

STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

In the Matter of: )  
 )  
 HEARING TO DETERMINE WHETHER )  
 TO RECONSIDER ORDER WR 2006-0018-DWR )  
 DENYING NORTH SAN JOAQUIN WATER )  
 CONSERVATION DISTRICT'S PETITION )  
 FOR EXTENSION OF TIME )  
(Application 12842) )

**TESTIMONY OF  
JOHN PULVER**

I am John Pulver appearing today on behalf of North San Joaquin Water Conservation District ("North San Joaquin"). I was the Water Resource Coordinator for the County of San Joaquin, Department of Public Works ("County") from 1989 to June of 2000. During this time, I was familiar with and participated in the water matters within San Joaquin County and those which involved the County.

State Board Proceedings Potentially Impacting North San Joaquin

In 1992 the State Water Resources Control Board ("State Water Board") held a hearing regarding the Mokelumne River that involved the water right holders on the Mokelumne River, including North San Joaquin's Water Right pursuant to Application 12842 ("1992 Mokelumne River Hearing"). The purpose of this 1992 hearing as set forth in the Notice of Hearing was "to receive evidence that will assist the State Water Board in determining the measures needed to protect fish and public trust resources in the lower Mokelumne River." [NSJ-42]. The Notice of Hearing stated that this included the water rights of North San Joaquin and whether additional conditions needed to be included in the water right permits and licenses of North San Joaquin, East Bay Municipal Utility District ("EBMUD"), and Woodbridge Irrigation District.

North San Joaquin and the County each participated in the 1992 Mokelumne River Hearing. Both entities presented evidence at the hearing, and I testified at the hearing on behalf of the County. At the hearing both parties requested that North San Joaquin's water rights not be reduced.

At that time, the County was greatly concerned that North San Joaquin's water right would be adversely impacted due to the 1992 Mokelumne River Hearing by the State Water Board. In order to assist North San Joaquin at this time, the County not only participated in the hearing as a party but also assisted North San Joaquin in the preparation of its case and participation in the hearing. This included the County paying its Special Water Counsel to assist North San Joaquin in preparing its case for the State Water Board and for the County's counsel to prepare the legal briefs and papers submitted on behalf of North San Joaquin in the 1992 Mokelumne River Hearings. Due to the financial situation of North San Joaquin and the potential significant impacts that the 1992 Mokelumne River Hearing could have had on North San Joaquin's water rights the County deemed it important to assist North San Joaquin to protect its water rights at that time.

No decision on the merits was rendered regarding the 1992 Mokelumne River Hearing. The State Water Board did not formally resolve this matter until 2001. From 1992 until 2001 it was unclear and there was uncertainty whether North San Joaquin's water right would be adversely impacted by the State Water Board. The 1992 Mokelumne River Hearing was resolved by correspondence from State WaterBoard Staff in 2000 and 2001 indicating that the Bay/Delta Water Rights Hearings and ultimate adoption of Decision 1641 in effect resolved the 1992 Mokelumne River Hearing [NSJ-

43 and NSJ-44]. Furthermore, Decision 1641 acknowledged that no formal decision resulted in the 1992 Mokelumne River Hearing and stated that unless further notice is given, the State Water Board will not revisit water rights on the Mokelumne River as part of future phases of Bay-Delta Water Rights Hearing [NSJ 45, p.63].

Additionally, the State Water Board held a hearing on January 22, 1997, with a consideration to declare the Mokelumne River fully appropriated during the period of March 1 through November 30. The County and North San Joaquin participated in this hearing. The Declaration of Fully Appropriated Stream Systems was considered by the State Water Board on November 19, 1998, and Water Right (WR) 98-08 was adopted by the State Water Board. WR 98-08 states that North San Joaquin submitted a technical report addressing the groundwater overdraft problem in San Joaquin County and difficulties that the District has encountered in obtaining adequate water supplies. Footnote 3 of the Order states that “although the SWRCB acknowledges (North San Joaquin’s) ongoing water supply concerns, we are not able to address those problems in the context of the current proceedings regarding revisions to the Declaration of Fully Appropriated Streams.” (NSJ- 46, WR 98-08, p. 7.).

Yet another water rights hearing was noticed by the State Water Board on December 2, 1997, that could have impacted North San Joaquin’s water right on the Mokelumne River. The State Water Board gave notice of a public hearing to commence on March 9, 1998, to consider, among other things, alternatives to the 1995 Bay-Delta Plan. A Revised Notice of Public Hearing was issued on May 6, 1998, to commence on July 1, 1998, and continue periodically until December 28, 1999. The final order was adopted on March 15, 2000, with the issuance of Decision 1641. Both North San Joaquin

and the County participated as parties and presented evidence at this hearing. I testified at this hearing on behalf of the County of San Joaquin.

Among other things, Decision 1641 approved the Joint Settlement Agreement on the Mokelumne River, which had previously been approved by the Federal Energy Regulatory Commission in 1998, and indicated that the State Water Board would take no further action regarding the 1992 hearing on the Mokelumne River. Decision 1641 was issued by the State Water Board in 2000 and legal challenges were filed by many parties, including the County and North San Joaquin. This matter was heard in Sacramento Superior Court and an appeal to the Third District Court of Appeals resulted. The appellate court's decision was issued in February of 2006.

East San Joaquin Parties efforts to develop project to utilize surface water

In 1996, the East San Joaquin Parties Water Authority ("East San Joaquin Parties") was formally formed as a joint powers agency which included all of the water agencies in the eastern portion of San Joaquin County. The members included the County, the cities of Stockton and Lodi, Stockton East Water District, Central San Joaquin Water Conservation District, Woodbridge Irrigation District and North San Joaquin. In addition, California Water Service Company, which is a private company that provides water service to a portion of the Stockton metropolitan area, was an associate member. The purpose of the East San Joaquin Parties Water Authority was to "plan . . . a project, or projects, to meet the water deficiencies of Eastern San Joaquin County." [NSJ -47] North San Joaquin was a participating member of East San Joaquin Parties.

Although the East San Joaquin Parties joint powers agreement was executed by the member parties in 1996, the members had been meeting prior to the formal execution of the joint powers agreement. This included a cooperative agreement entered into in May of 1995 between EBMUD and East San Joaquin Parties. The cooperative agreement and cost sharing arrangement was to jointly evaluate a San Joaquin County based groundwater storage-conjunctive use program to meet the water supply needs of the East San Joaquin Parties and EBMUD.

In March of 1996 a report was prepared to formulate and evaluate the alternatives for a joint project by EBMUD and East San Joaquin Parties. This report was entitled the Mokelumne Aquifer Recharge and Storage Project (“MARS”). The MARS Report considered 11 potential water sources and various recharge facility options including agricultural in-lieu recharge and injection. This included usage within North San Joaquin.

The East San Joaquin Parties also developed a pilot project with EBMUD, referred to as the Beckman Project. The Beckman Test Project involved two injection wells that injected Mokelumne River water from EBMUD’s aqueduct into private wells. One of the purposes of the Beckman Test Project was to determine the ability to inject water into the overdrafted Eastern San Joaquin Groundwater Basin. The Beckman Test Project was completed in 1998 and successfully injected water into the groundwater basin.

Following the completion of the Beckman Test Project substantial negotiations occurred between East San Joaquin Parties and EBMUD for a ten injection well project within eastern San Joaquin Parties. No agreement between the parties was reached. This

was primarily due to San Joaquin County's groundwater export ordinance which requires a permit from the County Board of Supervisors in order to extract and export groundwater from within the County. One of the purposes of the County's groundwater export ordinance, which was originally enacted in 1996 and amended in 2000, was to protect the groundwater resources of the County, particularly due to the overdraft within the County.

STATE OF CALIFORNIA  
STATE WATER RESOURCES CONTROL BOARD

WATER RIGHTS ORDER 2006-0018-DWR	}	<b>TESTIMONY OF MARK J. MADISON</b>
In the Matter of Permit 10477 (Application		
12842) Regarding Diversion by NORTH SAN		
JOAQUIN WATER CONSERVATION		
DISTRICT		
Source: Mokelumne River	}	
County: San Joaquin	}	
_____	}	

I am Mark J. Madison, appearing today on behalf of North San Joaquin Water Conservation District (“North San Joaquin”). I am the Director of Municipal Utilities Department for the City of Stockton (“City”). I am a civil engineer registered in the State of California.

Generally, urban development within the City and over the Eastern San Joaquin County groundwater basin does not exacerbate the existing groundwater overdraft.

1. Current water demands for the City are approximately 68,714 acre-feet per year. After about 2015, new development will be displacing agricultural lands that currently use groundwater and some surface water. By the year 2035, the City’s water demand is projected to increase to as much as 156,083 acre-feet per year at full General Plan Update buildout. A portion of this demand will be met by groundwater supplies now used by agriculture.

2. Existing water demands are met through a combination of surface and ground water supplies. Surface water from the Stockton East Water District (“Stockton East”) accounts for about 60 percent of the City’s overall supply. The remaining 40 percent of demand is met through groundwater.

3. Based on studies conducted by the City, the long-term sustainable yield of the groundwater basin is 0.75 acre-feet/acre/year.

4. The City’s goal is to limit future urban groundwater use (on a conjunctive use basis) to below the estimated safe yield, with a long-term average groundwater extraction objective of 0.60 AF/acre/year, and an absolute extraction limit of 0.75 AF/acre/year.

5. Groundwater is an extremely important resource for City and is managed for long-term sustainability and use through conjunctive use with surface water supplies. Groundwater is used as the last source of supply when surface water is insufficient to meet water demands.

6. The overall decline in groundwater elevations from 1947 to 1978 is the result of agriculture and urban areas relying entirely on groundwater supplies.

7. In the late 1970’s, Stockton East began to provide surface water to the Stockton urban water retailers, resulting in increased groundwater elevations in the urban area that continued until the drought of the late 1980’s and early 1990s. The behavior of the groundwater basin during the drought and subsequent normal year hydrology of the late 1990’s indicate that the basin is recovering and is stabilized and operating within a manageable range.



8. The recent stabilization and improvement in groundwater elevations in the urban area is the result of wet hydrology, active recharge projects, and increased surface water deliveries in areas historically served by groundwater. Stabilization occurs because the amount of recharge is keeping up with the amount of extraction in certain areas on a long-term average basis.

9. In 2006, the City completed a Water Supply Evaluation (“WSE”) to determine the adequacy of water supply sources needed to serve the General Plan Update that will supersede the current 1990 General Plan. A copy of the WSE is included as Exhibit NSJ-48.

10. To simulate the variability of water supplies for differing hydrologic conditions, the City used an Integrated Surface and Ground Water model. A 70 year repeat of the historic hydrology was used to determine the adequacy of the sum total of water supplies in any given hydrologic year type. For instance, in dry years, surface water curtailments are considered, so groundwater and rationing are used to make up the difference. The objective is that over the 70 years, groundwater use does not exceed the predefined sustainable yield of 0.75 AF/acre/year as described above. Figure 13 of NSJ-48 shows the results at 2035 on how water demands are met. This figure shows that, in even the driest historical hydrologic periods (say 1976 to 1978 or 1987 to 1992) there is sufficient water supply to meet existing and reasonably foreseeable water demands with 2035 surface water supply availability and use of groundwater.

11. Figure 14 of NSJ-48 shows the build-up of water demand as the top line, the safe sustainable yield as the dashed line and the modeled average yield as the bottom

line. From this figure, it shows that during no time does the groundwater yield approach the safe sustainable yield of based on the 0.75 AF/ac/year.

12. The average groundwater extraction yield over 70 years of historic hydrology at 2035 conditions is 30,394 AF/year. In dry years, slightly more groundwater is available to replace deficiencies in surface water as part of the existing conjunctive use program. The sustainable yield of groundwater is based on the amount of urban developed acreage. This developed area of 51,203 acres of existing and foreseeable developed acreage results in a maximum long-term average groundwater extraction rate of 40,609 AF/year based on the 0.75 AF/ac/year factor.

13. When the General Plan Update demands are added to existing water supplies, the WSE shows that existing water supplies are not sufficient to meet the expected water demand from the General Plan Update.

14. Future demands can be met through a combination of existing and new surface water supplies and the conjunctive use program identified in the WSE. Future water supply sources for the City include the Delta Water Supply Project, appropriative water rights to be obtained by Stockton East Water District, water transfers from local irrigation districts for both potable and nonpotable uses, active groundwater storage, water conservation, and the use of recycled water for nonpotable uses.

15. In 2006, the City received a water right permit from the State Water Resources Control Board for its Delta Water Supply Project (“DWSP”), and is currently implementing that project. Planning for the DWSP assumed a maximum long term operational yield objective of the basin underlying the City 0.60 AF/ac/year. This is a 20 percent reduction in the estimated safe yield of 0.75 AF/ac/year. The purpose of using the

more conservative goal of 0.60 AF/ac/year is to maximize the use of surface water and manage the underlying groundwater basin for the protection of groundwater resources indefinitely.

16. A deviation from the lower extraction rate can occur if lands within the General Plan Planning Area Boundary are converted from agricultural uses irrigated with groundwater to urban uses. To account for the prior groundwater pumping, an agricultural credit was assumed based on not exceeding a 1.0 AF/ac/year maximum. This acknowledges that the groundwater basin was being used for agriculture prior to urbanization. The determination of how the agricultural credit concept is used can be found in the WSE and a detailed technical memorandum is included as Exhibit “F” to the WSE. [NSJ-48]

17. Applying the methodology in Exhibit “F” to the WSE, the 0.75 AF/ac/year goal can be increased in the City up to 0.87 AF/ac/year and maintain a net positive impact to the groundwater basin. Based on this higher amount, assumed to not occur until 2015 when agricultural lands begin to be fallowed and developed, the groundwater use compared to sustainable yield is shown in Figure 22 of NSJ-48.

18. From this evaluation the City has confirmed that use of groundwater under full build out conditions of the General Plan Update at a level of 0.87 AF/ac/year or lower will not impact the larger groundwater basin and will not have a negative effect on regional groundwater elevations, water quality, or groundwater quantity.

19. The City is also currently pursuing additional surface water supplies.

20. I have already met with North San Joaquin to discuss this potential, and the City is interested in pursuing discussions with North San Joaquin for this purpose.

STATE OF CALIFORNIA  
STATE WATER RESOURCES CONTROL BOARD

WATER RIGHTS ORDER 2006-0018-DWR	}	<b>TESTIMONY OF RICHARD PRIMA</b>
In the Matter of Permit 10477 (Application 12842) Regarding Diversion by NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT		
Source: Mokelumne River		
County: San Joaquin		
_____		

I am Richard Prima, appearing today on behalf of North San Joaquin Water Conservation District (“District”). I am the Public Works Director for the City of Lodi (“City”) and have been employed by the City since September 1975. I am a civil engineer registered in the State of California. At the outset, I would like to state that the City **fully supports the District’s request to extend their permit.**

**BACKGROUND**

The City of Lodi, founded in 1869 as the town of Mokelumne, was incorporated in 1906 and currently has a population of 63,000 residents. One of the main reasons for incorporation was to provide for municipal water and electric service. The City has relied on groundwater for its waster supply since its beginnings and has recognized the importance of the Mokelumne River for recharge of the local aquifer since the early 1900’s.

Given the City’s reliance on groundwater and the regulatory and financial implications of developing a new surface water supply solely for Lodi municipal purposes, the City has always

supported efforts by neighboring water districts and San Joaquin County to develop new surface water supplies for agriculture to help preserve groundwater resources.

In June 23, 1948 the Lodi City Council approved providing funds for the creation of what became the North San Joaquin Water Conservation District. [NSJ-49] At that time the District included the entire City, however, subsequent City annexations to the west were in the Woodbridge Irrigation District. The City has continued to cooperate with the District and other local water agencies. More recent highlights of this support include:

- ❖ 1970 – Resolution #3417 supporting extension of the Folsom South Canal. [NSJ-50]
- ❖ 1992 – City Council authorized Public Works Director to participate in State Water Board hearings on Mokelumne River allocations on District’s behalf. [NSJ-51]
- ❖ 1999, 2000 – City Council support for joint groundwater banking project with District & EBMUD, including direct funding grants to District for their participation in Bay-Delta hearings. [NSJ-52 and NSJ-53].
- ❖ 2001 – Resolution 2001-72 supporting legislation authorizing District Groundwater Assessment. [NSJ-54]
- ❖ 2003 – Resolution 2003-118 to cast “Yes” votes on District Groundwater Assessment. [NSJ-55]
- ❖ 2007 – City’s support of the District’s proposed groundwater charge.
- ❖ Ongoing – The City has continued to participate with the District and other area water entities in the East San Joaquin Parties Water Authority (now Northeastern San Joaquin Groundwater Banking Authority) as part of the joint powers

authority and in making financial contributions. Also, the City has participated financially with Mokelumne River Water & Power Authority, and has a representative on the San Joaquin County Water Advisory Commission.

## **CITY WATER SUPPLY PLANNING**

The City's current groundwater use is approximately 17,000 acre-feet per year (afa) which represents the City's total potable water supply. The 2005 Urban Water Management estimates 2030 demands of 25,100 afa. [NSJ-56]

Recognizing the importance of securing surface water supplies for municipal use and helping to correct the groundwater basin overdraft, in 2003, the City departed from past "support others" policies and directly entered into a long-term agreement with the Woodbridge Irrigation District (WID) for a nominal 6,000 acre feet annually for conserved water from the WID's pre-1914 water rights. [NSJ-57] In 2006, the City Council made a decision to pursue development of a water treatment facility to directly use the WID water in the City's municipal system. [NSJ-58]

Because the City has now made the decision to develop a water treatment facility it now has a serious new opportunity to work with the District to utilize a portion of its Mokelumne River water in that treatment facility. Prior to this, the City had not anticipated directly using water from the District given its frequent unavailability. A treatment plant would allow North San Joaquin and the City to work together on a conjunctive use basis to provide the City of Lodi with additional much-needed surface water. In addition, the City is willing to work with North San Joaquin to develop future groundwater recharge projects with City participation.

## **CONCLUSION**

This City urges the State Water Board to grant the District's Petition for Extension of Time as this water is vital to both agricultural and urban interests and needed to for the District to replenish the critically overdrafted groundwater basin.



# Ground Water Basins in California

A Report to the Legislature  
in Response to  
Water Code Section 12924

Publication 118-80  
January 1980



### Basins With Special Problems

Only one basin with special problems has been identified in the Sacramento Basin Hydrologic Study Area.

Sierra Valley Basin. In the Sierra Valley, which is primarily a cattle area, Sierra Valley ground water is threatened by the drilling of large agricultural wells and an impending population growth. Pressures for housing subdivisions because of population growth in Nevada have increased. Some existing wells have lost considerable artesian head. In fact, artesian head in some areas has dropped below ground surface, thereby severely complicating the problem of providing winter water for cattle. The basin is situated in Sierra and Plumas Counties.

### San Joaquin Basin Hydrologic Study Area

Figure 10 presents the 39 ground water basins in the San Joaquin Basin Hydrologic Study Area. Table 6 shows those basins and identifies eight basins now indicated to be in overdraft.

### Ground Water Basin Boundaries

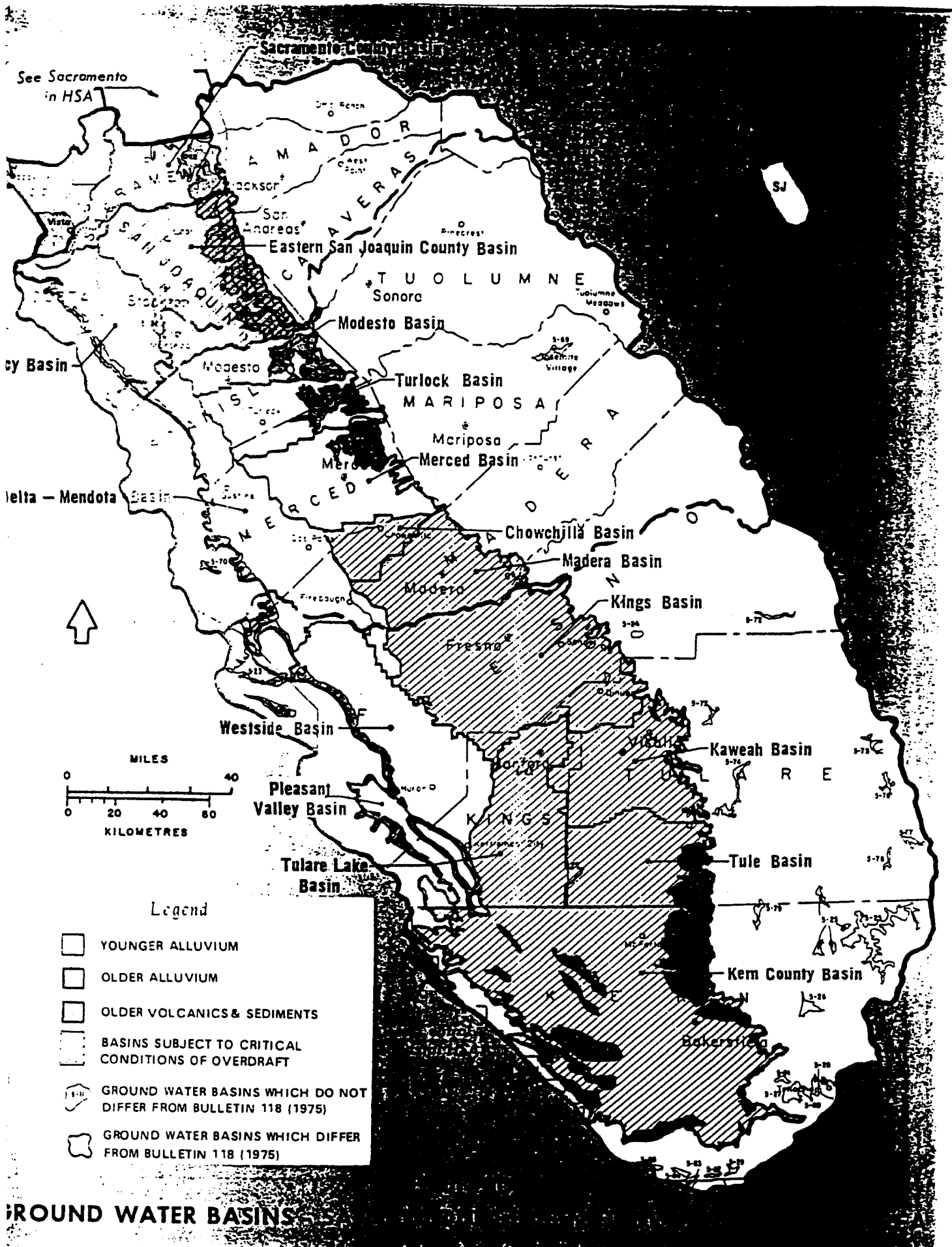
The Sacramento County Basin extends into this hydrologic study area but is discussed under the Sacramento Basin Hydrologic Study Area.

Local views included both leaving the San Joaquin Valley as one basin and identifying each existing water agency boundary as a ground water basin boundary.

The San Joaquin Valley is divided into 15 separate basins, largely based on political considerations. Division into these basins is essential for ground water management, since management of the valley as a whole is impractical. Division along all existing water agency boundaries would result in basins with technical problems in the conduct of management activities.

Eastern San Joaquin County Basin. The boundaries are the county line on the north, the San Joaquin River on the west, the county line and the Stanislaus River on the south, and the edge of the alluvium on the east. The basin includes a portion of Stanislaus County in the southeast portion. The specific boundaries were endorsed by local water agency personnel.

Modesto Basin. The Modesto Basin lies between the Stanislaus and Tuolumne Rivers, from the San Joaquin River on the west to the Sierra Nevada foothills on the east. The basin comprises land in the Modesto Irrigation District, the southern two-thirds of the Oakdale Irrigation District, and lands to the east in the unincorporated area called Cooperstown.



**GROUND WATER BASINS**

**Legend**

- YOUNGER ALLUVIUM
- OLDER ALLUVIUM
- OLDER VOLCANICS & SEDIMENTS
- BASINS SUBJECT TO CRITICAL CONDITIONS OF OVERDRAFT
- GROUND WATER BASINS WHICH DO NOT DIFFER FROM BULLETIN 118 (1975)
- GROUND WATER BASINS WHICH DIFFER FROM BULLETIN 118 (1975)

Table 6

GROUND WATER BASINS IN THE  
SAN JOAQUIN BASIN HYDROLOGIC STUDY AREA

<u>Basin Name</u>	<u>Bulletin 118 (1975) No.</u>	<u>Evidence of Overdraft</u>
<u>EASTERN SAN JOAQUIN COUNTY BASIN</u>		yes
San Joaquin Valley (portion)	5-22	(b)
<u>MODESTO BASIN</u>		
San Joaquin Valley (portion)	5-22	--
<u>TURLOCK BASIN</u>		
San Joaquin Valley (portion)	5-22	--
<u>TRACY BASIN</u>		
San Joaquin Valley (portion)	5-22	--
<u>MERCED BASIN</u>		
San Joaquin Valley (portion)	5-22	--
<u>CHOWCHILLA BASIN</u>		yes
San Joaquin Valley (portion)	5-22	(d)
<u>MADERA BASIN</u>		yes
San Joaquin Valley (portion)	5-22	(d)
<u>DELTA-MENDOTA BASIN</u>		
San Joaquin Valley (portion)	5-22	--
<u>KINGS BASIN</u>		yes
San Joaquin Valley (portion)	5-22	(d)
<u>KAWEAH BASIN</u>		yes
San Joaquin Valley (portion)	5-22	(d)
<u>TULARE LAKE BASIN</u>		yes
San Joaquin Valley (portion)	5-22	(d)

Table 6 (Continued)

<u>Basin Name</u>	<u>Bulletin 118 (1975) No.</u>	<u>Evidence of Overdraft</u>
<u>TULE BASIN</u>		
San Joaquin Valley (portion)	5-22	yes (d)
<u>PLEASANT VALLEY BASIN</u>		
San Joaquin Valley (portion)	5-22	--
<u>WESTSIDE BASIN</u>		
San Joaquin Valley (portion)	5-22	--
<u>KERN COUNTY BASIN</u>		
San Joaquin Valley (portion)	5-22	yes (e)
PANOCHE VALLEY	5-23	--
SQUAW VALLEY	5-24	--
KERN RIVER VALLEY	5-25	--
WALKER BASIN CREEK VALLEY	5-26	--
CUMMINGS VALLEY	5-27	--
TEHACHAPI VALLEY WEST	5-28	--
CASTAC LAKE VALLEY	5-29	--
YOSEMITE VALLEY	5-69	--
LOS BANOS CREEK VALLEY	5-70	--
VALLECITOS CREEK VALLEY	5-71	--
CEDAR GROVE AREA	5-72	--
THREE RIVERS AREA	5-73	--
SPRINGVILLE AREA	5-74	--
TEMPLETON MOUNTAIN AREA	5-75	--
MANACHE MEADOWS AREA	5-76	--
SACATOR CANYON VALLEY	5-77	--
ROCKHOUSE MEADOW VALLEY	5-78	--
INNS VALLEY	5-79	--
BRITE VALLEY	5-80	--
BEAR VALLEY	5-81	--
CUDDY CANYON VALLEY	5-82	--
CUDDY RANCH AREA	5-83	--
CUDDY VALLEY	5-84	--
MILL POTRERA AREA	5-85	--

- (b) Water Code Section 12924 Public Hearing Record: Statement of Richard W. Dickenson, San Joaquin County Flood Control and Water Conservation District.
- (d) DWR District Report on Mid-Valley Canal Areal Study, publication pending.
- (e) Original data presented in speech "Dust Bin of History" by Ronald B. Robie, Director, Department of Water Resources, to State Board of Food and Agriculture on February 1, 1979.

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Tule Basin. The Tule Basin is generally bounded on the west by the Tulare County line, excluding those portions of Tulare Lake Basin Water Storage District and Sections 29 and 30 of Township 23 South, Range 23 East, that are west of Homeland Canal. The northern boundary of the basin follows the northern boundaries of Lower Tule Irrigation District and Porterville Irrigation District and the southern boundary of Lindmore Irrigation District, the eastern boundary is at the edge of the alluvium, and the southern boundary is the Tulare-Kern County Line.

Pleasant Valley Basin. This basin includes the older and younger alluvium of the San Joaquin Valley north of the Kern County line and west of the Tulare Lake Basin and the Westside Basin.

Westside Basin. The Westside Basin consists mainly of lands in the Westlands Water District. Heavy pumping occurred prior to construction of the San Luis Unit of the Central Valley Project, causing ground subsidence as much as 8.5 metres (28 feet) in one area and lower ground water levels.

Kern County Basin. The Kern County Basin consists of that portion of the San Joaquin Valley in Kern County and includes the contiguous older and younger alluvium.

#### Basins Subject to Critical Conditions of Overdraft

Eight basins have been identified as subject to critical conditions of overdraft in the San Joaquin Basin Hydrologic Study Area.

Eastern San Joaquin County Basin. This basin for many years has experienced overdraft, the adverse effects of which include declining water levels that have induced the movement of poor quality water from the Delta sediments eastward near the City of Stockton. Migration of these saline waters has severely impacted the utility of ground water in the vicinity of Stockton. Wells have been abandoned and replacement water supplies have been obtained by drilling additional wells generally to the east. For partial mitigation of these adverse impacts, supplemental water from the Calaveras River through the Stockton-East Water District Aqueduct is being substituted for ground water.

To stop the easterly migration of poor quality water would require maintaining higher water levels in the basin and other measures, which, in turn, would probably reduce ground water inflow from the south. Under those higher water level conditions, the estimated supplemental water requirement would be materially greater than at the present. The exact amount of overdraft and supplemental water requirement is presently under study.

The identification of the Eastern San Joaquin County Basin as subject to critical conditions of overdraft is based on the existing overdraft and the adverse effects described above.

Chowchilla Basin. Overdraft in the basin was estimated at 62 000 cubic dekametres (50,000 acre-feet) annually in 1975, based upon the DWR Mid-Valley Canal Areal Study. Chowchilla Water District, which lies in the eastern portion of the basin, presently has a balanced water budget due to CVP deliveries from the Madera Canal and an estimated 29 600 cubic-dekametre (24,000 acre-foot) annual new water yield from the recently completed Buchanan Dam on the Chowchilla River.

However, ground water meets nearly all applied water demands in the areas to the southwest and to the north of Chowchilla Water District, and maximum ground water level declines amounted to over 2 metres (6 feet) per year during the period 1970-75. These areas are experiencing a rapid growth in irrigated agriculture. Ground water level lowering in these areas of heavy pumping is expected to induce greater subsurface flows from the Chowchilla Water District area and cause water levels there to drop.

A water quality problem has developed over the years in the southwest portion of the basin due to the reclamation of lands for agricultural expansion. The heavy pumping and application of water for leaching of salts from the soils has apparently carried those salts to the ground water.

Adverse effects from the overdraft include increasing ground water pumping lifts, costs, and energy usage, and the water quality problems. The Chowchilla Basin is identified as subject to critical conditions of overdraft, as present water management practices would probably result in adverse environmental, social or economic impacts, particularly in the western portion of the basin.

Madera Basin. Overdraft in the basin was estimated at 123 000 cubic dekametres (100,000 acre-feet) annually in 1975, based upon the DWR Mid-Valley Canal Areal Study. Madera Irrigation District, which lies in the central portion of the basin, presently has a balanced water budget due to CVP deliveries from the Madera Canal and an estimated 29 600 cubic-dekametre (24,000 acre-foot) annual new water yield from the recently completed Hidden Dam on the Fresno River. However, ground water meets nearly all applied water demands in the area west of Madera Irrigation District, where agricultural development is growing rapidly and maximum ground water level declines amounted to over 2 metres (6 feet) per year for the period 1970-75. Heavy pumping is also occurring to the east of Madera Irrigation District, where cropped acreage has increased by 10 100 hectares (25,000 acres) during the period 1958-74 and where only minor amounts of surface water are available. The

STATE OF CALIFORNIA  
GOODWIN J. KNIGHT  
GOVERNOR

PUBLICATION OF  
STATE WATER RESOURCES BOARD

BULLETIN NO. 11

SAN JOAQUIN COUNTY  
INVESTIGATION

Volume I (Text and Plates)

( Seal of )  
( State of )  
( California )

April, 1954

The annual costs included interest, repayment, replacement, operation and maintenance, insurance, and general expenses. In the cost analysis it was shown that annual costs based upon the two per cent interest rate could be met under the schedule of revenues shown in the following tabulation, but that an annual deficit of some \$1,426,000 would occur with the three per cent rate.

<u>Item</u>	<u>Unit charge</u>	<u>Annual revenue</u>
311,000 acre-feet of new water delivered to service area along Feather River	\$ 1.00	\$ 311,000
2,845,000 acre-feet of new water delivered to Delta	1.00	2,845,000
1,670,000,000 kilowatt-hours of electrical energy at terminal substation	0.007	<u>11,690,000</u>
TOTAL		\$ 14,846,000

Based on the foregoing assumptions, the estimated cost of water from the Feather River Project available for export from the Sacramento-San Joaquin Delta to the San Joaquin Area would be about \$1.00 per acre-foot at points of diversion in the Delta.

#### Folsom Project

The probable ultimate supplemental water requirement of the San Joaquin Area could be met under a plan which will provide regulatory storage on the American River, by construction of Folsom Dam and Reservoir about 2-1/2 miles upstream from the town of Folsom and about one-half mile below the confluence of the North and South Forks of the river. A portion of the regulated water supply so made available could be conveyed to the San Joaquin Area by gravity conduit, or could be released to the Sacramento-San Joaquin Delta for pumped diversion to the San Joaquin Area as described in the preceding section in the case of Feather River water.

Folsom Dam and Reservoir, locations of which are shown on Plate 14,



are under construction by the Corps of Engineers, Department of the Army. Folsom Dam and Reservoir were authorized for federal construction in Public Law 534, 78th Congress, 2nd session, and were adopted and authorized by the State of California in Chapter 1514, California Statutes of 1945. Subsequently, the Folsom Project was authorized as a unit of the Central Valley Project by the Congress in Public Law 356, 81st Congress, 1st session. This authorization included Folsom Dam and Reservoir, Folsom Power Plant located below Folsom Dam, Nimbus Dam and Power Plant located about seven miles below Folsom Dam, and the Sly Park Project located in El Dorado County to furnish supplemental water to lands in and adjacent to the El Dorado Irrigation District. Under the legislation the power features and the Sly Park Project are being constructed by the Bureau of Reclamation, Department of the Interior. In addition to the presently authorized development, the Folsom Project contemplates eventual construction of conveyance and distribution systems for the conserved water, which features were not included in the foregoing legislation.

Yield studies presented in a report prepared by the Division of Water Resources pursuant to Senate Concurrent Resolution No. 48, Legislature of 1951, entitled "Feasibility of State Ownership and Operation of the Central Valley Project of California", dated March, 1952, indicate that new seasonal yield of Folsom Reservoir will be about 800,000 acre-feet. This report assumed that the yield of Folsom Reservoir would be used primarily in a service area extending along the east side of the Central Valley from Markham Ravine on the north to Littlejohns Creek on the south, and including the major portion of the San Joaquin Area. In order that this water might be utilized in the service area, it would be necessary to construct canals to convey releases from Folsom Reservoir both to the north and south of the American River.

The main section of Folsom Dam will consist of a concrete-gravity structure across the river channel, with a crest length of 1,400 feet and a height of

280 feet above stream bed. The left and right wings of the main dam, as well as several auxiliary dams, will consist of earth-filled sections. The overcur spillway will be located at the center of the concrete section of the main dam, and will have a capacity of 567,000 second-feet. The storage capacity of Folsom Reservoir will be 1,000,000 acre-feet, and the reservoir area is 11,650 acres. Several county roads will require relocation as well as electric utility distribution lines, and provision will be necessary for maintenance and operation of flooded water supply systems.

The Folsom Power Plant is to be located below Folsom Dam. The installed power capacity of the plant will be 162,000 kilowatts, and the maximum head will be 340 feet. Nimbus Dam and Reservoir will be located about seven miles below Folsom Dam, and this reservoir will serve as an afterbay to re-regulate the power releases from the Folsom Power Plant to a uniform flow. The dam will be a concrete structure with a crest length of 1,170 feet and a height of 45 feet above stream bed, and will create a reservoir with storage capacity of 7,700 acre-feet. The Nimbus Power Plant, located at the dam, will have an installed power capacity of 13,500 kilowatts.

A summary of estimated capital costs of Folsom Dam and Reservoir, and appurtenant features, as furnished by the Bureau of Reclamation and the Corps of Engineers is presented in the following tabulation:

Folsom Dam and Reservoir	\$52,074,000
Folsom power facilities including Nimbus Afterbay Dam and Power Plant	<u>36,741,000</u>
TOTAL	\$88,815,000

The Bureau of Reclamation is presently conducting detailed studies of the alignment and costs of the Folsom South Canal and of the areas which could be served from the canal. Preliminary data and information furnished by the Bureau of Reclamation indicate that water would be diverted into the Folsom South

Canal from the American River at a point below Nimbus Dam. The Folsom South Canal would extend southerly to Littlejohns Creek, a distance of approximately 50 miles. As presently planned, the Folsom South Canal would divert water from the American River at an elevation of about 118 feet and extend southerly, crossing the Cosumnes River at an elevation of about 110 feet, Dry Creek at an elevation of 100 feet, the Mokelumne River at an elevation of 95 feet, the Mokelumne Aqueduct of the East Bay Municipal Utility District at an elevation of about 93 feet, and near the Calaveras River at an elevation of 90 feet. Studies made by the Division of Water Resources indicate that it would probably be desirable to convey the water by gravity in the Folsom South Canal easterly and north of the Calaveras River a distance of about 3.5 miles to an elevation of about 89 feet. At this point the water would then be lifted to an elevation of 132 feet and conveyed easterly by gravity and cross the Calaveras River by means of a siphon immediately above Bellota with water surface at an elevation of about 130 feet. The water would then be conveyed in a southerly direction, skirting the foothills south of Bellota, to Littlejohns Creek. The canal would terminate about two miles upstream from the town of Farmington at an elevation of about 124 feet. This alignment would eliminate the necessity of acquiring expensive rights south of the Calaveras River and, furthermore, would facilitate delivery of water to a larger service area than had the canal continued by gravity from the Calaveras River to Littlejohns Creek. The location of the described Folsom South Canal is shown on Plate 14. Water released from Folsom Reservoir and conveyed in the Folsom South Canal could serve a large portion of the San Joaquin Area by gravity.

In the cited report of the Division of Water Resources on feasibility of state ownership and operation of the Central Valley Project, it was assumed that water released from Folsom Reservoir would be delivered at the intake to the Folsom South Canal for \$1.00 per acre-foot. This assumed rate of revenue from the sale of new seasonal yield from Folsom Reservoir was used in the

financial analyses of the Central Valley Project presented in that report. Since the Bureau of Reclamation is presently conducting detailed studies of the alignment and costs of the Folsom South Canal, and probably will make such information available in the near future, no detailed studies for the Folsom South Canal were made by the Division of Water Resources. However, preliminary estimates of costs made by the Division, based on a preliminary alignment furnished by the Bureau of Reclamation to the Calaveras River and the alignment contemplated by the Division of Water Resources from the Calaveras River to Littlejohns Creek, indicate that capital costs to deliver 609,000 acre-feet of water seasonally to Sacramento and San Joaquin Counties through the Folsom South Canal would be about \$24,650,000. The estimated 609,000 acre-feet of water per season comprises the probable ultimate supplemental water requirement of lands which could be practicably served from the Folsom South Canal, including 303,000 acre-feet in San Joaquin County and 306,000 acre-feet in Sacramento County. Annual costs on a 3 per cent and 4 per cent basis were estimated at \$1,306,000 and \$1,517,000, respectively. Unit annual costs on a comparable basis, and including the assumed value of \$1.00 per acre-foot for water delivered to the intake of the Folsom South Canal, were estimated to be \$3.20 per acre-foot and \$3.50 per acre-foot, respectively.

As has been mentioned, as an alternative to its conveyance in the Folsom South Canal, a portion of the yield of Folsom Reservoir could be released down the American and Sacramento Rivers to the Sacramento-San Joaquin Delta. It could then be conveyed across the Delta in a cross canal, and to the South Fork of the Mokelumne River and the delta channels tributary thereto. From the

delta channels the water could be pumped to and distributed in the San Joaquin Area lying immediately to the east. Preliminary designs and cost estimates for such a conveyance system have not been made. However, based on data and estimates at hand, it is indicated that unit cost of the new/<sup>seasonal</sup>yield from the Folsom Project would be little different than at Nimbus Dam, or about \$1.00 per acre-foot at points of diversion in the Delta, and comparable with the estimated cost of new water from the Feather River Project at the same points.

#### Other Projects Under Consideration

In connection with the State-Wide Water Resources Investigation and the Survey of Mountainous Areas, various plans for development of the water resources of Sierra Nevada streams are under consideration. Among the streams under investigation, in addition to the Feather and American Rivers already discussed in part, are the Cosumnes, Mokelumne, Calaveras, and Stanislaus Rivers, and Dry Creek. All five of these latter streams were considered as possible sources of additional water supply for the San Joaquin Area, as well as for the natural foothill and mountain water service areas of the streams, which service areas are located to the east of the San Joaquin Area, and are shown on Plate 16, "Potential Water Developments". With the exception of small portions of some <sup>foothill</sup> of the lower/service areas, none can be practicably supplied with water directly from the Central Valley Project, the Feather River Project, or from possible large, low-elevation reservoirs on the five cited tributary streams. Probable ultimate water requirements of the mountain and foothill areas are substantial, and very little water has been developed for use in those areas to date. On the other hand, the waters of the Stanislaus and Mokelumne Rivers, by far the larger of the five streams, have been developed to a considerable degree for the benefit of areas on the Central Valley floor and in the San Francisco Bay Area.

Since the foregoing studies and investigations are in progress, no final conclusions regarding project plans and costs, and allocations of new safe