Mean annual precipitation was used as the first basis for comparison. Observed basin average precipitation indicated a net basin-wide increase of about 10 per cent above estimates for surrounding non-orographic areas.

February, March and August were selected for estimating topographic effects on monthly rainfall volume. The larger basin was divided into three zones (Figure 3.19):

A: A zone of minimal topographic effects;
B: An orographic depletion zone;
C: An orographic intensification zone.

The average precipitation in zone A was used as a base. The mean precipitation for each of the three months indicated a net topographic depletion for the winter months based on the zone B decrease overcompensating for the orographic zone C increase.

A similar comparison based on the mean of seven unusually wet months selected from the January–April season in six different years showed no appreciable difference between precipitation in depletion zone B and that in intensification zone C.

Daily station rainfalls averaged over the Tennessee River basin above and below Chattanooga were used as an auxiliary indicator of net orographic effects. The area above Chattanooga can be likened topographically to zones B and C, and the area below to zone A (Figure 3.19). Comparison of the means of the series of monthly maximum daily averages showed a net deficit for the basin above Chattanooga.

Although mean annual precipitation indicated a modest orographic intensification, the more extreme precipitation data tended to negate such intensification. The net effects, if any, are apparently small and it was assumed that there was no net topographic effect on the volume of precipitation for the basin as a whole.

3.4.2.2 Derivation of PMP

About three dozen major storms scattered throughout the eastern half of the country were maximized, and generalized charts of PMP were prepared for south-eastern United States. It developed that March storms provided controlling PMP values for the basins, and a map of 24-hour 25 900 km^2 March PMP was drawn (Figure 3.20). The PMP value for the centre of the 20 668 km^2 sub-basin was then read from this map, and adjusted upward slightly, on the basis of depth–area relations of observed storms, for the difference in area size. The 24-hour March PMP for the sub-basin was thus determined to be 357 mm.

3.4.2.3 Seasonal variation

Study of outstanding storms of the region indicated that, for the basin sizes involved, a March storm would be more likely to produce PMP than would summer tropical storms. Thus, the seasonal variation curve was established with 100 per cent indicated for mid-March. Other precipitation data, such as wettest 7-day periods and months, rainfall-frequency data, and some unpublished generalized PMP estimates for 51 800 km^2 were used in setting the seasonal variation for the larger basin. Tropical storms, which

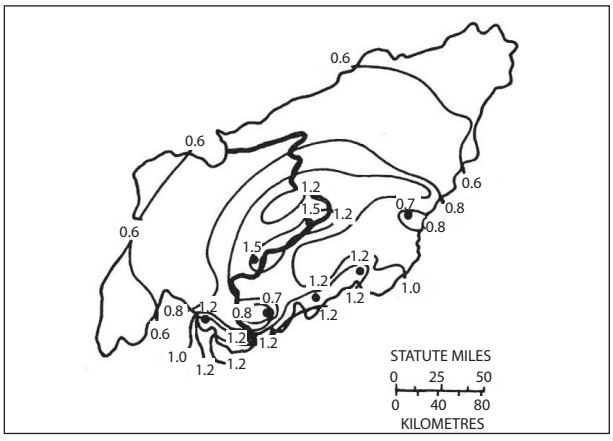

Figure 3.18. Typical orographic rainfall pattern for southwesterly winds. Isolines indicate ratios of orographic to non-orographic rainfall (Schwarz, 1965)

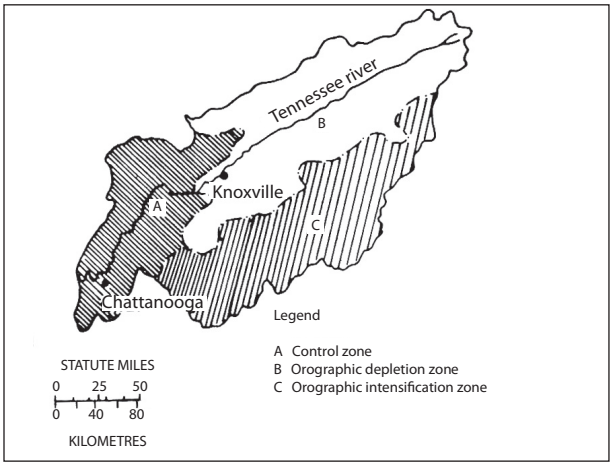

Figure 3.19. Basin subdivisions for check of topographic effects on basin-wide precipitation volume (Schwarz, 1963)