Water Supply and Use

Water shapes California—physically, biologically, politically, economically, and socially. It moves across landscapes, through cycles, between living things, in and out of plumbing, out of sight, and ultimately consumed. That is why much importance is given to the care of water.


Rangeland stream

Most of the headwaters of the State's streams and rivers are found within forested landscapes. Their associated vegetation and soils are valuable for absorbing snowmelt and rain, reducing silt from washing off hills, storing moisture, providing shade to cool water temperatures, cleansing water, slowing storm runoff, and helping hold hill slopes in place. In return, Californians receive quality drinking water, recharged aquifers, reduced flooding, water recreation, habitat for fish and wildlife, and scenic beauty.

Historically, water has been the cause of much political and legal conflict. Given the increasing demands, it could be even more so in the future. With California's increasing water demands competing for a limited supply, every drop of water running off of forests and rangelands in the State adds to the value of water and makes the management of water quantity and quality even more vital to the State's future.

Findings on water use

Water remains the State's most important, valuable, and controversial resource. The importance of water to the State lies in the fact that 1) water is an essential, non-substitutable commodity needed for human uses; 2) usable water is a scarce resource in many parts of the State; 3) water deficiencies (droughts) and excesses (floods) are recurring problems to the State; 4) water represents the State's most economically valuable natural resource; and 5) water is essential for ecological functions.

Uses of water (see DWR Bulletin 160–98)

The largest use of water in the State is for environmental purposes.

Water use is divided into urban, agricultural, and environmental purposes in California (Department of Water Resources, 1998). Urban and agricultural uses are self–defined, but environmental water represents quantities of water dedicated to this use through legislative or regulatory processes. It is considered the sum of dedicated flows in state and federal wild and scenic rivers, in-stream flow requirements, required outflows to the Bay-Delta, and applied water demands of managed freshwater wildlife areas. Miscellaneous uses such as canal conveyance losses, recreation, cooling water, energy recovery, and high water industrial uses are included in one of these three

categories based on their intended purpose. Table 1 indicates recent estimates and projections of water use within these categories.

Table 1. Applied water use in average water year conditions, 1995 and 2020
(million acre–feet)

Water use	1995	2020 (projected)	Change
Urban	8.8 (11%)	12.0 (15%)	+3.2 (+4%)
Agricultural	33.8 (43%)	31.5 (39%)	– 2.3 (–4%)
Environmental	36.9 (46%)	37.0 (46%)	+0.1 (0%)
Total	79.5	80.5	+1.0

Source: Department of Water Resources, 1998

As shown in Table 1, the total 1995 water use in the State was calculated at 79.5 maf. The Department of Water Resources (DWR) projects water demands will increase to 80.5 maf in 2020. Important consumption observations include:

- Water for urban uses represents the largest expected increase (rate and total quantity) by 2020. Urban uses represent 97 percent of the expected increased demand for water by 2020. Population growth is expected to drive increased water demand for urban uses.
- The highest level of water uses (36.9 maf) are for environmental purposes but no significant increases are used in the 2020 projects.
- Water for agricultural uses is expected to decline by four percent by 2020.

Water is also valuable for other purposes for which economic values are not documented. Examples include functions such as habitat enhancement, recreation and salt water flushing. Some of these do not involve any investments or management, but would often be prohibitively expensive to replace with engineered substitutes.

From a water quality perspective, the State Water Resources Control Board (SWRCB) also lists "beneficial uses" of water as a requirement of California's Porter-Cologne Water Quality Control Act. All surface (including bays and estuaries) and ground water bodies in the State are afforded protection against water quality degradation for their present and potential beneficial uses. Beneficial uses include consumptive and non-consumptive water uses, economic, and non-market purposes.

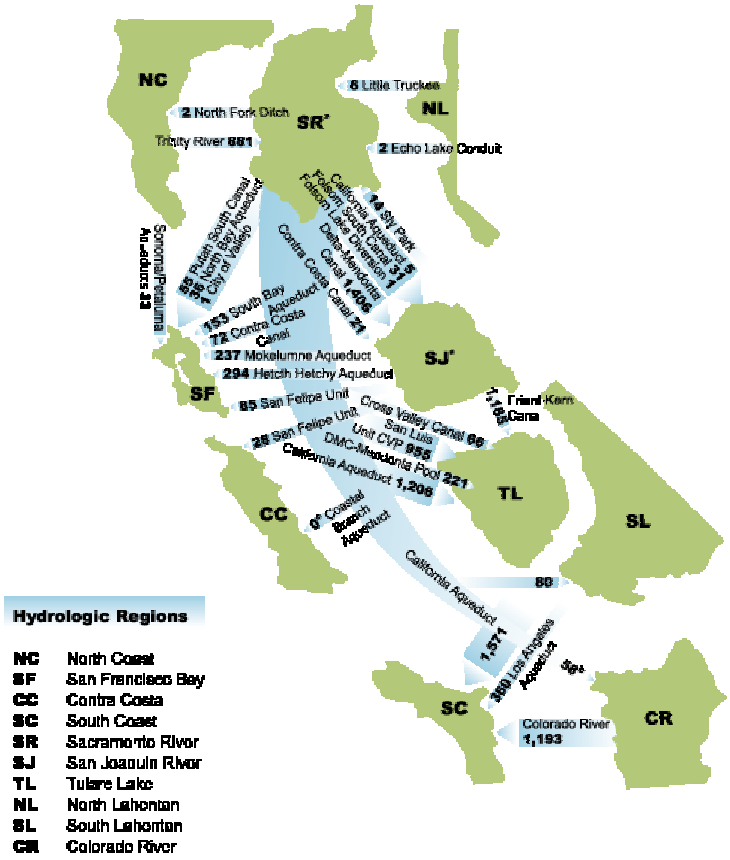
The most common beneficial uses are municipal and domestic supply, agricultural supply, industrial service supply, groundwater recharge, recreation (water contact and non-contact), navigation, and hydropower generation. Specific non–consumptive uses such as commercial and sport fishing, shellfish harvesting, and aquaculture are also listed. Environmentally beneficial uses include freshwater replenishment, warm freshwater habitat, cold freshwater habitat, inland saline water habitat, estuarine habitat, marine habitat, wildlife habitat, rare/threatened/endangered species, migration of aquatic organisms, and spawning/reproduction/early development habitats.

Water storage

To support water needs during the dry season and in dry years, the uneven timing of California's water runoff has led to the storage and transport of water. Historically, these water projects moved water from upper storage sites to other locations within a watershed or sub-basin. With the population and water needs growing in drier regions of the State, water transport changed in the middle of the twentieth century on an immense scale. More than 75 percent of the State's average annual runoff of 71 million acre-feet (maf) comes from north of Sacramento. In contrast, about 75 percent of California's urban and agricultural water demands are south of Sacramento (Department of Water Resources, 1998). Water is often conveyed from one watershed or hydrologic region to another, usually from north to south and rural to urban (Figure 1). Normally over 6 maf is transported southern San Joaquin Valley and southern California annually. Other transport examples include the Sacramento River Basin exports of about 3.2 maf to the San Francisco, San Joaquin, South Coast, and Colorado River hydrologic regions.

More than 75 percent of the State's average annual runoff of 71 million acre–feet comes from north of Sacramento.

Figure 1. Regional import and export of water



Source: Department of Water Resources, 1998

The largest reservoirs have been built in areas that fill with spring snowmelt, like watersheds that flow into Shasta Lake and Lake Oroville. The State Water Project (SWP) and the Central Valley Project (CVP) were developed to move large amounts of water from the north to the south mainly via the California Aqueduct while regional projects (e.g., Mokelumne Aqueduct for East Bay Municipal Utility District, Hetch Hetchy Aqueduct for the City of San Francisco, Los Angeles Aqueduct for the City of Los Angeles) transfer water interbasin often from east (Sierra Nevada Mountains) to west (Figure 2).

Figure 2: California's major water projects

Source: Department of Water Resources, 1998