

Figure 5-18. The final generation of AnnAGNPS cells used for the Ward Creek watershed simulations.

Table 5-3. The TOPAGNPS critical source area (CSA) and minimum source channel length (MSCL) parameters used for each of the three regions defined for the final subdivision of the Ward Creek watershed into AnnAGNPS cells.

TOPAGNPS CSA and MSCL Region	CSA Parameter (hectares)	MSCL Parameter (meters)
1	25	75
2	10	40
3	5	20

5.2.4 Weather Data

Development of the Climate Database

All weather data was obtained from the nearest NRCS SNOTEL site and was assigned to each of the modeled watersheds (Figure 5-19). Each station was used to determine the individual event information describing measured precipitation and temperature for the years 1976-2002

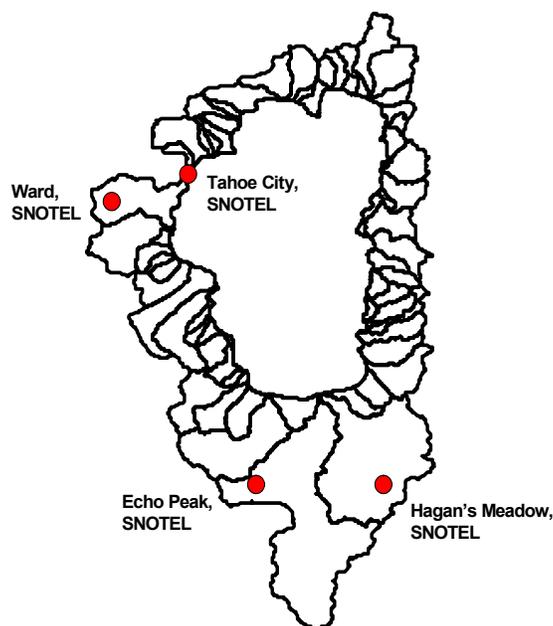


Figure 5-19. Climate stations from the NRCS SNOTEL sites used in the AnnAGNPS simulations.

from the Tahoe City climate station needed for the AnnAGNPS simulation. Climate data, based on numerical simulations conducted by a concurrent research project, were not available for this study.

For the Ward climate station, information from 1980-2002 was available and for Echo Peak and Hagan's Meadow climate stations, only information from 1981-2001 was used. Additional weather data was generated using the GEM climate generator for parameters describing sky cover, dew point, and wind speed, and then actual precipitation and temperature data for those dates replaced the generated values. The annual precipitation measured from each of the climate stations is shown in Figure 5-20. Annual precipitation is generally higher for those climate stations at higher elevations and on the western side of the Lake Tahoe Basin. The climate record for the 50-year simulation was developed for each climate station by repeating the same period of record to create a continuous 50-year climate record. For example, at the Tahoe City climate station, the 1976-2002 record was used for the first 27 years and then 1976-1998 record was used for years after 2002, although the runoff events of January 1 and 2, 1997 were not repeated. A similar approach was used for all of the other climate stations.

Assignment of a Climate Station to an AnnAGNPS Cell

Each climate station represents a point in the Lake Tahoe Basin. Precipitation can be highly variable based on the predominate movement of storms and the elevation at any point. Since there was limited precipitation data in the watersheds, an attempt was made to distribute precipitation in the Upper Truckee and Ward watersheds. Since General Creek watershed did not have a precipitation gage at higher elevations, only the Tahoe City climate station was used.

For the Upper Truckee River watershed, the Echo Peak and Hagan's Meadow climate stations were used and assigned to an AnnAGNPS cell, based on the GIS layer containing the isopluvial lines (Sierra Hydrotech, 1986). For the Ward Creek watershed, the Tahoe City and Ward climate stations were used.

Two additional climate stations were developed for the Upper Truckee River watershed based on the location of the Echo Peak and Hagan's Meadow climate stations within the isopluvial line GIS layer. Since the Echo Peak climate station represented a value of 1260 mm on the hypsography and Hagan's Meadow represented a value of 690 mm, two additional climate stations were developed that were a function of each based on the changing hypsography between them. The adjustment in precipitation for the 833 mm to 975 mm file was then a simple increase in Hagan's Meadow precipitation based on the increase in the associated iso-pluvial values, and similarly a decrease in the Echo Peak precipitation for the 975 mm to 1120 mm file. The assignment of the appropriate climate file for each AnnAGNPS cell in the Upper Truckee River watershed is shown in Figure 5-21 and was based on the centroid of the AnnAGNPS cell falling within each isopluvial region defined for each climate file. Water draining from Echo Lake was diverted out of the watershed and thus, was not routed to the Upper Truckee River watershed outlet.

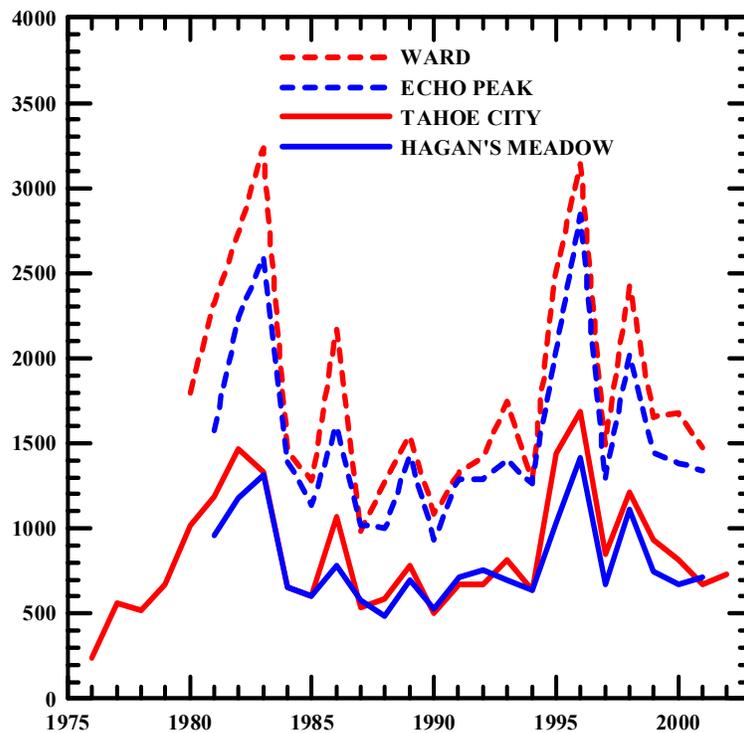


Figure 5-20. Annual precipitation measured at the Ward, Echo Peak, Tahoe City, and Hagan's Meadow climate stations.

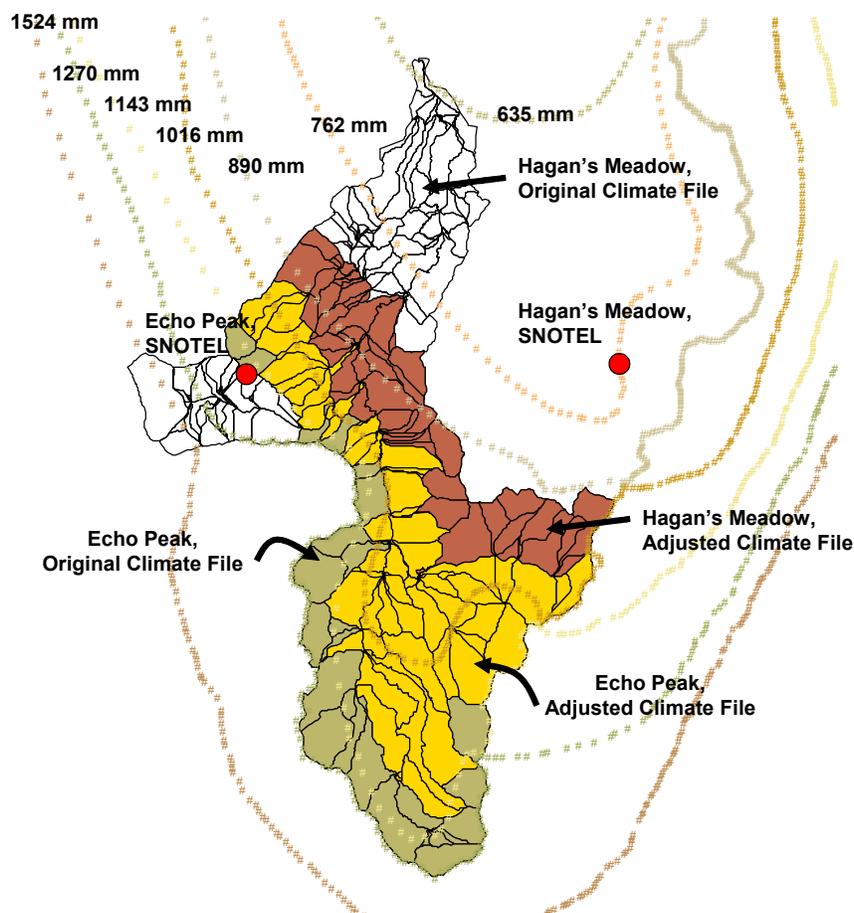


Figure 5-21. Climate files assigned to AnnAGNPS cells based on the isopluvial lines (Sierra Hydrotech, 1986) of Upper Truckee River watershed.

A similar approach was used on Ward Creek watershed for the Ward and Tahoe City climate stations that fell on the 1820 mm and 914 mm values, respectively. The assignment of the appropriate climate file for each AnnAGNPS cell in the Ward Creek watershed is shown in Figure 5-22.

Development of Temperature Lapse Rate

The AnnAGNPS model has the capability to vary temperature by elevation and in a mountainous region this can be critical in defining whether precipitation falls as snow or rain, or runoff occurs as a result of snowmelt. The default lapse rate within AnnAGNPS is the accepted global average decrease of 3.6 degrees Fahrenheit (F) per 1000 feet increase in elevation. For Ward Creek watershed, the Tahoe City and Ward climate stations were used to determine the average lapse rate. Using the corresponding climate period, an average annual lapse rate of 3.9 degrees F was calculated for the Ward Creek Watershed (Figure 5-23).