6.6 WATER RESOURCES AND WATER QUALITY

6.6.1 Introduction

How water resources are planned and used in Shasta County are key to both regional as well as statewide water issues. For this reason, water resource issues are important to each of the three element groups: Public Safety, Resources, and Community Development. Flooding and dam inundation are discussed in the Public Safety Group. Water supply for domestic purposes is discussed in the Community Development Group and in the studies entitled Water Use and Wastewater Treatment in Shasta County and the Shasta County Water Resources Master Plan Phase 1 Report, Current and Future Needs. The impacts of human activities on the availability and quality of water in Shasta County are the subjects of this element.

This element contains a discussion of water resources and water quality as required by the State- mandated Conservation and Open-Space Elements.

Under the Conservation Element, State law requires:

> A conservation element for the conservation, development and utilization of natural resources including water and its hydraulic force . . . (and) rivers and other waters . . . The conservation element may also cover: . . . (3) Preservation and control of the pollution of streams and other waters . . . (5) Prevention, control and correction of the erosion of soils, beaches, and (6) Protection of watersheds (Government Code Section 65302(d))

Under the Open-Space Element, water resources are designated as open-spaces when considered as any one of the following:

- Open-space for the preservation of natural resources including . . . rivers, streams, bays, and estuaries; . . . lakeshores, banks of rivers and streams, and watershed lands; (and)

- Open-space for the managed production of resources including . . . areas required for recharge of ground water basins, bays, estuaries, marshes, and rivers and streams which are important for the management of commercial fisheries . . ." (Government Code Section 65560(b).)

6.6.2 Findings

Water Supply

The majority of the water available for use in Shasta County is collected in the mountainous regions of the County. Streams, creeks, and rivers carry these surface waters to lower elevations, where a portion is eventually stored in lakes, reservoirs, and groundwater basins. Federally owned and Central Valley Project (CVP) managed Whiskeytown Reservoir and Shasta Lake are major surface water storage facilities in Shasta County.

The Shasta County Water Resources Master Plan Phase 1 Report, Current and Future Needs, identifies that Shasta County lies at the headwaters of the State's largest watershed, the Sacramento River Basin. About 6.5 percent (5.8 million acre-feet) of all surface runoff in the State of California originates within Shasta County. This represents more than one-fourth of the total surface runoff within the Sacramento River system, the State's largest source of domestic and agricultural water supplies.[1]

The Water Resources Study identifies that surface water represents 77 percent of all diversions, groundwater represents 16 percent, and reclaimed water 0.3 percent. Surface Water diversions accounted for 258,550 acre-feet, groundwater 77,124 acre-feet, and reclaimed water 1,160 acre-feet. In total 565,572 acre-feet are diverted for beneficial use in Shasta County.[2]

A total of 151,000 acres of land in Shasta County with established water uses were mapped as part of the Water Resources Study. Primary water use is for agriculture, urban, industrial, and recreation needs. About 580,000 acre-feet of water is required per year to sustain existing land uses. It is estimated that the need will increase to 671,850 acre-feet by the year 2030. A comparison of available water supplies with current and future needs in the Redding Basin shows annual shortages from about 26,500 acre-feet now, to about 81,200 acre-feet by the year 2030.[3]

The U.S. Bureau of Reclamation, at the time of the construction of Shasta and Whiskeytown Dams, acquired substantial appropriative rights from the State, subject to area of origin restrictions. The construction of Whiskeytown Lake and other features of the Trinity River Division of the CVP provided a supplemental supply of water that led to the development of irrigation systems in the Bella Vista and Happy Valley areas. Historically, an average of 999,500 acre-feet of water is imported annually to the Sacramento River Basin from the Trinity River. Annual imports from the Trinity River have recently been reduced to 800,000 acre-feet, and the final resolution of long-term inflow stream requirements in the Trinity River is pending. The water is imported through a tunnel that links Trinity Lake and Whiskeytown Lake.[4] The Bureau maintains contracts for the sale of that CVP water to service agencies in Shasta County and elsewhere. There are currently 14 public agencies and private parties in Shasta County contracting for CVP water. These contracts cover approximately 251,500 acre-feet of water (see Table PF-1 in the Public Facilities Element).

The Water Resources Study concludes that most of the Redding Basin water purveyors currently depend on CVP contracts for their water supplies. Some Redding Basin water purveyors have only one significant source of supply, and the total available resources of several purveyors are inadequate to provide a reliable supply to customers during dry periods and, in some cases, normal years. Water supplies for some purveyors with existing CVP water supply contracts have been inadequate to meet needs in 4 out of 5 years since 1990. Water transfers from one purveyor to another have historically been hindered by apparent State and Federal institutional restrictions. Continued, increased, and more formal local agency cooperation will be needed to meet the future water supply needs of the Redding Basin.

The most severe reduction in contract water has been experienced by the Bella Vista Water District (BVWD). In 1991, BVWD's annual allocation of 24,000 acre-feet was cut to only 6,420 acre-feet. Although BVWD was able to pump 1,798 acre-feet from district wells and secure 1,400 acre-feet from the City of Redding and 453 acre-feet from the Shasta County Water Agency (SCWA), the total available supply in 1991 of 9,987 acre-feet fell short of the 18,400 acre-feet needed by district water users. BVWD suffered cutbacks in 4 out of 5 years from 1990 to 1994. Cutbacks in the supplies available to water purveyors have occurred as a result of increasing demands on the State's water supply systems and the effects of these dry periods. Table W-1 describes the recent cutbacks in CVP Supplies.

The Water Resources Study also concludes that Federal and State water policies and legislative direction are decreasing the yields of the Federal and State water projects, causing increased deficiencies to local purveyors who depend on water supply contracts.

Two major groundwater basins within the County, the Redding and Fall River Valley basins, have been identified as significant sources of groundwater. In addition, volcanic and alluvial soils that contain groundwater, known as water bearing soils, are located in the Northeast, Lassen, Eastern Forest, and portions of the Eastern Upland and possibly Western Upland planning areas. Water bearing soils provide most, if not all, of the water used by existing development in these areas. Unlike geographically definable groundwater basins, however, the location and amount of water found in alluvial and volcanic soils is difficult to quantify.

The cited Water Use and Wastewater Treatment Report contains an extensive discussion of the surface and groundwater resources of Shasta County. A major conclusion of this discussion is that the water resources of Shasta County are more than adequate to meet its existing and future needs. The problem is that these resources are not uniformly distributed throughout the County. This fact has major implications for the geographic distribution of future growth, as discussed in the Community Development Group.

TABLE W-1
RECENT CUTBACKS IN CVP SUPPLIES

Purveyor/Year of Shortage	USBR Reduction in CVP Contract Supply
ACID -1994	25% cut from Agricultural Allocation
BVWD - 1990	50% cut from Agricultural Allocation, 25% from M&I Allocation
BVWD - 1991	75% cut from Agricultural Allocation, 25% from M&I Allocation
BVWD - 1992	75% cut from Agricultural Allocation, 25% from M&I Allocation
BVWD - 1994	65% cut from Agricultural Allocation, 25% from M&I Allocation
BVWD - 1997	10% cut from Agricultural Allocation,
Clear Creek CSD - 1991	25% from M&I Allocation
City of Redding - 1992	25% from M&I Allocation
City of Shasta Lake - 1992	25% from M&I Allocation
Centerville CSD - 1991	65% from M&I Allocation
Shasta CSD - 1991	75% from M&I Allocation

ACID = Anderson-Cottonwood Irrigation District CSD = Community Service District
BVWD = Bella Vista Water District M&I = Municipal and Industrial
USBR = U.S. Bureau of Reclamation

Source: Shasta County Water Resources Master Plan Phase 1 Report, Current and Future Needs. Prepared by Shasta County Water Agency, CH2M Hill, & California Department of Water Resources, October 1997.

Another important finding of the Water Use and Wastewater Treatment Report is the lack of precise, quantifiable data on the groundwater resources of the County, including the Redding and Fall River Valley groundwater basins. Safe yields, the maximum quantities of water that can be continuously withdrawn from a groundwater basin without adverse effect, on these and other groundwater basins, are unknown. This has implications for the process by which water is stored in these basins. Further discussion of these groundwater basins is found in the Public Facilities Element. Additional studies are planned to better quantify the water resources available within the County. Table W-2 identifies the water consumption by major industries. Table W-3 identifies the Redding Basin Water Budget as estimated by the Water Resources Study.

Groundwater basins and water bearing soils are recharged (replenished) by the natural process of percolation. This is a process whereby precipitation and percolating stream flow collects in a water table by filtration through the soil. Natural features are essential to groundwater recharge, particularly floodplains and streams that pass over gravel or other porous materials. The flat agricultural lands of the Sacramento River Valley and the Fall River Valley are the most significant areas for this process in Shasta County. It is important that these types of features are protected so that water transfer to ground basins is maintained. Preservation of natural recharge systems is particularly important for Shasta County as there are no human processes to augment them. In many counties where urbanization is widespread, groundwater bodies are artificially recharged by using water from reservoirs. Shasta County has not experienced a level of growth and development resulting in groundwater overdrafting, and therefore artificial groundwater recharge is not justified.

TABLE W-2
INDUSTRIAL WATER USERS

WATER USER	CONSUMPTION	WATER SUPPLY SOURCE
Sierra Pacific, Anderson Division	500,000 gallons per day	Four on-site wells
Simpson Paper Co. Shasta Mill	11.0 million gallons per day	Seven on-site wells
Wheelabrator Shasta Energy Co.	1.15 million gallons per day	Two on-site wells
Sierra Pacific Mill, Burney	500,000 gallons per day	On-site wells

Source: Shasta County Water Resources Master Plan Phase 1 Report, Current and Future Needs. Prepared by Shasta County Water Agency, CH2M Hill, & California Department of Water Resources, October 1997.

TABLE W-3
REDDING BASIN WATER BUDGET

INFLOW		OUTFLOW	
Source	Acre-Feet/Year	Source	Acre-Feet/Year
Sacramento River Inflow	7,261,000	Sacramento River Outflow	9,064,000
Other Streams	1,673,089	ACID Diversion	165,000
Precipitation (Precip.)	934,718	Deep Percolation of Precip.	164,951
Groundwater Discharge to Surface Streams	266,305	Evapotranspiration of Precipitation	604,817
Irrigation Return	47,163	Consumptive Use	103,338
Treated Effluent	11,185	Deep Percolation of Applied Water	20,787
Groundwater Pumpage	37,302	Septic Tank Discharge	4,807
		Surface Stream Seepage	59,000
		Canal Seepage	44,063
TOTAL	10,230,762		10,230,762

ACID = Anderson-Cottonwood Irrigation District

Source: Shasta County Water Resources Master Plan Phase 1 Report, Current and Future Needs, Appendix F, Prepared by Shasta County Water Agency, CH2M Hill, & California Department of Water Resources, October 1997.

Water Quality

For the most part, surface water quality in the County is good, as is indicated by fish populations and recreational fishing activities. Potential hazards to surface water quality include the following non-point pollution problems: high turbidity from sediment resulting from erosion of improperly graded construction projects, concentration of nitrates and dissolved solids from agriculture or surfacing septic tank failures, contaminated street and lawn run-off from urban areas, and warm water drainage discharges into cold water streams. The most critical period for surface water quality is following a rainstorm which produces significant amounts of drainage runoff into streams at low flow, resulting in poor dilution of contaminates in the low flowing stream. Such conditions are most frequent during the fall at the beginning of the rainy season when stream flows are near their lowest annual levels. Besides the greases, oils, pesticides, litter, and organic matter associated with such runoff, heavy metals such as copper, zinc, and cadmium can cause considerable harm to aquatic organisms when introduced to streams in low flow conditions.

Urban storm water runoff was managed as a non-point discharge (a source not readily identifiable) under the Federal Water Pollution Control Amendments of 1972 (PL 92-500, Section 208) until the mid 1980's. However, since then, the Federal Environmental Protection Agency has continued to develop implementing rules which categorize urban runoff as a point source (an identifiable source) subject to National Pollution Discharge Elimination System (NPDES) permits. Rules now affect medium and large urban areas, and further rulemaking is expected as programs are developed to meet requirements of Federal water pollution control laws.

Along the Sacramento River, chemical and physical water quality is usually within desirable limits for most uses, although quality tends to deteriorate during periods of heavy runoff. Biochemical oxygen demand (BOD) in the river rarely exceeds the 2.5 mg/l desirable limit for domestic uses.[5] High coliform (bacteria) counts are sometimes recorded, however, thus requiring filtration and chlorination of water prior to drinking.

Water quality in the lower Sacramento River for domestic use is adversely affected by high levels of storm-discharged turbidity. Water quality impacts on lower Sacramento River aquatic life include elevated levels of dioxin and elevated heavy metal levels resulting from undiluted acid mine drainage (AMD) from old copper mines located west of the Shasta/Keswick Dam area. The principal source of Sacramento River heavy metal contamination is from runoff from the Iron Mountain Mine complex from Spring Creek. Anadromous fish that migrate beyond Cottonwood Creek run the risk of acid mine poisoning from the Spring Creek drainage. Dioxin is believed to have resulted from discharges from area wood products mills and pose a potential health threat if river-contaminated fish are consumed beyond State recommended quantities.[6]

The Sacramento River is one of the County's (and the State of California's) most important natural resources and opportunities to encourage or promote improving water quality conditions should be strongly supported and integrated with associated planning, recreation improvement, and enhancement activities whenever possible.

Surface water pollution is also caused by erosion. Excessive and improperly managed grading, vegetation removal, quarrying, logging, and agricultural practices all lead to increased erosion of exposed earth and sedimentation of watercourses during rainy periods. In slower moving water bodies these same factors often cause a buildup of siltation, which ultimately reduces the capacity of the water system to percolate and recharge groundwater basins, as well as adversely affecting both aquatic resources and flood control efforts.

The quality of water in underground basins and water-bearing soils is considered generally good throughout most of Shasta County. As these basins or soils are the primary sources of water in the rural upland areas of the County, it is very important to prevent contamination. Potential hazards to groundwater quality involve the concentration of nitrates and dissolved solids from agricultural practices and septic tank failures. Several small pockets are found in the eastern portions of Fall River Valley where groundwater testing shows elevated levels of nitrates. Also, several areas within the Eastern Upland planning area contain potential groundwater quality and quantity limitations.

The ability of soils to support septic tanks or on-site wastewater treatment systems is generally severely limited in Shasta County, particularly on older valley terrace soils and certain loosely confined volcanic soils in the eastern portions of the County. Septic tank failures have occurred in Shasta County, but the magnitude of this problem is largely unknown. While the County has adopted more stringent standards regarding their use

several times during the last decade, additional study and understanding of the cumulative impacts of large scale use of septic systems in high rainfall and poor soil areas needs to occur. Once the long-term septic capability of an area is understood, it can provide an important basis for setting land use densities that assure protection of water quality.

6.6.3 Objective

W-1 Protection of the surface and groundwater resources so that all County residents, both now and in the future, have reasonable assurances that an adequate quantity and quality of water exists.

6.6.4 Policies

W-a Sedimentation and erosion from development shall be minimized through grading and hillside development ordinances and other implementation mechanisms as adopted by the County.

W-b Septic systems, waste disposal sites, and other sources of hazardous or polluting materials shall be designed to prevent contamination to streams, creeks, rivers, reservoirs, or groundwater basins in accordance with standards adopted by the County.

W-c All proposed land divisions and developments in Shasta County shall have an adequate water supply, from a quantity and a quality standpoint, for the planned uses. Furthermore, the potential adverse impacts on the existing reasonable and beneficial uses of utilizing that same water supply should not be significant. Project proponents shall submit data and reports, when requested, which demonstrate that these criteria can be met. In the case of land divisions, the reports shall be submitted to the County for review and acceptance prior to a completeness determination of a tentative map. This policy will not apply to developments in special districts which have committed and documented, in writing, the ability to provide the needed water supply.

W-d The potential for cumulative water quality impacts resulting from widespread use of septic systems in poorly suited soil areas shall be periodically evaluated for the need to provide greater monitoring and possible changes to applicable standards.

W-e The Shasta County Water Agency should encourage and promote interagency water planning efforts within the County, particularly in the South Central Urban Region.

W-f The County shall encourage and participate in interagency planning efforts to protect and enhance stream and river water quality.

Footnotes:

1. Shasta County Water Resources Master Plan Phase 1 Report, Current and Future Needs. Prepared by Shasta County Water Agency, CH2M Hill, & California Department of Water Resources, October 1997.
2. Ibid, p. 66.
3. Ibid, pp. 86, 93.
4. Ibid, p.8.
5. Sacramento River Water Quality and Biology (Keswick Dam to Verona) - A Literature Review, California Department of Water Resources, 1986, pg. 6.
6. California Code of Regulations, Title 14, Fishing Regulations, 1991