**SIEN SNOW COURSE RECORDS** Snowpack survey records collected by several entities are stored in the California Data Exchange (CDEC) database, maintained by the California Department of Water Resources. Historical measurements of snow water equivalent (SWE) sampled on or about the first day of the month during the winter and early spring can be found in the CDEC database at http://cdec.water.ca.gov/staInfo.html. Various options are provided to search and identify the desired records. For this study, snow courses were searched by the nine major river basins, Tuolumne, Merced, San Joaquin, Kings, Kaweah, Kern, Owens, Mono, and Walker draining the southern Sierra Nevada. The CDEC database contains records for snow courses that have been operated in the nine river basins. Most of the snow courses were established prior to 1970 and very few, if any, have been established since 1990. Accordingly, snow courses that are still active or have been discontinued in the past 15 years typically have more than 25 years of record. Given the large number of snow courses well-dispersed throughout the SIEN, discontinued snow courses with less than 25 years of record were not considered. Sixty-eight snow courses located within or adjacent (~10 miles) to the SIEN with 25 years or more of record were selected for analysis. The selected snow courses are listed in Table 1 below along with a summary of basic characterisitics. The selected snow course records are saved in the file sien\_swe, which contains a separate sheet for the snow courses located in each of the 9 major drainage basins. Each snow course is identified by a 3 letter abbreviation, which is the same identifier as used in the CDEC database. Eighteen of the snow courses selected for this study have been discontinued and were not operated in 2008. Most of the discontinued snow courses were eliminated 1990 through 2000.

The SWE content in a snowpack is typically near the annual maximum value during the April 1 measurement. Accordingly, the analysis of trends in annual snow accumulation, such as this study, focus primarily on the April 1 measurements. Furthermore, although SWE is frequently measured throughout the winter, the April 1 SWE measurement is the most complete, and consistently made measurement available. The attached snow course records are April 1 SWE in inches.

Table 1. Trends in April 1 SWE Observed at 68 Snow Courses Within and Adjacent to the SIEN National Parks

| **Snow Course Name** | **ID** | **Elev** | **Lat** | **Long** | **Period of Record** | **Median April 1 SWE** | **Slope** | **P-Value** | **Difference** | **Percent Change** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | (feet) |  |  |  | (inches) |  |  | (inches) |  |
| Beehive Meadow | BHV | 6500 | 37.995 | 119.780 | 1930-2008 | 22.1 | -0.082 | 0.192 | -6.39 | -0.22 |
| Bond Pass | BNP | 9300 | 38.178 | 119.623 | 1948-2008 | 31.1 | 0.040 | 0.770 | 2.43 | 0.06 |
| Dana Meadows | DAN | 9800 | 37.897 | 119.257 | 1927-2008 | 33.4 | 0.043 | 0.395 | 3.47 | 0.12 |
| Huckleberry Lake | HCL | 7800 | 38.102 | 119.745 | 1948-2000 | 37 | 0.022 | 0.892 | 1.13 | 0.03 |
| Horse Meadow | HRS | 8400 | 38.158 | 119.662 | 1948-2008 | 35 | 0.007 | 0.961 | 0.40 | 0.01 |
| Lower Kibbie | LKB | 6700 | 38.033 | 119.878 | 1937-2000 | 30 | -0.119 | 0.237 | -7.50 | -0.25 |
| New Grace Meadow | NGM | 8900 | 38.150 | 119.617 | 1966-2000 | 42.6 | -0.178 | 0.613 | -6.04 | -0.12 |
| Paradise Meadow | PDS | 7650 | 38.047 | 119.670 | 1946-2008 | 40.5 | 0.034 | 0.786 | 2.10 | 0.05 |
| Rafferty Meadows | RFM | 9400 | 37.837 | 119.325 | 1948-2008 | 27.6 | 0.117 | 0.212 | 7.01 | 0.24 |
| Sachse Springs | SAS | 7900 | 38.085 | 119.837 | 1948-2008 | 30.85 | 0.015 | 0.908 | 0.91 | 0.02 |
| Spotted Fawn | SPF | 7800 | 38.092 | 119.758 | 1948-2000 | 40.1 | 0.017 | 0.920 | 0.90 | 0.02 |
| Tuolumne Meadows | TUM | 8600 | 37.873 | 119.350 | 1930-2008 | 18 | 0.024 | 0.661 | 1.88 | 0.09 |
| Upper Kibbie Ridge | UKR | 6700 | 38.043 | 119.887 | 1947-2000 | 7.5 | -0.034 | 0.785 | -1.78 | -0.09 |
| Vernon Lake | VNN | 6700 | 38.017 | 119.717 | 1947-2000 | 18.2 | -0.054 | 0.633 | -2.88 | -0.12 |
| Wilma Lake | WLW | 8000 | 38.083 | 119.633 | 1946-2000 | 45.2 | 0.081 | 0.609 | 4.38 | 0.11 |
| Gin Flat | GFl | 7000 | 37.765 | 119.773 | 1930-2008 | 29.75 | -0.044 | 0.578 | -3.42 | -0.10 |
| Peregoy Meadow | PGM | 7000 | 37.667 | 119.625 | 1931-2008 | 26.8 | -0.103 | 0.121 | -7.96 | -0.23 |
| Snow Flat | SNF | 8700 | 37.827 | 119.497 | 1930-2008 | 39.35 | 0.011 | 0.895 | 0.87 | 0.02 |
| Ostrander Lake | STR | 8200 | 37.637 | 119.550 | 1938-2008 | 43.9 | -0.006 | 0.945 | -0.40 | -0.01 |
| Tenaya Lake | TNY | 8150 | 37.838 | 119.448 | 1930-2008 | 28.65 | -0.004 | 0.959 | -0.28 | -0.01 |
| Agnew | AGP | 9450 | 37.724 | 119.143 | 1930-2008 | 24.6 | 0.026 | 0.701 | 2.04 | 0.07 |
| Colby Meadow | CBM | 9700 | 37.178 | 118.720 | 1944-2008 | 19.15 | 0.040 | 0.597 | 2.58 | 0.12 |
| Clover Meadow | CLM | 7000 | 37.528 | 119.275 | 1939-2008 | 15.3 | 0.021 | 0.798 | 1.46 | 0.07 |
| Cora Lakes | CRA | 8400 | 37.598 | 119.267 | 1939-2008 | 23.55 | 0.014 | 0.882 | 0.97 | 0.03 |
| Emerald Lake | EML | 10600 | 37.183 | 118.762 | 1944-2000 | 29.95 | 0.026 | 0.841 | 1.48 | 0.04 |
| Piute Pass | PPS | 11300 | 37.240 | 118.687 | 1930-2008 | 28.45 | 0.088 | 0.244 | 6.85 | 0.21 |
| Blackcap | BCB | 10300 | 37.067 | 118.770 | 1930-2008 | 27.6 | 0.006 | 0.936 | 0.47 | 0.01 |
| Bullfrog Lake | BLF | 10650 | 36.770 | 118.398 | 1955-2008 | 26.95 | 0.108 | 0.367 | 5.73 | 0.22 |
| Big Meadows | BMS | 7600 | 36.715 | 118.842 | 1930-2008 | 26.65 | -0.033 | 0.672 | -2.59 | -0.10 |
| Bishop Pass | BSH | 11200 | 37.100 | 118.557 | 1930-2008 | 26.85 | 0.104 | 0.167 | 8.14 | 0.28 |
| Charlotte Ridge | CLT | 10700 | 36.770 | 118.415 | 1955-2008 | 29.25 | 0.079 | 0.548 | 4.18 | 0.14 |
| Grant Grove | GNG | 6600 | 36.742 | 118.963 | 1930-2008 | 8 | -0.061 | 0.362 | -4.77 | -0.29 |
| Horse Corral Mdw | HCM | 7600 | 36.752 | 118.750 | 1930-2008 | 17.5 | -0.040 | 0.362 | -3.12 | -0.17 |
| Rattlesnake Creek | RTT | 9900 | 36.982 | 118.720 | 1973-2000 | 41.85 | -0.167 | 0.737 | -4.51 | -0.11 |
| Rowell Meadow | RWM | 8850 | 36.717 | 118.737 | 1933-2008 | 29 | 0.013 | 0.857 | 1.00 | 0.04 |
| Vidette Meadow | VDM | 9500 | 36.758 | 118.410 | 1956-1996 | 28.55 | 0.202 | 0.265 | 8.07 | 0.44 |
| Farewell Gap | FRW | 9500 | 36.412 | 118.583 | 1952-2008 | 49.55 | 0.033 | 0.832 | 1.87 | 0.06 |
| Giant Forest | GFR | 6400 | 36.570 | 118.768 | 1930-2008 | 16.15 | -0.074 | 0.198 | -5.79 | -0.31 |
| Hockett Meadows | HKM | 8500 | 36.382 | 118.655 | 1930-2008 | 32.8 | -0.064 | 0.379 | -4.96 | -0.16 |
| Mineral King | MNK | 8000 | 36.437 | 118.587 | 1948-2008 | 23.5 | 0.034 | 0.725 | 2.06 | 0.10 |
| Panther Meadow | PTM | 8600 | 36.588 | 118.717 | 1930-2008 | 36.35 | -0.001 | 0.987 | -0.10 | 0.00 |
| Bighorn Plateau | BGH | 11350 | 36.615 | 118.377 | 1949-2008 | 20.25 | 0.009 | 0.923 | 0.51 | 0.02 |
| Big Whitney Mdw | BWH | 9750 | 36.440 | 118.255 | 1948-2008 | 13.25 | 0.026 | 0.720 | 1.58 | 0.10 |
| Beach Meadow | BHM | 7650 | 36.122 | 118.293 | 1930-2008 | 8.25 | -0.046 | 0.284 | -3.56 | -0.33 |
| Crabtree Meadow | CBT | 10700 | 36.563 | 118.345 | 1949-2008 | 18.1 | 0.024 | 0.768 | 1.43 | 0.08 |
| Cottonwood Pass | CWP | 11050 | 36.450 | 118.217 | 1948-2008 | 8.95 | 0.090 | 0.209 | 5.42 | 0.45 |
| Guyot Flat | GYF | 10650 | 36.523 | 118.348 | 1949-2008 | 19 | 0.031 | 0.714 | 1.81 | 0.09 |
| Rock Creek | RCR | 9600 | 36.497 | 118.333 | 1949-2008 | 16.95 | 0.041 | 0.614 | 2.42 | 0.15 |
| Sand Meadows | SDM | 10650 | 36.572 | 118.367 | 1949-2008 | 17.45 | 0.025 | 0.757 | 1.49 | 0.08 |
| Siberian Pass | SIB | 10900 | 36.473 | 118.267 | 1948-2008 | 14.45 | 0.046 | 0.568 | 2.77 | 0.16 |
| Tyndall Creek | TND | 10650 | 36.632 | 118.392 | 1949-2008 | 17.55 | 0.045 | 0.574 | 2.63 | 0.15 |
| Little Whitney Mdw | LWM | 8500 | 36.378 | 118.347 | 1930-2008 | 15.65 | -0.004 | 0.938 | -0.30 | -0.02 |
| Quinn Ranger Station | QRS | 8350 | 36.328 | 118.573 | 1931-2008 | 16.6 | -0.076 | 0.291 | -5.86 | -0.26 |
| Big Pine Creek 1 | BP1 | 10000 | 37.125 | 118.483 | 1950-2000 | 17.9 | -0.015 | 0.903 | -0.76 | -0.03 |
| Big Pine Creek 2 | BP2 | 9700 | 37.127 | 118.470 | 1950-2000 | 12.5 | -0.037 | 0.716 | -1.83 | -0.12 |
| Big Pine Creek 3 | BP3 | 9800 | 37.128 | 118.475 | 1950-2000 | 14.8 | 0.080 | 0.492 | 4.02 | 0.25 |
| Bishop Lake | BSP | 11300 | 37.123 | 118.545 | 1951-2008 | 17.35 | 0.085 | 0.358 | 4.84 | 0.24 |
| Cottonwood Lakes 1 | CW1 | 10150 | 36.483 | 118.177 | 1931-2008 | 7.75 | 0.020 | 0.634 | 1.52 | 0.13 |
| Cottonwood Lakes 2 | CW2 | 11100 | 36.483 | 118.217 | 1944-2000 | 15.65 | 0.035 | 0.618 | 1.96 | 0.14 |
| East Piute Pass | EPP | 10800 | 37.235 | 118.687 | 1950-2000 | 13.15 | 0.178 | 0.059 | 8.91 | 0.83 |
| Sawmill | SWM | 10200 | 37.162 | 118.562 | 1950-2000 | 18.85 | 0.087 | 0.383 | 4.34 | 0.25 |
| ElleryLake | Ell | 9600 | 37.928 | 119.248 | 1927-2008 | 36.6 | 0.074 | 0.215 | 6.01 | 0.24 |
| Gem Pass | GEM | 10750 | 37.780 | 119.170 | 1931-2008 | 22.35 | 0.137 | 0.134 | 10.52 | 0.40 |
| Saddlebag Lake | SDL | 9750 | 37.957 | 119.267 | 1926-2008 | 15.45 | 0.112 | 0.092 | 9.21 | 0.37 |
| Tioga Pass | TGP | 9800 | 37.917 | 119.253 | 1927-2008 | 26.65 | 0.086 | 0.116 | 6.93 | 0.31 |
| Center Mountian | CTM | 9400 | 38.150 | 119.467 | 1930-1984 | 35.8 | 0.141 | 0.262 | 7.59 | 0.22 |
| Virginia Lakes | VGL | 9400 | 38.057 | 119.247 | 1947-2000 | 18.4 | 0.015 | 0.846 | 0.81 | 0.05 |
| Virginia Lakes Ridge | VRG | 9300 | 38.077 | 119.234 | 1969-2008 | 29.65 | 0.003 | 0.980 | 0.12 | 0.01 |