Acre Feet per Annum of Streamflow Improved

Purpose

The purpose of this Performance Measure (PM) is to measure the changes in flow conditions, measured in acre feet per annum for a stream or river. 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 two categories:

- Acquisition projects
- Site Improvement/Restoration

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*: There are several ways that project proponents can report on afa of streamflow improved:
    a. Legal Description: The most basic approach involves the transfer of a water right to instream flows through a lease or permanent transfer. Under these conditions, the acre feet of streamflow improved would be the legal description of water transferred.
    b. Before and After Monitoring: A more physically-based approach would involve monitoring streamflows in a particular reach before and after the project is implemented and reporting the change in acre feet as a result of the action taken. This monitoring would rely on existing stream gage stations, if available, or installing and calibrating staff and gages. Using this method, project proponents would need to take steps to isolate project effects through comparing rainfall in the years before and after the project.
    c. Modeling: In many cases, the natural hydrologic variability in the system might cause issues with attributing change to projects and a modeling approach might be necessary. In these cases, a significant hydrologic record would be required.

- *Analysis*: Data analysis methods vary depending on which of the three methods outlined above is used. Analysis is not required for the legal description (a above). Using before and after monitoring and modeling would involve collection and analysis of streamflow data. A significant hydrologic record (10 years or longer) would be needed to determine if the impact on flows is due to the project action or to natural variability, and the impact would need to be monitored over several years. A modeling approach would also require calibration.
- *Reporting*: The grantee should provide the following information:
    a. Estimation of increased streamflow based on project action. For example, if the action involves lining of a canal, then a comparison of existing versus projected seepage rates should be provided, along with a projection of expected increase in streamflow due to the lining of the ditch, taking into consideration any other conveyance losses.
    b. The actual amount of increased streamflow in acre feet. Note: increase in stream flow is often calculated in cubic feet per second (cfs). To convert from cfs to acre-feet, note 1 cfs for 24 hours = 1.983 acre-feet.

Other

The following additional reference information is suggested:

- The California Water Acquisition Handbook, "How to Acquire Water for the Environment in California", 2003, Trust for Public Land, (http://www.tpl.org/tier3_cd.cfm?content_item_id=11521&folder_id=266).
- The website of the Department of Ecology, Washington State, provides helpful information regarding measuring instream flows (http://www.ecy.wa.gov/programs/wr/instream-flows/isfsci.html)

The costs associated with monitoring this PM vary. For the first data collection method listed above, namely, legal description, there is no cost for reporting as determining the acre-feet change is part of the project action. To determine the instream changes using gaging or modeling, the costs would be moderate to significant depending on how many gages would be necessary to monitor flows, and the type of modeling needed, and would require specialized knowledge. Once the model is built and calibrated and the gages installed, the cost would be moderate (40 to 100 hours annually) to download and analyze the data, and update the model.