

Section 3

Supply and Demand

Understanding the magnitude and location of water demands and supplies allows the Solano agencies to develop recommendations that will meet or manage demands for water quantity and quality into the future. Water supply and demand information provides the context for water resource planning. Section 3 contains key information on supply and demand that was used in conducting the evaluations for the decision-making process.

3.1 TYPES OF SUPPLY

The region has several major sources of supply. SCWA serves as a water wholesaler for the Solano Project and the SWP, which provide surface water supplies. Local agencies have also secured other sources of both surface water and groundwater. The sections below describe these sources. Most of the information in these sections is excerpted from the IRWMP Phase 1 report.

3.1.1 Solano Project

The Solano Project is a federal project with the Bureau of Reclamation (Reclamation) that stores water in Lake Berryessa for delivery to users throughout the region. Local agencies and Reclamation first conceived the project in the 1940s and 1950s to meet the increasing water demands of agriculture, municipalities, and military facilities within the region. The Solano Project first delivered water in 1959. The major facilities are:

- Monticello Dam, which captures water from Putah Creek in Lake Berryessa;
- Putah Diversion Dam, which diverts water out of Lower Putah Creek just downstream of Monticello Dam; and
- Putah South Canal, which delivers water to local agencies.

Reclamation holds the water rights permits for the Solano Project in trust for the Solano water users. When the permits are converted to a license, and the capital debt for the Project is paid off, the license will be issued in the name of the Solano water users.

In 1995, the Solano agencies and upstream water right holders (upstream of Monticello Dam) reached a settlement on part of the Putah Creek Adjudication that addressed longstanding disputes between the parties. Called the “Condition 12 Settlement Agreement,” the settlement placed a cap on future water development in the watershed of Lake Berryessa and allocated a limited amount of future water development rights to projects in Napa and Lake Counties. The original water rights permit for the Solano Project had set limits to water supply development in the watershed, but the settlement clarified the limits and provided a mechanism to account, monitor, and enforce compliance. The Court appointed a Watermaster to monitor water use and enforce the settlement. The settlement agreement provides a measure of certainty to the Solano Project water supply because all major water users in the watershed of Lake Berryessa are bound by the settlement agreement.

In March 1996, the Sacramento Superior Court held a trial on instream flow needs for Putah Creek downstream from the Putah Diversion Dam. The Court ruled that Putah Creek required additional flows.

The Solano parties appealed the judgment, but the parties then agreed to a negotiated settlement in 2000. The Putah Creek Accord increases flows to Putah Creek, but includes reduced flows when Lake Berryessa is low in storage and includes a process for addressing illegal surface water diverters in Putah Creek.

The “firm yield” of the Solano Project (the amount available during the driest hydrologic period on record) is approximately 207,350 acre-feet. SCWA has water contracts to deliver this water for municipal and agricultural uses to Fairfield, Suisun City, Vacaville, Vallejo, Solano Irrigation District, Maine Prairie Water District, University of California at Davis, and California State Prison – Solano.

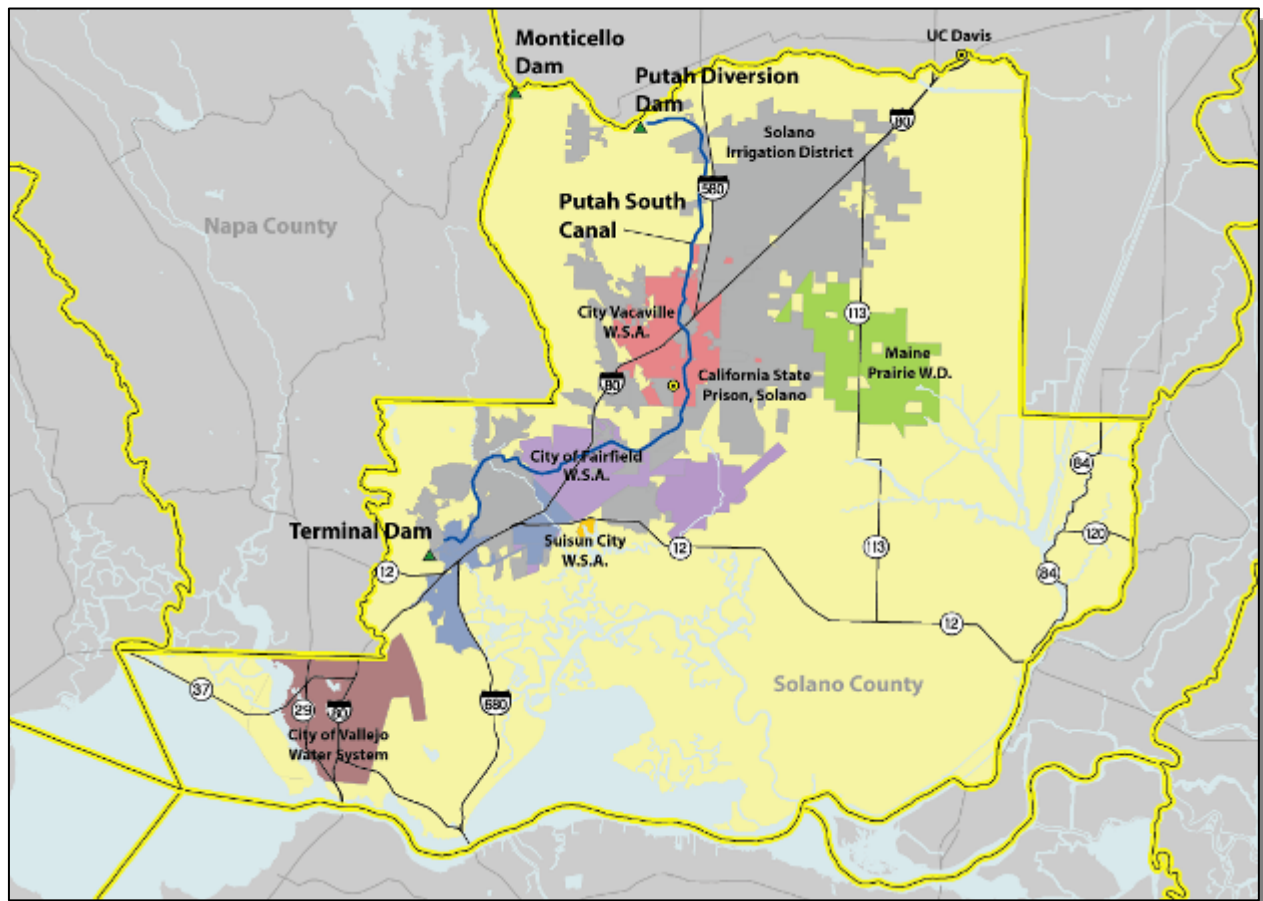


Figure 3-1
Solano Project Facilities and Participating Agencies

3.1.2 State Water Project

The SWP provides water to the Solano agencies through the North Bay Aqueduct (NBA). The SWP has water rights on the Sacramento and San Joaquin River systems, and it stores water in Lake Oroville (on the Feather River). The NBA diverts this water from Barker Slough, in the Delta, to the Solano agencies for water supply. DWR envisioned the NBA as part of the SWP during the initial SWP planning in the 1950s

and 1960s. Construction of the NBA in Solano County started in 1984 and was completed in 1988. The major SWP facilities that deliver water to the Solano agencies include:

- Barker Slough Pumping Plant, which pumps water from Barker Slough into the NBA;
- North Bay Aqueduct, a pipeline that delivers water from Barker Slough to Cordelia Forebay; and
- Cordelia Forebay, where water is pumped to Napa County, Vallejo, and Benicia.

SCWA has a contract with DWR for water supply from the SWP. In turn, SCWA has contracts with Solano cities for provision of this water supply. The NBA contracting cities are Benicia, Vacaville, Fairfield, Vallejo, Suisun City, Rio Vista, and Dixon. The city of Suisun City has an allocation of NBA water but has no facilities to take NBA water at this time. The cities of Rio Vista and Dixon have the right to obtain a specified amount of NBA water in the future, but have no facilities to take NBA water at this time.

SCWA has contracted for an ultimate allocation of 47,756 acre-feet of water per year from the SWP. This amount includes 5,756 acre-feet of additional SWP water per year that SCWA purchased on behalf of the cities of Fairfield and Vacaville from the Kern County Water Agency (another SWP contractor) in 2001. The SWP contract amount is 47,206 acre-feet in 2004, and will increase each year until it reaches 47,756 acre-feet per year in 2015.

DWR prepared a report on SWP reliability titled “The State Water Project Delivery Reliability Report” in 2002. This report provides a thorough analysis of the delivery capability of the SWP. DWR initially thought that the SWP would have additional facilities, and the SWP contractors’ allocations are based on the yield with these additional facilities. The report indicated that supplies are variable, with the SWP able to deliver at least 82 percent of allocations in 50 percent of the years.

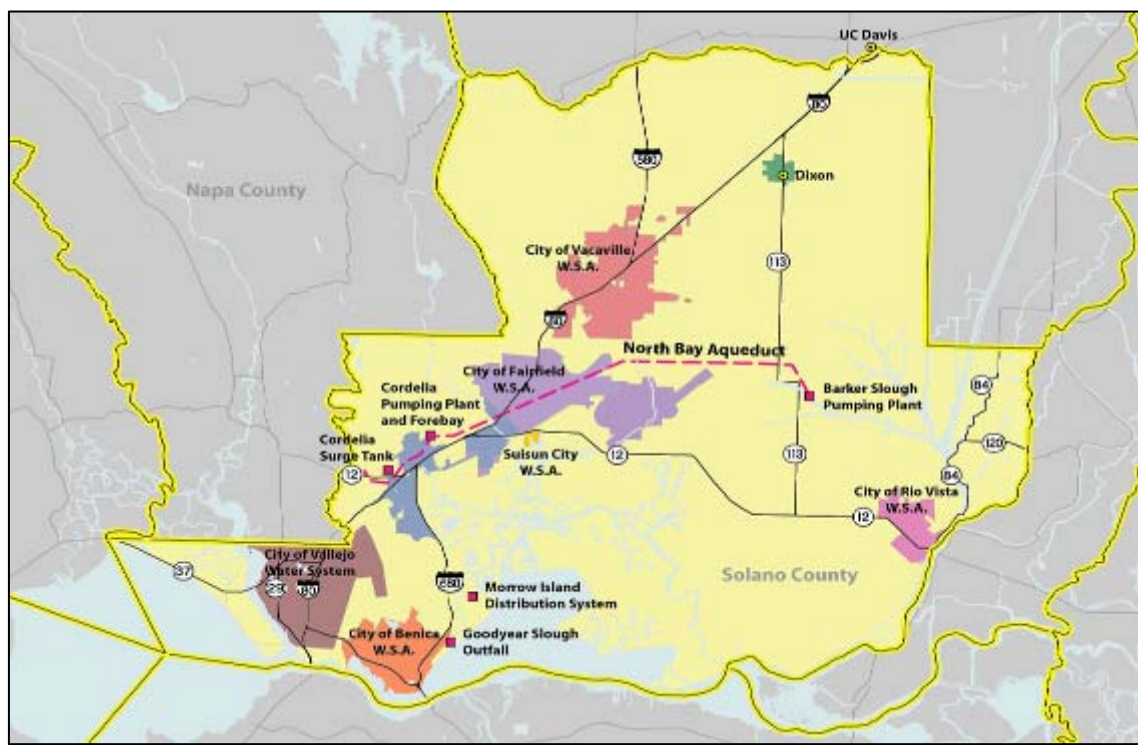


Figure 3-2
SWP Facilities and Member Units

3.1.3 Local Supplies

Local agencies have secured additional supplies to meet local needs. Several important supplies include Vallejo Permit Water, Settlement Water, and groundwater.

3.1.3.1 Vallejo Permit Water

Vallejo holds a water rights license for 31.52 cubic feet per second (cfs) of water diverted from the Delta, known as Vallejo Permit Water (VPW). The VPW right allows use within a service area that includes Vallejo, Benicia, parts of Fairfield, and the American Canyon area of Napa County. Prior to the construction of the NBA, a pumping plant on Cache Slough in the Delta pumped water to Vallejo through an underground pipeline (the Cache Slough Pipeline, owned by Vallejo). The Cache Slough Pipeline is interconnected with the NBA, and Vallejo still uses portions of the Cache Slough Pipeline to transport water from the NBA.

When DWR constructed the NBA, Vallejo paid for the right to use the NBA to deliver VPW. DWR increased the size of the NBA to account for the additional 31.52 cfs of VPW. DWR has contractually limited the annual amounts of VPW to 17,287 acre-feet per year. This amount is 5,493 acre-feet less than if Vallejo diverted the 31.52 cfs year-round. An amendment to the agreement with DWR would be necessary to increase the amount of VPW to the maximum amount for year-round diversion.

VPW has a higher water right priority than the SWP and Central Valley Project (CVP), so it is more reliable than SWP supplies. VPW is subject to being cut off during the summer of very dry years when the State Water Resources Control Board (SWRCB) determines that the available water supply in the Delta is coming from SWP and CVP reservoir storage releases. Term 91 is not included in the VPW license (see explanation of Term 91 in the discussion below about Settlement Water).

3.1.3.2 Settlement Water

Settlement Water is a major new source of water for Benicia, Fairfield, and Vacaville. In 1990, the three cities filed for SWRCB water rights permits for an appropriation of water under the state's Watershed of Origin statutes. The permit application was withdrawn after the cities and DWR reached a settlement that provided an essentially equivalent water supply from the SWP. A Settlement Agreement and a Conveyance Agreement with DWR specify the details of the Settlement Water supply.

Settlement Water is available up to the following amounts:

- Benicia – 10,500 acre-feet per year;
- Fairfield – 11,800 acre-feet per year, and
- Vacaville – 9,320 acre-feet per year.

The main restriction to Settlement Water is that it is not available when Standard Water Right Term 91 is in effect. SWRCB declares Term 91 when it determines that the SWP and CVP are releasing stored water in excess of natural flows (natural flow is the flow that would have been in existence if DWR and Reclamation had not constructed the Projects) to meet in-Delta demands and Delta water standards. Term 91 is declared in the summer of all but very wet years. The cities can divert Settlement Water when the Delta is in excess conditions (more inflow than needed to meet in-Delta demands and Delta water standards) or when the Delta is in balanced conditions as long as Term 91 is not in effect. Balanced conditions in the

Delta are when the SWP and CVP are meeting in-Delta water demands, meeting all Delta standards, and meeting their export demands with no extra water available. During balanced conditions, the SWP and CVP are releasing water from reservoir storage to meet their water delivery obligations.

Settlement Water is a major new source of water to meet the long-term needs of Benicia, Fairfield, and Vacaville. The cities requested these amounts of water based on projected water needs to meet city General Plan demands. The Settlement Agreement allows the three cities to apply in the future to the SWRCB for a Watershed of Origin appropriation above Settlement Agreement amounts if their demands exceed those upon which the Settlement Agreement was based. The Settlement Agreement runs through 2035 and is renewable under the same terms as the DWR/SCWA SWP contract. The Settlement Water is considered a permanent supply.

3.1.3.3 Groundwater

Prior to the development of the Solano Project, both municipal and agricultural users pumped groundwater extensively as their water supply. One of the main reasons that SCWA and Reclamation developed the Solano Project was to rectify groundwater overdraft in some agricultural areas. Groundwater levels rebounded after the Solano Project started making agricultural water deliveries.

The amount of groundwater use for municipal, agricultural, and rural residential uses within the region has not been accurately quantified. The cities of Rio Vista and Dixon solely use groundwater supplies from basins underlying the cities. Approximately one-third of Vacaville's municipal water supply is from groundwater underlying the city.

Most of the growers within the Solano Irrigation District (SID) use surface water, but SID has wells to supplement its surface water supply from the Solano Project. Maine Prairie Water District (MPWD) and RD 2068) provide surface water to their growers, and do not currently use groundwater underlying their districts. Growers outside of water supply districts rely entirely on groundwater unless they have an individual right to a surface water supply.

Most rural residential landowners have individual shallow groundwater wells that serve their domestic needs. Some small rural residential water systems also distribute groundwater to their customers.

The Solano Subbasin is the largest groundwater basin in Solano County and underlies the northeastern part of the county. This groundwater basin starts from the foothills above Vacaville and extends to the Sacramento River. The groundwater basin extends from Putah Creek to the north to the boundaries of Fairfield to the south. There are two basic aquifers in the groundwater basin. The Putah Fan is a shallower aquifer providing agricultural water and local domestic supplies. The Putah Fan is underlain by the Tehama Formation aquifer. This aquifer is quite deep (over 1,000 feet) under Vacaville, but surfaces in the English Hills area north and west of Vacaville. Vacaville's wells draw from the Tehama Formation for its groundwater supply. The Suisun-Fairfield Valley Basin is the second largest groundwater basin in Solano County. It occurs to the west of the English Hills beneath the Fairfield and Suisun. This basin is not used in a significant capacity due to low yields and poor water quality.

Public agencies that overlie this groundwater basin have developed groundwater management plans as specified in Assembly Bill (AB) 3030, the state law that authorizes local agencies to prepare groundwater management plans. SCWA, through the Solano Water Authority, prepares biannual reports on groundwater levels for the groundwater basin. DWR and local public agencies that utilize the

groundwater basin supply groundwater level data. These reports show no trend of groundwater overdraft with current levels of groundwater use. Groundwater levels drop in dry years, but rebound in wet years.

3.1.3.4 Other Surface Water Supplies

Vallejo has local surface water supplies stored in the “Vallejo Lakes System,” which includes Lakes Frey, Madigan, and Curry. The Vallejo Lakes System historically provided water to the City of Vallejo, but it currently provides water to the unincorporated communities in Suisun Valley and Green Valley. Vallejo agreed to serve some residents in this area as part of the development of the Vallejo Lakes Systems. The largest lake, Lake Curry, has a storage capacity of 10,700 acre-feet and a yield of about 3,750 acre-feet per year.

Benicia uses Lake Herman, in the hills between Benicia and Vallejo, as a local supply. Lake Herman has a storage capacity of 1,800 acre-feet. The average yield of the 10 square mile watershed is 500 to 1,000 acre-feet annually with no yield in dry years. The additional storage capacity serves as terminal storage for excess water delivered through the NBA.

In the eastern Delta part of Solano County, many growers divert directly from local waterways. Growers hold riparian rights (water rights that derive from land ownership) or appropriative rights. Records do not exist to quantify the amount of this water use. These supplies are very reliable because water is always available in this part of the Delta.

3.2 SUMMARY OF SUPPLY

Phase I identifies supply sources for SCWA and its member agencies. Table 3-1 shows a summary of supply data from Phase I. The table does not include RD 2068 as its supply is independent of SCWA. The reliability of each supply is described in the Phase I report (that is included herein as Appendix A).

Table 3-1
Summary Of Regional Supplies

Type of Supply	Amount of Supply (in acre-feet per year)
Solano Project	192,350
SWP	47,206
VPW	17,287
Settlement Water	31,620
Groundwater	23,300
Local	900
Total	312,663

Solano Project supplies are highly reliable. Full allocations are allowed until Lake Berryessa is empty. SCWA and the Solano Project water users have agreed on reductions in usage during extremely low reservoir levels to carry over water for use in future years. Groundwater supplies are also very reliable; pumpers use groundwater conservatively so that they can increase pumping in a series of dry years.

The NBA has the most supply variability. DWR significantly reduces SWP supplies in dry years. Settlement Water is less available in dry years, and VPW can be reduced in very dry years.

Projecting future supplies for different hydrological conditions is complicated. The SWP has reports documenting its current reliability. There is no comparable report for the Solano Project. Additional analysis is needed to determine the conditions when VPW is likely to be reduced.

Additionally, the determination of the reliability for each supply source will depend on how much an agency relies on the supply. For example, a city that is entirely dependant on SWP supply may be more conservative regarding the reliability of its SWP supplies than an agency that has multiple supplies and is able to substitute SWP shortages by using other supplies.

Additional work is necessary to portray supply projections for different hydrological year types using a common set of assumptions.

3.3 SUMMARY OF DEMAND

Phase I identified current water usage (1999 through 2002) by member agencies. Projected future demands were estimated by these agencies and reported in various documents such as Urban Water Management Plans, SB 610 reports, and Municipal Service Reviews. Further analysis is needed to develop projections with common assumptions to show collective long-term demand for all Solano water users.

City water use is expected to increase in the future as population increases. Irrigated agriculture and cropping patterns in Solano County have been stable; therefore, agricultural water use will not likely increase in the future.

Based on Phase I findings, Table 3-2 shows the current water use of member agencies. Table 3-2 does not include RD 2068 because its supplies are separate from SCWA.

Table 3-2
SCWA Member Agency Demands

Agency	Current Demand (in acre-feet per year)
Benicia	13,000
Dixon	3,500
Fairfield	25,000
Rio Vista	1,800
Suisun City	4,900
Vacaville	18,000
Vallejo	22,500
SID	140,000
MPWD	24,000
CSP Solano	1,200
UC Davis	4,000
Total	257,900

3.4 COMPARISON OF SUPPLY TO DEMAND

A comparison of Table 3-1 (full supply) and Table 3-2 (current demand) shows that the region currently has an excess of supply if full supplies are available. However, full supplies are not always available.

The supply table shows the collective supplies (full supplies) for all SCWA member agencies. This collective analysis on a countywide basis is appropriate as a baseline because, as shown in Phase I, agencies within the region have extensive exchange and transfer arrangements. If any one agency has a shortfall, it will likely make arrangements with other agencies to cover that shortfall, or join in a future project to obtain additional supplies.

However, there are scenarios where full supplies may not be available. For example, assuming a series of dry years, supplies from the SWP could be severely reduced. Settlement Water is less available and VPW may be reduced. One possible dry year scenario is a 10% reduction in Solano Project Supply, a 60% reduction in SWP, a 30% reduction in Settlement Water, a 30% reduction in VPW, and a 10% reduction in local supplies. Table 3-3 shows the impact of such a dry year scenario on countywide supplies. Comparing this scenario with the current demands, shown in Table 3-2, identifies shortages. In this example, the region would have a 7,000 acre-foot shortage based on current demands. This shortage would increase with increased future demands as cities grow.

Table 3-3
Dry Year Supply Scenario

Supply Source	Dry Year Supply Available (in acre-feet per year)	Reduction from Contract or Water Rights
Solano Project	173,115	10%
SWP	18,882	60%
VPW	12,101	30%
Settlement Water	22,134	30%
Groundwater	23,300	
Local Supply	810	10%
Dry Year Supply Total	250,342	

3.5 ADDRESSING SHORTAGES

For the foreseeable future, shortages will only occur in dry years. SCWA and the member agencies should plan on meeting these dry year demands. Although further study could provide more information on how frequent and severe these shortfalls will be, these shortfalls are driven by climatic and regulatory conditions that are difficult to predict. A practical course of action is to implement a series of projects to provide additional dry year supplies to Solano cities and assess on a regular basis whether the region needs additional dry year supplies.