

Appendix 2 - Standardized Precipitation Index

McKee et al. (1993) developed the Standardized Precipitation Index (SPI) to quantify precipitation deficits on multiple time scales.

The SPI calculation for any given location is based on the long-term precipitation record for the desired period that is then transformed into a normal distribution creating a variable with a mean of zero and a standard deviation of one.

SPI is calculated as:

$$SPI_t(n) = \frac{R^m(n) - \bar{R}^m(n)}{s^m(n)}$$

Where:

$SPI_t(n)$ is the standardized precipitation index in period t (month m) of duration n months.

$s^m(n)$ is standard deviation of n month duration rainfall ending in month m

$\bar{R}^m(n)$ is mean rainfall of duration n months ending in month m

Welsh Water compute the SPI using an improved method by introducing the second step as follows:

1. A precipitation time series is summed over the time scale of interest.
2. The frequency distribution of this summed precipitation time series is then fitted to a gamma density function.
3. The resulting probability density function is then transformed into the standardized normal distribution.

A full account of the SPI computation can be found at the website of the National Drought Mitigation Centre, University of Nebraska – Lincoln - <http://www.drought.unl.edu/>.