

THE SOUTHERN CALIFORNIA COMPREHENSIVE WATER RECLAMATION  
AND REUSE STUDY: BALANCING NEEDS OF PEOPLE AND WETLANDS  
IN THE DESERT

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ABSTRACT

The Bureau of Reclamation is conducting the Southern California Comprehensive Water Reclamation and Reuse Study (Study), which reviews and evaluates the potential for using water more than one time before discharging it to the Pacific Ocean. Agricultural and landscape irrigation, other urban demands, and environmental enhancement are uses being considered for reclaimed water. An integral step in the process has been coordination with the U.S. Fish and Wildlife Service (Service) to identify environmental projects which could be supported by reclaimed water.

Southern California has a population of over 18 million and is one of the largest economies in the United States. An economy of this size and the population it supports could not exist without adequate resources, the most important of which is water. Yet southern California is a desert. To explain how an economy the size of southern California's could exist in a desert, one can think of it as a garden. A garden is an artificial environment sustained by a garden hose. Without the garden hose, the garden would not have come into existence, and if the garden hose goes away, so will the garden. Southern California has three garden hoses: the Colorado River Aqueduct, the California Aqueduct, and the Los Angeles Aqueduct, the latter of which is temporarily operating at less than full

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capacity to restore and protect the environment of Mono Lake and the Owens Valley, the sources of its water.

Despite its importance to southern California, however, water imported into the area is dwindling. The Colorado River Aqueduct may have as much as 50 percent of its flows reduced, due to new demands on Colorado River flows from the recently-completed Central Arizona Project. Reduced deliveries to the California Aqueduct from the State Water Project could result from changes to Project operations to protect the Sacramento-San Joaquin Delta environment, the source of its water. Water resources are dwindling and the population of southern California is expected to increase and the economy is expected to expand. How can we reconcile this apparent incongruity and resolve the problem it poses? About two million acre-feet of potentially reclaimable water are presently produced, of which approximately 1.6 million are discharged to the Pacific Ocean. By putting reclaimed water to beneficial use, the economy can continue to grow and the ecosystems of southern California can be sustained. At the very least, residents will be able to preserve the water resources upon which they now depend.

#### INTRODUCTION

The Bureau of Reclamation is conducting the Southern California Comprehensive Water Reclamation and Reuse Study (Study) that reviews and evaluates the potential to reuse or reclaim water before discharging it into the Pacific Ocean. An integral step in the Study process has been coordinating with the Service to identify environmental projects which could be supported by reclaimed water.

Southern California's continued growth requires large amounts of water, yet the primary supply, imported water, is becoming less reliable. The intent of the Study is to identify and solve water supply and demand problems, and in the process, balance competing needs for water. The Study will document water supply and demands and demonstrate the need for, and availability of, reclaimed water on a large scale, including that which could be used for potential environmental

enhancement projects. During the next several years, potential solutions will be explored, and based on preliminary findings by the Service, specific environmental areas will be identified that may receive water. This paper discusses the Study and its preliminary findings, including those of the Service.

### About the Study

Congress authorized the Study as a means to increase the use of reclaimed water in southern California and to encourage a region-wide approach. The Study was authorized in the Reclamation Projects Authorization and Adjustment Act of 1992 (P.L. 102-575, Title XVI). Seven major water agencies and municipalities, the California State Department of Water Resources, and the Bureau of Reclamation are charged with implementing the Study in an area covering nearly all of Ventura, Los Angeles, Orange, Riverside, San Diego, and Imperial Counties, as well as roughly the southern half of San Bernardino County.

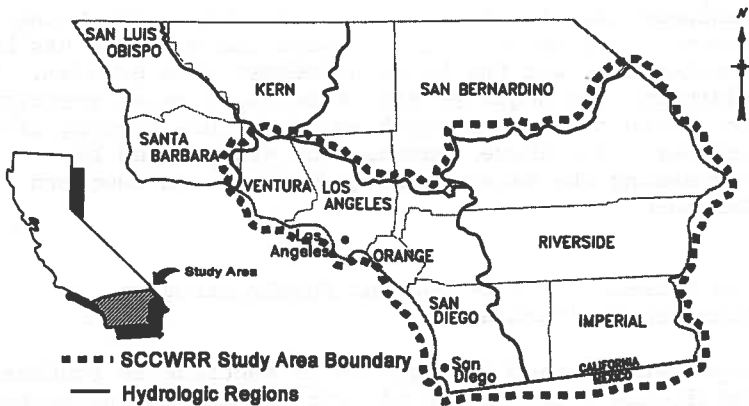


Figure 1. Southern California Comprehensive Water Reclamation and Reuse Study Area

The first of three Study phases is complete. Results of the first phase, water supply and demand

information, were documented in the "Phase IA Interim Report." Currently, Study sponsors have started Phase IB, which will identify potential reclamation projects that would deliver reclaimed water supplies to various areas for varying uses. The final phase of the Study, Phase II, will focus primarily on analyzing and documenting the feasibility of implementing the potential reclamation projects identified during Phase IB. The final Study report will result in specific water reclamation project recommendations. The list of potential water reclamation projects generated by this Study is expected to constitute the best possible solutions to the water supply and demand problem in southern California.

#### WATER SUPPLY AND DEMAND

Despite Congressional legislation to initiate the Study, the seriousness of water demand and supply problems in southern California is not always fully realized, especially since droughts generally recur only over long periods of time. Water resource managers have found that educating people about the widening gap between water demand and supplies has been challenging, and the Study addresses this problem. In addition, the negative side-effects of water scarcity are often overlooked, such as a possible slowing of the economy. For these reasons, the Study began by addressing the water shortage question in southern California.

#### The Current Water Demand and Supply Situation in Southern California

High water demand is expected to continue as southern California's population of over 18 million residents increases by about 250,000 people each year, and as the state hosts many visitors. Population levels are an important factor, given that an average person uses about 81,000 gallons (or a quarter of an acre-foot) of water each year. The current population expansion translates to an estimated water demand of about 20.2 trillion gallons, or 62,500 acre-feet of water. However, the Study's Phase IA Interim Report found that

in 1990, there was an estimated shortage of 80,000 acre-feet of water, and by 2010, the shortage could reach about 740,000 acre-feet.

On the water supply side, it is important to note that two-thirds of southern California's total water supply is imported. The area has, in essence, three garden hoses: The Colorado River, the California Aqueduct (State Water Project), and the Los Angeles Aqueduct. Environmental protection in the originating sources of the imported water, as well as other restrictions, are limiting all three sources in the short- and long-term. The Los Angeles Aqueduct is temporarily operating at less than full capacity in order to protect the environment of Mono Lake and the Owens Valley, the sources of its water. Additionally, now that the Central Arizona Project has been completed, new demands on the Colorado River may reduce flows in the Colorado Aqueduct by as much as 50 percent. Reduced deliveries from the State Water Project could result from changes to its operation to protect the Sacramento-San Joaquin Delta environment, the source of its water. Furthermore, groundwater supplies have dwindled over time with heavy agricultural use, and groundwater quality is often poor.

An unchecked gap between water demand and supply could cause water shortages even in normal years that would hamper the growth of one of the most important economies in the nation. Southern California's primary industries constitute about 61 percent of the total sales and dollar values of products and services in the State of California. Southern California's primary industries -- manufacturing, agriculture, trade, and services, most of which require large, reliable water supplies -- constituted nearly \$5.6 trillion (1987 dollars) in sales and dollar values. As an example specifically tied to water use, a Los Angeles Area Chamber of Commerce study showed that a 30 percent reduction in the water supplies going to large industries could result in a loss of about \$8 billion in revenues and 26,000 jobs.

### Reclaimed Water Sources and Markets

In view of water demand and supply problems in southern California, the Study seeks to provide a solution by identifying supplies of reclaimed water as well as potential markets, including environmental enhancement projects. According to preliminary Study findings, there is an abundant potential supply of nearly 2 million acre-feet of potentially reclaimable water that will increase annually by an average of about 40,000 acre-feet through the year 2040. However, currently, only about 350,000 acre-feet of recycled water is used each year leaving most of the reclaimed water, about 1.6 million acre-feet, to be discharged to the ocean. On the other hand, the potential reclaimed water supply will increase by half by the year 2010, and will reach about 4 million acre-feet per year by 2040.

In terms of markets for reclaimed water, the Study has identified areas of high or concentrated reclaimed water demand, which will be the focus of the Study during Phase IB and Phase II. Demand projections were based on anticipated population growth and corresponding water use. Geographic areas of demand for reclaimed water were based on current reclaimed water uses, which are highest for groundwater recharge (53%) and landscaping (19%), followed by sea water intrusion barriers (11%), environmental (8%), and agriculture (7%). Current reclaimed water demand shortages are largest for groundwater recharge and landscape uses, which together comprise 83% of the potential uses. Longer-term demands for reclaimed water will continue to be largest for landscaping and groundwater recharge, comprising about 75% of the total, while agriculture and industry will each need about 6 percent, and environmental demand is projected to be minimal at 2%.

### ENVIRONMENTAL ENHANCEMENT AREAS

By identifying potential reclaimed water markets and sources, specific projects and water transport systems will be planned that could provide reclaimed water to municipalities, agriculture, or industry, with largely incidental delivery to environmental enhancement areas.

The Service, as part of the Study, identified and ranked environmental enhancement opportunities that, in most cases, would be related to restoration. The selection and ranking process included research; consultations with local, state, and federal specialists; telephone surveys; and the use of advisory committees. The process resulted in a total of 80 environmental areas identified for potentially receiving reclaimed water, of which 17 are existing environmental sites and 16 are potential environmental enhancement projects. The remaining 47 locations are general habitat enhancement refuges, reserves, or wildlife areas. Most of the enhancement projects and habitat areas are considered to be wetlands of various types.

#### Functions of Wetlands

Southern California is unique in that it contains most types of wetlands and has historically been a significant habitat area. Wetlands are transitional lands between terrestrial and aquatic environments which may take several different forms that support certain plant, fish and wildlife species. There are five major classifications of wetlands: marine (ocean coastline areas), estuarine (inlet along ocean coastline), riverine (on or near the banks of a river), lacustrine (lakes and lake-sides), and palustrine (marshes). California has lost about 91 percent of its historical wetlands between about 1780 and the mid-1980s, with most of the loss in riparian wetlands.

In addition to supporting wildlife, wetlands benefit human needs directly through flood control, water storage, water treatment, and recreation and educational opportunities for adults and children. Relatively recent legal authorities and policies have placed a national and local priority on protecting and creating wetlands. The environmental enhancement projects and wetlands selected by the Study for potentially receiving reclaimed water include the five main categories of wetlands, most of which offer recreation and education opportunities.

### Existing Environmental Enhancement Projects

Of the 17 existing enhancement areas within the Study area that could benefit from reclaimed water supplies, several of the most important are in the Sepulveda Basin, which contains a wildlife pond, a lake, and a Japanese Garden. The three freshwater wetlands sites, are in Los Angeles, and are no more than a mile apart. Although they currently use some reclaimed water, they could be enhanced with more water. Although the primary uses are education and recreation with incidental wildlife use, there are several threatened or endangered species that use the basin. The peregrine falcon and loggerhead shrike use the wildlife pond, and the American coot, several species of grebes, starlings, and cowbirds have been seen at the lake.

### Potential Environmental Enhancement Projects

Sixteen potential enhancement areas that could possibly benefit from deliveries of reclaimed water were identified. One of these is a 19.2-mile reach of the Los Angeles River near downtown Los Angeles. The river has both palustrine and riverine type wetlands. Although there are numerous obstacles that may make it infeasible to create a habitat restoration project along the Los Angeles River, the Study identified an area covering up to 60 acres along three segments of the river that potentially could be restored, provided sufficient flood control protection can be maintained. If sufficient habitat is developed, Bell's vireo may be reappear in the area.

### Habitat Enhancement Areas

Some of the largest habitat areas, particularly for endangered species, are the 47 wildlife refuges, reserves, and wildlife areas identified for potentially receiving reclaimed water. One of the most important areas is the Cibola National Wildlife Refuge. The refuge is primarily a riverine wetland with some palustrine areas, and spans about 16,667 acres as it extends down a large segment of the Colorado River. The Cibola refuge is an important habitat area

primarily because of its location in the desert and its proximity to the North American flyway. In addition, the refuge is used for recreation and educational purposes with interpretive trails and picnic sites provided, and with fishing, boating, and hunting activities. The wetland is important for several species of threatened or endangered birds.

#### CONCLUSION

The Study is important for enabling southern California to continue to be a garden in the desert for people and the environment. A growing water demand and shrinking supplies have been documented by the Study, and the result could be a damaged or limited economy in the future. In addition, environmental needs for water could continue to suffer without an alternative source of supply. The Study has also identified areas of large reclaimed water supply and demand.

The next step in the Study will be to solve water supply and demand problems by connecting reclaimed water supplies with potential market demands. Potential uses for the reclaimed water include landscape and agricultural irrigation, groundwater recharge, and other urban uses, and environmental projects including wetlands. Identifying candidate environmental projects for reclaimed water has been an integral step in the Study. By locating large reclaimed water supplies and potential markets, the Study will attempt to ensure that there will be enough water in the future for the needs of municipalities, industry, agriculture, and the environment.

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