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REVISED DRAFT

SECTION 2

Westside Sacramento Integrated Regional Water Management Plan

29 June 2012~~25 May 2012~~

TRACK CHANGES VERSION

Prepared for

Westside Sacramento Regional Water Management Group
34274 State Highway 16
Woodland, CA 95695-9371

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Section 2: Region Description

This section describes the Westside Sacramento **R**~~Subr~~egion (~~Westside Region,~~ Region). This ~~region~~**Region** is large and diverse and has evolved **to reflect the key natural resources** ~~in interesting ways~~ since the mid-1800~~'~~s. Some important historical decisions and practices factor into the challenges people now face **in**~~when~~ trying to manage the ~~region~~**Region**'s water and environmental resources.

2.1 Region Overview and History

2.1.1 Overview

The unique and wide-ranging landscape of the ~~Westside~~ Region includes nearly 3,000 square miles located west of the Sacramento River and north of the San Francisco Bay-Delta ~~in northern California~~**at the most downstream end of the larger Sacramento River watershed**. The Region boasts a diverse mix of landscape**,** including national forest, mountainous serpentine landscape and canyons, vast agriculturally developed valleys, and burgeoning urban communities. The Region encompasses all of Yolo County and portions of Lake, Napa, Solano, and Colusa Counties**,** as shown on Figure 2-1. The **Region's** ~~Westside~~**s** ~~Region's s~~urface and groundwater resources are inextricably linked**;**~~,~~ therefore**,** th**e** ~~its~~ **boundaries**~~is Region~~ **are** ~~is~~ appropriate to **better** address the common water challenges of the more than 70 water agencies and other interested parties.

The four ~~sub~~watershed **subbasin**s within the ~~region~~**Region** ~~are connected~~ **include the Cache and Putah Creek watersheds as well as a portion of the Sacramento-Stone Corral and the Lower Sacramento watersheds which all drain to** ~~and form a~~ **the lower westside** portion of the ~~Lower~~ Sacramento **River** ~~watershed.~~ The ~~watersheds of~~ Cache Creek and Putah Creek **watersheds** drain from the coastal mountains on the western edge of the Region towards the Sacramento River valley and ~~define~~ **comprise** ~~most~~ **a large portion** of the Region**'s area**. The ~~Westside~~ Region also incorporates those portions of Solano and Yolo counties which lie outside the Cache and Putah Creek watersheds. ~~These areas are included because despite being outside the Cache and Putah Creek watersheds, they share common elements.~~ The Lower Sacramento **watershed overlies both Yolo and Solano County while** ~~and~~ **the** Sacramento-Stone Corral ~~subwatersheds~~ **watershed overlies the northern portion of Yolo County. Both of these** are large drainages in the flatter Sacramento Valley area of the Region that also flow into the Sacramento River and Sacramento-San Joaquin Delta.

The eastern side of the Region ~~also shares portions of~~ **is a part of** the expansive and interconnected Sacramento Valley groundwater basin. Since ~~each~~ ~~**of**~~ the **two** major watersheds of the Region,~~ namely~~ Cache Creek and Putah Creek, influence the Sacramento Valley groundwater basin**,** considering this ~~region~~**Region** as a whole **fosters**~~offers the opportunity for~~ a broader understanding of water management challenges and opportunities not previously considered **in IRWM Plans** ~~in integrated plans~~.

Together, the watersheds and groundwater resources throughout the numerous basins in the Region provide diverse water sources**, which are** relied on for numerous agricultural, urban, **and** rural water users~~,~~ and support of critical ecosystems. The specific linkages between the water sources of the ~~region~~**Region** are described throughout the ~~following~~ section.

Figure 2-1: Topography

2.1.2 Planning Areas

Because of its expansive geography, t~~T~~he ~~Westside~~ Region has been subdivided into ~~"~~Planning Areas~~"~~ (PAs) ~~due to the expansive geography of the region~~**Region**. The PAs were developed to provide for focused study and improved understanding of watershed management challenges and opportunities ~~that are~~ unique to each area. The P**A**~~lanning Area~~ **b**~~B~~oundaries were developed ~~by considering the availability of hydrologic information that could be used~~ to describe hydrologic functions within each area and provide meaningful insight into the organization **and use** of water resources **throughout the** ~~**region**~~**Region**. As a result, the ~~Westside~~ Region was ~~divided~~ **characterized as**~~into~~ **consisting of** three P**A**~~a~~s**,** as shown in Figure 2-2 and referred to throughout this ~~**Integrated Regional Water Management (**~~IRWM~~)~~ Plan:

- Upper Cache Creek PA **(605,704 a**~~A~~**cres)** – Includes the Cache Creek and Bear Creek **w**~~W~~atersheds**,** located primarily in rural Lake and Colusa **C**~~c~~ounties**,** down to the Rumsey Bridge in Yolo County. The Rumsey Bridge was selected as the downstream extent of the Upper Cache PA because **of its location where Cache Creek enters the flatter valley.** ~~the gage is a key stream- level indicator used to regulate upstream releases from Clear Lake.~~

- Upper Putah Creek PA **(361,285 a**~~A~~**cres)** – Includes the mountainous and sparsely populated Putah Creek **w**~~W~~atershed upstream of Monticello Dam and Lake Berryessa **in eastern Napa County and southern portions of Lake County**.

- Valley Floor PA **(944,473 a**~~A~~**cres)** – Includes the lower portion**s** of both the Putah Creek and Cache Creek watersheds, as well as the surrounding low**-**~~-~~lying drainages in the Region**,** including the Colusa Basin **d**~~D~~rain (a portion of the Sacramento-Stone Corral watershed) and Lower Sacramento watershed. The Valley Floor PA is the largest of the three PAs and extends to the Sacramento River in the east and the Delta in the south.

2.1.3 History of Water Development

Understanding the historical influences o**n water supply**~~f the~~ development and use ~~of water supplies~~ in the ~~Westside~~ Region provides essential context **for** ~~to~~ the complex relationships that surround water management~~,~~ and **the way**~~how~~ these relationships have affected the water resources landscape over time. **H**~~This h~~istor**ical understanding also**~~y~~ provides a common foundation for **addressing the Region's** ~~improved understanding of the~~ challenges and opportunities **in**~~addressed by~~ the ~~Westside Region's Integrated Regional Water Management (~~IRWM~~)~~ Plan.

2.1.3.1 Early History

Native American tribes are the first known settlers within the ~~Westside~~ Region. Historians believe that Native American communities existed in the area **more than**~~over~~ 10,000 years before European settlers. These tribes resided near water sources**,** including Clear Lake, Cache Creek, **and** Putah Creek**,** and other areas within the Valley. Early residents in the Region included the Pomo (Clear Lake) and Wintun (Cache Creek, Putah Creek, and **v**~~V~~alley ~~F~~**f**loor areas) **p**~~P~~eople. A handful of Wappo and Miwok also lived around Clear Lake.

Note: Tribal History Section Under Development

Figure 2-2: Planning Areas

2.1.3.2 19th Century

American and European settlers began arriving in the mid-1800~~'~~s, with the first recorded contact with Native Americans occurring in the 1830~~'~~s. Early immigrants began planting crops and developing ranchos on Spanish land grants in the late 1830~~'~~s and early 1840~~'~~s. Significant agricultural and cattle ranching industries began to develop in the 1850s around Clear Lake and within the **v**~~V~~alley **f**~~F~~loor. The early settlers practiced subsistence farming based on livestock and dairy. In the late 1800~~'~~s, farmers began to capitalize on the rich and fertile soils and ideal growing conditions and start**ed** exporting crops from the Region. Native oak woodland and riparian habitat was cleared and replaced with agricultural fields, pastures, and orchards. The mountainous sections of the ~~region~~**Region** have included vineyards and pear orchards for many years now. The valley's rich alluvial soils and relatively flat terrain supported the development of a wide variety of crops**,** including rice, grains, and citrus orchards.

The discovery of gold in 1848 in the Sierra Nevada and the resulting influx of prospectors into California dramatically changed the makeup of the Region. By the 1850~~'~~s, settlers were making their homes throughout the Region and some communities, such as Lakeport **and Woodland,** were forming. Mining developed into a large industry within **Napa, Colusa, and** Lake Count~~y~~**ies** during the gold rush. Gold, borax, and large quantities of mercury were mined, particularly in the upper Cache Creek and Putah Creek watersheds **within Lake and Napa Counties**. Mercury ~~was~~**,** ~~-~~used **in placer and hydraulic mining** to ~~extract~~ **amalgamate** gold **fines**~~from quartz~~**,** ~~and~~ was mined extensively throughout the **Lake, Knoxville, and East Mayacamas mining districts in the upper watershed areas** ~~Clear Lake area~~ for use in the Sierra Nevada during the mid**-** to late 1800~~'~~s. Some ~~of the~~ **mercury and gold** mining ~~activity~~ in the Region continued through the late 1950~~'~~s **for military and commercial uses elsewhere**. **With negligible pollution controls, mining waste contaminated the mine sites and downstream waterways throughout the two watersheds.** These mines are now inactive, but many **have not been properly reclaimed and** ~~may~~ still affect the mercury levels in the creeks and water bodies within the Region. **Mineral springs and natural mercury-enriched soils are** ~~**also**~~ **additional sources of mercury. A portion of the inorganic mercury in water is converted into methylmercury, a highly toxic form that gets incorporated into food webs, reaching concentrations one million times greater in predatory fish than in water. Most major waterways in the Region are now impaired by mercury because of the high levels of methylmercury in fish consumed by humans and wildlife.**

Gravel mining within the **lower** stream channels was also a large industry along Cache and Putah Creek**s**. Although in-channel gravel mining no longer occurs along either creek, the historic mining still affects the integrity of portions of the stream channels, resulting in decreased salmonid spawning habitat.

By the end of the **19th**~~nineteenth~~ century, the Region had been transformed from **one hosting** small, relatively isolated populations of Native Americans to **one with**~~include~~ expanding agricultural and mining communities of Western settlers dispersed throughout **it**~~the **Region** Valley and Clear Lake areas~~. By the early 1900~~'~~s, few Native Americans remained **because of**~~due to~~ local skirmishes and disease introduced by Europeans. Conversion of land for agriculture and mining activities continued to expand. Western-style communities within the Region ~~first~~ began to develop along the waterways**,** including the Sacramento River, Cache Creek, Putah Creek**,** and Clear Lake. Some of these communities can still be recognized today, such as Clearlake, Lakeport, Winters, Davisville (now called Davis), and Rio Vista. Other**s,**

~~communities~~ such as Vacaville and Dixon**,** developed along the route between the Sacramento Valley and San Francisco.

2.1.3.3 Development of Water Supply

The demand for water supply increased along with the rapid growth in population and agricultural activities in the late 1800~~'~~s. Water was either directly diverted from the Sacramento River, Putah Creek, Cache Creek, and Clear Lake or extracted from local aquifers during the 1800~~'~~s and early 1900~~'~~s. The advent of reliable groundwater pumping techniques provided for a significant expansion of agriculture. Unfortunately, this development also resulted in an overreliance on groundwater. Excessive groundwater pumping created an overdraft of basins and caused localized subsidence **in lowland areas**. **This o**~~O~~verpumping ~~of groundwater~~ began to threaten access to shallow groundwater for irrigation. Water agencies began to supplement their local resources with projects that delivered available supply from the Cache Creek and Putah Creek watersheds, as well as importing water supplies from outside the Region to meet the growing water demands. Local water suppliers constructed several important supply enhancement projects between 1914 and 1988**, which** ~~and~~ included~~:~~ Cache Creek Dam, Solano Project **(Monticello Dam)**, Indian Valley Reservoir**,** and **the** North Bay Aqueduct.

Cache Creek

The Yolo Water and Power Company constructed the Cache Creek Dam at Clear Lake in 1914 to supplement the growing need for water within Yolo County. The Cache Creek **D**~~d~~am serves to **both increase the natural storage and** regulate the release of irrigation water from Clear Lake for downstream uses. Today**,** the Yolo County Flood Control and Water Conservation District (YCFCWCD**)**~~)~~ owns and operates the dam consistent with the Gopcevic Decree**,** issued in 1920**,** which regulates how much water can be stored in Clear Lake during non-flood and flood conditions. YCFCWCD stores up to 150,000 acre-feet per year (AFY) in Clear Lake for agricultural water use in Yolo County as allowed in the Solano Decree, which was approved in 1978. In 1975, YCFCWCD completed constructing the Indian Valley Reservoir, located on the North Fork of Cache Creek**,** to help meet agricultural water demands within Yolo County during dry years that could not be supplied by Clear Lake alone. Indian Valley Reservoir also provides 40,000 AF capacity for flood control **out of its 300,600 AF storage**.

Putah Creek

Solano County and the water users of the Solano Basin similarly employed ~~the use of~~ surface water supplies to offset groundwater overdraft. In 1957, the United States Bureau of Reclamation (USBR) completed the Solano Project on Putah Creek to **increase** ~~supply~~ Solano County**'s** ~~with an increased~~ water supply because groundwater resources had been depleted. This project features the Monticello Dam, which created Lake Berryessa. Releases from the dam flow downstream to Lake Solano, created by the Putah Diversion Dam. The Putah Diversion Dam provides control over releases to the lower portion of Putah Creek and supports diversions to the Putah South Canal, which transports agricultural and municipal water supplies to much of Solano County.

Imported Supplies

Municipal and agricultural users rely ~~on~~ significant**ly on** sources of water imported into the Region from the ~~State of California State Water Project (~~SWP~~)~~ and Federal Central Valley

Project. The ~~North Bay Aqueduct (~~NBA~~)~~, completed in 1988, is the most recently built major supply source within the Region~~. The NBA~~ **and** supplies SWP water to **agencies in** Solano **County** ~~Agencies.~~ The ~~Department of Water Resources (~~DWR~~)~~ envisioned the NBA as part of the SWP during the initial SWP planning in the 1950s and 1960s. ~~Solano County Water Agency (~~SCWA~~)~~ has a contract with DWR for water supply from the SWP. In turn, SCWA provides water under contract to Vacaville~~, Rio Vista, and Dixon (all within Solano County),~~ **and a number of cities in Napa County.**~~.~~ **SCWA also has** ~~The~~ contracts **to provide NBA water to**~~with~~ Rio Vista and Dixon**;** ~~allow for deliveries of an additional specified amount of NBA water in the future, but those cities would require~~**however,** additional facilities **need to be constructed** ~~in order to receive tha~~**for Rio Vista or Dixon** t**o receive the** water.

While water managers within the Region have expanded their portfolios to include additional surface water supplies, communities still face challenges meeting their demands for water.~~.~~ Surface water supply availability varies depending on hydrologic conditions; and surface water delivery infrastructure does not extend to all communities in the PAs. Likewise, communities and agricultural users that rely on groundwater supplies must deal with elevated concentrations of naturally occurring constituents such as boron, selenium**,** and total dissolved solids as well as constituents such as nitrate that have been added **by**~~due to~~ human activities within the Region.

2.1.3.4 Development of Flood Protection

Throughout the late 1800~~'~~s and into the 1900~~'~~s, communities began to m**odify**~~ake modifications to~~ local waterways **and operate constructed facilities (dams) so as** ~~**in manner**~~ to decrease the negative effects from **local** flooding. For example, one of the natural features of Clear Lake is the Grigsby Riffle, a rock sill that has long functioned as a dam to create Clear Lake. This natural hydraulic impediment in Cache Creek also causes levels to rise in Clear Lake when inflows are high and has resulted in periodic flooding around the shores of the lake. Some of the highest known lake stages occurred in 1890. Then**,** after a significant flood in 1938, water managers excavated the Riffle to allow for increased flows into downstream portions of Cache Creek when the lake reaches high stages. However**,** in response to the effects of those higher downstream flows, the ~~"~~Bemmerly Decree~~"~~ was issued in 1940**,**~~ and~~ prohibit**ing**~~s~~ further excavation of the Riffle. Since flooding around the lake has continued to be a persistent problem and increasing releases out of the lake during flood stages is not an available option, communities have altered the streams entering Clear Lake. They have constructed levees to reclaim **low-lying** land adjacent to Middle Creek and to prevent flooding along Scotts, Middle, Clover**,** and Adobe **C**~~c~~reeks **which are tributaries to Clear Lake**.

Communities established within the lower valley areas of the Sacramento River watershed have also faced significant flood hazards. These communities**, many of which are** located ~~throughout~~ **in** the floodplain of the Sacramento River**,** experienced significant flooding in 1850, 1861-1862, 1878, 1902, and 1909. As a result, state and local agencies have significantly altered stream channels and constructed levees in many areas of the valley floodplain to improve public safety and reduce flood-related damages. The largest set of flood management facilities affecting this Region is the Sacramento River Flood Control project initiated in 1918**,** **which** ~~and~~ includes the Yolo Bypass**, constructed to reduce flood risk in the City of Sacramento**. As is always true for all communities located within natural floodplains, Rio Vista~~,~~ and portions of Woodland, Davis, and Vacaville and unincorporated areas of Yolo and Solano Counties still face residual flood risk.

2.1.3.5 The Modern Era

The d~~D~~evelopment of communities, formation of local governments, and incorporation of cities **that** began in the mid-1800s ~~and~~ continue today. Solano, Yolo, Colusa**,** and Napa formed as part of the original 27 counties created in the statehood proceedings for California in 1850. Lake County formed ~~later~~ in 1861. Within Yolo County, the cities of Davis, Woodland, and Winters incorporated in 1917, 1871**,** and 1898**,** respectively; West Sacramento incorporated much later**,** in 1987. Within Solano County, the cities of Dixon, Vacaville**,** and Rio Vista incorporated in 1878, 1892, and 1893**,** respectively. Within Lake County, the cities of Lakeport and Clear Lake incorporated in 1888 and 1980**,** respectively. **N**~~There are n~~o incorporated cities **exist** within the portions of Napa and Colusa **C**~~c~~ounties located within the Region.

Approximately 390,000 people live within the Region today**.** **M**~~ and m~~uch of the valley area lands support significant agricultural activities. Even so, the vast majority of the land within the Region remains undeveloped. The communities throughout the Region value preservation of these open spaces and agricultural lands**.** In addition, many residents both inside and outside the Region demonstrate interest in restoring **the Region's** environmental function**:** ~~within the Westside Region~~ **a**~~. A~~ number of environmental enhancement efforts have been undertaken ~~in order~~ to continue **to** protect and enhance ~~the~~ significant habitat and water resources ~~of the Region~~. Examples ~~of these efforts~~ include the ongoing development of the Habitat Conservation Plan (HCP) for Solano County, a HCP/Natural Communities Conservation Plan (NCCP) for Yolo County**,** and the state led Bay-Delta Conservation Plan (BDCP).

The modern focus of water resources management in the ~~Westside~~ Region centers around several key factors ~~including~~:

- **S**~~s~~upporting sustainable economic activities and beneficial uses of water**,**
- **P**~~p~~reserving open space and agricultural activities within the ~~region~~**Region,**
- **E**~~e~~ngaging in environmental stewardship**, and**
- **P**~~p~~rotecting and improving water quality to support the range of beneficial uses**.**

~~T~~**T**hese **key factors** ~~**of** considerations are~~ **are emphasized**~~highlighted~~ throughout this IRWM Plan.

2.2 Population

The population of the ~~Westside~~ Region more than doubled over the past 40 years, growing approximately 174 percent ~~over the past 40 years~~. **Its**~~The~~ estimated current population ~~of the Westside Region~~ is over 390,000. The majority of the population is located in the incorporated cities in Solano and Yolo Counties**,** including Vacaville, Davis, Woodland, Dixon**,** and West Sacramento. The total population and population for each PA **are**~~is~~ summarized in Table 2-1. U.S. Census data (census tract data) for 2010 were used to estimate current population. The population density for the Region has been mapped in Figure 2-3, which **shows**~~provides~~ the number of persons per square mile. This figure demonstrates that the majority of the population in the ~~region~~**Region** exists primarily in and around city/community areas. Agricultural lands**,** which include smaller communities and scattered ranches and farms**,** contain lower~~-~~-density populations.

Table 2-1: ~~Estimated~~ Projected Population by Planning Area

	1970	1980	1990	2000	2010	2015	2020	2025	2030	2035
Communities										
Dixon [1]	4,432	7,541	10,401	16,103	18,376	19,916	21,148	22,380	23,304	24,536
Rio Vista [1]	3,135	3,142	3,316	4,571	7,346	8,348	9,516	10,685	11,770	12,772
Vacaville [1]	21,690	43,367	71,479	88,625	92,344	95,030	97,253	99,383	101,328	102,903
Davis [2]	23,488	36,640	46,209	60,308	64,965	68,117	71,421	74,886	78,519	82,328
West Sacramento [2]	-	-	28,898	31,615	48,744	55,244	62,611	70,960	80,422	91,147
Winters	2,419	2,652	4,639	6,125	6,624	7,125	7,664	8,243	8,866	9,537
Woodland [2]	20,677	30,235	39,802	49,151	55,472	58,196	61,053	64,051	67,196	70,495
Lakeport [3]	3,005	3,675	4,390	4,820	4,753	5,248	5,794	6,397	7,063	7,798
Clearlake [3]	-	-	-	13,142	15,250	16,837	18,590	20,524	22,661	25,019
Rural										
Lake County - Other Communities/Rural	15,467	32,131	46,029	40,220	44,591	48,640	53,088	57,976	63,348	69,255
Solano County - Rural [1]	1,859	2,601	3,819	4,436	4,648	4,870	5,012	5,113	5,214	5,234
Yolo County - Rural [2]	45,204	43,847	21,544	21,461	25,161	26,749	28,437	30,231	32,139	34,167
Colusa County - Rural [4]	17	18	23	26	30	31	32	34	35	36
Napa County - Rural [1]	1,530	1,927	2,155	2,421	2,661	2,788	2,869	2,927	2,985	2,997
Westside ~~Subregion~~Region	142,923	207,776	282,703	343,024	390,965	417,138	444,488	473,790	504,849	538,222

Source: Dept. of Finance, Historical Census Populations of California, Counties, and Incorporated Cities, 1850-2000 (2011).
2010 p~~P~~opulation based on GIS calculation of U.S. Census Bureau 2010 U.S. Census by Census Block Data.~~;~~ (1) 2010-2035 g~~G~~rowth rate based on ABAG 2009 p~~P~~rojections; (2) 2010-2035 g~~G~~rowth rate based on SACOG Draft 2012 Regional Data**;** (3) 2010-2035 g~~G~~rowth rate based on 2008 Lake County General Plan, Table 2-1, Community Profiles; **and** (4) 2010-2035 Colusa County growth rate assumed to be the same as Lake County rural growth rate.
Note: West Sacramento incorporated in 1987 a~~A~~nd Clearlake incorporated in 1980.

Figure 2-3: Population Density

Population projections shown in Table 2-1 and summarized on Figure 2-4 are based on ~~Projection~~ models specific to localized areas provided by the Sacramento Area Council of Governments (SACOG), Association of Bay Area Governments (ABAG)**,** and Lake County General Plan projected growth rates**.** ~~are the basis of the population projections.~~ California Department of Finance growth data were used where local government data w**ere**~~as~~ not available. Growth rates were applied **to** the 2010 estimated population according to census tract boundaries to project growth in five**-**~~-~~year increments. The historical population of the ~~region~~**Region** and projected growth through the 2035 planning horizon **are**~~is~~ shown **o**~~i~~n Figure 2-4. The population is estimated to reach approximately 550,000 by 2035. A detailed tabulation of projected population by community with growth rates can be found in Appendix **2-X**~~A~~.

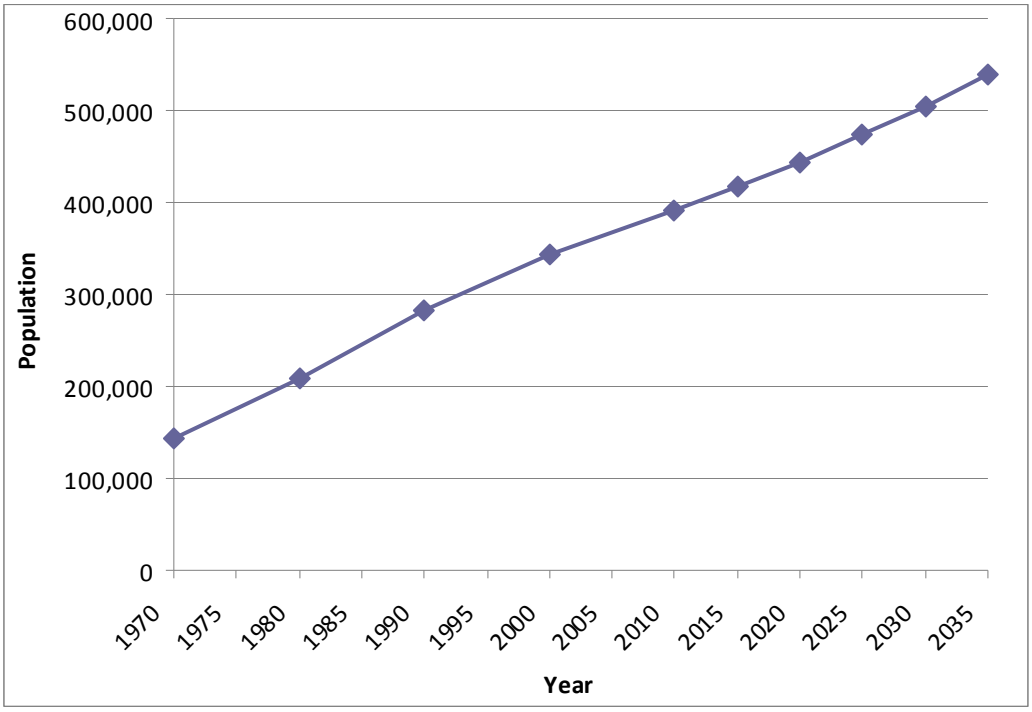

Figure 2-4: Historical and Future Population

2.3 Social and Cultural Values

The story of the ~~Westside~~ Region's development ~~provided~~ earlier in this section hints at the broad range of social and cultural values that characterize the ~~region~~**Region**. High**-**~~-~~priority social and cultural values ~~in the Westside Region~~ that affect **the Region's** water management activities include open space preservation, agricultural preservation, and economic development. These values are interconnected**, as recreation and agriculture are the** ~~**the** as open space and agricultural preservation~~ **and** ~~promote the health of recreational and agricultural economies, which are~~ key**stone to the** economies of the Region. These values have ~~and will continue to~~ be**en** supported through public policy **on**~~, as it pertains to~~ land use, education**,** and continued support of Native American traditions. These policies are documented in the existing County and incorporated City General Plans, discussed in greater detail in Section ~~2.6~~**13**.

2.3.1 Maintenance of Agricultural Character

Collectively, the counties of Colusa, Lake, Napa, Solano, and Yolo are committed to retaining the existing agricultural and rural character of the ~~region~~**Region**. Each county and many of the cities ha**ve**~~s~~ adopted General Plans that largely reflect this vision of preserving the ~~region~~**Region**'s agricultural and recreational resources. The Yolo County General Plan Agricultural Element Policy Document and Background Report **emphasizes**~~confirms~~ that agriculture has always been an important part of Yolo County's history, culture, and economy. ~~The~~ **Yolo and Napa** County ~~made efforts~~ **have policies** in ~~its~~ **their** general plan**s** to conserve and preserve agricultural land by enacting ordinances limiting the use of agricultural lands, creating minimum parcel sizes, and implementing the Williamson Act (which enables local governments to enter into **restrictive** contracts with private landowners of agricultural lands~~. The program entails a 10-year contract between the City or County and an owner of land whereby the land is taxed on the basis of its agricultural use rather than the market value. The land becomes subject to certain enforceable restrictions)~~ **to preserve agriculture~~al~~ in exchange for reduced taxes)**. Strong support from **industry groups and members of** the communities and UC Davis (which conducts much of Northern California's research on agriculture) have also helped the County preserve its agricultural lands.

2.3.2 Maintenance of Recreational Opportunities

Maintaining and improving outdoor recreational opportunities is another key value of the Region. Every year, kayakers and rafters visit the ~~Westside~~ Region for premiere Class II to Class V whitewater runs on Upper Cache and Putah Creeks. ~~Adequate instream flows are needed to~~ **N**~~allow rafters to n~~avigat**ion of**~~e~~ the creeks~~, On the creeks that are regulated by upstream dams,~~ **by rafters requires adequate instream flows, provided by**~~such as Cache Creek, flows are often~~ increased **flow management** on ~~the~~ **summer** weekends **when possible** to **promote** ~~provide opportunities for~~ recreational use of the rivers ~~throughout the summer~~. Fishermen, boaters**,** and other water recreation~~al~~ist**s** rely on the **many** lakes of the ~~region~~**Region,** including Lake Berryessa and Clear Lake**,** for their significant **amount of** fishing and recreational **boating** ~~opportunities~~.

2.3.3 Environmental Enhancement

Environmental enhancement continues to be an area where both local agencies and **n**~~N~~on**-g**~~G~~overnmental **o**~~O~~rganization**s** (NGO**s**) have focused efforts through policy development, awareness, and education. Some ~~examples~~ of **the major** local agencies **and**~~or~~ NGOs that have conducted work to improve and sustain the aquatic and riparian environments throughout the Region are**:** ~~listed below.~~

- Yolo Basin Foundation in the Yolo Bypass**,**
- Putah Creek Council on Putah Creek**,**
- Yolo Natural Heritage Program **in the d**~~: D~~evelopment of a Habitat Conservation Plan/Natural Communities Conservation Plan (HCP/NCCP) for Yolo County**,**
- Lake County in the development of the Lake County Watershed Management Plan**,**

- The Lower Putah Creek Coordinating Committee in the development of the Lower Putah Creek Management Action Plan**,**
- **Blue Ridge Berryessa Natural Area (BRBNA) Conservation Partnership, and**
- **Solano Habitat Conservation Plan.**

2.3.4 California Native American Tribes

The ~~Westside~~ Region is home to a number of Native American Tribes, each with a long ~~tribal~~ history and rich set of cultural values **that** ~~which they~~ have **been** preserved through the centuries. **I**~~The i~~dentified reservations and Rancherias are shown on Figure 2-5, and the federally registered tribal names are listed in Table 2-2.

Table 2-2: Native American Tribes

Reservation/Rancheria Name	Official Federal Register Tribal Name
Upper Lake	Habematolel Pomo of Upper Lake
Robinson (below Upper Lake)	Robinson Rancheria of Pomo Indians
Yocha Dehe Wintun	Yocha Dehe Wintun Nation
Scotts Valley	Scotts Valley Band of Pomo Indians
Big Valley	Big Valley Band of Pomo Indians
Sulphur Bank	Elem Indian Colony of Pomo Indians
Middletown	Middletown Rancheria of Pomo Indians
Lower Lake	Not Federally Recognized

2.4 Economic Conditions and Trends

The communities of the ~~Westside~~ Region have a broad socio~~-~~economic makeup. The growing urban cities of southern Yolo and Solano Counties are distinct from the rural and largely disadvantaged communities in Lake **County and sparsely populated areas of Napa** County. ~~For example, T~~**T**~~t~~he **V**~~v~~Valley **F**~~f~~Floor PA includes a large agricultural industry, a public university at the University of California Davis, and large industrial and commercial areas in West Sacramento and Vacaville. **In**~~By~~ contrast**,** the Upper Putah Creek and Upper Cache Creek PAs are largely rural**,** with limited agricultural areas and scattered small communities. The recreation-vacation industry is the most significant segment of Lake County's economy in the Upper Cache Creek PA. **Similarly, the Upper Putah PA, which includes portions of Napa and Lake Counties, provides numerous rafting and boating recreational opportunities on Upper Putah Creek and at Lake Berryessa.**

Household income data by county obtained from the U.S. Census Bureau's American Community Survey highlights economic disparities within the Region. The median household income (MHI) of Lake County is estimated to be $39,491 per year, which is $18,000 per year lower than the Yolo County MHI of $57,077 and $29,000 per year lower than the Solano County MHI of $68,409. **Appendix 2-X gives a**~~A~~ more detailed tabulation of demographic information ~~is found in Appendix X~~.

Figure 2-5: Communities and Tribes

Figure 2-6: Disadvantaged Communities

DWR defines **a**~~the~~ disadvantaged community (DAC)~~ classification~~ as an area with a**n** MHI less than 80% of the statewide average of **$60,883;** $48,706 **is 80% of the statewide average MHI**. The majority of the communities of the Upper Cache PA and portions of the Valley Floor PA meet the requirements **of a**~~to be considered~~ DAC. Figure 2-6 shows the DAC areas by census block and census~~-~~-designated areas for the Region. DACs may have additional project funding and assistance opportunities.

2.5 Land Characteristics and Uses

The ~~Westside~~ Region encompasses over 1.9 million acres of land, which is dominated by open space and agriculture. Native **vegetation** and open space remains the predominant land use in the Region, occupying approximately 6**8**~~7~~**%**~~ percent~~ of the entire land area, despite the vast agricultural and urban development that has occurred over the past 150 years. Agriculture makes up approximately 28**%**~~ percent~~ of the total land area, and urban and community developments represent only 5**%**~~ percent~~ of the total land area.~~.~~ Open space provides essential habitat for native species and vast opportunities for recreation. Tourists and residents are attracted to the Region's lakes, waterways**,** and lands administered by local and private entities as well as federal and state agencies such as the Bureau of Land Management (BLM), the U.S. Forest Service (USFS), and California Department of Fish and Game (CDFG) for recreational activities like boating, fishing, hiking, camping**,** and hunting.

Table 2-3 ~~provides a~~ summar**izes**~~y of~~ existing land use classifications in the ~~Westside~~ Region, by planning area, and Figure 2-7 illustrates the distribution of land uses throughout the Region.

Table 2-3: Summary of Existing Land Use By Planning Area

Land Use Category	Upper Cache Creek PA (Acres)	Upper Putah Creek PA (Acres)	Valley Floor PA (Acres)	Total (acres)	Percent of Total Land
Agriculture	33,409	9,801	486,668	529,877	28%
Communities	26,**708**~~078~~	9,588	55,911	92,207	5%
Native Riparian**/Vegetation**	~~2,584~~**496,826**	~~151~~**319,669**	~~20,462~~**372,729**	~~23,196~~**1,189,222**	~~1~~**62**%
Barren/Unclassified	1,836	738	8,948	11,523	<1%
Total	~~605,074~~**605,704**	~~361,287~~**361,285**	~~944,474~~**944,473**	**1,911,462**~~2,278,557~~	

Source: DWR Land Use Survey (**by Counties:** Lake 2006; Colusa 2003; Solano 2003; Yolo 2008; Napa 1999) (Lake 2006; Colusa 2003; Solano 2003; Yolo 2008; Napa 1999)

The land use classifications are adapted from the DWR Land Use **S**~~s~~urvey classes. The following classifications are used for the ~~Westside~~ Region:

- Agriculture – **I**~~Agricultural land uses~~ include**s** a variety of permanent and seasonal crops and growing methods, all of which ~~have~~ influence~~s on~~ water use patterns. Some crops**,**

such as pasture grasses**,** are dry farmed, while others, such as alfalfa**,** can be fallowed during seasons or years when water is not available.

- Communities – ~~I~~**I**~~Communities as described in this section i~~include **those in** all developed land use categories such as residential, industrial, institutional, office**,** and commercial space. Includes landscaped lands such as golf courses, parks, and other open spaces situated within the community boundaries.
- Water Surface – Includes the total surface area occupied by the major lakes and reservoirs in addition to irrigation ditches and canals, delta sloughs, creeks, streams, rivers, wetlands**,** and wastewater ponds.
- Native Riparian – Land near streams and water bodies. Includes marshes, meadows, trees**,** and other watercourse vegetation.
- Native Vegetation – Includes native vegetated grass lands, brush, forests, and oak woodland.
- Barren/Unclassified – Includes barren land potentially including dry stream channels **and**~~,~~ mine tailings. Unclassified lands **are**~~include~~ areas not categorized by the DWR land use survey.

Section 3 provides more detailed information regarding land use and anticipated future conditions that could impact water use, including agricultural-to-urban conversion and changes in cropping patterns.

2.5.1 Communities

The major communities and tribal areas within the Region are shown on Figure 2-7. The seven incorporated cities within the **v**~~V~~alley **f**~~F~~loor include Davis, Dixon, Rio Vista, Vacaville, West Sacramento, ~~-~~Winters, and Woodland. Other unincorporated communities scattered throughout the **v**~~V~~alley ~~F~~**f**loor include Esparto, Knights Landing, Dunnigan, Monument Hills, Clarksburg, Madison, Yolo, Zamora**,** and Capay Valley.

The Upper Putah and Cache Creek PAs are predominantly undeveloped, although there are some agricultural and rural communities scattered throughout, particularly around Clear Lake**,**~~.~~ Hidden Valley Lake**,** and Middletown, located in the northern portion of the area within Lake County. Some urban growth has also occurred around the **western shoreline and** southern portion of Lake Berryessa**,** which is located within Napa County. The Cit~~y~~**ies** of Lakeport and Clearlake, within Lake County, are the only incorporated cities within the Upper Cache Creek PA. Other communities within the ~~region~~**Region** include Clearlake Oaks, Cobb, Kelseyville, Lower Lake, Lucerne, Nice, and Upper Lake. Most of these communities are scattered around the shores of Clear Lake**, but** ~~; however,~~ some are located in more rural mountainous areas.

Figure 2-7: Land Use Map

2.5.2 Land Use Management Agencies

Local, state**,** and federal land management agencies in the ~~Westside~~ Region are shown on Figure 2-8 and include the following:

- Colusa County
- Lake County
- Napa County
- Solano County
- Yolo County
- City of Clearlake
- City of Davis
- City of Dixon
- City of Lakeport
- City of Rio Vista
- City of Vacaville
- City of Winters
- City of West Sacramento
- City of Woodland
- U**.**S**.** Bureau of Land Management
- U**.**S**.** Bureau of Reclamation
- U**.**S**.** Fish and Wildlife
- U**.**S**.** Forest Service
- CA Department of Fish and Game
- Tribal Lands
- State Lands

2.6 Water and Resource Management Boundaries

There are over 90 municipalities, special districts, and agencies with water supply, wastewater management, flood control, and other water or resource management responsibilities in the ~~Westside~~ Region, as ~~shown~~ **listed** in ~~Table~~ **Appendix** 1-X. The**y include**~~re are~~ 50 agencies **that**~~which~~ are strictly wholesale or retail water suppliers, **nine**~~9~~ that provide only wastewater services, **and** ~~while~~ 12 agencies provid**ing**~~e~~ both water and wastewater services. There are 12 agencies that provide only flood control services **and** ~~,~~two resource conservation districts**;** ~~, and~~ the remaining seven provide a combination of the **services noted** above to the ~~region~~**Region**. Figure 2-9 identifies the service areas and agency boundaries for the municipalities and agencies**,** where data were available. The figure demonstrates that the majority of the agencies in the upper watershed portions of the ~~region~~**Region** have small service areas while the largest service areas occur in the valley.

2.7 Hydrologic Features

The ~~Westside~~ Region is ~~an expansive~~ **and**~~, open~~**,the source of** ~~-~~**much surface water from** ~~region~~**Region** ~~with~~ multiple watersheds that either originate or flow into and through the ~~region~~**Region**. Each of the watersheds ~~in the region~~**Region** is discussed in more detail below ~~in order~~ to characterize the heterogeneous diversity of the various water resources in the ~~region~~**Region**.

Figure 2-8: Land Management Agencies

Figure 2-9: Retail Water Purveyors

2.7.1 Watersheds

The ~~Westside~~ Region is principally defined by Cache Creek and Putah Creek**, whose**~~. The~~ watersheds ~~of these two creeks~~ clearly delineate **its**~~the~~ upper **boundaries**~~reaches of the region~~**Region**. While the Cache and Putah Creek watersheds ~~only~~ account for **only** a small area of the lower ~~reach~~ **portion** of the ~~region~~**Region**, water from the **two** creeks represent**s** a significant portion of the water entering the downstream end of the ~~region~~**Region** and are the key connection **between** ~~between~~ the upper watersheds **of** the flat valley floor~~,~~ and ultimately the Sacramento River and Sacramento-San Joaquin River Delta. **A number of s**~~S~~urface water features **dominate the portion of the ~~region~~Region located on the** ~~of the~~ **v**~~V~~alley **f**~~F~~loor**, principally and** ~~consist of smaller~~ creeks and tributary streams~~, sloughs and irrigation canals that generally flow towards the Sacramento River,~~ **(**see Figure 2-10.

The Sacramento River forms the southeasterly border of the ~~Westside~~ Region. The entire Sacramento River watershed covers approximately 27,000 square miles in Northern California. The ~~Westside~~ Region, which lies at the downstream end of the Sacramento River, only encompasses approximately 3,000 square miles, or ~~less than~~**around** 10 percent, of the overall Sacramento River watershed. Because of its location and relatively small drainage area, the portion of the Sacramento River within the ~~Westside~~ Region is influenced heavily by the areas outside ~~the region~~**it**~~**Region**~~.

The Sacramento River system represents a complex network of natural and man-made features that are operated to achieve established objectives for water supply, flood control, and environmental purposes. The operation of the system **has** become~~s~~ more complex **over**~~with~~ time as the water demands for each purpose **have** change**d** and ~~the~~ competition **has** become~~s~~ more intense when ~~the~~ supplies are short. The watershed contains numerous reservoirs**,** including Shasta Lake and Lake Oroville, the two largest reservoirs in California, which are major features of the Federal Central Valley Project and S**WP**~~tate Water Project~~, respectively. The combined operation of these and other water storage facilities largely controls the low~~-~~-flow regime and exert**s** a strong influence on the high**-**-flow regime in the river. Unlike the Coastal Range watersheds that drain through **the ~~Westside~~ Region** ~~Yolo County~~, the Sacramento River watershed benefits from a large snowpack, which supports flow throughout the spring and early summer. The Sacramento River system is operated in conjunction with the San Joaquin River system and diversions from the Delta to meet Delta outflow standards established by the State Water Resources Control Board.

The major hydrologic areas of the ~~region~~**Region,** as defined by the U.S. Geologic Survey (USGS) National Watershed Boundary Dataset**,** are illustrated on Figure 2-10. The key water features ~~of the Westside Region~~ as indicated by the USGS subbasin boundaries (using Hydrologic Unit Code Level 8)~~,~~ are Cache Creek (which shapes the Cache Creek watershed), Putah Creek (which shapes the Putah Creek watershed)**,** and the Sacramento River (which shapes the Sacramento-Stone Corral and Lower Sacramento watersheds).

Figure 2-10: Watersheds

2.7.1.1 Cache Creek Watershed

The Cache Creek watershed encompasses approximately 1,165 square miles~~,~~ and begins at the headwaters of Cache Creek at the peak of Cobb Mountain at an elevation of approximately 4,700 feet in Lake County. The Upper Cache Creek is divided into two major reaches within Lake County – the main stem of Cache Creek and the North Fork Cache Creek. Cache Creek flows easterly from Lake County into Yolo County, where it is joined by the Bear Creek reach of the watershed, which lies entirely in Colusa County. See Figure 2-10.

The Cache Creek main stem feeds into Clear Lake, which **has over 1 million acre-feet of storage and** is the largest freshwater natural surface water body that lies entirely in California. Clear Lake is also fed by Kelsey Creek, Adobe Creek, Scott's Creek**,** and Middle Creek. Cache Creek flows are the sole outflow from Clear Lake and are managed in part by the YCFCWCD**,** which has an appropriative right to water in Clear Lake. YCFCWCD owns the Cache Creek Dam, which is located approximately **3**~~three~~ miles downstream of the outlet from Clear Lake, and ~~YCFCWD~~ operates Cache Creek Dam in accordance with the Solano and Gopcevic Decrees, as described previously. The two major tributaries to the main stem of Cache Creek are the North Fork Cache Creek and Bear Creek. North Fork Cache Creek drains the area north of Clear Lake and includes Long Valley Creek, Wolf Creek**,** and Bartlett Creek. YCFCWCD owns and operates the Indian Valley Dam on the North Fork Cache Creek, which forms the Indian Valley Reservoir. Indian Valley Reservoir has a total storage capacity of 300,600 AF, of which 40,000 AF is dedicated to flood control. Bear Creek drains the area to the east of the North Fork Cache Creek, and its watershed lies entirely within Colusa County. Bear Creek flows into the main stem of Cache Creek at the border of Colusa and Yolo Counties. See Figure 2-10.

Once Cache Creek flows into Yolo County **into the Valley Floor Planning Area**, it continues through the rich agricultural Capay Valley until it reaches the Capay Diversion Dam, where some flows are diverted into YCFCWCD's irrigation system. Cache Creek continues downstream of Capay Dam, where it terminates in an area known as the Cache Creek Settling Basin. Cache Creek is considered an intermittent stream, in that flows in the creek are inconsistent, and there are periods particularly during the summer when ~~there are~~ no releases **are**~~being~~ made into the creek.

The Cache Creek Settling Basin is a component of the Sacramento River Flood Control Project. It was designed to trap sediments carried by Cache Creek and prevent them from being deposited in the Yolo Bypass, thereby maintaining the flood capacity of the Yolo Bypass. **The settling basin does have an overflow into the Yolo Bypass which enters the Sacramento River upstream of Rio Vista providing a connection between Cache Creek and the Sacramento River.**

2.7.1.2 Putah Creek Watershed

The Putah Creek watershed encompasses approximately 654 square miles and extends from an elevation of 4,700 feet at Cobb Mountain in Lake County southeast for a distance of about 50 miles to the Yolo Bypass, at an elevation a few feet above sea level. Tributaries to Putah Creek within Lake County include Harbin Creek, Big Canyon Creek, St. Helena Creek**,** and Soda Creek. From Lake County, Putah Creek flows into Napa and into Lake Berryessa. **The major t**~~T~~ributaries within Napa County include Pope Creek, Chiles Creek, Capell Creek**,** and Eticuera Creek. Lake Berryessa has a storage capacity of 1,602,000 AF and is controlled by Monticello Dam. Monticello Dam is owned by ~~the~~ U**SBR**~~S. Bureau of Reclamation~~ and operated

by ~~Solano County Water Agency (~~SCWA~~)~~. From the outlet of Monticello Dam, Putah Creek flows into Solano County in the Valley Floor P**A,**~~lanning Area~~ where it discharges to the Yolo Bypass. See Figure 2-10.

The Putah Creek watershed consists of mountainous terrain in the eastern part of the Coast Ranges. It is underlain mainly by steeply dipping, folded, and faulted sandstone and shale formations of Jurassic-Cretaceous age with local areas of serpentine and associated intrusive members of the Franciscan Formation of Jurassic age (California Division of Water Resources 1955). Where Putah Creek enters the Sacramento Valley near Putah Diversion Dam, it flows across its own alluvial fan (historically called the ~~"~~Putah Creek Cone~~"~~) and is underlain by hundreds of feet of relatively unconsolidated alluvial deposits that form a large groundwater basin.

The South Fork of Putah Creek is an artificial channel constructed over a period of several decades beginning in the 1870s**. It** ~~that~~ departs from the natural creek channel about **1**~~one~~ mile upstream of Interstate 80 and flows directly east to the Yolo Bypass (Brice 1998). The creek eventually abandoned its original channel (the North Fork) entirely, and for practical purposes the South Fork channel is the channel of Putah Creek. In the 1940s, the U.S. Army Corps of Engineers constructed levees along the lowermost **9**~~nine~~ miles of the South Fork channel as part of the Sacramento River Flood Control Project (U. S. Fish and Wildlife Service 1992).

2.7.1.3 Sacramento-Stone Corral Watershed

The Sacramento-Stone Corral watershed encompasses 1,884 square miles ~~and~~ **most of which** is located ~~primarily~~ outside of the ~~Westside~~ Region. Flows in the watershed generally travel from the coastal ranges in the west towards the Sacramento River. See Figure 2-10. The majority of water from the watershed is discharged to the Sacramento River outside the ~~Westside~~ Region; however, the southernmost portion of the watershed flows into the Region via the Colusa Basin Drain ~~(Drain)~~. Th**is d**~~e~~ D~~d~~rain is a man-made channel designed to convey irrigation drainage to the Knights Landing outfall gates for discharge into the Sacramento River. There are 32 ephemeral streams that convey storm runoff to the **d**~~D~~rain. Seven of these streams originate in the Dunnigan Hills of Yolo County. The Colusa Basin Drain watershed comprises nearly 1,620 square miles in the Sacramento Valley, and includes portions of Glenn, Colusa, and Yolo **C**~~c~~ounties. The portion of the watershed in Yolo County is approximately 255 square miles.

2.7.1.4 Lower Sacramento River Watershed

The Lower Sacramento watershed encompasses 1,229 square miles. Within the ~~Westside~~ Region**,** the watershed includes four important subwatersheds: Willow Slough, ~~Cache Slough,~~ Knights Landing Ridge Cut~~e~~-Tule Canal**, Cache Slough,** and Ulatis Creek.

- Willow Slough subwatershed – The Willow Slough **s**~~S~~ubwatershed lies between the Cache Creek and Putah Creek watersheds and extends from the slopes of the Coast Ranges into **the** flatter slopes of the valley floor. Natural levees **that**~~which~~ have formed along the lower reaches of the Cache Creek and Putah Creek direct runoff away from the main creek channels and into ~~the~~ a network of sloughs that consolidate in Willow Slough. Willow Slough discharges into the Knight's Landing Ridge Cut-Tule Canal Watershed.

- Knight's Landing Ridge Cut-Tule Canal subwatershed – This subwatershed is at the eastern edge of the ~~Westside~~ Region and is bounded on the east by a levee separating the watershed from the Sacramento River. **Its**~~The~~ defining features ~~of the watershed~~ are the Knights Landing Ridge Cut and the Tule Canal. The Knights Landing Ridge Cut, which lies at the northern tip of the watershed**,** allows flows from the Colusa Basin Drainage Canal, which are primarily discharged to the Sacramento River, to enter the watershed. The Tule Canal, which follows the toe of the levee on the eastern edge of the watershed, collects flows from the Colusa Basin Drain, Cache Creek**,** and Willow Slough and conveys the flows into the Cache Slough **subw**~~W~~atershed.

- Cache Slough subwatershed – This subwatershed is situated at the southeast edge of the ~~Westside~~ Region **and**~~,~~ lies within the Sacramento-San Joaquin Delta. The majority of the water leaving the ~~Westside~~ Region is discharged to the Delta via Cache Slough. Water is conveyed within the Cache Slough **w**~~W~~atershed through both constructed and natural waterways. An artificial channel on the eastern side of the watershed known as the Toe Drain collects inflows from Putah Creek and Tule Canal and transfers them to Prospect Slough, which merges with Cache Slough a few miles upstream of the Sacramento River. Inflows from the Ulatis Creek Watershed and local runoff **are**~~is~~ captured within natural waterways and discharged to the Sacramento River.

- Ulatis Creek subwatershed – Mountains and flat alluvial valleys characterize the terrain of the Ulatis Creek **subw**~~W~~atershed **in the southern portion of the Region**. The Vaca Mountains are part of the Coast Ranges and lie along the western border of the watershed. The English Hills lie east of the Vaca Mountains, separated by the Vaca Valley. The remainder of the watershed is characterized by flat terrain, which gradually slopes to the southeast. The Ulatis Creek Watershed is drained by a series of major stream courses that discharge into the Cache Slough and ultimately into the Sacramento River. The**se** major stream courses ~~, which drain to the Cache Slough,~~ include Alamo Creek, Ulatis Creek, Horse Creek, Gibson Canyon Creek, Sweeny Creek, and McCune Creek. ~~(Vacaville Lagoon Valley DEIR, Page 2).~~

2.7.2 Groundwater

The geologic formations of ~~the groundwater basins in the Region provide diverse water resources.~~ **t**~~T~~he ~~Westside~~ Region's **17** ~~seventeen~~ groundwater basins recognized in DWR's Bulletin 118 provide an essential water resource and were ~~instrumental~~ **a consideration** in defining the Region boundaries. The groundwater basins of the Region are shown in Figure 2-11. Within Lake County, the basin delineations correspond to the groundwater basins that the Lake County Water Resources Department utilizes for its California Statewide Groundwater Elevation Monitoring (CASGEM) reporting. The basin and subbasin delineations for the remainder of the ~~region~~**Region** are based on the ~~Department of Water Resources (~~DWR~~) California~~'s Groundwater Bulletin 118. **Groundwater is a significant resource to all areas of the Region and preservation of groundwater through development of surface water projects and preparation and implementation of groundwater management plans has been a focus of the agencies in the Region.**

Figure 2-11: Groundwater Basins

Shallow alluvial deposits, fractured sedimentary and metamorphic rock of the Franciscan Formation, and the Clear Lake volcanic deposits mainly form the groundwater basins of the Upper Cache and Putah watersheds. These groundwater basins have limited storage capacity and generally have high groundwater tables in the spring that decrease over the summer **(CDM 2006a)**. Although the groundwater basins of the upper watersheds are less extensive, they represent a significant source of supply for those communities and agricultural users.

The single groundwater basin in the Valley Floor PA – the Sacramento Valley **g**~~G~~roundwater **b**~~B~~asin – also extends outside the ~~Westside~~ Region and is divided into subbasins. The ~~Westside~~ Region encompasses the Capay Valley, Yolo, Solano and a portion of the Colusa groundwater subbasins. In contrast to the shallow groundwater basins of the upper watersheds, thick alluvial and river sediments of the Tehama formation overlain by younger sediments form the subbasins of the Sacramento Valley **g**~~G~~roundwater **b**~~B~~asin, and these subbasins have significant storage capacity **(DWR 2003)**.

2.8 Climate

~~2.8.1Climate Statistics~~

The ~~Westside~~ Region as a whole has a Mediterranean-like climate, with warm, dry summers~~,~~ and cool, moist winters. Summer temperatures are generally high during the day ~~time~~ with fast cooling in the evenings. Variation in the summer ranges from highs in the 90 degrees Fahrenheit to lows in the 50s. Variations in temperature during the winter are much less drastic, with average highs in the 50s to 60s and lows in the 30s to 40s. Figure 2-12 shows the average temperatures for each P~~lanning~~ A~~rea~~. Average temperatures **are relatively consistent** throughout the Region ~~are relatively consistent as a whole~~.

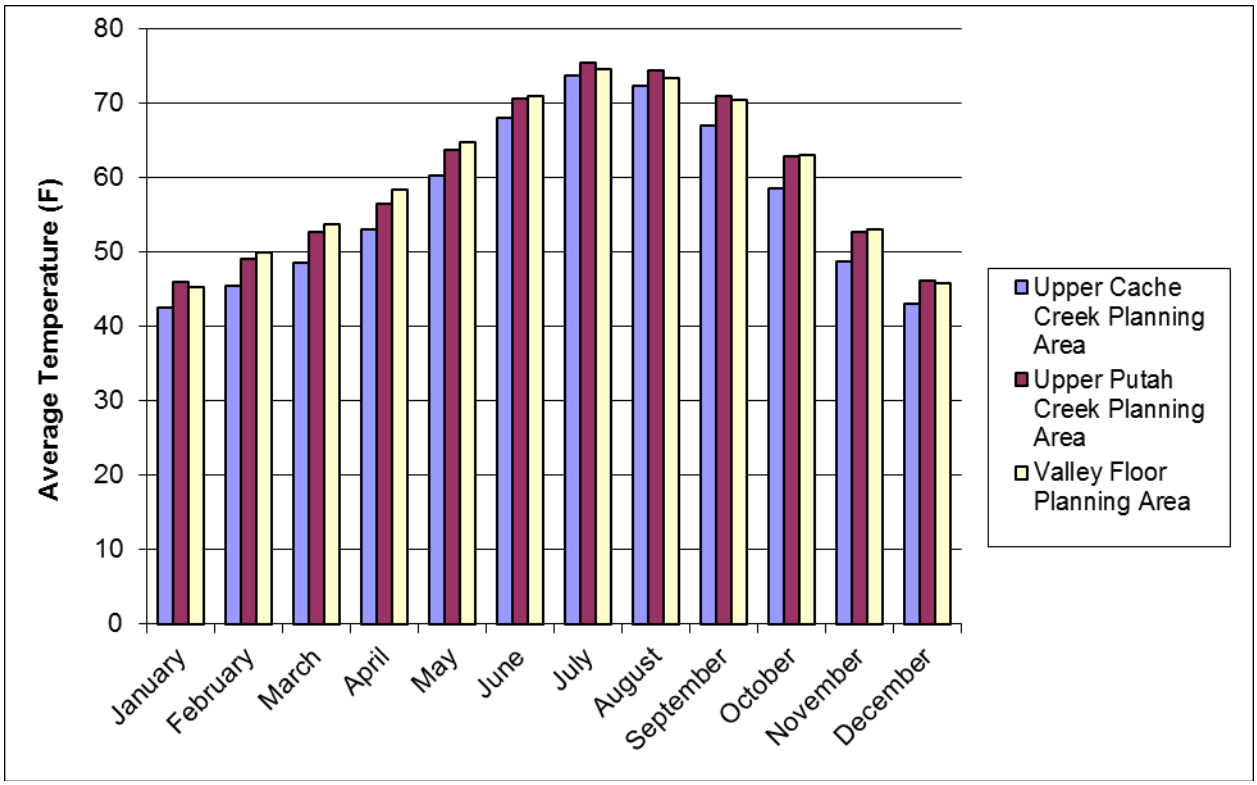

Figure 2-12: Average Monthly Temperatures

Most precipitation in the ~~Westside~~ Region **comes**~~falls~~ in the form of rainfall. Increased precipitation typically occurs at higher elevations **because of**~~due to~~ orographic cooling**;** ~~. This is exhibited in~~ the ~~Westside Region where the~~ valley area experiences significantly less precipitation than ~~the~~ **the** ~~other~~ two areas located in the higher ~~elevation~~ mountainous portions ~~of the region~~**Region**. Precipitation ~~within the area is in the form of rainfall and~~ generally occurs between the months of October and March. Snowfall is not a significant component of the ~~Westside~~ Region's water resources. Figure 2-13 shows the variability in precipitation from the **v**~~V~~alley **f**~~F~~loor to the Upper Cache Creek and Upper Putah Creek P~~lanning~~ A**s**~~reas~~. Cobb Mountain, a portion of which drains to the Upper Cache and Upper Putah Creeks, has the highest annual rainfall in California at about 100 inches/year.

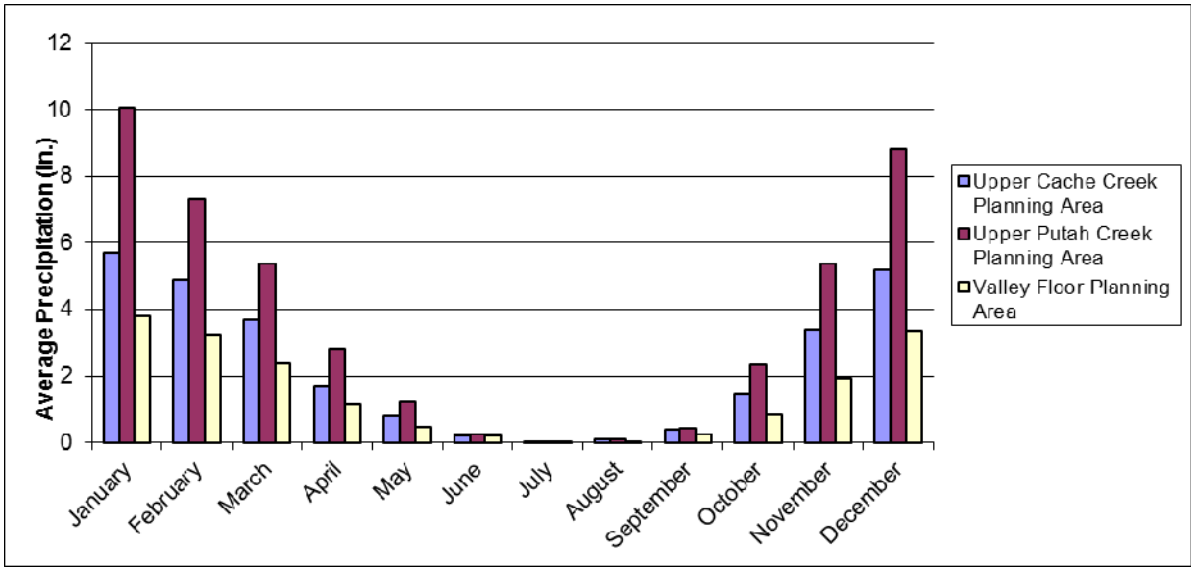

Figure 2-13: Average Monthly Precipitation by Planning Area

Evapotranspiration is the loss of water to the atmosphere through evaporation from soil and plant surfaces and transpiration from plant tissues. ETo is a measure of evapotranspiration from a standardized grass surface and is used to estimate specific crop water requirements. The California Irrigation Management Information System (CIMIS) maintains weather stations that measure ETo. CIMIS stations in the ~~Westside~~ Region are limited to the Valley Floor P**A**~~lanning Area~~. Overlaying representative ETo data for the Valley Floor PA with precipitation data shows a mismatch between plant water demand and precipitation, which drives the need for water supply for irrigation. As illustrated **in** Figure 2-14 in the summer months when plant water demand is greatest, the precipitation in the ~~region~~**Region** is lowest.

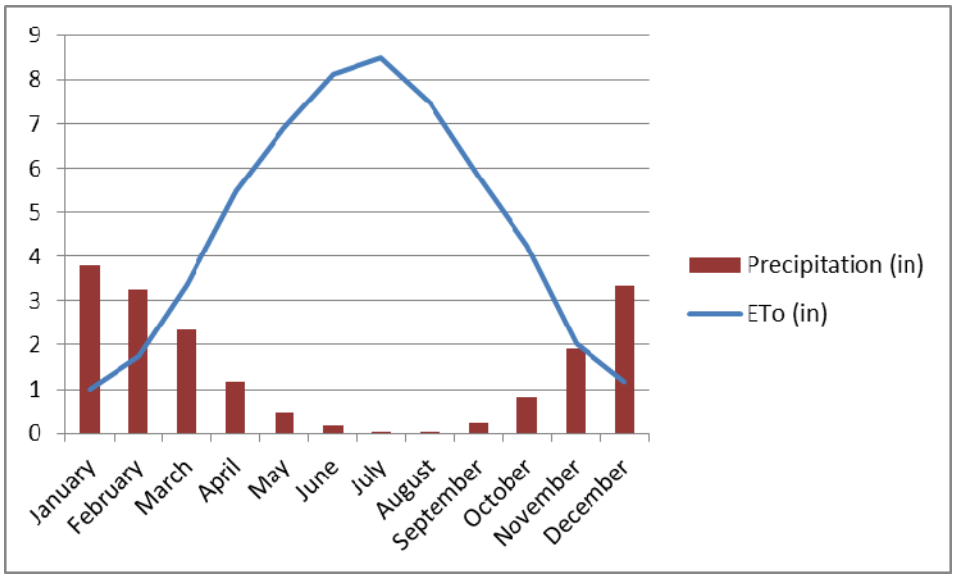

Figure 2-14: Evapotranspiration and Precipitation Comparison for the Valley Floor PA

Tables 2-4 through 2-6 describe the monthly maximum, minimum, and ~~a~~ mean temperature and precipitation for each ~~of the~~ PA.

Table 2-4: Upper Cache Creek PA Climate Data

	Temperature			Precipitation		
	Ave. Max. (F)	**Ave. Min. (F)**	**Mean (F)**	**High (in.)**	**Low (in.)**	**Mean (in.)**
January	54.5	30.6	42.6	25.96	0.11	5.72
February	58	33	45.5	22.03	0.02	4.91
March	61.8	35.5	48.6	15.71	0.06	3.69
April	67.7	38.5	53.1	8.57	0	1.66
May	76.2	44.4	60.3	5.99	0	0.81
June	85.2	51	68.1	1.39	0	0.19
July	93.1	54.3	73.7	0.7	0	0.04
August	92.2	52.6	72.4	1.97	0	0.11
September	86.4	47.8	67.1	4.11	0	0.39
October	75.9	41.3	58.6	7.4	0	1.44
November	62.4	35	48.7	10.44	0	3.41
December	54.9	31.3	43.1	17.88	0	5.2
Total Annual				**61.88**	**8.17**	**27.57**

Source: http://www.wrcc.dri.edu, Station # 041806 (Clearlake) aAverages from 1954-2011, elev. 1349 ft.
Notes: The monthly high and low precipitation values are the highest and lowest values for each month over the period of record. The annual high and low precipitation values are the total precipitation for the highest and lowest years on record, which were 1983 and 1976, respectively.

Table 2-5: Upper Putah Creek PA Climate Data

	Temperature			Precipitation		
	Ave. Max. (F)	**Ave. Min. (F)**	**Mean (F)**	**High (in.)**	**Low (in.)**	**Mean (in.)**
January	55.7	36.1	46	28.9	0.23	10.07
February	60.1	38.2	49.2	20.13	0	7.3
March	64.8	40.6	52.7	18.18	0.09	5.38
April	70.3	43	56.6	10.91	0	2.79
May	78.8	48.6	63.7	7.14	0	1.22
June	87.1	54	70.6	2.1	0	0.26
July	93.7	57.3	75.5	1.12	0	0.02
August	92.8	56.1	74.4	1.76	0	0.1
September	88.5	53.5	71	3.56	0	0.42
October	78.1	47.7	62.9	13.37	0	2.34
November	64.4	41.1	52.7	18.16	0	5.37
December	56	36.3	46.2	31.64	0	8.83
Total Annual				**90.23**	**20.01**	**44.1**

Source: http://www.wrcc.dri.edu, **t**~~T~~emperature from Station # 045360 (Markley Cove) **a**~~A~~verages from 1970-2011, elev. 470 and **p**~~P~~recipitation from Station # 045598 (Middletown) **a**~~A~~verages from 1893-2011, elev. 1130 ft.
Notes: The monthly high and low precipitation values are the highest and lowest values for each month over the period of record. The annual high and low precipitation values are the total precipitation for the highest and lowest years on record, which were 1983 and 1939, respectively.

Table 2-6: Valley Floor PA Climate Data

	Temperature			Precipitation		
	Ave. Max. (F)	**Ave. Min. (F)**	**Mean (F)**	**High (in.)**	**Low (in.)**	**Mean (in.)**
January	53.9	36.9	45.4	13.08	0	3.8
February	60.4	39.7	50	11.38	0.02	3.24
March	65.8	41.8	53.8	8.63	0	2.35
April	72.4	44.5	58.4	6.45	0	1.17
May	80.5	49.1	64.8	2.53	0	0.46
June	88.3	53.6	71	1.97	0	0.19
July	94.1	55.4	74.7	0.63	0	0.01
August	92.8	54	73.4	0.84	0	0.03
September	88.6	52.4	70.5	4.07	0	0.24
October	78.9	47.4	63.1	7.93	0	0.83
November	65.5	40.7	53.1	6.87	0	1.92
December	54.8	36.9	45.9	11.87	0.03	3.34
Total Annual				**38.15**	**5.62**	**17.58**

Source: http://www.wrcc.dri.edu Station # 042294 (Davis) aAverages from 1893-2011, elev. 60 ft.; www.cimis.water.ca.gov Davis (St. #6)
Notes: The monthly high and low precipitation values are the highest and lowest values for each month over the period of record. The annual high and low precipitation values are the total precipitation for the highest and lowest years on record, which were 1983 and 1976, respectively.

2.9 Environmental Features

The lakes, creeks, wetlands, sloughs, Delta, and other water features that form the ~~Westside~~ Region provide key habitat for many of California's most important fish and wildlife species. **Anadromous fish migrate into the Region and use its waterways for spawning. Populations of fish that are declining throughout the state, like the Clear Lake hitch, can still be found in the Region. Resident and migratory waterfowl rely on the lakes and wetlands for food and nesting habitat. Over 50 federally and state listed wildlife and plant species are found in the Region, and hundreds of other species with special-~~ ~~status designations are supported by the habitats of the Region.**

~~Significant changes to the environmental features of the region~~**~~Region~~** ~~began to take shape since the Western settlement of the Westside Region. Agricultural lands began to displace native habitat and agricultural and urban land uses resulted in disturbance of habitats including aquatic and other water-dependent habitats. The changes to habitats types affect native species in the area and allow for spread of non-native, invasive species.~~

~~2.9.1 Habitat Types~~

~~There is a diverse~~ Figure 2-15 provides an overview of the ~~wildlife/~~habitat types throughout the ~~Westside~~ Region. Native habitat account for the majority of the land area in the Upper Cache Creek and Upper Putah Creek PAs**.**~~,~~ **In**~~By~~ contrast, in the Valley Floor PA, agriculture accounts for the majority of land area, suggesting that the water environment of the Valley Floor PA is significantly influenced by human activities.

Water**-**~~-~~related habitats are a small percentage of the Region, accounting for less than 4% of the area. Of the water**-**~~-~~related habitats**,** the actual waterways (i.e.**,** lake and rivers) represent the majority of the habitat**,** with wetlands and riparian habitats comprising a smaller **amount of –** yet equally important **–** ~~-~~habitat types. The preservation of water**-**~~-~~related habitats is important to the maintenance of native species; ~~as discussed in the following section,~~ the majority of threatened and endangered species in the ~~Westside~~ Region are associated with aquatic, wetland**,** and riverine/lacustrine habitat.

A list of s~~A list of s~~pecial-~~-~~status species with recorded occurrences in the Region and a table identifying the habitats and planning areas in which these species are found are provided in Appendix 2-X~~A~~. Appendix 2-X~~A~~ also presents~~contains~~ figures showing listed wildlife and plant species that have been documented to occur within 500 feet of the Region's waterways.

~~NOTE: SECTIONS 2.9.2 through 2,9,5 have been incorporated into Section 3~~

Figure 2-15: Habitats of the ~~Westside~~ Region