

Sierra Nevada Conservancy Performance Measures Descriptions

August 5, 2008

Acre Feet per Annum of Water Supply Conserved or Enhanced

Purpose

The purpose of this Performance Measure (PM) is to measure the benefits of water conservation and efficiency projects and particular restoration efforts that impact timing of flows, including floodplain and meadow restoration. An acre-foot per annum (AFA) of water is enough to cover one acre of land one foot deep for a year.

Likely Project Categories

This PM would likely be applicable for projects in the following category:

- Site improvement/restoration

Variations

This PM is further classified into the following two variations:

- Water Conservation and Efficiency – water conservation and efficiency actions might include the lining of a ditch, installation of low flow toilets or more efficient irrigation systems.
- Restoration – restoration actions might include the restoration of a downcutting river through a meadow so that the new river configuration would allow for increased flooding in the meadow, an increase in the groundwater levels, and thus increased storage capacity.

Guidance on Applying this PM to Your Project

This is a recommended approach to collecting data and reporting on this PM. Grantees are asked to further evaluate how these steps may best be applied to your specific project and discuss with SNC any steps or considerations that may be unique to your project.

- Data collection:
 - a. Water conservation and efficiency projects--use before and after meters to calculate water saved, or make estimates from the design specifications of the products that state the expected savings over the current practices. For example, subtract the amount of water that will be used under the current practice from the amount of water that was

used under the less efficient practice. Then multiple this savings times the number of installations, and then covert (if necessary) into acre-feet (1 US gallon = $3.06888328 \times 10^{-6}$ acre foot).

- b. Restoration efforts—calculating the average amount of natural storage enhanced per year from a restoration project such as increasing inundation of a floodplain next to a river or in a meadow, requires significant field work. It is critical to know the area that will be inundated, the depth and porosity of the soil that will be inundated, and the frequency of inundation, and compare this to pre-restoration conditions. To obtain this information, the following types of field work are required at a minimum: auguring to determine depth to bedrock and characterization of subsurface materials, topographic mapping of the floodplain or meadow surface, upstream and downstream gaging, and installation of piezometers. To increase the reliability of the information, the following methods can be used: shallow seismic refraction, in-situ hydraulic conductivity tests, laboratory testing to determine porosity, and modeling. An experienced hydrologist and/or geomorphologist should be used to aid in this effort.

If increasing water supply is a primary purpose/benefit of a restoration effort, measuring the effects of the project on water supply should be included within the scope of the project. Given the level of effort required, however, SNC understands that this might not be feasible for all projects.

- Analysis: No data analysis is required for water conservation and efficiency projects. Data analysis for meadow restoration is provided in the reference below.
- Reporting: The grantee should report acre feet per annum of water supply enhanced.

Other

The following additional reference information is suggested:

- For detailed description of determining water supply enhancement from meadow restoration: Cornwell, K, K. Brown, and C. Monohan, "Mountain Meadows and their contribution to Sierra Nevada Water Resources", 2007, Eos Trans. American Geophysical Union. 88 (52), Fall Meeting. Suppl., Abstract H31DO 0642.

Monitoring for this type of impact costs approximately \$10,000 - \$20,000 for restoring a medium size meadow (20-80 acres). Costs for measuring water use efficiency savings will vary; estimates calculated from design specifications will be minimal (generally requiring less than 40 hours of grantee time annually), whereas in-field measurements of savings could be moderate (generally requiring 40-100 hours of grantee time annually) and would require specialized expertise in terms of installing gages or reading meters.