

Section 2 Sevier River Basin EXECUTIVE SUMMARY

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Section Two Sevier River Basin - State Water Plan

Executive Summary

This section summarizes the *Sevier River Basin Plan*. This plan contains 19 sections and is modeled after the *State Water Plan (1990)*. In addition, this plan contains Section A; *Acronyms, Abbreviations and Definitions*, and Section B; *Bibliography*.

Sections 1 and 3-19 are summarized under the following headings. Those sections should be studied for more detailed information.

2.1 FOREWORD

The *State Water Plan* provides a foundation for state water policy. This helps the state meet its obligation to plan and implement programs to best serve the needs of the people.

More detailed plans have been prepared for the Bear River, Cedar/Beaver, Kanab Creek/Virgin River, Jordan River, Utah Lake and Weber River hydrologic basins. The remaining basins will be completed by the year 2000. This plan was prepared under the direction of the Board of Water Resources.

The Sevier River is unique in Utah and is one of the most utilized rivers in the nation. It is used and managed under a complex system of water rights determined by court decrees, stipulations, agreements and certifications. Water rights are influenced by even small changes in weather patterns.

2.3 INTRODUCTION

Water planning has always been a part of Utah's history. Current water planning adds more impetus to the process and establishes guidelines that are critical to the concept. Preparation of this plan has involved many local, state and federal entities who are involved in and have expertise regarding water resources.

The Sevier River Basin is located in Central and South Central Utah. It covers nearly 6.8 million acres (10,575 square miles) which contain large variations in topography, climate,

soils and vegetation. Elevations drop from 12,173 feet to about 4,500 feet with precipitation ranging from more than 35 inches to less than 8 inches. Growing seasons range from 74 days at Panguitch to 144 days at Fillmore. The geologic parent materials provide a wide variety of soils producing vegetation from alpine conifer forest complexes to desert shrubs and grasses. Private lands cover about 23 percent of the area, federally administered lands 69 percent and state lands 8 percent. Indian tribal lands cover 1,735 acres.

Although the Fremont Indians irrigated land for crops about 1,000 years ago along Gooseberry Creek, Sanpete County settlers in 1849 were the first recent irrigators. Settlements soon sprang up all around the basin along with developments for culinary and irrigation water. Construction of reservoirs became necessary to manage the water resources beginning in 1860 with construction of Scipio Reservoir. Even today, projects are still being planned and facilities built to make the best use of the water and related resources.

2.4 DEMOGRAPHICS AND ECONOMIC FUTURE

The Sevier River Basin is essentially an agricultural-based economy. As such, the viability of the area is mostly controlled by the economics of the agricultural industry. Richfield is the basin's largest city as well as its service and trade center.

The 1997 population of the basin was more than 56,700 people. The area is expected to grow to nearly 86,000 people by 2020 and about 150,000 people by 2050, annual growth rates of 1.82 percent and 1.9 percent, respectively. Total job growth is expected to parallel the population. Total jobs were nearly 29,200 in 1997 and are expected to be more than 46,700 by 2020, increasing at an annual rate of 2.1 percent. Jobs

in government, trade and services will grow at about the same rate while jobs in agriculture will decline slightly.

2.5 WATER SUPPLY AND USE

The total water supply comes from precipitation except for small transmountain diversions and groundwater movement into the basin. This precipitation produces both surface water and groundwater. Most of the precipitation is used directly by native vegetation (primarily in the upper watershed areas) except in the **cropland** areas where it is used by cultivated crops. Total surface water tributary yield is nearly 823,000 acre-feet. Groundwater tributary yield is estimated at 20-25 percent of the surface water yield. The Sevier River is gaged at several points throughout the system, with several reaches flowing around 200,000 acre-feet annually. Major tributaries are the East Fork of the Sevier River, San Pitch River, Chicken Creek, Chalk Creek and Corn Creek.

Total diversions for irrigation were 903,460 acre-feet; culinary use, 23,360 acre-feet; and secondary irrigation, 8,590 acre-feet. Industrial use is 26,290 acre-feet of which 1,170 acre-feet is supplied from culinary water systems. After water is diverted for use, the unused portion returns to the river as return flow for rediversion downstream. Wetland and open water use is 262,620 acre-feet. This use is not considered part of the tributary yield but is included in the water budgets.

Surface water imports from the Colorado River basin to Sanpete Valley is 9,340 acre-feet annually. There is 4,800 acre-feet of water exported through the Tropic East Fork Canal to Tropic in the Colorado River basin. Groundwater moves in and out of the basin at several locations. There is movement into the basin through the Gunnison Plateau and from the Awapa Plateau. Movement out of the basin occurs from the Paunsaugunt Plateau, Markagunt Plateau and Pahvant Valley.

Water quality deteriorates as the flows move downstream. Water quality in the upper reaches is good with total dissolved-solids of about 300 mg/L. Salinity increases to about 1,040 mg/L in

the Redmond area and is about 1,025 mg/L near Lynndyl.

2.6 MANAGEMENT

Management of the water resources became imperative when average diversions exceeded the supply. Storage reservoirs were built, beginning with Scipio Reservoir in 1960, in order to save water during high flows for later use. Court decrees allocated water rights in an effort to divide up the available supplies. Even though the Higgins and Morse decrees and later "Bacon's Bible" managed the river system well, the Cox Decree in 1936 was the final determination of all the water rights. Although there have been modifications in this decree, it is still in use today.

There are several water users associations and water conservancy districts throughout the Sevier River Basin which assist with water management and development. More than 40 major water storage reservoirs have been built by water users. There are 72 mutual irrigation companies serving more than 1,000 acres each and an additional 103 irrigation companies serving less than 1,000 acres each.

Real-time monitoring systems have been installed at several locations in the Richfield and Delta areas. The issues at the end of this section address the need for more real-time monitoring stations. It is recommended that water-user groups take this responsibility.

2.7 REGULATION/INSTITUTIONAL CONSIDERATIONS

State agencies are required by law to provide administrative control and regulatory authority over the state's water resources. The State Engineer, as Director of the Division of Water Rights, has responsibility for administering the water rights and for dam safety. Currently, there are 20 high hazard reservoir dams that could cause loss of life and considerable property damage if they failed. Water quality regulations are administered by the Water Quality Board and the Drinking Water Board. The Division of Water Quality and Division of Drinking Water, respectively, are staff for these two boards.

Other entities also have responsibilities for regulating and managing certain aspects of the water resources. These include mutual irrigation companies, water conservancy districts, special service districts, drainage districts, and cities and towns. These entities can levy taxes and assessments for maintenance and operation of their facilities.

Water is an important part of our environment, making it possible to have healthy lives and pleasing surroundings. It is important to improve and maintain the quality of the water resources in order to provide a good, clean water supply for human use and for wildlife habitat.

Problems include the increasing demand for domestic wells as more summer homes are built and people continue to build in valley areas not served by community water systems. Another problem is the deterioration of water quality.

2.8 WATER FUNDING PROGRAMS

Funds have always been a part of development of the water resources. In the days of early settlement, most of the funds came from local sources although the state started participating at a later date. There are now many state and federal programs with funding available for water development using either grants or loans or a combination of both. More than \$106 million of state funds and nearly \$15 million of federal funds have been made available for water resources development. Loan funds have to be repaid so much of this investment eventually comes out of the pockets of the local water users.

2.9 WATER PLANNING AND DEVELOPMENT

Since agriculture is the largest water user, management of the river system is centered around meeting these demands. There is a need for development of more storage to provide better water management for some users with only direct flow rights but this is limited under the current water rights constraints. Water quality (primarily salinity) is a problem from the Redmond-Gunnison area to the lower end of the river. It is also a problem in the lower Chicken Creek area and in Pahvant Valley. Water quality

studies are now underway by the Division of Water Quality to consider ways to reduce pollution of the river system.

Two communities in Sanpete County and four in Sevier County will be short of culinary water supplies by 2020. This shortage will be caused by a lack of water rights or system capacity. If the demand for domestic wells increases as it has in the past, there will be a shortage of water outside of community systems. These total domestic culinary water needs are expected to be nearly 1,200 acre-feet or water for about 4,800 people. With the existing closure on development of the groundwater reservoirs, meeting this demand will require purchase of existing water rights, which is becoming increasingly difficult.

Total depletions for mans use were about 618,460 acre-feet for 1996. This is expected to increase to 630,960 acre-feet by 2020. The extra water to meet this increased demand is expected to come from importing additional water from the Colorado River basin through the Gooseberry Project, more efficient use of the existing supplies, and cloud seeding.

Water education for young people is becoming more important. This is carried out though such things as Project WET (Water Education for Teachers) and the Young Artists' Water Education Poster contest. The goal of Project WET is to facilitate and promote awareness, appreciation, knowledge and stewardship of water resources. This is done by



Pivot sprinkler near Circleville

training public and private school teachers through hands-on training.

2.10 AGRICULTURAL WATER

The economy of the Sevier River Basin is centered around agriculture. The major agricultural operations are cow-calf and beef production although the turkey industry is important in Sanpete County. Most of the irrigated agriculture supports these operations.

The average farm size has increased from about 200 acres in 1924 to 390 acres in Sevier County, 790 acres in Millard County and 1,640 acres in Juab County in 1992. This trend has resulted in a one-third decrease in the number of farms. Presently, 903,460 acre-feet of water is diverted onto 354,320 acres of irrigated lands. About 783,000 acre-feet of this water is diverted from surface water supplies and 120,460 acre-feet from groundwater. Major irrigated crops are 40 percent alfalfa, 14 percent pasture and grass hay and 13 percent small grains with 12 percent idle and fallow. There are 40,400 acres of dry cropland, mostly grain and exotic grasses, and more than five million acres of rangeland.

An important irrigated agriculture problem is low on-farm application efficiencies in some areas. Water salinity is a problem in the lower reaches of the river. In addition, overgrazing in the upper watersheds has caused erosion. It is estimated there are about 1.0 million acres with heavy to excessive erosion and 1.0 million acres with moderate erosion. This erosion in turn increases downstream sediment deposition. Increased water-use efficiency and restoring and maintaining healthy watersheds can help to overcome these problems.

The issue discussed in this section is the need for a rangeland condition survey. The Division of Water Quality and soil conservation districts should take the lead with assistance by state and federal agencies as needed.

2.11 DRINKING WATER

All of the drinking water supplies come from either springs or wells with only chlorination being needed. Systems are both publicly and privately owned. There are 57 public community

water systems. These are all subject to the state and federal safe drinking water acts.

Communities must submit source protection plans for each of their sources. At this time, only 48 plans have been submitted so there is considerable work to do. The Drinking Water Board has funds available for improving drinking water systems and preparing the plans needed.

There were 14,322 acre-feet of culinary quality water delivered by public water suppliers during 1996. The basin-wide use was 267 gallons per capita per day. Average use varied from 190 gallons per capita per day in Sanpete County to 357 gallons per capita per day in Millard County and 415 gallons per capita per day in Juab County.

Water for future demand can come from existing undeveloped rights for wells or springs. It is possible to purchase and convert agricultural water rights to culinary use. Another possibility for meeting future demands is to establish a water bank.

2.12 WATER QUALITY

The highest water quality is found in the upper reaches of the Sevier River, its tributaries and the streams flowing into Pahvant Valley. As the water flows downstream, the chemical and biological quality of the water deteriorates. During studies in the 1980s and 1990s by the U.S. Geological Survey, both surface water and groundwater quality data were obtained. The following water salinity data comes from surface water measurements taken during the survey: Sevier River near Hatch, 190 mg/L; East Fork of the Sevier River near Kingston, 255 mg/L; Sevier River above Clear Creek, 283 mg/L; Sevier River at Sigurd, 590 mg/L; San Pitch River below Milburn, 448 mg/L; San Pitch River below Gunnison Reservoir, 920 mg/L; Sevier River below San Pitch River, 1,103 mg/L; Chicken Creek Reservoir outlet, 780 mg/L; Sevier River near Lynndyl 1,162 mg/L; and the Sevier River near Hinckley, 2,730 mg/L (1964). Salinity measurements in Pahvant Valley were taken on Chalk Creek near Fillmore, 435 mg/L and Corn Creek near Kanosh, 395 mg/L. The groundwater quality also was found to deteriorate

in a downstream direction but was generally of better quality than the surface water except in some localized instances.

The beneficial use classifications for the reservoirs and streams are mostly 2B and 3A. All water bodies had use classification 4. Navajo Lake, Panguitch Lake and Otter Creek Reservoir have been studied under the Clean Lakes Program. Funds have been expended in the Panguitch Lake watershed. More recently, \$375,000 have been expended on the Otter Creek Reservoir watershed to implement best management practices to improve water quality.

2.13 DISASTER AND EMERGENCY RESPONSE

Natural disasters and other major emergencies are perennial problems. Water-related disasters are generally floods and droughts. Local governments have the responsibility to initiate the first response to a disaster or emergency. If an event is beyond the scope of local government, the governor can declare an emergency and make state assistance available. The Division of Comprehensive Emergency Management is the state lead agency, coordinating state and, if necessary, federal assistance.

Flooding is the most frequent natural disaster. Flood-prone communities should have a flood insurance program in place. Flood plain maps have been prepared for most communities. Droughts can also have a disastrous impact, especially in prolonged situations.

The only issue discussed in this section concerns flood plains. It is recommended nonparticipating communities should become qualified under the National Flood Insurance Program.

2.14 FISHERIES AND WATER-RELATED WILDLIFE

Fishing is clearly dependent on quality aquatic habitat. Riparian vegetation provides food, cover and nesting sites for wildlife. A wide diversity of fish, wildlife and plant species are found in the basin; interacting to contribute to a well functioning ecosystem. Early settlers

found big game scarce although furbearers, waterfowl and predators were abundant. Today, most species of fish and wildlife are abundant in most of the basin. Because of diversions for irrigation, fish habitat condition has deteriorated. Most of the lakes, reservoirs and stream reaches are 3A or 3B for aquatic use class. However, most of the stream reaches are partially or non-supporting as a fishery. Water quality is also a problem, especially in the downstream reaches.

2.15 WATER-RELATED RECREATION

Water is often the center of outdoor recreation, either directly or just part of the setting. The Utah State Comprehensive Outdoor Recreation Planning process provides data on a regular basis to guide development of the recreational base. More than \$2 million has been expended on 32 Land and Water Conservation Fund matching-grant projects. The Division of Parks and Recreation manages six state parks, all but one having water as an on-site use or amenity. Local community parks are an important part of the scene as are federal parks and campgrounds. Recreation visits to the Sevier River Basin are popular and are increasing at an accelerating rate.

Two issues are discussed in this section. One concerns unethical behavior in recreational settings. It is recommended that the Division of Parks and Recreation organize recreators and managers to obtain suggestions for controlling the problem. The second issue addresses comprehensive planning. The Division of Parks and Recreation should continue to update and prepare management plans.

2.16 FEDERAL WATER PLANNING AND DEVELOPMENT

The federal role and involvement in planning and development is changing. Many past activities concern development of the resources but are now oriented toward conservation and protection. The main concern is the part federal agencies should play compared to state and local involvement. Coordinated planning and use is needed, especially with the large land areas administered by the federal government.

Major local projects with federal agency involvement include assistance with the real-time monitoring network by the Bureau of Reclamation, the Redmond Channel Project by the Corps of Engineers and four watershed protection and flood prevention projects by the Natural Resources Conservation Service.

2.17 WATER CONSERVATION

Conservation is one way of making an existing water supply go farther. In many cases, it can be achieved without sacrificing an existing life style. Water conservation was a way of life in the early days of settlement; it needs to be made a part of our lives again.

The culinary water use for 1996 in the Sevier River Basin was 267 gallons per capita day (gpcd). This is just under the statewide average use of 268 gpcd. Secondary water use for 1996 was 153 gpcd compared to 50 gpcd statewide.

There are several ways conservation can take place. Conservation of irrigation water can be achieved in local areas but not in the basin as a whole. Outside culinary water use can be reduced by increased application efficiencies and by replacing high-water using landscapes with vegetation using less water. Secondary water can be used instead of culinary quality water. Water use indoors can be reduced by using low volume fixtures. Ultimately, education on water availability and use is the best way to achieve conservation.

Four water conservation issues are presented. These are; the need for water management and conservation plans, more use of secondary water, use of low water-using landscapes on city property, and implementation of rate schedules to encourage saving water. These measures should all be implemented by communities and public

water suppliers.

2.18 INDUSTRIAL WATER

Industry uses a small but important part of the total water supply. Total self-supplied industrial water use is 25,120 acre-feet of which 7,120 acre-feet is potable. Public community systems provide 1,170 acre-feet. The Intermountain Power Project is the largest industrial water user in the basin. There are 12 hydroelectric power plants operating , mostly owned by communities.

2.19 GROUNDWATER

Although groundwater is difficult to discern, it is evidenced by the seeps and springs that reach the surface in numerous locations throughout the basin. There are 19 groundwater reservoirs described in this section. Wells have been constructed to evaluate and use these reservoirs under each of the valleys. The Sevier River Basin above Sevier Bridge Reservoir is

characterized by a series of groundwater reservoirs, each separated from the one upstream by a relatively impermeable, underground geologic restriction. These reservoirs are an integrated part of the operation of the Sevier River system. When a groundwater reservoir is full, it spills over the geologic restriction and contributes to the downstream flow of the river. For this reason, any change in a reservoir has an impact on

downstream water rights.

Average withdrawals from groundwater are 155,540 acre-feet. The quality of groundwater varies from good to poor, depending on location and depth. Wells used for culinary purposes penetrate the deeper, better quality aquifers while those for irrigation use water of lesser quality.

The Division of Water Rights is implementing new groundwater management



Well near Flowell

plans throughout the basin. **In March** 1997, the basin was closed to additional well permits.

Studies by the U.S. Geological Survey indicate that limited use of the 5.5 million acre-feet in storage above Sevier Bridge Reservoir could occur although there would be impacts, both within the groundwater reservoir basin and downstream. These potential impacts require additional investigation. Use of this water also would require approval from the State Engineer.