Climate Change In Montana[TWS]

Phil Farnes
Hydrologist, Snowcap Hydrology
P.O. Box 691, Bozeman, MT 59771-0691
farnes@montana.net

Records from climatological stations having approximately 100 years of record and snow courses with approximately 75 years of record were analyzed to determine how temperatures, precipitation, and snowpack have changed over the last century. Only stations that were not moved and those that had substantially complete data were analyzed. Comparisons have been made for annual and seasonal temperature and precipitation for stations in Montana and northwestern Wyoming. Many Montana snow courses have been measured since the mid-

1930s. Three snow courses that were established in Glacier National Park (GNP) in 1922 are still being measured on May 1. Only the 1 April (1 May for GNP) snow water equivalent (SWE) for snow courses that have been measured manually since the 1930's and have not been relocated were analyzed. Reduction in manual measurements due to implementation of the SNOTEL network has eliminated most of the early-season manual surveys and most of the snow courses that were co-located with SNOTEL sites. Annual or seasonal values were used to obtain 5-yr moving averages to help visualize trends. Annual and seasonal variability is probably more significant than small changes over long time periods. Wet and dry years and warm and cold years will still be part of our climate even though trends over longer periods may change. For example, it is not uncommon for annual precipitation to vary between 40 and 160 percent of average and annual temperatures to vary 3 °C above or below average.