

APPENDIX A

PRECIPITATION IN THE UPPER SNOQUALMIE RIVER BASIN

1.0 DATA SUMMARY

Precipitation data for the upper Snoqualmie Valley are available from a National Weather Service weather station near Snoqualmie Falls. Precipitation data have been collected at this station from 1920 to the present and are available at: www.ncdc.noaa.gov/oa/climate/stationlocator.html.

Additional precipitation data were collected at a rain gauge that the East King County Regional Water Association installed on Grouse Ridge, near the Fire Training Academy. Precipitation data at this gauge were collected from 1995 to 2007. An electronic data logger was installed in the Grouse Ridge gauge in July 2005 to collect finer resolution data and allow for the determination of daily and monthly precipitation totals.

1.1 Snoqualmie Falls

A summary of the annual precipitation record at Snoqualmie Falls is shown on Figures A-1 and A-2. Annual precipitation at Snoqualmie Falls ranged from 33.84 to 81.41 inches. The mean annual precipitation was 59.17 inches and the median annual precipitation was about 57 inches. Annual precipitation at Snoqualmie Falls was below the long-term mean every year between 2002 and 2006.

A summary of the monthly precipitation record at Snoqualmie Falls is shown on Figure A-3. Over 70 percent of the annual precipitation falls between October and March. November, December, and January are the wettest months of the year, with a mean monthly precipitation of about 8 inches per month. July and August are the driest months of the year, with monthly means of only 1.5 inches.

1.2 Grouse Ridge

The mean annual precipitation at Grouse Ridge was 86.10 inches, based on the years with a complete rainfall record (Figure A-4). Monthly precipitation at Grouse Ridge followed similar patterns as the Snoqualmie Falls gauge with approximately 70 percent of the annual precipitation falling between November and March (Figure A-5). For example, there was more than 20 inches of precipitation in both January and November of 2006. July and August were the driest months of the year with a mean of less than 2 inches of precipitation per month. The daily precipitation totals indicate that most of the precipitation falls during large storm events during the winter months (Figure A-6). For example, over 5.3 inches of precipitation fell on November 6, 2006.

1.3 Snoqualmie Basin Overview

The mean precipitation at Grouse Ridge was about 46 percent higher than the mean at Snoqualmie Falls. This is not surprising because precipitation generally increase with elevation and the Snoqualmie Falls rain gauge sits at 134 feet above mean sea level (msl) while the Grouse Ridge rain gauge sits at about 1,600 feet msl.

The general trend of increased precipitation with elevation is illustrated on a Parameter-elevation Regressions on Independent Slopes Model (PRISM) rainfall map of the upper Snoqualmie Basin. The map extends from Snoqualmie Falls to the upper watershed boundary (Figure 3-4). The PRISM model uses historical rainfall data and elevation models to predict distributed precipitation totals over large areas (Taylor, *et al.*, 1993). The PRISM data for the upper Snoqualmie Basin predicts that the mean annual precipitation at Snoqualmie Falls and Grouse Ridge is about 60 and 90 inches, respectively, which is similar to the observed data from these gauges. Further, the PRISM data

predicts a mean annual precipitation of 175 inches in the highest elevation portions of the basin, and an area-weighted mean annual precipitation throughout the upper Snoqualmie Basin of 98.62 inches.

2.0 REFERENCES

Taylor, G.H., C. Daly and W.P. Gibson. 1993. Development of an Isohyetal Analysis for Oregon Using the PRISM Model. *Engineering Hydrology: Proceedings of the Symposium*, Chin Y. Kuo, Eds., American Society of Civil Engineers, New York, NY, 121-125.

FIGURES

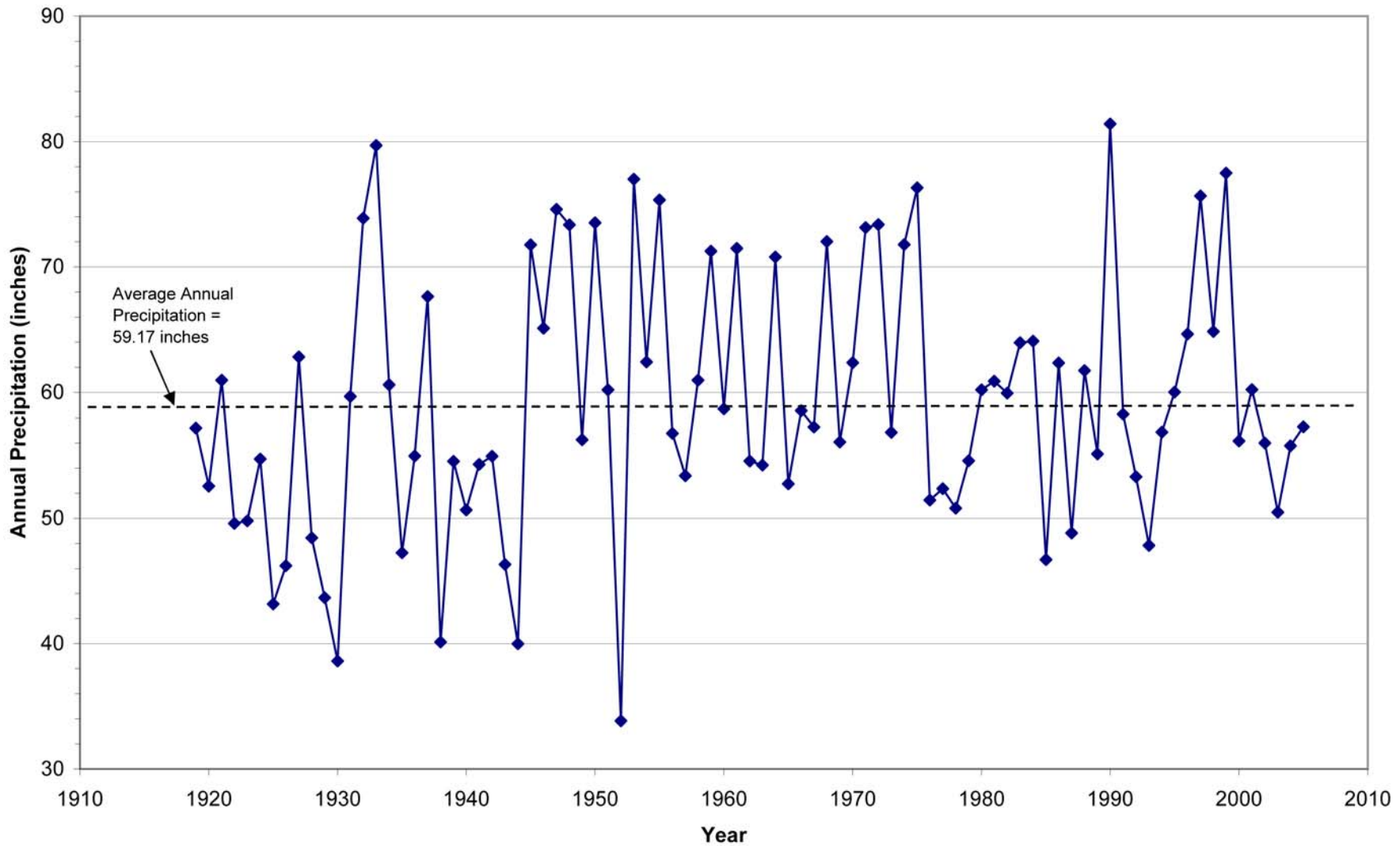


FIGURE **A-1**
ANNUAL PRECIPITATION AT SNOQUALMIE FALLS
 EAST KING CO. RWA/AQUIFER ENHANCE/WA

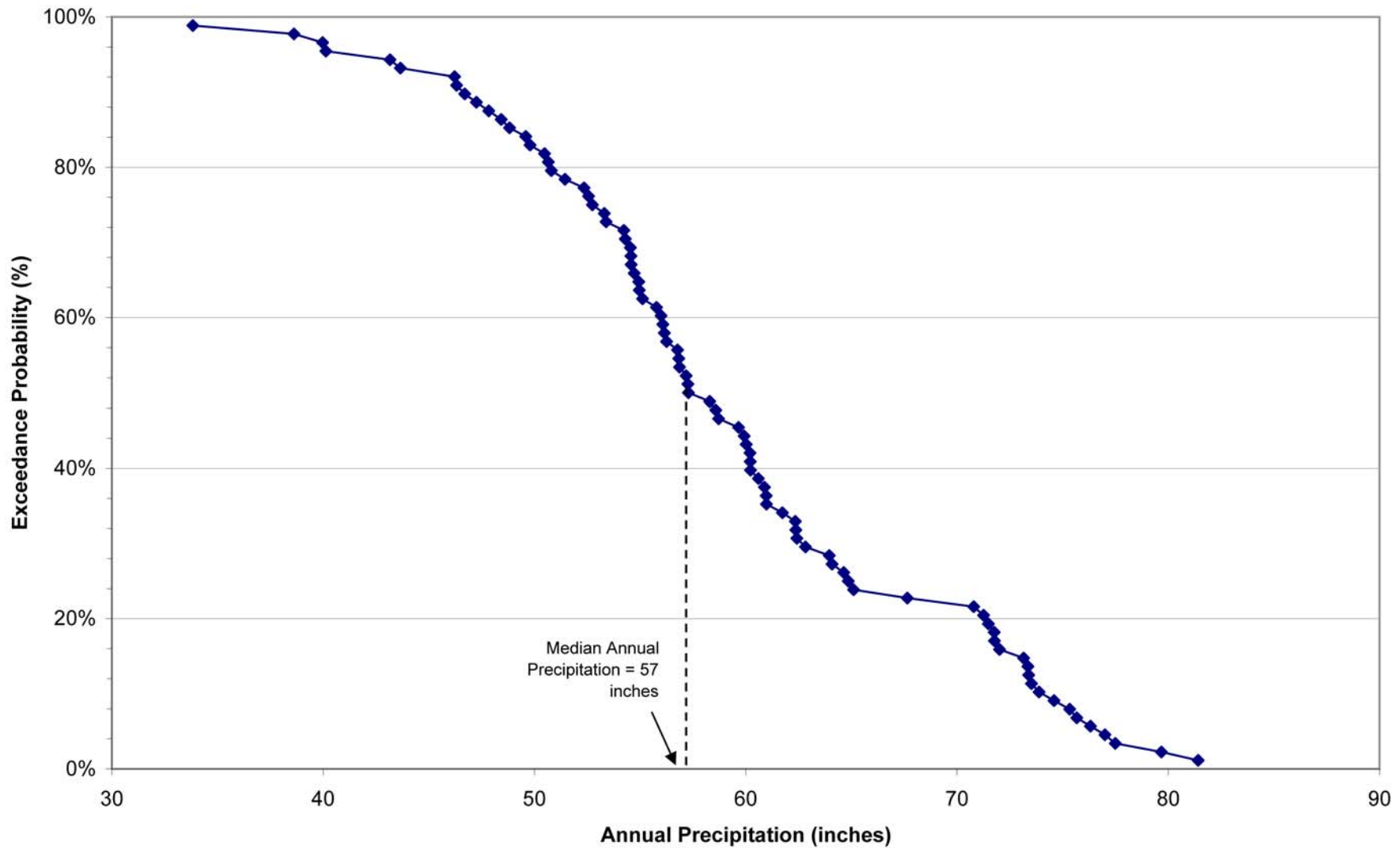


FIGURE **A-2**
ANNUAL PRECIPITATION EXCEEDANCE PROBABILITIES AT SNOQUALMIE FALLS
 EAST KING CO. RWA/AQUIFER ENHANCE/WA

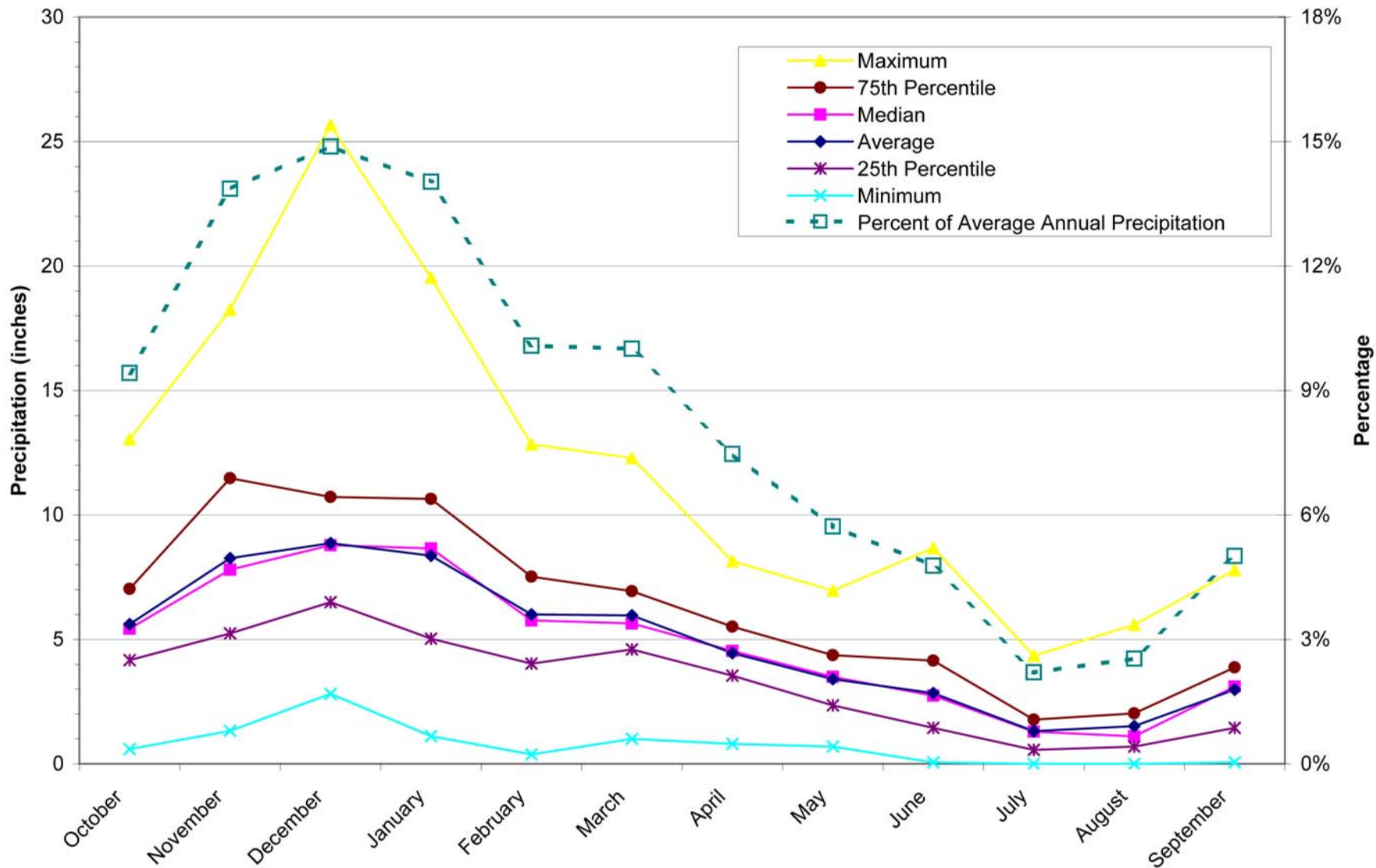


FIGURE **A-3**
MONTHLY PRECIPITATION STATISTICS AT SNOQUALMIE FALLS (1919-2006)
 EAST KING CO. RWA/AQUIFER ENHANCE/WA

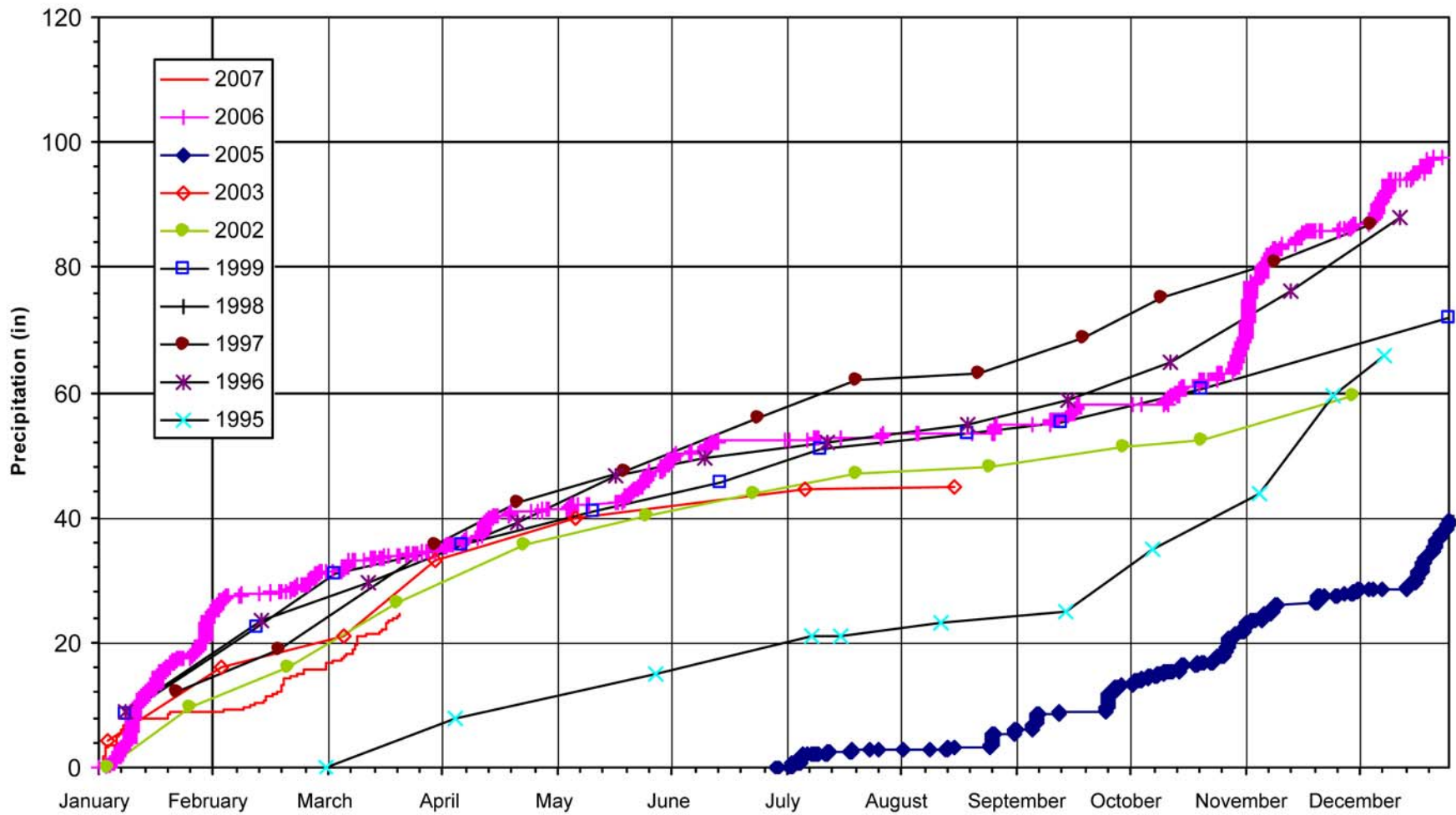


FIGURE **A-4**
CUMULATIVE ANNUAL PRECIPITATION (1995-2007) AT THE GROUSE RIDGE RAIN GAGE
 EAST KING CO. RWA/AQUIFER ENHANCE/WA

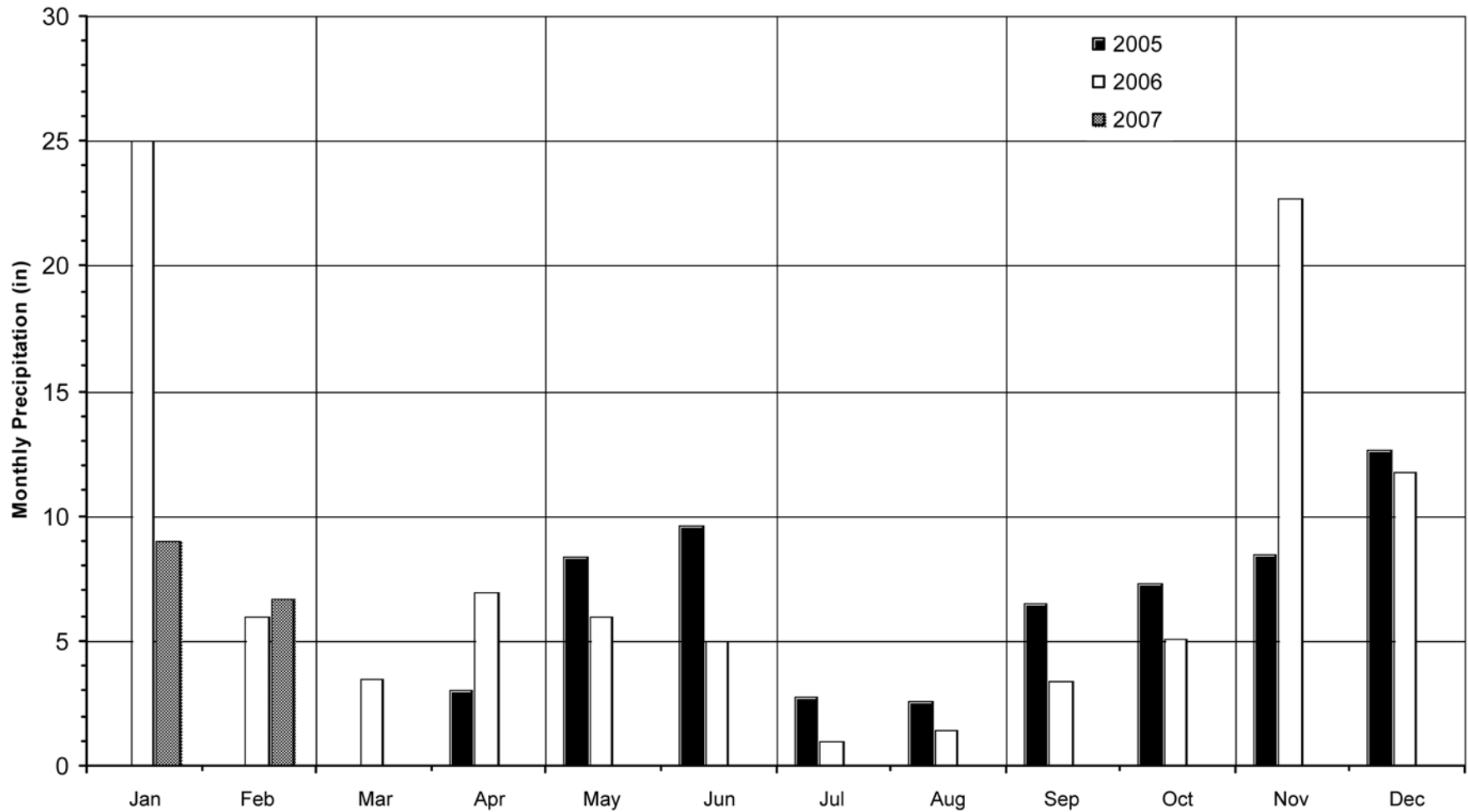


FIGURE **A-5**
MONTHLY PRECIPITATION (2005-2007) AT THE GROUSE RIDGE RAIN GAGE
 EAST KING CO. RWA/AQUIFER ENHANCE/WA

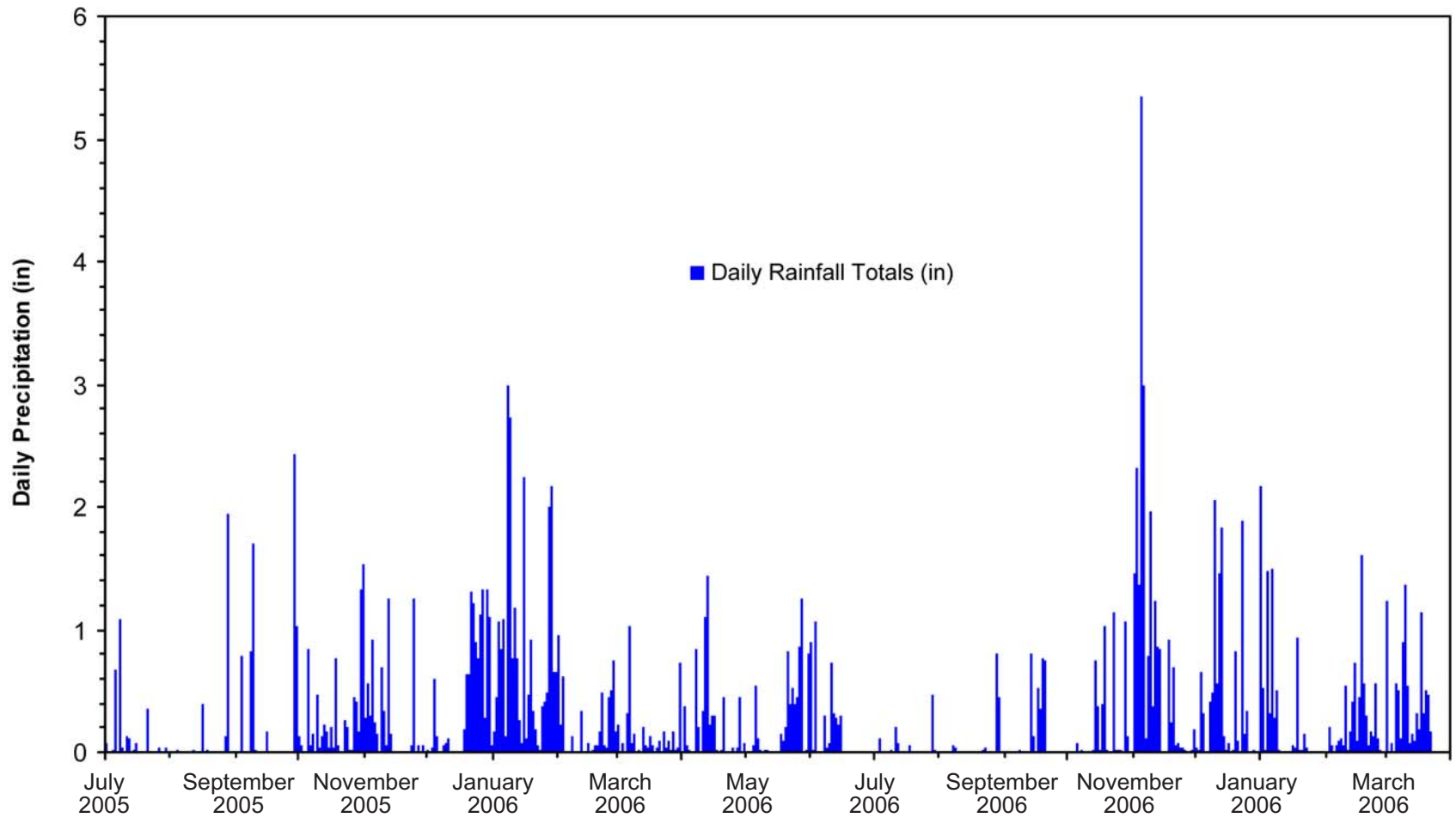


FIGURE **A-6**
DAILY PRECIPITATION (2005-2007) AT THE GROUSE RIDGE RAIN GAUGE
 EAST KING CO. RWA/AQUIFER ENHANCE/WA