II.4 Water

California receives about 200 million acre feet (maf) of precipitation in a normal non-drought year. Roughly 65% of this is lost to evaporation or vegetation. The remaining 71 maf of average runoff, plus imported water, supplies the state's water "budget," traveling through California's complex water distribution system to environmental, agricultural, and urban uses. Groundwater is an additional important source.

- In 1998 the California Department of Water Resources released a normalized water budget showing the state's supply and use of applied water in an "average" non-drought year. Figures in the "average" year budget were based on the distribution infrastructure in place in 1995. The 1.6 maf shortage is largely accounted for by groundwater overdraft that was not included in the budget.

TABLE 21

California Annual Average Water Budget*

	Million Acre-Feet
Water Use	
Urban	8.8
Agricultural	33.8
Environmental	36.9
Total	79.5
Supplies	
Surface Water	65.1
Groundwater**	12.5
Recycled & Desalted	0.3
Total	77.9
Shortage	1.6

TABLE 22

California Annual Average Water Supplies*

	Million Acre-Feet
Surface Water	
Central Valley Project	7.0
Other Federal Projects	0.9
State Water Project	3.1
Colorado River	5.2
Local	11.1
Required Environmental Flow	31.4
Reapplied	6.4
Groundwater**	12.5
Recycled and Desalted	0.3
Total	77.9

*Normalized data for a non-drought year based on the distribution infrastructure in place in 1995.
**Excludes overdraft.

Source: California Department of Water Resources, *The California Water Plan Update,* Bulletin 160-98.

- California's annual precipitation is distributed unevenly. Over 70% of the average annual runoff occurs in the northern part of the state, but about 75% of the state's water demand is south of Sacramento. California uses a combination of federal, state, and local water projects to capture, store, transport, and import surface water to meet demand around the state. The largest water projects are the federal Central Valley Project and the State Water Project.

- Groundwater provides 30% of the supply used by agriculture and the urban sector in a normal non-drought year. Agriculture accounts for over 90% of the groundwater used in the San Joaquin, Tulare Lake, and Central Coast hydrologic regions.

FIGURE 21

California Water Distribution Infrastructure, 1998

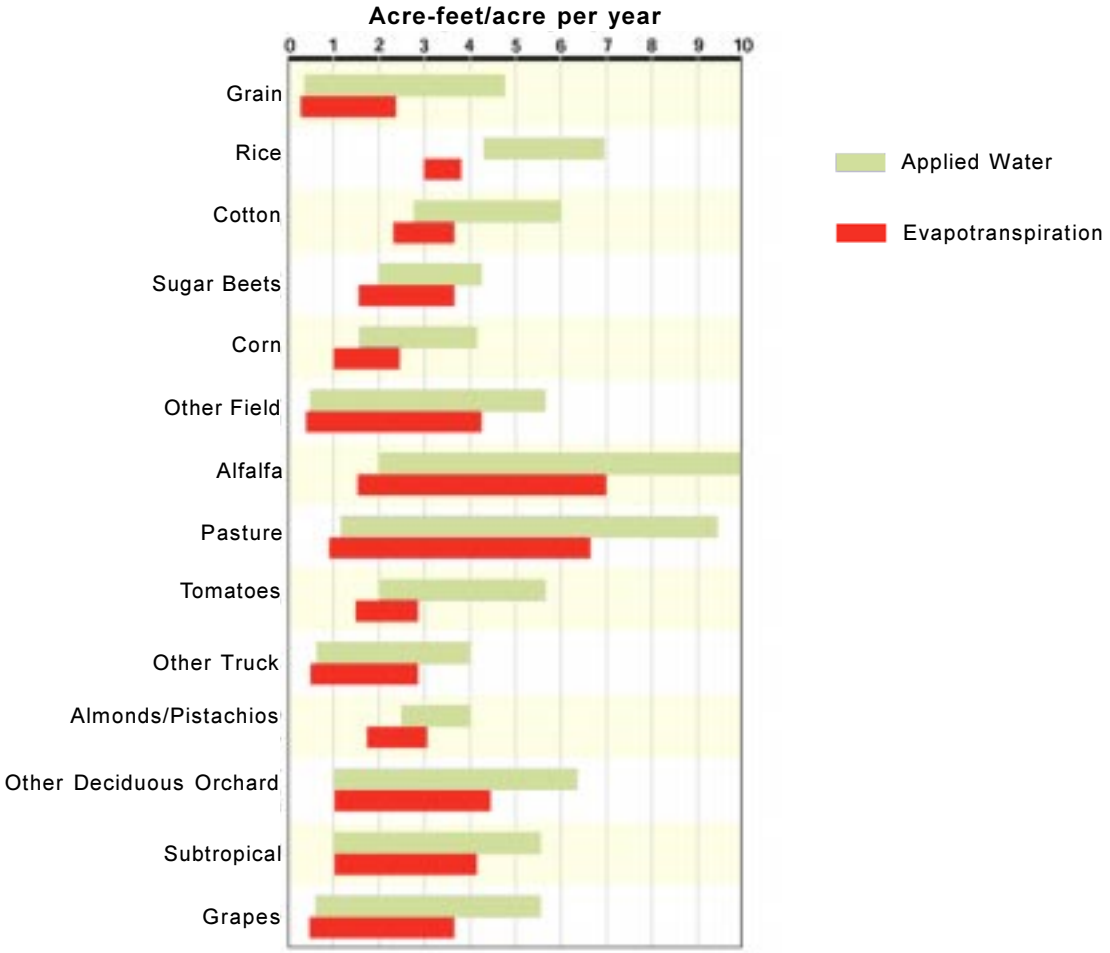
Source: California Department of Water Resources, *The California Water Plan Update,* Bulletin 160-98.

- The amount of water applied to a particular crop depends on many factors including plant evapotranspiration, soil properties, irrigation efficiency, and weather. Plant intake is the primary purpose of water application, but water is also applied to crops for cultural purposes such as frost control, facilitating cultivation and leaching of salts out of the crop root zone. There is a wide range in water application rates among crops and hydrologic regions. For example, depending on the hydrologic region, anywhere between 2 and 10 acre feet/acre are applied to alfalfa annually.

- Only a portion of the applied water is actually used by the crop. The remainder percolates through the soil, flows downstream to other uses, or is irrecoverably lost due to other factors. Crop water use is measured as evapotranspiration of applied water (ETAW). The ratio of ETAW to applied water is an indication of irrigation efficiency.

FIGURE 22

California Ranges of Applied Water and Evapotranspiration of Applied Water*



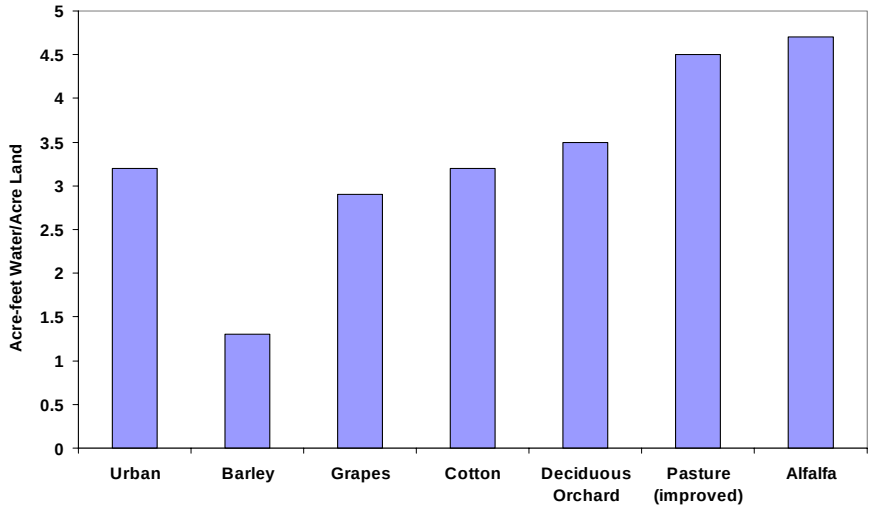
* Applied water includes the water used for cultural practices such as frost control and leaching salts from below the crop root zone.

Source: California Department of Water Resources, *The California Water Plan Update,* Bulletin 160-98.

- The amount of water per acre used by urban areas varies according to land use, population density and water use efficiency. In some areas agriculture may use less water per acre than nearby urban development while in other areas the opposite case may be true.

FIGURE 23

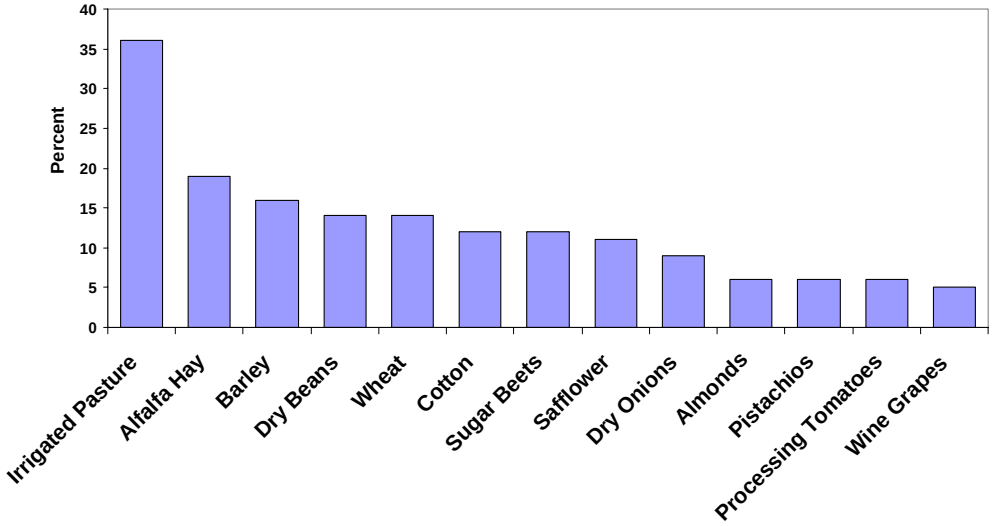
Applied Water Use in the San Joaquin Valley



- Agricultural surface water costs differ greatly by hydrologic region and source of supply. A DWR survey of water agencies found that in 1996 the weighted average annual price to farmers ranged from $10/acre-foot (af) in the North Coast region to $373/af in the South Coast region. In the Central Valley hydrologic regions, prices varied between $22/af and $61/af. In the Tulare Lake region (which includes parts of Tulare, Kings, Fresno, and Kern counties) the weighted average cost was $42/af.

FIGURE 24

Water Costs as a Percent of Total Production Costs for Selected Crops in the Tulare Lake Region



Source: Department of Water Resources, *The California Water Plan Update,* Bulletin 160-98.

TABLE 23

California Land Irrigated by Water Distribution Method, 1998

	Gravity Flow Systems	Sprinkler Systems	Drip or Trickle Systems	Sub-irrigation	All Irrigation
Farms	19,575	7,870	14,697	2,710	40,121
Acres Irrigated 1,000	5,820	1,528	1,022	55	8,140
Acres Irrigated percent	71	19	13	1	

Source: USDA, National Agricultural Statistics Service, *Census of Agriculture, Farm and Ranch Irrigation Survey*, 1998.

■ Almost one-third of California's irrigated acreage used sprinkler, drip or trickle systems in 1998. The rest used gravity flow systems such as furrows. More than one method was used on some acreage.

TABLE 24

California Irrigated Acreage, 1995*

(1,000 acres)

Crop	1995
Rice	517
Grain	900
Cotton	1,244
Sugar Beets	178
Corn	438
Other Field	467
Alfalfa	1,094
Pasture	933
Tomatoes	357
Almond/Pistachios	534
Other Deciduous	602
Subtropical	455
Grapes	736
Other	1,060
Total Irrigated Crop Area	9,515
Multiple Crop	447
Irrigated Land Area	9,068

* Normalized data.

Source: Department of Water Resources, *The California Water Plan Update*, Bulletin 160-98.