



THE RESOURCES AGENCY OF CALIFORNIA
Department of Water Resources

BULLETIN No. 132-63

THE CALIFORNIA STATE WATER PROJECT IN 1963

APRIL 1963

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CHAPTER V. WATER SUPPLY

California's water resources are sufficient to meet its needs. The major portion of California's natural water supply, however, occurs in the northern part of the State during the winter season and in widely varying quantities from year to year. On the other hand, the major portion of the water requirement occurs in Central and Southern California during the summer season. Therefore, the solution to the State's water supply problems must involve the construction of large regulatory storage reservoirs in the north and conveyance facilities to deliver the conserved water to the central and southern areas of the State. Not only, therefore was it necessary to work out the plan for Oroville Dam and the California Aqueduct, but also a plan for marshalling the State's waters and economic resources. In order to do this the department adopted the Delta Pooling Concept.

Delta Pooling Program

The department will operate the project in accordance with the Delta Pooling Concept. The Delta Pooling Program recognizes the Sacramento-San Joaquin Delta as the central collection point for all surplus waters from the Sacramento and San Joaquin Valleys. All state project demands in Central and Southern California, as well as a substantial measure of the Federal Central Valley Project demands, will be met by exporting water from the Delta. These export requirements will be provided by diverting

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surplus waters now wasting to the ocean during the winter and spring months, such surpluses to be firmed up by major storage developments in the Sacramento Valley and by San Luis Reservoir. Water imported from the North Coast also will be added in the future.

Estimated mean seasonal natural runoff^{1/} of the Central Valley area tributary to the Delta is given in the following tabulation:

<u>Area</u>	<u>Acre-feet</u>
Sacramento River Basin	22,390,000
San Joaquin River Basin	6,386,000 ^{2/}
Delta Tributary Area	<u>1,547,000</u>
Total	30,323,000

In the operation of the State Water Project, Oroville and San Luis Reservoirs will be operated in conjunction with surplus flows in the Delta to develop an initial firm annual yield for delivery of 4,000,000 acre-feet. The present surplus flows in the Delta will be diminished in the future, because of further development of water in the area tributary to the Delta, particularly in the Sacramento River Basin. Therefore, additional future

^{1/} State Water Resources Board, Bulletin No. 1, "Water Resources of California," (1951).

^{2/} Runoff to the Tulare Lake Basin is excluded because outflow from that basin occurs only at times of extreme flood when large surpluses of water in the Delta are wasting to the ocean.

water supplies must be made available in the Delta, both to offset the effect of depletions resulting from increased upstream development, and to meet export demands. P. 121

The Delta Pooling Program involves the utilities' system approach in the marketing of water in the service areas of the State Water Project. The Delta Water Charge is one of the principal components of the cost of project water to the contracting agencies. It will represent the cost of all facilities necessary to develop the project yield. The Delta Water Charge will vary to reflect the cumulative investment in facilities to maintain the yield of the project for export at any given time. All water users will pay the Delta Water Rate as a part of their service.

Delta Depletions

The watershed tributary to the Delta is a vast basin with widely varying climate and terrain. The inflow to the Delta reflects the cumulative effect of all hydrologic phenomena and economic development occurring within this basin. Changes in conditions, such as increasing water use for urban or agricultural purposes, necessarily will be reflected in the pattern, quantity, and quality of the inflow to the Delta.

Since water exported from the Delta will include both regulated and unregulated flows, the maximum quantity which may be diverted at any particular time will be partially dependent upon the degree of urban and agricultural development within the basin. In order to predict the quantity of water available for

export in the future it is necessary to estimate the extent of future development within the basin^{3/}, and the effects of this development upon the inflow to the Delta.

The determination of future consumptive use of water requirements in the watershed tributary to the Delta was made on the basis of anticipated markets for crops grown in the area, analysis of informed local opinion concerning future agricultural development, and population forecasts. Estimates of increase in water use above 1960 conditions are given in Chapter VII.

Operation Studies

Operation studies to evaluate the present and future surplus flows in the Delta and the water supply available for the State Water Project have been based on the historical inflows to the Delta^{4/}.

Historically, inflow to the Delta has varied widely, generally being large during the winter and spring months of

^{3/} Runoff to the Tulare Lake Basin is excluded because outflow from that basin occurs only at times of extreme flood when large surpluses of water in the Delta are wasting to the ocean.

^{4/} Relevant data were taken from two principal sources: (1) "1957 Joint Hydrology Study, Sacramento River and Sacramento-San Joaquin Delta," prepared by the United States Bureau of Reclamation and the Department of Water Resources as a cooperative effort; and (2) reports of the Department of Water Resources and its predecessors entitled "Sacramento-San Joaquin Water Supervision," published annually from 1924 until 1955, and replaced beginning in 1956 with "Bulletin No. 23-56, Surface Water Flow for 1956" and subsequent reports of that series through Bulletin No. 23-60.

maximum precipitation and snowmelt, and relatively small in the late summer and early fall months of waning mountain and foothill runoff and maximum use in the tributary areas. Moreover, the historical inflow to the Delta has fluctuated in a rough cyclic pattern, involving several consecutive years when runoff was either far below or far above average runoff. For example, the seven-year period from 1928 through 1934 which was grossly deficient in runoff, represents the most severe drought period in the recorded history of the Central Valley. The ensuing period from 1935 through 1944, including the heavy flood years of 1938 and 1941, was greatly above average.

The chronological occurrence of these extended wet and dry periods is of extreme importance in determining the water supply available for export by State Water Projects. In order to evaluate the firm yield, that is, the minimum amount of water that could be made available for use every year by the State Water Project, it was necessary to select an operational period covering the 1928-34 drought period. At the same time, the operational period must include a sufficient number of the wet years preceding and following the critical drought period to ensure that the storage reservoirs would be full both at the beginning and at the end of the operational period. The operational period selected covers the 20 runoff years from 1921-22 through 1940-41. This

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The operation studies were based upon the fundamental assumption that future hydrologic conditions will be no more severe than those of the recorded past. It is recognized that critical drought periods in the future may possibly be more extended than those upon which the yields of the State Water Project have been predicated.

Present Inflows to the Delta

Determination of inflows to the Delta under present conditions of development was necessary to form a basis for predicting the surplus flows under future conditions of development in the watershed. Present conditions, as used herein, include the effects of full operation of most water development facilities in the Sacramento and San Joaquin Valleys presently in operation or under construction except in the Tulare Lake Basin.^{5/} Demands to be met by existing projects were the largest measured annual diversion during the latest five years of record available at the time of the study, on a monthly schedule based on the average of monthly diversions during that period.

The Central Valley Project was assumed to be operated to meet demands, namely diversions along the Sacramento River; navigation requirements; salinity repulsion; consumptive requirements in the Delta; present export requirements from the Delta;

^{5/} Since completion of the studies described herein, operation of the Corning Canal Unit of the Central Valley Project and the American River Development of the Sacramento Municipal Utility District have begun. The effect of these facilities upon the operation studies would be negligible.

and necessary fishery releases. In addition, sufficient power was assumed to be generated to meet the Central Valley Project pumping requirements and power sales contracts. Shasta and Folsom Reservoirs were operated in accordance with established flood control operational criteria.

Operation of the present water development facilities over the historical water supply period provides the basis for determination of the flows that would enter the Delta under the conditions assumed. Some of these inflows are needed to meet present water requirements in and from the Delta while the remainder wastes into San Francisco Bay. The inflows include uncontrolled stream flow, project spills, and other project releases in excess of the demands mentioned in the preceding paragraph.

Surplus Water in the Delta

The future availability of surplus waters in the Delta was determined from analyses using the data on present inflow to the Delta and estimates of future consumptive use of water in the tributary watershed and within the Delta itself.

A graphical method of analysis was used to account for the additional surface and ground water storage necessary to satisfy the forecasted growth in consumptive use of water in the basin tributary to the Delta. With this method the estimated future surplus flows reflect the ratio of storage requirements to consumptive water requirements, which has been shown to apply

under present conditions of water supply development. This allows for the fact that not all inflow to the Delta can be regulated by reservoirs.

Water Rights

In planning the State Water Project, careful attention has been given to acquisition of adequate water rights in accordance with state law. In obtaining such rights, the State is in virtually the same position, and must proceed in the same manner, as any other party wishing to acquire water rights in California.

Applications for State Water Project

Since 1927, the department and its predecessors have filed a number of applications for the appropriation of water in furtherance of "a general or coordinated plan looking toward the development, utilization, or conservation of the water resources of the State."^{6/} Of these state applications, 15 are applicable to the State Water Project.

The essential features of the applications are summarized in Table 1.

Action by California Water Commission

On February 26, 1960, the department requested assignment by the California Water Commission of Applications Nos. 5629, 5630, 14443, 14445A, 17512, 17514, and 17515, for purposes of the

^{6/} Water Code, Sec. 10500