

FUNDING PROGRAMS FOR WATER MANAGEMENT AND EFFICIENCY MEASURES

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ABSTRACT

The Bureau of Reclamation (Reclamation) has played a significant role, in partnership with water users, States, and other interested parties, to help improve water resource management and the efficiency of water use in the western United States. The Mid-Pacific Region of Reclamation has three water conservation grant programs to establish these partnerships, which provide funding opportunities for infrastructure improvements and delivery flexibility including, but not limited to, activities such as canal lining and piping, system automation, and water banks. Funding opportunities include the Water Conservation Field Services Program, the CALFED Water Use Efficiency Program, and the Water Marketing and Efficiency Challenge Grants. Each grant program has a unique focus while contributing to the overarching goal of water conservation. These grant programs provide tools to urban and agricultural delivery entities to manage their water more effectively, and thus use the same amount of water to meet additional or unmet needs or conserve by decreasing consumptive use.

INTRODUCTION

Reclamation was created by an act of Congress in 1902 to develop and provide water resources for the arid Western United States. Differentiated into 5 regions, Reclamation encompasses 17 states (Figure 1), and is the largest wholesale water supplier in the United States. Since 1902, Reclamation has constructed over 475 major structures including Hoover Dam on the Colorado River and Shasta Dam on the Sacramento River. Beginning in the 1980's environmental concerns and population growth in such areas as Los Angeles, San Francisco, Las Vegas, and Phoenix required Reclamation to expand its mission to *"manage, develop, and protect water and related resources in an environmentally and economic sound manner in the interest of the American public."*

With much of the Western United States historically experiencing moderate to extreme drought conditions, achieving Reclamation's mission is challenging due to the limited water supply needs to meet environmental, agricultural, and urban needs. California is in its third consecutive dry year, and the United States Department of Agriculture has designated 53 of 58 California counties as agricultural disaster areas. In 2009, Reclamation had only a 10% water allocation to some agricultural customers, and was close to delivering only the amount of water necessary to meet human health and safety needs for the urban sector. Californians are experiencing the pain of drought through lost

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jobs and severe economic hardships in what used to be farm rich regions of the Central Valley.



Figure 1. Map of Reclamation's 17 Western States with the five regional boundaries.

In California, water supply is at the forefront of everyone's mind, including farmers, recreationists, fish and wildlife managers, and lawmakers alike. State and Federal governments are taking critical steps to help ease water supply strains in the face of shortages, population growth, and competition. Historically, competing stakeholders have debated the issue of storage versus demand management and water conservation. Through recent legislative acts, it has become clear that water conservation and water use efficiency are front-runners in helping to mitigate the immediate water challenges in the West.

RECLAMATION'S WATER CONSERVATION AND WATER USE EFFICIENCY PROGRAMS

For purposes of this paper, "water conservation" is defined as cost effective and environmentally sound measures, technologies, programs, and incentives that result in improved, efficient management of water resources for beneficial uses, preventing waste or accomplishing additional benefits with the same amount of water. Examples of water conservation measures include, but are not limited to, Supervisory Control and Data Acquisition (SCADA) systems for improved water management and deliveries, canal lining to prevent seepage, tailwater return systems for water reuse, leak detection programs, irrigation retrofits, and water efficient appliance rebate programs.

Reclamation has the responsibility, in partnership with water users, States, and other interested parties, to help improve water resource management and the efficient use of water in the Western United States. Reclamation's commitment to conservation through grants was solidified with the passage of the Omnibus Public Land Management Act of

2009, Public Law 111-11. Whereas Reclamation struggled in the past for authority to award financial assistance for water conservation projects/programs, Public Law 111-11, Section 9504, provides the Secretary with long-term authority for entering into financial assistance agreements for water conservation.

Public Law 111-11 specifies that water conservation grants shall not exceed 50 percent of the project's cost and cannot exceed \$5,000,000. However, federal funding maximums vary depending on the program and the region that is administering the program. Funding amounts/maximums are further discussed under each program title.

Reclamation has three water conservation grant programs designed to establish conservation partnerships: Challenge Grants, the CALFED Water Use Efficiency (WUE) Grant Program, and the Water Conservation Field Services Program (WCFSP). Through these programs, Reclamation provides funding to irrigation districts and urban water agencies for water management improvements that accelerate the implementation of conservation activities. These grants provide tools to water districts to better manage their water, and thus conserve by diverting less, or using the water more efficiently within their service area. Each grant program has a unique focus (Table 1) while contributing to the overarching goal of water conservation.

Challenge Grants

Reclamation presented The Water Conservation Initiative in 2009 as part of the strategic plan for implementing the Secure Water Act. The Secure Water Act authorized Reclamation to establish a climate change adaptation program that includes the facilitation of basin-wide water management improvements. The Water Conservation Initiative will develop incentives for the implementation of best management practices for water conservation. The Water Conservation Initiative also includes Challenge Grants (formerly Water 2025 and Water for America Challenge Grants) that focus on the following:

1. Water use efficiency projects that produce “real water savings,”
2. Water markets and water banks,
3. Improving water management by increasing the use of renewable energy and operation flexibility,
4. Addresses endangered species or other environmental concerns,
5. Water treatment pilot or demonstration projects to create new water supplies from brackish, saltwater, or otherwise unusable waters,
6. Planning or research activities designed to conserve or increase the efficiency of water use and the development of climate analysis tools.

In 2010, there is an increased focus on “real water savings.”

Although Reclamation unveiled the Water Conservation Initiative in 2009, Challenge Grants were initiated in 2004 as part of the Water 2025 Initiative; the first Reclamation-

wide program that focused attention on the complex water issues of the West by providing a forum for public discussion so that decisions could be made in advance of a water supply crises. Challenge Grant projects focused on modernizing aging water delivery infrastructure, water banking/marketing, and improving water use efficiency and conservation. Since 2004, the Challenge Grant program has funded 167 projects that when coupled with local cost-shares, represent approximately \$60 million in water system and water management improvement across the West. These projects create new water banks, promote the use of advanced technology to improve water management and increase collaboration among Federal, State, tribal, and local organizations.

Challenge grants are competed Reclamation-wide, and are typically capped at \$300,000. In 2009, the Mid-Pacific Region of Reclamation received 10 of the 23 grants awarded. Projects included groundwater banking, new construction, and canal lining (Figure 2).

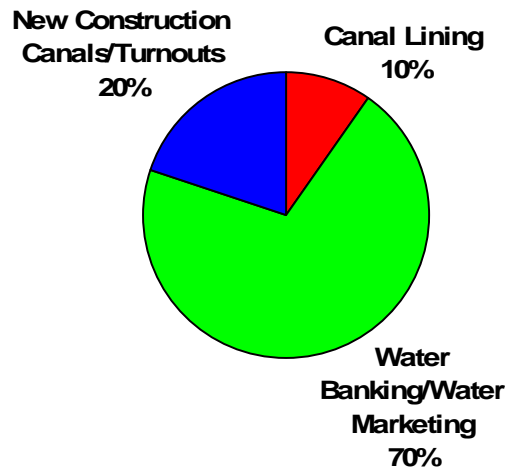


Figure 2. Percent of Money Awarded for 2009 Challenge Grants

In 2009, 10 grants totaling \$3 million were awarded to Mid-Pacific Region water purveyors through the Challenge Grant Program. Federal awards were \$300,000 each. The projects' potential acre feet of water conserved or better managed is 57,357.

The Water Conservation Field Services Program

Before the development of Challenge Grants, the WCFSP was Reclamation's primary source of water conservation grants. The WCFSP is a locally administered and competed program, designed to provide technical and financial assistance for water management planning, implementation of best management practices, demonstration projects, and conservation education.

The WCFSP commenced in 1997, to aid in Reclamation Reform Act of 1982 (RRA) compliance. RRA, Section 210, stated that Reclamation was to "encourage the full consideration and incorporation of prudent and responsible water conservation measures in the operations of non-federal recipients of irrigation water from Federal Reclamation

projects...” As a result, all agricultural, municipal, and industrial water contractors that entered into contracts pursuant to Federal Reclamation law or the Water Supply Act of 1958, were required to provide Water Management Plans (Plans). The completion of these Plans became a provision in the water supply contracts and each Plan had to include the following:

- Definite goals
- Water conservation measures
- Time schedule for meeting objectives

Approximately 10 years after the passage of RRA, Reclamation was criticized for their contractors’ lack of water conservation efforts, and the Natural Resources Defense Council and other environmental groups filed suit against Reclamation, stating that Reclamation was not effectively implementing the water conservation measures of RRA. In 1996, Reclamation entered into a Settlement Agreement to fulfill its legal responsibility under Section 210 of RRA, and as a result, the Commissioner of Reclamation issued a new Reclamation-wide policy on water conservation planning. To ensure efficient use of federal water, Reclamation was to work directly with individual districts to develop water conservation plans and provide technical and/ or financial assistance in the implementation of water conservation programs/projects and new technology.

A key element in the settlement agreement was the initiation of the WCFSP, designed to encourage and support water conservation as a non-regulatory incentive based program for financial and technical assistance. The goals of the WCFSP were outlined as follows:

1. Ensure development and implementation of high quality water conservation plans.
2. Demonstrate innovative technologies that conserve water.
3. Implement effective water conservation measures throughout Reclamation States and advance improved water management on a regional and statewide basis.

Over the years, the WCFSP has evolved to accommodate the more challenging societal pressures on limited water supplies. At the WCFSP inception, Reclamation awarded grants on a non-competitive basis. Water districts submitted a letter of request that described the project, and if Reclamation’s Area Office Water Conservationist Specialist deemed the project beneficial, funds were generally awarded on a cost share basis and did not exceed \$25,000. However, in Fiscal Year 2005, the WCFSP became a competitive process, advertised on grants.gov, and new legislation required that the federal cost share per project be capped at 50% of project costs. In 2009, the WCFSP selection criteria underwent a significant change. In previous years, each region of Reclamation identified their own selection criteria for the competitive process; however, each region now incorporates Reclamation-wide selection criteria and grading scales that emphasize water conservation planning and implementation of efficiency improvements. In addition to the Reclamation-wide selection criteria, each funding announcement could include additional criteria developed at the regional or local level to account for local water conservation priorities and goals.

Maximum funding for the WCFSP is \$100,000 per grant (not to exceed 50% of the projects cost); however, some of Reclamation's regions choose to limit funding to a lesser amount to effectively meet local needs.

In 2009, the Mid-Pacific Region awarded 16 grants for meter testing, leak detection, measurement and flow regulation, irrigation evaluations, and education (Figure 3).

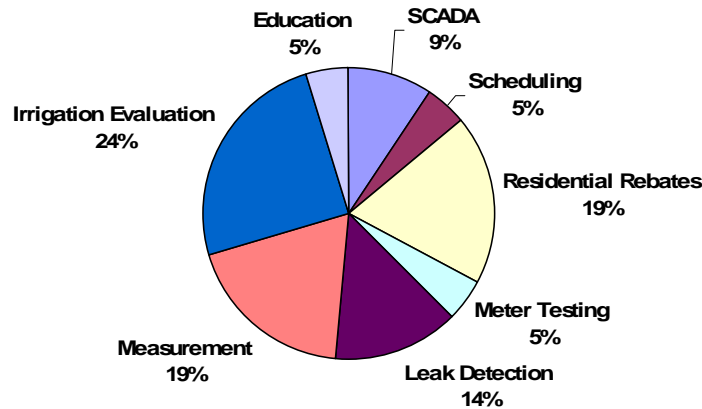


Figure 3. Percent of Money Awarded for 2009 WCFSP Grants

In 2009, 16 grants totaling \$534,000 dollars were awarded to MP-Region water purveyors through the WCFSP Program. Federal awards ranged from \$25,000 to \$84,000. The projects' potential acre feet of water conserved or better managed is 34,000.

Since the program's inception, the Mid-Pacific Region has awarded over 400 WCFSP grants for projects such as canal lining and piping, irrigation scheduling, system delivery, system modernization, residential rebate programs, education, and measurement. Including water district contributions, the WCFSP has resulted in over \$25.6 million invested in water conservation projects in the Mid-Pacific Region alone.

The CALFED Water Use Efficiency Grant Program

In addition to participating in Challenge Grants and the WCFSP, the Mid-Pacific Region also administers the CALFED WUE Grant Program. CALFED is a combined State of California and federal program focused on the restoration of the Delta's fragile ecosystem while improving water supply reliability for urban and agricultural water users. The goal of the WUE Grant Program is to accelerate the implementation of cost-effective actions that provide state-wide benefits through water conservation. Water use efficiency from districts linked to the Bay-Delta water supply can result in significant benefits to water quality, water supply reliability, and in stream flows.

In 2009, the Mid-Pacific Region awarded 16 grants for hardware retrofits, SCADA, Leak Detection, rebates, ET controllers, and distribution system improvements (Figure 4).

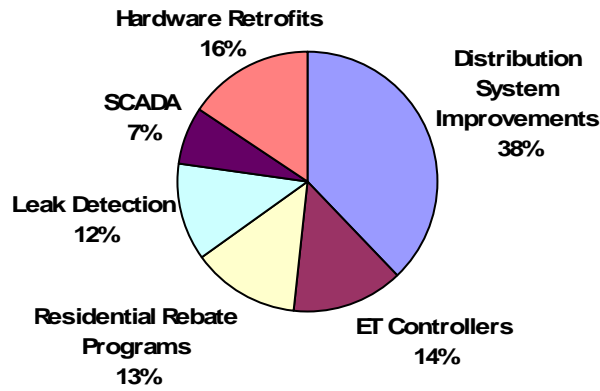


Figure 4. Percent of Money Awarded for 2009 CALFED Grants

In 2009, 16 grants totaling \$5.3 million were awarded to Mid-Pacific Region water purveyors throughout the State of California. Federal awards ranged from \$79,000 to \$1 million. The projects’ potential acre feet of water conserved or better managed is 22,524.

Since the inception of the CALFED WUE Grant Program in 2006, Reclamation has awarded 47 grants to water purveyors throughout California. With local cost-share contributions, Reclamation’s CALFED WUE Grant Program has resulted in over \$29.6 million being invested into water use efficiency projects statewide.

Table 1. Reclamation’s Grant Program Attributes

Program	Program Attributes
Challenge Grants	Competed Reclamation-wide and focus on quantifiable water savings, water banks, water markets, and other efficiency measures to address the challenges posed by drought, climate change, energy demands, expanding populations, and increased environmental needs.
WCFSP	Locally administered program, designed to provide technical and financial assistance for water management planning, implementation of best management practices, demonstration projects, and conservation education.
CALFED	Designed to provide benefits to the Bay-Delta Estuary through water use efficiency activities.

In 2009, The CALFED WUE grant program, the WCFSP, and the Challenge Grant program significantly contributed to West-wide (17 western states) water conservation (Table 2). Although all programs play a significant role in Reclamation’s efforts to promote better water management, recent budgetary trends support an all-West-wide encompassing conservation approach (Figure 5). In recent years, Reclamation has

reduced the dollars spent on the WCFSP, Reclamation’s deep-rooted, locally administered conservation program, while other programs continue to grow. This approach has several positive attributes such as the ability to award more large-scale projects, but it also poses challenges in that water purveyors are now competing amongst other water purveyors from the 17 western states.

Table 2. 2009 Water Conservation Expenditures and Benefits

Grant Program	# Projects Funded	Federal \$ Invested	\$ of Local Cost Share	Acre-feet Conserved or Better Managed
Challenge Grants*	23	4,672,493	14,478,152	74,228
WCFSP	16	533,875	1,332,802	33,996
CALFED	16	5,584,131	7,763,907	22,524
Total	55	10,790,499	23,574,861	130,748

*This number represents all Challenge Grants Reclamation-wide, not just within the Mid-Pacific Region.

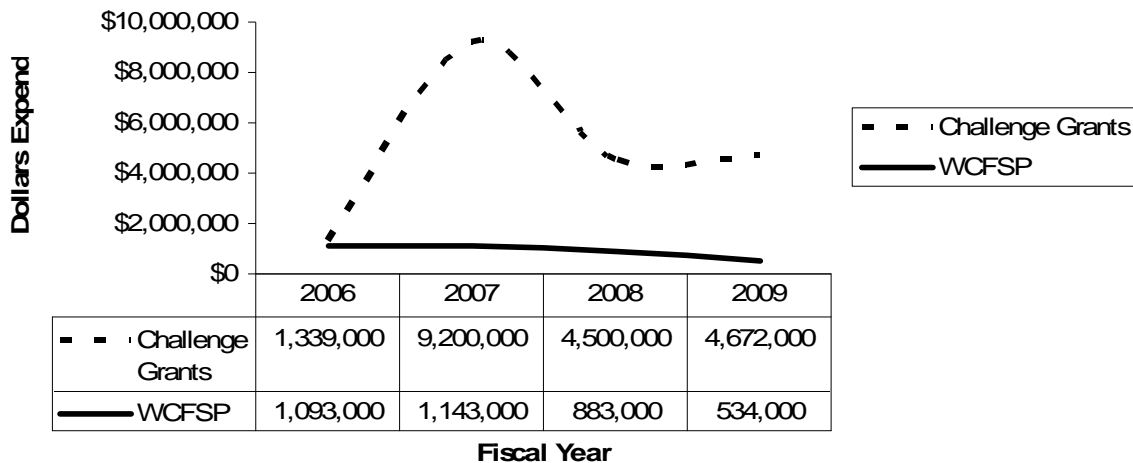


Figure 5. Historical dollars Spent on conservation projects per program from 2006-2007.

As can be seen in Figure 5, the availability of funds is shifting from locally administered programs (WCFSP) to Reclamation-wide programs (Challenge Grants).

With such large dollar amounts being spent on water conservation programs, there is an increased accountability to prioritize expenditures and determine the most cost-effective means of using limited funding resources. In the water management industry, this requires analyzing the cost versus the benefits of projects that focus on water demand management to determine which practices, in which situations, result in the best use of funding.

Prior to 2006, Reclamation had no standardized methods to quantify the results of water conservation projects even though initial estimates of water savings were required. In order to quantify benefits of a project, determine effectiveness of water management

efforts and summarize the overall effectiveness of the WUE grant programs, Reclamation, in cooperation with CALFED, developed performance measures to compare pre- and post-project water use data. By implementing these performance measures, one can calculate the anticipated project benefits and verify results, i.e. water conserved after project implementation.

The effort to quantify benefits is consistent with laws such as the Government Performance and Results Act of 1993 (GPRA) and with the federal government's Program Assessment Rating Tool (PART) which require federal agencies to strategically plan according to program objectives and to track and report their performance. GPRA and PART promote measurable results and assess performance using program results. Developing water management performance measures for Reclamation's WUE projects adheres to GPRA and PART requirements and will allow Reclamation to measure program effectiveness and to calculate the costs and benefits of conservation efforts. Performance monitoring will give output measurements that are expressed in a quantifiable manner, which will give water managers real data to use when evaluating the financial feasibility of future projects.

Currently, quantifiable information for water use efficiency projects is limited, and varying measurement methodologies make it difficult to compare benefits from program to program, or location to location. Standardizing quantification methods for measuring WUE benefits with performance measures will allow comparison of the results from varying grant programs such as Challenge Grants, the WCFSP, and CALFED WUE Program.

Specific performance measures were developed for various WUE projects including canal lining or piping, installation of measurement devices, SCADA, system controls to decrease spillage, drainage reuse projects, landscape evapotranspiration controllers, irrigation system improvements, water marketing, and ground water banking. Types of data collected will include quantification of seepage, spills, water deliveries consumptive use, crop evapotranspiration, improvements in delivery flexibility, pumping volumes, and end of season water storage. Table 3 is an abbreviated version of Reclamation's performance measures for canal lining, measuring devices, and data acquisition projects. The complete performance measures document is online at <http://www.usbr.gov/mp/watershare/documents>.

There are limitations to the performance measures. In some cases, baseline data may not be available for post-project comparisons. One may face challenges quantifying the direct benefits for certain projects such as measurement and automation since no previous data on water consumption exists for that area. It is also impossible to come up with a "one size fits all" performance measure for each project type. In addition, verifying water conserved from certain projects may take several years due to temporal and spatial differences.

Table 3. Examples of drafted performance measures for WUE projects.

Action	<i>Pre-project estimations of baseline data</i>	<i>Post-project verification methods</i>
<u>Canal Lining or Piping</u>	<ul style="list-style-type: none"> ▪ Ponding Tests: Conduct ponding tests along canal reaches proposed for lining or piping. ▪ Inflow/Outflow testing: Measure water flowing in and out of the canal reach, taking evaporation into consideration. 	<ul style="list-style-type: none"> ▪ Using ponding tests, compare pre- and post-project test results to calculate water savings. ▪ If ponding or inflow/outflow tests cannot be performed, compare estimated historic seepage and evaporation rates for the lateral length of the canal to the post-project seepage and evaporation. ▪ Compare ratio of historic diversion-delivery rates. Also include a comparison of historical and current canal efficiencies. ▪ Record reduction in water purchases by shareholders and compare to historical water purchases.
<u>Measuring Devices</u>	<ul style="list-style-type: none"> ▪ Pre-project estimated savings are difficult to measure; however, one can collect historical data on water use to estimate the amount of delivered water. 	<ul style="list-style-type: none"> ▪ Compare post-project water measurement (deliveries or consumption) data to historical water uses. ▪ Compare pre- and post-project consumptive use by crop via remote sensing information. ▪ Survey users to determine utility of the devices for decision making. ▪ Document rate structure changes such as volumetric or tiered water pricing due to the use of measurement devices (assumes non-metered to metered district) so that water users are billed for actual water used instead of at a flat rate.
<u>Data Acquisition</u>	<ul style="list-style-type: none"> ▪ Collect data on diversions and deliveries to districts and ditch companies, making estimates if necessary. ▪ Document employee 	<ul style="list-style-type: none"> ▪ Calculate amount of increased carryover storage in associated reservoirs. This measure will be more meaningful over a period of years. ▪ Track and record the diversions to individual districts and ditch

	<p>time spent on pre-project ditch/canal monitoring and water control.</p>	<p>companies or district laterals and compare to pre-project diversions. This would show results of improved management if yearly fluctuations in weather are accounted for.</p> <ul style="list-style-type: none"> ▪ Report delivery improvements- i.e. changes in supply, duration or frequency that are available to end users because of SCADA. ▪ Document other benefits such as less mileage by operators on dusty roads (which saves time and influences air quality) and less damage to canal banks due to fluctuating water levels in canals.
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CONCLUSION

Reclamation has historically funded several water conservation and efficiency projects geared towards decreasing water demands in order to meet environmental, agricultural, and growing urban needs. Over the last several years, Reclamation has given hundreds of cost-shared grants to water purveyors and other water related entities for projects such as canal lining and piping, irrigation scheduling, system delivery automation, system modernization, measurement and flow control, residential rebate programs, and water banking.

Investing in new water conservation technology is one of the Secretary of Interior’s top four priorities, which is easily addressed through the water conservation grant programs that Reclamation currently offers. Water use efficiency and conservation are key elements in achieving Reclamation’s mission, and are critical in the State of California to meet rising demands. Districts that implement water conservation measures either divert or export less or are able to use their water more effectively; that is, using the same amount of water to meet additional or unmet needs. Over the years, grant programs have served as a strong catalyst for the implementation of water conservation measures, and thus have significantly contributed to the improvement of water supply reliability, water quality, and in-stream flows.

Although Challenge Grants, the WCFSP, and the CALFED WUE Grant Program have unique focuses, the core goals are the same: stretch existing water supplies while improving water management and efficiency. Grant programs have been instrumental in transforming water conservation efforts throughout the West, and these programs will continue to be a major catalyst for efficiency implementation measures to help decrease water demands and improve water supply reliability.