

## **On a Water Supply Index: Poudre River Case Study**

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**Abstract.** A water supply index is present along with a case study of the application of the index. The index is calculated from the discharge the present year and discharges in previous years. The paper also compares the use of a water supply index to the use of a single year as a method of classifying annual streamflows into water year classes for the purpose of allocating water to environmental flows. The third task compares the return periods of low annual flows to return periods of a low a water supply index, The Cache la Poudre River in Colorado is used as a case study (the Cache la Poudre River simply called the Poudre River). The water supply index (WSI) is calculated using the equation  $WSI = \{Q(i) + 0.5 Q(i-1) + 0.25 Q(i-2)\}/1.75$  where Q is the annual discharge and i is the index to the year. The index does improve the classification of years into various classes of water years where the classes are very dry, dry, moderate dry, moderate wet, and wet. The classification using the water supply index, as compared to using annual streamflows, appears to improve the ability of water manages to respond to low flow conditions. The normative streamflows in the Cache la Poudre River were from 1884 thru 2009 were analyzed using a log-Pearson Type III analysis. The 2002 water year annual streamflows were found to have a return period of 426 years. For the water supply index the return period is 403 years. A long period record has been generated by NOAA using tree rings for 1615-1999. Using a long period record based on three ring analysis (1615-1999) and normative streamflows (2000-2009) the return period for the annual discharge in 2002 is 46 years and 157 years for the water supply index.

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