

General Plan

Conservation Element

BACKGROUND TO THE 1993 GENERAL PLAN AS AMENDED

The background section text and maps were not updated as part of the 2011 amendments to the County General Plan.

County of Sacramento
Community Planning and Development Department

**SACRAMENTO COUNTY GENERAL PLAN
CONSERVATION ELEMENT**

**A. WATER RESOURCES
BACKGROUND REPORT**

1. WATER PURVEYORS

There are currently twenty-eight water purveyors in Sacramento County (see Table 1). There are five different categories of water purveyor: Dependent water districts, Autonomous (independent) water districts, Cities, Private, and Mutual water companies.

**TABLE 1
WATER PURVEYORS IN SACRAMENTO COUNTY**

Arcade WD	Mather AFB
Arden Cordova Water Service	McClellan AFB
Carmichael ID	Natomas CWD
Citizens Utilities	Northridge WD
Citrus Heights ID	Omochumne-Hartnell WD
Clay WD	Orangevale Mutual Water Co.
Del Paso Heights WD	Rancho Murieta Services District
Elk Grove Water Works	Rio Linda WD
Fair Oaks WD	Sacramento, City of
Florin County WD	Sacramento County WD
Folsom, City of	Sacramento County WMD
Fruitridge Vista Water Co.	San Jaun Suburban WD
Galt, City of	SMUD
Galt ID	Tokay Park Water Co.

Types of Water Agencies

Dependent Water Districts: Dependent water districts are dependent on the county government for their power to implement water use plans.

Water Maintenance Districts: The Sacramento County Water Maintenance District is operated by the Department of Public Works. Several small districts were consolidated for the express purpose of constructing and maintaining a water distribution system within limited geopolitical jurisdictions. Included within the County operated water district are the following service areas:

Valley Hi Greens, Arden Park Vista, Southwest Tract, Northgate 880, Sunrise, Hood, Grantline 99, Laguna, and Vineyard.

Maintenance districts may be formed for a number of purposes in addition to the operation and maintenance of a water distribution system. Some of the other common maintenance districts include both sanitary sewer and street lighting maintenance districts.

Autonomous Water Districts: There are four main types of autonomous water districts in Sacramento County: County water district, irrigation districts, California water districts, and community service districts. They are autonomous because each has its own independently elected governing body.

County Water Districts: Despite the name, all five "county water districts" are completely autonomous with elected governing bodies. Five county water districts were formed pursuant to the California Water District Act (Water Code Section 30000 et. seq.). The five are Northridge, Arcade, Florin County, Del Paso Manor County, and Rio Linda Water Districts.

Irrigation Districts: There are four irrigation districts located partially or wholly in Sacramento County. They include: Carmichael and Fair Oaks Water Districts and Citrus Heights and Galt Irrigation Districts. They were formed under the California Irrigation District Act (Section 20500 et seq. of the Water Code).

California Water Districts: There are two water districts in Sacramento County that were formed under the provisions of the California Water District Act (Water Code Section 35300 et seq.): They are the Clay and Omochumne-Hartnell Water Districts located in the southeastern section of Sacramento County.

Community Services Districts: The San Juan Suburban Community Services District provides retail and wholesale water to the northeast section of Sacramento County. Rancho Murieta Community Services District provides its own water system.

Cities: The following cities provide their own water service: City of Galt, City of Folsom, and City of Sacramento.

Private Water Companies: There are four private water companies in Sacramento County which are regulated by the Public Utilities Commission. They include: Arden-Cordova Water Service, Citizens Utilities Company of California, Elk Grove Water Works, and Fruitridge Vista Water Company. These purveyors are owned by stockholders and are governed by State Statutes set forth in the Public Utilities Code.

Mutual Water Companies: There are four mutual companies in Sacramento County. These entities are not regulated by any governmental body, except that when a mutual water company is formed and it sells "securities," or shares of the water system to its users, it must be granted permission to do so by the State Department of Corporations. If a mutual water company is a

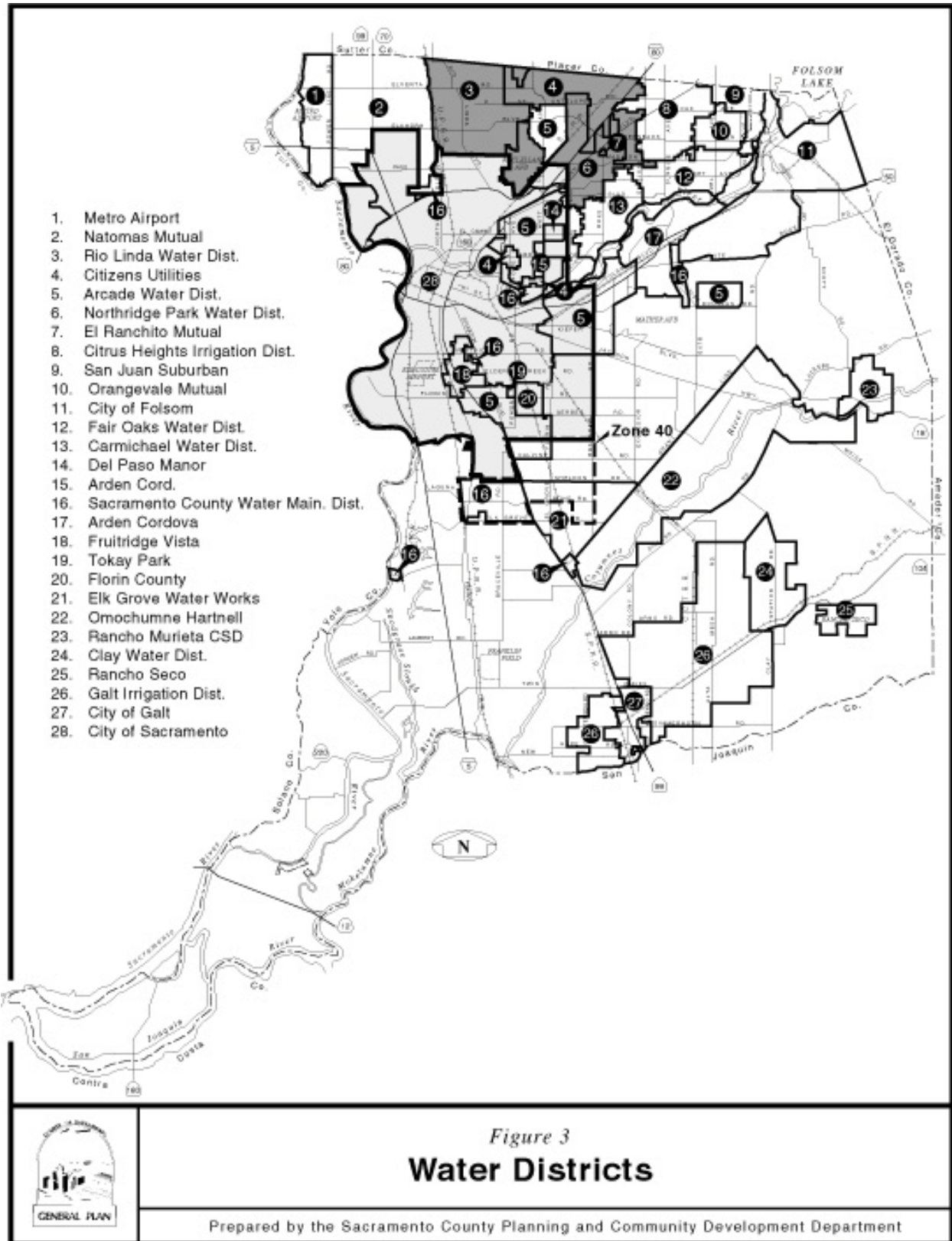
corporation (some of the smaller mutuals are not incorporated), it also files with the Office of the Secretary of State, like any other corporation. The mutual water companies in Sacramento County are: Tokay Park, Orangevale, and Natomas Mutual Water Companies.

Water districts are responsible for securing and developing their own water supply either through obtaining surface water rights from the United States Bureau of Reclamation or drilling wells into any aquifers which may underlie their jurisdiction. The boundaries of each district are shown on the map, Figure 3. This can be compared to the study areas which were drawn up for the Sacramento County Water Agency Water Plan Supplement done by the Boyle Engineering Corporation as seen in Figure 4.

Sacramento County Water Agency (SCWA): This Agency was formed through the Sacramento County Water Agency Act. Its purpose is to develop an overall statement on county water needs.

The SCWA has the following responsibilities:

1. To provide a program of groundwater management with the objective of halting and, if feasible, reversing the long-term decline in groundwater levels, and terminating the use of groundwater of undesirable quality in the urbanized area of Sacramento County.
2. To establish appropriate groundwater management zones which may include areas within as well as outside the City Limits and to levy and collect groundwater charges within such zones for the purpose of managing groundwater use and improving groundwater quantity and quality. The revenues from the groundwater management program are used to offset groundwater management costs incurred by the County Water Agency and to pay for the construction of surface water facilities provided by the City.
3. To establish surface water benefit zones outside the City limits which will be benefited by surface water supply provided by the City. The Agency can assess, collect and pay to the City appropriate amounts for the construction of the surface water facilities provided by the City.
4. The County and the County Water Agency shall share and guarantee any debt financing required for the expansion of existing or construction of new facilities by the City.
5. The County shall cooperate in providing members of a technical advisory committee to represent the County and County Water Agency in providing specific policy and action recommendations and guidance to achieve the objectives of the Memorandum of Understanding (see separate section on Memorandum of Understanding for explanation of this term).



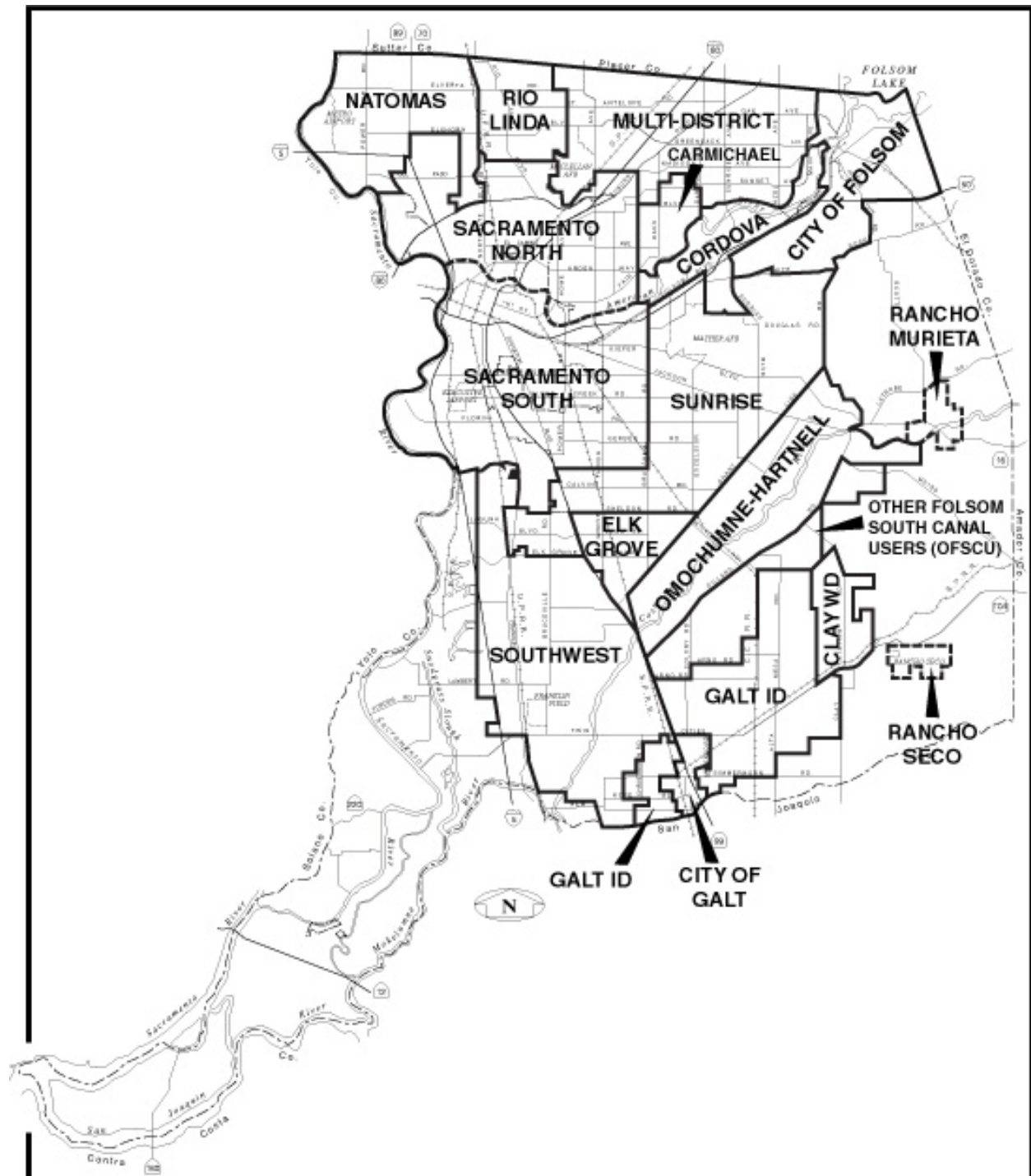


Figure 4
Sacramento Water Plan
Subarea Map

Prepared by the Sacramento County Planning and Community Development Department



A Technical Advisory Committee drafts agreements delineating the County's participation in the expansion of the American River Water Treatment Plant and the City's commitment in treating and wheeling water obtained by the County to areas outside the City's place of use.

Sacramento County Water Agency: The Sacramento County water agency is operated by the Sacramento County Department of Public Works, Water Resources Division, and is authorized to perform water supply, drainage and flood control for all of Sacramento County. Within the Water Agency, separate zones provide funds for specific projects in specific areas.

The current efforts of zone 40 and the proposed zone 41 to obtain surface water rights from the American River have received much attention. The purpose of both these zones is to try to secure surface water and/or additional groundwater rights in order to meet the water needs of their respective areas. The area to be served by zone 41 and the area already served by zone 40 are unincorporated areas which presently have no surface water entitlements. Both fund capital improvements through fees levied on water users. The Sacramento County Water Agency (SCWA) is empowered to levy fees. The main difference between these two zones is that the zone 40 area has no water purveyors while the zone 41 area has four purveyors: Northridge Water District, McClellan AFB, Rio Linda Water District, and Citizens Utilities Company. By joining, these water districts are more capable of negotiating water rights from a stronger unified position. Finalization of zone 41 is dependent on agreement by the affected water purveyors with the terms of the SCWA for formation of zone 41. The following issues must be worked out and agreed upon: administration and boundaries of the zone, procurement of water entitlements, and construction of facilities to provide a continuous supply of ground or surface water to lands within the zone. No fees for the construction of these facilities may be levied by SCWA until an agreement has been reached.

SACRAMENTO COUNTY PLAN CONSERVATION ELEMENT

A. WATER RESOURCES BACKGROUND REPORT

2. CURRENT SUPPLY

Groundwater

Groundwater is subsurface water occurring in the zone of saturation (below the water table) and moving under the control of the water table slope or gradient. Below the ground surface there are two zones: an unsaturated zone and a saturated zone. The unsaturated zone is that zone between the land surface and the water table and includes the capillary fringe. Perched water bodies may exist within the unsaturated zone. The saturated zone is that part of the water-bearing material in which all voids, large and small, are filled with water.

Precipitation, applied water irrigation, and stream flow enter the unsaturated zone from the surface and flow by gravity toward the saturated zone. The rate at which this water reaches the saturated zone depends on factors including the amount of precipitation or applied water available, soil type (sandy or hardpan), moisture content, and vertical permeability of the unsaturated zone. If only a small amount of water is applied or is available through precipitation, it may be consumed by evapotranspiration of the vegetative growth in the soil zone. Water that passes through the soil zone moves downward through the unsaturated zone. Water reaching the saturated zone is considered deep percolation and is treated as an increment to the groundwater supply.

The time of travel through the unsaturated zone is unknown due to soil type variation and varying distance to the water table. In the Natomas area the response of the water table to precipitation or irrigation should be several days. However, in the southern part of the county it would be considerably longer. Generally it is assumed that recharge water takes less than a year to travel to the water table.

The water-bearing sequence beneath Sacramento County can be divided into two main saturation zones. The lower zone, referred to as the deep aquifer system, includes the black volcanic sands of the Mehrten Formation, volcanic sediments in the Valley Springs Formation and non-volcanic sediments in the Ione Formation. The upper zone, referred to as the shallow aquifer system, includes the non-volcanic sediments of the Fair Oaks, Laguna, and Victor formations, as well as the overlying alluvial deposits. Most significant water-yielding deposits occur as sinuous layers of sand and gravel formed as stream channel deposits become buried as rivers and streams altered their course during geologic events (Figure 5).

Groundwater is the primary source of water supply for domestic, municipal and agriculture uses in the County. In 1987, it was estimated that groundwater use was approximately 450,000 AF/yr., accounting for 60 percent of the total water required by the county.

The average elevation of groundwater levels in Sacramento County remained steady at approximately 30 feet above sea level from 1930 through 1940. From 1941 to 1970, levels declined to about 50 feet below sea level. The declining trend has continued until 1981. The high precipitation experienced in 1982 and 1983 caused the groundwater level to temporarily rise. However, levels have gone into decline again and are now lower than in 1981. For more on this, see the section titled Groundwater Overdraft.

Recharge Characteristics

Only a relatively small portion of the land area of Sacramento County is underlain by materials with sufficient infiltration capability to provide natural recharge to the groundwater body. In the eastern foothill region, slopes are too steep and consequently precipitation in excess of evapotranspiration becomes runoff. The Victor plain and Delta area are underlain by soils containing hardpan or organic clays; the low permeability of these materials inhibits infiltration. It is only along active stream channels that sands and gravels occur of sufficient area extent and depth that adequate quantities of surface water may infiltrate to recharge the ground water body.

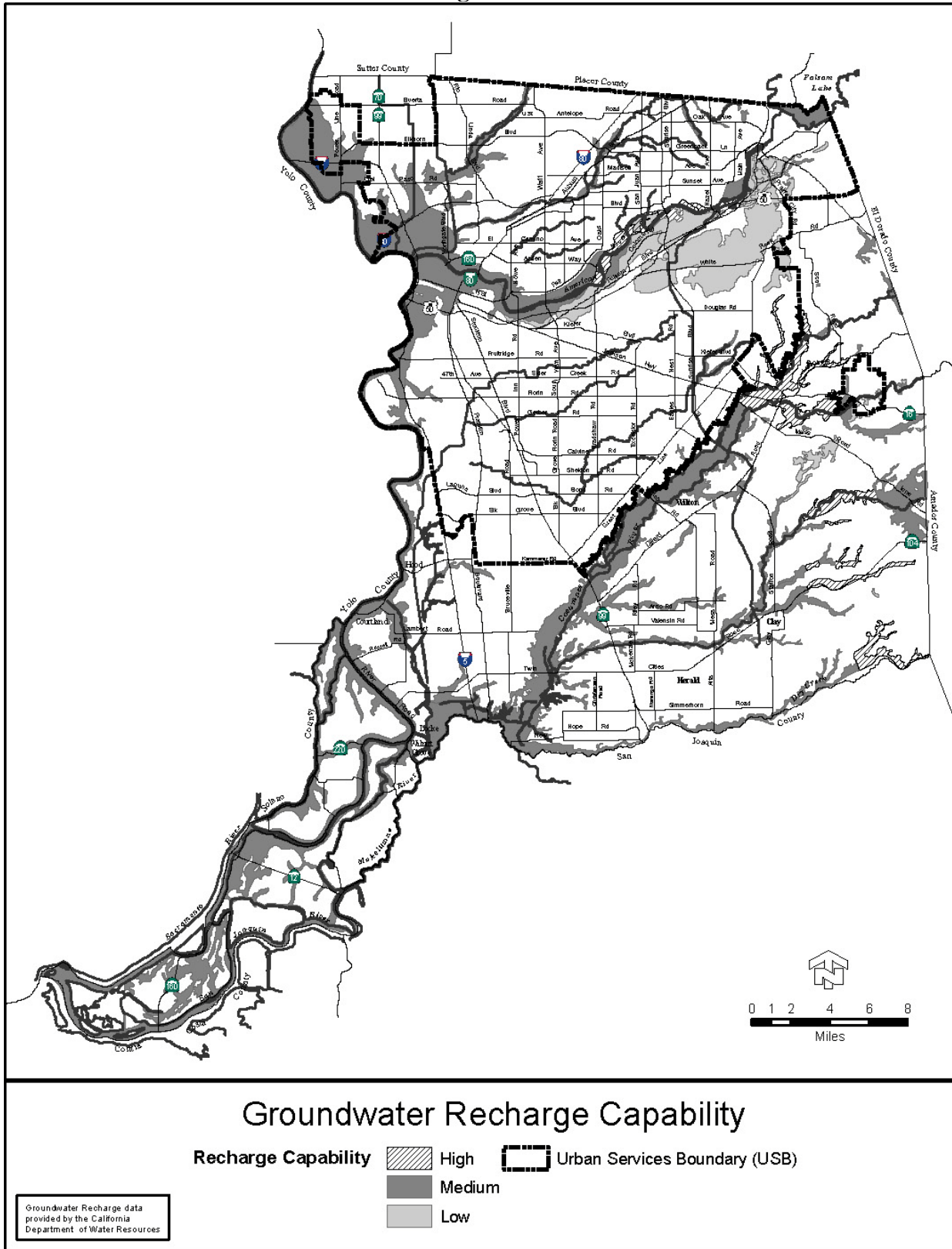
Most of the stream channel deposits in Sacramento County occur along the courses of the Cosumnes and American Rivers. Along the former, studies have shown that there is an annual recharge of 17,000 AF/yr. along the river reach from Bridgehouse (east edge of the groundwater basin) to McConnell. Downstream from McConnell, recharge is insignificant due to an abundance of clay materials in the subsurface.

Recharge

Recharge to the groundwater basin is derived from three major components: precipitation, applied water, and streamflow.

- Precipitation is the general term for all forms of moisture emanating from the clouds and falling to the ground. In Sacramento County precipitation usually occurs as rainfall. Once the rain hits the ground, it can evaporate, become streamflow, or groundwater.
- Applied water is a general term for all forms of water applied by humans to irrigate crops. In general, about 65 percent of all irrigation water is consumptively used by plants for vegetative growth. Of the 35 percent left, 10 to 25 percent infiltrates the groundwater basin and the rest evaporates or becomes streamflow.
- Stream flow should theoretically recharge the groundwater body if no impervious surface impedes the downward flow, since groundwater elevations throughout the County are lower than the stream's and river's surface elevations.

Figure 5



Average annual precipitation varies from 15 to 26 inches in Sacramento County. Also, areas have widely variable soil permeabilities causing different areas to have large variations in recharge. Different crops have different root depths which are directly related to the ability of the plant to gather moisture from the soil profile. The available water from rainfall and irrigation is compared with the water required for evapotranspiration and soil moisture deficiency. If there is any excess water on pervious land, it is considered to be deep percolation. The rainfall on impervious areas remaining after evaporation was assumed to be runoff. Ten percent of the agricultural and native vegetation areas is estimated to be impervious and 50 percent of the urban area is impervious.

In the urban area, approximately 20 percent of the runoff from the impervious areas ran onto adjacent pervious areas and was used by the plants, evaporated, or percolates downward. Countywide, the estimated average recharge is from 10 percent to 20 percent of average rainfall. The portion of irrigation return flow that contributes to the groundwater basin is assumed to be 15 percent of the annual average irrigation water, or 0.44 AF/yr. per an acre of land. It is assumed that 40 percent of urbanized area is pervious and subject to groundwater recharge. Table 2 presents the estimated amounts of groundwater recharge from rain and applied water.

**TABLE 2
GROUNDWATER RECHARGE FROM RAIN AND APPLIED WATER**

AREA	AVERAGE ANNUAL RECHARGE (Total AF/YR.)
FOLSOM SOUTH SERVICE AREA	
Sunrise, Elk Grove	21.9
Omochumne, Other Folsom South Service Area	19.7
Clay WD, Galt ID, City of Galt	16.9
Southwest	21.3
REMAINDER OF THE COUNTY	
Natomas	9.7
Rio Linda	3.3
Multi-District	12.6
Sacramento North	15.5
Sacramento South	15.2
Carmichael, Cordova	4.1
Total =	140.2

Other significant inflows into the groundwater basin under Sacramento County include streamflow recharge and subsurface inflows. These quantities are extremely difficult to estimate separately due to the lack of appropriate data. However, it is estimated that a combined quantity for streamflow recharge and subsurface recharge inflows should be 135,300 AF/yr. for the Folsom South Service Area and 81,600 AF/yr. for the remainder of the County. The Department

of Water Resources (Bulletin 118-3) presented estimated streamflow recharges in the County. These recharge quantities, by stream source, are shown in Table 3.

**TABLE 3
ANNUAL RECHARGE FROM STREAMS**

RIVER OR STREAM	AVERAGE ANNUAL RECHARGE (AF/YR)
American River	40,900
Sacramento River	23,800
Cosumnes River	43,900
Minor Streams	12,900
Total =	121,500

Sustained Yield

When a groundwater basin is influenced by any subsurface inflow, sustained yield will vary depending on the desired water level to be maintained. Sustained yield is defined as that yield of groundwater that will maintain present water levels. Based on this definition, the sustained yield for the Study Area was estimated to be approximately 357,000 AF/yr., of which 215,000 AF/yr. is estimated for the Folsom South Service Area, and the remaining 142,000 AF/yr. for the remainder of the County. A summary of the groundwater budget developed for the County is presented in Table 4.

**TABLE 4
ANNUAL GROUNDWATER BUDGET (1,000 AF)
(Long-Term Average, Based on Review of Records From 1961-1981)**

AREA	AVERAGE ANNUAL RECHARGE (AF/YR)
Folsom South Service Area	
Inflows:	
Deep Percolation (Rain & Applied Water)	79.7
Stream Recharge & Subsurface inflow - net	135.3
Sustained Yield	215.0
Outflows (pumpage)	235.2
Overdraft	20.2

AREA	AVERAGE ANNUAL RECHARGE
Remainder of the County	
Inflows:	
Deep Percolation (Rain & Applied Water)	60.4
Stream Recharge & Subsurface Inflow - Net	81.6
Sustained Yield	142.0
Outflows (pumpage)	144.8
Overdraft	2.8

Sustained Yield Subarea

Sustained yield estimates were calculated for each subarea so that surface water needs could be determined on a subarea basis. The estimates for each subarea are based on the ratio of each subarea to the total area. The results are calculated values and refinement will require further study of each local situation. These values are shown in Table 5.

**TABLE 5
SUBAREA SUSTAINED YIELD ESTIMATES**

SUBAREA	ESTIMATED SUSTAINED YIELD (AF/YR)
Folsom South Service Area	
Clay ID	7.5
Elk Grove	10.3
Galt, City of	3.6
Galt ID	33.4
Omochumne	33.9
Other Folsom South Service Areas	18.5
Southwest	56.9
Remainder of Study Area	
Carmichael	4.0
Cordova	6.6
Folsom, City of	0.0
Multi-District	30.9
Natomas	16.5
Rio Linda	8.9
Sacramento North	33.2
Sacramento South	41.9
	Total = 357.0

Surface Water

There are no countywide surface water entitlements which would allow surface water to be distributed to all places which need surface water to augment their groundwater supplies. Surface water entitlements are restricted to "places of use" as follows (Table 6).

Sacramento River

Sacramento City: The City of Sacramento has water rights to 81,800 AF/yr. from the Sacramento River. Water from the Sacramento River can only be used to serve property within Sacramento City Limits. This is a legal requirement which cannot be altered by negotiations. But, as territory is annexed to the City it is entitled to Sacramento River water.

Natomas Central Mutual Water Company: The Natomas Central Mutual Water Company has entitlements to 82,000 AF/yr of Sacramento River water for irrigation purposes.

American River

Sacramento City: Currently, the City of Sacramento has water rights to approximately 245,000 AF of water per year from the American River; however, this is the diversion limit for the year 2030. The annual limit is based on an increasing schedule which began in 1963. About 57,000 AF/yr. is currently withdrawn from the river at the City's "H" Street diversion and treatment plant. Water from the American River can be delivered beyond the City Limits as long as it is within the boundaries of the American River Place of Use (POU) (Figure 6). To date, the City of Sacramento has contracted to sell or distribute American River Water only to Arcade Water District and Del Paso County Water District located within the American River Place of Use Boundary.

Cosumnes River

Rancho Murieta Water District: The Cosumnes River is the sole source of water for the Rancho Murieta community. The principal domestic water right held by the District is Application 2341b, Permit 16762. This water right allows for diversions from the Cosumnes River from November 1 through May 31 under the following conditions:

A. No water can be diverted when river flows are less than 70 cubic feet per second (cfs) at Michigan Bar and there is evidence of visible flow at McConnell Gage located approximately 21 miles downstream. For flows between 70 cfs and 175 cfs, a maximum diversion of 6 cfs is allowed provided this diversion does not reduce the downstream flow below 70 cfs.

**TABLE 6
ENTITLEMENT AND USE OF SURFACE WATER (AF/YR)**

<u>Area</u>	<u>American</u>	<u>River Sacramento</u>	<u>Cosumnes</u>	<u>Total Current Estimated Use</u>	<u>Total Water Available</u>
Arcade WD	3,363			2,130	1,233
Arden/Cordova	10,000			2,040	7,960
Carmichael	36,500			10,800	25,700
Citizens Utility					
Citrus Hts.	19,774			19,640	134
Clay WD				4,190	
Del Paso County					
Elk Grove WW					
Fair Oaks WD	16,219			15,400	819
Florin County					
Folsom City	36,000			14,780	22,780
Folsom Prison	4,000			1,490	2,410
Fruitridge Vista Water Company					
Galt ID	90,000			7,340	82,660
Galt City					
Mather AFB	10,000				
McClellan AFB					
Metro Airport	Included in Natomas				
Natomas CWD		132,000		82,000	60,000
Northridge					
Omochumne			2,000	10,400	-8,400
Orangevale				5,500	
Rio Linda					
Sacramento C.	90,200 currently 245,000 (by 2030)	81,800		94,100	77,900
SCWD	60,000			2,000	58,000
SCWMD					
San Juan	44,200			4,000	4,200
SMUD	60,000			9,418	50,582
Tokay Park					
Sunrise					
Other Folsom South					
Southwest					
Rancho Murieta			6,368	4,164	2,204
			Total =	289,392	388,182

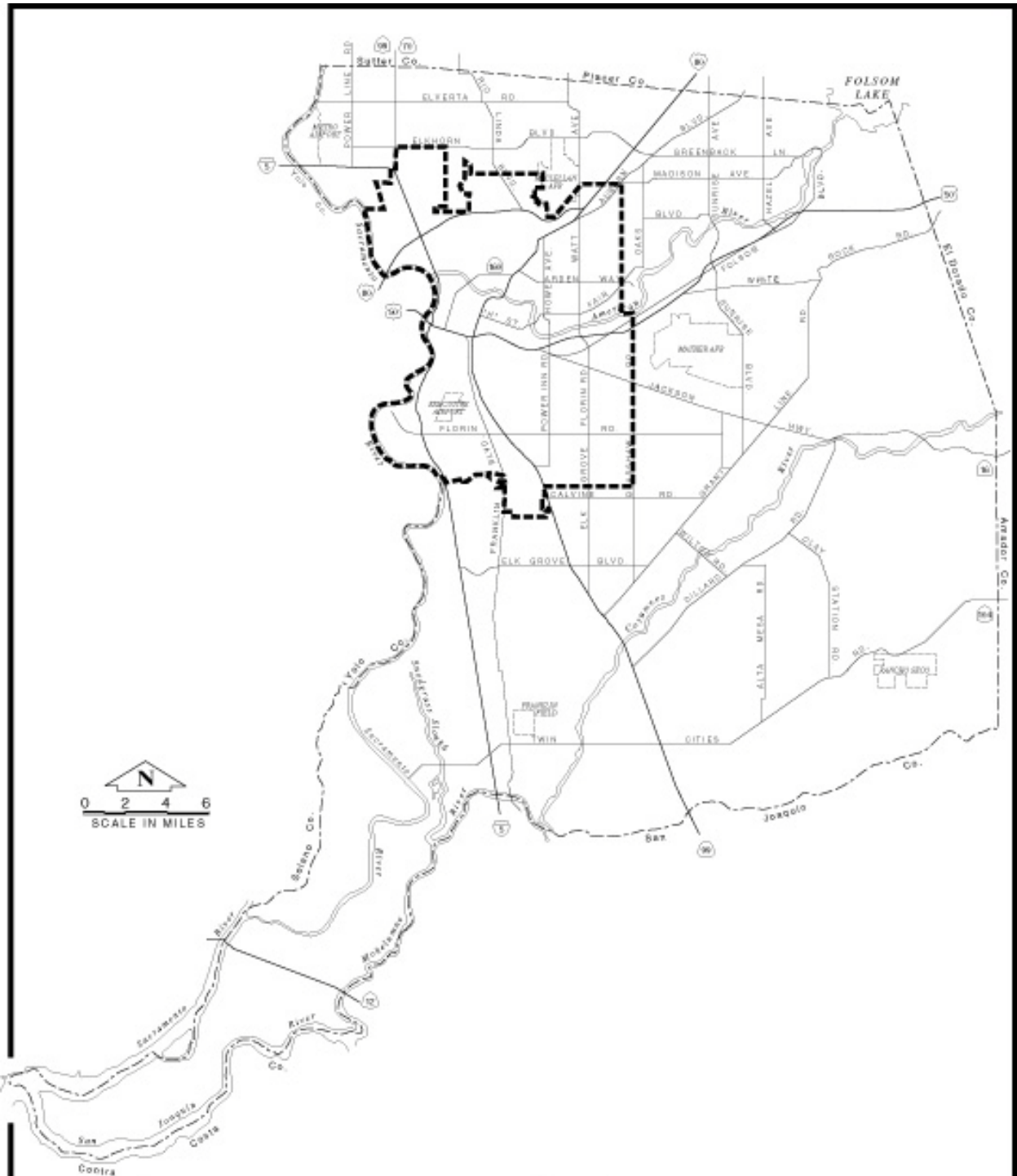


Figure 6
**American River
 Place of Use Boundary Map**
 Prepared by the Sacramento County Planning and Community Development Department

B. When river flows exceed 175 cfs, a diversion of 6 cfs is allowed for direct use plus an additional 3,900 AF to storage is allowed as follows:

1. 1,250 AF to Chesbro Reservoir
2. 2,610 AF to Calero Reservoir
3. 850 AF to Clementia Reservoir
4. 40 AF to South Course Lake #10

C. The combined amount of B. (2), (3), and (4) above cannot exceed 2,650 AF. The maximum allowable rate of diversion to storage is 46 cfs. The total amount of water to be taken cannot exceed 6,368 AF/yr.

Omochumne-Hartnell Water District: The Omochumne-Hartnell Water District has riparian water rights to 2,400 AF/yr. from the Cosumnes River.

**SACRAMENTO COUNTY GENERAL PLAN
CONSERVATION ELEMENT**

**A. WATER RESOURCES
BACKGROUND REPORT**

3. CURRENT WATER USE

Current surface and groundwater use for the different Subareas of Sacramento are shown in Table 7. There are three separate water use categories: 1) Agricultural, 2) Commercial and Industrial, and 3) Residential, Parks and Schools. All categories are not necessarily represented in all subareas; some areas having more land in agricultural use while others are strictly commercial, industrial and residential and still other areas are a mix of all three types of uses. In general areas which are mostly agricultural use more water, especially if there is a large percentage of rice lands as rice requires flooding during most of its growing season. However, much of the water used for agriculture either returns to the Sacramento River or recharges groundwater.

TABLE 7**CURRENT (1987) SURFACE AND GROUNDWATER USE IN THE COUNTY**

<u>SUBAREA</u>	<u>SURFACE WATER AF/YR</u>	<u>GROUNDWATER AF/YR</u>	<u>TOTAL</u>
Carmichael Carmichael ID	10,800	4,300	15,100
Cordova Eastern portion of the Arden Cordova Water District.	2,040	10,860	12,900
Folsom, City of Aerojet, Folsom, & Folsom Prison.	16,270	---	16,270
Multi-District San Jaun Suburban WD, Citrus Heights ID, Fair Oaks WD, Lincoln Oaks area of Citizens Utility Co., Northridge WD, Orangevale Mutual WC, northern part of Arcade WD, and McClellan AFB.	44,540	94,040	138,580
Natomas Metro Airport, part of Natomas Central Mutual WC, and North- gate 880 Service Area of SCWMD	82,000	960	9,160
Rio Linda Rio Linda WD	0	9,190	9190
Sacramento South Suburban and Parkway service areas of Citizens Utility, Fruitridge Vista WC, Tokay Park WC, Florin County WD, the south area of Sacramento City, and Southwest area of	94,100	32,395	126,495

<u>SUBAREA</u>	<u>SURFACE WATER AF/YR</u>	<u>GROUNDWATER AF/YR</u>	<u>TOTAL</u>
Sacramento North North part of Sacramento, North Natomas, Arden-Arcade area, and South Natomas. SCWMD	2,130	24,645	26,775
Clay WD Clay WD	4,190	5,300	9,490
Elk Grove Elk Grove WW and Grantland 99 service area of SCWMD	0	4,570	4,570
Galt, City of City of Galt	0	2,900	2,900
Galt ID Galt ID	7,340	50,000	57,340
Other Folsom South Canal Users Unincorporated area east of Hwy 99 and between Omochumne- Hartnell WD and Galt ID.	0	20,000	20,000
Omochumne Omochumne-Hartnell WD	10,400	31,000	414,000
Southwest Area west of Hwy 99 and south of Laguna-Elk Grove	0	106,000	106,000
Sunrise Unincorporated area south of the American River and east of the City of Sacramento water rights service area.	2,000	30,000	32,000
		Total Use	628,050

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**SACRAMENTO COUNTY PLAN
CONSERVATION ELEMENT**

**A. WATER RESOURCES
BACKGROUND REPORT**

4. GROUNDWATER OVERDRAFT

Continuing groundwater overdraft has been occurring in various parts of the County since the 1940's. While groundwater can continue to meet some of the water needs in these areas, new or increased surface water supplies should be secured in the immediate future in order to protect the viability of the groundwater resource. Continuation of current practices will result in further decline of groundwater levels with corresponding increased pumping costs and possible degradation of groundwater quality.

As shown in Figure 7, there are three distinct cones of depression in Sacramento County, indicating that past and current groundwater pumpage in these areas has significantly exceeded sustained yield quantities. These areas have an immediate need for imported surface water to meet current demands.

Changes in Storage

Changes in storage can be computed from the change in water levels. The change in water level elevations was determined from spring water level contour maps. Estimated annual changes in storage in acre feet for the period 1962 through 1968 are listed in Table 8. Using the average specific yield of 7.5 percent, the average decline in water level is about 0.5 foot per year.

**TABLE 8
ANNUAL CHANGE IN STORAGE FOR 1962 TO 1968**

<u>Year</u>	<u>Annual Change in Storage (AF)</u>
1962	-19,650
1963	51,510
1964	-170,960
1965	29,560
1966	-196,200
1967	303,440
1968	-157,700
Summation	-160,000
Average Annual	-22,860

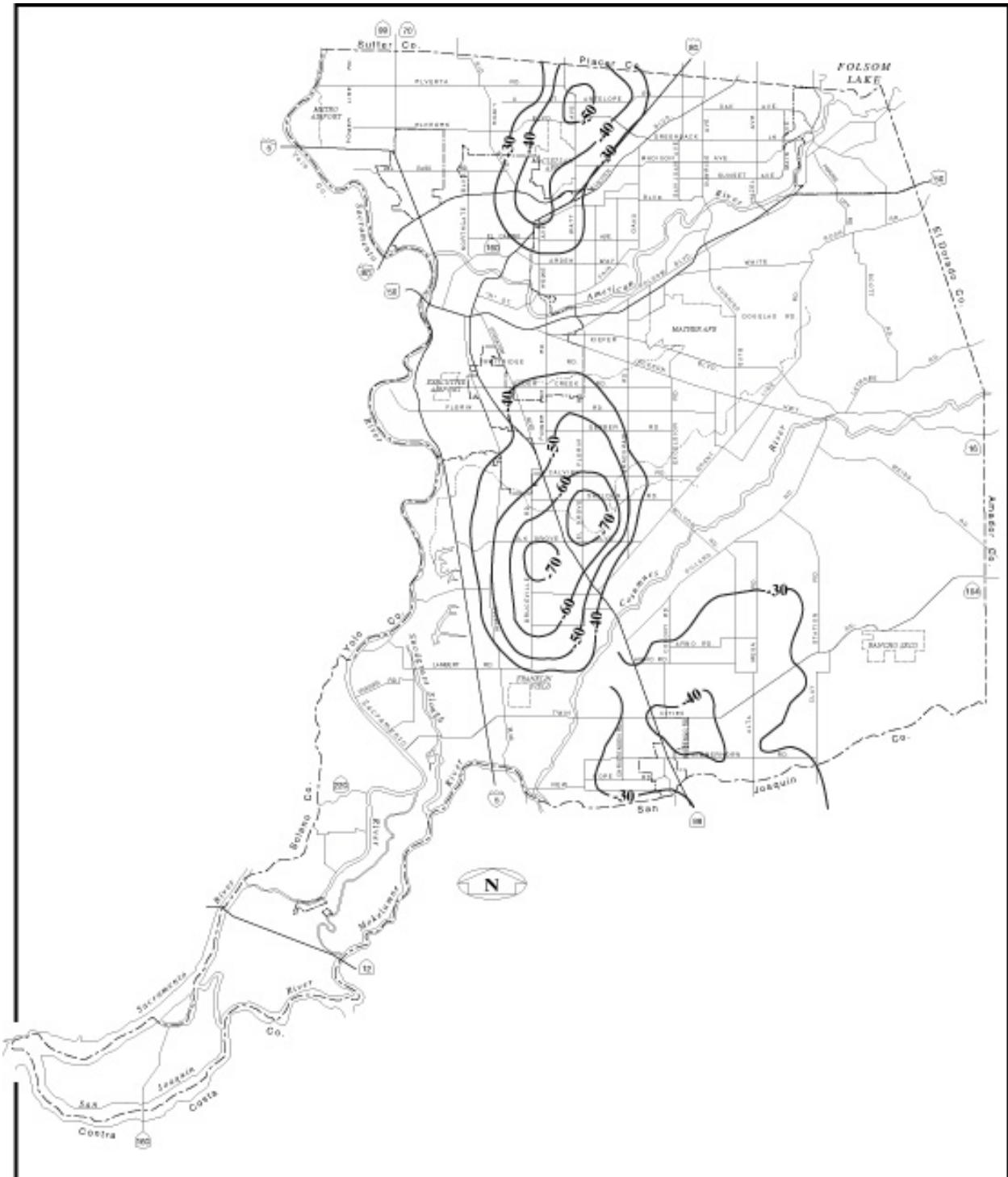


Figure 7

Groundwater Overdraft Areas Spring 1991 Groundwater Elevation

Prepared by the Sacramento County Planning and Community Development Department



See Table 5, in Section 2 under groundwater for sustained yield estimates.

Problems With Overdraft

A few purveyors within the County have indicated little or no problem with their current water supply situation. However, most purveyors were concerned about growth and resulting need for additional water. While some purveyors expressed belief that additional wells could meet future needs generated by projected growth, most indicated an interest in securing new or increased surface water supplies. In many cases, surface water supplies will be necessary because groundwater is not present in sufficient quantities to meet future demands without exceeding the sustained yield values.

In general, most purveyors have reported that the quality of groundwater is suitable for all beneficial uses. It usually meets drinking water standards contained in Title 22 of the California Code of Regulations; occasional chlorination is required. However, secondary drinking water standards for iron, manganese and other constituents have been exceeded at some locations, making additional treatment necessary. Existing community water systems, including their wells, may not be required to meet the Maximum Contaminant Levels (MCL) specified at 23 CCR Sec. 64473. New wells, however, must adhere to the MCL standards. Purveyors expressed their concerns that new wells will therefore require additional, expensive treatment and that water costs could increase significantly.

The aquifer systems and the quality of water contained therein are presently inadequately defined to be able to identify a pattern as to locations where water quality problems are encountered. Groundwater quality problems have been found in some wells in the northern part of the County. In the south area of the County, particularly south of the City of Sacramento and westward, wells drilled to a depth of 400 to 600 feet are generally found to contain high levels of iron, manganese, hydrogen sulfide, methane, and iron bacteria. In this same area, the quality of water found at depths of 200 to 300 feet is excellent and no treatment has been required.

Recently, in an area east of Highway 99, wells have been drilled to depths of 900 feet. Water production from these wells, which presumably produce from the Mehrten Formation, has generally been very high, exceeding 2500 Gallons Per Minute (GPM). However, small amounts of iron, manganese and hydrogen sulfide have been found in groundwater produced by some of these wells. The source of these constituents is unclear at this time. Their source may be in deeper water-bearing zones, in shallower zones or in both; or their presence in wells may be the result of poor well construction practices.

Groundwater contamination has been reported at a number of locations. This contamination is primarily from organic solvents and wastes at the following sites: The Aerojet-General property east of Rancho Cordova, McClellan and Mather Air Force Bases, the Army Depot in South Sacramento, and the Southern Pacific and Union Pacific yards in downtown Sacramento. The area south of McClellan AFB also has been the location of a pumping depression for a number of years. Such depressions tend to exacerbate groundwater contamination problems, as many

contaminants will migrate down gradient toward the trough of the depression. Because of localized groundwater contamination, McClellan AFB now receives water from Rio Linda Water District and Northridge Water District, and Aerojet now receives surface water from the City of Folsom. Groundwater at the International Airport is marginally acceptable for drinking purposes, as contaminant levels approach or exceed MCL's specified at 23 CCR Sec. 64435. Cleanup operations are either underway or are being planned. Other problems, besides contamination, arise when groundwater overdraft occurs. These are; subsidence of the earth as the water supporting it is drawn away; increased drilling and pumping costs as the water becomes harder to extract; and increased treatment costs as more lower quality waters requiring treatment for contamination are extracted when higher quality waters have been depleted.

Current Use Versus Sustained Yield

Current use of groundwater exceeds estimated sustained yield amounts for groundwater in Sacramento County. The total current use is 380,000 AF/yr. while safe yield is 357,000 AF/yr. resulting in an overdraft of 23,000 AF/yr. See Table 5, Section B. for sustained yield estimates.

SACRAMENTO COUNTY PLAN CONSERVATION ELEMENT

A. WATER RESOURCES BACKGROUND REPORT

5. PROJECTED WATER DEMAND

Assumptions

The calculation of future water needs in the County for the year 2015 assumes the following:

- There will be no net increase in agricultural land. Urban pressures may cause a net reduction in cropland in some subareas.
- Water demand factors for all land use categories except residential remain constant. Per capita residential demands are reduced in some subareas due to increased densities.
- Current non-urban land will be developed in the order of land valuation. Vacant land and nonirrigated farmland will be developed first, followed by general irrigated farmland and rice farmland.
- All vacant land that is currently zoned commercial and industrial will be fully developed by 2015.

Agricultural:

It is assumed, for the purpose of estimating future agricultural water need, that total crop acreage will not increase in the future. This assumption is based on the following:

1. Most of the economically developable farmland in the County is already in production.
2. Soil surveys further indicate that the great majority of agriculturally suitable land within the County is already in use.

A number of the subareas are projected to experience a reduction in irrigated agriculture. Planned building patterns (zoning) and a population increase will completely eliminate general agriculture and reduce rice acreage by two-thirds in the North Sacramento subarea by 2015.

Commercial and Industrial:

All vacant land that is currently zoned as commercial and industrial is assumed to be fully developed by 2015. Total Commercial and Industrial need amounts to approximately 10 percent of the 2015 projected total water need for the County. Land thus developed will be withdrawn from non-urban land. Water factors and area employment patterns are assumed unchanged, with subarea water demand calculated from SACOG's estimate of employment for 2015.

Residential/Parks/Schools:

- Residential: Most subareas are expected to experience an increase in residential density by 2015.
- Parks: It was estimated that known 1987 acreage will increase in proportion to subarea population projections so that acreage to population ratios remain unchanged.
- Schools: The student yield factor (.44 student/house) and water factor of 0.024/AF/pupil/yr. remain constant for 2015 predictions. SACOG's housing distribution was used to predict school water use.

Results:

Table 9 summarizes the projected 2015 water supply need for the County. The total need is 886,000 AF/yr. excluding conveyance losses and 931,000 AF/yr. assuming a 5 percent conveyance loss factor. The 931,000 AF/yr. projection represents a 22 percent increase over the calculated current water demand.

TABLE 9

ESTIMATED 2015 WATER SUPPLY NEED IN (AF/YR)

Area	Total Need	Total Need plus Conveyance Losses
Carmichael	15,622	16,403
Cordova	14,423	15,144
Folsom, City of	42,879	45,023
Multi-District	105,871	111,166
Natomas	70,217	73,727
Rio Linda	13,461	14,134
Sacramento N.	93,184	97,843
Sacramento S.	155,438	163,210
Clay WD	10,119	10,625
Elk Grove	23,041	24,193
Galt, City of	8,722	9,158
Galt ID	77,942	81,839
Omochumne	50,743	53,281
OFSCU	23,004	24,154
Southwest	115,170	120,928
Sunrise	66,414	69,734
TOTAL =	886,249	930,562

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**SACRAMENTO COUNTY GENERAL PLAN
CONSERVATION ELEMENT**

**A. WATER RESOURCES
BACKGROUND REPORT**

6. IN-STREAM WATER NEEDS: AMERICAN RIVER

IN-STREAM BENEFITS

Introduction

As early as 1915, the City of Sacramento planned for development of recreational parks within the American River floodplain. The City established the first park in the vicinity of the "H" Street Bridge in the 1920's. The County of Sacramento also planned for development of recreational sites along the American River. However, the purchase and development of riverfront property proceeded slowly and in piecemeal fashion until the completion of Folsom Dam in 1956. Then, pressure for urban development adjacent to the river spurred efforts to preserve open space along the river. In 1959 the County established a Department of Parks and Recreation to develop a detailed plan of park needs along the American River. The American River Parkway Plan was approved by the Board of Supervisors in January, 1962, and was incorporated into the recreational element of the County General Plan. A systematic land acquisition program was initiated, and by 1986 Sacramento County had acquired over 4,000 acres of parkway land at a cost of 22 million dollars.

In addition, the 23 miles of the American River below Nimbus Dam has been designated as a recreational river by the Secretary of the Interior under the National Wild and Scenic Rivers Act (U.S.C. 1271 et. seq.) and is given the same designation by the State under the State Wild and Scenic system (Public Resources Code 5093.50, 5093.54(3)).

Recreational Values

The American River Parkway is unique among urban rivers in the United States. Running through the center of the Sacramento Metropolitan area, the river and parkway provide a public recreational resource of great value and regional significance; it has no equivalent in California and few equivalents in this country. The parkway provides an outstanding variety and quality of recreational opportunities in the heart of a major metropolitan area. The parkway is California's largest urban riparian area. The parkway is managed to balance the dual goals of preserving natural, or open space, and protecting environmental quality within the urban environment, and at the same time contributing to recreational opportunities in the Sacramento area.

Recreational possibilities in the American River Parkway include such diverse activities as hiking, bicycling, picnicking, birding, horseback riding, canoeing, kayaking, rafting, sailing, power cruising, and swimming, to name a few. Some of these activities are water-dependent, such as rafting, swimming, or fishing; others are water-enhanced, such as bicycling, hiking, or picnicking.

The parkway contains developed parks such as Discovery, Ancil Hoffman and Goethe parks, as well as areas set aside in their natural condition. The Jedediah Smith Bicycle Trail permits parkway users to bicycle the full 23 miles from the confluence of the Sacramento and American Rivers at Discovery Park to Nimbus Dam. The bicycle trail then continues along Lake Natomas to Folsom State Park. Separate equestrian trails extend for many miles along the parkway.

A wide range of special activities takes place in the parkway, including nature study at the Effie Yeaw Nature Center, Take-a-Kid Fishing Day, Eppie's Great Race (triathlon), a kite festival, and other organized programs. The parkway is also an excellent place for those who simply wish to relax in pleasant surroundings.

Riparian Vegetation Values

The riparian vegetation acts as a buffer between the lower American River and the surrounding urban development. This vegetation, together with the river itself, are the most prominent features of the Parkway, and contribute greatly to the recreational experiences there. Many species of wildlife use the riparian vegetation for sources of food, cover, nesting sites, roosting areas and migratory corridors. Riparian vegetation is recognized by ecologists as being among the most productive wildlife habitat in the state.

Riparian Vegetation and Floodplain Relationships

The parkway's riparian vegetation and the river system are dynamic and interdependent. As the lower American River moves down and across its valley, the river attempts to erode its banks and cut deep channels at the outside of a bend where the water is swift, and to deposit the eroded fines and gravels farther downstream on the inside of a bend where the water is slower. When the river overflows its banks, the water slows and deposits its sediment load on the floodplain. Spring runoff can leave deposits of moist, nutrient-rich soils upon which riparian plant seedlings become established. However, sediments deposited by the spring runoff, and any seedlings germinated there, are susceptible to removal by floods occurring within the next several winters.

Winter flood events on the American River rework sediments in the active channel too frequently to allow many seedlings to survive. Floods during December, January and February average 46,000 CFS, and are considerably higher than average spring runoff. Production and survival of the riparian vegetation on the semi-confined lower American River is dominated by these flood processes.

Riparian vegetation on the lower American River has adapted its reproduction processes by re-sprouting after damage from floods. The "scour and re-sprout" process is more important on the lower American River than seedling germination. Following the large 1986 flood (130,000 CFS) this re-sprouting process produced vigorous new stands of cottonwood 25 to 30 feet above the summer low-flow channel.

Riparian Vegetation and Wildlife

The parkway supports a wide variety of birds and wildlife. More than 220 bird species have been recorded in the parkway. Sacramento County estimates that 30 mammal species, 13 reptile species, and 6 amphibian species also inhabit the parkway. The possibility of catching a glimpse of deer, beaver, blue heron, or wild turkeys adds to the pleasure of parkway users. The riparian habitat is important not only as a breeding grounds for resident animals, but also as wintering grounds and migratory corridors for nonresident species.

Ponds

The Parkway includes a number of off-channel ponds that have high wildlife value. Ponds are found at Sacramento Bar, Arden Bar, Rossmoor Bar, just upstream of Discovery Park, and in Ancil Hoffman Park Golf Course. Bushy Lake is also located within the parkway. These ponds were mostly developed during the late 1960's and early 1970's when tailing mounds from the gold dredging era were excavated for the production of aggregate. Water surface elevations in the ponds are controlled, in large measure, by water surface elevations of the river nearby. These ponds provide some of the most important riparian habitat for wildlife.

Fisheries

The lower American River has 41 reported species of fish. Of these species, nine are anadromous (they live mainly in salt water but ascend freshwater rivers to spawn). The most abundant anadromous fish in the river are chinook salmon, striped bass, American shad and steelhead trout. These fish are all sensitive to changes in stream flow levels, sediment loads, warm temperatures, and low dissolved oxygen content. In addition clean gravel is required for spawning and fry rearing.

Establishing Minimum In-Stream Flows

Recommended Minimum In-stream Flows For The Lower American River

Since completion of Folsom Dam, public attention has been increasingly focused on the Lower American River's fishery and recreation values. Construction of the dam was followed by public debate and governmental action to establish the Nimbus Fish Hatchery and in-stream flow standards to protect salmon and steelhead trout populations in the Lower American River. Over the years, essentially four flow regimes have been proposed. These are as follows:

Decision 893 - The Existing Legal In-stream Flow Requirements

This decision, established in 1958 by the California State Water Resources Control Board (SWRCB) in connection with the Folsom Water Rights permitting process, requires the Bureau to release a minimum flow of 250 to 500 cfs below Nimbus Dam. This was the minimum flow used in the original planning of the Auburn-Folsom South Unit in the early 1960's. Releases of 500 cfs would be made from September 15 through January 1, with a minimum release of 250 cfs during the remainder of the year.

Decision 1400 - Post-Auburn Dam Flow Conditions

This decision, made in connection with the Auburn Water Rights permitting process, was made in 1972 after a series of public meetings. This decision established post-Auburn Dam flow conditions between 1,250 and 1,500 cfs. In the absence of Auburn Dam, minimum flows would continue to be governed by D-893.

County of Sacramento - Minimum Recreation Flows

The County of Sacramento has prepared documentation on what it considers to represent the minimum flows consistent with the avoidance of permanent impairment to the Lower American River Parkway's recreational values. These flows range between 1,750 and 3,000 cfs as follows:

- 2000 cfs from October 15 through February
- 3000 cfs from March through June
- 1750 cfs from July through October 14.

Department of Fish and Game - Minimum Flows for Fish Reproduction

The in-stream flow needs are as follows, regardless of hydrologic conditions if fish populations are to remain unaffected:

<u>Month</u>	<u>Flow in CFS</u>
October	1,750
November	2,000
December	4,250
January	6,000
February	5,000
March	4,800
April	4,600
May	4,100 (+477)*
June	3,750 (+493)*
July	3,500
August	3,400
September	3,000

*Additional flows included to meet the needs of smolt migration, shad attraction flows, temperature control, and gravel recruitment.

East Bay Municipal Utilities District Lawsuit

Background

The single issue, which has spawned 17 years of litigation to date is whether, pursuant to a 1970 contract with the Bureau of Reclamation, EBMUD may divert 150,000 AF/yr. from the Folsom Reservoir at the Folsom-South Canal or whether the mandates of Article X, Section 2 of the California Constitution and public trust doctrine require that the diversion occur below the confluence of the American and Sacramento Rivers. Plaintiffs and intervenors contend that the EBMUD diversion and consequent reduction of in-stream flows will cause substantial ecological harm to riparian habitat, fisheries, and recreational resources. Plaintiffs and intervenors further direct their concern to the cumulative impact of the EBMUD diversion in combination with projected appropriation and diversion of American River water in response to expanding urbanization and population growth.

EBMUD contends that the evidence is insufficient to demonstrate any appreciable harm to public trust values; that principles of California Water Law require the recognition and implementation of its contract rights; that sound public policy requires that high quality drinking water be obtained from the best available source; and that the Folsom Dam was constructed pursuant to objectives and purposes that preempt state interference. Each side advanced a number of issues which the Court considered individually.

Summary of Decision in EBMUD Case

Judge Richard A. Hodge in the Superior Court of Alameda County made a "Physical Solution" in the case of the Environmental Defense Fund v EBMUD. The important points are:

- EBMUD will be allowed to divert water at the Folsom-South Canal if the conditions below are met.
- The following in-stream flow requirements must be met as a condition of the diversion:
 - 2000 cfs from October 15 through February
 - 3000 cfs March through June
 - 1750 cfs July through October 14.
- An additional 60,000 AF must be maintained in reserve from mid-October through June for release in accordance with the recommendations of the Department of Fish and Game in response to specific fishery needs.

- EBMUD shall use its best efforts to divert as much water as possible during those times when in-stream flows are least required for protection of environmental interests.
- During such periods when flow requirements physically cannot be met, EBMUD may not divert any part of its appropriation. Defendants shall not divert water except to meet the demands of customers within the EBMUD Utility District.
- EBMUD shall not market nor sell its water to any third party, particularly agricultural interests.
- EBMUD shall contribute to the cost of maintaining a viable fishery and riparian habitat in the Lower American River.
- The foregoing flow regimen is not merely "interim" in nature. It is intended as a permanent, constitutionally mandated prerequisite to diversion.
- The Court will appoint a special master to monitor the physical solution upon terms and conditions to be agreed upon by the parties.

Implementation of The Decision

The Court maintained jurisdiction for the purpose of implementing the "Physical Solution" and providing for its modification in the event of new information on the American River which may come from one of the government agencies (i.e., DFG or FWS) which continue to study the river or the special master. John Williams of Carmel Heights, California. He will oversee all activities and research on the Lower American River to coordinate these activities and further advise the Court on possible changes or modifications to the decision which may be necessary.

SACRAMENTO COUNTY PLAN CONSERVATION ELEMENT

A. WATER RESOURCES BACKGROUND REPORT

7. SOURCES OF ADDITIONAL WATER

It is obvious, when Sacramento County's current groundwater and surface water supplies are compared to the projected 2015 water needs, that the County must develop new water supply sources in order to meet the future needs of the area and stop the present groundwater overdraft condition that exists in the County. Potential sources of additional water are discussed here.

Central Valley Project Water

The purchase of water from the Central Valley Project (CVP) is traditionally considered to be the primary source of additional water for the County. The United States Bureau of Reclamation (USBR) has not entered into any new long-term contracts to supply water within the CVP since 1979. At that time, the United States Department of Interior declared a moratorium on CVP water contracting while the USBR and California Department of Water Resources (DWR) resolved questions of their respective responsibilities regarding water quality standards for the Delta. In 1986, the USBR and DWR concluded a Coordinated Operation Agreement which resolved these questions. Congress authorized execution of this agreement by USBR the same year. The Secretary of Interior lifted the contracting moratorium following execution of that agreement. USBR intends to undertake contracting of available, uncommitted CVP water, subsequent to the filing of the Final Environmental Impact Statements on the proposed water contracting.

The USBR estimates that the available remaining firm water supply of the CVP is approximately 1.1 million AF/yr. Eighty-four agencies have made requests for supplies from the CVP totaling 4.2 million AF/yr. The USBR determined that the 4.2 million AF/yr. could be reduced to 3.4 million AF/yr. and that that total would meet agricultural, municipal and industrial (M&I), and wildlife refuge needs within the CVP service area. Requests for water from the American River totaled 610,000 AF/yr. and the USBR, after reviewing each request, adjusted this total request down to 542,000 AF/yr. which it determined would meet the region's needs. USBR's calculated water supply needs for the American River Service Area, along with current American River contracts and water rights entitlements, are shown in Table 10.

Three types of allocations will be made: firm, conditional, and intermittent.

Firm Yield - Water supply available from the operation of CVP facilities in all but dry and critically dry years when shortages occur. The amount of yield is premised on (1) ultimate conditions (traditionally equated to year 2020 level of development), and (2) operations studies of the 1928-1934 critically dry period to establish deficiency criteria. The operations studies use historical hydrology modified to show the level of depletion, accretions, and demands appropriate for 2020 development and reflect coordinated operations with the State of California as set forth in the Coordinated Operations Agreement (COA).

Interim Water - The difference between firm yield and the level of firm yield demand in any year. Prior to 2020, demands for firm yield supplies are assumed to be below their contractual maximum; thus, interim water can be contracted until the firm yield demand has built up to the contractual maximum.

Intermittent Water - The USBR proposes to use this term to denote a supply of water above firm yield which, when added to the supply, would constitute the total amount of water that could be contracted. This supply would be used in combination with groundwater through a conjunctive use program to expand the total supply of water that could be contracted by the USBR. This water could be contracted on an annual, short-term (longer than one year but less than 20 years), or long-term (up to 40 years) basis. The amount of water that could be delivered under this type of contract would not be as dependable as firm yield since the intermittent supply would depend on the type of water year (wet, normal, or dry), the total amount of water that could be delivered to users, and the quantity of water delivered each year to firm yield contractors. The probability of delivering an intermittent supply would be calculated on the basis of past hydrology and the ability to meet firm yield demands based on the 1928-1934 dry year period.

The USBR proposes to allocate approximately 317,150 AF of water annually to areas in Sacramento County. All of Sacramento County would receive 174,200 AF of firm water and 22,050 AF of intermittent water for municipal and industrial uses, and 60,450 AF of firm water and 60,450 AF of intermittent water for agriculture. The final amount of firm and intermittent water may be adjusted, depending on the capability of the groundwater basin to be used in conjunction with intermittent supplies. The USBR has acknowledged, informally, that insufficient water may have been allocated to meet Sacramento County's water needs. Sufficient quantities of intermittent water should be available to meet any shortfall.

The USBR based its proposed allocations on the following considerations:

Allocation to areas where major conveyance facilities already exist and any required construction would be for delivery facilities only.

Allocation to areas currently authorized for service.

Allocation to the areas of origin to the extent there is conveyance capacity.

Allocation to meet the full needs of wildlife refuges.

Allocation in a manner that strongly encourages conjunctive use of surface and groundwater.

Allocation in a manner which considers total available supplies, including integration of safe yield of local groundwater supply.

Of the six considerations listed above, five apply to Sacramento County. USBR's allocation considerations give the County and Central Valley wetlands needs priority for future allocations of CVP water.

Prior to entering into new long-term water contracts, the USBR is required by the National Environmental Policy Act to prepare Environmental Impact Statements (EIS's). The USBR has prepared three draft EIS's covering the three distinct geographical areas to be served by the new CVP water contracts: the Sacramento River Service Area, the American River Service Area, and the Delta Export Service Area. The draft EIS's were filed with the Environmental Protection Agency (EPA) on December 29, 1988. Public hearings were held in March. The required comment period was extended and closed on April 3, 1989. The draft EIS's have recently been withdrawn by the Secretary of Interior. It is unclear, at this time, whether the draft EIS's will be redrafted and refiled or if the Secretary plans significant changes in the USBR's water market strategy. It is therefore not possible to predict just when the water the USBR proposes to allocate to Sacramento County will become available.

The contracting process is also vulnerable to a number of factors and events that cannot be wholly controlled by the USBR and its contracting partners. These include:

1. The SWRCB is reviewing existing water standards established by D-1485 for the Bay-Delta Estuary. These standards address salinity and pollutant levels, as well as minimum flow requirements for fisheries in the Estuary. New long-term CVP contracts will include provisions, like most of the existing contracts, to allow the Bureau to reduce the firmness of the water supplied to CVP water contractors should the SWRCB allocate more water than presently required by D-1485 to the Bay-Delta Estuary. Reduced firmness means the contractors will experience shortages more often and the severity of those shortages will be greater. The USBR contracting strategy assumes this contract language will allow new long-term CVP contracts to go forward before the SWRCB finalizes new water quality standards for the Bay-Delta Estuary.
2. As mentioned above, three draft EIS's on water contracting were prepared by the USBR for three distinct geographical areas. The draft EIS's were prepared separately under the assumption that contracting in each area could proceed separately regardless of the status of the process for the other two areas. The draft EIS's include a cumulative analysis of impacts

in all three areas and contracting from any single area could be delayed by a court challenge until all three have completed the process.

3. SWRCB has issued a work Plan to review the USBR's and the City of Sacramento's American River water rights. The stated purpose of this review is to determine the appropriate flow to be maintained in the Lower American River. It is unclear at this time what will emerge from the SWRCB's review, but the review will integrate the results of several studies, the Boyle Engineering supplement to the Water Plan, the USBR's American River Service Area Water Contracting EIS, and developments results of the EDF v. EBMUD litigation.

U.S. Bureau of Reclamation

Recognition of Needs of American River Service Area:

The following table (Table 10) shows the USBR's recognitions of future needs for the American River Service Area by agency.

TABLE 10

**U.S. BUREAU of RECLAMATION PROJECTED NEEDS
FOR THE AMERICAN RIVER SERVICE AREA
FOR 2020 (1,000 AF/YR.)**

<u>Agency</u>	<u>Contractual & Water Rights Entitlements</u>	<u>Additional Need</u>	<u>Total Need</u>
MISCELLANEOUS			
Placer County CVP Water	117.0	---	117.0
Placer County Water Rights	120.0	---	120.0
Natomas Ditch Diversion	32.0 ¹	---	32.0
North Fork Ditch (San Juan)	33.0	---	33.0
Folsom Prison	4.0	---	4.0
El Dorado County CVP	7.5	---	7.5
El Dorado Water Rights	47.5	---	47.5
City of Roseville	32.0	---	32.0
MISCELLANEOUS SUBTOTALS	393.0	0.0	393.0
FOLSOM LAKE			
Folsom, City of	0.0 ²	20.9	20.9
Mather Air Force Base	0.0	0.4	0.4
San Juan Suburban Water District	11.2	26.1	37.3
Citizens Utility Company	0.0	21.6	21.6
Northridge Water District	0.0	13.2	13.2
McClellan Air Force Base	0.0	2.5	2.5
Rio Linda County Water District	0.0	6.8	6.8
FOLSOM LAKE SUBTOTALS	11.2	91.5	102.7
SACRAMENTO COUNTY WATER AGENCY			
Folsom-South County Irrigation	0.0	---	0.0
Area 1	0.0	29.0	29.0
Area 3	0.0	46.0	46.0
Omochumne-Hartnell Water District	0.0	12.0	12.0
Galt Irrigation District	0.0	31.0	31.0
Clay Water District	0.0	2.7	2.7
Galt, City of	0.0	9.9	9.9
Laguna/Elk Grove	0.0	77.7	77.7
Sunrise East Area	0.0	17.2	17.2
SUBTOTAL AGRICULTURAL WATER	0.0	120.7	120.7
SUBTOTAL MUNICIPAL & INDUSTRIAL	0.0	104.8	104.8
SACRAMENTO COUNTY WATER AGENCY SUBTOTALS	225.5	225.5	225.5

<u>Agency</u>	<u>Contractual & Water Rights Entitlements</u>	<u>Additional Need</u>	<u>Total Need</u>
OTHER SACRAMENTO COUNTY			
Galt, City of	0.0	9.9	9.9
Folsom-South Canal:			
EBMUD	150.0	---	150.0
SMUD	75.0 ³	---	75.0
Losses	20.0	---	20.0
City of Sacramento	230.0	---	230.0
Carmichael Water District	10.8	4.2	15.0
Riparian	41.0	---	41.0
OTHER			
SACRAMENTO COUNTY SUBTOTALS	526.8	4.2	531.0
SAN JOAQUIN COUNTY			
North San Joaquin Water			
Conservation District	0.0	57.0	57.0
Woodbridge area	0.0	13.0	13.0
Stockton East Water District	0.0	49.0	49.0
Central San Joaquin Water			
Conservation District	0.0	22.0	22.0
San Joaquin County Flood and			
Water Conservation District	0.0	31.0	31.0
Stockton East Water District	0.0	49.0	49.0
SAN JOAQUIN COUNTY SUBTOTALS	0.0	221.0	221.0
TOTAL AGRICULTURE		292.7	
TOTAL MUNICIPAL & INDUSTRIAL		249.5	
TOTAL - AMERICAN RIVER	931.0	542.2	1,471.2

1. City of Folsom Water Right (22,000), S. CA Water Co. (10,000).
2. Included in Natomas Ditch Diversion.
3. Includes 15,000 AF Water Right (City of Sacramento).

Conclusion

Sacramento County has viable options available to obtain the quantities of surface water needed to meet the County's projected 2015 water supply demand and to stop the existing groundwater overdraft condition. Surface water can be delivered with little or no effect on American River flows if diversions are moved downstream to the Sacramento River, except those that presently appear extremely difficult to move downstream, and if a diversion and distribution system is constructed that allows the surface water to be used as the base water supply and the groundwater resources available to the area to be used to meet peak spring and summer months demands. This system should be designed to eliminate any negative impacts the diversion alternative had on American River flows in the spring and summer months of above and below normal water years. Protecting the American River flows from adverse flow impacts by moving the County's diversions to the Sacramento River will cost the County approximately \$17 million a year more than it would cost to divert directly from the American River.

City of Sacramento Water Rights and Entitlements

As mentioned in Part B of the Background Report, the City of Sacramento currently has water rights to approximately 245,000 AF of water per year from the American River; however, this is the diversion limit for the year 2030. The annual limit is based on an increasing schedule which began in 1963 (see Table 11). Only about 57,000 AF/yr. is currently required to meet existing demand. This excess supply is obviously very important and would greatly benefit Sacramento County Water Agency as well as other water districts who rely on groundwater resources if it becomes available. The City of Sacramento also has water rights to 81,800 AF/yr. from the Sacramento River. The City's total demand was about 90,000 AF/yr. in 1989.

TABLE 11

CONTRACT SCHEDULE FOR AMERICAN RIVER AND FOLSOM SOUTH CANAL FOR THE CITY OF SACRAMENTO

<u>Year</u>	<u>Entitlement (AF/YR)*</u>	
1975	75,000	(4,000)
1980	90,000	(7,500)
1985	102,000	(7,500)
1990	115,000	(7,500)
2000	151,000	(13,500)
2010	185,500	(15,000)
2020	223,500	(15,000)
2030	245,000	(15,000)

*Includes water which goes to SMUD a maximum of 15,000 AF/yr. Amounts in parentheses.

Each river has a specific as well as restricted territory which it can serve. Water from the Sacramento River can only be used to serve property within the Sacramento City Limits. This is a legal requirement which cannot be altered by negotiations. But, as territory is annexed to the City, it is entitled to Sacramento River water. Water from the American River, however, can be delivered beyond the City Limits within boundaries known as the American River Place of Use (POU). The map, Figure 4, Section B, illustrates the existing boundaries for using American River water. To date, the City of Sacramento has contracted to sell or distribute American River water only to Arcade Water District and Del Paso County Water District, both of which meet the requirement of being in the POU. Currently, negotiations are underway to try and develop criteria for the possible distribution of American River water outside of the POU.

Memorandum of Understanding

Reliance solely on groundwater is becoming increasingly expensive because water levels continue to decline and construction costs continue to rise. As a result of the various water issues and concerns, the Metropolitan Water Plan recommended that the City and County execute an agreement to implement a regional water plan. To date, no final agreement has been reached, however, the County and City have adopted a Memorandum of Understanding (MOU) to facilitate future negotiations.

The City of Sacramento and the County are at a crossroads with regard to development of surface water. There are volumes of studies and reports available which document the groundwater overdraft and underutilization of surface water available to the community at large. The Sacramento County Water Agency (SCWA) and the County have taken lead roles in developing groundwater management authority. However, that management is dependent in large part on the cooperation of the City as it has the surface water entitlements, treatment and distribution system which is capable of expansion, and the experienced staff trained to operate the water system. Recognizing the City's capacity and the County's need, the two governing bodies extended a Memorandum of Understanding (MOU) to logically and efficiently provide water to the greater Sacramento metropolitan area. The purpose of the MOU is summarized below.

Expansion of the City's water treatment and supply system to functions as a regional water utility under the direction of the City of Sacramento to serve a predetermined service area made up of the City of Sacramento and portions of the unincorporated area, both inhabited and uninhabited, appears to be the most logical and efficient way to proceed. Based upon the findings of the Metropolitan Water Plan, which outlines the respective roles of the City and the County. This Plan best meets the objective of an integrated ground and surface water program. On July 14, 1987 the City and County executed a MOU. Subsequently, this MOU was restated on April 5, 1988 to clarify and broaden the scope of the original agreement as summarized below:

"...recognize the need for conjunctive use of groundwater and surface water in the Sacramento area, to renew the bond of cooperation between the parties to plan together to resolve mutual water supply concerns, and to serve as an agreement for planning by

establishing a Technical Advisory Committee to study and prepare a proposed conjunctive use program for consideration and possible adoption by the parties after appropriate environmental review."

Per Resolution No. 88-0381.

Highlights of MOU Agreement

1. Properly balance use of groundwater and surface water by:
 - a. Utilizing City's existing surface water rights to the maximum extent.
 - b. Seeking and utilizing additional surface water rights and entitlements.
 - c. Limiting and managing groundwater use.
2. Provide equitable financing to construct City facilities for treatment, storage and conveyance of water.
3. Appoint Technical Advisory Committee
 - a. Purpose - Plan a proposed conjunctive use program and appropriate policy.
4. Policy Issues: Investigate and consider feasibility and desirability of:
 - a. Providing City water service outside City Limits but within American River POU on a wholesale basis.
 - b. Provide City service outside City limits and outside American River POU. The City would not utilize its own water rights and entitlements. The City would process, treat, store and distribute wholesale water if a public water agency could obtain their own permanent water rights from USBR.
 - c. Delivery of water in (a) and (b) is conditional upon acceptable financing.
5. City should assess and collect water connection fees on new development within City to finance its appropriate share of capital improvements.
6. City and County should develop and implement a groundwater management plan to halt overdraft, protect water quality.
7. Establish appropriate groundwater management zones with the ability to levy and collect groundwater charges.
8. Establish appropriate surface water benefit zones which are or will be benefited by surface water supplied by the City.
9. If the conjunctive use program is adopted, the City and County should mutually guarantee debt repayment in an equitable manner.

10. The City Council, County Board of Supervisors, and the Agency Board of Directors have the power and right to approve or deny any proposed conjunctive use program(s). The same parties shall also consider the results of environmental review and compliance with CEQA.
11. MOU may be terminated by mutual agreement or by a party giving one year's prior written notice.

(Note: IF the City/County consolidation is approved, it would no longer be necessary to reach an agreement, however, there may be some technical, design, engineering and environmental issues to be resolved. Water supply issues would not be the stumbling block, provided the City's existing water rights and entitlements succeed or can be transferred to the consolidated entity.)

In order for SCWA to obtain a firm water supply contract for surface water, it will need to either acquire the necessary water rights and entitlements from the State Water Resources Control Board (SWRCB) or it would have to secure a contract to purchase water from the USBR. Once a water supply contract has been obtained, SCWA would then need to enter into a "wheeling agreement" with the City to treat and deliver this water through the City's treatment plant and water distribution system. A second way to obtain surface water would be to purchase water directly from the City, which would both wholesale and deliver (wheel) water. However, this alternative would require the City to modify or amend its American River POU boundaries.

A fee ordinance has been established to fund the necessary capital improvements to treat, transport, deliver, and store water once it becomes available. The problem continues to be the inability of SCWA to successfully negotiate a water supply contract from either SWRCB or the City (provided appropriate amendments to POU boundaries can be obtained). It should be noted the County (SCWA) has recently adopted Resolution 89-2002 on December 19, 1989, offering to participate in the cost of financing an additional water intake near the mouth of the American River. This is one of several project alternatives currently being studied by the City in its environmental impact report for the E.A. Fairbairn Water Treatment Plant expansion project. It is likely that several major issues must be resolved before a final decision on the project can be made. Questions have been raised regarding the trade-off between maintaining water flow in the American River (environmental concerns) until it reaches the Sacramento River versus the cost to construct, operate and maintain a pipeline that will pump water back upstream to the plant. There may also be a reduction in water quality associated with the downstream intake structure. The proposed solution, together with the many alternatives, will generate extensive study and debate before a final decision can be reached. However, the proposed expansion of the Fairbairn Plant is not intended to serve any areas outside of the current American River POU. It is one step needed to deliver water to the unincorporated areas, provided water supplies become available.

Unused SMUD Entitlement

The SMUD contract for 60,000 AF/yr. of American River water for cooling the Rancho Seco Nuclear Generating Plant was executed in 1972 and expires in 2011. In addition, the City has dedicated 15,000 AF/yr. of its 245,000 AF/yr. of American River water as transport water for SMUD. Future use of CVP water for Rancho Seco is in doubt as the public recently voted to close Rancho Seco, and SMUD has indicated that it will abide by that direction.

The 60,000 AF/yr. from the American River was originally meant to provide cooling water for two nuclear power plants the size of Rancho Seco, however, it now seems likely that Rancho Seco will remain closed and no new nuclear plants will be built. Discussions with several technical and legal representatives of SMUD have been held to explore the possibilities of the County purchasing a portion of the water SMUD no longer needs. The USBR has traditionally opposed transfer of unused contract entitlement water. That agency has argued the water user should amend its contract entitlement if the water is not needed. The USBR has proposed selling water to those currently under contract and to others, such as the County, on an interim basis. In contrast to past policy, the USBR has also expressed a desire to encourage water transfers for specific reasons, such as groundwater recharge. The USBR may, therefore, support the interim use of SMUD water by Sacramento County for recharge of depleted groundwater aquifers in the southern part of the County, a suggestion that has received favorable attention by SMUD officials. The County will need to explore this possibility with representatives of SMUD and USBR.

Auburn Dam

History

In 1965, the Auburn Dam Project was approved by Congress. If completed, it would have delivered water to Sacramento County, San Joaquin County, and the East Bay Municipal Utility District via the Folsom-South canal. In 1975, the project was stopped when the earthquake in Oroville raised questions about the seismic stability of the dam which is built on a similar fault feature. By 1977, funding for Auburn had been permanently removed by the Carter administration which declared it both economically and environmentally unsound. In 1984, President Reagan stopped federal involvement in water development projects, thus withdrawing any hopes of federal funding for the Auburn Dam. Severe flooding in 1986 revived the Auburn Dam concept and by 1987 the Corps of Engineers was studying several different plans for the Auburn Dam site. Among these were the original plan for a full-scale, multipurpose dam, a flood control only dam, and several types of expandable dams (dams built primarily for flood control, but which can be expanded at a later time for multipurpose use).

Current Status

Currently, no consensus has been reached on what, if any, type of dam should be built on the North Fork of the American River. Environmentalists and the U.S. Fish and Wildlife Service both claim that severe environmental damage will result if Auburn Dam is built. Associated wetlands, 42 miles of riparian canyons, riverside forests, and whitewater stretches will all be affected by a dam on the North Fork of the American River. The flood control dam is the least damaging to the river itself, however, other indirect environmental effects are concentrated down river in the Sacramento area. These environmental effects are related to increased flood protection which potentially increases development. Increased growth can cause increased air pollution, reduce farmlands, and decrease wetlands.

Flood control is currently of great concern for Sacramento County since the Federal Government has imposed building moratoriums, and private flood insurance costs are up. The Auburn Dam issue is seemingly no closer to resolution than it ever has been. Sacramento County is supporting the least expensive and equally effective flood control dam. Placer and El Dorado Counties are pushing for a full-scale multipurpose dam in the hopes that they will get some water from it. SWIM (Sacramento Water Intelligently Managed) supports a middle-sized dam for water, power and flood protection; and environmentalists are fighting all proposals for another dam on the American River.

Cosumnes River

History

The Cosumnes River basin was studied by the Bureau of Reclamation in the 1960's, and a feasibility study for a dam on the Cosumnes River was conducted. In 1979, a concluding report was issued by the USBR and determined that under the federal government's criteria for project analysis a feasible project could not be built. Also in 1979, the Cosumnes River Association was revived through the sponsorship of the Counties of Amador, El Dorado, Sacramento, and San Joaquin. A report was prepared for the Association indicating that a project on the Cosumnes River could be built and paid for through the sale of water and hydroelectric power.

The Cosumnes River Water and Power Authority was formed through a joint powers agreement between Amador and El Dorado Counties. The Authority was joined by Sacramento and San Joaquin Counties in January, 1983. After several years of study and efforts to find buyers for the project's water supply and power, the Authority issued requests for proposals for a "turn key" approach to preliminary studies, water rights and power permits, project design, and construction. No responses were received and on April 28, 1987, the Sacramento County Water Agency withdrew from the Authority.

Current Status

The Cosumnes River Association dissolved in 1988 because of increasing awareness of the project infeasibility. While the costs of the project - both environmental and construction - were steadily increasing, the revenue from power sales which were supposed to finance the project were steadily decreasing. There was some hope that East Bay Municipal Utilities District would take an interest in the project and contribute to financing, however, they have not. At this point, the Cosumnes River project seems to be a dead issue.

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SACRAMENTO COUNTY PLAN CONSERVATION ELEMENT

A. WATER RESOURCES BACKGROUND REPORT

8. WATER CONSERVATION

Conservation Programs

Water conservation could reduce the projected 2015 water demand. Reductions in water use can be accomplished through several means ranging from voluntary programs to mandatory water rationing. Voluntary programs and residential water metering are discussed below, along with the effects of reduced use on river return flows. It is assumed that mandatory water rationing would be instituted only under emergency situations, such as severe water shortages.

Ongoing Programs

Voluntary Programs

The Sacramento Area Water Works Association (SAWWA) is a Sacramento County organization of waterworks management personnel. One of its functions is to promote water conservation. All of the water districts within the County are currently participating in SAWWA's ongoing voluntary water conservation campaign. Through the work of this group and individual water district conservation programs, water consumption in Sacramento dropped approximately 30 percent during the 1976-77 drought. The ongoing programs continue to promote voluntary conservation in Sacramento County. The City of Sacramento has noted a 13 percent reduction in use this last year (1989). Water district membership and application of conservation measures suggested by SAWWA are voluntary.

Emergency Drought Measures

During emergency drought situations several voluntary procedures combined with monitoring and some enforcement procedures have proven very effective in reducing water usage. Some of these measures include:

- Odd-Even Landscape Watering Days - houses with odd street numbers water on odd numbered days and houses with even street numbers water on even numbered days.
- Prohibitions on:
 - Landscape water between noon and 6:00 pm, when evaporation is highest.

- Washing sidewalks and driveways unless necessary due to health hazard.
 - Washing vehicles unless using a bucket and hose with stopper nozzle.
- Water Police - patrol for people violating prohibitions. Violators will be warned and repeat offenders often face fines of up to five times their monthly water bills. This is an enforcement measure and may or may not be used depending on whether the program is voluntary or mandatory. This is usually dependent on the severity of the drought situation.

Water Metering

General Discussion

The Sacramento Metropolitan area is the largest unmetered water service area in the State. In order to charge for water according to the amount delivered, water must be metered. If customer's water bills are the same regardless of how much water they use, they have little incentive to use water efficiently. Metering in conjunction with pricing structure influences water use by providing a continual means to tie water charges directly to the amount of water used by the customer.

Advantages and Disadvantages

Advantages

- Provides an economic incentive for consumers to use less water.
- could reduce consumption in Sacramento County by an additional 15-20 percent.
- Reduced water demand due to metering could mean that costly enlargements of the distribution system could be postponed and that less water would be required from expensive new sources.
- In most cases the cost to install meters will be recovered in the rates charged for water service. These costs should be recovered in about three or four years.
- With metering, utilities can more easily locate and pinpoint system water leaks, and can eliminate sources of unnecessary water loss. (It is estimated that 4 percent of urban water deliveries are lost to system leakage every year.)

Disadvantages

- In a study done by the city of Denver, Colorado in 1985, it was found that metering, in itself, does not affect the amount of water consumed. Metering must be used in conjunction with pricing rate structures.
- Initial installation costs and operation and maintenance costs would be high; ranging from \$250 to \$500 per meter installed. Retrofitting existing unmetered homes is estimated to have a total cost of anywhere from \$67 to \$135 million.
- Metering installation in Sacramento County would increase the average residential billing by 38 percent to 69 percent over current prices which average \$7 to \$8 per month.

- Saving water in Sacramento County is somewhat redundant as 95 percent of all indoor water used and 19 percent of all outdoor water used in the County returns to the Sacramento River for eventual reuse.
- Metering will save approximately the same amount of water that is currently being saved through voluntary conservation measures now in place. It is unlikely that water metering and pricing will induce enough additional water savings (estimated additional savings would be 2 percent) that the cost of installing meters will be justified.
- Equity issues: Costs distribution and implementation time frame will effect the equity of increased costs of water metering.

Costs of Metering

Several studies have been done to determine costs of installation and operation and maintenance of residential water meters. Costs to install range from \$250 to \$500 per unit. Due to the many variables included in meter installation, it is impossible to develop a single cost for a residential meter installation. Contributing to this wide range in costs are several factors:

- labor rates,
- differing materials costs,
- back or front yard installation,
- manual or machine excavation,
- size and type of meter installed,
- retrofit or new construction.

There are also several factors which could further increase the installation costs:

- public relations during construction (replacement of lawns, fencing and other landscaping),
- costs of installing new billing apparatus (computer programs, equipment, personnel, vehicles, and supplies),
- engineering costs for materials or contracts (i.e., bids, locating services, problem solving, contract administration),
- salaries for new employees (inspectors, engineers, laborers, and clerical).

Many of these costs were absorbed into purveyors' budgets and were not included in the estimated cost to install meters.

With installation costs between \$250 and \$500, it would cost between \$67 and \$135 million to install meters in the County's 271,000 unmetered homes. This cost would be completely paid by water customers through fees attached to their monthly water bills. The average water meter lasts approximately 15 years. At 8 percent interest, the annual (amortized) cost is between \$29.23 and \$58.46 per meter. Annual operation and maintenance cost for one meter is \$8.18 per year (\$2.92 for maintenance and \$5.26 for reading, logging, and billing). Therefore, the total additional monthly charge to install water meters is \$3.11 for the \$250 price and \$5.55 for the \$500 price.

Although metering existing homes may be expensive, installing meters at the time of construction is not. It costs only \$60 to provide a new home with metered water service.

Options for Ease in Installation

A water metering program poses many problems for Sacramento County. The Boyle report, Water Plan Supplement, done for SCWA outlines three strategies which could simplify the transition to meters both politically and economically.

Meter Installation in New Homes and Upon the Resale of a Home

Under this strategy, property owners would be required to install meters at their own expense when a residential property with no meter is sold, or a new home is built on a vacant lot. After several years of this intermittent installation, remaining unmetered water services would be required to install meters. This could be accomplished under either individual programs administered by individual water purveyors or by a county wide program administered by an agency formed just for this purpose or SCWA or SAWWA. Several payment structures are available to encourage early installation, and to provide the lowest initial costs for the water users and purveyors. Examples include:

- Higher rates for unmetered services in order to pay for meter installation.
- No rate structure differences until mandatory meter installation program begins. Then charge higher rate for those who waited until this time to install meters.

Public Awareness Programs

A public awareness program on conservation values for fee increases imposed as metering is implemented. Programs should be continuous to ensure all users conserve as much as possible. Particular attention should be paid to programs which educate consumers about the high cost of summer water use. If the public understands the reasons for water metering and know how to avoid high bills by conserving, metering programs will face much less resistance. Also, when meters are installed, a transition period is needed to allow customers to adjust to the new pricing scales. It is usually better to start the public awareness programs long before meters are installed and metering started. This especially is true if metering is scheduled to start during the summer months when water usage is high and rates are usually increased in order to increase conservation.

Core Organization

A core organization is formed by the County to administer the metering program. This allows for volume purchases of quality materials and services, standardized installation procedures, and a stronger position for negotiation of financing. This organization would coordinate installation (both new and retrofit), help to lessen adverse public reaction, enforce meter sizing specifications and installation methods, and deal with legal and financial constraints and labor considerations.

Metering and Strategies

As mentioned earlier, in order for water meters to act as water conservation devices they must be used in conjunction with a conservation oriented water pricing technique. Meters, in conjunction with a suitable rate schedule, can decrease water use by up to 30 percent especially immediately following installation. As people become adjusted to the higher prices, over time the savings decrease to around 15 percent of the pre-meter water use.

Current Efforts to Require Meters

Assembly Bill 3222, requiring metering in unmetered areas of California with more than 800,000 residents would require water meters to be installed on all new homes and would give homeowners until the year 2000 to retrofit existing homes with meters. This bill was specifically targeted at Sacramento County since it was aimed at unmetered areas with more than 800,000 residents and other unmetered areas like Fresno, Kern, Placer, Sonoma, and Sutter Counties do not meet this requirement. The bill made it through the Assembly but was withdrawn by the sponsor while still in committee in the Senate. AB-3222 is typical of bills introduced almost yearly by other areas of the State which are currently metered. Although both the City and County continue to strongly oppose metering. There is a realization that it may be politically advantageous to install meters. The amount of water conserved after installation, however, may not be much greater than the amount that has been achieved through voluntary programs. Installing meters may give Sacramento better standing when competing with metered areas for new or expanded water rights by helping to show that Sacramento is aware of and willing to do something about the water shortage problems faced by the State.

Reclaimed Water

Reclaimed wastewater from commercial, industrial, agricultural, and domestic uses is an important supply source for many areas of California where existing water supplies are scarce or expensive. In areas where groundwater and surface water have been plentiful, as in Sacramento County, reclamation of wastewater has not been aggressively pursued. Current trends toward conservation of natural resources, however, are causing a resurgence of interest in this very important source.

Accepted Uses of Reclaimed Water

Over the years, reuses of reclaimed wastewater have gained acceptance by public health organizations and the general public. Table 12 lists wastewater reuses and a short explanation of each. As described in Table 12, Irrigation Reuse, and Groundwater Replenishment, are addressed here as they could provide the most immediate benefits to Sacramento County. The other classifications of reuse are generally more complex and deserve more detail than is possible within the scope of this paper.

**TABLE 12
TYPES OF WASTEWATER REUSE**

<u>Type of Reuse</u>	<u>Description</u>	<u>Current Status</u>
Industrial in-plant recycling	Multiple recycling and/or treatment.	Extensively used, especially in Western US.
Municipal reuse	Process water for wastewater treatment municipal power plant cooling, fire protection and irrigation of public sites.	Widely utilized but generally only portion of potential. Numerous California applications.
Industrial reuse	Distribution of partially treated wastewaters from municipal plants for industrial process & cooling waters.	Rapidly growing acceptance. Several applications and many feasibility studies are under way in California.
Irrigation reuse	Reuse of partially treated wastewaters for agricultural & landscape irrigations. Degree of necessary treatment varies from primary to secondary plus filtration.	Extensively used, on seasonal basis, in CA. Application and degree of treatment established by State Health Department.
Groundwater replenishment	Incidental and intentional spreading and/or injection of treated wastewaters for	General use in California especially in water wastes are high in TDS.
General use recycling	Recycling and distribution of treated wastewaters for general uses except drinking and washing.	Isolated applications. None in CA, but may be feasible in water deficient regions.
Potable use recycling	Recycling and distribution of advanced treated water & partially demineralized wastewaters for all uses.	Non-intentional U.S. applications. Acceptance by public is gradually increasing but majority reject. Regional Sanitation District examining feasibility.

Groundwater Replenishment

Reuse practices for groundwater replenishment generally consist of spreading and/or injecting reclaimed wastewater on open land (open space, agricultural land, or parks) over groundwater tables to supplement natural replenishment. Along the coast this procedure is used to form subsurface hydraulic barriers to prevent salt water intrusion. Large scale utilization of reclaimed water for groundwater replenishment would require strict groundwater management practices to prevent adverse variations and impairment of groundwater quality. Such impairment could include significantly higher total dissolved solids, higher nitrates, increased hardness, and other effects upon quality parameters. Nitrates and other nutrients found in reclaimed water can be of beneficial use for irrigation/fertilizer and, in that application, can have a value of \$20 to \$40 per acre foot. These same nutrients, however, can have an adverse effect on domestic waters and must be kept separate from a groundwater basin used for domestic water supplies. Proper application and groundwater basin management are necessary for successful replenishment programs.

Irrigation

In 1981, approximately 184,000 AF of reclaimed water was used for agricultural irrigation in California. By 1986, this use had increased to approximately 300,000 AF a year. Within the County two smaller wastewater treatment facilities presently provide reclaimed water to local farmers to irrigate fodder crops. However, much of the approximately 170,000 AF/yr. of treated wastewater from the Regional Wastewater Plant presently flowing into the Sacramento River could be retained and used in the Sacramento area.

The Regional Plant is located on a 3,000 acre parcel adjacent to the Sacramento River, approximately four miles south of Sacramento Executive Airport and approximately two miles west of the Cosumnes River. Treatment plant facilities cover 1,000 acres, and the remaining 2,000 acres serve as a buffer for surrounding properties. The Plant provides secondary treatment for wastewater and consistently meets public health requirements. The effluent from the plant is discharged into the Sacramento River just south of the town of Freeport. Presently, the average daily dry weather flow through the plant is 150 million gallons per day. Regional Sanitation has recently received grant monies to investigate the feasibility of using treated waste water for wetland restoration or other uses.

Existing Reclaimed Water Projects

In 1987, the California Department of Health Services reported that wastewater was reclaimed at over 200 wastewater plants and applied to more than 360 locations. A 1981 SWRCB Office of Water Recycling study provided an in-depth report on 21 of these locations. The results of this study showed that a wide range of field crops and some orchard crops were irrigated with reclaimed water with average annual wastewater use ranging from 560 AF to 16,800 AF, depending on location.

Table 13 lists all sewage treatment facilities in Sacramento County. It can be seen that three plants currently utilize treated wastewater for reclamation projects. The Rancho Murieta system is a model for self-contained application of reclaimed wastewater in a densely populated area, the effluent of the treatment facility meets strict health requirements through tertiary treatment. Additionally, all drainage from the site must be contained during initial rains and diverted back into detention ponds. Reclaimed water from the Rio Cosumnes Correction Center is used to spray irrigate alfalfa. Fields of alfalfa are flood-irrigated with water from the Walnut Grove facility.

TABLE 13
Existing Wastewater Facilities, Sacramento County

<u>Name/Location</u>	<u>Type of Treatment</u>	<u>Average Daily Flow, MGD</u>	<u>Reclamation Use</u>
Regional Treatment Plant	Secondary	150.000	No
Rancho Murieta	Tertiary	0.325	Yes
Walnut Grove	Lagoon	-0.100	Yes
Boys Ranch	Lagoon	-0.100	No
Courtland	Lagoon	-0.100	No
Metro Airport	Lagoon	-0.100	No
Rio Cosumnes Correction	Lagoon	0.150	Yes
Galt	Aeration Lagoon	0.650	Yes
Isleton	Lagoon	0.250	No

Health Considerations

Health and regulatory considerations govern use of reclaimed water for agricultural irrigation. The EPA, USBR, DWR, Central Valley Regional Water Quality Control Board (CVRWQCB), California Department of Health Services, and Sacramento County Environmental Health and Sanitation are responsible for regulating reclaimed water use in Sacramento County. CVRWQCB establishes water quality standards, prescribes and enforces wastewater discharge requirements, and in consultation with the Department of Health Services, prescribes and enforces reclamation requirements. Each reclamation project must have a permit from the CVRWQCB conforming to the Department of Health Services criteria.

Where there is minimal health risk, based on degree of contact and water quality, the regulations are liberal, allowing the use of primary effluent for surface spray irrigation of fodder, fiber, and seed crops and surface irrigation of orchards and vineyards. If food crops are surface-irrigated in a manner that allows no contact between edible portion of the crop and the reclaimed water, a disinfected, secondary treated effluent is acceptable. Tertiary effluent that is pathogen free is required for spray irrigation of all crops that are eaten or sold raw. Additionally, intensely used landscape areas such as parks and golf courses require tertiary treatment.

Xeriscaping Ordinances

What are Xeriscapes?

Xeriscaping is derived from the Greek word, Xeros, meaning dry. This concept involves planning landscaping which uses less water than conventional landscaping. The main principles involved are:

- Reduction of turf areas (grass consumes a lot of water).
- Use of drought tolerant plants.
- Grouping plants with similar water requirements together so that no plants are over or under watered.
- Careful design and implementation of irrigation systems to prevent water waste through over watering and "gutter flooding."

Xeriscaping and Other Jurisdictions

More than 50 communities have ordinances that require conserving water by appropriate landscape design (Xeriscaping). Goleta has one of the strictest, limiting the turf in new single-family homes and demanding efficient irrigation systems. The City of Santa Monica has an ordinance which requires reduced water consumption in landscaping through xeriscaping. It applies to all new multifamily, commercial and industrial projects. Plans which must be prepared by a California licensed landscape architect or other qualified person must be submitted to the planning department for approval before landscaping can begin.

Draft Xeriscaping Ordinance in Sacramento

The County of Sacramento has passed a xeriscaping ordinance to help promote xeriscaping as an efficient, low maintenance answer to all landscaping situations. By requiring xeriscaping the County hopes to help reduce the demand on water resources while convincing homeowners that xeriscapes are better than acres of thirsty, labor intensive lawn.

Statewide Xeriscaping Ordinance

Assembly Bill 325, introduced into the 1989-90 Regular Session, would require every city, county, and city and county to adopt a xeriscaping ordinance for all new developments within the city, county, or city and county by January 1, 1991.

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SACRAMENTO COUNTY PLAN CONSERVATION ELEMENT

A. WATER RESOURCES BACKGROUND REPORT

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SACRAMENTO COUNTY GENERAL PLAN CONSERVATION ELEMENT

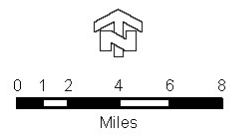
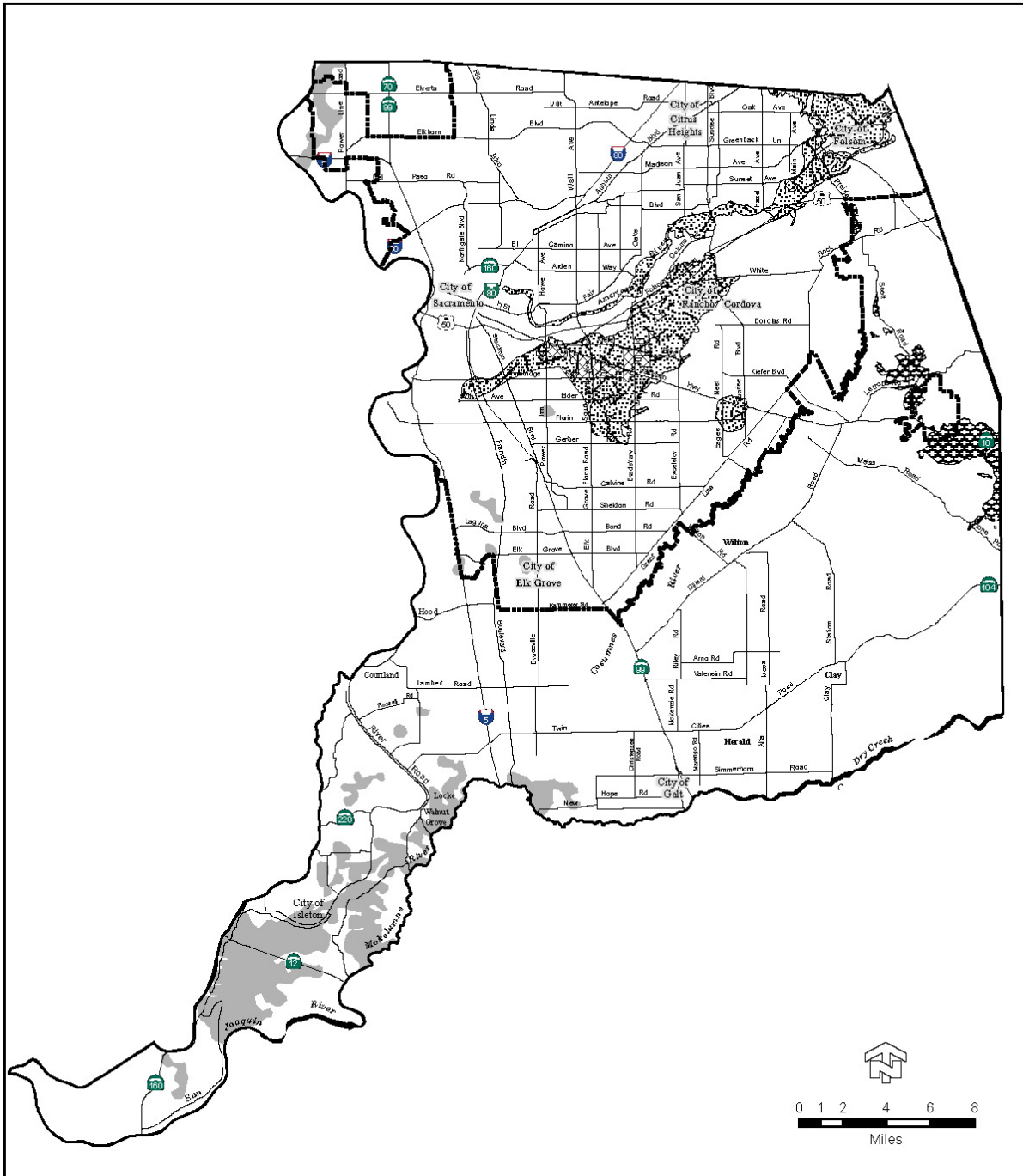
B. MINERAL RESOURCES BACKGROUND REPORT

INTRODUCTION

Mineral resources in Sacramento County include sand, gravel, clay, gold, silver, peat, topsoil, lignite, natural gas and petroleum (Figures 8 and 9). The principal resources which are in production are aggregate (sand and gravel) and natural gas. The natural gas production areas are located mostly in the Delta's Rio Vista Field, one of California's largest producing areas. There are three major and several smaller producers of sand and gravel in Sacramento County, the larger producers are located in the Fair Oaks and Perkins-Kiefer areas. They also produce asphaltic and Portland concrete cement along with free gold and silver recovered from the crushing process. Clay is surface mined in at least two location; topsoil from one location on the Cosumnes River. At present, peat and lignite deposits in the Delta are not commercially minded. Resource conservation issues associated with natural gas production and the lesser minerals are not significant. This plan focuses primarily on aggregate production.

This background report discusses four sections that pertain to the continued availability of construction aggregate in Sacramento County. Section A reviews past and present aggregate production rates, revised depletion estimates and updates the status of known reserves since publication of P.K. Morton's Aggregate Resource Report in 1986. Current production and reserve estimates were provided by local aggregate producers and are aggregated to protect the proprietary nature of the information. Section B evaluates Resource Sectors F and I for potential mining based on criteria used by the State Mining and Geology Board. Section C updates ongoing discussions on aggregate reserves on Mather Air Force Base and evaluation of the resource. Section D suggests alternative deposits located outside the Perkins-Kiefer area under exclusive ownership of local aggregate companies.

Figure 8



Aggregate Resource Area Information Provided By: The Department of Conservation, Division of Mines and Geology

DMG Open-File Report 99-09 Plates 3, 4 & 8
Mined Land Classification
Portland Cement Concrete-Grade
Aggregate and Kaolin Clay Resources

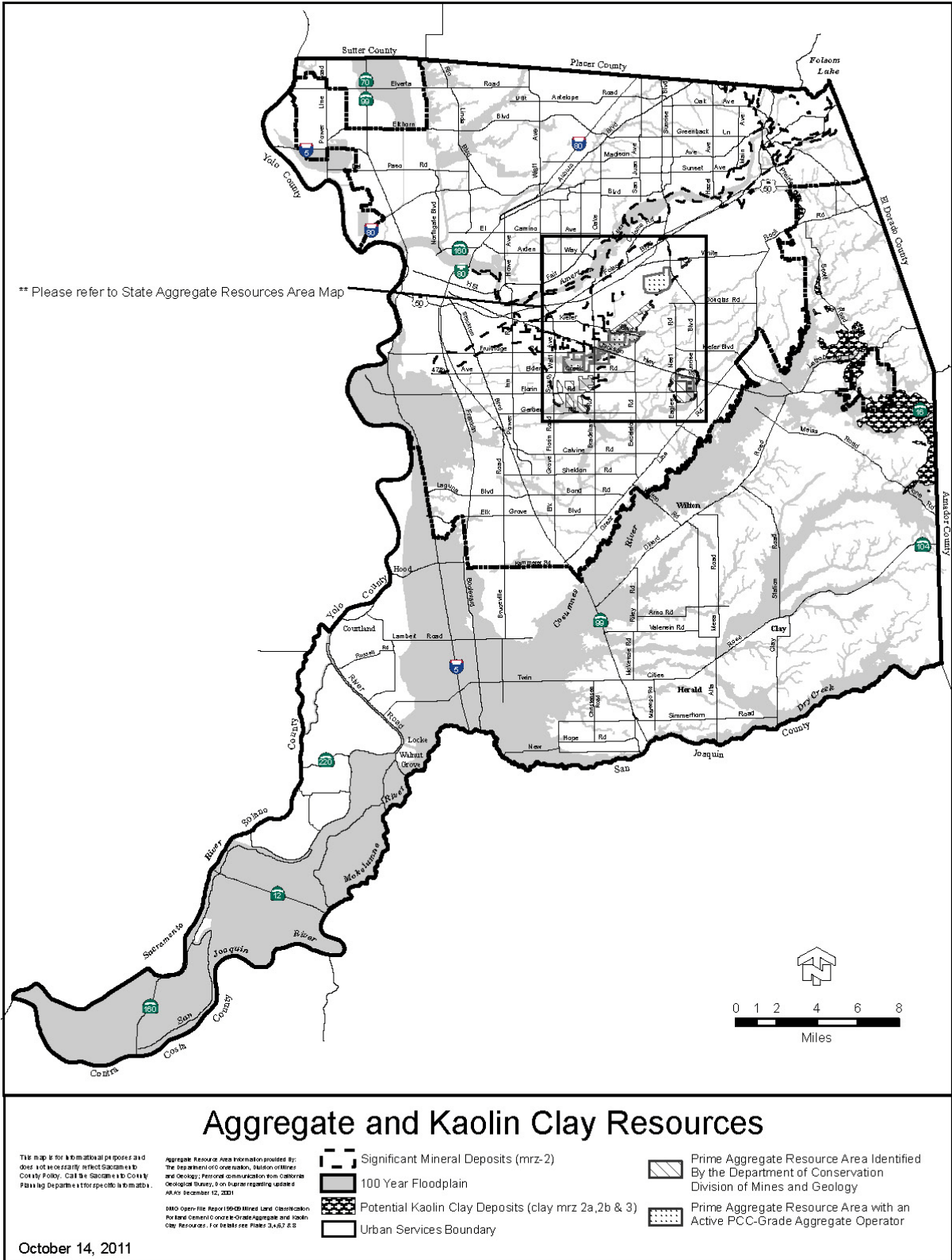
October 14, 2011

This map is for informational purposes and does not necessarily reflect Sacramento County Policy. Call the Sacramento County Planning Department for specific information.

Mineral Resources

- Aggregate Resource Areas Mined Out
- Known Gas Regions
- Urban Services Boundary (USB)
- Major Roads
- Potential Kaolin Clay Deposits (clay mrz 2a, 2b & 3)
- Significant Mineral Deposits (mrz-2)

Figure 9



PRODUCTION AND ESTIMATED RESERVES

Production Rates: Production rates for construction aggregates in the American River Resource Area from 1960 through 1980 averaged 5.4 million tons, according to a 1985 study conducted by the California Division of Mines and Geology. In 1986, the consulting firm of P.K. Morton determined the three year average production rate of major aggregate producers in the American River Resource Area at 6.7 million tons/year.

To determine current projection rates, Planning staff contacted major local aggregate producers in the Spring, 1990. Their combined 1989 production amounted to 9.8 million tons. This significantly higher production rate (46 percent increase since the mid 1980's) can be attributed to increased demographic growth rates and increased construction activity in the Greater Sacramento Area. Sacramento County grew by 246,500 residents and added 93,700 housing units during the 1980's. The rate of growth has particularly accelerated over the last three years.

Estimates Reserves: The P.K. Morton report in 1986 estimated total resources of 161 million tons and total permitted reserves of 47 million tons within the American River Resource Area. The 161 million ton estimate represents resources judged to be of commercial quality and was derived from sector by sector yield estimates prepared by the State DMG in its 1985 study. Total permitted reserves are those resources owned by local aggregate producers and approved for mining. Based on these estimates and a stable depletion rate of 6.7 million tons/year, or by 2009.

The Planning Department's 1990 survey of major local aggregate producers indicated that total resources of these companies in the American River Resource Area amounted to 170 million tons, and total permitted reserves were 47 million tons (coincidentally, the same figure Morton used in 1986). The 170 million ton figure does include potential resources not owned or under option to individual companies, including the area generally south of Elder Creek Road. The reason for the discrepancy in the two estimates of total resources over the intervening four years is not clear, although it is probably a reflection of different methods of estimation. Presumably, local aggregate producers have conducted more through tests to determine potential yields from resources under their control.

SECTOR ANALYSIS

A key issue relevant to the General Plan is whether the likely resources within the American River Resources Area which are south of Jackson Highway and (except for Sector F-6 generally not owned by aggregate companies are viable areas for future surface mining operation. Portions of this area are designated as Aggregate Resources on the prior General Plan land use map, but corresponding (SM) Surface Mining Combining zones are not widely in place. Encroachment of incompatible land uses may affect the practicability of mining these resources. A second concern was whether aggregate resource planning and zoning designations have been effective in protecting the resource.

To address this question, staff conducted a sector analysis for the resource area south of Jackson Highway. The Boundaries of the sectors, as shown in Figure 10, were determined by the State in its 1985 study, and generally exclude agricultural-residential parcels. The MRZ-2 designation stands for Mineral Resource Zones where there is a high likelihood of significant deposits of PCC-grade aggregates. The small sectors I-1 and I-4 were not evaluated. The analysis included the following tasks:

1. Identify additional residential and other construction activity between 1977 (when aggregate resource protection was first established) and 1989, using aerial prints from those years.
2. Identify land use entitlements, including rezones, use permits and parcel maps, granted in each sector between 1977 and 1989.
3. Determine the number of agricultural-residential home sites on the periphery of each sector.
4. Determine the acreage and distribution of protective zoning designations.

The results of the analysis are summarized in Table 14. Based on this information, review of ownership patterns and discussion with aggregate industry representatives, Sector F-6, F-12, and I-3 have the greatest potential for future surface mining. Much of Sector F-6 is under ownership of local aggregate producers, it has large acreage and potential yield, 71 percent is zoned for surface mining, and it has good access to existing processing plants. Sector F-12 has over 300 acres, the second highest potential yield, good access to existing processing plants, and an average parcel size of 15 acres, although only sector south of Elder Creek Road that P.K. Morton recommended as economical to mine. At 340 acres it is the second largest sector, although the yield is estimated to be only 78 percent of Sector F-12. This reflects the decline in thickness and quality of the resource moving southward. Average parcel size is 11 acres, and 63 percent of the sector is zoned industrial reserve. Its major drawback is relatively poor access to existing processing plants.

The remaining sectors are considerably smaller in size, potential yield, and average parcel size. Surrounding agricultural-residential uses and approved and pending projects further constrain several of them. Local aggregate producers have demonstrated little interest in the area, believing that potential yields do not warrant major investment at this time. Moreover, they are proximate to the Central Valley Traction Railroad, which is under consideration as a major transportation corridor for urban expansion.

MATHER AIR BASE

The State study for the Sacramento-Fairfield Production-Consumption Region did not quantify aggregate potential underlying Mather Air Force Base because of assumed long-term unavailability. Renewed interest in the aggregate potential underlying Mather has surfaced with the prospect of its closure in 1995. Recovery of the resource could greatly extend Sacramento County's resource base and defer depletion of a local source of aggregate by several years.

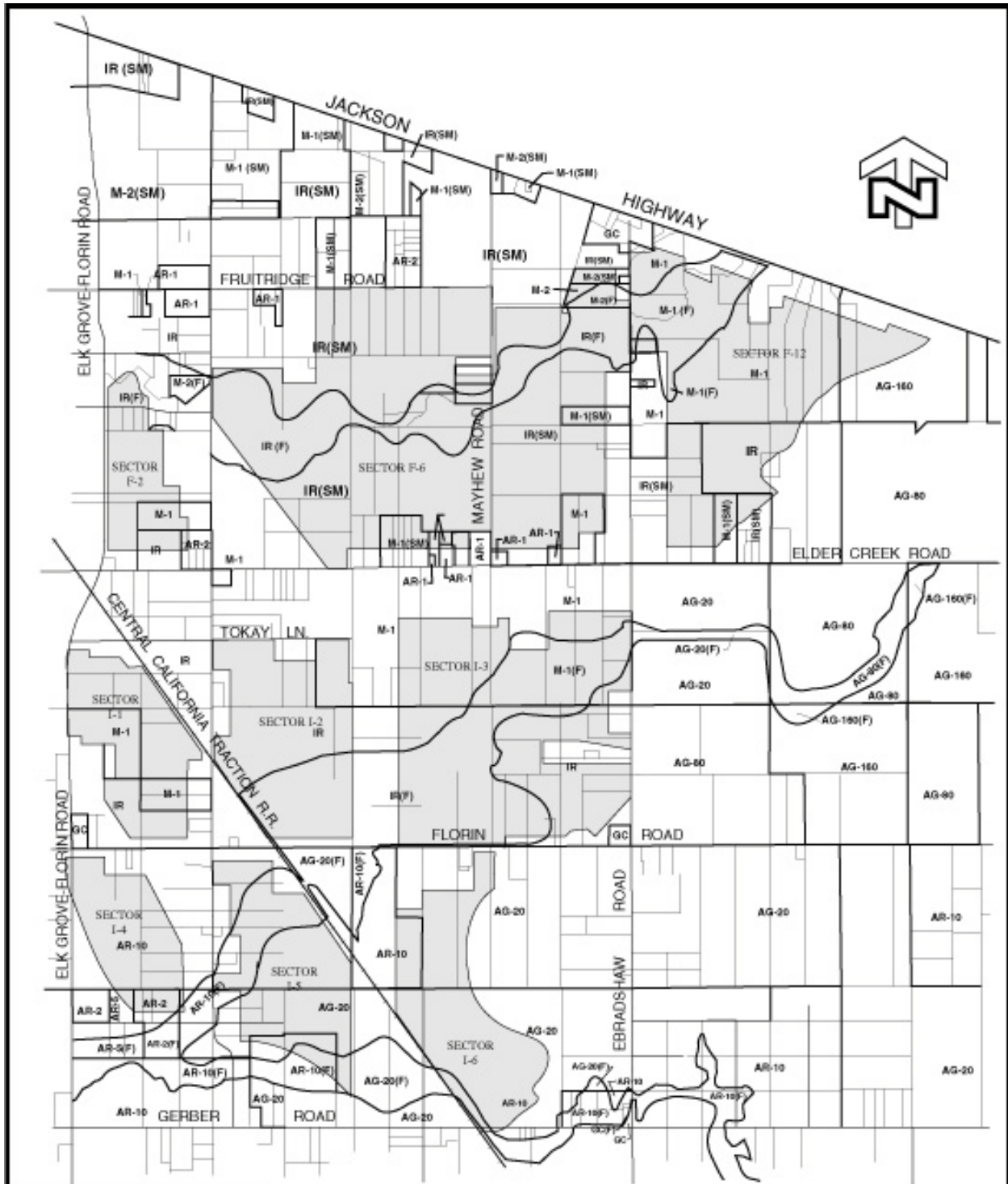


Figure 10

MRZ-2 Sectors

SOURCE: DMG-SR156



Prepared by the Sacramento County Planning and Community Development Department

TABLE 14
MRZ-2 SECTOR ANALYSIS
Sectors

	<u>F-2</u>	<u>F-6</u>	<u>F-12</u>	<u>I-2</u>	<u>I-3</u>	<u>I-5</u>	<u>I-6</u>
Acres*	73.4	681.331	314.7	203.0	339.6	161.3	161.9
Est. tons** (In Millions)	<u>3.8</u>	<u>37.6</u>	<u>15.6</u>	<u>7.3</u>	<u>12.2</u>	<u>5.8</u>	<u>5.8</u>
Total Zoning (acres)	M1,M1f &M2=44.3	M1,M1f,M1SM M2f-69.9	M1,M1f M1SM=211.8	M1=17.9	M1,M1f= 125.8		
Percent	<u>60%</u>	<u>10%</u>	<u>67%</u>	<u>9%</u>	<u>37%</u>	<u>None</u>	<u>None</u>
	IRf, IR=24.7 <u>34%</u>	IRSM,IR F=596.1 <u>88%</u>	IRSM,IR,AG, 160=102.9 <u>33%</u>	IR,IRF= 185.1 <u>91%</u>	IR,IRF= 213.8 <u>63%</u>	AG20,AG20 F=85.2 <u>53%</u>	AG20= 155.7 <u>96%</u>
	AR-2=4.4 <u>6%</u>	AR-1 AR-2=15.3 <u>2%</u>	<u>None</u>	<u>None</u>	<u>None</u>	A10,A10F =76.1 <u>47%</u>	A-10 =6.2 <u>4%</u>
% of Area In Floodplain:							
Zoned: MIF,M2F	<u>5%</u>	<u>3%</u>	<u>19%</u>	<u>None</u>	<u>18%</u>	<u>None</u>	<u>None</u>
Zoned: IR(F),Ag-20(F)	<u>26%</u>	<u>19%</u>	<u>None</u>	<u>33%</u>	<u>31%</u>	<u>6%</u>	<u>None</u>
Zoned: AR10(F)	<u>None</u>	<u>None</u>	<u>None</u>	<u>None</u>	<u>None</u>	<u>24%</u>	<u>None</u>
% of Area in M1 (SM) & IR(SM):							
	<u>None</u>	<u>71%</u>	<u>15%</u>	<u>None</u>	<u>None</u>	<u>None</u>	<u>None</u>
Potential tonnages lost due to M1, M2:							
(In millions)	<u>2.3</u>	<u>3.6</u>	<u>9.0</u>	<u>0.3</u>	<u>4.5</u>	<u>None</u>	<u>None</u>
# of Parcels per sector	<u>26</u>	<u>91</u>	<u>23</u>	<u>26</u>	<u>30</u>	<u>26</u>	<u>8</u>
Average parcel size	<u>3.0</u>	<u>7.5</u>	<u>15.0</u>	<u>8.0</u>	<u>11.0</u>	<u>6.0</u>	<u>20.0</u>

* Sector acreage may not approximate actual acreage due to scale and planimeter errors.

** Portland concrete cement grade aggregate classified by CDMG

The Board of Supervisors has formed the Sacramento Area Commission on Mather Conversion (SACOMC) to study and make recommendations concerning the productive reuse of Mather AFB. Committees of SACOMC have received information from the aggregated industry, U.S. Bureau of Land Management, and the California Division of Mines and Geology that indicate construction quality aggregates exist at Mather AFB. A subcommittee examining natural resources issues associated with Mather reuse alternatives has indicated in its report that the potential yield in the southeastern part of the base may approach 41,385 tons/acre and that as many as 1000 acres might potentially be mined (Figure 11). This would amount potentially to an additional 15 years of aggregate reserves. However, more detailed site specific geologic data is needed before the feasibility of mining as an interim reuse option can be determined. Additional sampling and testing will occur in the fall of 1990.

ALTERNATIVE SOURCES

Potential sources of quality aggregate, in addition to the deposits classified as MRZ-2 exist within Sacramento County. These potential sources lie within areas that are classified MRZ-3, and include igneous rocks of volcanic origin and metamorphic rocks. In addition, untested MRZ-3 alluvial deposits that may provide alternative sources of PCC-grade aggregate include: dredge tailings; channel deposits; and beds of the River Bank, Modesto and Laguna formation.

Alluvium classified MRZ-3 includes river-channel deposits and dredge tailings in the Sacramento-Folsom area. Alluvium is considered desirable as PCC-grade aggregate because of its texture and ease of mining. Future PCC-grade aggregate needs may require a transition from the mining of premium quality alluvial materials in MRZ-2 areas to the mining of an inferior grade alluvium that requires more extensive and costly processing.

Additional PCC-grade aggregate exists in the floodplain and channel of Cosumnes River. State Geologists indicated that the quality of aggregates are mined along with topsoil at Wilton Road, and aggregate producers have purchased at least one tract in the Cosumnes flood plain. Further evaluation of the resource needs be conducted.

Potential crushed rock aggregate massive consolidated rock formations may provide an alternative to depleted PCC-grade alluvial deposits east of Sacramento in Placer and El Dorado Counties. However, economic considerations indicate that crushed rock cannot compete with alluvium PCC-grade aggregate resources that are available in the Sacramento-Fairfield Production-Consumption Region.

Another out-of-county source is the Yuba River near Marysville, a 40 mile distance from central Sacramento. This area represents a vast aggregate resource of high quality aggregate. Despite the distance, it remains a realistic future alternative. The Yuba River dredge fields contain a reported 1.5 billion tons or more of potential aggregate resources. The Yuba River is a more viable source than Cache Creek with Yolo County's current mining ordinance that limits mining below the channels Thalweg line.

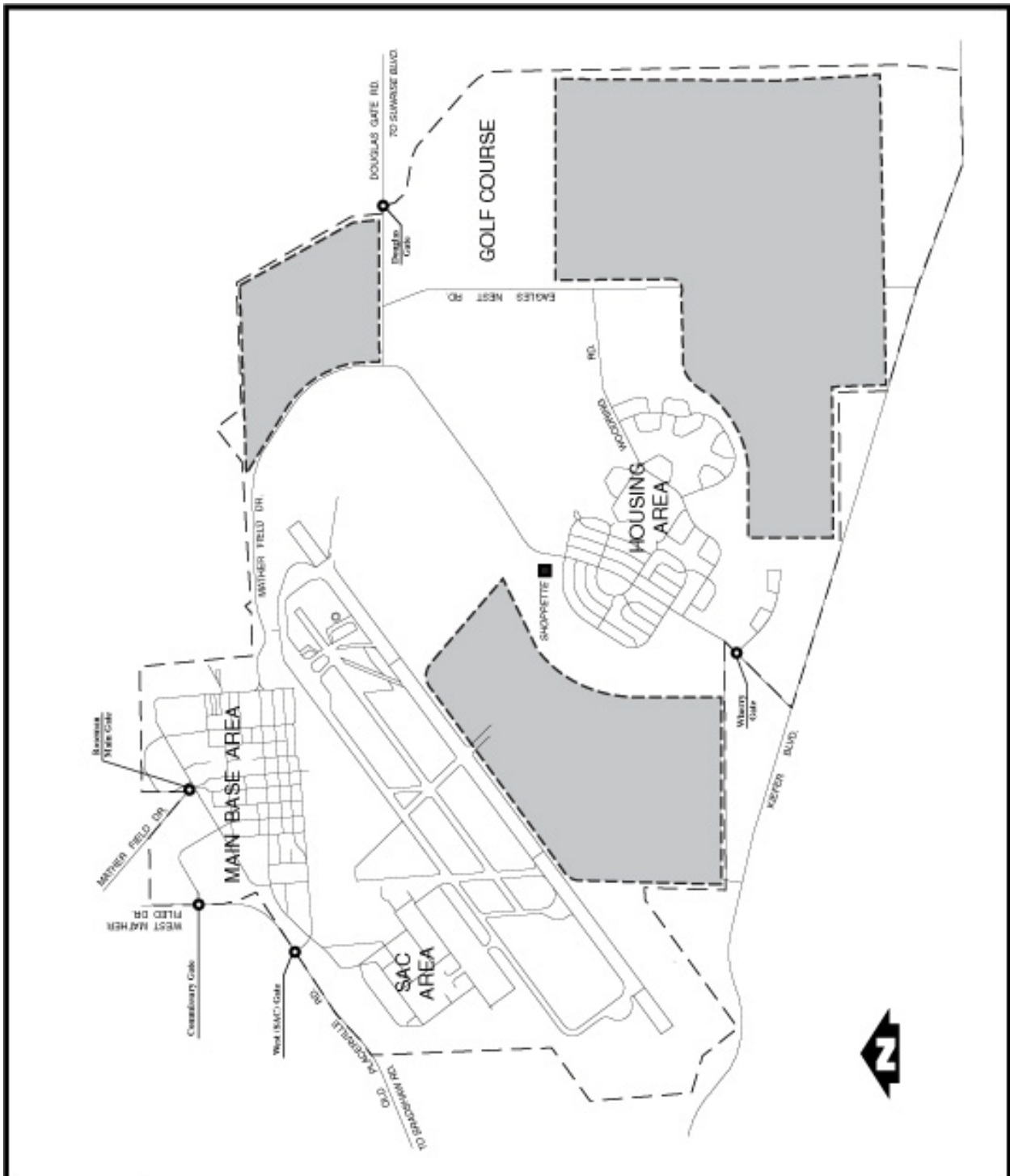


Figure 11
 Mather Air Force Base
Potential Aggregate Mining Areas

Prepared by the Sacramento County Planning and Community Development Department



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SACRAMENTO COUNTY GENERAL PLAN CONSERVATION ELEMENT

C. SOIL RESOURCES BACKGROUND REPORT

INTRODUCTION

Sacramento County's successful agricultural economy is, and will remain, dependent upon the productivity of the soil. Three soil regions make up the County. The dark soils of the Delta area are primarily fertile peat comprised of slow to decay organic matter. The geologically recent flood basin soils, rich with organic and mineral compounds, are alluvium formed by historic and ancient flood depositing from swollen rivers overflowing into adjacent floodplains. Lastly, the bench soils, elevated above the spreading basins are river terraces and due to erosion and leaching lack the high percentage of organic material found in the Delta and flood basin soils.

SOIL CLASSIFICATION

To classify soils within Sacramento County two separate complimentary systems, devised by the U.S. Soil Conservation Service (SCS), can be used for ranking capability and suitability for crop use. Agricultural capability, an eight class series, defines soils based on physical and chemical characteristics. The soils suitability class reflects soil potential for suitable crops and prioritizes soils as to level of importance to crop production.

As defined by SCS, classes I and II are considered to be prime soil because the high level of fertility imposes few limitations on agricultural production, and almost all crops can be grown successfully on these soils. Limited agricultural soils are grouped into classes III and IV either because few crops can be grown on these soils, special conservation measures are required, or both conditions exist. Classes V, VI, and VII include soils that are suited primarily for rangeland, woodland, or wildlife habitat. Finally, soils and landforms that are unsuited for agricultural use are placed in Class VIII.

The California State Conservation Department, in conjunction with the SCS, has also adopted categorical definitions of suitably important farmland for land use inventory purposes. These definitions recognized the land's suitability for agricultural production, rather than solely reflecting the physical and chemical characteristics of the soil. To this end, the Important Farmland Map Series was developed, based on SCS soil surveys. It includes seven categories: prime (of national significance), statewide importance, unique, local importance, grazing, urban and built-up land, and other. The last two classes will not be addressed in this document. Minimum map unit for all these categories is ten acres.

Prime farmland is land which has the best combination of physical and chemical characteristics for crop production, as well as high soil quality, appropriate growing season, and adequate moisture supply to sustained high crop yields. Water management including reserves, transport, and delivery are assumed. Prime farmland must have been used for the production of irrigated crops within the last three years. Water source for the area must be available to produce crops eight out of ten years.

Farmland of statewide importance is land other than prime farmland which has a good combination of physical and chemical characteristics for crop production. The definition is similar to prime farmland except crop production characteristics are considered good, not the best. It must have been used for production in the last three years and have a developed irrigation supply available eight out of ten years.

Unique farmland does not meet the definition for prime or statewide importance, but is being used for specific high economic value crops. It has a special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of specific crops. Such crops include, olives, grapes, walnuts, and pistachios.

Farmland of local importance is a category representing agricultural lands important at the local level. Farmland of local importance represents the county level of interest and commonly includes dry land agriculture or soils that if cultivated and irrigated would be prime or state-wide important farmland. Representatives from Sacramento County's farming community under the auspices of the State Conservation Department have developed a formal definition for land of local importance: "Lands which do not qualify as prime, statewide, or unique designation but are currently irrigated crops or pasture or nonirrigated crops; lands that would be prime or statewide designation and have been improved for irrigation but are now idle; and lands which currently support confined livestock, poultry operation or aquaculture."

The acreage breakdown as defined by the suitability classification for Sacramento County as of 1989 is 124,301 acres (19.6%) of the total county area of 635,825 acres are classed as prime; 80,398 (12.6%) are classed as statewide; and 12,130 (1.9%) are classed as unique. Due to recent changes in the definition, locally important farmland acreage is being recalculated.

RESOURCE CONSERVATION DISTRICTS

The continued viability of agricultural crop production is related directly to the preservation and conservation of the County's highly productive soils. To this end, farm community members have entered into agreements with the SCS to create three Resource Conservation Districts (RCD) in the southern portion of the County -- Florin, Lower Cosumnes, and Sloughhouse RCDs. In so doing district members are provided technical and financial assistance from the SCS. Technical assistance regarding such topics as crop rotation practices, irrigation technologies, wind row plantings, and soil enhancement are provided through individual contact with SCS staff scientists and conservationists. Additional education and information outreach

programs include media contacts, workshops, seminars, and tours of farms practicing soil and water conservation methods.

The Florin Road Conservation District is 91,480 acres and encompasses the Laguna and Morrison Creek drainages from the Sacramento River east to the County line. Farming is principally irrigated pasture, sudan grass and clover seeds, dry farmed and irrigated grain, hay pears, and row crops. Practically all irrigation water is trapped from the depleting groundwater table underlying the area.

The Sloughhouse RCD totals 197,440 acres of farm and rangeland lying on both sides of the Cosumnes River up stream from Highway 99. The District was formed to assist farmers and ranchers to effectively solve resource conservation problems.

The Lower Cosumnes RCD encompasses 98,000 acres and is situated in the Delta, extending up the Sacramento River to the lower Cosumnes River. The RCD was formed to assist landowners with the use and conservation of soil, water, and other related resources. Active participation by all members of the farm community within each district is encouraged by SCS, but is not mandatory. Some farm community members with these districts prefer to remain outside the RCD's jurisdiction and thus do not benefit from the technical and financial benefits related to soil conservation methods provided by SCS.

SOIL PRODUCTIVITY ISSUES

Sacramento County is fortunate in that the long-term agricultural productivity of its soils is generally not at issue as elsewhere in the Central Valley. Salt buildup in soils, perched water tables, toxic mineral concentrations, and wind erosion are, with two exceptions discussed below, not a problem.

Similarly, whereas overgrazing on fragile soils has significantly increased soil erodibility in some counties, grazing in Sacramento County causes only nominal damage to soil productivity. Grazing lands are concentrated in upland areas adjacent to flood plains and in the lowest reaches of the Sierra foothills. Limited oak and riparian woodland exist in some locations but, due in part to grazing, regeneration of woodland is slow to occur. Native California bunch grasses have long ago been replaced by grasses of Mediterranean origin. These introduced species are shallow rooted and develop a matting which reduces the soil moisture holding capacity and inhibits sprouting of native species. However, the grasses do exist in adequate amounts to retard erosion. Soils in these areas are usually not considered highly erodible due to a well defined matrix of organic and mineral compounds and the lack of topographic relief. Furthermore, most cattlemen in the area practice reasonably wise grazing and soil conservation methods.

Sacramento County's most significant soil productivity issue concerns the rich and fertile Delta peat soils, a sizeable portion of which are being lost to oxidation. These soils are undergoing subsidence that will potentially reduce or eliminate agriculture on some areas if conservation and sound soil management are not practiced. The Delta peat soils are made up of organic soils

ranging from unaltered plant materials to accumulation of highly altered structureless organics of jellylike consistency. Almost continuous submergence of peat prevents or greatly retards natural decomposition through oxidation. To grow crops on Delta peat soil, levees were erected creating diked off islands. This prevented continual submergence and allowed the peat soils to dry for cultivation. Drying saturated peat can reduce its volume by 50 percent causing land, soils, and surrounding levees to subside. The largest contributors to subsidence are oxidation of peat soils (exposing peat to the drying factors associated with air), shrinkage, and subsequent wind erosion.

The elimination of fertile soil through oxidation is not the immediate problem, although it is a long-term concern. Delta soils are 10 to 20 feet thick, and at an inch loss per year will still be productive for many decades. Rather, oxidation induced subsidence is the controlling factor for the future of agricultural production in the Delta because it has the potential to greatly reduce the ability of levees to withstand inundation. Subsidence of levees and crop covered islands is occurring, though levees lower at a slower rate due primarily to a slow oxidation process from reduced tillage and irrigation. The ability of levees to withstand major storm events is thus continually being reduced. Low bayward islands will lead to increased wave action on adjoining levees and eventual inundation may lead to succession of more inland Delta islands being inundated. Raising and strengthening levees to provide additional protection is exceedingly costly and may not be feasible. At some point, it will not be justifiable to repair levee breaks and pump islands dry.

Soil conservation efforts sensitive to the process of oxidation would lessen the rate at which Delta islands are subsiding. Ceasing all tillage of bayward islands, specifically Sherman Island, is advisable to moderate the subsidence process and maintain viable levees on this key island, thereby helping to protect the soil and agricultural productivity of Delta islands to the east.

A less significant, terms of acreage effected, but no less severe problem arising from subsidence of bayward Delta islands is salt water intrusion of subsurface fresh water. River water runoff during years of comparatively normal precipitation has been sufficient to retard salt water from intruding into the fresh water table. However, the rate of salt water intrusion of west Delta islands increases during years of below normal precipitation, causing damage to crops irrigated with subsurface water contaminated with salt water. Efforts to develop salt tolerant crops and a reduction in the subsidence rate might enable farming to continue on west Delta islands for a limited time. However, continuing crop production accelerates peat oxidation and potentially lessens irrigation water quality from salt water intrusion of subsurface fresh water sources.

URBAN CONVERSION OF CROPLAND

In recent years the County's productive cropland has been increasingly converted to urban uses. Between 1980 and 1989 total acreage in production fell from 374,857 acres to 252,555 acres, a decline of 122,302 acres. The 1989 figure was derived by combining harvested acreage of field crops (218,580 acres), fruit and nut crops (11,780), seed crops (10,310), vegetable crops (10,770), and nursery production (1,115). In 1980, of the 630,400 acres comprising Sacramento County, 59.5 percent were in agricultural production. In 1989 this figure has dropped to only 40 percent. Gross value of production has not fallen as significantly, in part due to inflationary factors and demand for Central Valley grain, such as rice. In 1980 gross value was figured at \$221,189,400. In 1989 that had fallen marginally to \$216,760,000. As conversion of productive farmland continues, it permanently commits agricultural land to a nonproductive category, from the agricultural perspective. At the same time, there has been a decline in the area of land most suitable for agriculture.

To curb this decline and preserve soil productivity, and thus greater crop potential, programs to maintain prime, statewide and locally significant farmlands need to be instigated. One such option would be to establish policy which seeks to protect and maintain suitable agricultural lands within the County. Mitigation procedures for development of prime, statewide, or locally significant soils would necessitate off-site mitigation procedures. The mechanism for implementing this policy could be purchase of transfer of development rights from nearby farmlands as CEQA required mitigation for loss of productive agricultural land. Purchase of development rights would simply involve an acre for acre purchase of development rights in an area designated for preservation.

Transfer of development rights involves a more complicated ordinance requiring property owners in a designated development district to acquire a specified amount of development rights from land owners in a designated preservation area before they can develop in accordance with an adopted plan. Such a program would allow more flexibility and predictability for developers and probably would cost less.

Measures to preserve and maintain Sacramento County's most productive soils need to be implemented. The SCS assists agricultural producers in maintaining the viability of soil by offering expertise and financial assistance in soil conservation methods. The prime agricultural lands of the Delta are in danger of inundation if subsidence continues. Bayward islands, such as Sherman, should reduce or cease agricultural production to lessen subsidence and the potential for successive inundation of up Delta islands. Lost acreage of agricultural lands through conversion to urban uses is permanently withdrawing prime and statewide significant soils from agricultural production. Consideration of the inherent value of such land should be closely examined when deciding to develop or not develop on fertile soils.

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**SACRAMENTO COUNTY GENERAL PLAN
CONSERVATION ELEMENT**

**D. VEGETATION AND WILDLIFE RESOURCES
BACKGROUND REPORT**

1. INTRODUCTION

The County of Sacramento is fortunate to have several locations where vestiges of the once vast and diverse Central Valley natural habitat areas still exist. Habitat areas include riparian zones, riverine habitats, wetlands, woodlands, and grasslands.

Remaining marsh and riparian areas in the County include backwater basins and riparian woodlands along the Sacramento, American, and Cosumnes Rivers and other smaller waterways, and in the Delta. These biologically dynamic areas host thousands of waterfowl migrating along the Central Valley leg of the Pacific Flyway. In addition, numerous other migratory and resident species, some of which are listed as threatened or endangered, inhabit the County's natural areas. Species include majestic colony birds such as the American egret and great blue heron, the opportunistic coyote, the industrious beaver, deer, and elusive grey fox and bobcat.

The wetland and riparian areas are regarded as the County's most important resource. Such habitat becomes all the more significant when viewed against the acreage lost since the time of European settlement. Approximately 95 percent of the Central Valley's wetlands have disappeared in the last 100 years, reducing habitat for millions of migratory waterfowl. Riparian habitat has suffered a similar fate. In the Sacramento River Valley only 25,000 of the estimated 500,000 acres of the riparian habitat existing in 1850 exists today.

The aquatic environment of the County supports tens of thousands of anadromous fish and rears a comparable amount of resident species. Anadromous fish include salmon, bass, shad, and sturgeon. Resident fish include trout, catfish, sunfish, and bullhead. With the development of urban areas and water projects, fisheries have declined. This loss has been generated by habitat destruction, water diversion, and temperature increases.

Extending out from the riparian zone are the distinctive upland habitats of the Central Valley, scattered with oak, blanketed with grazinglands, and dotted with vernal pools. Native oaks, signature trees of the Central Valley have declined in population over the years to accommodate agriculture and development. Concentrated efforts will need to be undertaken if we are to preserve the isolated groves and diminishing woodlands. Native grasslands have virtually disappeared due to grazing and development. The once prolific and well adapted bunchgrass has been displaced by invasive weeds from the Mediterranean region. The vernal pools which once

dotted vast areas of the Central Valley landscape, are found only in concentrations in the southern section of the County. The pools sustain flora and fauna adapted to the ephemeral nature of these small yet vibrant habitats.

The County's natural vegetation and wildlife resources are important to the quality of life Sacramento area residents have come to enjoy and are vital to the maintenance of healthy interwoven ecosystems. Detailed knowledge of the resource holdings, as well as thoughtful protection strategies, will ensure that future generations will be able to enjoy, explore, and appreciate the Central Valley's unique habitat areas.

**SACRAMENTO COUNTY GENERAL PLAN
CONSERVATION ELEMENT**

**D. VEGETATION AND WILDLIFE RESOURCES
BACKGROUND REPORT**

2. WILDLIFE OF SPECIAL INTEREST

Threatened and Endangered Animals. The Fish and Game Department maintains a list of threatened and endangered species in California. State and federal laws protect the habitat of these species through the environmental review process. Several additional species are of special concern or candidates to make the protected list. The table summarizes Sacramento's special status animal species. The Department's classification scheme is defined as follows:

A species is a candidate when the Fish and Game Commission has formally noticed it as being under review by the Department to determine whether listing as threatened or endangered is warranted, or when it is the subject of a proposed rulemaking by the Commission to list as threatened or endangered.

A species is threatened when although not presently threatened with extinction, it is likely to become an endangered species in the foreseeable future in the absence of special protection and management efforts.

A species is endangered when it is in serious danger of becoming extinct throughout all, or a significant portion of, its range due to one or more causes, including loss of habitat, change of habitat, overexploitation, predation, competition or disease.

Waterfowl. Sacramento County is an important part of the Central Valley leg of the Pacific Flyway, where millions of waterfowl winter during their annual migration. The Beach/Stone Lakes area is the most important waterfowl area in the County, with 10,000 to 15,000 waterfowl using North Stone Lake alone in the early 1970's. Tundra swans, snow geese, white-fronted geese, Canada geese, mallards, pintail, blue-winged teal, cinnamon teal, green-winged teal, wood ducks, scaup, and ruddy ducks are found in substantial numbers on the water surfaces and surrounding vegetation.

Among the many non-game waterfowl species in Sacramento, the greater sandhill crane deserves special attention. Tall, stately birds with interesting behavior and ringing calls, they are one of California's more ancient avian inhabitants. The population in California is down to about 3,000 birds wintering in the Central Valley. Cranes are among the least tolerant of birds to human interference.

The great blue heron and snowy egret are other striking water birds frequently observed foraging in fields and wetland areas. Several rookeries exist in Sacramento, which require minimal disturbance by human activity due to the birds' sensitivity.

Upland Game Birds. The ring-necked pheasant is a handsome game bird found throughout the County, but more commonly in interspersed agriculture, grassland, and riparian habitats. The lower Cosumnes River typifies this habitat mix and supports densities of 10 to 50 pheasants per 100 acres. Hunting opportunities are primarily limited to hunting clubs licensed by the Department of Fish and Game and to private hunting. There is a shortage of clubs throughout the state and especially in Sacramento.

Mourning doves and California quail are also common throughout Sacramento. A population of between 50 to 80 wild turkeys inhabits the upper American River and Aerojet lands. A second smaller population can be found in the vicinity of Rancho Seco.

Raptors. Sacramento and other foothill counties serve as major California breeding and wintering areas for numerous raptor species. They are found throughout Sacramento County, but the oak woodland and associated grasslands of the east County are the prime habitat area. Bald eagles nest east of Folsom Lake just outside the County and are an irregular winter visitor. Golden eagles, red-tailed hawks, red-shouldered hawks, and Cooper's hawk are the dominant foothill raptors. The northern harrier, Cooper's hawk, Swainson's hawk, and burrowing owl are species of special concern to the state and are comparatively common in Sacramento County. (See Table 15)

Deer. Mule deer reside in Sacramento County, but not in particularly large numbers. They are most concentrated on the oak woodlands of the east county. Densities may reach 20 per square mile in the vicinity of the Cosumnes and Deer Creek. Small resident populations of deer also exist in the lower Cosumnes and along the American River. There are no public hunting opportunities for deer in Sacramento County.

Fur Bearing Animals. Beaver, mink, river otter, raccoon, opossum, bobcat, badger, long-tail weasel, ringtail, grey fox and coyote occur in varying numbers along the riparian woodlands of Sacramento. Beaver dams periodically cause problems along waterways and have to be removed. Some beavers exist in the lower Delta, particularly the dead-end sloughs, but they are more common in San Joaquin County.

PLANTS OF SPECIAL CONCERN

Rare and Endangered Plants. The California Native Plant Society's inventory of rare and endangered vascular plants in California lists 10 species that have been found in Sacramento County which are characterized as rare or endangered according to either federal, state or California Native Plant Society definitions (Table 16). Six species are vernal pool species. California Hibiscus is found along the Sacramento River and is severely threatened by

channelization of the river. The Antioch Dunes Evening Primrose is extremely rare and known from only one site in Sacramento County.

TABLE 15
SPECIAL-STATUS WILDLIFE SPECIES THAT ARE
KNOWN OR HAVE POTENTIAL TO OCCUR IN SACRAMENTO COUNTY (a)

(b)

Species	Legal Status (Federal/State)	Habitats	Occurrence
Valley elderberry longhorn beetle (<i>Desmocerus californicus dimorphus</i>)	T/C	Elderberry shrubs in riparian habitats	At least 7 reported sites in Sacramento.
Giant garter snake	C/T	Marshlands, ditches, and adjacent uplands	At least 20 reported sites in Sacramento
American white pelican	-/SSC	Feeds in shallow waters	Migrants occur in spring & early summer
Double-crested cormorant	-/SSC	Nests in trees; forages in water bodies	Year-round resident Nesting sites reported at North Stone Lake.
Bald eagle	E/E	Feeds in winter at lakes	An irregular winter visitor. Nesting sites at Folsom Lake just outside County.
Northern harrier	-/SSC	Dense, tall grasslands or seasonal marsh for nesting; grasslands & marsh for feeding	Beach Lake/Stone Lake & treatment plant breeding areas.
Cooper's hawk	-/SSC	Riparian and oak woodland	Regular migrant and winter resident; breeds in oak woodland of east County and American River.
Swainson's hawk	C/T	Large trees for nesting; alfalfa or hay fields for feeding	Common throughout the County
Peregrine falcon	E/E	Marsh, grassland	Possible irregular migrant.

**TABLE 15 (Cont.)
SPECIAL-STATUS WILDLIFE SPECIES THAT ARE
KNOWN OR HAVE POTENTIAL TO OCCUR IN SACRAMENTO COUNTY**

(b)

<u>Species</u>	<u>Legal Status (Federal/State)</u>	<u>Habitats</u>	<u>Occurrence</u>
Prairie falcon	-/SSC	Grassland	Possible irregular migrant and wintering bird.
California gull	-/SSC	Water bodies	Nonbreeding resident
California yellow-billed cuckoo	C/T	Extensive riparian woodland	No records.
Burrowing owl	-/SSC	Natural or artificial burrows for nesting; grasslands for foraging	Nests at several locations in Sacramento County.
Short-eared owl	-/SSC	Dense grasslands and marshlands	Probable irregular winter visitor.
Willow flycatcher	-/SSC	Willow scrub	Probable migrant.
Purple martin	-/SSC	Riparian woodland	Reported nesting sites found in or near downtown Sacramento
Tricolored blackbird	-/SSC	Emergent wetlands for breeding; marsh and grasslands for feeding	At least 24 reported nesting sites in Sacramento.
Bank swallow	-/T	Riparian river bluffs	Reported nesting site on Cosumnes River near Rancho Murieta.
Longeared Owl	-/SSC	Riparian woodland	Known to nest in Sacramento County.
Black Shouldered Kite	-/P	Grasslands	Roost in Sacramento County.

Notes: (a) Adapted from draft Urban Forest Master Plan, Jones & Stokes Associates.

(b) Legal status abbreviations are: E = Endangered, T = Threatened, C = Candidate for listing, and SSC = Species of special concern. P = Protected

**TABLE 16
RARE AND ENDANGERED PLANT SPECIES IN SACRAMENTO COUNTY**

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>		<u>CNPS</u>	<u>Habitat</u>
		<u>Federal</u>	<u>State</u>		
Aster chilensis var lentus	Suisun marsh aster	C	--	RE	Brackish marsh
Downingea humilis	Dwarf downingea	--	--	RE	Vernal pools
Gratiola heterosepala	Boggs lake hedgehyssop	C	E	RE	Vernal pools
Hibiscus californicus	California hibiscus	C	--	RE	Freshwater marsh
Lathyrus jepsonii var jepsonii	Delta tule pea	C	--	RE	Brackish marsh
Legenere limosa	Green's legenere	C	R	RE	Vernal pools
Lilaeopsis masonii	Mason's liaeopsis	--	E	RE	Brackish marsh
Orcuttia viscida	Sacramento orcutt grass	E	E	RE	Vernal pools
Orcuttia tenuis	Slender orcutt grass	E	E	RE	Vernal pools
Oenothera deltoides howellii	Antioch dunes evening primrose	E	E	RE	Inland dunes
Plagiobothrys hystriculus	Bearded popcorn flower	C	--	RE	Vernal pools

C = Candidate

R = Rare

E = Endangered

CNPS = California Native Plant Society

Native Wildflowers and Bunch Grass. Native grassland species are of interest primarily because they have been so widely displaced by invasive weeds from the Mediterranean region. Among the common species are perennial bunch grasses such as purple stifa and nodding stifa, pine bluegrass, California melka, small flowered melka squirreltail and wildrye. Though none of these species are rare or endangered, grasslands dominated by these species are rare and considered a significant biological resource.

Extensive farming and grazing in Sacramento have taken their toll on native grasslands. The only reported purple needlegrass community of any significance is a little over 1 acre in size at the South Florin multicultural park site. There, average purple needlegrass cover ranged from 19 to 25%, about the same as for Jepson Prairie grasslands in Yolo County.

Numerous species of native grassland wildflowers exist in Sacramento County. Except for vernal pool areas, staff is not aware of any wildflower assemblages that are noted for their showy displays in Sacramento County. The foothill woodlands along Scott and Latrobe Road are identified by the Open Space Task Force as having spring wildflower displays. The Audubon Society also notes the American River Bluffs above Lake Natoma as having some of the most varied and dense floral displays in Sacramento County.

Oaks. If any one plant species could be said to symbolize the Sacramento Valley, it would be the majestic spreading valley oak. No other tree is so characteristic of the fertile valley and no other approaches it in its unexampled parklike affect on the Valley floor. Favoring deep fertile soils and shallow watersheds, valley oaks are concentrated in riverbottoms of South Sacramento County. The largest stands grow near Elk Grove, Galt, and along natural drainages. Their numbers decrease as one moves eastward from lowland to drier, less fertile foothills.

The blue oak is most common in the dry rocky foothill areas, forming large stands in the Cosumnes-Deer Creek drainage. It is also frequent in the bluffs above the American River, east of Watt Avenue and in Carmichael, Orangevale and Fair Oaks. The majority of interior live oaks, on the other hand, grow along creekways, especially in the northeast County.

VEGETATION TYPES

Detailed evaluations of vegetative cover types include numerous specific classifications. The detailed natural area inventory maps described below will incorporate as many specific vegetative cover types as possible. Discussion here focuses on the major vegetation groupings in Sacramento.

Riparian. Riparian woodlands are widely regarded as the most important wildlife habitat in California. There are the most structurally diverse of all habitats, with trees, shrubs, vines, brush, forbs and emergent vegetation combining to provide a diverse range of microhabitats, nesting sites, cover, and food for a greater variety of species than any other wildlife habitat in the state. This in turn enhances the wildlife value of adjacent habitat types, including agricultural lands.

Riparian vegetation also provides shade for aquatic habitats, and helps prevent streambank erosion.

Riparian habitat becomes all the more significant when viewed against the acreage which has been lost over the years. In the Sacramento River Valley only 25,000 acres of an estimated 500,000 acres existing in 1850 remain today. Although the pace of conversion has slowed, hundreds of acres continue to be converted in California every year.

Willow scrub or riparian shrub brush is a successional stage in woodland riparian development characterized by thickets of shrub-form willows, blackberry, wildrose, alder and occasional trees. It varies in composition from one locality to another, reflecting differences in topography, disturbance history, and surrounding vegetation.

Dredger tailings where ponds have formed between the tailing piles support a specialized cottonwood dominated riparian environment of comparatively limited diversity frequented occasionally by duck, deer and other species.

Freshwater Marsh. The second most diverse of wildlife habitats in terms of species supported, freshwater marshes provide unique cover, nesting sites, and feeding habitat for wildlife. Ducks, geese and many waterbirds depend on them for feeding, breeding and nesting. Freshwater marshes in the Central Valley make it a primary wintering area on the Pacific Flyway. Other values include high biological productivity, the continuing source of extensive peat deposits in the Delta, and contributing to water purification by metabolizing excess nutrients and acting as a sediment trap.

In the Delta, freshwater tidal marshes were the dominant habitat prior to reclamation. Today, they are found in small patches and narrow bands throughout the Delta on sand bars, dredge spoil islands, natural meander deposits, around the margins of larger islands and along many miles of waterways at the base of levees where silt accumulates. Tule islands and shrubby marshes are among the marsh types found in the Delta. Depth of water is a key determinant of emergent cover and species association. Typical marshes include a mix of open water and associations of tule and reed grass.

Non-tidal freshwater marshes are usually associated with lake or patches of open water, or streams which have relatively calm patterns of flow and deposition. Usually the underlying soil is high in clay content or underlain by hardpan, and water does not readily percolate downward. Cattails, tules, rushes, sedges, barnyard grass and nutgrass are common, with willow, dogwood, button brush and other shrubs established on high margins of the marsh.

Seasonal Marshes. These marshes are characterized primarily by annual vegetation adapted to a yearly cycle of winter flooding and summer drawdown. Relatively impervious soils are essential to seasonal marshes. They are also important as a feeding and breeding area for wintering and resident waterfowl, water birds and shorebirds. Pheasant also may occur in high numbers.

Typical species include watergrass, smart weed, cocklebur, yellow nutsedge, curly dock, and drought-stressed stands of swamp timothy.

Vernal Pools. Vernal pools are a type of seasonal wetland supporting annual grasses and forbs that germinate, grow, and mature during later winter and early spring. They are unique, complex, and highly specialized ecosystems which have evolved within shallow ephemeral pools located on soils containing near surface hardpan layers. The characteristics and species composition of vernal pools are determined by the underlying geologic formation and associated surface soils. Thus, vernal pools associated with alluvial floodplains low terrace and high terrace land forms each have distinct attributes. Vernal pools sustain a specially adapted flora of approximately 200 species, including some of the state's rarest and most unusual plants. They also provide seasonal wetland habitats for vertebrate and invertebrate fauna, also including rare species.

Oak Woodlands. Oak woodlands are found in the eastern portion of the County in moderate to dense stands comprising blue oak, interior live oak and valley oak. Some California black walnut and cottonwood exist at better locations. This is good habitat for deer, gray squirrels, other rodents and birds, particularly in the vicinity of streams and ponds.

Oak grassland is a transition zone between woodlands and grassland. Majestic valley oaks, outstanding in the field, typify this community.

Grasslands. Generally grasslands are limited to species of annual plants with low wildlife values. Invader species such as rip brome, foxtail brome, wild oats, and star thistle are often dominant. Native perennial bunch grasses, once dominant in the valley grassland ecology, are now limited to occasional clumps, if they are found at all. Species composition is affected by grazing practices. Wildflowers are occasionally numerous, particularly near rock outcroppings and in areas where grazing is light.

With resident animal species limited to rodents, grassland has comparatively lower wildlife values than other cover types. Large expanses of foothill grassland in the east County provide valuable prey area for raptors. Where grassland meets riparian, wetland and woodland habitats, the edge effect created by intermixing species enhances diversity.

Agricultural Lands. Although they are not a natural habitat type, agricultural lands are not without wildlife value. Geese, pheasant, and other species feed on grain crops, and losses are occasionally significant. Agricultural lands can often be managed to enhance wildlife values with minimal crop loss.

FISHERIES

The rivers, streams, and water bodies within or passing through Sacramento County provide an important habitat for a diverse assemblage of fish, including both anadromous and resident species. Anadromous fish include chinook salmon, steelhead trout, striped bass, American shad, sturgeon, and Pacific lamprey. Resident fish can be separated into warm water gamefish (such as

large mouth bass, crappie, catfish, bullhead, and sunfish), cold water gamefish (such as rainbow and brown trout), and nongame fish (such as Sacramento squawfish, Sacramento sucker, and carp). However, gamefish consideration could be extended to these nongame species since recent immigrant peoples catch these species for food. Specific population numbers on most species in Sacramento County are currently not available.

The aquatic environment in the County supports tens of thousands of anadromous fish and rear a sizeable amount of both cold and warm water species. However, with expanding development and neglect of the habitat, fisheries have declined. This loss has been generated by habitat destruction, water temperature increases, water diversion, and non-point source pollution runoff. While license fees are increasing, recreational fishers are finding the habitat in shambles and the fishing mediocre. Some waterways are no longer fished because dumping of trash has ruined the natural character and is in the process of destroying the fisheries. To reverse the decline of fisheries the County needs to pursue policy that increases propagation, preserves and protects existing aquatic environments, and expands habitat.

Migratory Species: Chinook Salmon. The migratory species chinook salmon is economically the most important fish in the County. Annual commercial, ocean, and river sport catches of chinook reared in the Lower American River have averaged about 180,000 fish. In addition, approximately 45,000 chinook enter the Lower American during the four annual spawning runs - fall, late fall, winter, and spring. The fall run in both the American and Sacramento Rivers is the most abundant, comprising approximately 80 percent of the annual migrations. During very wet years a few chinook may also enter the Cosumnes River and Laguna, Deer, and Dry Creeks.

Chinook production is dependent on two sources, hatchery and natural production. The major factors effecting propagation from both sources are habitat availability, water diversion, and water temperature. Diversion of water and dramatic changes in discharge volume and timing have impacted habitat and reduced populations. Spawning habitat in both the Sacramento and American Rivers have been degraded by decreases in gravel shoals due to gravel retention behind upriver dams. Artificially high water temperatures in the Sacramento River and in the American near its confluence with the Sacramento River all but preclude spawning.

Resident Species. The warm water species prefer the vegetated shoreline areas where current velocity is low and cover is available. Shaded riverine aquatic habitat provides essential spawning cover for most warm water fish, including largemouth bass, bluegill, green sunfish, and crappie. Lower segments of the Cosumnes River and Dry Creek also support bullhead, Sacramento squawfish, Sacramento sucker, threadfin shad, and carp.

Warm water fisheries also exist along the canals and drainages in the County. Canals typically contain the same species found in the adjacent river. Some spawning occurs in canals, but population levels are maintained primarily through fish passage. Many species do quite well in canals that are not chemically treated or emptied of water.

The Delta and associated sloughs, along the southwestern reaches of the County, provide habitat for many warm water fish and functions as a nursery area for many migratory species. Much of the County fish stock, including striped bass and shad, depend directly on the slow moving, nutrient rich waters of the Delta.

Fishing. The most popular sport fisheries are the anadromous fish; chinook in the fall, steelhead trout in winter, and shad in late spring. These are large fish that arrive by the thousands. Sport fishing of resident species, although not as popular, does attract many recreationists. Resident species are also a major component in the predator - prey relationship with the anadromous species and are vital in maintaining the ecological character of County waterways.

Hatcheries. There are two active fish hatcheries in the County. One along the American River at Nimbus Dam produces salmon and steelhead. The second facility in Elk Grove produces warm water fisheries. Hatcheries have supplemented natural propagation; however such facilities while increasing the population, do nothing for habitat, and arguably increase mortality. Hatcheries are also an expensive way to produce fish, averaging as much as two dollars per pound.

HABITAT MAPPING

The Open Space Task Force specifically requested that the Planning Department inventory and map natural areas in Sacramento County. The Planning Department does not have sufficient staff or expertise to properly undertake a full inventory. However, there exists a number of vegetative cover data sources, including the U.S. Fish & Wildlife Service wetlands inventory maps, the Delta Atlas, riparian vegetation maps, the Natural Diversity Database, and recently prepared vegetation maps for the floodplain within the scope of the Army Corps of Engineers current flood control studies of the American and Sacramento Rivers. Staff intends to simplify and combine this data on 7-1/2 minute topographic quadrangles.

**SACRAMENTO COUNTY GENERAL PLAN
CONSERVATION ELEMENT**

**D. VEGETATION AND WILDLIFE RESOURCES
BACKGROUND REPORT**

3. NATURAL AREAS OF SPECIAL SIGNIFICANCE

This section identifies specific areas of the County which have special natural resource values. We have identified those areas which have been singled out by resource conservation agencies and private groups. Comments and descriptions are drawn from sources cited. The list is not all-inclusive, nor is there unanimous agreement on the significance of all areas. A map identifying natural areas of special significance will be available at the Board Workshop on August 8, 1989. An asterisk indicates all or a major part of the area is in public or quasipublic ownership.

MOKELUMNE/COSUMNES DRAINAGE

1. Lower Cosumnes River

Location: From junction of Cosumnes River and Cosumnes River Overflow (1 mile west of Dillard/99 Jcn) to confluence with Mokelumne. Includes Badger Creek from Cosumnes confluence to Highway 99.

Comments: Support more than 100,000 waterfowl; sandhill crane here; important and unique natural area; variety of hydrological conditions in small area at merging of Valley River and Delta systems; undammed, represents unaltered valley ecosystem; system of sloughs and marshes each slightly different in its ecological balance; intermixing of habitats enhances ecological diversity.

Sources: Cosumnes River Basin Resource Study identifies as a critical natural resource conservation area. The Study recommends the area from Twin Cities Road to the Mokelumne confluence as an ecological preserve. Identified as a significant resource area in the Delta Wildlife Protection Plan. Within this area the following are singled out by additional sources.

a. Cosumnes/Mokelumne Confluence Valley Oak Riparian Forest.*

Location: North and east of Mokelumne at confluence with Cosumnes.

Comments: Considerable microtopography; high water channels and intervening sand and silt bars; national natural landmark designation; state designated significant natural area.

Source: Fish and Game California Natural Areas Program.

b. Cosumnes Valley Oak Riparian Forests.

Location: Vicinity of confluence with Grissley and Bear Sloughs, and between 1/2 and 1-1/2 miles upstream from confluence.

Comments: Diverse forest of valley oak, cottonwood and ash dominated by oaks; outstanding example of valley oak forest; well balanced population of all diameters; many sloughs cut forest; excellent oak reproduction; national natural landmark designation; state designated significant natural area.

Source: Fish and Game California Natural Areas Program.

2. Deer Creek - Cosumnes Riparian Corridor

Location: From El Dorado County line to confluence of Cosumnes River and Cosumnes River Overflow.

Comments: Good riparian woodland cover along most of both banks of both water courses; occasional clear spots; generally is narrow band along each watercourse, occasionally widens to hardwood forest in valley portion.

Sources: Cosumnes River Basin Resource Study identifies as a resource conservation area; Open Space Task Force recommends an open space corridor to protect wildlife habitat. Within this area the following area is singled out by additional sources.

a. Lower Deer Creek

Location: Along Deer Creek 1 mile northeast of confluence with Cosumnes River between Grant Line Road and Dillard Road.

Comments: Grazing maintained savanna with valley oaks; Swainson's hawk observed; wetlands, riparian and valley oaks amid valley grassland; wildlife extremely plentiful; State designated significant natural area.

Sources: Fish and Game California Natural Areas Program; Audubon Society area of critical concern.

3. Badger Creek

Location: East of Highway 99 just south of Dillard Road interchange, including Badger Creek and North Fork Badger Creek extending just past Riley Road.

Comments: Wetlands, riparian and valley oaks amid valley grassland. Excellent example of historical Sacramento Valley habitat. Especially scenic from Highway 99.

Sources: Proposed natural resource conservation area in Cosumnes Basin Resources Study; Audubon Society area of critical concern; Open Space Task Force recommends high priority for open space preservation.

4. Lower Mokelumne, Dry Creek, Grissley and Bear Sloughs

Location: Mokelumne River from 1/2 mile east of Cosumnes confluence eastward to Dry Creek confluence; Dry Creek from Mokelumne confluence eastward four miles; Grissley Slough between Cosumnes River and Dry Creek.

Comments: Riparian vegetation along all water courses; excellent grassland, riparian, woodland mix along Bear Slough; some of grassland and woodland along Mokelumne has been leveled since 1973.

Sources: Cosumnes River Basin Resources Study identified as a critical natural resource conservation area; identified as a significant resource area in Delta Wildlife Protection Plan; Grissley Slough included as part of Cosumnes riparian corridor by Open Space Task Force.

5. Mokelumne River

Location: North bank between Franklin Boulevard and New Hope Landing.

Comments: Riparian vegetation on levee side of river.

Source: Identified as significant resource area in Delta Wildlife Protection and Restoration Plan.

6. Dry Creek

Location: North bank, Amador County line to point four miles east of Mokelumne confluence.

Comments: Riparian corridor occasionally widening to woodland areas.

Source: Identified as Dry Creek riparian corridor by Open Space Task Force.

7. Laguna Creek

Location: From one mile west at Clay Station Road at Hobday Road extension to confluence with Cosumnes River.

Comments: Intermittent stream with riparian habitat; two miles of riparian woodland with large trees; lower reaches include seasonal marsh along creek and tributaries.

Sources: Identified as Laguna Creek riparian corridor by Open Space Task Force. The western reach, upstream 1-1/2 miles from Cosumnes confluence is included within critical natural resource area identified by Cosumnes River Basin Resources Study.

STONE LAKES/DELTA

1. Beach Lake/Morrison Creek*

Location: Northern portion Regional Treatment Plan property between I-5 and Union Pacific Railroad.

Comments: Permanent and seasonal marsh in what used to be Beach Lake; riparian forest along Morrison Creek, essentially intact since 1937, dominated by cottonwood and willow; a riparian area abundantly rich in wildlife and plant communities.

Sources: The draft master plan for buffer lands designates the area as a natural area; Audubon Society area of critical concern; identified as open space for winter waterfowl by Open Space Task Force.

2. Lower Laguna Creek*

Location: Between Franklin Boulevard and Union Pacific Railroad tracks on Regional Treatment Plant property.

Comments: Seasonal wetland, ponds and vernal pools with adjacent grassland; channel modifications in conjunction with upstream improvements along Laguna Creek.

Source: Draft Master Plan for buffer lands designates the area as a natural area.

3. North Stone Lake*

Location: Morrison Creek levee on north, I-5 on east, Hood-Franklin Road on south and Southern Pacific Railroad on west.

Comments: Extremely high fish and wildlife values; old overflow basin with diversity of habitat; 464 acres emergent marsh 155 acres riparian, 170 acres water, 2,158 acres upland; supports excellent warm water fishery; high diversity of vegetation types makes area one of most unique and valuable in Sacramento Valley. Large rookery on southeast arm is largest in County; vital link in Pacific Highway; number one ranked site for new western national wildlife refuge.

Sources: U.S. Fish and Wildlife Service report to Corps on Morrison Creek Project; Audubon Society area of critical concern; identified as significant resource in Delta Wildlife Protection and Restoration Plan; Open Space Task Force wildlife protection area.

4. South Stone Lake

Location: Hood-Franklin Road on north, I-5 on east, Lambert Road on south and Southern Pacific Railroad on west.

Comments: Includes 93 acres riparian, 446 acres marsh, 186 acres upland, 121 acres water; rest of 3,480 acres is agriculture; supports excellent warm water fishery; supplements North Stone Lake as important wildlife area; part of number one ranked site for new western National Wildlife Refuge; with North Stone Lake, is one of the most important ecological complexes in Delta.

Sources: U.S. Fish and Wildlife Service report to Corps on Morrison Creek Project; designated significant resource on Delta Wildlife Protection and Restoration Plan; Open Space Task Force wildlife protection area.

5. Snodgrass Slough

Location: Length of slough, between Sacramento River and Delta Meadows.

Comments: Shrub brush and occasional riparian woodland along northernmost Delta slough in Sacramento.

Source: Significant resource in Delta Wildlife Protection and Restoration Plan.

6. Delta Meadows*

Location: Between Locke and Walnut Grove.

Comments: Significant prime natural resource area; remnant of valley oak woodland; in excess of 110 bird species, abounds with small mammals; state park acquisition project.

Source: Audubon Society area of critical concern.

7. Lost Slough

Location: Union Pacific Railroad tracks east to Sacramento River, just north of Delta Meadows.

Comments: Waterway and adjacent riparian habitat linking Lower Cosumnes and Delta Meadows, Snodgrass Slough and the Delta river system.

Source: Identified by Open Space Task Force as natural area to protect as open space.

8. Steamboat Slough

Location: Entire length.

Comments: Riparian shrub-brush and woodland at south end near Howard Landing and along north portion.

Source: Significant resource in Delta Wildlife Protection and Restoration Plan.

9. Grand Island Tip

Location: West end Grand Island at mouth of Steamboat Slough.

Comments: Mason's lilaeopsis, Delta tule pea, and Sacramento anthacid beetle found here; state designated significant natural area.

Sources: Fish and Game California Natural Areas Program; significant natural resource in Delta Wildlife Protection and Restoration Plan.

10. Georgiana Slough

Location: Walnut Grove to Isleton.

Comments: Shrub-brush and occasional woodland riparian along open slough.

Source: Identified as riparian open space corridor by Open Space Task Force.

11. Seven Mile Slough

Location: Brannan Island State Park east to San Joaquin River.

Comments: Riparian trees and shrub-brush along a little-used slough.

Sources: Significant natural area in Delta Wildlife Protection and Restoration Plan; designated natural area in Delta Master Recreation Plan.

12. Brannan Island*

Location: South end Brannan Island at State Park.

Comments: Site of Antioch Dunes evening primrose, very rare plant; state designated significant nature area.

Source: Fish and Game California Natural Areas Program.

13. Mayberry Slough

Location: Southwest end of Sherman Island.

Comments: Deadend slough, isolated for wildlife habitat.

Source: Natural area recommendation of Open Space Task Force.

14. Southwest Tip of County

Location: Tip of Sherman Island.

Comments: Upland habitat; blue heron rookery; several rare and endangered species.

Sources: Delta Wildlife Protection and Restoration Plan; recommended natural area open space by Open Space Task Force.

15. Chain Island

Location: Westernmost point of County.

Comments: Isolated island, formerly diked with coastal brackish marsh habitat; Mason's ilaeopsis and Suisun marsh aster; state designated significant natural area.

Source: Fish and Game California Natural Area Program.

EASTERN SACRAMENTO COUNTY

1. Upper Laguna Creek

Location: Upstream from Sheldon Road for one mile.

Comments: Dense stand of riparian vegetation listed as one of three most important sections on Laguna Creek (the other two are now urban creek sections).

Source: U.S. Fish and Wildlife Service report to Army Corps on Morrison Creek Project.

2. Sloughhouse South

Location: Uncertain.

Comments: One of best sites of valley elderberry longhorn beetle habitat; state designated significant natural area.

Source: Fish and Game California Natural Areas Program.

3. Meiss-Ione Road Overlook

Location: Four miles southeast of Bridgehouse just south of Meiss Road and west of Ione Road.

Comments: Only lesser nighthawks in Sacramento County; vernal pools with unusual dwarf plant.

Sources: Audubon Society area of critical concern; natural area recommendation by Open Space Task Force.

4. Scott Road Raptor Area

Location: Between Cosumnes River, Latrobe Road and Grant Line Road; approximately 80 square miles including El Dorado County portion.

Comments: Open shortgrass prairie with sparse to dense valley and blue oak thickets, mostly in southern area; dense cottonwood-willow riparian vegetation along stream courses; habitat for one of largest concentrations of raptorial birds in Sacramento region; grand wildflower displays in spring.

Sources: Audubon Society area of critical concern; natural area open space recommendation by Open Space Task Force.

5. Sloughhouse Vernal Pools

Location: East and southeast side of Grant Line Road between one and six miles north of Highway 16.

Comments: Concentrations of vernal pools; very rare Sacramento orcutt grass found near County dump; state designated significant natural area.

Sources: Fish and Game California Natural Areas Program; Audubon Society area of critical concern.

6. Rancho Seco Lake*

Location: one half mile south of Rancho Seco Lake.

Comments: About 500 plants of Sacramento orcutt grass; state designated significant natural area.

Source: Fish and Game California Natural Areas Program.

7. Jackson Highway Oak Woodland

Location: South of Jackson Highway between Ione Road and Amador County line.

Comments: None.

Source: Natural area recommendation of Open Space Task Force.

8. Twin Cities Road Oak Woodland

Location: Both sides Twin Cities Road and Amador County line.

Comments: None.

Source: Natural area recommendation of Open Space Task Force.

9. South Area Vernal Pools

Locations: The following descriptions generally define where the densest concentration of vernal pools occur in Sacramento County in addition to those sites identified above. The list is not all inclusive.

- North side Douglas Road one mile east of Sunrise
- East side Sunrise Boulevard north of Kiefer Road
- Lower 1/2 of triangle formed by Sunrise, Highway 16 and Grant Line Roads
- Both sides Meiss Road, three miles east of Dillard Road

- East side Clay Station Road south of Laguna Creek
- Both sides Riley Road between Arno and Salas Roads
- Between Clay Station Road/Laguna Creek and Alta Mesa Road one mile south of Tavernor and north of Salas Road extension
- Along three mile wide corridor flanking railroad tracks north of Twin Cities Road, extending from Southern Pacific RR tracks east to County line. Located in 50 to 300 acre groups of densely occurring vernal pools.

Comments: Quality of pools is unknown; may contain rare and endangered plants.

NORTH SACRAMENTO

1. Garden Highway

Location: Sacramento River from Interstate-80 north to County line.

Comments: Greatest concentration of riparian woodland in Sacramento County along Sacramento River; riparian woodlands are seven times greater in extent than disturbed rip-rap areas to south; coexists with several homes; Swainson's hawk nests.

Source: Sacramento Marina Carrying Capacity Study.

2. Alder Creek

Location: Aerojet property paralleling U.S. Highway 50.

Comments: Excellent riparian area; diverse vegetation and wildlife; spillway and marsh; upstream ponds add diversity; good beaver and muskrat habitat.

Sources: Audubon Society area of critical concern; Open Space Task Force recommended natural area.

3. Fair Oaks Bald Spot*

Location: Phoenix Park in Fair Oaks.

Comments: Excellent examples of vernal pools with Sacramento orcutt grass; state designated significant natural area.

Sources: Fish and Game California Natural Areas Program; Audubon Society area of critical concern; Open Space Task Force recommended natural area.

4. Lake Natoma*

Location: East of Hazel Road on American River.

Comments: American River bluffs, 100 feet high, cut by several small canyons; rich foothill woodland plant community; some of most varied and dense floral displays in Sacramento County; cottonwood dredger tailing riparian at Negro Bar with jungle-like mixture of oak, buckeye, elderberry, et al on higher ground.

Source: Audubon Society area of critical concern.

5. East Main Drain*

Location: Northern city limits to Sutter County line.

Comments: Waterfowl habitat; year round habitat; much disturbance, dumping.

Source: Open Space Task Force recommended wildlife habitat and natural area.

6. Dry Creek*

Location: Sutter County line south to Rio Linda Community Park, including both channels and Cherry Island in between.

Comments: Dual channel with grassland/farming in between creates good wildlife habitat. Good riparian cover along creek channels.

Source: Additional areas recommends for purchase by County Parks using Proposition 70 funds designated for purchase of riparian corridors.

7. American River Parkway*

Location: Hazel Avenue west to Sacramento River.

Comments: Mix of riparian, freshwater marsh, oak woodland, grassland, inhabited by great variety of plant and wildlife species.

Source: American River Parkway Plan.

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SACRAMENTO COUNTY GENERAL PLAN CONSERVATION ELEMENT

D. VEGETATION AND WILDLIFE RESOURCES BACKGROUND REPORT

4. RESPONSIBILITIES AND CURRENT EFFORTS

Most levels of government, as well as in the private sector, play an active role in protecting vegetation, wildlife, and natural areas. The following summarizes key responsibilities and current efforts.

U.S. ARMY CORPS OF ENGINEERS

Wetlands Regulation. The primary federal regulation protecting wetlands is Section 404 of the Clean Water Act. Section 404 regulates discharge of dredged or fill material into waters of the United States, including most wetlands. Section 404 is administered jointly by the U.S. Army Corps of Engineers (COE) and the U.S. Environmental Protection Agency (EPA). The U.S. Fish and Wildlife Service and the National Marine Fisheries Service have advisory and commenting roles in the 404 process.

The COE has jurisdiction over waters of the United States. Such waters are referred to as jurisdictional wetlands and are defined as those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. To be regulated by the COE wetlands must meet a three-parameter test by having 1) a predominance of plants determined to be "obligate wetland," "facultative wetland," or "facultative" species; 2) indicators of wetland hydrological conditions, such as inundation, saturation, drift lines, watermarks, sediment deposits, or drainage patterns in topographically low sites; and 3) indicators of hydric soil conditions, such as highly organic surface layers, hydrogen sulfide emissions, shallow groundwater, reducing soil chemistry, gray soil colors, bright mottles in a dark matrix, and iron-manganese concretions.

Obligate wetland plants are species "that occur almost always (estimated probability greater than 99 percent) in wetlands under natural conditions." Facultative wetland plants are species "that occur usually (estimated probability 67-99 percent) in wetlands." Facultative plants are species "with a similar likelihood (estimated probability 33-67 percent) occurring in both wetlands and nonwetlands."

Section 404(b)(1), a subsection, requires that practicable alternatives be considered before a permit can be issued to discharge dredged or fill material into wetlands. Practicable alternatives are presumed to exist for uses that are not water dependent. The COE applies the (b)(1) guidelines and its own public interest review to individual permit applications. Public interest review includes considering aesthetics, conservation, economics, general environmental concerns, wetlands, flood hazards, historic properties, fish and wildlife values, land use, navigation, shoreline erosion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people. Economic hardship is considered a valid reason for permit issuance.

Local governments can participate in the COE permitting process through the notice and comment procedures for permit applications. They can monitor activities in wetland areas and report unauthorized filling or dredging. The COE prefers to conduct evaluations of permit requests simultaneously with local permit review, whenever possible. If local permits are denied within 30 days of the issuance of a public notice, the COE will usually deny the requested Section 404 permit.

Certain activities are specifically exempt from 404 regulations. Exemptions include normal farming, silvaculture, and ranching activities; the construction or maintenance of farm or stockponds, or irrigation ditches; and the construction of farm or forest roads. These exemptions are subject to the so-called "recapture" provision that negates the exemption for the activities listed if the purpose of the activity is to bring an area of navigable waters into a new use--one that either impairs the flow of waters or reduces their extent. To facilitate the regulatory process governing wetlands of relatively small size, ten acres or less, the COE will issue a Nationwide General Permit, referred to as Nationwide 26, to an applicant seeking to fill up to ten acres of wetland under a single development proposal. The issuance of a Nationwide permit for filling one to ten acres typically allows mitigation which results in a net loss of wetland. For wetland loss under one acre the Corps will issue the permit and may require no mitigation.

Streambank Protection. Ironically, while the COE is charged with protecting wetlands, its traditional responsibility is flood control which has led to the loss of thousands of acres of natural habitat. In Sacramento, their efforts concern levee protection and stabilization along the Sacramento River.

Since 1960, Congress has authorized a total of 158 miles of bank protection under the first two phases of the Sacramento River Bank Protection Project. About 138 miles of this work have been completed and about 20 more miles are scheduled for completion by 1991. After 1991, the third phase of the project, covering a substantial additional length of riverbanks, will likely be initiated. Usually, from one to three construction contracts are issued each year. Each contract generally comprises 10 to 25 individual sites which total at least several miles in length.

As each new levee contract is completed, a substantial part of the river's remaining riparian cover is permanently removed. In the past, the COE has offered replacement mitigation. Presently,

replacement efforts by the Corps are limited to, at best, a few hundred linear feet annually of experimental mitigation measures. The experimental measures are designed primarily for replacing the habitat values for juvenile salmon. Specific replacement for other fish and wildlife is secondary.

OTHER FEDERAL AGENCIES

U.S. Fish and Wildlife Service. The Fish and Wildlife Service manages the National Wildlife refuge system, operates or participates in several wildlife habitat preservation programs, undertakes wildlife studies in conjunction with environmental analysis of federal projects, oversees the Endangered Species Act, and advises the COE on 404 permit applications. The Service operates under a no net wetlands loss policy with regard to its recommendations to the Corps of Engineers and involvement in federal projects

The Service has approved the Stone Lakes National Wildlife Refuge for Sacramento County. However, due to funding constraints and some property owner opposition refuge establishment has been delayed. Fish and Wildlife staff plan to begin restoration of some sections of the project area within the coming months. The project include Beach Lake Preserve, the Regional Sanitation buffer lands, and North and South Stone Lakes.

U.S. Soil Conservation Service. The purpose of the Soil Conservation Service (SCS) is to develop and implement individual soil conservation plans with participating landowners. The SCS also assists local Resource Conservation Districts to develop long-term soil and water conservation programs. The SCS is the only agency that inventories, assesses, and monitors soil resources on a significant scale.

The SCS carries out federal policy on agricultural conversion of wetlands under the 1985 Food Security Act. The act included the "swampbuster" provision that denies all federal farm benefits, mortgages, commodity support, and crop disaster loans to farmers or other persons converting wetlands to dry cropland after December 1985. The SCS identifies and maps all wetlands on property for which landowners submit applications for federal benefits. In Sacramento County, wetlands covered by the Swampbuster provision are located primarily in the lower Cosumnes and the Delta and do not constitute a significant percentage of the wetlands acreage.

Other Federal Agencies. The Bureau of Land Management owns property in the Consumnes River area and is a cooperator within the Nature Conservancy's Consumnes River Preserve. There are no Forest Service holdings in the County. Department of Defense property at Mather Air Force Base includes a 67-acre wetlands area known as Mather Lake as well as several vernal pool complexes. The County Parks Department is proposing that the wetlands area be part of a regional park when Mather closes. The Bureau of Reclamation owns land around Lake Natomas comprising bluffs, oak woodland, grassland, and some wetlands which are managed by the state as part of Folsom State Park.

STATE AGENCIES

Department of Fish and Game. As California's principal agency protecting wildlife, Fish and Game operates programs to protect rare and endangered species, preserve valuable wildlife habitat and manage wildlife resources on public lands. The Department operates the hunting licensing program and employs wardens throughout the state to enforce hunting laws and minimize wildlife depredation. The Department also licenses several pheasant hunting clubs in Sacramento.

Fish and Game also issues streambed alteration permits which are required of any person or agency undertaking any work within the mean high-water mark of any body of water containing fish or wildlife resources or where the project sponsor will use material from the streambed. The permit imposes such conditions as necessary to protect the fish and wildlife resources or where the project sponsor will use material from the streambed. The permit imposes such conditions as necessary to protect the fish and wildlife resources of the site. Permits involving development projects are usually processed after local approval.

In addition to its regulatory responsibilities, Fish and Game reviews and recommends modification, approval, or denial of projects requiring a County permit that may affect wildlife.

Department of Water Resources. Water Resources is currently purchasing most of Twitchell Island and some of Sherman Island. Although habitat restoration plans are complete, there is no schedule yet for implementation. Current efforts are replacing row crops for pasture land to minimize tillage which aggravates soil oxidation. The pastures will provide some wildlife foraging opportunities.

Department of Parks and Recreation. The state parks system includes Folsom Lake, Delta Meadows, and Brannan Island with natural habitat lands. The Department does not anticipate additional recreation development which would encroach upon natural areas.

LOCAL AGENCIES

Sacramento County Parks and Recreation Department. The American River Parkway is the jewel of the County's park system, and recognized nationally as an outstanding example of a local effort to protect a major riparian environment throughout its length. The Parkway receives heavy recreational demand which must be balanced with wildlife protection imperatives. The Department is guided in its management and development of the Parkway by the American River Parkway Plan, an element of the County General Plan. The Plan establishes 80 percent of the Parkway as a natural area.

Outside of the American River, the Department has focused primarily on providing regional recreation facilities. Gibson Ranch Park includes riparian woodland on both sides of Dry Creek. A draft Dry Creek Master Plan has been released which includes a linear trail following the

creek. In the south County the Department has begun development of a multicultural park. A Master Plan for this site, which has over 70 vernal pools, has also been released.

The Parks Department recognizes the need for its more active role in natural area acquisition and management. The Parks 2000 Plan establishes that "provision of a sufficient quantity of high quality conservation oriented regional open space shall be a major mission of the department."

Sacramento County Department of Environmental Review and Assessment (DERA). All projects to which CEQA applies are reviewed by DERA for possible impacts on vegetation and wildlife. Projects where aerial photos and field inspections by DERA staff indicate probable wetlands are surveyed by a professional botanist for the presence of rare and endangered plants. The Environmental Coordinator determines if the project will have significant affect on vegetation and wildlife resources and recommends appropriate mitigation measures.

Public Works Tree Coordinator. The Tree Coordinator, a position with the County Department of Public Works, is responsible for administration of the Tree Preservation Ordinance and all tree mitigation measures incorporated as conditions to discretionary projects. The ordinance protects all oak trees unless they are specifically designated for removal as part of an approved project. When oaks are removed they must be replaced with the same tree species equaling in sum the diameter of the tree lost. Any person may pay a fee of \$60.00 per inch diameter to remove oaks when their replacement is not possible due to site constraints. The Tree Preservation Ordinance applies only to the designated urban area, except for projects that require a discretionary land use entitlement, such as a parcel map.

The Tree Coordinator advises DERA staff in developing recommended native oak tree mitigation measures. Other responsibilities include reviewing improvement plans and building permits and ensuring that project proponents comply with required conditions of approval.

The Coordinator has the authority to issue "stop work orders" on projects in violation of required mitigation measures. In extreme cases, where project implementation results in the willful destruction of native oaks, again in violation of required mitigation, the Coordinator can recommend the revocation of the project's land use entitlement by referring the project proponent back to the original hearing body.

Regional Sanitation District. The Sacramento Regional County Sanitation District manage a 2,650-acre buffer area surrounding its regional treatment plant near Freeport. The buffer lands include 556 acres of wetlands, riparian forest, willow scrub and vernal pools and an additional 896 acres of grassland. The District has completed a draft Master Plan for the buffer lands which identifies natural areas for protection and restoration.

A supplement to the plan notes the buffer lands' potential to be part of a new federal wildlife refuge. The supplement also explains increasing interest by local developers and environmental organizations in managing buffer lands as a mitigation bank site for wetlands. The District will

not undertake new long-term leases or other land use commitments until the status of the refuge and its future management become clear.

Private Organizations. The Nature Conservancy and Ducks Unlimited are both private, nonprofit agencies dedicated to preserving natural habitat nationwide. Nature Conservancy's mission is to preserve the full array of biological diversity by finding, protecting, and preserving the best examples of ecosystems, communities, and important species in the natural world. Ducks Unlimited seeks to conserve wetland habitat for waterfowl and other wildlife. They also use satellite imagery and computers to evaluate, inventory, and map wetlands important to migratory waterfowl.

In Sacramento, the Nature Conservancy owns and jointly manages the 5,000 acre Cosumnes River Preserve with Ducks Unlimited, the Bureau of Land Management, State Fish and Game, and County Parks. This joint effort, one of several nationally significant projects undertaken by the Nature Conservancy, will protect a prime habitat for California's migrating waterfowl. As part of the overall project the Nature Conservancy will restore riparian forest and wetland on what is currently levelled agricultural land. The revegetation project will be conducted with controlled scientific experiments. The two conservation agencies are currently negotiating additional purchases in the lower Cosumnes River. The Nature Conservancy is also evaluating the natural values of the South County east of Highway 99 to determine if additional projects in Sacramento merit consideration.

SACRAMENTO COUNTY GENERAL PLAN CONSERVATION ELEMENT

E. CULTURAL RESOURCES

INTRODUCTION

Sacramento County is fortunate to have a rich and varied collection of historic and prehistoric features which serve as a record of significant, as well as routine, events in the County's long history of human habitation. Exemplary archaeological sites of Nisenan-Maidu and Plains Miwok Indians have been identified along river terraces. Their locations are fiercely protected by researchers who feel, without protection, the sites would be disturbed if the locations were disclosed. The history of more recent settlers in the County is seen at the Historic sites and structures of explorers and settlers who came to trap, mine, and farm. The area's wealth in fur, gold, and soil drew settlers of diverse ethnicities and cultures including, Asians, Hispanics, African Americans, and Europeans whose cultural imprint can be found throughout County neighborhoods.

THE RESOURCE

The evidence left by prehistoric ancestors in what is now the vicinity of Sacramento County is often difficult to detect. Most artifacts of prehistoric peoples were made of natural materials, stone, fur, sticks, grasses, and mud which rapidly return to the earth. However, due to the length of habitation and the abundance of food Sacramento County has a rich array of important archaeological sites where many artifacts have been recovered. An array of hand implements, middens rich in discarded objects, isolated field houses, and mud, stick, and stone structural remains of entire villages comprise some of the County's cultural resource heritage. Trained and locally experienced archaeologists decipher the relationship these artifacts have to one another in hopes of understanding, among other things, food gathering practices, societal structuring, and trading networks.

Archeologic sites are especially important to Native American Indians as such sites represent a significant part of their ancestral heritage. Consultation with Native American Indians has proven valuable in helping to discover, protect, and interpret many County archaeological sites.

More recent historical sites involve settlers from Europe, Asia, Spanish holdings in South America, and other areas of the world. Comparatively fewer historic sites remain due to continual changes to the area caused by successional use. In addition, Sacramento County is the center of many interesting and important events which are historically significant, including the Gold Rush, the development of railroads, the seat of State Government, and as a major shipping

port for the Central Valley's products. A variety of sites and artifacts have been preserved representing a wide array of cultural and historical events that have occurred in the County. Among the most prominent are Old Town Sacramento, the Capitol, Sutter's Fort, City of Folsom, and many structures with cultural, historical, or architectural significance.

LOCATION

Both historic and prehistoric sites tend to be scattered throughout the County, although both can potentially be found in greater concentration along waterways. Areas that are likely or extremely likely to contain prehistoric sites include the Cosumnes River area, the American River area, and the Delta and Sacramento River areas (Figure 12).

Historic sites tend to be concentrated in areas still inhabited such as the City of Sacramento, City of Folsom, the Delta, along old travel routes like the Jackson Highway, Central California Traction Railroad, and Southern Pacific Railroad routes and along river and stream beds.

ISSUES FACING CULTURAL RESOURCES

It is important to define, protect, and preserve our cultural resources for future generations and to provide continuity between past and present. There are four general areas where cultural resources face problems. These are: 1) Lack of systematic methods for locating, reporting, and recording sites or storing excavated cultural artifacts, 2) Numerous agencies and interest groups are, at times, seemingly unable to reach a consensus on "significant" site definition or appropriate mitigation measures, 3) Lack of adequate protection through either public or private ownership leads to site disruption from illegal collecting, vandalism, or uninformed usage, 4) Lack of funding for protection and preservation. Each of these issues are discussed below.

1. LACK OF SYSTEMATIC METHODS FOR HANDLING CULTURAL RESOURCES

The possibilities for losing cultural resources are very high because no systematic plan for future exploration for new sites has been implemented. In addition thorough and uniform reporting methods and catalog and storage procedures have yet to be established. Resource losses occur through degradation from weathering, incompatible land uses, and removal of artifacts by collectors. Once archaeological or historic sites are destroyed, there is no way to restore their scientific value. If the site was unknown to archaeologists and historians before its destruction, the link with the past is completely lost.

Previously located and excavated archaeological sites are largely undocumented because many earlier archaeological surveys provided inexact locations of excavations. In addition, early pioneers and mission priests who recorded significant events mention the names of Native American Indian villages, but locations were not specifically described. As a result, information contained in early documentation of some of Sacramento's 400 sites is questionable.

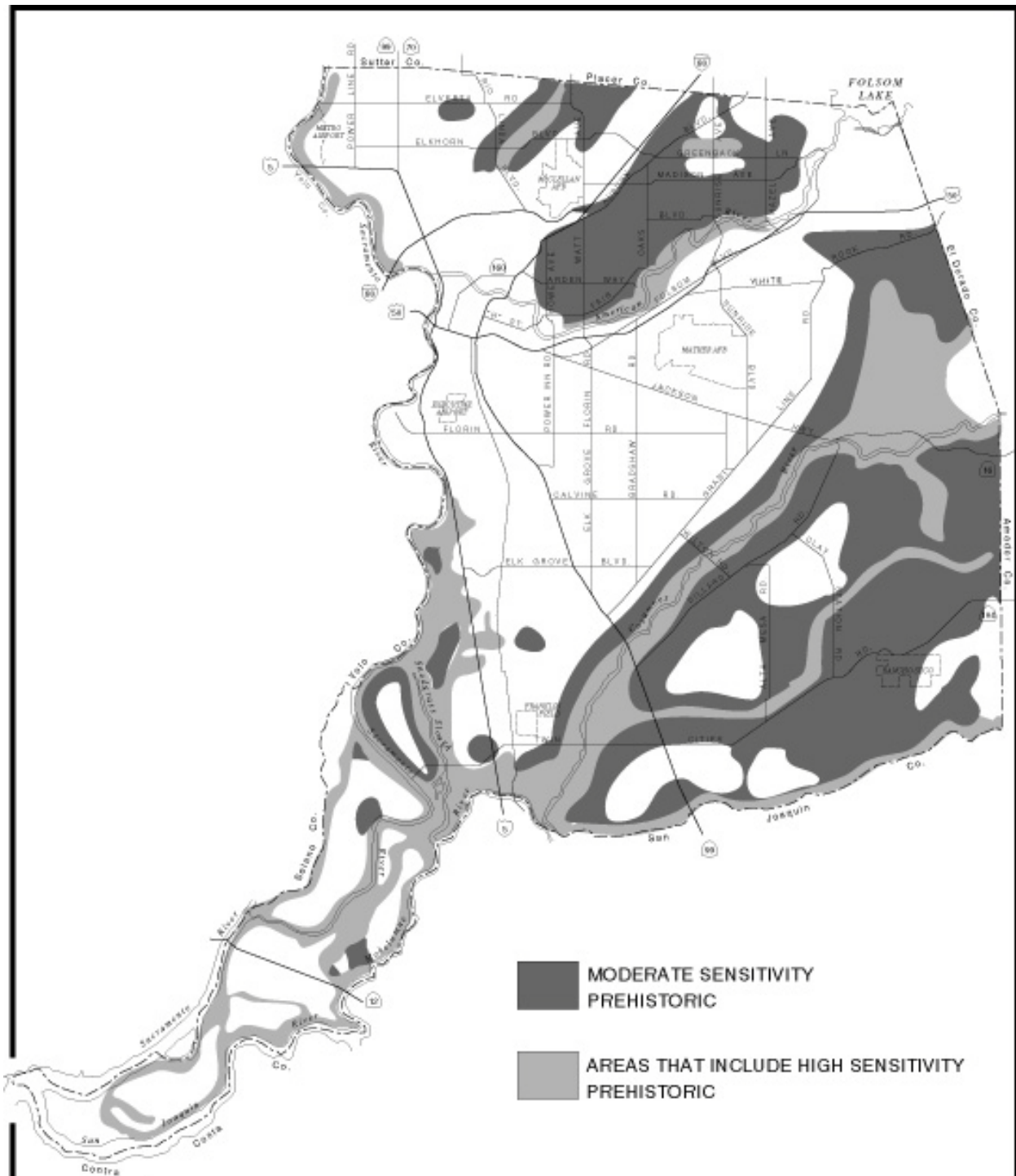


Figure 12
Cultural Resources Sensitivity

Prepared by the Sacramento County Planning and Community Development Department



Currently, the California Archaeological Inventory (CAI) acts as the major clearinghouse for archaeological and historic information. CAI compiles all site information onto U.S.G.S. 7-1/2 minute topographic maps and maintains pertinent data using personal computers. The County Department of Environmental Review and Assessment (DERA) staff uses these maps to refer projects planned in culturally sensitive areas to CAI for data review and possible field and site survey recommendations. The maps and data base represent a guide only, not a comprehensive inventory, unmapped sites can only be located through field investigations. If the CAI's review finds positive site location DERA, will field check the area for archaeological features. The State Office of Historic Preservation (OHP) does some review also, but only for federally funded projects.

Records on local resources are also kept by several other agencies. The California Native American Heritage Commission (NAHC) catalogs traditional and sacred lands used by California Indians in prehistoric and historic times. The Sacramento Museum and History Division collects and catalogs historical records and photographs of local significance and surveys historic buildings. Lastly, the Office of Historic Preservation conducts surveys of historic properties and nominates cultural sites to the National Register of Historic Places and to the State Registry.

Storage of Artifacts

Existing facilities for artifact storage are insufficient. Neither California State University at Sacramento (CSUS), University of California at Davis (UCD), or the State Indian Museum are accepting new artifacts for their collections. Therefore, new materials collected for scientific research are stored uncataloged in basements and garages of archaeologists, where artifacts are unavailable to other researchers and subject to potential damage in an uncontrolled environment. Moreover, the provisions of the California Environmental Quality Act (CEQA), together with continuing urban expansion in archaeologically sensitive areas is yielding an ever-increasing inventory of excavated materials.

Limited storage facilities for historical artifacts have led to similar problems. The Sacramento History Museum and other sites like the Governor's Mansion and Sutter's Fort have only limited storage, catalog, and display space. Some historical artifacts are extremely fragile such as photos, diaries, other written materials, and textiles. Without proper preservation, many such items deteriorate rapidly and so become lost for future reference and appreciation.

2. LACK OF CONSENSUS AND COORDINATION AMONG NUMEROUS AGENCIES AND INTEREST GROUPS

There are a total of ten different public agencies and interest groups involved with preserving historic resources (see Table 17), not including the many consultants who conduct archaeological and historic research, surveys, and excavations. These groups often have different preservation strategies and priorities. While formal coordination between

some groups--County ERA and CAI--is good, most rely on informal communication. No central agency monitors all the various programs and activities.

TABLE 17

AGENCIES AND INTEREST GROUPS

<u>AGENCY</u>	<u>TYPE</u>	<u>FUNCTION</u>
State Office of Historic Preservation (OHP)	State	Nominates cultural sites to the National Register of Historic Places and State Register. Has prepared and implemented a comprehensive Statewide Preservation Plan. Reviews Federally funded projects only.
California Native American Heritage	Interest Group	Catalogs traditional and sacred land uses of California Indians. Have the authority through the State Attorney General to identify and preserve access to State lands which are religiously or socially significant to Native Americans. Reviews and comments on Environmental Impact Reports which affect property in the sacred lands inventory. If Native American Indian burial remains are found, the NAHC acts as a liaison between descendents and the developer.
California Archaeology Inventory (CAI)	State	Associated with California State University, Sacramento and is the major clearinghouse for sites of cultural significance in Sacramento and five surrounding counties. CAI compiles all archaeological and historic site information onto U.S.G.S. 7-1/2 minute topographic maps and personal computers. Conducts literature review of federal, state, local, or private development projects and forwards findings and recommendations to the County's Environmental Review and Assessment Section.
California State University, Sacramento (CSUS)	State	Trains students in archaeological theory and conducts research projects in Northern California. Only entity In County training students in site excavation methods.

TABLE 17 (Cont.)

AGENCIES AND INTEREST GROUPS

<u>AGENCY</u>	<u>TYPE</u>	<u>FUNCTION</u>
Environmental Review and Assessment (ERA)	County	Conducts initial environmental studies and prepared negative declarations, EIR's, and suggestions for mitigation. All projects determined to be near or in areas of significant probability for sites are sent to CAI for further review. Often, further review and partial or complete site surveys are required.
Parks and Recreation	County	Manages the countywide parks system. An Archaeologic Inventory Plan was prepared in 1978 focusing on American River Parkway sites suggesting preservation methods. It is possible that a future park may focus entirely on Native American heritage.
Sacramento Museum and History Division	City	Sacramento City Department of Parks and Community Services manages the Sacramento History Center in Old Sacramento, collects and catalogs historical records and photos, reviews historic values of buildings countywide, and educates the public on Sacramento history.
Archaeological Conservancy	Private	Based in Santa Fe, New Mexico, this organization acquires archaeological sites to protect them from development. Criteria used for selecting the sites: 1) sites must be undisturbed and intact, 2) site is distinct and exhibits rare cultural attributes, and 3) the site has the potential to contribute significantly to prehistorical research. The Conservancy either manages its own parcels or sells the parcels to a public agency if the agency has enough personnel to effectively manage sites.

TABLE 17 (Cont.)

AGENCIES AND INTEREST GROUPS

<u>AGENCY</u>	<u>TYPE</u>	<u>FUNCTION</u>
Central California Foundation (CCAF) and the Society for California Archaeology	Private	Professional organizations that seek to Archaeologic inform the general public and public the agencies on importance of preserving archaeological areas through education, lobbying and legislation. Provide scholarships to students of anthropology/archaeology.
Federal Agencies		All Federal agencies must identify properties under their jurisdiction, consider historic properties when actions affect them, and document historic properties that cannot be preserved from development under the National Historic Preservation Act of 1966. Mather McClellan Air Force Bases are the largest federal land managers in the County. Mather has no identified historic or prehistoric sites but McClellan has a historic site of approximately 30 structures which is under review.

An accessible network linking scientific knowledge and preservation strategies is lacking. Professional societies with annual meetings and periodic publications do offer a forum in which issues are addressed and ideas exchanged; however, there seems to be limited communication and coordination among local groups which hinders exchange and cooperation. Limited coordination among agencies and interest groups may also hinder surveying efforts and curtail cataloging and storage expansion efforts.

Professional opinion varies concerning what constitutes a significant site, and there is often disagreement of appropriate mitigation measures. Issues like whether sites should be left intact, as is preferred by Native American Indians, in the case of sacred or burial grounds, or whether removal of artifacts is more appropriate, have several answers depending on who is asked and what criteria is used to guide decisions.

3. LACK OF ADEQUATE PROTECTION FOR SIGNIFICANT SITES

Both publicly and privately held sites face disruption, damage, and destruction from illegal collecting or improper or uniformed use.

Site locations are often kept secret to prevent artifact collectors and others from damaging sites. However, keeping site locations secret can inadvertently lead to destruction by people who are uniformed. Even planners do not always have ready access to the location data, making it difficult to utilize the cultural resources data based when approving development applications or updating community plans.

It is imperative to the science of archaeology that sites, yet to be studied remain untouched. Archaeology attempts to understand and interpret human behavior through reconstruction of events. Damage, destruction and removal of artifacts from sites diminishes scientific values by eliminating figures in the interpretation equation.

Public ownership does not necessarily guarantee protection of cultural resources. Public ownership may entail roads and trails to access sites, potentially increasing opportunities for vandalism. Nevertheless, federal, state, local governments, as well as private organizations have, in many cases, successfully preserved sites by purchasing culturally important areas for parks and open space. Private ownership can sometimes offer better protection of cultural resources primarily because of restricted public access. Some private landowners have a strong appreciation of and/or desire to protect cultural resources in such cases the site may be better preserved and protected in private rather than public trust.

However, limiting public access to sites can lead to a decrease in public interest in preservation efforts since the sites can't be publicly enjoyed. This could be especially important when trying to develop public support for funding cultural resources preservation.

4. LACK OF FUNDING

Lack of funding for protection and preservation has magnified many of the problems and issues surrounding cultural resources. Proper funding can help to ease some of these problems by providing the means to secure significant sites, develop Countywide plans for coordinating archaeological efforts, and possibly locate new storage and display areas.

Part of the attractiveness of Sacramento County comes from its rich historic past. The Chamber of Commerce promotes history. As a result, Sacramento profits from tourism, conventions, and new businesses. Yet, the County's financial support falls short of the amount needed for wise protection and management of cultural resources.

CONCLUSION

Preserving and stabilizing remnants of our past require we address problems leading to the rapid deterioration of our cultural resources. The lack of systematic methods for handling cultural resources, lack of consensus and coordination among agencies and interest groups, lack of protection for privately and publicly owned sites, and lack of funding should receive a greater commitment from the County. As unprecedented urbanization and population growth expands into the Twenty-first Century, the need to protect and preserve these resources so future residents will have the opportunity to learn and appreciate the important contributions of past inhabitants increases the urgency of the situation.