reported by Bixby and Hardman (1928) (4.5 inches per 1,000 feet of altitude rise) but rather approximately 1.8 inches per 1,000 feet **(Figure 4-2)** of altitude rise. This altitude-precipitation relationship also appears to apply over the entire range of altitude.

This is a very different conclusion than would be expected from the Hardman (1936, 1965) or NDWR (1971) precipitation maps. This implies all of the acreage above 6,000 feet of altitude (36 percent) and 5,000 feet (66 percent) and potentially all of the acreage above 4,000 feet (78 percent) may receive "effective" precipitation that at least partially becomes natural recharge.

This can also be demonstrated by comparing the composite altitude-precipitation relationships in the various precipitation maps with the actual precipitation data **(Figure 4-8)**. This is fairly simple when comparing the precipitation data with a Maxey-Eakin analysis (including the modified form used here), because the altitude-precipitation relationship used in a particular valley or region is clearly stated. When using a precipitation map this relationship can only be determined either by visual inspection (visually comparing the altitude intervals and precipitation intervals) or GIS analysis (combining two digital geographic data sets, then determining the numerical relationship between them, typically by weighted averages). The curves determined by GIS analysis of the two precipitation maps (NDWR 1971) and PRISM are presented on **Figure 4-8** for comparative purposes and were created using standard GIS processing techniques. The GIS technique was preferred over visual inspection because it is reproducible.

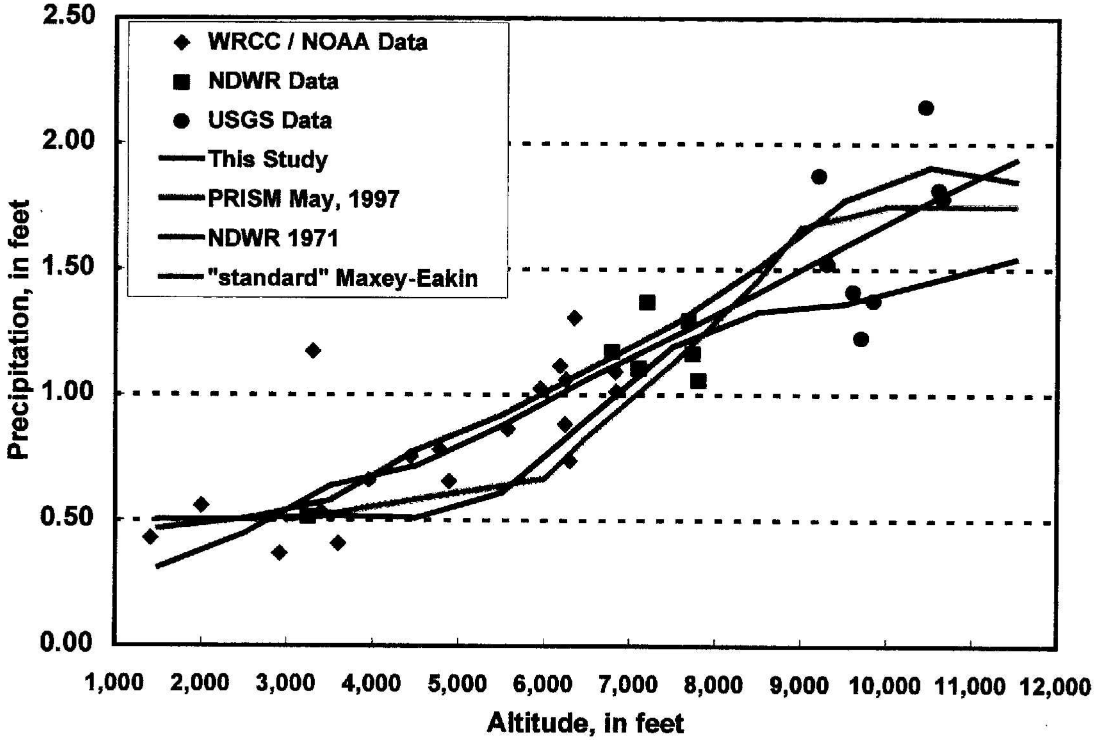

Figure 4-8. Composite altitude-precipitation relationships compared to gage data.

The line presented as "This study" is a weighted average line influenced by the relative size and altitude of the regions where the four altitude-precipitation relationships were used and was