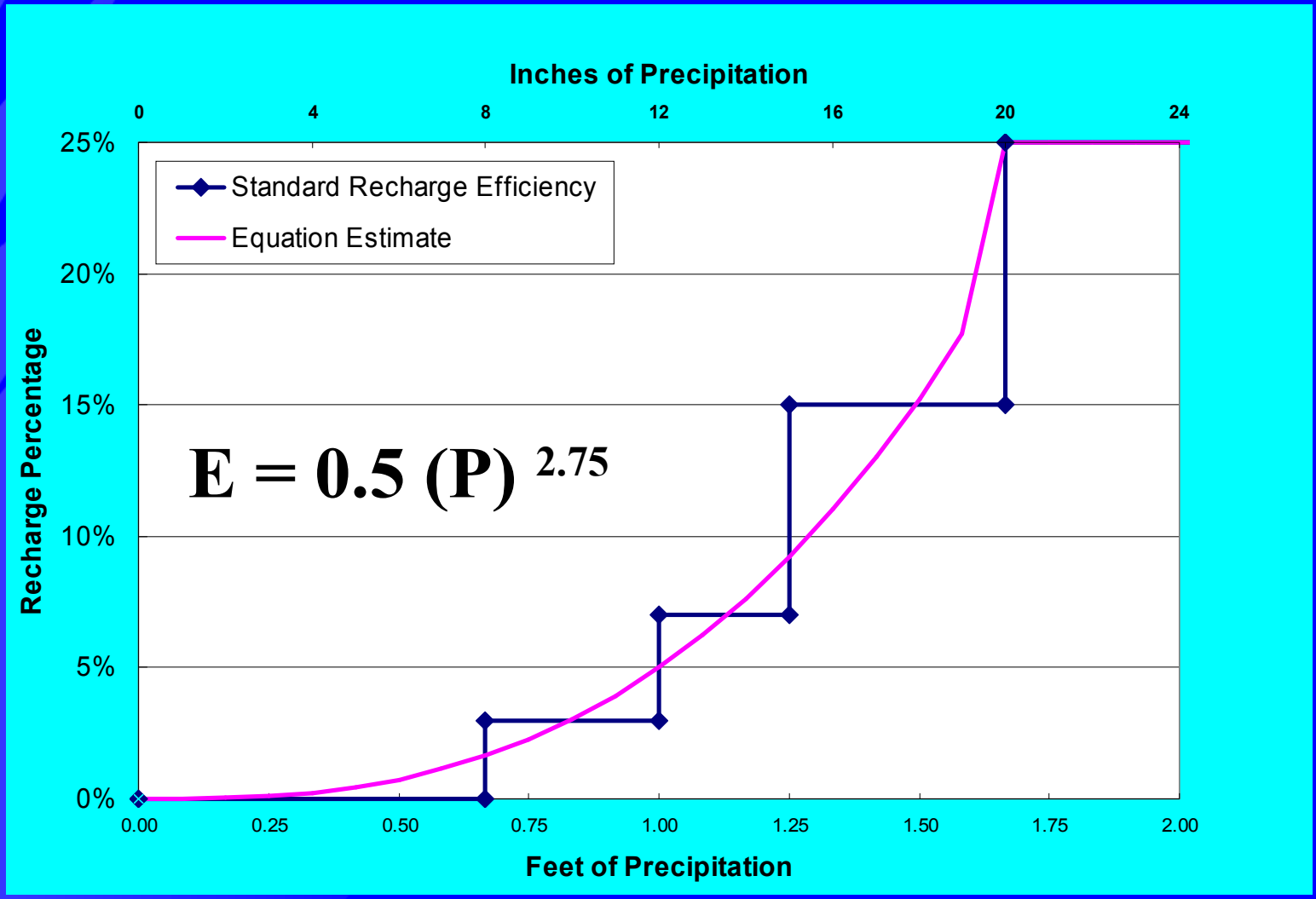
Altitude - Area



"Standard" Maxey-Eakin Assumptions Bulletin 33 - Eakin (1966)

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

Natural Recharge Calculation Method

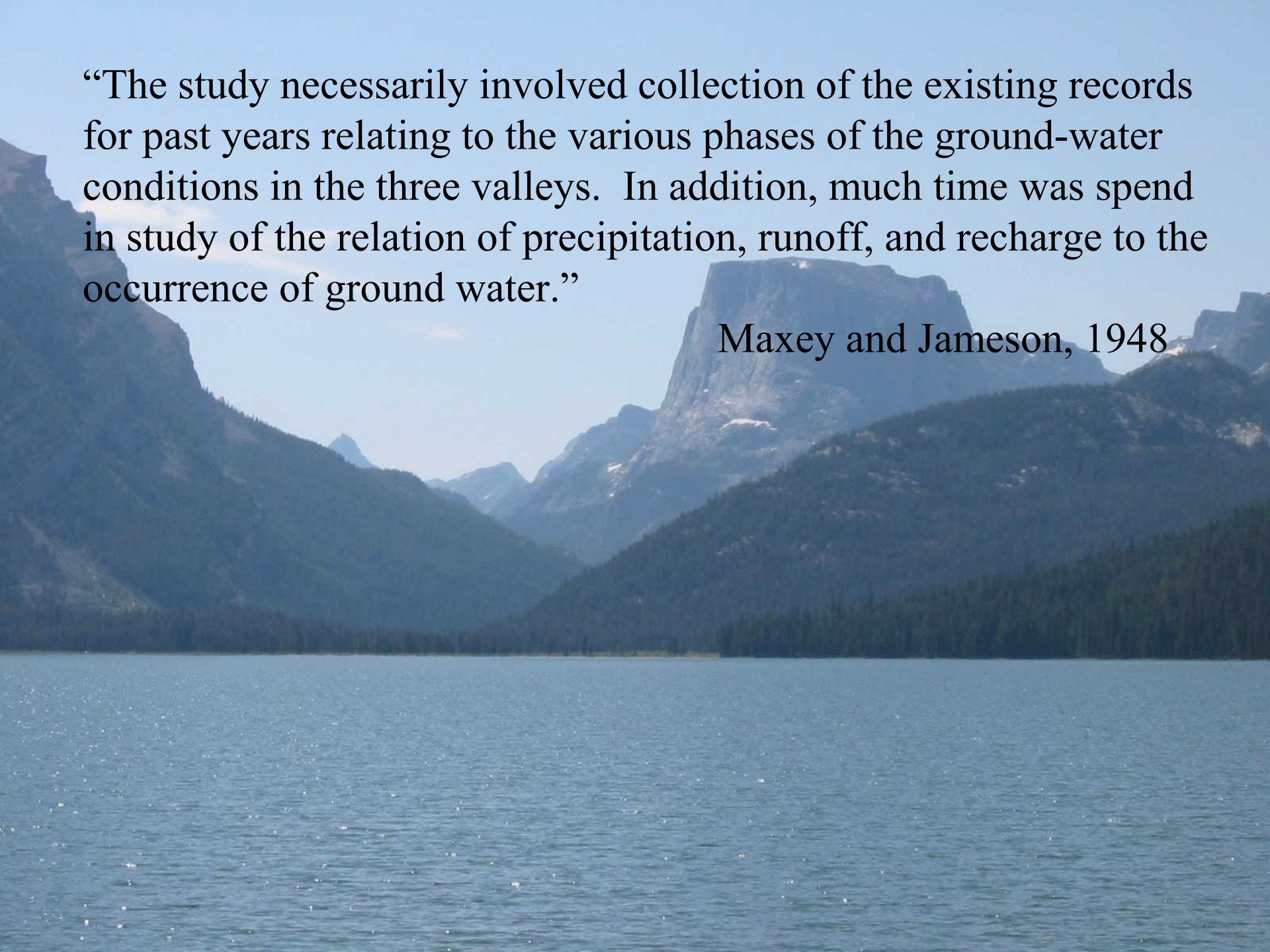


Precipitation and Recharge Estimates

- Compared to other estimates
- Independent discharge estimate not available (underflow)
- Precipitation estimate largest but similar to others
- Recharge estimate similar to recent re-estimates for DVFS

Discharge

- Discharge is by Interbasin Flow
  - Most researchers believe these valleys are part of Death Valley Flow System
  - Ground water is > 100 ft below land surface
  - No ET areas within the valleys



"The study necessarily involved collection of the existing records for past years relating to the various phases of the ground-water conditions in the three valleys. In addition, much time was spend in study of the relation of precipitation, runoff, and recharge to the occurrence of ground water."

Maxey and Jameson, 1948