

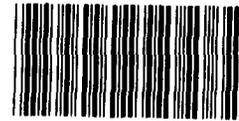
GAO

Report to the Chairman, Subcommittee  
on Water and Power, Committee on  
Energy and Natural Resources, U.S.  
Senate

August 1991

# RECLAMATION LAW

## Changes Needed Before Water Service Contracts Are Renewed



144833

**RELEASED**

**RESTRICTED**—Not to be released outside the  
General Accounting Office unless specifically  
approved by the Office of Congressional  
Relations.

---

---



United States  
General Accounting Office  
Washington, D.C. 20548

**Resources, Community, and  
Economic Development Division**

B-242275

August 22, 1991

The Honorable Bill Bradley  
Chairman, Subcommittee on Water and Power  
Committee on Energy and Natural Resources  
United States Senate

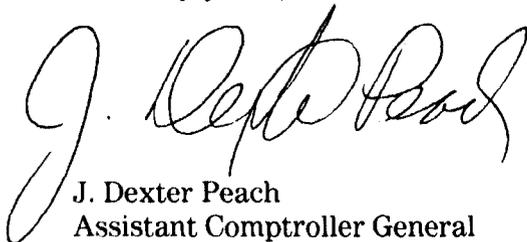
Dear Mr. Chairman:

This report responds to your request that we identify environmental and water use problems associated with water service contracts for the Central Valley Project entered into by the Department of the Interior's Bureau of Reclamation and determine whether contract renewals would allow such problems to continue.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the Secretary of the Interior, the Commissioner of the Bureau of Reclamation, and other interested parties. Copies will also be made available to others on request.

This report was prepared under the direction of James Duffus III, Director, Natural Resources Management Issues, who can be reached at (202) 275-7756 if you or your staff have any questions. Other major contributors to this report are listed in appendix I.

Sincerely yours,



J. Dexter Peach  
Assistant Comptroller General

# Executive Summary

---

## Purpose

Irrigation has made California's Central Valley one of the most productive agricultural areas in the world. Farmers in the federal Central Valley Project (CVP) receive over 6 million acre-feet—an acre-foot is about 326,000 gallons—of low-cost federally subsidized water each year for irrigation. However, this irrigation has been linked to environmental problems and to the production of subsidized crops.

The Department of the Interior's Bureau of Reclamation has been providing CVP irrigation water to state-established water districts through 40-year water service contracts. Interior has begun renewing the 238 irrigation contracts as they expire for the same quantities of water.

The Chairman of the Subcommittee on Water and Power, Senate Committee on Energy and Natural Resources, asked GAO to identify environmental and water use problems associated with the CVP's water service contracts and determine whether problems will continue if contracts are renewed.

---

## Background

Located in California's Central Valley Basin, the CVP is the Bureau's largest water resource project in the United States. About 85 percent of the CVP's water supply is used for irrigation, with the remainder used for other purposes, such as municipal and industrial use. The CVP's water is marketed under the Reclamation Project Act of 1939 (43 U.S.C. 485), which authorized the Secretary of the Interior to enter into short- or long-term (10 to 40 years) contracts with water districts to supply subsidized water for irrigation. The water is referred to as subsidized because the rates do not cover all costs, such as interest on the federal government's investment in the irrigation component of water resource projects. The act of July 2, 1956, amends the Reclamation Project Act by requiring the Secretary to renew the long-term contracts if water districts request it.

---

## Results in Brief

Significant environmental and water use problems associated with irrigation practices carried out under water service contracts have developed in the CVP.

- Irrigation practices have contributed to selenium poisoning and increasing salinity in the CVP's San Joaquin Valley.
- Some farmers use CVP water to produce crops that are also eligible for subsidies under the U.S. Department of Agriculture's (USDA) commodity programs.

- With most CVP water dedicated to irrigation through water service contracts, the water supply available for wildlife habitat is inadequate.

Unless renewed contracts provide incentives to change irrigation practices and allow greater flexibility in water use, problems associated with these irrigation practices may continue for the duration of the contracts. Since the Secretary of the Interior currently is renewing the contracts for the same duration (about 40 years) and the same quantities of low-cost water, irrigators will have little incentive to use water more efficiently. In addition, because the long-term contracts will commit water to irrigation, California's growing demands may not be met.

Interior considers long-term contract renewal for the same quantity of water a nondiscretionary action under the 1956 act. As a result, Interior will not change these provisions regardless of the results of environmental impact statements prepared under the National Environmental Policy Act (NEPA). Without a thorough analysis of all the impacts of contract renewal and the alternatives, the Bureau cannot make an informed decision on whether to renew contracts under existing terms or whether alternative provisions would provide better water management.

---

## Principal Findings

---

### Environmental Degradation Is Occurring

Agricultural drainage has degraded the quality of the area's water supply and soil, poisoning wildlife and threatening agricultural productivity. In 1984 the U.S. Geological Survey documented the presence of selenium<sup>1</sup> accumulating at dangerous levels in the Kesterson National Wildlife Refuge and linked the contamination to drain-water runoff from farms in the CVP's Westlands Water District. Increasing salinity in the San Joaquin Valley, caused by dissolved salts left in the soil as water evaporates, has cost millions of dollars in crop damage.

---

### Subsidized Water Is Used for Subsidized Crops

Some CVP farmers use subsidized water to produce crops that are also eligible for subsidies through USDA's commodity programs. Interior's Office of Inspector General reported in September 1990 that two large farm operations in the San Luis Unit of the CVP received a total of \$5.5

---

<sup>1</sup>Selenium is a trace element occurring naturally in soil and needed in small amounts to sustain life. High levels have been associated with abnormalities in waterfowl, such as weight loss, embryo deformities, and mortality.

---

million in federal irrigation and crop subsidies from 1986 through 1988. The Congress has expressed concern over the apparent inconsistency between the Bureau's programs for increasing agricultural production through inexpensive subsidized water and USDA's programs for raising prices while limiting production.

---

### Wildlife Habitat Needs Are Not Being Met

A water supply of more than 500,000 acre-feet annually is needed to sustain Central Valley wetlands; however, annual water deliveries total about 380,000 acre-feet. According to the Bureau, inadequate water supply is a major factor limiting the quantity and quality of Central Valley waterfowl habitat. In addition, the use of water for irrigation adds to the adverse effects of dam construction by reducing the amount of water left in-stream for salmon and steelhead trout.

---

### Problems Could Be Perpetuated Under Contract Renewals

Increased conservation and more efficient water use might reduce environmental damage from irrigation, while increasing the water supplies available for wildlife and other uses. Yet because the renewed contracts will provide the same quantities of low-cost water, and water districts are required to pay for all water whether or not they use it, irrigators have little reason to alter their current irrigation practices.

In addition, the Bureau may not be able to meet changing water supply needs if California's population increases as projected. Under long-term contracts, the Bureau cannot transfer irrigation water as competing demands emerge because it is contractually bound to provide irrigation districts with the same quantities of water. Water districts can transfer irrigation water to other users with the Bureau's approval, but legal uncertainties and third-party impacts impede transfers.

---

### Impact Analysis Limited

On the basis of its 1988 Solicitor's Opinion, Interior interprets the 1956 act as requiring it to renew long-term contracts for the same quantities of water so long as the districts use the water beneficially. Under the act, long-term contract renewals are to be for at least 10 years, potentially restricting the Bureau's management of emerging concerns.

Interior maintains that because long-term contract renewal for the same quantity of water is nondiscretionary, it is not subject to change as a result of NEPA environmental impact statements. Without an analysis of all the impacts of contract renewal, the Bureau cannot make an informed decision on whether to renew contracts under existing terms

or whether alternative provisions would provide better management of water resources. Changes to consider include market mechanisms such as raising water prices and easing water transfers as well as a reduction in the quantity of water guaranteed for irrigation. Renewing contracts for shorter periods of time would provide more opportunities to address new problems as they develop.

---

## Recommendations to the Congress

To provide the Department of the Interior with greater flexibility to manage Bureau of Reclamation water in the Central Valley Project in the most effective and efficient manner, GAO recommends that the Congress (1) place a moratorium on all CVP contract renewals, while temporarily extending existing contracts, and (2) amend the 1956 act to explicitly allow contract renewals for lesser quantities of water and shorter periods of time so the Bureau can periodically assess water use.

---

## Recommendations to the Secretary of the Interior

GAO is making recommendations to the Secretary of the Interior to determine the impacts of renewing CVP water service contracts for the same quantities of water, for long terms, and to incorporate into renewed contracts changes in contract terms identified as likely to mitigate problems associated with water service contracts.

---

## Agency Comments

As requested, GAO did not obtain official agency comments on this report. However, GAO discussed the factual information in the report and the implications of these facts with Bureau officials. In general, the officials said that the information was accurate and GAO incorporated suggested changes where appropriate. However, these officials did not agree that the duration and quantity provisions in renewed contracts should change. They believed the Bureau's role should be to provide the same quantity of water and that the state should decide how it is used. GAO believes the problems identified transcend state boundaries and that the Bureau should have the flexibility to be an active participant in determining the use of the water supply available.

# Contents

---

<b>Executive Summary</b>		2
<hr/>		
<b>Chapter 1</b>		8
<b>Introduction</b>	The Central Valley Project	8
	Water Service Contracts	10
	Changes to Water Service Contracts	10
	Objectives, Scope, and Methodology	12
<hr/>		
<b>Chapter 2</b>		13
<b>Problems Associated With Irrigation Practices Carried Out Under Water Service Contracts</b>	Environmental Degradation Is Occurring	13
	Subsidized Water Is Used to Produce Subsidized Crops	16
	Wildlife Habitat Needs Are Not Being Met	18
<hr/>		
<b>Chapter 3</b>		22
<b>Environmental and Water Use Problems May Be Perpetuated Under Contract Renewals</b>	Contract Renewal Will Likely Maintain Current Irrigation Practices and Problems	22
	Emerging Competing Demands May Not Be Met	23
	Bureau Will Not Be Fully Addressing Current and Emerging Problems	24
	Conclusions	29
	Recommendations to the Congress	30
	Recommendations to the Secretary of the Interior	30
<hr/>		
<b>Appendix</b>	Appendix I: Major Contributors to This Report	32
<hr/>		
<b>Figures</b>	Figure 1.1: Major Components of the Central Valley Project in California	9
	Figure 2.1: California's San Joaquin Valley and Westlands Water District	14

---

### **Abbreviations**

CVP	Central Valley Project
EPA	Environmental Protection Agency
GAO	General Accounting Office
NEPA	National Environmental Policy Act
USDA	U.S. Department of Agriculture

# Introduction

The Department of the Interior's Bureau of Reclamation plans, constructs, and operates water resource projects to, among other things, provide irrigation water to arid and semiarid lands in the 17 western states. Construction, operation, and maintenance of these projects are financed with federal funds. The Bureau sells most of its irrigation water to state-established water districts that purchase the water under contracts. By selling the water, the Bureau, over time, recoups a portion of the federal government's investment to provide the water.

The Bureau's Central Valley Project (CVP) provides water for irrigation and other purposes to water districts in California through long-term water service contracts. The Bureau has begun renewing these 40-year contracts as they expire.

## The Central Valley Project

The CVP, located in California's Central Valley Basin, is the Bureau's largest water resource project and consists of dams, reservoirs, canals, and pumping and power generating facilities. The Central Valley Basin includes the Sacramento River in the north and the San Joaquin River in the south, and extends nearly 500 miles. The two river systems join at the Sacramento-San Joaquin Delta, and eventually flow out to the Pacific Ocean.

Initially authorized by the Congress under the Rivers and Harbors Act of 1935, the CVP was constructed by the Bureau of Reclamation primarily to supply water for irrigation. It also provides flood control, improves navigation, supplies municipal and industrial water, generates electric power, provides recreational opportunities, and conserves fish and wildlife. Farmers in the CVP normally receive over 6 million acre-feet of water on about 3.8 million acres of land.<sup>1</sup> Over 2.3 million acre-feet of this water is delivered to exchange contractors, who held water rights before the CVP was built and now receive their water through CVP facilities. Figure 1.1 shows the location of the CVP's major components.

<sup>1</sup>An acre-foot is the volume of water necessary to cover 1 acre to a depth of 1 foot—about 326,000 gallons.

Figure 1.1: Major Components of the Central Valley Project in California



---

## Water Service Contracts

The CVP's water is marketed under the Reclamation Project Act of 1939 (43 U.S.C. 485), which authorized the Secretary of the Interior to enter into short- or long-term contracts with state-established water or irrigation districts to supply subsidized water for irrigation.<sup>2</sup> The act of July 2, 1956, amends the Reclamation Project Act by adding provisions for renewal of long-term contracts to ensure farmers a continuing supply of water. Under this act, contracts may be renewed before expiration on terms mutually agreeable to all parties. In its 1988 Solicitor's Opinion, Interior interpreted the act as requiring the Secretary to renew long-term contracts for the same quantities of water that is beneficially used by water districts, if so requested by a district. The 1956 act defined long-term contracts as those lasting for 10 to 40 years.

In 1989 Bureau records showed 238 long-term contracts for irrigation water in the CVP, with expiration dates from February 1989 through December 2026. Interior renewed the first CVP water service contract in May 1989 for the Orange Cove Irrigation District within the CVP's Friant Unit. Ten additional Friant Unit contracts were renewed between September 1990 and February 1991. All the contracts were renewed through the year 2029—40 years from the renewal date for the first contract renewed—so that all renewed contracts within the unit will expire in the same year. Over one-quarter of the remaining 227 CVP irrigation contracts will expire over the next 5 years.

---

## Changes to Water Service Contracts

Certain contract provisions in the renewed water service contracts differ from those of the original 40-year contracts, primarily because of reclamation and environmental laws enacted in recent decades. The Reclamation Reform Act of 1982 (43 U.S.C. 390aa to zz-1) requires the price of irrigation water in all new or amended contracts to fully cover annual project operation and maintenance costs. Under a 1986 statutory requirement, all new or amended contracts in the CVP must include a provision for automatic adjustment of rates if the rates are too low to allow recovery of the appropriate share of the existing federal capital investment in the project by the year 2030. Previously, the fixed rates established in contracts were not always sufficient to allow recovery of operation and maintenance costs over the 40-year life of the contract because of inflation, and some districts were able to defer repayment of

---

<sup>2</sup>Water delivered at rates that do not cover all costs, such as interest on the federal government's investment in the irrigation component of its water resources projects, is referred to as subsidized water because the lost interest is viewed as a subsidy to farmers.

federal capital costs. As a result, by the end of fiscal year 1990 irrigators had repaid only \$10 million of over \$1 billion in capital costs associated with construction of irrigation facilities, as estimated in 1989. In the renewed contracts, the Bureau will adjust each water district's rates annually to meet these provisions.

Other changes to the contracts address environmental issues. The Reclamation Reform Act requires water districts to submit water conservation plans. Renewed contracts state that plans must contain economically feasible water conservation objectives and a schedule for meeting these objectives. The results of the plans are subject to the Bureau's review every 6 years. In addition, the 11 water service contracts renewed to date are subject to modifications to ensure compliance with environmental laws such as the National Environmental Policy Act (NEPA) (42 U.S.C. 4321) and the Endangered Species Act (16 U.S.C. 1531). Under NEPA the applicable federal agency must prepare a detailed environmental impact statement for any discretionary major federal action significantly affecting the quality of the human environment. This statement is designed to provide information on the environmental impacts of federal actions, and alternatives to mitigate these impacts, before the government commits to a proposed action. Under the Endangered Species Act, federal agencies must ensure that proposed actions are not likely to jeopardize the continued existence of any endangered or threatened species or to result in the destruction or adverse modification of critical habitat.

Basic contract provisions remain the same, however. In all contracts renewed to date water districts receive the same quantities of water provided in their original contracts, and are required to pay for the full volume of water specified, whether they use it or not, each year for the duration of their contracts. The Bureau must deliver the full volume of water specified in contracts if requested to do so by the water district unless drought conditions or other unavoidable causes prevent this.<sup>3</sup> The amount of water guaranteed under the contracts can only be changed by mutual written agreement.

Interior's interpretation of the 1956 act ensures that in the future all contracts will be renewed for the same quantities of water that is beneficially used, if so requested by the water district. California state law

---

<sup>3</sup>In February 1991 the Bureau announced that water deliveries to CVP water districts in 1991 would be reduced by 25 to 75 percent because of the prolonged drought in California.

defines what is considered to be a beneficial use of water. To assess beneficial use for contract renewal, the Bureau examines the amount of irrigable acreage within each district to see if any changes have occurred since original contracts were signed and, therefore, whether all contract water can still be used. If, for example, urban development has replaced irrigated acreage, contract water may still be beneficially used for municipal and industrial use.

## Objectives, Scope, and Methodology

The Chairman of the Subcommittee on Water and Power, Senate Committee on Energy and Natural Resources, asked us to (1) identify environmental and water use problems associated with the irrigation practices carried out under the Bureau's water service contracts in the CVP and (2) determine whether such problems will be perpetuated if the long-term contracts are renewed.

To review water service contract provisions, we obtained copies of contracts from the Bureau's Contracts and Repayments Branch in Washington, D.C., met with Bureau officials regarding changes in contract provisions, and reviewed Bureau policies and federal reclamation laws relating to water service contracting practices.

To identify problems in the Central Valley associated with water service contracts, we reviewed reports, documents, and studies prepared by multiple federal and state agencies as well as private organizations. We met with Department of the Interior solicitors regarding compliance with NEPA. We also reviewed the Bureau's water transfer policy and discussed its implementation with Bureau officials in the Mid-Pacific Regional Office in Sacramento, California. We discussed proposed legislation with congressional staff.

Our work was conducted between June 1990 and May 1991 in accordance with generally accepted government auditing standards. As requested, we did not obtain official agency comments on a draft of this report. However, we discussed the factual information in the report with Bureau of Reclamation officials in Washington, D.C. In general the officials said that the information was accurate; in a few instances they suggested revisions to information that they believed to be technically inaccurate. We made changes where appropriate. These officials also commented on the issue of changing the contract provisions regarding long-term duration and the quantity of water to be delivered. We discuss these matters in the report.

# Problems Associated With Irrigation Practices Carried Out Under Water Service Contracts

Significant problems associated with irrigation practices carried out under water service contracts have developed in the CVP. Irrigation practices have been linked to environmental degradation of water and soil in the CVP's San Joaquin Valley. Some CVP farmers use subsidized water to produce crops that are also eligible for subsidies under USDA's commodity programs. With most of the CVP's water dedicated to irrigation through water service contracts, the supply of water available for wildlife habitat is not adequate.

## Environmental Degradation Is Occurring

The irrigation practices of farmers in the CVP have contributed to environmental problems in the San Joaquin Valley. Agricultural drainage has degraded the quality of the area's water supply and soil, poisoning wildlife and threatening agricultural productivity with selenium accumulation and increasing salinity. If current irrigation practices continue, problem areas will expand. This expansion can be slowed or stopped by increasing irrigation efficiency and reducing irrigation.

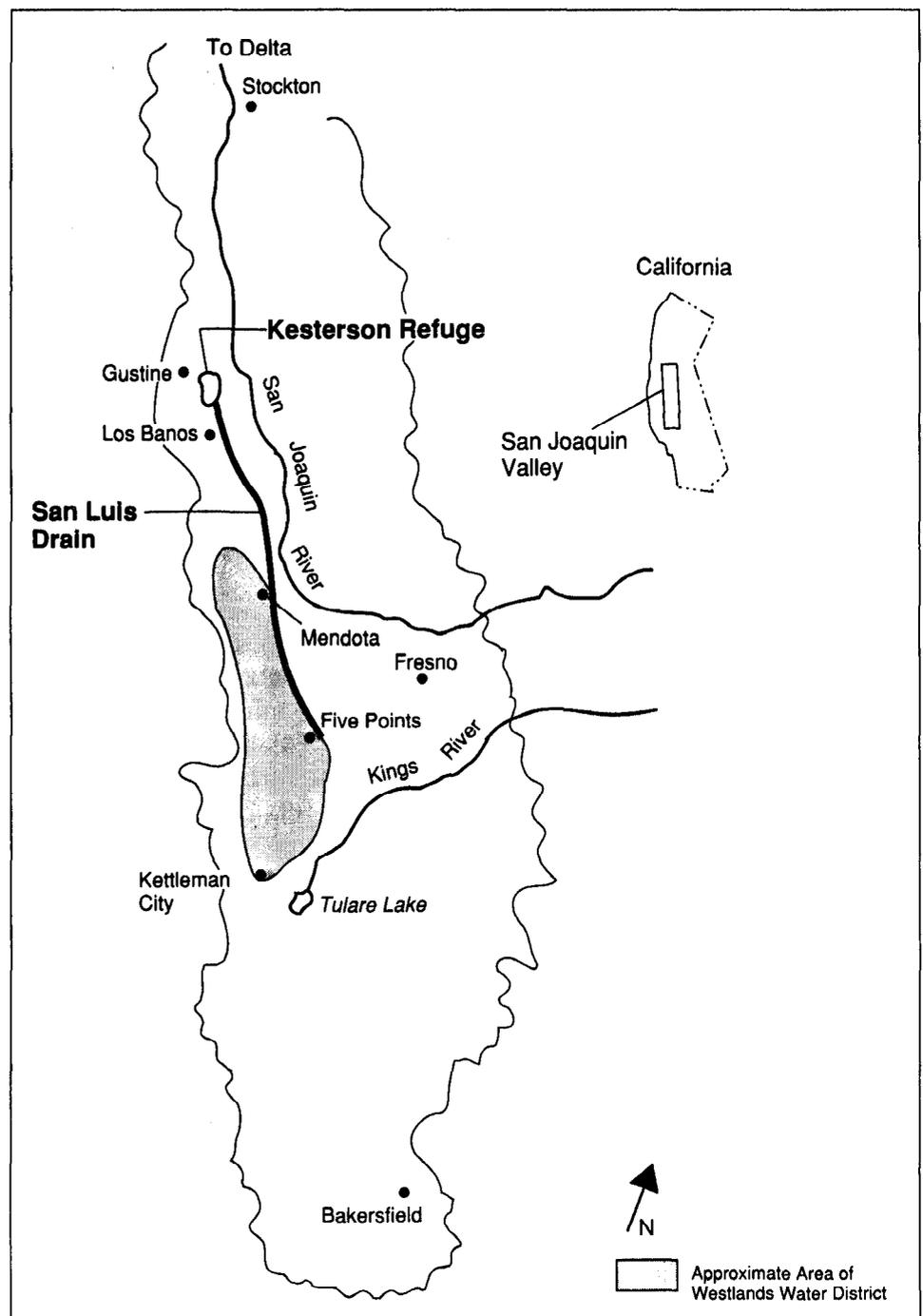
## Irrigation Practices Have Caused Selenium Poisoning

Much of the west side of the San Joaquin Valley lies above an impermeable layer of clay that impedes the movement of water downward through the soil. To alleviate drainage problems, the Bureau began construction of the San Luis Drain in 1968 to collect agricultural drain-water from farms in the CVP's Westlands Water District in the San Luis Unit. (See fig. 2.1.) Selenium, a trace element that occurs naturally in soil and is needed in small amounts to sustain life, was being leached out of the soil and carried in agricultural drain-water. It was accumulating in Kesterson National Wildlife Refuge, the terminus of the drain, at dangerously high concentrations. In 1984 the U.S. Geological Survey documented the presence of selenium and positively linked the source of the selenium contamination in the Kesterson Reservoir to drain-water runoff from farms in the Westlands Water District. Researchers documented high selenium levels in waterfowl as well as associated abnormalities such as deformities and mortality in embryos as well as weight loss and death in adult birds.<sup>1</sup>

<sup>1</sup>Wildlife Management: National Refuge Contamination Is Difficult to Confirm and Clean Up (GAO/RCED-87-128, July 17, 1987).

**Chapter 2  
Problems Associated With Irrigation  
Practices Carried Out Under Water  
Service Contracts**

**Figure 2.1: California's San Joaquin Valley and Westlands Water District**



High levels of selenium have also been detected in agricultural drainage entering the Grasslands Water District in the western San Joaquin Valley. The Bureau has found that concentrations of selenium and other contaminants in water flowing into Grasslands have exceeded drinking water standards and criteria established for the protection of aquatic life or irrigated agriculture.

---

### Irrigation Practices Are Increasing Salinity

In addition to concentrating contaminants such as selenium, irrigation can diminish environmental quality by increasing salt concentrations in the soil and water. All water carries dissolved salts. As water evaporates, the salts are left behind in the soil. Too much salinity in the root zone can cause some plants to grow more slowly, while others die, threatening agricultural productivity. When there is adequate underground drainage, however, the salt can be flushed out of the soil by irrigating with more water than is needed to grow crops.

Salinity levels in river basins such as the San Joaquin Valley have become very high. Much of the west side of the San Joaquin Valley, located in a semiarid area of California, contains naturally saline soil with poor drainage. As a result, salty water stays on top of the underlying clay, eventually building up and saturating the root zone of crops until crop growth is no longer possible, or only salt-tolerant crops such as cotton can be grown. As more irrigation water is applied, the water table continues to rise and the waterlogged area expands. The Westlands Water District reported crop production losses due to salinity worth \$35 million in 1987.

Salinity in the river has increased as well. Not only does irrigation water pick up salts from the soil and drain into the San Joaquin River, but river diversions for irrigation reduce water supplies, thereby increasing the salt concentration in the remaining water. In addition, under an exchange agreement, downstream water rights holders receive CVP water from the Sacramento-San Joaquin Delta. Delta water is much higher in salts than the San Joaquin River water that originally supplied these farmers. According to 1987 testimony presented by California's South Delta Water Agency to California's Water Resources Control Board,<sup>2</sup> salt concentrations in the San Joaquin water supply to South Delta farming areas downstream from the CVP's Friant Dam increased substantially after the dam began operating in 1947, diverting San Joaquin River water for irrigation.

---

<sup>2</sup>The State Water Resources Control Board is the water permitting authority in California.

Discharge of agricultural return flows into the San Joaquin River is a major cause of the river's water quality problems, according to the State Water Resources Control Board. Most of the river flow during the summer months consists of agricultural return flow, which contains pesticides and fertilizers from surface runoff as well as salts and trace metals from drainage water. Modeling studies by the Control Board's San Joaquin River Basin Technical Committee suggest that increased flow to the San Joaquin River below the Friant Dam would improve the water quality in the river.

---

### Problem Area Will Expand If Current Practices Continue

The U.S. Geological Survey stated in a 1989 report that if present irrigation practices continue, the area in the San Joaquin Valley with drainage problems will enlarge. It noted that this expansion can be slowed or stopped by increasing irrigation efficiency and changing agricultural activities to reduce or eliminate irrigation. Similarly, the San Joaquin Valley Drainage Program<sup>3</sup> stated in its final report in 1990 that, if current irrigation practices continue, areas with groundwater levels within 5 feet of the surface of agricultural lands will continue to expand. The program predicted that this will reduce crop productivity, cause loss of farm income, increase costs of drainage management, and force land out of production. According to the program's report, a first step in solving San Joaquin Valley drainage problems is to reduce the production of potential drainage water. The report stated that options to reduce drainage water include increasing irrigation efficiency and retiring lands that have high salinity and selenium concentrations in underlying shallow groundwater. The report noted that improvement in the application of irrigation water has been shown to be the most effective and least costly means of reducing the amount of potential drainage problem water.

---

### Subsidized Water Is Used to Produce Subsidized Crops

Some CVP farmers produce crops with subsidized water that are also eligible for subsidies under USDA's commodity programs. The Congress has expressed concern over the apparent inconsistency between the Bureau's programs for increasing agricultural production through inexpensive subsidized water and USDA's programs for limiting production to raise prices and stabilize farm income.

---

<sup>3</sup>The San Joaquin Valley Drainage Program is a federal-state interagency program established in 1984 that has studied agricultural drainage and drainage-related problems in the western San Joaquin Valley.

---

## Federal Commodity Programs

The Agricultural Act of 1949 (7 U.S.C. 1421) authorized the Secretary of Agriculture to administer commodity programs to stabilize, support, and protect farm income and prices, and manage program crop reserves and surpluses. The specific features of these commodity programs are revised every 5 years by legislation. Crops such as corn, wheat, barley, rice, and cotton have been part of the program. Cotton and rice farmers in the CVP, among others, have been eligible for subsidies under these programs.

---

## Subsidized Crops Are Grown With Bureau Water

According to Interior, between 1976 and 1985 an average of 38 percent of the acreage served by the Bureau of Reclamation nationwide was associated with the production of subsidized crops. Interior reported that irrigation subsidies throughout the 17 western states totaled \$534 million in 1986, with \$203 million of this amount associated with the production of subsidized crops. Other estimates are higher. For example, the Bureau of Reclamation estimated that annual irrigation subsidies totaled \$2.2 billion in 1986, of which \$830 million was associated with the production of subsidized crops. Estimates differ because of different definitions of irrigation subsidy, different interest rates used to calculate the subsidy, and different methods for compounding unpaid interest.

Based on Interior's figures, 46 percent of the acreage in the CVP that received Bureau water in 1985 was used to produce subsidized crops. Interior's Office of Inspector General reported in September 1990 that two large farm operations producing primarily cotton in the San Luis Unit of the CVP received a total of \$5.5 million in federal irrigation and crop subsidies from 1986 through 1988.<sup>4</sup>

---

## Congressional Concerns About the Double Subsidy

The Congress has expressed concern over the apparent inconsistency between the Bureau's programs for increasing agricultural production through inexpensive subsidized water and USDA's programs for limiting production to raise prices. In the Reclamation Reform Act of 1982, the Congress requested that the Secretary of Agriculture report on the production of subsidized crops on acreage served by Bureau irrigation water. The USDA concluded in its report that reclamation and commodity program goals conflict and that policy is needed to link long-term agricultural capacity emphasized in reclamation programs and short-term

---

<sup>4</sup>Irrigation and Crop Subsidy Programs, Bureau of Reclamation, U.S. Department of the Interior Office of Inspector General, Report No. 90-106 (Sept. 1990).

income and agricultural stability objectives emphasized in commodity programs.<sup>5</sup> Similarly, Interior's Office of Inspector General recommended in its September 1990 report that the Bureau, in coordination with the USDA, develop policies and procedures to limit or eliminate double subsidies. The Bureau responded that it would work with USDA to enforce the provisions of any legislation passed, but that formulating policies prior to knowledge of possible legislative requirements would not be productive. According to the Office of Inspector General, the Bureau has not satisfactorily addressed this recommendation.

The Congress continues to express its concern through proposed legislation. In 1990 the House of Representatives passed H.R. 2567 specifying that under new or amended contracts, farmers who participate in crop commodity programs using Bureau water pay full cost for the water after four years if stocks of the crop exceed the amount the Secretary of Agriculture determines is necessary to provide for a reserve. However, the Senate did not pass a similar bill. Similar provisions passed the House in 1991 as well.

---

## Wildlife Habitat Needs Are Not Being Met

Typically, over 85 percent of the CVP's water supply is dedicated to irrigation through water service contracts, with the remainder divided among other purposes such as municipal and industrial use and fish and wildlife conservation. This use pattern results in not enough water being available for wildlife habitat needs.

---

## Waterfowl Habitat Not Adequately Supplied

Valuable wildlife habitat in California's Central Valley is threatened by a declining water supply. Studies indicate that agricultural and urban development have destroyed over 90 percent of the Central Valley's original wetlands habitat. Currently, 10 national wildlife refuges and 4 state wildlife management areas in the Central Valley provide about one-third of the state's remaining waterfowl habitat. Most of the wintering waterfowl on the Pacific Flyway, one of four migratory waterfowl routes across North America, are concentrated in the Central Valley. Central Valley wetlands and associated habitat are also important to a number of threatened and endangered species.<sup>6</sup> The Bureau

---

<sup>5</sup>Production of Surplus Crops on Irrigated Land Served by the U.S. Bureau of Reclamation, United States Department of Agriculture, Economic Research Service, (Feb. 1984).

<sup>6</sup>An endangered species is any species that is in danger of extinction throughout all or a significant portion of its range. A threatened species is any species that is likely to become an endangered species within the foreseeable future. Both are protected by the Endangered Species Act.

reported in 1989 that a water supply of more than 500,000 acre-feet annually is needed for optimum management of all the Central Valley wetland refuges. However, existing firm supplies—legal entitlements to water—totaled 121,713 acre-feet, or 77 percent less than needed for optimum management. This is the amount of water the refuges will receive even in very dry years. The amount of water available to refuges varies each year, depending on precipitation and carryover from previous years. As a result, average annual water deliveries totaled about 380,000 acre-feet per year, or 27 percent less than needed.

The Bureau stated in its 1989 Report on Refuge Water Supply Investigations that inadequate water supply is a major factor limiting the quantity and quality of Central Valley waterfowl habitat and a principal problem for 15 wildlife areas in the Valley. None of the areas receives, on a yearly basis, the quantity of water required to operate optimally. Eight of the 15 areas have no existing dependable supply of water. Pixley National Wildlife Refuge, for example, has no firm supply, and needs 6,000 acre-feet per year to satisfy its primary objective of restoring habitat for endangered species and migratory waterfowl. The Bureau reported in 1989 that wildlife areas typically receive water only after all agricultural and municipal and industrial demands are fulfilled.

The Grasslands area, in which much of the remaining Central Valley wetlands are located, covers 100,000 acres downstream from the CVP's Friant Dam on the San Joaquin River. The California Department of Fish and Game considers the waterfowl habitat in part of the Grasslands area the most important in the Pacific Flyway, and Interior's U.S. Fish and Wildlife Service ranked preservation of this habitat as one of the highest priorities in its waterfowl habitat program.

Historically, the Grasslands area received water from the San Joaquin River. However, because of CVP diversions of the river—primarily for irrigation—the area now depends entirely on agricultural drainage, imported surface water, and groundwater. Based on Bureau figures, Grasslands has a firm supply about one-third the amount needed for optimum management, and average annual supplies about 68 percent of the amount needed. The San Joaquin Valley Drainage Program recommended in its 1990 final report that the Bureau of Reclamation seek authority to reallocate 74,000 acre-feet of water annually from the CVP to partially replace drainage water previously delivered to Grasslands wetlands but no longer delivered because the water was too contaminated.

The Bureau, assisted by the U.S. Fish and Wildlife Service, the California Departments of Fish and Game and Water Resources, and the California Waterfowl Association, is reviewing alternatives for increasing water supplies to 15 wildlife refuges in the Central Valley, but has not yet recommended plans to provide additional water. Possible alternatives identified by the Bureau in its 1989 Report on Refuge Water Supply Investigations focus largely on construction or improvement of conveyance facilities to deliver water to refuges, as well as pumping of groundwater in dry years. The Bureau acknowledged, however, the likelihood of groundwater overdraft problems and the often prohibitively high cost of additional groundwater pumping. It also recognized that the current demand for CVP water exceeds the anticipated available supply.

## Water Supply and Quality Affect Salmon and Steelhead Trout

California's salmon and steelhead trout populations have declined precipitously in recent decades because of land use changes affecting water supply and quality such as irrigation, logging, grazing, mining, and land development. In its 1988 report to the California legislature, the California Advisory Committee on Salmon and Steelhead Trout<sup>7</sup> stated that dams have reduced fish numbers significantly by impeding upstream migration of adults to spawn in river headwaters, and downstream migration of juveniles to the sea to mature. Damming of virtually all salmon and steelhead rivers in the Central Valley has reduced the amount of river available to migrating fish by 95 percent. Current irrigation practices add to the adverse effects of dam construction by storing and diverting river water for irrigation, thus reducing the amount of water left in-stream for fish.

The San Joaquin Valley Drainage Program noted that in-stream flows in the San Joaquin River between the CVP's Friant Dam and the Merced River are inadequate to sustain migration of salmon. The Advisory Committee estimated that 75 percent of California's in-stream salmon production and 50 percent of remaining steelhead trout are at risk because of inadequate streamflow in the Sacramento-San Joaquin Delta and the Trinity River. Spring runoff necessary for downstream migration of juvenile fish is stored in CVP reservoirs and released later in the year to irrigation customers. Stored water from reservoirs is often too warm for survival of these coldwater fish. According to the Advisory Committee report, fall 1987 stream temperatures in the upper Sacramento and

<sup>7</sup>The California Advisory Committee on Salmon and Steelhead Trout was created by the California legislature in 1983 to develop a strategy for the conservation and restoration of salmon and steelhead trout. Its 11 members represent commercial fisheries, sportsfishing organizations, fisheries science, Native Americans, and the general public.

---

**Chapter 2**  
**Problems Associated With Irrigation**  
**Practices Carried Out Under Water**  
**Service Contracts**

---

American rivers below CVP reservoirs were lethal for salmon and their spawn.

# Environmental and Water Use Problems May Be Perpetuated Under Contract Renewals

Unless irrigation practices are changed under renewed contracts, the environmental and water use problems associated with these practices may continue. The Department of the Interior is renewing water service contracts for the same quantities of water for up to 40 years, providing irrigators little incentive to alter irrigation practices. In addition, the long-term renewal may inhibit the Bureau's ability to meet future emerging demands, such as municipal and industrial water supply needs. Interior is renewing contracts on the basis of its 1988 Solicitor's Opinion, stating that long-term contract renewal for the same quantity of water is nondiscretionary and not subject to change as a result of NEPA environmental impact statements. Contract renewals currently are not being preceded by analysis of the environmental, economic, and water use impacts of renewal and by a thorough consideration of alternatives that might mitigate problems.

## Contract Renewal Will Likely Maintain Current Irrigation Practices and Problems

Renewal of contracts for the same quantities of low-cost water gives CVP farmers little incentive to alter existing irrigation practices and invest in efficient technologies or to shift cropping patterns to less water-intensive crops. The problems associated with irrigation practices carried out under water service contracts are likely to continue unless contract provisions are changed to promote greater efficiency.

Increased irrigation efficiency and conservation could reduce environmental degradation caused by agricultural runoff and drainage while freeing water currently diverted for irrigation for other uses. However, the low cost of federal irrigation water is a disincentive to increased irrigation efficiency. Irrigators who pay higher water rates generally tend to use less water per acre of cropland, either by shifting to crops that require less water, or by installing more efficient irrigation methods. Irrigation efficiency can be increased, for example, by scheduling irrigation to fit the needs of the crop more precisely. Technologies such as laser leveling, drip, and sprinkler irrigation systems can also increase efficiency. Laser leveling removes the irregular high and low spots that can cause overwatering in some areas in order to give other areas enough water. Drip and sprinkler systems reduce runoff and excess percolation. However, these systems are costly to install.

Under the Reclamation Reform Act all water districts are required to develop water conservation plans. Renewed contracts state that these plans must be accepted by the Bureau for approval before delivery of water. Conservation objectives are required to be appropriate and economically feasible. However, despite these plans each water district will

receive the same quantity of water beneficially used that was provided in its original contract if it so requests. Districts are required to pay for all of the water specified in their contracts whether or not they use it. Since districts are required to pay for the water, they are likely to take their entire share for use within the district. With the same amount of low-cost irrigation water available, irrigators have little incentive to invest in efficient irrigation technologies.

## Emerging Competing Demands May Not Be Met

If water service contracts are renewed without change, the Bureau may not be able to meet changing water supply needs. As California's population grows from 26.1 million in 1985 to a projected 36.3 million in the year 2010, additional demands for water such as urban use are expected to grow rapidly. However, under recently renewed long-term contracts the Bureau has no flexibility to redistribute, sell, or transfer irrigation water as competing demands emerge. The Bureau is contractually bound to provide districts with the same quantities of subsidized water provided for the past 40 years, for the long-term duration of the contracts, unless drought or other unavoidable causes prevent this. Once signed, these contractual obligations will not change as California's water needs change without agreement from both the Bureau and the irrigation districts.

Unlike the Bureau, the water districts themselves have some flexibility under the renewed contracts to reallocate irrigation water to meet changing demand. Contract provisions and Bureau policies allow water districts to (1) reallocate water from irrigation to municipal and industrial uses within some districts (other districts are still permitted to use water only for agricultural purposes); (2) sell or transfer water to other CVP water districts in any given year, contingent on the Bureau's approval; and (3) voluntarily transfer water to users outside the CVP, also contingent on the Bureau's approval. To allow water to be used more efficiently and meet changing demands, the Bureau will approve transactions proposed by willing parties that are in accordance with state and federal law and do not adversely impact third parties.

These policies are steps in the direction of increasing flexibility and efficient water use. Transfer or marketing of water rights is receiving attention from many economists as an efficient way to deal with competing water supply problems. Water transfers would allow the market to facilitate the allocation of water to the highest valued uses. However, uncertainty about who owns rights to federally supplied reclamation water (the Bureau, the water district, or the individual irrigator) and about the

legality of transferring Bureau water under reclamation law potentially discourages such water transfers. Water transfers have not been specifically addressed in reclamation law, and language in authorizing legislation and other reclamation law limiting permissible project uses and project boundaries could discourage transfers among users who fear legal problems. Bureau policy on the evaluation and approval of proposed transfers is vague, adding to uncertainty.

In addition, private transfer efforts have revealed that with heavily used water resources, proposed transfers often impact third parties. For example, some water rights depend on return flows from users upstream. If the upstream irrigation right providing return flows is transferred to a new place in another river basin, these return flows are no longer available to others in the original basin. For those who wish to transfer water, determining and demonstrating these impacts is a complex and often costly process. As a result, third-party impacts are a significant impediment to water transfers. So far, transfers among water districts within the CVP have occurred, according to the Bureau, but there have been no transfers outside of the CVP. In fact, one water district has voted not to allow its water to be sold outside of the district.

Growing demand for water could result in pressure to build new, potentially expensive and environmentally damaging reservoirs. But growing demand could be met in part with existing sources. Some economists and environmentalists state that if 10 percent of California's agricultural water were conserved, the state's growing demands could be met for decades without developing any new sources. The recent drought in California, which has lasted 5 years, underscores the need to make the best use of the water supply as many interests compete for it. With current contract provisions and impediments to transfers, however, irrigators have little incentive to conserve.

---

## **Bureau Will Not Be Fully Addressing Current and Emerging Problems**

Interior has interpreted the 1956 act as requiring contract renewal for the same quantity of water that is beneficially used for between 10 and 40 years. As a result, it believes that long-term renewal of contracts for the same quantities of water is nondiscretionary, and that these provisions cannot be changed as a result of environmental impact statements. No analysis of the environmental, economic, and water use impacts of renewal is currently completed before contracts are renewed. Without a thorough analysis, the Bureau cannot make an informed decision on whether to renew contracts under existing terms, or whether contract

provisions could be changed to mitigate problems associated with the contracts.

---

### **Contract Renewal Based on 1956 Act**

The act of July 2, 1956, states that the Secretary of the Interior shall include provisions for renewal in long-term contracts under stated terms and conditions mutually agreeable to both parties, and shall provide parties a first right to a stated share or quantity of the project's available water supply for beneficial use on irrigable lands. According to Interior's 1988 Solicitor's Opinion, this act requires the Secretary to renew long-term water service contracts for the same quantities of water beneficially used that are provided in the original contracts. On the basis of this interpretation of the act's provisions, Interior is renewing contracts for the same quantities of water for up to 40 years as they expire.

Others disagree with Interior's interpretation of the 1956 act. In April 1989 the Environmental Protection Agency (EPA) interpreted these provisions as directing the Secretary to include in renewed contracts a stated share of the amount of water determined to be available for beneficial irrigation uses. EPA believes that the Secretary may consider competing beneficial uses and assess whether it is reasonable in today's water environment to devote the full contract amount exclusively to irrigation. EPA referred the matter to the President's Council on Environmental Quality,<sup>1</sup> which found in June 1989 that the act does not guarantee contractors a right to the same amount of water granted in the original contract.

Under the act, long-term contracts must last for between 10 and 40 years. The act, therefore, restricts management of concerns that develop within that time period. For example, if water quality in an area declines because of irrigation drainage and runoff upstream, additional water may not be available to dilute the contamination if the water is contractually obligated to other users. Shorter contract periods would allow the Bureau to manage the water more effectively.

---

<sup>1</sup>The Council is responsible for resolving interagency disagreements concerning implementation of NEPA.

---

NEPA Analysis Limited  
Because of Interior's  
Interpretation of 1956 Act

Interior currently is renewing the CVP irrigation contracts without fully analyzing the impacts of renewal and evaluating alternatives. It believes that contract renewal for the long-term and the same quantity of water is nondiscretionary under the 1956 act and is not subject to change as a result of NEPA environmental impact statements.

NEPA requires federal agencies to prepare environmental impact statements for major federal actions significantly affecting the quality of the human environment, and to include alternatives to proposed federal actions to aid in agency decision-making. Impact statements must identify agencies' preferred alternatives and are required only for actions over which federal agencies exercise some discretion.

Interior's Solicitor determined in the 1988 opinion, however, that since the Secretary has no discretion over renewing long-term contracts for the same quantities of water, an impact statement need not be prepared for their renewal. The Solicitor noted that other contract provisions are discretionary, and changes in these provisions may require environmental assessment. However, he determined that if changes in discretionary contract provisions involve only administrative or financial matters, then contract renewal causes no significant change, and is exempt from NEPA.

Interior renewed the first contract—with the Orange Cove Irrigation District in the Friant Unit—in May 1989 without an impact statement. However, in response to concerns over environmental impacts, in November 1989 the Secretary of the Interior directed that the Bureau conduct the San Joaquin River Basin Resource Management Initiative, a study to examine ways to mitigate the environmental impacts of irrigation and other water development in the San Joaquin Valley. Contracts in the valley were to be subject to modification pending the results of the initiative, but because water districts objected, the Bureau did not include this condition in the renewed contracts.

According to Interior's solicitors, because the initiative indicated a potential exercise of discretion over contract terms, NEPA environmental impact statement requirements apply to contracts renewed within the initiative study area, such as the Friant Unit contracts. As a result, the Bureau is preparing an environmental impact statement specifically addressing the environmental impacts of renewing contracts in the Friant Unit. Provisions in renewed Friant Unit contracts are subject to change pending the results of this impact statement. However, because

Interior considers contract renewal provisions for the long-term duration and quantity of water to be mandated by law, these provisions will not be changed as a result of the impact statement. Yet the duration and quantity of water are two of the most important conditions in the contracts.

Moreover, citing its legal obligation under the 1956 act, Interior intends to continue renewal of all of the 28 contracts within the Friant Unit even though the environmental impact statement on Friant Unit contracts has not been completed. By performing the impact statement analysis after making a decision to renew the contracts, Interior is not following NEPA regulations that require that environmental information be available before decisions are made and actions are taken. Agencies may not make a decision on a proposed action until a final impact statement is available.

Others disagree with Interior's interpretation of compliance with NEPA. The Council on Environmental Quality concluded in June 1989 that the Secretary has discretion regarding contract terms and that contract renewal is a major federal action significantly affecting the quality of the human environment. The Council recommended that the Bureau prepare a programmatic environmental impact statement addressing all CVP contact renewals or, if more effective, separate statements for each of the CVP units before renewal of contracts.

Similarly, in a pending federal district court lawsuit, the Natural Resources Defense Council<sup>2</sup> and other environmental interest groups contend that the renewal of contract terms for duration and volume of water are discretionary acts, are not exempt from NEPA, and should be considered in an environmental impact statement.<sup>3</sup> The Attorney General of California has voluntarily come forward in a brief filed with the court to concur with the plaintiffs that the decision to renew the contracts without first preparing an environmental assessment<sup>4</sup> and environmental impact statement violates NEPA.

Although Interior's legal position regarding its NEPA requirements has not changed, an attorney in its Office of the Solicitor advised us in May

---

<sup>2</sup>The Natural Resources Defense Council is an environmental interest group.

<sup>3</sup>Natural Resources Defense Council v. Houston, No. CIVS-88-1658-LKK-EM (E.D. Cal.), filed Dec. 21, 1988.

<sup>4</sup>Environmental assessments are used to determine if environmental impacts are likely to be significant, and therefore whether environmental impact statements are necessary.

1991 that as a matter of policy Interior intends to comply with NEPA prior to contract renewals in other CVP units, and complete either environmental assessments or environmental impact statements. It is not known how many other CVP units will require environmental impact statements. Regardless, the attorney advised us that contract provisions for long-term duration and quantity of water will not be changed as a result of environmental impact statements.

---

**Analysis Might Identify  
Better Water Management  
Practices**

Without a thorough analysis of the environmental, economic, and water use impacts of contract renewal, the Bureau cannot make an informed decision on whether to renew contracts under existing terms, or whether contract provisions could be changed to mitigate problems associated with the contracts.

Contract provisions that provide incentives for conservation and more efficient water use could reduce environmental damage resulting from irrigation drainage and runoff while increasing water supplies available for wetlands habitats and other uses, and increasing the amount of water left in-stream. Changes to consider include market mechanisms such as raising water prices and easing water transfers, as well as allowing water districts to pay only for water used, improving scheduling, and including provisions that address irrigation drainage charges or restrictions. These changes to contract provisions may be considered in the Friant Unit environmental impact statement.

However, such incentives may not fully address all problems. Given the existing and likely future competing demands for the CVP's water supply, a thorough impact analysis should consider, as a viable option, whether water currently guaranteed to irrigation districts could be better used for other purposes, and therefore whether the quantity of water provided to districts should be reduced. In addition, renewing contracts for shorter periods of time would provide more opportunities to address new concerns and new water demands as they emerge. Under the 1956 act, however, contracts must be renewed for at least 10 years.

Bureau officials stated that long-term renewal of contracts for the same quantities of water is necessary to ensure that farmers qualify for the long-term financing they require to continue operations. These officials also believe that the state is responsible for determining water use and the Bureau is responsible for providing water for the state to use. We believe, however, that the problems we identified transcend state and local boundaries and now compromise other national interests such as

environmental protection and wildlife conservation. This necessitates the federal government's becoming an active participant in determining the use of the limited supply of water available. Any impact analysis needs to address the implications of changes to contract provisions on quantities of water and duration for farming operations.

Such analysis would be consistent with the Bureau's stated new mission of effective and environmentally sensitive resource management. In describing its new mission in 1987, the Bureau mentioned the need to develop policies that encourage water conservation and efficient management of existing resources. Such analysis would also be consistent with the Bureau's drought assistance report released in February 1991. In addition to developing drought contingency plans, the Bureau stressed the importance of water conservation efforts to optimize the use of water resources.

The Bureau currently has a draft plan for developing a Central Valley Project Water Management Program to examine competition for water throughout the entire CVP, considering problems raised in previous studies such as wildlife water needs. The Bureau hopes to develop a comprehensive management strategy to achieve a balanced approach for the use of the CVP's water supply. However, under Interior's interpretation of the 1956 act most of the CVP's water is guaranteed to irrigation districts. In addition, the Bureau's management study will take years to complete, yet one-quarter of the remaining contracts will expire over the next 5 years. Continued renewal of water service contracts under the 1956 act will lock up CVP water specified in these contracts for their long-term duration.

---

## Conclusions

While the purpose of the 1956 act is to ensure irrigators a long-term supply of water, its provisions and Interior's interpretation of them will limit the Bureau's ability to address existing problems and meet emerging demands. When the Congress directed in the 1956 act that the contracts be renewed, the CVP's environmental degradation, the cost to the government of producing subsidized crops with subsidized water, the threat posed to wildlife by a declining water supply, and the potential need to redistribute available water among growing competing demands were not yet apparent. Yet continuing irrigation practices carried out under existing contract provisions now compromise other national interests such as environmental protection and wildlife conservation. This necessitates the Bureau's becoming an active participant in determining the use of the limited supply of water available.

Renewing the CVP's 238 contracts for the same quantities of water for up to 40 years could severely limit options for addressing existing and future problems. The Bureau should have greater flexibility to change contract provisions to address these problems. All contract renewals should be preceded by analysis of the environmental, economic, and management impacts of renewal. Analysis should include consideration of alternative contract provisions, including market mechanisms, that provide incentives for conservation and more efficient water use. This analysis should also consider, as a viable option, whether water currently guaranteed to irrigation districts should be reduced. Recurring droughts in California underscore the importance of determining the best use of the limited water supply to meet the ever-growing demand for water. Yet Interior states that it has a legal obligation under the 1956 act to renew long-term contracts before expiration for the same quantities of water.

Interior has already renewed 11 contracts and about one-quarter of the remaining contracts will expire in the next 5 years. Once the contracts are renewed, the quantity of water specified can only be changed by mutual written agreement of both Interior and the water district. Moreover, the more contracts that are renewed, the more difficult it may become to effect change because long-term contracts for the same quantity of water may be viewed as the norm.

---

## **Recommendations to the Congress**

To provide the Department of the Interior with greater flexibility to manage Bureau of Reclamation water in the Central Valley Project in the most effective and efficient manner, we recommend that the Congress (1) place a moratorium on all CVP contract renewals, while temporarily extending existing contracts, and (2) amend the 1956 act to explicitly allow contract renewals for lesser quantities of water and shorter periods of time so the Bureau can periodically assess water use.

---

## **Recommendations to the Secretary of the Interior**

We recommend that the Secretary of the Interior determine the impacts of renewing CVP water service contracts for the same quantities of water, for long terms. This impact analysis should include (1) an analysis of whether the water supply could be more effectively used to reduce environmental degradation and meet wildlife habitat needs and other emerging water needs in the state and (2) a demonstration of the extent to which problems associated with water service contracts can be mitigated by changes in the contract terms, including consideration of

---

**Chapter 3**  
**Environmental and Water Use Problems May**  
**Be Perpetuated Under Contract Renewals**

---

market mechanisms, to promote more efficient water use and conservation.

We also recommend that the Secretary of the Interior then incorporate into renewed contracts changes in contract terms identified as likely to mitigate problems associated with water service contracts.

# Major Contributors to This Report

---

Resources,  
Community, and  
Economic  
Development Division,  
Washington, D.C.

Leo E. Ganster, Assistant Director  
Caroline C. Vernet, Assignment Manager  
Amy Mathews Amos, Evaluator-in-Charge  
Phillip Farah, Economist

---

San Francisco  
Regional Office

George R. Senn, Advisor

---

Office of the General  
Counsel

Stanley G. Feinstein, Senior Attorney

---

Office of the Chief  
Economist

James R. White, Economist

---

### **Ordering Information**

**The first five copies of each GAO report are free. Additional copies are \$2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.**

**U.S. General Accounting Office  
P.O. Box 6015  
Gaithersburg, MD 20877**

**Orders may also be placed by calling (202) 275-6241.**

**United States  
General Accounting Office  
Washington, D.C. 20548**

**Official Business  
Penalty for Private Use \$300**

**First-Class Mail  
Postage & Fees Paid  
GAO  
Permit No. G100**