STATE OF CALIFORNIA
The Resources Agency

Department of Water Resources

PROGRAM STATEMENTS

1968-69

May 1969

VOLUME I

Water Development Planning Programs
Water Development Implementation Programs

RONALD REAGAN
Governor
State of California

WILLIAM R. GIANELLI
Director
Department of Water Resources

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SURFACE WATER MEASUREMENT
PART I

NEED

Historical records of flows of surface water throughout the State are needed for the planning and design of water development projects to satisfy the sociopolitical, economic and physical needs of the people of California most efficiently.

Tidal stage data are essential to any study or project involving tidal waters including land reclamation and waste disposal because any change in regime in a tidal estuary will cause a change in water stages, water movement, and sea-water incursion. Also, tide stage data are needed in designing any structure in tidal water for which maximum and/or minimum mean water stages are important.

The need for information gathered under this program will increase as development and utilization of the water resources of California increase and remaining sources become more critical. Hydrological relationships have sufficed to provide adequate water development for California's phenomenal growth based on an abundant supply. As this supply has become progressively more limited, we need to increase our efforts toward the understanding of hydrologic principles. Knowledge of floods from small drainage areas is essential for water yield determinations, flood peak volumes, and frequency estimates. The background of historical information available under this program will enable the economical planning of water development and other water-associated facilities.

AUTHORITY

Sections 225,226 and 228 of the Water Code.

OBJECTIVES

Provide sufficient historical records of surface water to plan water development projects to meet the social, economic, and physical needs of the people of California by providing (1) sufficient data to determine minimum flows for project development and water quality control, (2) maximum and minimum flows for recreation and navigation, (3) precipitation runoff correlations related to floods from small drainage areas, and (4) tide stages for planning delta and estuarian projects.

The program objective supports the organized development of water supplies to meet the needs of the people of California through the State Water Facilities and any other water development facilities that become necessary.

A

GENERAL DESCRIPTION

The means to the program objective is to record every economically important stream in the State; the program establishes, cooperatively with the U. S. Geological Survey, a base network of stream gages throughout the State and augments the work of other major agencies throughout the State as needed. The historical record for this program is published in an annual report which, when combined with reports from other agencies, gives a statewide inventory of the surface water supply of significant streams.

The gathering and compiling of the above data by the Department are done through the following specific activities:

1. Contract with the USGS on a matching fund basis to operate approximately 330 stream gaging stations which form a part of the base network in California. The USGS operates approximately 300 additional stations with agencies other than the State and these, when combined with the 330, form a complete base network. Information from the base network is published annually in the USGS Water Supply Papers.

2. Operate 150 stream gaging stations.

3. Make measurements and obtain record of use at approximately 1000 points of diversion.

4. Operate 54 stage recording stations.

5. Measure, tabulate, and analyze precipitation and runoff data from approximately 300 small drainage areas. This information is published annually in a USGS Water Supply Paper.

6. Operation of electronic computers to process and compute flow records.

7. Provide technical assistance to cooperating local agencies in obtaining records of streamflow and water utilization.

8. Collect surface water data in specified areas as required for advanced planning of State Water Facilities.

9. Make special flood measurement of flow at critical times.

Close cooperation is maintained with the U. S. Geological Survey and with other federal and local agencies on stream gaging and diversion measurements. An important part of the work

of this activity is supplying streamflow, diversion, and other data to other groups in the Department and to outside agencies through special requests and regular publication of data.

DATE WORK STARTED

Began in 1924. The contract with the U. S. Geological Survey started in 1903.

ESTIMATED COMPLETION DATE

Continuing

A. L. Winslow, Jr.
3/30/67

1968-69 F.Y.
Planning I-01
SPO WA 1441
ND 1271
SFBD 1273
SAC 1272, 1497*
SJD 1274
SD 1411

SURFACE WATER MEASUREMENT
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

(GENERAL FUND)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO **	473	1.5	494	1.5	530	2.5	530	2.0	550	2.0	580	2.0	620	2.0
ND *	179	9.8	171	9.0	208	11.0	223	11.0	243	11.0	245	10.5	257	10.5
SFBD	39	2.0	35	1.8	38	1.9	41	2.0	45	2.1	47	2.1	49	2.1
SAC *	185	9.7	187	9.7	215	11.7	220	11.7	225	11.7	230	11.7	235	11.7
SJD	116	6.5	119	6.5	129	6.5	134	6.5	140	6.5	145	6.5	150	6.5
SD	19	1.1	20	1.1	21	1.1	22	1.1	23	1.1	24	1.1	25	1.1
Total *	1011	30.6	1033	30.6	1141	34.7	1170	34.3	1226	34.4	1271	33.9	1336	33.9

(REIMBURSABLE FUND)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
ND	20	1.6	0	0	0	0	0	0	0	0	0	0	0	0
SAC	6	.3	6	.3	6	.3	6	.3	6	.3	6	.3	6	.3
SJD	1	.1	1	.1	1	.1	1	.1	1	.1	1	.1	1	.1
Total	27	2.0	7	.4	7	.4	7	.4	7	.4	7	.4	7	.4

PROGRAM OUTPUT DATA

1. Complete Appendix B of Bulletin No. 130 in the following years:

1968-69	Bulletin No. 130-67
1969-70	Bulletin No. 130-68
1970-71	Bulletin No. 130-69
1971-72	Bulletin No. 130-70
1972-73	Bulletin No. 130-71

* $28,000 of the total $1,011,000 was placed erronously in the Sacramento Flood Control Project Program with $20,000 in the Northern District and $6,000 in the Sacramento District, $600 in the San Francisco Bay District, and $1,300 in the San Joaquin District. The tab run of 1-26-67 shows $983,000.

** $19,400 was transferred to SPO for the evaluation activity as follows: ND = $6,000, SFBD = $1,600, SAC = $6,700, SJD = $4,400, SD = $700

FEDERAL-STATE COOPERATIVE PROGRAMS

SURFACE WATER MEASUREMENT AND SURFACE WATER INVESTIGATION

Fiscal Year 1968-69

SURFACE WATER MEASUREMENT		
1. Basic Surface Water Gaging Station Program		
a. California District	363 @ $780	$ 283,000
b. Nevada District	20 @ 635	12,700
c. Ruth Dam Gage	1 @ 200	200
Base Program		52,000
Special Activities		14,500
Total		$ 362,400
2. Station Changes (Operation & Maintenance)		
a. Additional gaging station (whole year)		0
b. Deleted gaging station (3 month completion cost)		0
c. Additional Thermographs (whole year)		0
d. Deleted Thermographs (3 month completion cost)		0
		362,400
Total		5,000
3. Data Processing		35,000
4. Major Rehabilitation		
5. Construction	8 Station	20,000
a. New Stations		0
b. Thermographs		
6. Acoustical Velocity Meter installation and O & M		0
		422,400
SURFACE WATER INVESTIGATION		
1. Floods from small drainage areas (Cal-401)		$ 85,600
Division of Highways		10,000
		95,600
2. Arid lands hydrology(Cal-116)		7,500
3. Temperature of California Streams(Cal-404)		8,000
4. Infiltrometer study		4,000
5. Vail reservoir study(Cal-120)		4,000
INVESTIGATION SUBTOTAL		119,100
SURFACE-WATER TOTAL		541,500
SOURCE OF FUNDS		
Surface Water Measurement		481,500
Flood Operations		50,000
Division of Highways		10,000

2. Complete data summary of surface water flow for Bulletin No. 120, "Water Conditions in California" (5 times each year)

3. Index to Stream Gaging Stations (published every 5 years; to be published in 1970-71)

4. "Surface Water Records of California" will be published by the U. S. Geological Survey each year.

5. Prepare letters transmitting surface water data to fulfill several hundred requests each year.

WORK PROGRAM FOR 1968-69

Statewide Planning Office

Contract with the U. S. Geological Survey to provide surface water flow records at approximately 330 stream gaging stations. Coordinate and manage this program. Evaluate this program to ascertain if the Department responsibilities are being met.

Northern District

1. Operate and maintain approximately 55-60 stream gaging stations.

2. Operate and maintain approximately 15-20 stage recording stations.

3. Measure and obtain records of use at approximately 300 points of surface diversion.

4. Inititate necessary repairs and rehabilitation to those stream measurement stations not meeting the minimum safety standards recommended by the California Department of Industrial Safety.

5. Station network review and revisions.

6. Fulfill special requests for Surface Water Hydrologic Data. Requests for data by the State Attorney General's Office are particularly important and time-consuming.

7. Provide technical assistance to those desiring Surface Water records and information on streamflow and utilization.

8. Install additional streamflow and diversion measurement devices.

9. Initiate installation of extensive measurement devices at each of three State Pumping Plants.

10. Publish Surface Water Measurement Data in Appendix B of Volumes I and II, Bulletin No. 130-67.

San Francisco Bay District

The work program for 1968-69 includes the continued operation of two tide stations, the construction and operation of an additional tide station in South San Francisco Bay, two stage only stations, the operation of seven stream gaging stations and station reconstruction and rehabilitation at three of these stations. The data will be published in annual Bulletin No. 130. Data and information will continue to be provided to other activities in the Department, to other agencies, and to the general public upon request. The mechanics for properly numbering surface water stations will be established.

A. L. Winslow, Jr.
3/30/67

Sacramento District

This activity is concerned with the gathering of basic data relating to water supply and water utilization, the measurement of flood flows and stages, and the recording of tidal fluctuations in the Sacramento-San Joaquin Delta.

The gathering and compiling of the data by the Department is done through the following specific activities:

1. Operate 43 stream gaging stations.
2. Make measurements and obtain record of use at approximately 435 points of diversion.
3. Operate 33 stage recording stations.
4. Provide technical assistance to cooperating local agencies in obtaining records of streamflow and water utilization.
5. Publish data on yearly basis.

San Joaquin District

Maintain and operate 40 stream gaging stations, collect recorder charts, make discharge measurements necessary to keep ratings current, process data for publication, collect diversion data at 175 points of diversion on San Joaquin, Tuolumne, Stanislaus, and Merced Rivers and Dry Creek. Measure discharge of diversion pumps as needed to keep rating current, and read electric meters monthly.

Review and publish diversion data collected by the Lower Tule River Association on the Tule River in accordance with a cooperative agreement with that agency.

Make flood flow discharge measurements at various locations other than regular gages and assist local agencies during periods of high flow in obtaining discharge measurements.

Publish annually all streamflow and diversion data collected under this program as well as data from other agencies in Bulletin 130 Hydrologic Data, Vol. IV., San Joaquin Valley. Supply data to other agencies and individuals as requested for planning and investigational studies.

It is assumed the program will continue at about the same level, with only necessary additions and/or deletions of gaging stations as determined by Statewide Planning Office evaluation which is presently being carried out.

Southern District

1. Collect, process, and publish information on surface water supply which satisfies program objectives. (Includes streamflow data from about 12 gaging stations operated by the Department in Southern California; also includes reservoir stage and storage data, and information concerning artificial recharge of ground water in Southern California.)

2. Evaluate gaging station network to insure that the immediate needs for data are satisfied.

3. Maintain liason with USGS in Southern California for the cooperative stream-gaging program.

4. Update Index to Stream Gaging Stations and maintain network maps.

5. Maintain and update historical data.

6. Answer public inquiries concerning surface water supplies.

GROUND WATER MEASUREMENT
PART I

NEED

In order to insure the orderly and efficient development of the water resources of the State, it is necessary to consider the possible use of ground conjunctively with other sources of water. Presently, ground water supplies more than one half of the State's water needs. Future demands upon this form of the resource will be even greater. In order to plan for the development of the State's ground water, knowledge of this resource and accurate records of ground water levels must be obtained over a period of years.

AUTHORITY

Sections 225 and 226 of the Water Code.

OBJECTIVES

Provide:

1. A general knowledge of the ground water resource of the State and surveillance of this resouce for significant trends or changes.

2. Information necessary for the planning and development of the ground water resource. This comprises the description of the ground water resource as to occurrence, amount, recharge, movement, and discharge.

GENERAL DESCRIPTION:

The ground water measurement program comprises:

1. The taking of periodic measurements of the water levels in wells.

   a. Publishing this information in a ready usable and available form for the Department's needs.

   b. The maintenance of necessary files and records for the control and assignment of state well numbers.

   c. The preparation of contour maps showing the elevation of free ground water and piezometric surface(s).

2. Cooperation with federal, state, local agencies and individuals for the most economical collection of ground water data from a statewide grid of measurement wells to suit the needs of the Department.

3. Obtain the necessary information on ground water to acquire meaningful measurements to meet the objectives of this program.

DATE WORK STARTED

1917

ESTIMATED COMPLETION DATE

Continuing

H. C. Hanson
3/30/67

1968-69 FY
Planning I-01
SPO WA 1443
ND 1281
SFBD 1283
SAC 1282
SJD 1284
SD 1413

GROUND WATER MEASUREMENT
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	48	1.9	69	2.0	70*	2.0	72*	2.0	75*	2.0	50*	1.0	50*	1.0
ND	52	3.1	43	2.5	64	4.0	67	4.0	70	4.0	73	4.0	77	4.0
SFBD	73	4.5	59	3.7	61	3.7	63	3.7	65	3.7	67	3.7	76	3.7
SAC	74	5.	53	4.	64	5.	74	5.	77	5.	80	5.	80	5.
SJD	110	5.	107	6.0	116	6.0	120	6.0	124	6.0	128	6.0	133	6.0
SD	118	6.6	110	5.8	120	6.0	131	6.3	143	6.6	151	6.6	151	6.3
Total	475	26.1	441	24.0	495	26.7	527	27.0	549	27.3	549	26.3	567	26.0

* Includes Fed.-State Coop. Ground Water Measurement Program.

PROGRAM OUTPUT DATA

1. Preparation and publication of Appendix C of Bulletin 130:

Fiscal Year	Bulletin No.
1968-69	130-67
1969-70	130-68
1970-71	130-69
1971-72	130-70
1972-73	130-71

2. Evaluation Report "Modification of Ground Water Measurement Program" Preliminary 1968-69; Final, 1969-70.

3. The collection and processing of sufficient meaningful ground water measurements for the Department's needs.

4. The maintenance of the necessary files and records for well numbering and identification.

WORK PROGRAM FOR 1968-69

Statewide Planning Office.

1. Coordinate activities of the districts relating to ground water as to adequacy methods, accuracy and

reporting of data. Administer Federal-State Cooperative Ground Water Measurement program.

2. Complete evaluation report.

Northern District.

1. Measure about 85 wells monthly; about 380 wells semiannually; about 40 wells annually; about 100 wells every 3 years; and, about 500 wells every 5 years.

2. Prepare spring ground water level contour maps for the Sacramento Valley.

3. Evaluate ground water measurement grids and individual wells in each grid.

4. Collect, review, and compile ground level data from local cooperating agencies.

5. Re-establish the preparation and maintenance of a master well file and assign well numbers. This activity was discontinued at the end of the 1965-66 fiscal year.

6. Fulfill requests for ground water hydrologic data.

7. Provide technical assistance on ground water records.

8. Publish Ground Water Measurement Data in Appendix C of Volumes I and II, Bulletin No. 130-67.

San Francisco Bay District

1. **Continue to compile monthly measurements of 365 wells, semiannual measurements of 850 wells and annual measurements of 1,450 wells by cooperators in 30 basins or areas.**

2. **Take three consecutive monthly spring measurements and three consecutive monthly fall measurements in 75 wells. Take annual measurements in 115 wells in 18 basins or areas.**

3. **Continue to maintain and improve the master file of well descriptions and assign well numbers.**

4. Continue to provide technical assistance to cooperators, particularly the local agencies with which formal cooperative work agreements are maintained.

5. Continue to function as the central repository for ground water data and information.

6. Continue to satisfy requests for data and information from all sources.

7. Publish the data in Bulletin No. 130.

Sacramento District.

1. Makes monthly measurements of 104 key wells and summarizes the data in a monthly report.

2. Maintain recorders for continuous water level records at 13 well locations.

3. Makes fall and spring measurements of ancther 370 wells.

4. Collects fall and spring measurements made by other agencies in another 1,200 wells.

5. Provides technical assistance to seven cooperating counties and several local districts on establishing and maintaining well grids and in collecting water level data.

6. Prepares ground water contour maps showing elevation of water surface, and change in water levels during various time intervals for the basins in the Sacramento District. Elevation maps are prepared semiannually for most of these basins, and the change maps are prepared at least once every five years.

7. Maintains master well file and assigns well numbers.

8. Prepares and publishes data collected and summaries of ground water conditions in Bulletin 130 series (collects data from Northern and San Francisco Bay Districts to be included in publication).

9. Analyses and evaluates the ability of the existing well grids to reflect the changing ground water conditions.

San Joaquin District.

1. Make monthly measurement of depth to water in 50 selected wells, collect depth to water measurements on 300 additional selected wells measured by other agencies, compile and publish monthly selected well reports.

2. Assist the U.S. Bureau of Reclamation and the Kern County Water Agency in making semiannual measurements of depth to water on approximately 1200 wells, and prepare ground water map showing lines of equal elevation and depth to water in wells in Kern County, under a cooperative agreement with the Kern County Water Agency.

3. Measure depth to water semiannually in 450 wells in the Delta-Mendota area under a cooperative agreement with the U.S. Bureau of Reclamation.

4. Measure depth to water in spring of each year approximately 1500 wells in the Mendota-Huron and Kings River fan area. Collect all spring measurements made by other agencies. Prepare a spring round water map of the entire San Joaquin Valley showing lines of equal elevation of water in wells.

5. Prepare ground water level measurements, hydrographs, ground water maps, and ground water level change data for publication in annual report.

6. Assign state well numbers to wells, and continue canvass of certain areas for replacement wells or new wells of known construction.

7. Prepare data for machine processing.

Southern District.

1. Collect, process, and publish ground water data which satisfy program objectives.

2. Evaluate network of monitored wells at a reconnaissance level to insure collection of meaningful data.

3. Maintain liaison with USGS in Southern California for the cooperative ground water program.

4. Provide technical assistance to cooperators upon request.

5. Install equipment to collect data in areas where no information is presently available from cooperators; and perform necessary field inspection and maintenance.

6. Assign state well numbers and maintain well location maps (to take care of current requests as necessary, and to identify historical records).

7. Process well logs and notices of intent to drill, as received from drillers.

8. Prepare ground water contour map for Antelope Valley.

9. Prepare hydrographs for about 200 wells in Southern California (selected hydrographs published in Bulletin No. 130, Appendix C).

10. Maintain an areal designation code for the filing and acquisition of data.

11. Answer public inquiries concerning ground water.

12. Continue conversion of historical data files to state well-numbering system to expedite identification of data; and continue processing historical data files to aperture cards and magnetic tape to facilitate data filing and retrieval. Priorities for this work will be assigned to areas scheduled for study during the next fiscal year under other programs, which will result in substantial savings to those programs.

H. C. Hanson
4/18/67

A

CLIMATOLOGIC DATA
PART I

NEED

Knowledge of climatological data of precipitation, wind intensity, temperature, and evaporation is basic to planning water development projects, operating flood control projects, and solving special problems. Planning for future water requirement studies requires complete record of rainfall, evaporation, wind, and air temperature data. For optimum operation of reservoirs, precipitation and evaporation data are needed. Reservoir spillway design requires duration and intensity of rainfall over the entire drainage area. Precipitation data from a few stations are needed for early forecasting of flood and water supply conditions. It is necessary that a background of historical information be available to evaluate seasonal and cyclic occurrence of the water supply for proper sizing of water development facilities.

AUTHORITY

Sections 225, 226, 278, and 236 of the Water Code.

OBJECTIVES

Provide sufficient historical records of climate to (1) plan water development projects to meet the needs of the people of California, (2) record the occurrence of climatic factors quantitively with time, and location to determine rainfall intensity, duration, and probabilities, and air temperatures, (3)report the historical record annually.

GENERAL DESCRIPTION

The Climatological Data program is geared to index and file important climatological data received from cooperators and agencies in a suitable form. Approximately 1,500 records yearly are forwarded by cooperators for processing by the Department. Additional data are received from the U. S. Weather Bureau in the form of publications and punched cards. The Department has developed some new machine methods for processing and analyzing such large volumes of data.

In addition to data handling, the climate program includes: (1) preparation of isohyetal map showing mean annual precipitation based on fifty years of record and altered to include most recent five years of record e.g. 1915 to 1965; (2) assistance in the inspection of the U. S. Weather Bureau's network of gages to assure the collection of adequate data; (3) evaluation of the quality of climatological data being collected; (4) maintenance of current maps and

tabular indexes of all climatological stations in and adjacent to California; (5) preparation of narrative summaries and tables of precipitation data for use in the department report; and (6) inspection and maintenance of climatologic stations established by the Department (approximately 300 stations).

DATE WORK STARTED

1956

ESTIMATED COMPLETION DATE

Continuing

B. P. Brown
3/30/67

1968-69 F.Y.
Planning I-01
SPO W.A. 1445
ND 1315
SAC 1316
SFBD 1317
SJD 1318
SD 1410

CLIMATOLOGIC DATA
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	27*	1.2	37	1.7	61	2.4	62	2.9	65	3.0	67	3.0	69	3.0
ND	38	2.2	37	2.0	50	2.5	52	2.5	55	2.5	58	2.5	61	2.5
SFBD	32	2.2	30	2.3	52	3.5	54	3.5	48	3.0	49	3.0	50	3.0
SAC	31	2.0	28	1.8	30	1.9	32	2.0	32	2.0	32	2.0	32	2.0
SJD	35	2.0	35	2.0	35	2.0	37	2.0	39	2.0	41	2.0	43	2.0
SD	52	2.9	40	2.2	42	2.2	45	2.2	48	2.2	51	2.2	54	2.2
Total	215	12.5	207	12.0	270	14.5	282	15.1	287	14.7	298	14.7	309	14.7

*$12,300 was transferred to Statewide Planning Office for program evaluation as follows: ND - $2,500; SFBD - $2,100; SAC - $2,000; SJD - $2,300; SD - $3,400.

PROGRAM OUTPUT DATA

Appendix A of Volumes I through V for following bulletins:

1. 1968-69 Bulletin 130-67
2. 1969-70 Bulletin 130-68
3. 1970-71 Bulletin 130-69
4. 1971-72 Bulletin 130-70
5. 1972-73 Bulletin 130-71

WORK PROGRAM FOR 1968-69

Statewide Planning Office.

1. Review all input and output climatologic data being handled by newly developed machine programs. Coordinate receipt and distribution of such data.

2. Coordinate climatologic programs among the districts and the U. S. Weather Bureau.

A

3. The 2nd and 3rd phases of an evaluation of the program will be completed in this fiscal year. The second phase will deal with the statistical adequacy of this program, and the third stage will deal with the economic consequences of the program. A report will be prepared for each phase. The results of the two phases will be used in making a final recommendation as to program revision.

Northern District

1. Operate and maintain approximately 150 department climatology data stations and approximately 160 U.S. Weather Bureau climatology data stations.

2. Re-establish a major maintenance and repair schedule for climatologic station facilities. This activity was discontinued at the end of the 1965-66 fiscal year.

3. Prepare a 50-year mean annual isohyetal map for the period 1915-16 to 1964-65.

4. Evaluate the weather data stations grid and the quality of all data collected in the district area.

5. Collect, review, and compile weather data from local observers.

6. Maintain a current file of all climatologic data in the district area and fulfill requests for this data.

7. Provide technical assistance in the collection and evaluation of weather data records.

8. Publish climatologic data in Appendix A of Volumes I and II, Bulletin No. 130-67.

San Francisco Bay District

1. Initiate network evaluation on basis of isohyetal map prepared during 1967-68.

2. Initiate adequate quality control for 102 DWR network stations; continue assistance to U.S. Weather Bureau for 168 stations on current level.

3. Continue machine processing of current data; initiate keypunching of historic records of current stations.

4. Continue:

   a. maintenance of station maps and indexes.
   b. filling requests for data and information.

5. Prepare Bulletin No. 130-67, Appendix A.

Sacramento District

1. The general processing of climatologic data including precipitation, temperature, and evaporation and the inspection and maintenance of climatological stations will continue. A summary of the number of stations follows:

Departmental cooperative weather observer	226
Department maintained storage gages	19
Department maintained U. S. Weather stations	131
Total	376

2. Prepares and publishes climatological data collected in Bulletin No. 130 series.

San Joaquin District

1. Maintain and service 250 Department of Water Resources climatology stations with assistance of volunteer observers, collect climate data pertaining to precipitation, evaporation, temperature, and wind movement.

2. In accordance with a cooperative agreement between the Department of Water Resources and U.S. Weather Bureau Climatology Stations. This entails semiannual inspections on recording type gages, and annual inspection on all nonrecording gages, with additional visits as required for emergency repairs and maintenance.

3. Service seven DWR storage precipitation gages in remote areas of the Sierra Nevada where observers are not available. Index, compile, and process data for publication on 450 stations part of which are maintained by other agencies. Fill many requests for data, and lend assistance to other agencies in establishing weather stations. Publish all data collected in Appendix A, "Bulletin 130-67, Hydrologic Data, Volume IV, San Joaquin Valley".

Southern District

1. Collect, process, and publish climatological data to satisfy program objectives.

2. Evaluate station network to insure data collection which will satisfy immediate needs.

3. Continue program to establish network of cooperative stations.

4. Perform necessary field inspections to insure collection of meaningful data from cooperators; and provide technical assistance to cooperators upon request.

5. Install equipment to collect data in areas where no information is presently available from cooperators; and perform necessary field inspection and maintenance.

6. Initiate work on 50-year mean annual isohyetal map for the period 1915-16 through 1964-65. Work includes computation of 50-year means for approximately 1,000 stations.

7. Maintain and update Index to Climatological Stations and station network maps.

8. Answer public inquiries concerning climatological data.

9. Continue processing historical data onto punched cards to facilitate data filing and retrieval.

SURFACE WATER QUALITY DATA
PART I

NEED

It is axiomatic that a usable as well as abundant source of surface water is essential to the development of California. Accordingly, it is necessary that the quality of the State's surface water supplies be determined to complement the determination of quantity. In addition, to insure that California's rapidly expanding economy and increasing population are provided with a usable supply of surface water, the early detection of quality impairment is necessary. This can best be accomplished by the systematic examination and surveillance of quality conditions of the State's surface waters through a network of sampling stations representative of significant surface streams and lakes.

AUTHORITY

Sections 225, 226, and 229 of the Water Code. Delta salinity measurement portion under agreement with the U. S. Bureau of Reclamation.

OBJECTIVES

1. Determine the quality of the State's surface waters.
2. Detect changes in the quality of surface waters and alert control agencies when adverse changes are noted.
3. Determine trends in surface water quality.
4. Record and catalogue the data.
5. Disseminate the data and information gathered.

GENERAL DESCRIPTION

Samples are collected periodically at stations located on significant streams and lakes in California. After collection, the results of laboratory analyses, together with comments on significant changes in quality which have taken place, are published in a report distributed to cooperators and interested agencies.

The frequency of sampling at each station varies considerably and is dependent on historic records, the need for the station, and the type of data specifically desired. Accordingly, the sampling frequency will range from semiannually to continuous. The corresponding laboratory analysis also varies. A physical examination is made for samples collected each time a station is visited.

Salinity recorders are installed at certain locations to obtain a continous record of the variation in salinity and to insure that periodic samples are representative. In addition, these instruments are a means for detecting abnormal short-term fluctuations in water quality.

At several locations, samples are collected and analyzed for organic concentrations. These data are used to determine the location and extent of degradation in water quality which may result from the increasing use of industrial and agricultural chemicals.

The data obtained are subject to repeated evaluation so as to assure the collection of continuous, reliable, and useful surface water quality information.

With respect to the Delta salininty measurement portion of the program, arrangements are made with private individuals near locations of the sampling stations to collect water quality samples at predetermined times based on tidal conditions. The Department of Water Resources laboratory analyzes these samples for chloride content. A monthly report is transmitted to the U. S. Bureau of Reclamation and other interested agencies.

The data and information collected under this program are assembled for publication in DWR Bulletin No. 130 series, "Hydrologic Data", published annually.

Data are also collected at three key locations in the State in cooperation with the Federal Water Pollution Control Administration as part of its Water Pollution Surveillance System.

DATE WORK STARTED

Regular program 1951, Delta Salinity Measurement portion 1920.

ESTIMATED COMPLETION DATE

Continuing

E. A. Ritchie
3/30/67

1968-69 F.Y.
Planning I-01
SPO W.A. 1444
ND 1262
SFBD 1264
SAC 1263,1496*
SJD 1265
SD 1409

SURFACE WATER QUALITY DATA
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	15	0.5	31	1.4	34	1.4	52	2.0	36	1.2	30	1.0	31	1.0
ND	55	2.1	50	2.0	58	2.0	61	2.0	64	2.0	67	2.0	70	2.0
SFBD	55	2.3	53	2.0	55	2.0	56	2.0	58	2.0	60	2.0	61	2.0
SAC *	66	2.3	64	2.0	73	2.9	77	3.2	78	3.3	79	3.1	78	3.0
SJD	49	1.7	45	1.7	52	1.7	57	2.0	60	2.0	60	2.0	60	2.0
SD	40	1.5	36	1.0	42	1.5	55	2.0	57	2.0	60	2.0	63	2.0
Total	280	10.4	279	10.1	314	11.5	358	13.2	353	12.5	356	12.1	363	12.0

PROGRAM OUTPUT DATA

1. Complete Appendix D "Surface Water Quality" of Volumes I through V for the following Bulletins:

1968-69	Bulletin No. 130-67	"Hydrologic Data"
1969-70	Bulletin No. 130-68	"Hydrologic Data"
1970-71	Bulletin No. 130-69	"Hydrologic Data"
1971-72	Bulletin No. 130-70	"Hydrologic Data"
1972-73	Bulletin No. 130-71	"Hydrologic Data"

2. Electrical Conductivity Recorder Data - Published monthly in San Joaquin District, quarterly in Sacramento District.

3. Salinity Observations in the Delta - published in Monthly letter.

4. Compilation of specific surface water quality data, on request, for:

a. Federal and state agencies.

b. Other units of this Department.

* The program "Salinity Measurements in the Delta" was combined with this program in 1966-67 Fiscal Year. Values for Sacramento District include $5,000 reimbursement from USBR for this activity.

c. Counties, irrigation districts, and water districts.

d. Consultant engineers.

5. Report on Modified Surface Water Quality Data Program August, 1969.

6. Report on Revised Surface Water Quality Data Program October, 1970.

WORK PROGRAM FOR 1968-69

Statewide Planning Office

Coordination of district activities and with other agencies involved with the program will continue. Procedures for conducting program activities will be developed. Program evaluation will be continued at an increased rate.

Northern District

1. Collect samples from approximately 60 regular Surface Water Monitoring stations at various sampling frequencies.

2. Operate and maintain 2 or 3 continuous salinity recorders.

3. Evaluate the monitoring program and the quality of data collected in the program.

4. Fulfill requests for Surface Water Quality Data.

5. Provide technical assistance in the collection and evaluation of surface water quality data records.

6. Initiate the preparation of all historical data for machine processing.

7. Publish surface water quality data in Appendix D of Volumes I and II, Bulletin No. 130-67.

San Francisco Bay District

1. Collect samples monthly at one station, bimonthly at six stations, and during May at twenty-six stations.

2. Obtain analyses of samples as follows:
   a. Partial mineral and physical examination for samples collected in months other than May and standard mineral analyses of May samples.

   b. Nutrients and related constituents for samples collected bimonthly from six stations.

   c. Detergents or other significant constituents from selected samples.

3. Continue collection of continuous electrical conductivity data from one station.

4. Process the data and prepare tables and graphs for publication in annual Bulletin No. 130.

5. Continue to maintain a central repository for all surface water quality data in the District and continue to satisfy requests for data and information.

6. Continue evaluation of the station network and sampling frequency and adjust the network and sampling frequency as needed.

7. Participate in the collection of waste water quality data.

Sacramento District

Four-day salinity sampling of 18 stations in the Delta will continue under contract with Bureau of Reclamation.

Five conductivity recorders will be maintained and data processed and reported.

Surface waters in the Sacramento District will be sampled at 35 locations at periodic intervals, generally monthly.

Data will be processed for inclusion in Appendix D of Bulletin 130-68.

Detailed review of collected data will continue, with emphasis on the American River. All analyses within the American River watershed will be reviewed and processed for computer applications. Pertinent auxiliary information such as hydrology and geology will be reviewed and documented. Tabular and graphical presentations will be prepared. Stream profiles will be undertaken from headwaters to mouth. Data will be evaluated to determine effects of natural and cultural conditions on water quality. A sampling network and frequency will be recommended.

Water quality data, as requested, will be provided to planning units and other agencies.

San Joaquin District

1. Collect, analyze and evaluate water quality samples from 31 stations in the District utilizing cooperative agreements where possible.

2. Continue operation of continuous conductivity recorders at six locations.

3. Reestablish sampling of intermittent streams deferred during 1967-68 because of budget cuts.

4. Reestablish machine processing of historic surface water data and development of machine program for detailed evaluation of data and data collection program deferred during 1967-68.

5. Reinstate semimonthly sampling of San Joaquin River near Vernalis in cooperation with Federal Water Pollution Control Administration's National Water Quality Surveillance System. Sampling was curtailed during 1967-68 because of budget cuts.

Southern District

1. Collection and analysis of samples of surface waters for the Water Year 1967-68 (approximately 450 complete mineral analyses).

2. Tabulation and publication of samples collected and analyzed for Water Year 1966-67.

E. A. Ritchie
4/18/67

GROUND WATER QUALITY DATA
PART I

NEED

Since about one-half the water used in California is derived from underground sources, ground water is equally as important to the development of California as is surface water. In some areas of the State ground water is the only source of water available. Furthermore since impairment of the quality of ground water (and thus its utility) is far more difficult to remedy than is the case with surface water, protection of the State's ground water resources becomes an important matter. Planning for the development and utilization of ground water and its preservation requires a thorough knowledge of prevailing quality conditions and systematic surveillance of these conditions where significant changes in quality have taken place or are anticipated.

AUTHORITY

Sections 225, 226 and 229 of the Water Code.

OBJECTIVES

1. Gather sufficient data which will assist in satisfying the planning needs of the State to allow the orderly development of its ground water resources.

2. Maintain surveillance of ciritical ground water quality conditions so as to forestall their extension.

3. Disseminate the data and information gathered.

GENERAL DESCRIPTION

The program consists of selecting representative wells to be sampled, the collection of samples by department personnel or cooperators, laboratory analysis of the samples, and evaluation and publication of the collected information.

Areas where significant changes occur or where sea water intrusion is evident are monitored in greater detail.

The areal and vertical extent of quality characteristics of ground water and variations in these characteristics are defined. To accomplish this effectively, areas or basins are selected where other investigative activities are concentrated in the program year. By successively selecting areas, each district will be reviewed in 5 to 10 years. Areas of study are selected by a priority system based on magnitude of resources and the degree of its development.

Findings and data produced by the program are made available as soon as possible to interested agencies or persons and are compiled for publication in the DWR Bulletin No. 130 series "Hydrologic Data", published annually.

DATE WORK STARTED

1953

ESTIMATED COMPLETION DATE

Continuing

E. A. Ritchie
3/30/67

1968-69 F.Y.
Planning I-01
SPO WA 1442
ND 1266
SFBD 1268
SAC 1267
SJD 1269
SD 1408

GROUND WATER QUALITY DATA
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	21	0.7	31	1.5	34	1.5	54	2.0	55	2.0	29	1.0	30	1.0
ND	38	1.5	29	1.0	40	1.5	42	1.5	44	1.5	46	1.5	48	1.5
SFBD	39	1.8	34	1.8	35	1.8	36	1.8	37	1.8	39	1.8	40	1.8
SAC	34	1.2	28	0.9	34	1.2	40	1.3	42	1.5	42	1.4	40	1.2
SJD	53	2.3	50	2.3	61	2.3	66	2.3	70	2.3	70	2.3	70	2.3
SD	67	2.5	66	2.5	82	3.0	85	3.0	90	3.0	95	3.0	100	3.0
Total	252	10.0	238	10.0	286	11.3	323	11.9	338	12.1	321	11.0	328	10.8

PROGRAM OUTPUT DATA

1. Appendix E of Volumes I through V for the following bulletins:

   1968-69 Bulletin No. 130-67
   1969-70 Bulletin No. 130-68
   1970-71 Bulletin No. 130-69
   1971-72 Bulletin No. 130-70
   1972-73 Bulletin No. 130-71

2. Preparation of maps delineating general quality characteristics in select areas.

3. Compilation of specific ground water quality data on request.

4. Complete implementation of machine processing of current data.

5. Report on Modified Ground Water Quality Data Program December 1969

6. Report on Revised Ground Water Quality Data Program March 1971

A

WORK PROGRAM FOR 1968-69

Statewide Planning Office

Coordination of district activities will continue. Standard procedures will be developed. Electronic data processing techniques will be developed and refined to meet the needs of the program.

Northern District

1. Collect samples annually from about 250-300 wells.
2. Evaluate ground water sampling grids and individual wells in each grid.
3. Coordinate collection of ground water samples with local cooperating agencies.
4. Fulfill requests for ground water quality data.
5. Provide technical assistance in the collection and evaluation of ground water quality data records.
6. Initiate the preparation of all historical data for machine processing.
7. Publish ground water quality data in Appendix E of Volumes I and II, Bulletin No. 130-67.

San Francisco Bay District

1. Collect and make partial mineral analyses of annual samples from about 520 wells in 20 basins or areas.
2. Continue implementation of machine processing of current data.
3. Prepare tables and graphs for publication in annual Bulletin No. 130.
4. Prepare a Sea-Water Intrusion Map for Santa Clara Valley.
5. Adjust the station network and type of analyses as needed.
6. Continue to maintain a central repository for all ground water quality data in the District and continue to satisfy requests for data and information.

Sacramento District

The program will continue at the same level as in 1966-67, with the following specific activities.

Detailed review of collected data will continue but with emphasis on Yuba County. Locations of sampled wells will be verified, pertinent auxiliary information, such as hydrology and well construction, will be reviewed and documented. Tabular and graphical presentations of the information will be prepared. A revised sampling network and schedule for Yuba County will be adopted.

Data for 1967-68 collected from approximately 200 wells will be processed for inclusion in Appendix E of Bulletin No. 130-68.

Ground water quality data, as requested, will be provided to planning units and other agencies.

San Joaquin District

1. Collect, analyze and evaluate ground water samples throughout the District utilizing cooperative agreements where practical.

2. Increase detailed sampling and evaluations in specific areas of the valley where curtailment in 1967-68 was necessary because of budget cuts. Such sampling and evaluation will be continued in Kern and Fresno Counties and will be initiated in Madera County.

3. Continue machine processing of current data and reestablish processing of historic data.

Southern District

1. Collect analyses and tabulate samples from ground water monitoring wells.

2. Analyze samples collected by cooperators.

3. Canvass cooperators for historic data and help cooperators to convert data to state well numbering system.

4. Evaluate program to try to use more cooperator's data.

5. Publish Bulletin No. 130-67 for the Water Year 1966-67.

E. A. Ritchie
4/18/67

QUALITY AND USE OF WASTE WATER
PART I

NEED

Large quantities of water in the State receive a single cycle of use in cities, communities, and in industrial activities and are discharged as waste to tidal water, inland streams, or to land. Waste volumes are increasing with the expanding urbanization and increasing industrialization of the State. Tidal discharges become unusable after mixing with saline water. Inland discharges to streams and to land, although generally available for subsequent surface water diversions and/or ground water extractions, are frequently lost to the immediate control of man.

Waste water quantities, although small in comparison to the total water requirements of the State, constitute a source of local water supply which may be used for various purposes in lieu of other supplies. A number of agencies throughout the State successfully operate projects and facilities for the purposeful reuse of waste water (water reclamation) thus decreasing the demand for supplemental or imported water. Wherever possible, water reclamation must be encouraged and practiced to insure efficient utilization and management of the State's water resources.

AUTHORITY

Section 230 to the Water Code.

OBJECTIVES

Maintain an inventory of the quantity, quality, and location of significant waste water discharges; to locate areas in which supplemental water demands might be partially satisfied by the planned reuse of waste water; review existing water reclamation operations and study associated costs, problems, and benefits; and disseminate information and data collected.

GENERAL DESCRIPTION

Data are collected to determine quantity and quality of significant waste discharges in the State. In general, significant discharges are examined to determine mineral, nutrient, and detergent concentrations present and the flow quantities are obtained. Facilities incorporating reclamation operations and/or located in watershort areas may be investigated more frequently. Insofar as is possible, every effort is made to coordinate with, and use data gathered by, other agencies so as to avoid duplication of effort. Areas are documented in which supplemental water demands might be partially satisfied by the planned reuse of waste water.

Operational features, quantities, qualities, costs, problems, and benefits of existing water reclamation projects (including pilot plants) are investigated and evaluated. Sufficient sampling and investigation is undertaken to assure an adequate evaluation of the operation.

Data collected on significant waste discharges and reclamation projects and operations are maintained for use in other Department studies and programs and are disseminated routinely to interested agencies. Investigational results are summarized and published.

DATE WORK STARTED

July, 1950.

ESTIMATED COMPLETION DATE

Continuing

E. A. Ritchie
3/30/67

1968-69 F.Y.
Planning I-01
SPO W.A. 1440
ND 1276
SFBD 1278
SAC 1277
SJD 1279
SD 1413

QUALITY AND USE OF WASTE WATER
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	5	0.2	0	0	2	0.1	2	0.1	18	0.6	3	0.1	3	0.1
ND	21	1.0	0	0	15	0.7	20	1.0	22	1.0	22	1.0	22	1.0
SFBD	32	1.7	10	0.5	23	1.2	24	1.2	24	1.2	25	1.2	25	1.2
SAC	22	0.8	0	0	30	0.4	40	1.6	41	1.6	43	1.6	44	1.6
SJD	32	1.4	0	0	33	1.4	36	1.5	40	2.0	44	2.0	44	2.0
SD	32	1.4	15	0.8	31	1.5	32	1.5	34	1.5	36	1.5	38	1.5
Totals	144	6.5	25	1.3	134	5.3	154	6.9	179	7.9	173	7.4	176	7.4

PROGRAM OUTPUT DATA

1. Publications containing information on the use of waste water and proposals for waste water reclamation.

2. Maintenance of an inventory of existing water reclamation operations.

3. Report on revised Quality and Use of Waste Water Program, March, 1971.

WORK PROGRAM FOR 1968-69

Statewide Planning Office

Coordination of district activities will be maintained.

Northern District

1. Compile data on waste discharges from Water Quality Control Boards, State and local health departments, and other sources.

2. Maintain inventory of waste water reclamation operations.

3. Obtain essential water quality data on all significant waste discharges.

4. Process, evaluate, and file data in retrievable form so that it is usable to all Department programs and other public agencies.

5. Make data available to all users by transmittal of analyses or office reports.

6. Prepare office report and contributions to any statewide report.

If the level of 1967-68 program is maintained, data needed for water resource development, utilization, and water quality control will not be obtained. This would result in much more costly planning studies being necessitated in the future to evaluate ground water development and conjunctive use potential.

San Francisco Bay District

Quantity and mineral quality of about 30 percent of the total significant waste discharges will be determined and collated for publication.

Under 1/20/67 level, the percentage of significant dischargers sampled each year would be reduced.

Sacramento District

The 1967-68 budget was reduced to a token $5,000, which will enable periodic visits to major dischargers and monitoring for only a few significant waste dischargers. In order to restore the program to a meaningful level, it is proposed to increase the budget to $30,000 for the 1968-69 fiscal year, which will permit the following work program.

Data will be collected relative to 50 significant waste discharges, including eight existing waste water reclamation facilities and operations, located throughout the District area. Collection of samples and laboratory analyses will be resumed on a reduced scale, as compared to the budget level of 1964-65 fiscal year ($36,300).

The collected data will be in the following categories:

1. Quality of Waste Discharge
    a. Mineral constituents
    b. Organics
    c. Nutrients
    d. Heavy metals
2. Flows (monthly average flows)
3. Changes in treatment disposal facilities and methods

Data collection and study of the most important plants practicing reclamation will be resuled on a reduced scale and intensity.

The collected data will be in the following categories:

1. Facilities and operational features

2. Problems of operations

The operational features and problems of these reclamation projects will be evaluated in order to encourage and stimulate the planned reuse of waste water.

Inspection of waste discharge facilities will be resumed and the results studied and evaluated to determine potential for reclamation. Data from other agencies will be used wherever possible in place of inspections of facilities or sampling by Departmental personnel.

San Joaquin District

1. Continued data collection on quantity and quality of waste discharges and on type of waste water treatment facilities in the San Joaquin District.

2. Continued inventory of existing reclamation operations in the District with emphasis on benefits and costs.

3. Sampling of ground and surface waters in areas of significant waste discharges to determine effects of waste waters on receiving waters.

4. Determination of areas which will benefit by reuse of local waste waters.

Southern District

The work program for the 1968-69 Fiscal Year will be continued at the same level. Currently there are approximately 230 plants in this program from which waste discharge samples are collected and analyses made at six-month to two-year intervals for mineral and sanitary quality. Samples are also taken periodically for determination of effluent radioactivity levels. The overall level of activity will increase gradually as the number of plants in the program increase, as new districts are formed, and the flows in smaller plants become large enough to be included.

E. A. Ritchie
4/18/67

A

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

PROGRAM STATEMENT

Cover and Approval Form - 1968 - 69

Program Title Federal-State Cooperative Mapping and Administration

It is recommended that the program statement for this program be approved.

SIGNATURE	TITLE	DATE
L. S. Even	Program Manager(s) Chief of Maps & Surveys	4-7-67
	Area Branch Chief or District Engineer	4-7-67
	Assistant Chief Engineer	
	Division Engineer (Line)	
	Division Engineer (Staff)	

DWR 1921 (3/65)

FEDERAL-STATE COOPERATIVE MAPPING AND ADMINISTRATION

Part I

A. Need

Quadrangle maps which are reasonably up to date and which are accurate are needed by many state agencies as well as other governmental and private agencies for planning and project development purposes. Topographic maps are of prime importance in planning airports, highways, dams, pipelines, transmission lines, industrial plants, and countless other types of construction. Topographic maps are an essential part of geologic and hydrologic research, of mineral investigations, and of studies on the quantity and quality of water. They greatly facilitate the study and application of flood control, soil conservation, and reforestation. Intelligent and efficient development of our natural resources depends on the availability of adequate topographic maps. This Federal-State Cooperative Mapping Program supplements mapping performed with federal funds, usually by the U. S. Geological Survey.

B. Authority

This cooperative program was initiated by the passage of Chapter 1424, Statutes of 1945. This statute authorizes matching State funds to increase the production of quadrangle maps in California by the U. S. Geological Survey. See Section 8014.5 and Section 8082 of the California Public Resources Code.

C. Objectives

The objectives of this program are to provide up-to-date topographic maps of the State at scales suitable for the purposes of the many using agencies. The specific objectives are to remap or revise existing maps in the areas shown under "Work Program".

D. General Description

The mapping work is performed by the U. S. Geological Survey under a cooperative agreement wherein the State and federal government each contribute one-half of the cost. Areas to be mapped, scales of mapping, and priority schedules are mutually decided upon by both participants. Prior to publication, the Department reviews the maps and indicates approval of each sheet or suggests desired revisions. An annual report is prepared by the Department setting forth the current status of topographic mapping throughout the State.

This program is administered by the Maps and Surveys Branch in the Technical Services Office.

Emphasis will be placed on revision of existing maps to reflect the changes in land use caused by agricultural, municipal and industrial development and on remapping and mapping of areas of greatest interest.

E. Date Work Started

1945

F. Estimated Completion Date

Continuing program.

FEDERAL-STATE COOPERATIVE MAPPING AND ADMINISTRATION

Part II

G. Resources Input Data (costs in thousands of dollars and personnel in man-years)

1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$
22	326	20	291	20.5	300	27	400	27	400	27	400	27	400

The estimates of the man-years required for the State's portion of this program are based on $15,000 per man-year.

H. Program Output Data

36 quadrangles (2,365 square miles of topographic mapping)

I. Work Program for Budget Year (contract with U.S.G.S.)

Projects in Progress (1968-69)

Projects In Program	No. Quads	Initiated	Photos	Controlled	Stereo Compl.	Field Compl.	Carto.	Pub.
Pasadena	14	7/23/63	14	14	14	14	-	-
Orick	9	7/23/63	9	9	9	9	-	-
Orick Rev.	3	7/23/63	3	3	3	3	-	-
Pozo	15	5/6/64	15	15	12	-	-	-
Elk Creek	34	3/11/65	34	34	34	-	-	-
San Bernardino	24	11/29/65	24	24	24	-	-	-
Lodi	12	1/5/67						
Modesto	17	1/5/67						
Escondido	21	1/5/67						
San Benito	18	1/5/67						

Projects initiated January, 1967

Proposed new projects for 1968-69 are:

1. Napa - 16 maps
2. Pittsburgh - 12 maps
3. Ventura - 16 maps

total - 2,365 square miles

CALIFORNIA-NEVADA JOINT WATER QUALITY INVESTIGATION OF LAKE TAHOE

PART I

A. Need

Cultural development in the Tahoe Basin during recent years has threatened the clarity and beauty of the Lake. Efforts are being made to control this development through improved zoning and planning, and further plans are underway to export sewage from the basin. Until these measures are implemented and effective, and to monitor the effectiveness of controls that are established, there exists a critical need for continuing surveillance of the quality of the waters in Lake Tahoe so that subtle indications of eutrophication can be detected at an early stage.

In order to preserve this resource, the Governors of California and Nevada have recently directed that a long-term surveillance program be undertaken. To initiate this program several cooperative meetings were held with officials from Nevada and California, at State and County levels, in addition to representatives from the federal government. It was unanimously agreed that this program should be undertaken as a cooperative effort and that each agency would furnish certain laboratory services, field assistance, or funds.

B. Authority

This program is included under Section 229 of the Water Code, which authorizes the Department to participate in an investigation of water quality problems in cooperation with other agencies.

C. Objectives

The general objective of this program is to maintain surveillance of the overall water quality in Lake Tahoe, especially with respect to factors that indicate eutrophication. Specifically the objectives are to:

1. Obtain field data from five sampling locations during quarterly five-day sampling cruises.

2. Obtain laboratory analyses for various chemical and biological samples collected during the cruises.

C. Objectives (Cont'd.)

3. Publish these data in quarterly reports to interested agencies.

4. Publish an annual summary and evaluation of the program's results.

D. General Description

Samples and field data will be collected periodically at five predetermined stations in Lake Tahoe. Samples will be distributed to cooperating agencies for bacterial and biological analysis. Laboratory analyses, along with pertinent observations, will be compiled and published quarterly in a data report. An annual summary and evaluation of the program will be published, along with recommendations for any necessary changes.

E. Date Work Started

August 1965.

F. Estimated Completion Data

This is a continuing program.

CALIFORNIA-NEVADA JOINT WATER QUALITY INVESTIGATION OF LAKE TAHOE

PART II

G. Resources Input Data

Fiscal Year	Cost Dollars (in thousands) Calif.	Nevada	Total	Man-Year
1966-67	8.0	3.9	11.9	0.8
1967-68	13.0	5.0	18.0	1.0
1968-69	14.0	5.0	19.0	1.0
1969-70	22.0	7.5	29.5	1.3
1970-71	23.5	8.0	31.5	1.4
1971-72	25.0	8.5	33.5	1.4
1972-73	26.0	8.8	34.8	1.4

H. Program Output Data

Quarterly Data Reports

Annual Report summarizing data and evaluating changes

I. Work Program for Budget Year 1968-69

Sampling runs for each season will continue, observing and measuring physical, chemical, biological, and organic parameters.

The collected data will be organized into a quarterly report and disseminated to cooperators.

Data will be reviewed and evaluated to determine the level of eutrophication. Any change in level and the rate of change, and factors affecting change will be identified. Recommendations relative to sampling frequency or location will be prepared.

The data collected during the year, and findings and recommendations that are developed, will be reported in an Annual Summary.

A

FEDERAL-STATE COOPERATIVE SEDIMENT DATA COLLECTION
PART I

NEED

It is essential that basic information on sediment production, transport, and deposition be obtained: in order to provide criteria for design of major water conservation and utilization facilities such as reservoirs, conduits including pipelines, canals, natural and artificial channels, and desilting works; so that construction can be accomplished without causing or sustaining excessive damage from siltation, erosion, or turbidity. Financial analysis of water projects requires knowledge of future effects of sedimentation processes, such as loss of reservoir capacity, increased levee maintenance costs, or change in water usability.

AUTHORITY

Section 225, 226, and 228 of the Water Code.

OBJECTIVES

Obtain data on the characteristics and quantity of sediment transported by particular California streams of immediate or impending importance to the State Water Facilities or related water resources of the State, and eventually to produce and accumulate sufficient data for the estimation of sediment production, transportation, deposition, and erosion in important streams in California.

GENERAL DESCRIPTION

Personnel of the U. S. Geological Survey, together with local cooperators whom they employ, make suspended sediment observations at approximately 69 points within the State. The Department contributes to the maintenance and operation of approximately 22 daily stations and 18 periodic stations. At periodic stations most sampling is done during flood flow, when sediment transport is at a maximum. However, an effort is made to cover all stages of flow that occur during year -- even low, clear flows.

In addition to measurement of suspended sediment in streamflow, occasional measurement is made of sediment accumulated in reservoirs, by sounding and estimating the effect of compaction. Occasional computations of probable silt load of ephemeral streams are made, and occasional computations of bedload in alluvial streams.

This program consists primarily of data collection, with a minor amount of analysis chiefly to enable the presentation of the data in the most meaningful form. Although the locations of most suspended sediment sampling stations are influenced by the information needs of specific projects, additions and changes are made, in accordance with a long-range plan for the eventual determination of zones of predictably similar sediment production throughout the State.

The State's contribution to this program is strictly financial. Coordination of this program by the Department's Statewide Planning Office, use of data from this program by department personnel, and collection of other evidences or measures of sedimentation by department personnel, are not part of this program.

DATE WORK STARTED

1956

ESTIMATED COMPLETION DATE

Continuing

A. L. Winslow
3/30/67

1968-69 F.Y.
Planning I-01
SPO W.A. 1161

FEDERAL-STATE COOPERATIVE SEDIMENT DATA COLLECTION
PART II

Resources Input Data (costs in thousands of dollars and personnel in man-years)

1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
$	MY	$	My	$	MY	$	MY	$	MY	$	MY	$	MY
60	0	60	.5	65	.1	70	.1	75	.1	80	.1	85	.1

Program Output Data

The annual record of sedimentation erosion transport, and deposition will be published for 40 sediment sampling stations. A report summarizing the sedimentation characteristics of California streams will be prepared.

Work Program for Budget Year

Collect suspended sediment data for a daily record at 20 stations and periodic record at approximately 20 stations. This work is done by the U. S. Geological Survey under contract.

The work program for this year may be altered in July, 1968 as a result of the program evaluation completed in June, 1968.

Arthur L. Winslow 3/30/67

FEDERAL-STATE COOPERATIVE GROUND WATER INVESTIGATIONS
PART I

A. Need

Ground water is a significant part of California's water supply. In many areas, it assumes a major role in the development of the local economy. In order to competently and continually assess this major resource, it is necessary to obtain complete information as rapidly and economically as possible. In order to conserve state funds and personnel and to accelerate the Department's statewide study of ground water, direct investigation of ground water by this Department has been supplemented by cooperative programs with the U. S. Geological Survey, Water Resources Division (USGS), and the U. S. Department of Agriculture, Agricultural Research Service (ARS).

B. Authority

This program is authorized under Sections 225 and 226 of the Water Code. Cooperative ground water investigations with the U. S. Department of Agriculture, Agricultural Research Service, were originated in the early 1920's; cooperative ground water studies with the U. S. Geological Survey, Water Resources Division, were originated in 1948.

C. Objective

1. General

   a. The primary objective of the cooperative studies is to supplement the Department's ground water program by developing data and information, and engaging in ground water research which is essential to the orderly understanding of the ground water resources of California.

2. Specific

   a. Develop reconnaissance level information and publish reports on the occurrence, depth, and quality of ground water in two or three desert areas of Southern California each year.

   b. Complete and report on detailed subsurface geologic, hydrologic, and water quality studies related to the evaluation of ground water resources in several areas of the San Joaquin Valley every two to three years. Area to be expanded in 1969-1970 to the Sacramento Valley.

PART I, continued

c. Conduct comprehensive investigations and report on the cause, extent, and rate of deep land subsidence in several areas of the San Joaquin Valley on a continuing basis.

d. Develop and implement a method to systematize the orderly collection and evaluation of ground water withdrawals on a statewide basis.

e. Compile, evaluate, and publish periodically aquifer tests on a statewide basis which will assist in the determination of permeability, transmissibility, and storage coefficients of water-bearing deposits. Furnish evaluation and advisory services to the Department in the highly technical and continual changing field of aquifer testing.

f. Derive more definitive values for specific yield and permeability of California water-bearing sediments through laboratory and field research studies.

g. Conduct continuing laboratory and field research studies related to recharge of ground water, and prepare a "Recharge Guide".

D. General Description

Studies by the U. S. Geological Survey, Water Resources Division, cover investigations of geologic, hydrologic and water quality factors related to the determination of: geologic formations which can store and transmit ground water; geologic structures which confine and impede the movement of ground water; reservoir characteristics of ground water basins including specific yield, storage capacity, permeability and transmissibility; and specialized studies of land subsidence and ground water extractions. Studies by the U. S. Department of Agriculture, Agricultural Research Service, are primarily concerned with research related to ground water recharge activities.

Findings and conclusions of the cooperative investigations are released as reports by the cooperators for use by Department staff members.

E. Date Work Started

"Irrigation Investigations" by the U. S. Department of Agriculture, Agricultural Research Service, in cooperation with the State of California began in the early 1920's.

PART I, continued

"Ground Water Investigations" by the U. S. Geological Survey, Water Resources Division, in cooperation with the State of California began in 1948.

F. Estimated Completion Date

This is a continuing program.

FEDERAL-STATE COOPERATIVE GROUND WATER INVESTIGATIONS PART II

G. Resources Input Data

	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73
USGS	$131,600	95,000	98,000	101,000	104,000	107,000	110,000
ARS	33,000	24,000	25,000	26,000	27,000	28,000	29,000
	$164,600*	$119,000	$123,000	$127,000	$131,000	$135,000	$139,000

H. Program Output Data

Reports, presenting the results of investigations and/or research, are the primary output of these cooperative ground water studies. The reports may be released as U. S. Geological Survey Open-file reports and Water Supply Papers, as publications of the U. S. Department of Agriculture, Agricultural Research Service, as basic data bulletins of the Department of Water Resources, specifically the Bulletin 91 Series, and as special papers in technical journals and publications.

I. Work Program for 1968-69

U. S. Geological Survey, Water Resources Division

1. Water Development Studies

Two detailed subsurface geologic, hydrologic and water quality studies related to the evaluation of ground water resources in the San Joaquin Valley will be undertaken as follows:

a. The detailed investigation in the Tracy-Gustine area will continue. A report is scheduled for release to the Department during fiscal year 1969-70.

b. A new start will be made on a San Joaquin Valley aquiclude and aquitard map, and a base of fresh water map. A report is scheduled for release to the Department during fiscal year 1970-71.

*Matching contract funds only. Administration of this program covered by Department overhead. Commencing with fiscal year 1967-68 these contract funds support approximately 7.2 man-years, 5.7 USGS and 1.5 ARS.

PART II, continued

2. Aquifer Tests

The aquifer tests program for determining permeability and transmissibility of California water-bearing materials will continue at a reduced rate. The major emphasis of the reduced program will be to assist the Department in the planning, execution and interpretation of aquifer tests. Formal reports will not be developed in this program.

3. Ground Water Withdrawals

This program will develop procedures for handling large quantities of data, provide information for estimating future cost of the continuing program, and supply estimates of ground water withdrawals in priority areas. Processing of data will continue in Kern County, San Joaquin Valley, and insofar as funds permit, processing of data will be undertaken in Kings, Tulare, Fresno and Madera Counties. If additional funds are available, the area will be expanded further to the north in San Joaquin Valley to include Merced and Stanislaus Counties. Formal reports will not be developed in this program. Data will be transmitted to the Department as collected, or by June 1969, whichever procedure is most satisfactory to both parties.

4. Southern California Area Studies

Three reconnaissance level investigations on occurrence, depth and quality of ground water in Southern California desert areas will be undertaken. These study areas will include:

a. Harper Valley area will be completed and report released to the Department about August 30, 1968.

b. A new start will be made in Ivanpah Valley area with a report scheduled for release to the Department about June 30, 1969.

c. A new start will be made in the Twenty-Nine Palms area. A report is scheduled for release to the Department during fiscal year 1969-70.

5. Permeability

The permeability research studies relating to California water-bearing sediments will continue and two reports will be prepared:

PART II, continued

a. "Relation of Permeability to Particle Size of Homogeneous Sands and Gravels." Report to be released to the Department January 1969.

b. "Factors Affecting Laboratory Permeability Measurements." Report to be released to the Department June 1969.

6. Land Subsidence

Comprehensive investigations on the cause, extent and rate of land subsidence will be undertaken in several areas of the San Joaquin Valley. These studies will include:

a. An overall subsidence report for the San Joaquin Valley bringing subsidence conditions up to latest leveling control (1968 and 1969) will be prepared. The report will show extent, magnitude, rates and other factual data. Preliminary edition of the report will be released to the Department about June 30, 1969, or shortly thereafter.

b. Final review and preparation of open-file reports for Los Banos-Kettleman City area and Arvin-Maricopa area will be completed. Open-file reports will be released to the Department during the fiscal year.

c. Operate and maintain compaction and water level recorders in the San Joaquin Valley.

The program may be augmented by $5,000 if a proposed cooperative land subsidence program is approved in the Southern District, Ground Water Basin Planned Utilization Studies. These studies would cover two areas:

a. Preliminary review and evaluation of land subsidence in coastal plain areas of Orange and Los Angeles Counties with Department personnel.

b. Advisory and planning services to Department personnel who will be conducting the land subsidence investigation.

U. S. Department of Agriculture, Agricultural Research Service

Research studies of ground water recharge will include investigations of the following:

1. Ground Water Mounds

a. Data acquisition, analysis and interpretation will be completed on ground water mound studies, and the

PART II, continued

study will be terminated at the end of the fiscal year.

b. An annual open-file report summarizing results of this program will be released to the Department about March 15, 1969. An open-file report containing all observational data, analytic comparisons, analysis, and programs will be released to the Department in June 1969. In addition, articles and papers for publication in technical journals will be prepared as appropriate.

2. Clogging During Recharge

a. Survey of clogging of field projects and laboratory studies will be completed, and the study will be terminated at the end of the fiscal year.

b. An annual open-file report summarizing results of this program will be released to the Department about March 15, 1969. An open-file report containing all laboratory and field observations, analysis of results, suggested descriptive theories, and proposed practical solutions to clogging will be released to the Department in June 1969. In addition, articles and papers for publication in technical journals will be prepared as appropriate.

3. Recharge Guide

a. Field and office studies will be completed bringing together all significant findings on recharge research at the Fresno Field Station and other research stations.

b. An open-file report "Annotated Bibliography on Recharge" will be released to the Department June 1969.

c. A preliminary draft of the recharge guide which is a revision of "Replenishment of Ground Water Supplies by Artificial Means" by Dean C. Muckel, Technical Bulletin No. 1195, U. S. Department of Agriculture, Agricultural Research Service, 1959, will be released to the Department June 1969.

COOPERATIVE WATERSHED MANAGEMENT RESEARCH
PART I

Need

With an increasing population in California, and an increasing per capita use of water, the vanishing supply of sites for low-cost reservoirs makes it imperative that other methods of increasing the State's water supply be found. The mountain and foothill watersheds of the State produce over 90 percent of California's annual water supply, yet less than half of the precipitation on this area becomes runoff. To determine how much of this vast quantity of lost water can be salvaged, and how this can be accomplished, requires research into the basic causes and compenents of water yield, and into the affects of watershed management practices.

Authority

Sections 225 and 226 of the California Water Code.

Objectives

1. Specific rules for watershed management.

   For recommendation to landowners that will improve quantities and qualities of usable streamflow or ground water, reduce flood hazards, reduce undesirable sediment movement, and cause minimal adverse effects on other wildland uses, such as timber production, grazing, mining, recreation, and wildlife protection.

2. Increased knowledge of the hydrologic cycle.

   A body of knowledge discovered and accumulated sufficient for formulation of specific rules for watershed management, and for other needs of the Department.

3. Procedures and devices for improved measurement or modification of the hydrologic cycle.

   Discovered or invented procedures and devices as necessary to accomplish Objective No. 2.

General Description

1. General

   a. The Department's contribution is financial only. The research work itself is conducted by specialists of the Pacific Southwest Forest and Range Experiment Station, and of the University of California at Davis, under cooperative contracts.

   b. Research is carefully coordinated with similar and connected research conducted by or supported by other state and federal agencies.

   c. Most of the research is comparative, control areas vs modified areas, and in three phases.

2. Phases of Research

   a. Calibration. Intensive data collection for several years.

   b. Modification. Experimental manipulation.

c. Evaluation. Data collection for several years after modification. Analysis is concurrent with all phases, and may result in abandonment or change at any time. Phases overlap for different experiments; all three phases are represented in program at present.

3. Departmental Control

Under each contract, the Department as a contributor is consulted in advance on proposed research activities. Departmental program manager monitors research by phone calls and visits.

4. Location of Research

a. Offices and Central Laboratories of Cooperators:

(1) Pacific Southwest Forest and Range Experiment Station, U. S. Forest Service, at 1960 Addison Street, Berkeley, California 94701.

(2) University of California, Department of Irrigation and Water Sciences, Davis, California 95616.

b. Snowland Experimental Areas

(1) Central Sierra Snow Laboratory, near Soda Springs, Nevada County.

(2) Headwaters of American River, Sierra County (inactive, budget and previous year).

(3) Headwaters of Yuba River, Placer County (inactive, budget and previous year).

(4) Headwaters of Kings River, Fresno County.

c. Lower Conifer Zone Experimental Areas

(1) Challenge Experimental Forest, Plumas County.

(2) Caspar Creek experimental watersheds, near Fort Bragg, Mendocino County.

d. Mass Soil Movement Experimental Areas

(1) Moraga Hills soil creep area, in Contra Costa County (inactive, budget and previous year).

(2) North Coast Transect, in Mendocino, Glenn, and Tehama Counties (inactive, budget and previous year).

e. Brushland Experimental Areas

(1) Placer County experimental watersheds, near Lincoln, Placer County.

(2) Hopland Experimental Watershed II, near Hopland, Mendocino County.

Date Work Started

1. Snowlands: 1956
2. Lower Conifer Zone: 1961
3. Mass Gravitational Movement: 1964
4. Brushlands: 1960

Estimated Completion Date

Continuing Program.

COOPERATIVE WATERSHED MANAGEMENT RESEARCH
PART II

1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
120	0*	41		18	**	**		**		**		**	

Program Output Data

1. Annual progress reports, in February. In addition to current progress, these reports present significant data, summarize important conclusions, and clarify the relationships between objectives and accomplishments.

2. Articles in technical journals and magazines. By this means, new discoveries and conclusions are disseminated to the most interested and concerned public.

3. Monthly progress reports. The Departmental program manager monitors the research by telephone and visits to research areas, and makes monthly progress reports.

Work Program for Budget Year. (Staff and Services Management)

Brushland Experimental Areas

a. Collection of postmanipulation data will continue on Placer County experimental watersheds and Hopland Experimental Watershed II.

b. Office analyses and correlations will continue with the ultimate objective being predictive equations, both accurate and practical, relating vegetative conversion to hydrologic response.

*All work done under contract. Departmental monitoring of program absorbed as additional duties of Staff Sedimentation Engineer.

**Cooperation with USDA suspended, and entire Watershed Management Research program to be reevaluated.

A

c. An attempt may be made to develop a parametric rainfall-runoff relationship, with base flow as the chief parameter.

d. Attempts may be made to find ready measurements of erosion for correlation with causative factors; or to correlate stream transport of sediment with causative factors through a variable time-delay.

BEACH EROSION INVESTIGATIONS
PART I

NEED

The State of California has over 1,100 miles of coastline subjected to continuous wave action causing a wearing away of land as rapidly as a foot per year in some areas. In addition, shoreline slips and slides in unstable soil areas, subsidence from offshore pumping, susceptibility to earthquakes, construction of harbor facilities, and unpredictable storm waves create a continuous and complex problem of beach erosion control and shoreline stabilization.

The erosion causes serious problems of loss of land, restricted use and eventual damage to improved property. Technical data and information are required to define the erosion problems and to serve as the basis for the design of effective measures for the protection and preservation of California's shoreline. Adequate general information regarding oceanic forces and shoreline conditions is insufficient to permit sound planning of projects and it has become apparent that studies of a general basic data nature are necessary. A modest program to investigate erosion conditions along the full length of the California shoreline is desirable.

AUTHORITY

Chapter 1859, Statutes of 1953, Section 330-334 of the Water Code.

OBJECTIVES

Increase basic scientific knowledge of coastal processes - ocean waves, tides and currents, movement of sand, and oceanic forces - that effect the shore; improve the design and maintenance of restored beaches and shores, coastal structures, and navigation channels and entrances; locate practical sources of sand; and devise means to prevent loss of offshore sand.

GENERAL DESCRIPTION

The studies generally fall into two categories: General Investigations and Project Studies. For both categories a study program involves a preliminary analysis of the problem, based upon data obtained by inspection of the problem area, and a review of available data and published reports. Previously used data will be confirmed or supplemented to the extent practicable for a complete understanding of the most suitable remedial measures. Field investigations may be necessary to establish base lines and ranges for measurement of ground and hydrographic surveys. Photo records and sand samples are also taken as part of beach surveillance activities. The investigations and studies are carried out in cooperation with local agencies, U. S. Corps of Engineers, U. S. Geological Survey, and others.

Studies of general basic data nature are funded on a cooperative basis, and may be requested of the Department of Water Resources by local agencies. These studies may be made by the Department or by consultants in

cooperation with the Corps of Engineers. The Department may also perform independent studies apart from local requests providing they are in the best interest of the State of California.

Project studies for the purpose of recommending solutions to specific problems are financed entirely by the Federal Government in accordance with Public Law 874, 87th Congress, passed in October 1962.

These studies are coordinated with the Department of Water Resources and local affected agencies toward development of protective projects setting forth financial responsibilities of federal and nonfederal agencies.

DATE WORK STARTED

1946.

ESTIMATED COMPLETION DATE

Continuing.

Tom Y. Fujimoto 3/30/67

1968-69 F.Y.
Planning I-02
SPO W.A. 1159
ND ----
SFBD ----
SD ----

BEACH EROSION INVESTIGATIONS
PART II

RESOURCES INPUT DATA (in $1,000 - GF - and man-years)

	1966-67		1967-68[a]		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	0	0.0	0	0.0	15	0.6	16	0.6	17	0.6	18	0.6	19	0.6
ND	0	0.0	3	0.1	15	0.5	15	0.5	16	0.5	17	0.5	18	0.5
SFBD	0	0.0	17	0.8	18	0.8	19	0.8	20	0.8	21	0.8	22	0.8
SD	0	0.0	48[b]	2.7	39	2.0	40	2.0	41	2.0	42	2.0	43	2.0
Contracts	35	---	55	---	85	---	85	---	85	---	85	---	85	---
Totals	35	0.0	123	3.6	172	3.9	175	3.9	179	3.9	183	3.9	187	3.9

a/ Starting in 1967-68 the program was realigned with Administration of Beach Erosion Control Funds.
b/ Transfer $10,000 to augment support Administration of Beach Erosion Control Funds.

PROGRAM OUTPUT DATA

1. United States to submit letter progress report in 1968 and 1969 with a final report in 1970 on the three-year cooperative beach erosion investigation from Cape San Martin to the Mexican Boundary. Total first year cost is $70,000 of which State share is $35,000.

2. U. S. Army Coastal Engineering Research Center to submit first annual summary report in 1968-69 on three-year cooperative investigation of littoral transport around Point Conception, Santa Barbara County. Total first year cost is $196,950 of which State share is $5,000.

3. U. S. Geological Survey to submit annual summary reports starting in 1968-69 on coastal watershed sedimentation investigation. Total first year cost $22,700, State share $11,350.

4. United States to submit photographic prints and plotted survey data in 1968 for a cooperative beach survey at mouth of Eel River, Humboldt County. Total cost $4,000 of which State share is $2,000.

5. A DWR Bulletin on independent Beach Nourishment Study along the Southern California Coastline is planned for 1972-73. Office reports will be issued to cover a specific segment of coastline on the following schedule.

a. San Diego County - 1968-69.
b. Ventura River to Palo Verdes Peninsula - 1969-70.

c. Palo Verdes Peninsula to San Diego County - 1970-71.
d. Cape San Martin to Ventura River - 1971-72.

6. Annual memorandum reports on surveillance, general data activities, and gravel mining at mouth of Russian River.

7. Project oriented studies will be completed for the following:

a. Capitola Beach, Santa Cruz County.
b. City of Pacifica, San Mateo County.
c. El Granada Beach, San Mateo County.
d. Alamitos Bay, Los Angeles County.

WORK PROGRAM FOR 1968-69

A cooperative three-year sand transport study by the U. S. Army Corps of Engineers in the area of the mouth of the San Lorenzo River in Santa Cruz County will be initiated, and participation will continue in the second-year with Corps of Engineers in a cooperative beach erosion study at the mouth of the Eel River.

Participation will continue in the second year of the Cooperative Investigation of Littoral Transport around Point Conception, Santa Barbara County.

Participation will continue in the second year of the cooperative coastal watershed sedimentation investigation.

Work will continue on the DWR Bulletin on Beach Nourishment Study along the Southern California coastline. The San Diego County segment will be completed.

A Northern California survey of existing beach areas with periodic surveillance of the rates of erosion and accretions will be initiated, including an inventory of existing natural and artificial barriers affecting the shoreline process. Local agencies with beach erosion control and stabilization problems will be provided assistance in implementing federal studies of needed shore protection works.

T. Y. Fujimoto 4/15/67

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WATER QUALITY INVESTIGATIONS
PART I

NEED

Natural conditions or man-made situations can contribute to degradation of the quality of water resources, thereby causing, or threatening to cause, water quality problems in some areas. Our present quality monitoring programs do not provide for detailed evaluation of the data collected; however, they frequently detect quality changes which indicate that detrimental effects on water quality may be occurring. We also receive numerous indications from public agencies and private citizens that detrimental quality changes are taking place in specific areas.

Water quality investigations must be conducted to define and document areal water quality conditions and to evaluate the nature and extent of water quality problems. The results of studies of this type are considered in formulating plans for development and management of the State's water resources, and the program is part of the Department's total responsibility toward all the water resources of the State. The program also is an essential element in enabling the Department to meet its increasing responsibilities in assisting the water quality control boards establish water quality control policies. These policies are implemented in part through departmental water resources planning and development.

AUTHORITY

Water Code Section 229.

OBJECTIVES

To determine the nature, extent, and significance of water quality problems and conditions; to define the urgency of water quality problems in specific areas; to recommend means for correcting, alleviating, or preventing undesired effects; and to recommend priorities for conducting more comprehensive and detailed investigations where warranted.

GENERAL DESCRIPTION

This program provides a level of investigation between the data collection programs and project planning studies by which relatively short-duration studies are made to determine the nature of problems and whether more detailed studies of a project planning nature are warranted.

Localities and problems are selected for study on the basis of water quality data, findings of studies, and suggestions of, or requests by, other governmental agencies. Numerous studies may be progressing concurrently. Priorities are subject to change commensurate with the urgency of situations and problems encountered. Water quality investigations generally include: (1) a review of pertinent data and literature; (2) geologic and hydrologic survey; (3) study of ground, surface, and waste water quality; (4) determination of the nature and extent of undesirable water quality effects; (5) evaluation of collected data and information; and (6) preparation of a report on the investigation.

Each investigation is coordinated as fully as possible with other agencies engaged in water quality work in the area of investigation.

DATE WORK STARTED

July 1952.

ESTIMATED COMPLETION DATE

Continuing.

James C. Mosley 3/30/67

1968-69 F.Y.
Planning I-02

SPO	W.A.
NB	1292
SFB	1294
SAC	1293
SJD	1295
SD	1296

WATER QUALITY INVESTIGATIONS
PART II

RESOURCES INPUT DATA (in $1,000 GF and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	0	0.0	3	0.1	3	0.1	3	0.1	3	0.1	4	0.1	4	0.1
ND	21	1.2	22	1.1	23	1.1	25	1.2	25	1.2	27	1.4	27	1.2
SFBD	44	2.2	38	1.8	39	1.8	40	1.8	41	1.8	42	1.8	43	1.8
SAC	31	1.8	25	1.5	33	1.8	36	2.0	39	2.2	45	2.5	47	2.5
SJD	21	1.1	22	1.1	34	2.2	40	2.4	40	2.4	40	2.4	40	2.4
SD	78	3.3	65	2.3	85	3.3	84	3.3	86	3.3	88	3.3	90	3.3
Totals	195	9.6	175	7.9	217	10.3	228	10.8	234	11.0	246	11.5	251	11.5

PROGRAM OUTPUT DATA

Total output data from this program cannot be identified specifically at this time, since many of the studies are conducted when and where the need arises and often at the urgent request of other agencies or individuals. Data which can be identified are the following:

1. 1968-69

   a. A bulletin in the 143 series on the Napa River watershed investigation.
   b. Office report - Desert Hot Springs
   c. Office report - Chuckwalla Valley*

2. 1969-70

   a. Office report - Boron discharges from mines (Sespe Creek).
   b. Office report - Water quality changes as a result of recharge of reclaimed waste water (Montebello Forebay).

3. 1970-71

   a. Office report - Water quality changes as a result of use and recharge of reclaimed waste water (San Diego River Valley).

* If the new program for Chuckwalla Valley Investigation is approved, the study under Work Authority 1296 will not be initiated.

4. 1971-72

   a. Office report - Water quality changes as a result of use and recharge of reclaimed waste water (San Gabriel Valley).

5. 1972-73

   a. Office report - Water quality changes as a result of use and recharge of reclaimed waste water (Antelope Valley).

WORK PROGRAM FOR 1968-69

Statewide Planning Office. Coordinate District activities.

Northern District

1. Process and answer questions regarding water quality problems.

2. Investigate most significant W. Q. problems reported.

3. Prepare memoranda and reports summarizing results and including conclusions and recommendations.

4. Inform appropriate control agencies during conduct of investigations.

5. Whenever remedial action can be taken, inform appropriate individuals or agencies.

6. Make data and study results available for other water resource studies.

San Francisco Bay District. The water quality investigation of the Napa River watershed will be completed and a report will be prepared. This will require approximately 60 percent of the time and manpower allotted this work authority. The remaining 40 percent will be used for smaller studies of localized quality problems according to the need and demand as pointed up by surveillance programs, other studies, requests and the area-wide study completed during fiscal year 1965-66.

Sacramento District. Based on past experience, we anticipate that about six or eight high priority studies will be undertaken during the 1968-69 fiscal year, resulting in one bulletin, about one office report, and the remainder letter-type reports. Following are examples of studies and reports undertaken in this program:

Short-term water quality investigations as they occur, following are typical examples

Well degradation from City of Tracy's sewage ponds.

Need for water quality monitoring at French Camp.

Suitability of area for dump site, Plumas County.

Leakage from gasoline tank degrading ground water basin near Chester.

Necessity for ground water monitoring for Deuel Vocational Institute.

Adverse effects of geothermal power plant at Clear Lake.

Ground water suitability for industrial use, Stockton Area.

Folsom-East Sacramento Ground Water Investigation.

Clear Lake Water Quality Investigation.

Foothills Water Quality Investigations.

San Joaquin District

1. Water quality studies initiated previous to budget year will be completed.

2. Additional studies conducted on a priority basis.

   a. Investigations of water quality problem areas detected by the data program.
   b. Answering requests for brief water quality studies, evaluations, or miscellaneous water quality information from other agencies.

3. Findings of these studies will be reported in office memorandum form.

   a. Define and document areal water quality condition.
   b. Evaluate the nature and extent of water quality problems.
   c. Notify appropriate control agency.

Southern District

1. Complete geohydrologic and water quality studies of high fluorides in Desert Hot Springs. Prepare and print formal blue cover report.

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2. Complete geohydrologic and water quality studies of high fluorides in Chuckwalla Valley. Prepare and print formal blue cover report.

3. Initiate a geohydrologic-water quality study of boron discharges from mines (Sespe Creek). Set up water quality sampling program. Send samples to laboratory for chemical analyses. Prepare base map and geology map.

J. C. Mosley 4/6/67

SEA WATER INTRUSION STUDIES
PART I

NEED

Ground water basins along the coast of California have been subjected to sea water intrusion, and sporadic encroachment of sea water. It is conservatively estimated that more than 320,000 acre-feet of fresh water storage capacity has been intruded by ocean waters. Many other areas are in potential danger of sea water intrusion. Water users in ground water basins which have suffered from encroachment by sea water must find other sources of fresh water for overlying lands if these lands are to remain productive. These other sources of water entail greater costs, and the value of ground water basins for storage, transmission, and peaking purposes is lost. As population increases, and the demand for additional water grows, the danger of further sea water intrusion becomes more serious.

AUTHORITY

Section 229 of the Water Code.

OBJECTIVES

Determine the extent and rate of sea water intrusion.

GENERAL DESCRIPTION

A study is initiated when the ground water quality data collection program reveals probably sea water intrusion in an area dependent wholly or partially on ground water to maintain its economy. Principal activities are collection, analysis, and evaluation of monitoring and observation wells and evaluation of geologic conditions in the intruded areas. Acquirement and preservation of the water wells include preparation and formulation of "right-of-way" and "lease" agreements, and when well construction is necessary, the design of wells, preparation of contracts, and supervision of construction.

Several local agencies are involved in collection of basic data on sea water intrusion and in test well drilling. Complete coordination between these local activities and the Department's program is maintained. The majority of the local entities, however, do not have the

personnel qualified or adequately trained to properly evaluate and interpret the data, to locate wells suitable for leasing, or to designate sites for new well construction.

The Districts conduct the following specific activities:

1. Samples of water from intruded areas are collected and analyzed at least once a year, and generally more often, from many wells. Sampling of acquired and drilled wells entails the employment of a mobile pump. A trained field crew spends approximately nine man-months per year sampling wells for this program.

2. Water quality data is collected from other agencies.

3. An annual report on the status of sea water intrusion is prepared and included in Bulletin No. 130 and in Southern California in the Bulletin No. 63 series also.

4. Wells for test and monitoring purposes in intruded areas are acquired by lease agreements or by construction.

5. Acquired or constructed wells are maintained in such a condition that data obtained is reliable, and maximum longevity of the well at minimum cost is insured.

6. When planned operation of these coastal ground water basins becomes effective, work on this program may be increased to observe the effectiveness of control measures.

In formulating plans for the control of sea water intrusion as authorized under Chapter 1620, Statutes of 1961, the "Porter-Dolwig Ground Water Basin Protection Law", information detailing the geology and subsurface hydrologic features of the study area must be provided. The collection and evaluation of such data are necessary basic steps in planning ground water basin protection programs. The budget for the ground water basin protection programs was prepared and the projects were formulated under the assumption that the sea water intrusion program would be continued and precede sea water barrier studies. Accordingly, the sea water intrusion program must be maintained at approximately the current level to assure the success of that portion of the ground water basin protection program dealing with the control of sea water intrusion.

Local governmental agencies familiar with the aims of the program are in complete accord with its objectives, have expressed their desire for its continuation and their intention to make use of the information developed.

Salt water channels are being constructed in coastal areas, at an ever-accelerating rate. Numerous marinas, canals, and channels which will convey saline waters inland have been proposed at numerous locations along the coastal reach of Southern California. Since any marinas, channels, or canals which are constructed along the coast may provide an avenue for the introduction of sea water to the shallow-water body in the alluvial and coastal deposits of Recent age, a principal purpose of the proposed studies will be to determine the physical properties of the shallow deposits of the coastal gaps, the relation of the deep aquifers to these shallow deposits, and whether saline water in the channels might percolate downward to the shallow-water body and then to the deeper fresh-water aquifers.

Requests from the public concerning the effects of construction of proposed marinas, harbors, and flood control channels on the utility of ground water basins have increased greatly during the past few years. The data to be collected and evaluated as part of this increased program will serve as guidelines and support for the decisions of the Department, regional water quality control boards, and local and federal agencies proposing or reviewing harbor and flood control channel projects. These data are not currently available, and the Department, because of its established sea water intrusion program, is the best organized to collect and analyze the urgently needed information.

DATE WORK STARTED

1950.

ESTIMATED COMPLETION DATE

Continuing.

Orville L. Abbott 3/30/67

SEA WATER INTRUSION STUDIES
PART II

RESOURCES INPUT DATA ($1,000 GF and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SFBD	0	0	0	0	25	1.2	30	1.2	35	1.2	35	1.2	35	1.2
SD	150	5	150	5	170	5	170	5	150	5	150	5	150	5
TOTAL	150	5	150	5	195	6.2	200	6.2	185	6.2	185	6.2	185	6.2

PROGRAM OUTPUT DATA

San Francisco Bay District

1. Review geology, hydrology and water quality data of area.

2. Develop and implement work plan to correct data deficiencies and provide monitoring of intrusion.

3. Evaluate the economic worth of the ground water resources and determine local interest in preserving ground water basin.

4. Recommend type of ground water investigation needed to develop means of correcting intrusion problem.

Southern District

1. 1968-69
   Complete second phase of model studies - Mound Basin.

2. 1969-70
   Bulletin: Sea Water Intrusion, Oxnard Plain - Mound Basin.

3. 1970-71
   Bulletin: Sea Water Intrusion, Morro Bay.

4. 1971-72
   Complete test drilling and observation wells, Huntington Beach Mesa.

5. 1972-73
   Bulletin: Sea Water Intrusion, Huntington Beach Mesa.

WORK PROGRAM FOR 1968-69

San Francisco Bay District

1. In Monterey Bay area: collection, analysis of existing geologic, hydrologic and water quality data on the lower Salinas ground water basin adjacent to Monterey Bay.

2. Develop program to extend knowledge of geology below the 400-foot depth and to monitor the extent of intrusion in each of the coastal aquifers.

3. In South Bay area: in cooperation with Alameda County agencies continue the monitoring of intrusion into the Fremont area.

Southern District

1. Study permeability of aquicludes in Mound Basin, Ventura County.

2. Second phase of model studies in Mound Basin,in cooperation with the University of California, Berkeley.

3. Laboratory Tests - Clay mineralogy, x-ray diffraction studies, at the University of California, Berkeley.

4. Initiate Morro Bay Sea Water Intrusion Study. Prepare contracts for drilling. Set up sampling program.

LOWER SAN JOAQUIN RIVER WATER QUALITY INVESTIGATION
PART I

NEED

For many years, water in downstream reaches of the San Joaquin River has been deteriorating in quality. Water available for diversion has been of such poor quality during recent "dry years" that substantial damage resulted to irrigated crops. Additional water development projects are to be constructed in the immediate future on the San Joaquin River and its tributaries, and plans are being formulated for further development within the basin. Such developments could result in an increase in the existing water quality problem. Further, changes in flow and quality characteristics of the lower San Joaquin River will be caused by the removal of irrigation drainage by the San Joaquin Valley Master Drain.

To prevent further water quality degradation and economic loss to water divertors it is necessary to anticipate the cumulative effects of the foregoing developments within the area. Therefore, investigation of the present problem and its causes is necessary to project the future conditions of water quality in the lower San Joaquin River. Once future conditions have been estimated, corrective measures can be planned if necessary. Because the construction of engineering works or implementation of operation criteria may take several years, it is necessary to make this investigation now.

AUTHORITY

This program is required to fulfill the state responsibility described in Section 12230 of the State Water Code which states that:

> "12230. The Legislature hereby finds and declares that a serious problem of water quality exists in the San Joaquin River between the junction of the San Joaquin River and the Merced River and the junction of the San Joaquin River with Middle River; that by virtue of the nature and causes of the problem and its effect upon water supplies in the Sacramento-San Joaquin Delta, it is a matter of statewide interest and is the responsibility of the State to determine an equitable and feasible solution to this problem."

In addition, the Department is directed by Section 229 of the Water Code to conduct investigations of the quality of all waters within the State.

> "229. The department, either independently or in cooperation with any person or any county, state, federal or other agency, to the extent that funds are allocated therefor, shall investigate conditions of the quality of all waters within the State, including saline waters, coastal and inland, as related to all sources of pollution of whatever nature and shall report thereon to the Legislature and to the appropriate regional water

pollution control board annually, and may recommend any steps which might be taken to improve or protect the quality of such waters."

OBJECTIVES

The objectives of this program are:

1. To determine the present degree of water quality problems and their impact upon the economy of the area.

2. To predict the future water quality conditions in the lower San Joaquin River.

3. To determine if future conditions will cause quality problems and if so to determine their effects upon the economy of the area.

4. To find a feasible and equitable solution to the present and possible future water quality problems in the lower San Joaquin River.

5. To prepare a report on the investigation presenting our conclusions and recommendations.

GENERAL DESCRIPTION

The program will consist of the following general work in the drainage area of the San Joaquin River and its tributaries upstream from its confluence with Middle River:

1. Compilation and evaluation of pertinent existing water quality, hydrologic, land and water use data.

2. Projection of agricultural, municipal and industrial growth.

3. An economic evaluation of present and future use of waters within the drainage area.

4. Determination of effects of presently authorized and planned projects on quality of waters within the drainage area.

5. Recommendation of method or methods of feasibly and equitably solving present and possible future water quality problems.

DATE WORK STARTED

Work on this program began in August 1964.

ESTIMATED COMPLETION DATE

This program originally was scheduled to be completed in June 1967. Using the critical path method, a thorough analysis of the work to be accomplished and of the length of time necessary to fulfill the objective of the investigation disclosed that a completion date of June 1969 would be necessary to include preparation and approval of the final report. Slippage in development of the mathematical model of San Joaquin River necessitated a revised completion date of November 30, 1969.

1.	Hydrologic studies completed	11-12-65
2.	Present conditions studies completed	7-14-67
3.	Future conditions studies without project completed	9-22-67
4.	Project development completed	5-30-68
5.	First draft of preliminary report completed	8- 2-68
6.	Preliminary report approved	11-29-68
7.	Final report approved	11- 7-69

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1968-69 F.Y.
Planning I-02
SJD W.A. 1249

LOWER SAN JOAQUIN RIVER WATER QUALITY INVESTIGATION
PART II

RESOURCES INPUT DATA

	1966-67		1967-68		1968-69		1969-70	
	$	MY	$	MY	$	MY	$	MY
SJD	62	3.4	73	4.3	20	.8	10	.3

PROGRAM OUTPUT DATA

1. Economic Justification of Alternatives.
2. Proposed Solution for Present Problems.
3. Proposed Solution for Future Problems.
4. Preliminary Edition Report on Investigation.
5. Public Review of Report.
6. Draft of Final Report.

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UNIT WATER USE - VEGETATIVE

PART I

NEED

Accurate estimates of irrigation requirements and unit values of evapotranspiration are essential as more complex and costly water development facilities are contemplated. The location and sizing of reservoirs, distribution systems, final disposal or drainage systems, and conjunctive operation of ground water basins are dependent upon reliable monthly values of irrigation requirements and evapotranspiration for various kinds of vegetation. Accurate values of irrigation requirements and evapotranspiration also important in planning. Furthermore, as water costs rise, more accurate knowledge of evapotranspiration rates will become of increasing importance to achieving greater efficiencies in irrigation practices.

In addition, a means of anticipating and predicting short-term water demands will substantially assist in the operation of water projects, particularly those subject to large fluctuations in water demand and diurnal power rates.

AUTHORITY

Section 226(e) of the Water Code.

OBJECTIVES

Determine monthly evapotranspiration rates and irrigation requirements of vegetative crops to determine inter-relationship between evapotranspiration and soil, plant, and agroclimatic factors affecting evapotranspiration; (2) measure evaporation and other data to provide a basis for estimating evapotranspiration within major agricultural areas of the State on an annual, monthly, or short-term basis; (3) collect data relative to irrigation practices, efficiencies, and growing seasons pertinent to the determination of irrigation requirements.

GENERAL DESCRIPTION

Measurements of evaporation from atmometers and standard Weather Bureau pans in established agroclimatic stations will be obtained from weekly readings. These measurements will provide a basis for estimating evapotranspiration rates of crops and will be utilized for anticipating and predicting short-term water requirements. Measurements of evapotranspiration, essential to determine monthly coefficients, are being made at Arvin, Thornton, Fall River Mills, Soledad, and near Santa Maria. The latter two are now being done cooperatively with the California State Department of Corrections Prison Farm at Soledad and San Luis Obispo County, respectively. Other factors

affecting evapotranspiration are being measured. Monterey County is also cooperating by making irrigation application measurements. Research regarding fundamental relationships of various climatological factors with evapotranspiration will be carried on by the University of California and the Agricultural Research Service. The Department will make use of equipment developed by the University for measuring consumptive use of various crops.

DATE WORK STARTED

July 1956

ESTIMATED COMPLETION DATE

Continuing

B. P. Brown
3/30/67

1968-69 F.Y.
Planning I-02
SPO W.A. 1306
ND 1307
SFBD 1309
SAC 1308
SJD 1310
SD 1311

UNIT WATER USE - VEGETATIVE
PART II

RESOURCES INPUT DATA (In $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO *	50	0.9	55	0.2	69	1.7	66	1.4	57	1.5	39	0.4	51	1.0
ND	34	1.9	19	0.8	30	1.5	30	1.5	31	1.5	32	1.5	33	1.5
SFBD	13	0.5	13	0.5	14	0.5	14	0.5	15	0.5	16	0.5	17	0.5
SAC	9	0.3	13	0.4	13	0.4	14	0.4	14	0.4	15	0.4	15	0.4
SJD	51	3.4	48	3.0	50	3.0	51	3.0	53	3.0	54	3.0	54	3.0
SD	2	0.1	6	0.4	17	1.0	18	1.0	19	1.0	20	1.0	21	1.0
Total	159	7.1	154	5.3	193	8.1	193	7.8	189	7.9	176	6.8	191	7.4

* The yearly expenditures and man-year activity in this program should be related to expenditures and man-year activity in the Unit Water Use-Municipal and Industrial program. The two programs are coordinated and reports are prepared by a single program manager. As a result, the level of activity and expenditure varies from year to year depending on work scheduled.

PROGRAM OUTPUT DATA

1. 1968-69:
   a. Five district office or memorandum reports.
   b. Memorandum report updating vegetative water use values.
   c. Two research reports
   d. Evaluation report - Phase I
2. 1969-70:
   a. Bulletin 113-3, "Vegetative Water Use"
   b. Two research reports
3. 1970-71:
   a. Five district office or memorandum reports
   b. Memorandum report updating vegetative water use values.
   c. Two research reports.
4. 1971-72:
   a. Bulletin 113-4, "Vegetative Water Use"
   b. Two research reports
5. 1972-73:
   a. Five district office or memorandum reports
   b. Memorandum report updating vegetative water use values for use in Bulletin 160-72
   c. Two research reports

WORK PROGRAM FOR 1968-69

Statewide Planning Office

1. The Statewide Planning Office will continue to support water use research by University of California and Agricultural Research Service relating to (1) fundamental relationships between various climatic, plant, and soil factors and evapotranspiration, and (2) development of recommended equipment and techniques that can integrate the important factors and effectively measure or predict actual evapotranspiration of irrigated crops and nature vegetation.

2. In addition to the basic research activities, research personnel of the University of California will provide technical assistance to Districts in operating a mobile micrometeorological laboratory partially financed by the Department and presently being built at Davis. The equipment will be used during certain periods to measure short-term consumptive use losses by various crops in the major agricultural areas of the State. This office will coordinate the use of this equipment.

3. A memorandum report will be prepared in the early part of the year updating vegetative water use values in Tulare Lake Basin, South Coastal Area, Sacramento Valley Floor, and North Bay Area for use in Bulletin 160-68.

4. Preparation of most of Bulletin 113-3, "Vegetative Water Use", will be accomplished in this fiscal year. Publication is scheduled in 1968-69. Office or memorandum reports provided by Districts summarizing program activities for calendar year 1968 will be used as the basis for preparing the report.

5. The first phase of an evaluation of the program will be completed in this year. Work under this phase will be directed toward determining how well the program meets statuatory or policy requirements and if the 2nd and 3rd phases of the evaluation study need to be implemented. A report will be prepared. If necessary, the 2nd phase will be initiated.

Northern District

1. Work with farm advisors and other local agricultural specialists on determining irrigation and cropping practices such as time of irrigation, planting dates, harvest dates, and percent ground cover during growing season for various crops.

2. Collection of applied water data from irrigation districts will be continued.

3. Continue operation of agroclimatic station at Red Bluff as reference point for evaporation.

4. The mobile equipment (Bowen Ratio) developed by the University of California at Davis will be used to measure consumptive use rates of irrigated and nonirrigated crops previously estimated.

5. A memorandum report will be prepared on work done in calendar year 1967, summarizing the measurements and the use of data by the Statewide Planning Office; Northern District planning, operations, and other programs; and by private engineering firms and irrigation districts, and government. The office report will be completed in March of 1968.

6. Operate E-W transect across Sacramento Valley using 1-gallan evaporimeters, anemometer, and pyrheliometer; to determine wind/evaporation rate differences for different environments.

7. Long term measurements of soil moisture changes will be made on irrigated lands and on native vegetation. This will provide information on deep perculation and consumptive use of precipitation and irrigation water in the Northern District.

8. A lysimeter will be installed in Tehama County as a basic reference point of evapotranspiration (ET) in the Northern Sacramento Valley.

San Francisco Bay District

1. A review of program direction will continue to ensure that objectives of the work are compatible with statewide objectives and with needs of Department investigations.

2. Agroclimatic, evapotranspiration, and applied water information will continue to be obtained from existing stations.

3. Certain types of field data are becoming adequate at a number of locations and emphasis will now be placed on analysis and interpretation. This data is not subject to trend changes but only to monthly differences from year to year. Field data values derived from analysis will be subjected continously to statistical tests of adequacy. Where data is considered reliable at a location, equipment will be moved to obtain information in the remaining data-deficient areas of the District.

4. Data will be summarized and made available for use through this calendar year (proceding the end of the fiscal year). To the maximum extent possible, data will be analyzed and interpreted in keeping with the format and content of Bulletin No. 113-2 in order to strengthen or modify this published report.

5. Bowen Ratio equipment used to determine consumptive use (ET) of row crops (tested in 1967), will be operated to

determine consumptive use of selected crops, such as lettuce, broccoli, and sugar beets, grown in this District. (This newly-developed equipment is now expected to make possible the determination of consumptive use of precipitation and of applied water for row and spaced crops not previously possible. By obtaining this type of information, computation of irrigation efficiencies and other analyses is possible for more accurate hydrology studies.)

Sacramento District

1. Evapotranspirometer tank measurements of consumptive use of pasture grass will be continued on Bract Tract Station which is located three miles south of Thornton. Other climatic measurements to be obtained at this ET measuring site includes pan and atmometer evaporation, min-max temperature, and continuous recorded measurements of incoming solar radiation, temperature, humidity, and rainfall.

2. Continue the collection, processing, and analysis of data on irrigation applications to major crops. Collate and interpret well pumpage and surface diversion data in district files and as obtainable from private source including PG&E pump records.

3. Install three Sparling continuous flow meters on irrigated fields planted to tomatoes, safflower and milo.

4. Assist in the testing and operation of the mobile ET measuring equipment constructed by the University of California, Department of Irrigation and Water Science. Locate representative or typical fields of major crops and operate the mobile ET equipment as necessary to obtain reliable crop ET measurements.

5. Prepare report of activities and submit to SPO in time for review and incorporation into the Statewide Bulletin No. 113 series. Assist SPO in preparing Bulletin No. 113-66.

6. Continue evaluation of program objectives relative to meeting district and statewide data needs.

San Joaquin District

1. In cooperation with U. S. Bureau of Reclamation, measure consumptive use of grass to determine a "mean" value and yearly variation of potential evapotranspiration in the San Joaquin Valley.

2. Make field measurements of consumptive use of potatoes and grapes.

3. Make periodic short term evapotranspiration measurements of several crops using newly developed Bowen Ratio equipment, for use as a basis for estimates of seasonal and annual consumptive use for those crops.

4. Continue the field survey to collect, tabulate, and interpret data on crop growing seasons, cultural and irrigation practices for crops within the San Joaquin District.

5. Continue collection of agroclimatic data at locations on the valley floor and in the foothills to determine a "reasonable mean" evaporative demand and expectations for yearly variations.

6. Prepare office report summarizing results for inclusion in the Bulletin No. 113 series on vegetative water use.

Southern District

1. Applied irrigation water will be determined from existing records.

2. Cooperative consumptive use data collection

   a. San Luis Obispo
   b. Palo Verde Valley

3. Irrigation efficiencies will be updated to reflect changes in farming practices since 1948.

B. P. Brown
4/18/67

UNIT WATER USE - MUNICIPAL AND INDUSTRIAL

PART I

NEED

Ever increasing urbanization of California imposes greater and greater demands for municipal and industrial water supplies. If planning efforts to develop facilities to satisfy greater demands are to be met efficiently, adequate and accurate data on municipal and industrial water requirements must be available. Before water requirements can be assessed under various conditions of time and area, it is essential that unit water use values for municipal and industrial uses either be collected or procedures be developed by which these values can be estimated.

Such values needed for all water development planning programs being carried out by the Department. Because sources of new water supplies are becoming more scarce with passing time, it is necessary to determine the specific needs of every water-using entity and to assure that as needs change, adequate data to determine such changes will be available.

AUTHORITY

Section 226(e) of the Water Code.

OBJECTIVES

Develop--through data collection, analysis, and interpretation--unit water use values or techniques that will permit accurate estimates to be made of present and future water requirements of municipal and industrial uses throughout California. Major emphasis is to (1) provide planners with available or developed data in Bulletin 166 series on a geographic, historic, and utilization category basis, (2) assist them in adopting and using such data to meet their needs, (3) develop historic gross per capita water use data that will permit projections of municipal and industrial water use requirements in the near future.

GENERAL DESCRIPTION

The approach is to first establish past and present unit values of water use of urban complexes in various geographic areas to provide a basis for measuring trends in water use. This is being accomplished by compiling from various sources historical records of water deliveries and by applying appropriate population values to determine overall per capita requirements. Coupled with this approach and being carried on concurrently is the collection and study of data on various segments of the urban development, such as the report of the manufacturing industry of California. Similar surveys are being contemplated for residential and commercial phases of urban development.

Information gathered under this program, and useful results of any analyses based upon collected data, will be published in the Bulletin 166 series.

DATE WORK STARTED

1959

ESTIMATED COMPLETION DATE

Continuing.

B. P. Brown

MAR 30 1967

1968-69 F.Y.
Planning I-02
SPO W.A. 1005
ND 1311
SFBD 1313
SAC 1312
SJD 1305
SD 1405

UNIT WATER USE - MUNICIPAL AND INDUSTRIAL
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO*	11	0.3	2	0.9	20	0.8	24	0.9	35	1.2	26	1.0	12	0.5
ND	6	0.3	7	0.4	10	0.5	10	0.5	11	0.5	11	0.5	11	0.5
SFBD	18	0.8	19	0.8	20	0.8	21	0.8	22	0.8	23	0.8	24	0.8
SAC	4	0.2	5	0.2	6	0.2	6	0.2	7	0.2	7	0.2	8	0.2
SJD	7	0.3	7	0.3	8	0.4	8	0.4	9	0.4	9	0.4	10	0.6
SD	20	1.2	20	1.2	21	1.2	22	1.2	23	1.2	24	1.2	25	1.2
Tot.	66	3.1	60	3.8	85	3.9	91	4.0	107	4.3	100	4.1	90	3.8

* The yearly expenditures and man-year activity in this program shall be related to expenditures and man-year activity in the Unit Water Use - Vegetative Program. The two programs are coordinated and reports are prepared by a single program manager. As a result, the level of activity and expenditure varies from year to year, depending on work scheduled.

PROGRAM OUTPUT DATA

1. 1968-69: a. Bulletin 166-1, "Municipal and Industrial Water Use"
   b. Evaluation Report - Phase I
2. 1969-70: Five district office or memorandum reports
3. 1970-71: Bulletin 166-2, "Municipal and Industrial Water Use"
4. 1971-72: Five district office or memorandum reports.
5. 1972-73: Bulletin 166-3, "Municipal and Industrial Water Use"

WORK PROGRAM FOR 1968-69

Statewide Planning Office.

1. The major activity in this program this year will be preparing Bulletin 166-1 for publication. Data relating

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to Tulare Lake Basin, South Coastal Area, Sacramento Valley Floor, and North Bay Area will be estracted for use in Bulletin 160-68.

2. The first phase of an evaluation of the program will be initiated in this fiscal year. Work under this phase will be directed toward determining how well the program meets statutory or policy requirements and if the 2nd and 3rd phases of the evaluation study need to be implemented.

Northern District:

1. The collection of municipal and industrial water use data from selected cities within the Northern District will continue. The data will be analyzed to provide monthly and annual gross per capita water use trends.

2. Water use data of selected cities will be evaluated to determine the unit use values of residential, commerical, industrial and urban components.

3. Principal water-using industries will continue to be contacted in order to keep abreast of changes in technology affecting water uses as well as to obtain current water use data.

4. Selected cities will be studied in order to formulate and initiate a method of discerning the indoor water uses from outdoor water uses.

5. A memorandum report will be prepared on work done in calendar year 1967, summarizing the data collected and analyzed; and the use of this data by the Statewide Planning Office, the Northern District, other government agencies and private engineering firms.

San Francisco Bay District

1. A review of program direction will continue to insure that objectives of the work are compatible with statewide objectives and with needs of Department investigations.

Data gathering must be continued to detect trends and changes; however, a shift toward analysis, interpretation, and long and short-term projections will be emphasized.

2. Municipal and industrial water use data on hand will be summarized, analyzed, and made available for inclusion into Bulletin No. 166-1. Assistance in the completion of this bulletin will be provided.

3. Trends in water use, key data for short-term projections (to about 1990), will be prepared for certain "indicator" agencies throughout the District.

4. Statistical methods will continue to be implemented and improved to test and obtain maximum value from the data and for defining the limitations of its use.

5. Bimonthly meetings with the Statewide Planning Office, and other related Department units, will be held to coordinate the program.

6. Preliminary work will be done to develop a model concept for long-term water use projections (to about 2020).

7. Time will continue to be allowed within the program to service requests for District investigation needs.

Sacramento District

1. Continue to collect, compile, and evaluate municipal and industrial water use data from local water agencies and from data published in "State Financial Transactions" and Public Utility Commission Annual Reports.

2. Continue to collect and evaluate water use data from specific municipal entities such as purely residential areas, apartment complexes, hospitals, schools, and commercial establishments. Use data to devise formula for projecting water demands which will meet projected municipal and industrial population and growth patterns.

3. Analyze, qualify, and interpret municipal and industrial water use data of the fifteen major district communities for the five year period ending December 1966. Prepare district write-up as required for inclusion in Statewide Bulletin 166 series.

4. Continue evaluation of program objectives relative to meeting district and statewide data needs.

San Joaquin District

1. Continue compilation and analysis of available municipal and industrial "unit water use" data (gallons per person per day) on a districtwide basis for inclusion in the Bulletin No 166 series.

2. To meet specific needs for water use information in the Sierra Foothills region.

   a. Continue collection of metered water use data from meters previously installed under this program.

   b. Compile and analyze any meter data found to be available from communities in the foothill area.

Southern District

1. Complete urban lawn percolation study

2. Continue multiple residential water use data collection

3. Collect existing M and I data from allied agencies

B. P. Brown
4/18/67

WEST SIDE CROP ADAPTABILITY STUDY
PART I

Need

The adaptability to various crops of large undeveloped but apparently irrigable areas lying along the west side of the San Joaquin Valley has never been determined. Some of these lands will have a potential irrigation supply for the first time upon completion of the California Aqueduct. Development of other large blocks must await other water supplies. Both the amount of irrigation water needed and the economic payment capacity of the lands depend upon the kind of crops that can be grown successfully. In turn, the kind of crops depends upon the climate (about which there are almost no useable data) and the soils (about which the data are extremely inadequate). The West Side Crop Adaptability Study is designed to indicate the potential of various parts of the study area for crops of all kinds. Thus, the results of this study will form the basis for any decision on the feasibility of future water supplies to the area.

Authority

1. Initiated in 1962-63 with water fund money to give broad estimates of climatic conditions in study area.

2. In subsequent years (after signing of water contracts) program funded as part of Coordinated Statewide Planning.

3. In 1965-66 legislative session program separately funded by legislature as specific line item in budget.

4. From inception program organized on cooperative basis with the University of California and U. S. Weather Bureau to provide technical assistance in analysis and interpretation.

Objectives

1. Determine adaptability of climate and soils in the study area for specific crops.

2. Indicate by tabulation and maps potential productivity limitations and specialized requirements such as leaching, drainage or method of irrigation.

General Description

The program will operate eight "transects" (lines of stations set on hundred-foot contours, extending from the trough of the valley to the upper edge of irrigable land) spaced from the vicinity of Coalinga to near Wheeler Ridge. The "major" stations (one to three on each transect) provide data on wind movement, temperature, humidity, solar radiation and soil temperature.

The "minor" or satellite stations (from three to 10 per transect) are equipped with maximum-minimum thermometers only. All stations are serviced weekly, and in addition, special nighttime periods of intensive observation of cold air masses are made.

Special soil studies made in cooperation with the Agricultural Extension Service and University of California, Department of Soils, are designed to relate soil characteristics such as salinity, boron content, permeability, and drainage to crop adaptability.

Interpretation and analysis of the data is done as a cooperative endeavor with a special committee set up by the University of California Water Resources Center.

Date Work Started - 1962-63

Estimated Completion Date - 1969-70 (June 1970)

WEST SIDE CROP ADAPTABILITY STUDY
PART II

Resources Input Data

1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
50	3.5	30	2.0	55	3.5	45	2.0	0	0	0	0	0	0

Program Output Data

A. Maps showing

1. Climatic zones or areas of synthesized long term climatic characteristics.
2. Soil zones or areas having different limitations.
3. Crop adaptability zones based on information from above maps.

B. Tabulations of climatic and soil data.

C. Progress reports (office reports).

D. Final report (Department Bulletin in 1970).

Work Program for Budget Year (1968-69)

A. Complete collection of climate data and reduce climate station network to a few key cooperator operated stations.

B. Complete reduction of climatic information to tabular form and machine form.

C. Continue cooperative analysis of data with University Advisory Committee and with Agricultural Extension Service.

D. Continue collection and analysis of soil data in cooperation with University and Agricultural Extension Service.

NORTH COASTAL AREA INVESTIGATION

Part I

A. NEED

Needs for water resources development investigation in the North Coastal area are primarily centered around needs for local water development, planning of projects to meet statewide water demands and the need to coordinate state and federal interest in water project planning.

There is a need within the North Coastal area for identification of projects to provide flood protection, local water supplies, recreation, and fisheries enhancement. The devastation resulting from the December 1964 flood emphasized the need not only for flood protection but also the need for revitalization of the economy of the area. In order to provide the best solution to these problems it is necessary to conduct detailed and comprehensive studies of the area's water resources. In some cases the development of local projects may offer the best solution; in others, local problems can best be solved through the inclusion of local features in major export projects. The Legislature recognized this need by initiating an action program for local development in July 1966 (ACR 27, 1966 First Extra Session).

Estimates of California's future water demands indicate that supplies which will be made available by the State Water Project, including the Upper Eel River Development, the federal Central Valley Project, and other extensive federal and local projects in California will reach full utilization by about 1990. The greatest opportunity for large scale developments to meet these future demands is in the North Coastal area. It is the Department's responsibility to formulate plans to meet these needs.

There is increasing state and national attention on the water resources of the North Coastal area. The federal agencies are actively engaged in planning studies of the major stream basins. There may be a cost savings to the State if the proposed projects are constructed jointly with the Federal Government. To insure that the state's interest is protected and furthered, it is necessary for the Department to maintain up-to-date water development studies for the North Coastal area.

When the Upper Eel River Development was authorized as the first additional facility of the State Water Project in the North Coastal area in March 1964, an obligation to plan for all water needs in the Eel River Basin was assumed. Later stages of the State Water Project in other river basins will create similar obligations for the State. There is a need for planning now throughout the North Coastal area in order to better prepare the State to meet these future obligations.

B. AUTHORITY

1. California Water Code, Part 6, Chapter 1, Section 12570 through 12634.

2. Legislative Resolution - ACR 27, 1966 First Extra Session.

3. Previous legislative funding.

C. OBJECTIVES

a. To identify possible local projects which might be constructed for purposes of local water supply, flood control, recreation, and fisheries enhancement.

b. To define and compare alternative major multiple-purpose projects in the North Coastal area to follow the Upper Eel River Development, in coordination with the Statewide Planning Office and with the federal and local planning agencies.

c. To prepare basinwide development plans considering both export projects, and possible local projects which might be constructed for purposes of local water supply, flood control, recreation and fisheries enhancement in coordination with federal agencies.

d. To build a backlog of information to form the basis upon which the Department can monitor the future development of the North Coastal area and thereby fulfill its responsibility, as set forth in the Water Code, to guide and control this development for the greatest long-range benefits to the State. These studies must provide specific information on project features and sizes to assist Statewide Planning in selecting and staging of the State Water Project to follow those now authorized.

e. To provide timely reports and recommendations relative to programs and actions which will be necessary to effect efficient, orderly, and optimum development of the region's water resources.

D. GENERAL DESCRIPTION

The work program can be considered in two main parts -- local project studies and major project studies. The South Fork Eel River Basin was selected for initial study of local projects starting in July 1965. A bulletin on that study is scheduled to go to the printing plant in September 1967. Under an action program for local development initiated by legislative action in July 1966, a progress report was prepared in December 1966, which reviewed local problems and development possibilities in the whole area. The McKinleyville-Trinidad area was selected as having the most urgent water supply problem. A cursory examination report on this area will be completed about May 1967, and a reconnaissance investigation will be completed during 1967-68. Another priority area will be selected for reconnaissance study in 1968-69.

Major project studies have concentrated on alternative plans for development of the lower Trinity and Klamath River Basins since July 1964. An office report on alternative in-basin plans will be completed in June 1967. Study of alternative conveyance systems to the Delta will be initiated in July 1967 and will result in an office report in June 1969. A bulletin on the Lower Trinity and Klamath Rivers Development is scheduled for June 1971.

In addition, a comprehensive basin-wide study to formulate a master plan for the optimum development of the Eel-Mad River Basin, in close coordination with the California State-Federal Interagency Group, will be initiated in July 1967 and will result in a joint report in June 1970.

The various parts of the investigation embrace nearly all disciplines of study pertaining to the development, control, and conveyance of water in the Trinity, Mad, Van Duzen, Klamath, and Eel River Basins and the minor stream basins of the North Coastal area. Evaluations will tentatively define the location and capacities of local and export project features including dams, reservoirs, tunnels, hydroelectric powerplants, and pumping installations.

Geologic explorations are conducted to evaluate the structural adequacy of dam foundations, the conditions of the rock affecting the construction of tunnels, and the availability of construction materials. This information is prerequisite to the initiation of future feasibility-level designs and cost estimates of the large hydraulic structures involved.

Studies are conducted to evaluate existing fisheries and to determine the measures necessary to preserve and/or enhance these resources when water resources developments are undertaken. Studies of water-associated recreation in reference to anticipated project usage and present area usage will be made. Reconnaissance-level land appraisals and rights-of-way cost surveys will be made. Machine computing methods will be used where applicable for reservoir and power operation studies. Economic studies will continue in order to estimate benefits and associated costs, and to ascertain what developments should be recommended for feasibility-level studies.

E. DATE WORK STARTED

July 1, 1964

F. ESTIMATED COMPLETION DATE

Continuing Program

NORTH COASTAL AREA INVESTIGATION

Part II

G. RESOURCES INPUT DATA (Costs in thousands of dollars and personnel in man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.
N.D.	260	13.0	285	14.0	360	16.0	365	16.0	370	16.0	375	16.0	380	16.0
S.F.B.D.	20	1.0	0	0	0	0	0	0	0	0	0	0	0	0
Total	280	14.0	285	14.0	360	16.0	365	16.0	370	16.0	375	16.0	380	16.0

H. PROGRAM OUTPUT DATA

1. Alternative Plans for Development of the Lower Trinity and Klamath River, Office Report.....June 1967

2. South Fork Eel River Basin, Bulletin No. 173.....Sept. 1967

3. McKinleyville-Trinidad Investigation, Bulletin 105-3 .....Sept. 1968

4. Alternative Conveyance Systems for Trinity-Klamath Imports, Office Report.....June 1969

5. Eel River Basin, Master Plan of Development, Bulletin.....June 1970

6. Lower Trinity and Klamath Rivers Development, Bulletin.....June 1971

7. Additional reports will be scheduled as the priority of need is clarified in the future.

I. WORK PROGRAM FOR 1968-69

1. Completion of two-year study of alternative conveyance systems for Trinity-Klamath imports.

a. Designs and cost estimates
b. Geology
c. Project formulation
d. Report preparation

2. Second year of three-year Eel River Basin Investigation

   a. Interagency coordination of sub-basin studies
   b. Fish and wildlife studies
   c. Master plan operation studies

3. Initiate and complete a reconnaissance-level study of the Willow Creek or alternative priority local area to select the best project to provide new domestic water supplies, recreation, and other benefits.

   a. Water requirement studies
   b. Topographic mapping
   c. Geology
   d. Designs and cost estimates
   e. Recreation studies
   f. Fishery studies
   g. Economic studies
   h. Project formulation

PLANNED UTILIZATION OF GROUND WATER BASINS
PART I

NEED

At present, nearly half of the water supply of California is furnished by water from ground water basins. The increased demand placed upon the water supply by the phenomenal growth of population and industry in California has maintained the critical need for water from the ground water basins in spite of increased surface water development. Drafts on many ground water basins continue to exceed the supply which results in overdraft conditions expressed by the lowering of ground water levels and advancement of ocean water into the coastal aquifers (see Sea-Water Intrusion Studies).

Under ultimate development, The California Water Plan can provide for all water requirements in all parts of the State only through the full utilization of the extensive ground water basins of the State. Full utilization includes development of the presently available ground water supplies and the underground storage of additional water which is partially developed in the surface storage sites. It will be necessary to operate basins in conjunction with surface storage to provide for local uses, long-term cyclic storage, and short-term terminal storage.

Planned utilization studies result in economic-operational studies which indicate, among other things, the point in time when additional water should be imported. Since the studies are being conducted in water-deficient areas, the import demand-time estimates relate directly to the staging of major transbasin water projects in the State. The timing of these studies relates to present estimates of the time when the State must provide additional water or assure that such additional water is provided by projects of other agencies.

AUTHORITY

Sections 226, 12616, and 12617 of the California Water Code and the Porter-Dolwig Ground Water Basin Protection Law of 1961.

OBJECTIVES

Formulate alternative plans of operation for the maximum utilization of each of the major ground water basins of the State.

GENERAL DESCRIPTION

In each basin investigation work will be done to delineate specifically all boundaries and determine the geology of the entire ground water basin; to determine the physical factors affecting the storage and transmission of ground water in the basin; to determine the hydrologic characteristics of the basin, including a reevaluation of the overdraft and the ground water storage capacity available for replenishment with imported water; to determine the best methods for utilization of the basin that would achieve fullest conservation and utilization of local supplies and also provide for seasonal and cyclic regulation of imported water supplies; to make an economic comparison of alternative plans of operation and to set forth the legal problems that may be involved in each plan; and to present to local agencies for consideration several programs for the operation of each of the ground water basins to allow selection of an optimum plan for use of surface and underground local waters and staged imported water supplies.

The future water facilities can be either all surface located facilities, all ground water based facilities, or a combination of the two basic types of facilities. The objective of the investigation is reached by analyzing various alternative combinations of these two types of facilities and determining several combinations that would meet the future water demands and showing the cost of each.

Each basin investigation is divided into three major phases of work: (1) geology, (2) hydrology, and (3) operation-economics. A general study to select areas of study and to set study schedules may also be undertaken as a separate phase.

The geologic phase includes determination of, among other things, relative infiltration rates of soils, the storage capacity and transmissibility of the aquifer or aquifers, the depth and areal extent of the various aquifers and their proints of interconnection, and the occurrence of special geologic features, such as faults and folds, which may affect the occurrence and movement of ground water. A mathematical model of the ground water basins is formulated on the computer based on the geologic characteristics developed.

The hydrologic phase includes studies of the historical surface and ground water hydrology, including the quality of surface and ground waters. Detailed items related to the hydrologic equation are compiled and analyzed to determine the historical annual surpluses or deficiencies of water; the safe yield and overdraft, if any, of the ground water basin; and estimates of future water demand and water supplies. The results of these historical hydrologic studies

are applied to the computer to test the mathematical model that was formulated with the results of the geologic studies. This mathematical model of the ground water basin enables the basin to be studied on the same basis as a surface water transmission and storage system is studied. In other words, just as the changes in pressure throughout a surface distribution system and the storage and delivery capabilities can be calculated by knowledge of the physical characteristics of the surface system such as pipe sizes, friction losses, distances, storage capacity, quantity and pressure of input water, and points of discharge from the system, so can the same factors be determined for a ground water basin.

The third phase of the investigation is the study of the operation of the ground water basin in coordination with surface storage and distribution systems. In this phase of study, the mathematical model that was developed and tested is applied to a digital computer, and detailed operation and economic studies are conducted. The digital computer enables the formulation and evaluation of alternative plans of operating the ground water basin in conjunction with existing surface water supply systems to meet the physical objectives of the investigation; the amounts and pattern of pumping and artificial recharge are the controllable items in the operation of the ground water basin. Also, considerations are concurrently given to the necessary future facilities that would be required in addition to existing surface storage and distribution facilities and the existing replenishment and extraction facilities to meet the increasing and fluctuating future water demands.

A report with several technical appendices detailing the results of all three phases of the investigation of each major ground water basin will be prepared. It will include the geology, hydrology, possible plans of operation , the optimum plan of operation, and specific suggestions for necessary legal adjustments, if any. The accumulated data and computations will be assembled and filed for reference in future studies after each major ground water basin has been investigated.

DATE WORK STARTED

July 1959.

ESTIMATED COMPLETION DATE

Planned utilization of ground water basins will continue for the period of years necessary to investigate each of the major ground water basins of the State.

Orville L. Abbott 3/30/67

1968-69 FY
Planning I-03
SFBD WA 1388
SD WA 1335

PLANNED UTILIZATION OF GROUND WATER BASINS
PART II

RESOURCES INPUT DATA (in $1,000 GF and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	/ MY	$	/ MY	$	/ MY	$	/ MY	$	/ MY	$	/ MY	$	/ MY
SFBD	141	6.5	160	7.4	165	7.8	169	7.8	174	7.8	179	7.8	184	7.8
SD	394	18	435	20.9	457	21	480	21	504	21	529	21	555	21
TOTAL	535	24.5	595	28.3	622	28.8	643	28.8	678	28.8	708	28.8	739	28.8

PROGRAM OUTPUT DATA

San Francisco Bay District

1. Review extent of knowledge on geology, hydrology and water quality of study area; prepare and implement work to bring basic knowledge up to a level to permit evaluation of ground water basin as a resource. Report geology as appendix to Bulletin No. 118.

2. Evaluate ground water basin as a resource, historically and in the future; review alternative management plans and recommend operation and economic studies. Report on resource as a Bulletin No. 118.

3. Perform operation and economic studies in conjunction with local agencies and report on in a Bulletin No. 118.

Southern District

1. 1968-69

   a. Operational-economic study of Bunker Hill-San Timoteo area will be completed.
   b. Geology and hydrology studies of Raymond Basin will be completed.

2. 1969-70

   a. Report for Chino and Bunker Hill published.
   b. Mathematical model and operational-economic study of Raymond Basin will be completed.
   c. Geology, hydrology, mathematical model, and operational-economic studies of Santa Clara-Calleguas area will be completed.

A

3. 1970-71

   a. Geology, hydrology, and operational-economic studies of Antelope-Fremont Valley will be completed.

   b. Reports of Raymond Basin and Santa Clara-Calleguas area studies will be sent to printing plant.

4. 1971-72

   a. Geology, hydrology, and operational-economic studies of San Jacinto Valley will be completed.
   b. Report of Antelope-Fremont Valley study will be sent to the printing plant.

5. 1972-73

   a. Geology, hydrology, and operational-economic studies of San Juan area will be completed.
   b. Geology, hydrology, and operational-economic studies of Santa Maria Basin will be completed.

WORK PROGRAM FOR 1968-69

San Francisco Bay District

In South San Francisco Bay:

1. Complete resource evaluation phase of north Santa Clara Valley in cooperation with Santa Clara County.

2. Complete operation-economics study of Fremont area in cooperation with Alameda County water agencies.

In San Francisco Bay area:

3. Begin resource evaluation phase of Clayton-Ygnacio Valley ground water basins.

Southern District

1. The activity will be continued at the same level as in 1967-68.

2. In the Chino area, Bulletin No. 104-3 will be in review stage.

3. For the Bunker Hill-San Timoteo area, the operation-economic study will be completed. Work will be initiated on Bulletin No. 104-5.

4. For Raymond Basin, geologic and hydrologic studies will be completed.

5. For Santa Clara-Calleguas area, geologic studies will be about 75 percent complete. Hydrologic studies will be about 90 percent complete. Work will be initiated on the mathematical model and on the operational-economic phase of the study.

WESTERN STATES WATER PLANNING PROGRAM

PART I

NEED

The unequal distribution of streamflow, and the limited supplies and increasing concentration of population in warm, dry climates of the Pacific Southwest necessitate that planning efforts be expanded to encompass interstate and interbasin projects.

All alternative sources of water supply, including potential interstate water exchanges in the West, must be studied if the most desirable and least costly water for future generations is to be assured, and the optimum development of California's own supplies is to be realized.

The merits of westwide water planning have been recognized by the Governors of eleven states which created the Western States Water Council in June 1965 and the California State Legislature which enacted AB 2087 in 1965, creating a seven-man Advisory Committee on Western States Water Planning.

AUTHORITY

This program was initially authorized by the Joint Legislative Budget Committee of the California Legislature, as set forth in a letter from Senator George Miller, Jr., Chairman, to Mr. Hale Champion, Director of Finance, on September 29, 1965, and has been implemented as a separate program in the Department and by legislative action since that time.

OBJECTIVES

The objectives are to protect and advance California's interest in westwide regional water development.

GENERAL DESCRIPTION

Proposals are initiated leading to interstate, regional legislation, legal actions, and possibly compacts. Similar proposals by other entities are reviewed and evaluated as to their impact on California. Recommendations for modification and improvement are formulated. This work involves direct participation in negotiations, hearings, and planning formulation with counterparts in the affected states and federal agencies.

DATE WORK STARTED

October 1, 1965

ESTIMATED COMPLETION DATE

This is a continuing program.

W. Don Maughan 5/12/67

WESTERN STATES WATER PLANNING PROGRAM

PART II

RESOURCES INPUT DATA

1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
197	6.0	166	6.0	171	6.0	220	7.0	231	7.0	243	7.0	256	7.0

PROGRAM OUTPUT DATA

In general, the outputs will contribute to the development of major legislation and interstate and federal-state agreements which are now being negotiated. State water plans by other states and framework studies by state-federal cooperative effort are scheduled for completion in the late 1960's and early 1970's, and it is anticipated that the workload of this program will increase beginning in fiscal year 1969-70.

The program organization produces outputs for California in three areas: (1) it develops essential technical and broad-scale planning concepts and initiates action proposals; (2) it analyzes and evaluates the technical aspects of proposals by others; and (3) it keeps our water leaders informed. Specifically, the outputs for fiscal year 1967-68 will be as follows:

1. Development of technical concepts and proposals

   a. For inclusion in congressional legislation in the field of interstate regional water development.

   b. For incorporation in the official views of California for presentation to the Congress, to the President, and to the Governors of other states.

c. For adoption as policies and programs of the Western States Water Council, the Committee of Fourteen, and the Southwest Water Council.

d. For adoption as principles, guidelines, standards, criteria, and procedures of the Western States Water Council.

2. Technical analyses and reports on data or proposals by others

a. Of major water legislation, decrees, compacts, and plans, with regard to their impact on California.

b. Of western states population, irrigated acreages, water supplies, water requirements, conservation and reuse programs, etc., to establish bases for comparison and evaluation.

3. Distribution of information

a. Disseminate to water leaders of the State the concepts, proposals, analyses, and reports discussed in Sections (1) and (2) above.

b. After careful selection and screening, provide essential information to water leaders of the State regarding actions and attitudes of other states and the Federal Government in the field of regional water development.

c. Continue development of the Western States Water Planning Library, a small reference collection of data on the physical, economic, and socio-political facts basic to sound regional water resources negotiations and planning.

WORK PROGRAM FOR THE 1968-69 BUDGET YEAR

The work program will be directed toward the continuing accomplishment of the items listed above.

W. Don Maughan 5/12/67

GROUND WATER BASIN PROTECTION STUDIES
PART I

NEED

Ground waters are the source of nearly half of the water supplies in California. The many ground water basins which are natural reservoirs containing vast quantities of water have been threatened with water quality degradation from a number of sources. It is of great importance that the ground water basins be protected from impairment for continued beneficial use of the water they contain and as natural storage and distribution facilities. Problems faced in this program have their origin rooted in the activities of man, and are thus inextricably linked with population growth.

A major cause of degradation is the intrusion of sea water or highly mineralized connate waters into fresh-water bearing aquifers because of overdraft. The dispersion of leachates and gaseous products of decomposition into ground water bodies from improperly constructed or operated rubbish dumps constitutes another source of degradation. A third cause of impairment originates through the uncontrolled discharge of sewage, agricultural, and industrial wastes reaching ground water bodies. The diluted product is repeatedly withdrawn and recycled; the result is an ever higher net dissolved sat content within the ground water body.

AUTHORITY

Sections 12920 to 12925 of the California Water Code.

OBJECTIVES

The general objective of this program is the formulation of project plans for the protection of ground water basins from irrepairable damage from any cause.

GENERAL DESCRIPTION

Projects for three types of problems are being studied. The problems are revealed under the Sea-Water Intrusion Program, the Water Quality Investigations, and Planned Utilization of Ground Water Basins Studies. The types of current projects studied are: barrier projects to protect coastal ground water basins from sea-water intrusion; a project to devise means for safe disposal of refuse in alluvial material overlying a ground water basin; and projects to arrest conditions of adverse salt balance in ground water basins. The urgency for corrective measures,

while the application of such measures can yet be successfully employed, imposes time as an element present in each project undertaken.

Hydrologic, geologic, and water quality data collected as part of other programs of the Department are utilized in ground water basin protection investigations. Barrier studies utilize information developed during the sea-water intrusion investigations.

A thorough evaluation of causative factors is made for the problems encountered based on information developed. Armed with specific factors of subsurface formations, transmissibility, and other information applicable to each area studied, and employing the latest engineering techniques available, parameters are delineated, the type and cost of each possible corrective device or means is studied, and the most economical and feasible plan is selected and drafted into workable form as the basis for appropriate action.

DATE WORK STARTED

November 1961.

ESTIMATED COMPLETION DATE

Continuing.

Orville L. Abbott 3/30/67

GROUND WATER BASIN PROTECTION PROJECTS
PART II

RESOURCES INPUT DATA (in $1,000 GF and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	/ MY	$	/ MY	$	/ MY	$	/ MY	$	/ MY	$	/ MY	$	/ MY
SD	105	5	70	3	115	5	121	5	127	5	133	5	140	5

PROGRAM OUTPUT DATA

1. Budget Year 1968-69

   a. Print final edition of the Lower San Dieguito Salinity Barrier (Bulletin No. 147-3).
   b. Print final edition of the Sanitary Landfill Studies (Bulletin No. 147-5).

2. Budget Year 1969-70

   Print final edition of the Santa Clara River Water Quality Management Study (Bulletin No. 147-4).

3. Budget Year 1970-71

   a. Print preliminary edition of the San Jacinto Water Quality Management Study (Bulletin No. 147-2).
   b. Print preliminary edition of the Oxnard Basin Salinity Barrier (Bulletin No. 147-6).

4. Budget Year 1971-72

   a. Print final edition of Bulletin No. 147-2.
   b. Print final edition of Bulletin No. 147-6.

5. Budget Year 1972-73

   Publish progress report of the Oxnard Basin Salinity Barrier (Point Mugu).

WORK PROGRAM FOR 1968-69

1. Complete the tests and evaluation of data obtained from the Oxnard Plain Experimental Barrier Facility.

2. Prepare Oxnard Basin Salinity Barrier report (Bulletin No. 147-6).

3. Hold public hearing and initiate printing final edition of the Santa Clara River Water Quality Management Study (Bulletin No. 147-4).

4. Hold public hearing and print final edition of the Lower San Dieguito Salinity Barrier (Bulletin No. 147-3).

5. Collect current data to update San Jacinto Water Quality Management Study (Bulletin No. 147-2). Continue writing report.

6. Print final edition (no preliminary) of Sanitary Landfill Studies (Bulletin No. 147-5).

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

PROGRAM STATEMENT

Cover and Approval Form - 1968 - 69

Program Title DELTA OFFSTREAM STORAGE INVESTIGATION
Los Meganos Reservoir

It is recommended that the program statement for this program be approved.

SIGNATURE	TITLE	DATE
Robert F. Sprague Guy Fairchild	Program Manager(s)	5/3/67
Carl A. Werner	Area Branch Chief or District Engineer	5/2/67
	Assistant Chief Engineer	
	Division Engineer (Line)	
	Division Engineer (Staff)	

DWR 1921

DELTA OFFSTREAM STORAGE INVESTIGATION
LOS MEGANOS RESERVOIR
PART I

NEED

Additional water supplies must be developed about 1990 to meet demands on the State Water Resources Development System. There are several alternative methods of meeting this demand including import of water from the North Coast area, development of additional supplies in the Sacramento Valley, firming-up unappropriated water in the Delta, or a combination of these.

Preliminary indications are that initial supplies of North Coast water will cost approximately $13 per acre-foot delivered in the Delta. Water developed at the new remaining major surface reservoir sites in the Sacramento Valley appears to be comparable in cost with that from the North Coast area.

There are several offstream storage sites in or near the Sacramento-San Joaquin Delta which present attractive possibilities for providing water for the State Water Resources Development System at comparable or lower cost than is possible from either North Coast or Sacramento Valley developments.

The Los Meganos Project would be located approximately 7 miles west of the Delta Pumping Plant. It could be constructed to store 2,500,000 acre-feet, and provide as much as 750,000 acre-feet of new water annually. The project would be operated in conjunction with the U. S. Bureau of Reclamation's Kellogg Unit and the State Water Project to firm-up surplus Delta flows by pumping during excess flow periods and releasing during periods of low flow. In addition, the site, which is immediately east of the populous bay area, has an extremely attractive water-associated recreation potential. As an example, the site has a considerably higher recreation potential than Kellogg Reservoir, to the immediate east, for which the estimated first year recreation use is 3,000,000 visitor days.

Latest projections show that additional water must be provided about 1990 to meet demands on the State Water Project - Central Valley Project system. Therefore, as shown by the following schedule, the investigation cannot be delayed.

Event	Begin	Complete	Duration (Yrs.)
Reconnaissance Planning	1968	1970	2
Feasibility Planning	1971	1975	4
Advance Planning	1976	1978	2
Design	1978	1982	4
Final right-of-way acquisition	1982	1983	1
Construction	1983	1987	4
Buildup of reservoir storage	1987	1990	3

AUTHORITY

This investigation is authorized under Section 12931 of the Water Code, which charges the Department with the responsibility of providing such additional facilities of the State Water Resources Development System as may be required to sustain the presently contracted water supply from the Sacramento-San Joaquin Delta and to meet anticipated future contractural obligations.

OBJECTIVES

The objectives of the reconnaissance investigation are to determine the approximate cost and quantity of firm yield which could be produced by the project, and to determine whether a feasibility level investigation of the project should be made.

GENERAL DESCRIPTION

Reconnaissance planning of the Los Meganos Offstream Storage Project is programmed for two years, beginning July 1968. During this period the engineering feasibility and economic justification of the project will be explored and the cost and feasibility of land acquisition in the immediate future and for conducting additional studies will be evaluated. Findings of the investigation will be summarized and a report on the investigation prepared. This report will include recommendations for feasibility level planning studies, if warranted.

During the reconnaissance planning, pertinent information from previous studies will be reviewed, previous operation studies will be extended, reconnaissance planning studies will be made, geologic information will be extended, preliminary planning designs and cost estimates of the major units of the project will be developed and engineering feasibility and economic justification of the project will be explored. Findings of the reconnaissance investigation will be determined by January 1, 1970.

DATE WORK STARTED

July 1, 1963. The Los Meganos Studies would be initiated July 1, 1968.

ESTIMATED COMPLETION DATE

This is a continuing program. The Los Meganos investigation would be completed June 30, 1970.

RFF:3/9/67 , Rev. 5/8/67

DELTA OFFSTREAM STORAGE INVESTIGATION
LOS MEGANOS RESERVOIR
PART II

RESOURCES INPUT DATA

	1968-69 $	MY	1969-70 $	MY
Sacramento District	40	1.6	57	2.2

The estimated total cost of the reconnaissance level investigation is $97,000.

RESOURCES OUTPUT DATA

Report stating findings of the investigation and recommendations for further action.

WORK PROGRAM FOR 1968-69

1. Review and compile pertinent information from previous studies.

2. Conduct preliminary operation studies to determine the yield potential of the development.

3. Conduct brief study of recreation potential of the project and initiate report of findings.

4. Initiate reconnaissance level design and cost estimates of the development.

RFF:3/9/67, Rev 5/8/67

WASTE WATER RECLAMATION PROJECTS

PART I

NEED

In Southern California large quantities of water pass through a single cycle of use and then enter the sewerage system for disposal to the ocean or other saline water bodies. With great increases of water use impending for industrial and urban development, ever increasing amounts of sewage and industrial wastes are becoming available for reclamation and use as a much needed supplement to our water supply. There are numerous instances in Southern California in which waste waters are successfully reclaimed for beneficial uses, however, consideration should be given to expanding those efforts that will lead to increased reclamation activity. This program is required to show where these waste waters can be economically reused.

AUTHORITY

Section 230 of the Water Code: "...to conduct surveys and investigations relation to the reclamation of water from sewage or industrial wastes for beneficial purposes...".

OBJECTIVES

To determine the feasibility of reclaiming water from waste flows for beneficial purposes in the Southern District; to encourage and stimulate the planned reuse of suitable quality waste waters wherever feasible in order to conserve better quality waters for high beneficial uses; and to provide information for legislators and state and local agencies which will aid them in stimulating the planning of water reclamation projects in order to achieve full utilization of the State's water resources.

GENERAL DESCRIPTION

The activity of the reclamation program is centered in areas where waste waters are or will be available for reclamation and where the reclaimed water supply will fill a part of the demand for increased water supplies.

Studies include a determination of water requirements and supply, quantity and quality of waste water, beneficial uses for which reclaimed water may be utilized, and estimates of cost of water reclaimed. Reports on special reclamation investigations are published as each study is completed.

The Department is actively engaged in providing advice and technical assistance on water use and availability of reclaimable water. By compilation and dissemination of current data on successful water reclamation projects, the planned re-use of water is encouraged, and action by appropriate agencies is stimulated.

DATE WORK STARTED

Work started on this program in the 1950-51 fiscal year.

ESTIMATED COMPLETION DATE

This is a continuing program.

WASTE WATER RECLAMATION PROJECTS

PART II

RESOURCES INPUT DATA ($1,000 - G.F. - and man-years)

1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
51	2.0	55	2.2	63	2.5	67	2.5	70	2.5	74	2.5	77	2.5

PROGRAM OUTPUT DATA

Complete reports on San Luis Obispo County, '68-69; Upper Santa Ana River Area, '71-72; and San Fernando Valley Area, '72-73.

Commence studies on Santa Barbara County Report, '73-74; and Long Beach Metropolitan area, start '72-73.

Develop mineral increment data in investigation areas.

WORK PROGRAM FOR 1968-69

Work will be completed and a draft report prepared on the reclamation of waste water discharges in San Luis Obispo County. During 1968-69, preliminary work will be completed and a report on waste water reclamation for the Upper Santa Ana River area will be initiated. Determination of mineral increments will be an integral part of this program. Due to increased activities resulting from coordinating the San Luis Obispo County report and the Upper Santa Ana River area report with other departmental reports in those areas and coordinating future planning in this field, it is expected that the work program for this year will require additional funds. These funds will be used to support part-time personnel in the program to augment the assigned staff.

D. G. Gildersleeve
3/30/67

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WATER WELL STANDARDS
PART I

NEED

Throughout the State, investigations have indicated that faulty construction of water wells and improper sealing of wells no longer intended for use have contributed to the degradation of ground water quality. Since degradation of ground water quality, once established, usually is long lasting and almost impossible to remove, it is particularly important that poor water well construction and sealing practices be prevented.

Although a limited number of local agencies have adopted regulations pertaining to construction and sealing of water wells, there is a need to develop water well standards generally applicable throughout the State and, in areas where special conditions or problems are encountered, more detailed supplemental standards must be devised.

Since every water well, whether active or abandoned, forms a potential channel for direct introduction of pollutants, contaminants, or degradants into water-bearing formations, it is necessary that water well construction and sealing standards be effectively enforced to protect the continued usability of the State's ground water reserves.

AUTHORITY

Section 231 of the Water Code.

OBJECTIVES

Develop water well construction and sealing standards and encourage and stimulate the use of good water well drilling practices throughout the State. Ultimately to assure that every reasonable precaution is taken in the construction and destruction of water wells to protect the quality of the State's ground water resources.

GENERAL DESCRIPTION

The program involves collection and evaulation of information regarding water well construction and sealing practices throughout the State. This information is combined with knowledge of existing geologic and ground water conditions to formulate recommendations for standards of water well construction. These recommendations are then subjected to the test of public opinion and ultimately published as department recommendations for minimum standards of water well construction.

Areas are selected for study on the basis of prior investigations which have indicated that (1) impairment of ground water quality can be facilitated or caused by faulty water wells, and (2) existing or anticipated problems could be solved, controlled, or mitigated by proper standards. Expressed interest by local agencies for particular studies are also considered and they are encouraged to contribute or participate in studies to develop well construction standards for their area.

Investigations are undertaken only where ground water conditions in the study area have been adequately defined or can be defined with minimal effort during the investigation.

DATE WORK STARTED

1952

ESTIMATED COMPLETION DATE

Continuing

E. A. Ritchie
3/30/67

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1968-69 F.Y.
Planning I-03
SPO W.A. 1363
ND 1364
SFBD 1366
SAC 1365
SJD 1362
SD 1298

WATER WELL STANDARDS

PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	8	0.3	25	1.0	20	0.8	20	0.7	20	0.7	14	0.5	14	0.5
ND	21	1.2	8	0.4	13	0.6	23	1.0	25	1.2	25	1.2	25	1.2
SFBD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAC	0	0	8	0.3	0	0	0	0	0	0	0	0	0	0
SJD	0	0	13	1.2	34	2.2	36	2.2	18	1.2	40	2.2	0	0
SD	22	1.5	0	0.0	0	0	0	0	0	0	0	0	0	0
Totals	51	3.0	54	2.9	67	3.6	79	3.9	63	3.1	79	3.9	39	1.7

PROGRAM OUTPUT DATA

1. Final edition of Bulletin No. 74-8 "Water Well Standards, Shasta County". 1968-69.

2. Bulletin No. 74-X "Water Well Drillers Guide" 1968-69

3. Bulletin No. 74-X "Water Well Standards, Pajaro-Salinas Valleys" 1970-71.

WORK PROGRAM FOR 1968-69

Statewide Planning Office.

A. Completion of the Water Well Drillers Guide.

B. Development of amendments to the Statewide Standards.

C. Coordination of district activities.

D. Service to general public.

Northern District

1. Preparation of final edition of Bulletin No. 74-8 "Water Well Standards, Shasta County", Northern District.

2. Review conditions within District as to need for future studies and prepare office report containing findings and recommendations.

3. Answer information requests from individuals and agencies.

San Joaquin District

1. Collect data from available sources to determine hydrologic and geologic conditions.

2. Collect additional data where required.

3. Prepare preliminary water well standards.

4. Submit preliminary standards to county officials, local well drillers, farm bureau, irrigation districts, and other interested agencies for comments and recommendations.

E. A. Ritchie
4/18/67

SALINE WATER CONVERSION INVESTIGATION
PART I

NEED

Saline water conversion offers considerable promise as a future economic source of water in certain areas of the State. As technology of removing dissolved solids from water is developed and the cost to carry on such processes is lowered, the financial feasibility of supplying desalted water to more areas will increase.

The Department must keep abreast of the advancing technology to identify local areas wherein desalted water is economically feasible for use, and to develop projects that will merge the technologically feasible desalting process with the needs of local areas.

The application of desalination processes could reduce the necessity for additional facilities for transporting water from distant natural sources, could improve water quality of local supplies by proper blending, and could be adopted as a measure for the treatment of highly mineralized waste waters.

AUTHORITY

Water Code Sections 12945 through 12949.

OBJECTIVES

Provide the means whereby the saline water conversion technology can be applied to augment the usable water resources of the State, in the management of local water quality, in identifying areas in which desalting will be economically feasible, in obtaining data on marketing desalted water including special types and uses, in brine disposal and value studies, in the determination of plant site requirements, and to assist in carrying out the Department's responsibility in the overall field of water resources development.

GENERAL DESCRIPTION

The program embraces preliminary analysis of the cost and market for converted sea and brackish water and recommendations for feasibility studies in those areas where desalted water is shown to be an economical alternative source of supply. Studies will be conducted of the potential for adopting desalination techniques for water quality improvement and treatment of mineralized wastes for protection of existing ground and surface water supplies.

In the south coastal area, studies will cover the monitoring of development and testing of desalting systems. This will include tests to be conducted on full-scale modules at the San Diego Saline Water Test Facility and development of the dual-purpose plant by MWD, OSW and AEC. In addition the Department will carry forward an inspection program to determine effect of desalted water on various types of linings installed in the transportation facilities for the Claire Engle Desalination Plant.

The program will correlate the need for water that cannot be furnished from the State Water Project with the possibility of furnishing desalted water to supply the need. There will be a continuing study of the financial feasibility of supplying isolated local areas with converted saline or brackish water, which will be related to lowered costs for converted water as new processes are developed.

The program makes preliminary cost estimates and evaluates economic estimates of conversion made by others, and relates the economics to the State Water Plan, long-range planning and regional water plans as required. The program necessarily keeps thoroughly informed on existing and potential saline water conversion process technology as an adjunct thereto.

The possibility of combining a desalination plant with the proposed state-owned nuclear power plant will be studied.

DATE WORK STARTED

July 1957.

ESTIMATED COMPLETION DATE

Continuing.

Robert A. Williams 3/30/67

1968-69 F.Y.
Planning I-03
SAC W.A.____
SJD ____
SD 1343

SALINE WATER CONVERSION INVESTIGATION
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SAC	-	-	-	-	20	1.0	22	1.0	24	1.0	26	1.0	28	1.0
SJD	-	-	-	-	25	1.5	30	1.5	40	2.0	40	2.0	15	1.0
SD	20	1.0	25	1.0	75	2.2	77	2.2	80	2.2	83	2.2	86	2.2
Totals	20	1.0	25	1.0	120	4.7	129	4.7	144	5.2	149	5.2	129	4.2

PROGRAM OUTPUT DATA

Memorandum and Office Reports on:

1. Operation of the Claire Engle Plant Transportation System including effect of desalted water on the various pipeline materials installed in this system.

2. Experiments performed by OSW and others at the San Diego Saline Water Test Facility of special interest to the Department.

3. Summaries of activities of other organizations in the general field of desalination including metropolitan water district.

4. Delineation of service areas for possible utilization of desalination as a source of supply with recommendations for more intensive studies of this alternative, as appropriate.

5. Potential applications of desalination as a measure for water quality improvement and treatment of agricultural and municipal-industrial waste waters including consideration of the marketability of mineral residues.

WORK PROGRAM FOR 1968-69

Sacramento District. A reconnaissance study will be made of the possibility of constructing waste water desalting plants at the north and south ends of Lake Tahoe for the purpose

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of alleviating the need for (1) additional facilities to export sewage effluent from the Lake Tahoe Basin, and (2) works required to import required additional water supplies to the basin.

The following activities will be performed:

1. The various processes and the costs of eliminating undesirable nutrients from waste water so that effluent will not have to be exported from the basin will be inventoried and evaluated.

2. The potential value and market for by-products and the means and costs of transporting the by-products from the basin will be studied.

3. Possibilities for federal and by-state cooperation and assistance for additional detailed studies and for financing construction of possible plants will be investigated.

4. The need for a feasibility study of constructing waste water desalting plants at the north and south ends of the lake will be determined. This evaluation will include consideration of the amount of sewage to be exported and the cost of export; the quantity and cost of alternative means of supplying the Lake Tahoe Basin with required additional water; and the net costs and accomplishments of possible desalting facilities.

5. A report stating the findings of the study will be prepared.

San Joaquin District

1. Possible sites for location of saline water conversion plants will be investigated and evaluated to determine the feasibility of these plants as a source of alternate supply in water short areas, as a method of water quality improvement and treatment of highly mineralized wastes for protection of existing ground and surface water supplies, and as a source of marketable minerals.

2. Determination of potential markets for water. A study will be made of water requirements for areas of short water supplies where a potential market for municipal and industrial water exists.

3. Determination of potential market for residue. A study will be made to determine possible industrial applications and processes for manufacture of marketable products such as chlorine gas, salts, agricultural and industrial chemicals, and etc.

4. Evaluation of saline water conversion processes for treatment of agricultural waste waters.

Southern District. The operation and maintenance of the San Diego Desalted Water Transportation Facility will be continued during the year. A testing program to determine the effect of desalted water on an operating pipeline will be carried on.

A survey will be completed to determine the areas in the Southern District where desalination is economically justified and financially feasible, not only as a water supply, but to improve existing water supplies.

The activities of local entities in desalination will be monitored and, where possible, will be participated in.

Robert A. Williams 4/5/67

UPPER SACRAMENTO RIVER BASIN INVESTIGATION

Part I

A. NEED

The recently published Department of Water Resources Bulletin No. 150, "Upper Sacramento River Basin Investigation", demonstrated that four tributary reservoirs in the upper Sacramento River Basin are economically justified multiple-purpose water development projects that could meet a part of the water needs of the State Water Resources Development System. This report also showed the Iron Canyon Reservoir Project to be not economically justified.

Since previous master plans for flood control in the upper Sacramento River Basin included the Iron Canyon Project as a major flood control feature, these plans were made obsolete by the findings of Bulletin No. 150. This fact and the floods of 1964 demonstrate the need for an up-to-date master flood control plan for the upper Sacramento River Basin. The 1964 floods also pointed out that potential flood control benefits on the tributary streams and in the Butte Basin may be much larger than had been previously estimated. Consequently, large flood control storage reservations that were found infeasible during the studies for Bulletin No. 150, now show strong indications of economic justification.

In order to properly formulate an overall plan for water resources developments in the upper Sacramento River Basin and to reevaluate the projects presented in Bulletin No. 150 a flood control plan for the basin should first be developed.

The U. S. Army Corps of Engineers, under its Northern California Streams Study, is currently restudying the upper Sacramento tributaries, with emphasis on the Cottonwood Creek Basin. They have scheduled a report on the Cottonwood Creek Basin for 1968. In order to properly review that report and coordinate water resources development in the upper Sacramento River Basin, the Department must update its own studies of the basin in general and the Cottonwood Creek Basin in particular.

B. AUTHORITY

1. California Water Code, Part 6, Chapters 1 and 4
2. Assembly Concurrent Resolution No. 18, 1966
3. Funds were included in 1966-67 Budget

C. OBJECTIVES

1. Evaluate the current and future flood problems in the upper Sacramento River Basin.

2. Establish a master plan for multiple-purpose water resources development projects in the basin that would solve these flood problems and provide for all beneficial uses of the water resources of the basin.

3. Reevaluate the economically justified projects presented in Bulletin No. 150, to reflect current economic criteria regarding flood control needs in the basin.

4. Identify specific projects for future study leading to authorization and construction.

D. GENERAL DESCRIPTION OF THE INVESTIGATION

The Upper Sacramento River Basin Investigation will consist of a re-analysis of those projects considered in Bulletin No. 150, "Upper Sacramento River Basin Investigation", and the formulation of a master plan for multiple-purpose water resources development projects in the basin.

Major emphasis will be placed on determining the flood control protection that could be provided by the tributary projects. Detailed flood operation studies will be made to determine the amount of storage reservation that can be included in these proposed projects.

In developing this comprehensive flood control plan, the multiple-purpose concept of water development planning will be used. Large recreation and fisheries enhancement benefits will undoubtedly continue to be a major feature in any upstream tributary projects that evolve from this study. The development of local irrigation and domestic water supplies also will be given strong consideration in this study.

The specific projects developed during this study will be part of a basin-wide plan to obtain maximum beneficial use of the resources of the basin. The data developed will be extremely useful to the alternate conveyance route studies for water from the Trinity and Klamath Rivers and for project staging considerations of the Coordinated Statewide Planning Unit.

E. DATE WORK STARTED

This study was initiated in July 1966.

F. ESTIMATED COMPLETION DATE

June 1969

UPPER SACRAMENTO RIVER BASIN INVESTIGATION

Part II

G. RESOURCES INPUT DATA (Cost in thousands of dollars and personnel in man years) All Northern District

Start 1966-67		1967-68		End 1968-69	
$	M.Y.	$	M.Y.	$	M.Y.
40	2.5	80	5.0	10	0.2

H. PROGRAM OUTPUT DATA

1. Submit preliminary bulletin to printer July 1968
2. Submit final edition to printer by June 1969

I. WORK PROGRAM FOR 1968-69 BUDGET YEAR

1. Publish preliminary bulletin giving findings of investigation.
2. Hold public hearing on findings.
3. Publish final bulletin on Upper Sacramento River Basin Investigation.

COORDINATED STATEWIDE PLANNING
PART I

NEED

It is essential to achieve optimum utilization of California's water resources, to effect coordination of planning activities of all water agencies, and to realize the most beneficial use of limited public funds for water project development. An indispensable prerequisite to these objectives is an up-to-date statewide time-related plan for project implementation.

The plan must integrate the investigative and development activities of all major water agencies, identify the full spectrum of alternative courses of action to meet forecasted needs for water project services throughout the State, denote the most favorable sizes and chronology of future developments, and extend the concepts of The California Water Plan of 1957 to embrace changing economic, social, technological, and institutional considerations.

On the basis of this information, decision makers will possess a rational basis for determining the most favorable courses of action for future statewide water resources preservation and development, including the selection, sizing, and timing of appropriate physical facilities which will be required to serve all areas of California.

AUTHORITY

Water Code Sections 232, 12578-12582, 12616-12623, 12631, and others.

OBJECTIVES

Preparation and periodic refinement of a statewide plan of action for water development; including review of progress in implementing The California Water Plan, forecasts of future demands for water project services, abilities of existing and authorized developments to provide these services, analysis of alternative future projects and other courses of action to meet emerging water needs, and recommendations as to the optimum sizing and timing of future developments.

GENERAL DESCRIPTION

Analytical studies are divided into four phases, as follows:

1. Water Demand Analysis - This involves preparation of reliable estimates of future demands for all categories of water project services as a function of time throughout the State. Specific activities include: population projections, agricultural and industrial market outlook studies, crop projections, payment capacity estimates, forecasts of water-oriented recreation uses, evaluation of needs for preservation and enhancement of fisheries and wildlife resources, generalized appraisal of flood control needs, evaluation of power utilization trends and outlook studies for development of additional hydroelectric power, and statewide appraisals of water quality conditions and control requirements.

2. Project Systems Analysis - This consists of the development and conduct of coordinated system operation studies for present and alternative future features of the California Water Resources Development System, including the State Water Project and the Central Valley Project, for purposes of estimating water, power, and other project system accomplishments; and the conduct of reconnaissance investigations of alternative major aqueduct systems which may be required subsequent to about 1990.

3. Development Status and Coordination - This includes a continuing inventory of information on present, proposed, and alternative future development programs of all major water agencies for purposes of maintaining current data on the status, level, costs of water services, and capabilities of statewide water development programs; guiding and coordinating planning activities of the Department; and participation in state-federal interagency coordinating activities to assist in avoiding overlapping and conflicting planning work and in emphasizing most critically needed projects.

4. Project Staging Analysis - This embraces the continuing integration of information provided through the other phases of this program, the project formulation and data collection activities of the Department, and the results of planning efforts of other major water agencies to identify and analyze all reasonable alternative courses of action and to recommend a long-range time-related plan for water development.

DATE WORK STARTED

July 1956.

ESTIMATED COMPLETION DATE

Continuing.

Wayne MacRostie 3/30/67

1968-69 F.Y.
Planning I-04
SPO W.A. 1376

COORDINATED STATEWIDE PLANNING
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	469	26	431	24	452	24	475	24	499	24	524	24	550	24
ND	56	3	65	3	68	3	71	3	74	3	77	3	80	3
SFBD	42	2	65	3	68	3	71	3	75	3	79	3	83	3
SAC	69	3	65	3	78	4	81	4	86	4	90	4	94	4
SJD	50	3	65	3	98	5	102	5	107	5	112	5	117	5
SD	55	3	72	4	76	4	81	4	84	4	88	4	92	4
Totals	741	40	763	40	840	43	881	43	925	43	970	43	1,016	43

PROGRAM OUTPUT DATA

1. Biennial publication of the Bulletin No. 160 series, "Implementation of The California Water Plan" and appendixes.

   a. Bulletin No. 160-68, December 1968.
   b. Bulletin No. 160-70, December 1970.
   c. Bulletin No. 160-72, December 1972.

2. Periodic publication of summary reports on studies of Alternative Aqueduct Systems, to serve the San Joaquin Valley, the Central Coastal Area, and Southern California.

   a. April 1969.
   b. April 1971.

WORK PROGRAM FOR 1968-69

Activities within Statewide Planning Office.

1. Complete and publish Bulletin No. 160-68 and appendixes in December 1968.

2. Complete and publish a summary report of progress on reconnaissance studies of alternative aqueduct systems in April 1969.

1/ Delta Offstream Storage Development Program included in this program in the Sacramento and San Joaquin Districts beginning in 1968-69--see program memorandum of March 1967.

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3. Complete statewide and intrastate regional economic "baseline" studies prerequisite to water demand analyses within those areas designated "3" on the attached map.

4. Continue reconnaissance-level studies of alternative major aqueduct systems, preliminary-examination and reconnaissance-level comparative studies of conservation and reregulatory storage features, not included under other Department programs, extensions of joint Central Valley depletion-accretion studies with the Bureau of Reclamation, and analytical studies for determining project system accomplishments of alternative future additions to the authorized State Water Project-Central Valley Project System.

5. Continue participation in state-federal interagency coordinating activities, line coordination with other planning programs of the Department, preparation of recommendations relative to refinement of water project evaluation criteria and techniques, development of estimates of annual funding requirements for needed additions to the State Water Resources Development System, and the monitoring of multiple-purpose planning work of local and federal agencies involving flood control to appraise how that function may affect alternative courses of action in water project development.

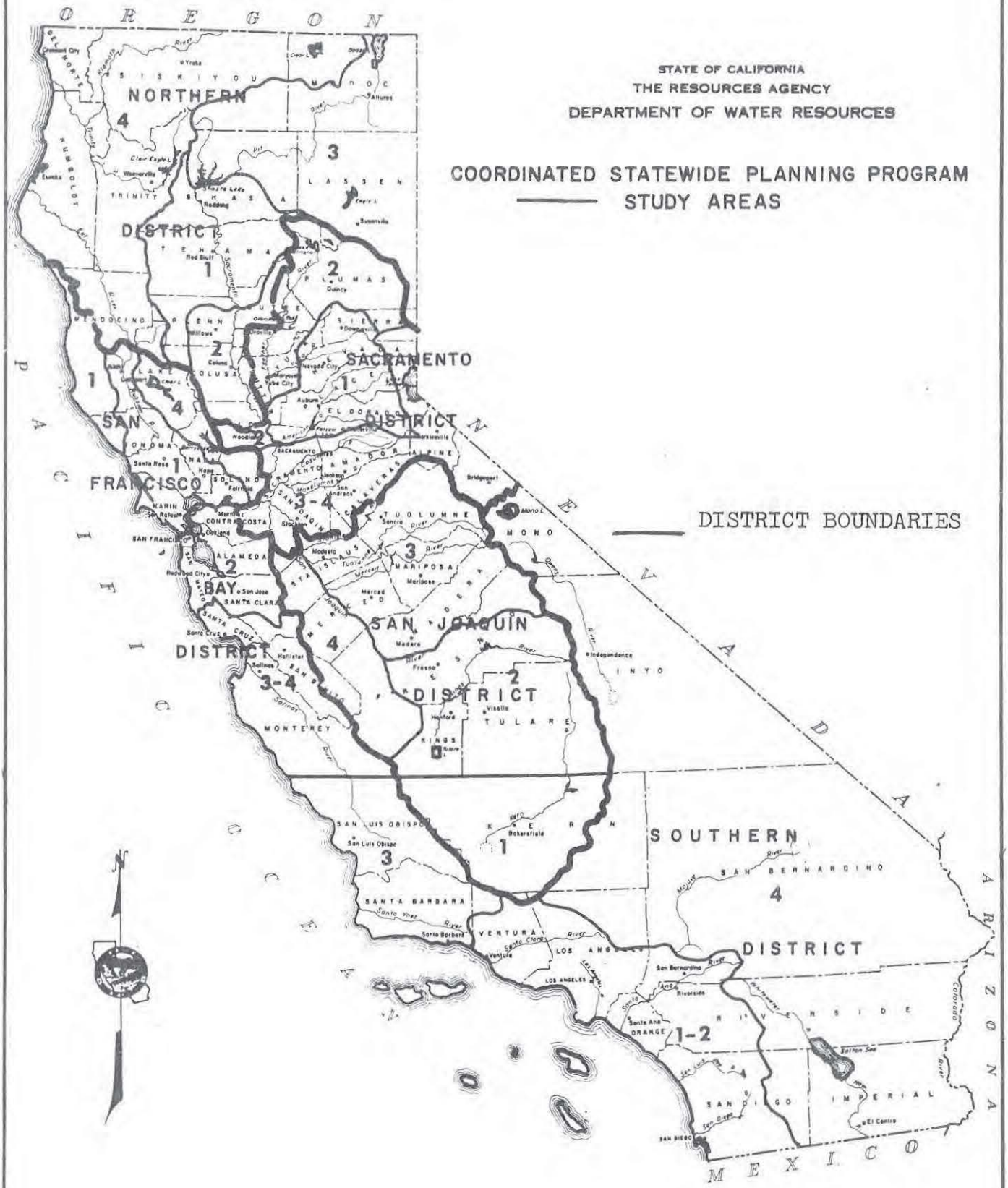
Activities within district offices.

1. Prepare future land use projections, estimate physical requirements for water project services, evaluate payment capacities, and develop reconnaissance-level forecasts of demands for water as a function of time within those areas designated "3" in each district as shown on the attached map.

2. Collect and analyze pertinent physical, economic, and financial information on presently developed local water supplies and on alternative future local water development which could meet all or portions of the water demands within those areas.

3. Relate forecasted demands for water to present and alternative future local developments, evaluate and compare the various alternative courses of action available including import supplies, make recommendations as to the most favorable alternatives, and prepare office reports covering the completed studies for areas "3".

Wayne MacRostie 3/30/67


STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
COORDINATED STATEWIDE PLANNING PROGRAM
STUDY AREAS
DISTRICT BOUNDARIES
OREGON
NEVADA
ARIZONA
MEXICO
PACIFIC OCEAN
NORTHERN DISTRICT
SACRAMENTO VALLEY DISTRICT
SAN FRANCISCO BAY DISTRICT
SAN JOAQUIN DISTRICT
SOUTHERN DISTRICT

A

LAND USE AND CLASSIFICATION SURVEYS
PART I

NEED

Adequate basic information on the present use of land and the availability and suitability of land for various kinds of water using development is essential to the preparation of reliable forecasts of future demands for water project services and the formulation of plans for water developments to meet those demands.

This program provides base line input data to the Coordinated Statewide Planning Program and other planning programs of the Department. It is scheduled to meet the current needs of these planning programs.

AUTHORITY

Water Code Sections 225, 226, 232, 12616, 12617, and 12609.

OBJECTIVES

The major objective of this program is to furnish timely and reliable information on present land use and the nature, location, and extent of land throughout the State suitable for various kinds of water using development to the Coordinated Statewide Planning Program and other planning programs of the Department. Immediate objectives are as follows:

1. To complete detailed land classification and land use surveys of the State for all areas which may have significant water needs in the foreseeable future. Remaining areas to be completed include portions of the Central Coastal area, and portions of the Cosumnes, Mokelumne, and Calaveras Rivers drainage basins.

2. To provide land use updating surveys by field checks and photogrammetric means at approximately four-year intervals for those areas in which population and/or land use are changing at rapid rates which may significantly affect demands for water project service.

3. To conduct detailed land use resurveys in those areas where the updating surveys show they are necessary to provide an adequate base for planning activities.

4. To make information on land use and classification available to the many users of this type data throughout the State as follows:

a. Through office reports presenting the results of updating surveys.

b. By presenting summaries of pertinent data in tabular form in appendixes to biennial reports of the Bulletin No. 160 series.

c. Through a new report, to be updated biennially, which will present tabulations of land use and classification data by counties, and information on the form and availability of all such data collected by the Department.

GENERAL DESCRIPTION

Work under the Land Use and Classification Surveys Program is conducted by each District of the Department, with coordination, scheduling, and overall guidance provided by the Statewide Planning Office. The work is performed in close cooperation with federal, other state, and local agencies involved in similar survey activities. At the federal level, these agencies include: Bureau of Reclamation, Forest Service, and Soil Conservation Service.

This is a minimum program to complete the initial detailed land use and classification surveys of the State and to provide updating land use information essential for water related planning.

Land Classification Surveys. The standard land classification survey involves the delineation and symbolization on aerial photographs of lands having similar soils and physiographic features that significantly influence water using development. The soil depth, texture, salinity, drainage, and rockiness, and land relief, position, and present use are some of the specific factors considered.

Land Use Surveys. Land use survey work falls into three categories: (1) reconnaissance surveys to monitor the general development of large areas in terms of increases or decreases of total urban and irrigated agricultural acreage, without regard to specific kind or location of such development, (2) semidetailed surveys to record the location and extent of general categories of water using development, and (3) detailed surveys to record the location and extent of each specific kind of development that has well defined economic or unit water use characteristics, such as individual crop types and specific kinds of urban development.

The reconnaissance surveys involve estimating the extent of water using development from aerial photo interpretation and/or statistical information collected by other agencies.

The semidetailed survey involves the delineation on maps of broad groups of water using development identified through aerial photo interpretation and a minimum of field examination.

The detailed survey involves field inspection of the whole survey area with the details of development noted on maps after on-site examination.

DATE WORK STARTED

July 1956.

ESTIMATED COMPLETION DATE

Continuing.

Wayne MacRostie 3/30/67

LAND USE AND CLASSIFICATION SURVEYS
PART II

RESOURCES INPUT DATA (in $1,000 GF and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	/MY*	$	/MY*	$	/MY*	$	/MY*	$	/MY*	$	/MY*	$	/MY*
SPO	17	0.8	15	0.7	15	0.7	15	0.7	15	0.7	15	0.7	15	0.7
ND	14	0.8	20	1.0	10	0.5	26	1.2	27	1.2	18	0.7	14	0.5
SFBD	61	3.0	45	2.3	40	2.0	31	1.5	32	1.5	28	1.2	29	1.2
SacD	36	1.5	45	2.3	40	2.0	26	1.2	27	1.2	28	1.2	14	0.5
SJD	36	1.5	35	1.7	35	1.7	36	1.7	37	1.7	38	1.7	39	1.7
SD	61	3.0	45	2.3	45	2.3	56	2.8	57	2.8	33	1.5	49	2.3
TOTAL	225	10.6	205	10.3	185	9.2	190	9.1	195	9.1	160	7.0	160	6.9

*Includes TSO man-power required for data tabulation.

PROGRAM OUTPUT DATA

1. Annual office report for each District presenting in detail the results of updating surveys.
2. A report, to be updated biennially, summarizing data by counties, first edition 1968.
3. Land use appendix to Bulletin No. 160-68, 160-70, and 160-72

WORK PROGRAM FOR 1968-69

Statewide Planning Office. Schedule and establish scope of surveys to be conducted by District personnel. Monitor progress of these activities to insure comparability of data from the various Districts. Establish format for reporting information and guide preparation and scheduling of reports. Develop new techniques to enable collection of needed information in the most economical manner.

Northern District. Conduct a reconnaissance land use survey of the North Coastal area (last surveyed in 1958). Prepare office report on results.

Sacramento District. Complete tabulation of land use and classification data for Cosumnes-Mokelumne-Calaveras Rivers Hydrographic Unit. Conduct semidetailed land use survey of Sacramento-San Joaquin Rivers Delta area, including valley floor lands adjoining on the east side (last survey in 1958-61). Conduct reconnaissance land use survey of Lahontan area from Mono County to Lassen County (last survey in 1956). Prepare office report, presenting results of Delta area and Lahontan area surveys.

San Francisco Bay District. Complete land classification and detailed land use survey of Monterey County area. Complete tabulation of this data and that previously collected in Pajaro-Santa Cruz area. Conduct reconnaissance land use survey of Putah-Cache Creeks Hydrographic Unit (last surveyed in 1960). Prepare office report on results of Putah-Cache Creeks survey.

San Joaquin District. Conduct semidetailed land use survey of west side of the San Joaquin River Basin and western Fresno and Kings Counties (last surveyed in 1957-58).

Southern District. Conduct reconnaissance land use survey of South Lahontan and Colorado Desert areas (last surveyed in 1958-61). Initiate semidetailed land use survey of the Upper Santa Ana River Basin (last surveyed in 1964). Complete tabulation of land use data for San Luis Obispo and Santa Barbara Counties. Prepare office report on results of San Luis Obispo and Santa Barbara Counties survey.

Wayne MacRostie 3/30/67

ADVANCED TECHNIQUES FOR WATER RESOURCES DEVELOPMENT

PART I

NEED

The Department, confronted with the problem of the utilization of our water resources at maximum economic efficiency, is continually searching for new means by which they can make better planning and operating policy decisions. The application of new techniques, employing operations research, statistics, etc., to water management problems can be beneficial in the formulation of these complex policy decisions.

AUTHORITY

This is a continuing program first authorized under the Budget Act of 1965.

OBJECTIVES

1. Keep informed of new techniques and determine if applicable to Departmental water management problems.

2. Provide staff advice, assistance, and consultation for implementation and application of new techniques to meet Departmental needs.

3. Conduct survey of areas in which the application of operations research techniques might enhance the effectiveness of the Department's water management activities.

GENERAL DESCRIPTION

A. The development and trial application of mathematical models is being performed principally by the Water Resources Center and the Operations Research Center of the University of California. The Water Resources Center has developed and reported on a single-purpose project model, and is presently developing the more complex multiple-purpose, multiproject, and project staging model. Close contact and participation with this work to ensure applicability of these models to current Departmental planning and operational problems is a function of this program. The University is utilizing expenditures of this program as matching state funds to justify federal grants under Title I and II of the Water Resources Research Act.

An important part of this program is the statistical description of water supply hydrology. Currently, the analysis of projects is based on one sequence of flows, which are those that have occurred in the past. The approach that will be taken in these studies is that of analyzing the statistical properties and interrelationships of recorded flows, and using this information to synthesize several hydrographs of future flows. This information will then make it possible to estimate the probability of a shortage.

Estimates of the economic loss resulting from a deficiency of water in the State Water Project-Central Valley Project service area would be developed. These studies would define economic loss as a function of severity of shortage.

These three lines of activity will be brought together. Equipped with a means of synthesizing flows, definitions of costs of deficiencies, and sophisticated techniques of analysis, it will be possible to illustrate ways to define the most efficient way to operate present State Water Project facilities and the most effective way to stage future facilities.

B. The advance of new techniques related to the field of water resources is accelerating, and the assimilation and analysis of these new techniques is becoming extremely difficult. In many cases, these new techniques may be too complex to apply directly to their related problems without the counsel of qualified personnel. This program will fill this gap with personnel knowledgeable in the fields of operations research, machine computations, and water resources engineering, by providing staff advice, assistance, and consultation as required.

C. The October 1966 Burns and Roe, Inc., report, which was prepared under contract for the Department, expresses an urgent need for the application of operations research techniques to departmental problems. Before these operations research techniques are applied, a detailed survey of the economic and institutional feasibility of applying these techniques must be performed. The principal products of this survey should include a description of the specific operations research techniques which may be employed, the cost of their development and application, and the benefits to be expected.

DATE WORK STARTED

Work started on January 25, 1965.

ESTIMATED COMPLETION DATE

This is a continuing program.

ADVANCED TECHNIQUES FOR
WATER RESOURCES DEVELOPMENT

PART II

RESOURCES INPUT DATA

	1966-67		1967-68*		1968-69*		1969-70*		1970-71*		1971-72*		1972-73*	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
Totals	78	3.0	41	2.0	72	3.0	72	3.0	72	3.0	72	3.0	72	3.0

PROGRAM OUTPUT DATA

The output for 1968-69 fiscal year will be as follows:

1. Technical and general memorandums showing an evaluation of the University of California's theoretical method for optimizing the SWP-CVP system model.

2. Develop an awareness within the Department of new techniques, such as the one listed above, which may be applied to the Departmental planning or operation problems to effect an increase in efficiency.

3. Memorandum detailing techniques which can be used to estimate effect of demand uncertainty.

4. Memorandum showing progress of operations research survey, including areas remaining to be investigated, areas investigated, and a summary of results.

5. Completion of refined report on municipal and industrial economic losses due to water shortages.

WORK PROGRAM FOR 1968-69

The principal activities for the fiscal year are as follows:

1. Provide staff advice, assistance, and consultation for implementation and application of new techniques to meet Departmental needs.

2. Cooperation with the University of California in making the following studies:

*Participant to Coordinated Interagency Projects Operation Program in the amount of $37,000 not included in this statement. This will finance one existing position.

A

a. Trial applications of the theoretical SWP-CVP system model.

b. Analysis of results obtained from trial runs of model.

c. Use of model for analysis of timing and sizing of additions to SWP-CVP system.

d. Development of probabilistic concepts to apply to model input and results.

e. Investigation of effect of demand uncertainties.

3. Continued refinement of loss function values due to water deficiencies.

4. Cooperative study with other Departmental organizations on utility of the SWP-CVP system model in answering operational and planning questions. The Statewide Operations Office will share in the conduct and funding of this work.

5. Survey of areas in which application of operations research techniques might enhance effectiveness of Department.

ORANGE COUNTY BASIN SIMULATION AND MANAGEMENT ASSISTANCE

PART I

A. Need. In the management of the water resources in Orange County, a multilayered mathematical model to simulate storage and transmission characteristics as well as the changes in water quality will be required. To develop, verify, and use a multilayered mathematical model, the present data collection program and existing data relating to such a study are inadequate. The need for a multilayered mathematical model was recognized as a result of the efforts by the U. S. Geological Survey and TEMPO, a division of General Electric, in their work in the development of a single layered mathematical model. A new data collection program should be developed to economically collect the minimum amount of data required for a multilayered mathematical model. The local agencies have set 1974 as the scheduled date for use of this model as a management tool for Orange County. The program must begin now in order that sufficient data can be collected and ready for use in the development and verification of a multilayered model by that date.

B. Authority. Statutory authority to conduct this investigation is contained in Section 226 of the California Water Code.

C. Objectives.

1. Development of the concept of a multilayered model.

2. Development of a minimum data collection program to meet the requirements of a multilayered mathematical model, considering both water quantity and quality.

3. Provide technical assistance to local agencies on alternative management plans.

4. Obtain all data developed in this cooperative study for use by the Department and all interested parties; the data will be useful in keeping current the location and timing of the next State Water Project Facility.

D. General Description. This is an extension and expansion of the present Orange County Coastal Plain Investigation and the activities under the $50,000, augmentation of 1966-67. The work of this program will consist of developing the concept of a multilayered aquifer water quality and quantity model and the evaluating of existing data and data collecting methods as related to the needs of a multilayered aquifer model. The requirements for a quantity-quality model are:

1. Aquifer delineation.

2. Individual aquifer water levels.

3. Separate extractions by aquifer.

Revised April 10, 1967

1968-69 F.Y.
Planning I-03
SD WA New

ORANGE COUNTY BASIN SIMULATION AND MANAGEMENT ASSISTANCE

PART II

G. Resources Input Data.[1] Costs in thousands of dollars and personnel in man-years.

1966-67		1967-68[2]		1968-69		1969-70		1970-71		1971-72		1972-73	
$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
25	4	0	0	55	3	55	2	30	1.5	30	1.5	30	1.5

H. Program Output Data.[3] Investigational results in a report including the following:

1. Concept of a multilayered mathematical model, considering both quantity and quality.
2. Basic data collection program, including TV camera survey of wells, reentry of abandoned oil wells or drilling of additional wells if required.
3. Delineation of the aquifers of the ground water basin.
4. Recommendations on basin operation, as requested by local agencies.

I. Work Program for Budget Year.

1. Develop concept of a multilayered aquifer model.
2. Formulate a data collection program to acquire information necessary to construct a reliable multilayered model.
3. Initiate the data collection program.
4. Furnish local agencies with aquifer system and basin operation information as requested.

1/ This is a cooperative undertaking by local, federal, state and private industry to obtain management tools and data for optimum operation of a very complex geohydrologic system. In addition to the work by the State, Orange County Water District is spending in 1967 in excess of $200,000, U. S. Geological Survey about $50,000 and TEMPO is providing its services at no cost during their learning process.

2/ If local agencies secure a state budget augmentation for 1967-68, the study will be commenced in that year.

3/ In the cooperative study the information will be made available to the local agencies as it is developed.

REVISED April 17, 1967

SAN LUIS OBISPO COUNTY GROUND WATER BASINS INVESTIGATION

PART I

A. Need. San Luis Obispo County Flood Control and Water Conservation District has contracted for eventual delivery to the County of up to 25,000 acre-feet annually through the Coastal Branch of the California Aqueduct. This water is not scheduled for delivery until about 1980, however, local water contracts must be negotiated and aqueduct turnout selected prior to that date. Meanwhile, most of the major ground water reservoirs in San Luis Obispo County are being overdrawn resulting in a decline of ground water levels. This condition is expected to become increasingly serious because of increasing water demands. Therefore, there is a need for survey of water requirements and supplies followed by development of generalized ground water basin models and preliminary economic-operation studies. This will assist local agencies to meet future water demands, conserve and utilize the maximmm amount of local water supply and minimize the effects of overdraft. In such a plan of operation, it is important that the ground water basins be coordinated with surface storage and distribution facilities.

B. Authority:

1. Statutory authority to conduct this investigation is contained in Section 226 of the California Water Code.

C. Objective.

1. Develop information on the physical characteristics and the mean water supply and requirements of the Paso Robles and Arroyo Grande Basins,

2. Develop a simplified basin model to simulate the two basins, if data from the above permits.

D. General Description.

Determine the water-bearing characteristics of the Arroyo Grande and Paso Robles ground water basins; the areal extent, transmissive and storage characteristics of the subsurface materials will be determined. The items of water supply and disposal over a number of years will be determined and estimates of the present and future uses of water will be made. If the information gathered is adequate, simplified ground water basin models will be developed and tested for the two basins. In these areas preliminary economic analyses will be conducted. A final report setting forth the findings of this investigation will be prepared.

REVISED April 10, 1967

1968-69 F.Y.
Planning I-02
SD WA New

SAN LUIS OBISPO COUNTY GROUND WATER BASINS INVESTIGATION

PART II

G. Resources Input Data.1/ costs in thousands of collars in personnel in man-years.

1966-67		1967-68[2]		1968-69		1969-70		1970-71		1971-72		1972-73	
$	MY	$	MY	$	MY	$	MY	$	MY$	$	MY	$	MY
0	0.0	0	0	20	1.0	55	3.0	75	4.0	46	2.5	14	0.5

H. Program Output Data. The investigation will result in annual blue cover progress reports and a final bulletin including the following:

1. Geologic study -- extent, nature, depth, and distribution of water-bearing materials; geologic cross sections indicating aquifer geometry; historical water level maps.

2. Hydrologic study -- determination of historical water supply, use, and disposal data.

3. Water quality study -- determination of water quality and nature of problems.

4. Basin Simulator -- if data are adequate, construct a basin model to predict ground water reservoir performance.

5. Preliminary economic analyses of basin operation.

6. Training of local agency personnel through local contribution of manpower to the program

I. Work Program for Budget Year

a. Collection of geohydrologic data.

b. Evaluation of available data.

c. Define problem areas.

d. Prepare base maps of the study areas.

e. EDP development and printout of data.

After the first year the project will be evaluated in the light of geologic, hydrologic and data problems encountered. The program may at this time be adjusted in scope of best accomplish the objectives.

1/ The County plans to contribute a total of $70,000 to the study.
2/ If local agencies secure a budget augmentation for 1967-68, the study will be commenced in that year.

SALINAS HIGHLANDS INVESTIGATION
PART I

NEED

Two areas adjacent to lower Salinas Valley; Corral de Tierra, located five miles south of Salinas, and Prunedale, located eight miles north of Salinas, are being developed as suburban residential communities. Both areas rely on water supply production from local wells.

In the Corral de Tierra area, wells are deep, production rates are low, and water quality is poor. In the Prunedale area, the wells are shallow, an adequate sewage disposal system is lacking, and the extent of the ground water resource at depth is not known.

Monterey County has requested assistance in evaluating the ground water potential for the two areas and in evaluating the alternate sources of water supply, including the proposed San Felipe Division of the Bureau of Reclamation. The information is needed now to allow the county time to negotiate with the Bureau of Reclamation.

AUTHORITY

A previous study of the Salinas River Basin was conducted in 1955 by the State Water Resources Board and funded jointly by Monterey County and the State. The results of this study are contained in State Water Resources Board Bulletin 19 (unpublished). The County of Monterey has requested that additional detailed study be given to the two specific areas.

Sections 12616 and 12617 of the Water Code authorize the Department to conduct investigations of the water resources of the State.

OBJECTIVE

To define the utility of ground water resources of the Corral de Tierra and Prunedale areas and to evaluate alternative sources of supply for the areas.

GENERAL DESCRIPTION

The Corral de Tierra and Prunedale areas are located in hilly areas within ten miles north and south of Salinas and are developing as suburban areas wholly dependent on local ground water. Studies of geology, hydrology, present and future land use, population, ground water yields and alternative sources of import water supply will be made to assist the local agencies in negotiating for supplemental water.

The study will be conducted in three phases:

1. Data collection and evaluation - twelve months
2. Develop information on water requirements and sources - twelve months
3. Develop recommendations and write report - six months

DATE WORK STARTED

Work proposed to start not later than July 1, 1968.

ESTIMATED COMPLETION DATE

The investigation is scheduled for two and one-half years. A report on the investigation will be completed not later than January 1, 1971.

SALINAS HIGHLANDS INVESTIGATION

PART II

RESOURCES INPUT DATA

1966-67		1967-68		1968-69		1969-70		1970-71	
$	MY	$	MY	$	MY	$	MY	$	MY
0	0	0	0	45.0	2.0	40.0	2.0	15.0	0.5

PROGRAM OUTPUT

Resource evaluation and yield of local ground water supplies.

Evaluation and comparison of alternate sources of supply.

Recommendation of action plan to meet future water needs.

WORK PROGRAM FOR 1968-69

Collect existing data on geology, hydrology, land use, population, and water use.

Evaluate existing data and determine supplemental data required.

Conduct field studies to obtain additional data on water levels, water quality, land and water use, transmissibility, and subsurface geology.

KERN COUNTY GROUND WATER INVESTIGATION
PART I

Need

Kern County is entering a new phase of water supply development. Starting in 1966, 40,000 acre-feet of additional imported water is being delivered through the Friant-Kern Canal. About 60,000 acre-feet will be delivered through the California Aqueduct beginning in 1968. By 1990, these new water imports will have increased to at least 1,300,000 acre-feet per year. These new water supplies will drastically change the present patterns and amounts of ground water pumping and replenishment. Direction and rate of ground water movement will change in some areas, and water of very poor mineral quality will be involved.

Because of the continued importance of the ground water resource to Kern County and to the staging of future water imports, a study of the geology, hydrology, and quality of ground water in Kern County is urgently needed now. Kern County Water Agency has indicated informally that it will assume about half the cost of the investigation.

Authority

Water Code, Sections 226, 229, 12616, and 12617.

Objectives

1. To evaluate and analyze the geologic and ground water data that have been collected so that present conditions can be better defined;

2. To make a preliminary estimate of the effect of the imported water on ground water movement and quality;

3. To identify present and potential ground water problem areas;

4. To develop possible solutions for the present and potential ground water problem; and

5. To study the orderly staging of additional imports and the efficient management of the water supplies in Kern County.

General Description

The Kern County Ground Water Investigation will include review, evaluation, correlation, and analysis of all existing data and reports. Where necessary additional data will be collected. A mathematical model of the ground water basin will be constructed to study future ground water conditions.

Date Work Started

The program will begin in July 1967.

Estimated Completion Date

The currently estimated completion date is June 30, 1972. This may have to be modified after completion of a PROMT network.

The total cost of this study is estimated to be $450,000 allocated as follows:

State	$250,000
Kern County Water Agency	200,000

In addition, the U. S. Geological Survey, under an existing cooperative agreement between the State and the Survey, will assist by providing computation of ground water extractions and analyses of aquifer tests.

A

KERN COUNTY GROUND WATER INVESTIGATION
PART II

Resources Input Data

	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73
			$: MY	$: MY	$: MY	$: MY	$: MY
SJD	0	*	85:4.0	90:4.0	40:2.0	35:1.5	0 : 0

* A bill proposing a budget of $85,000 will be introduced by Kern County interests. If the bill is successful, the input and output schedule will be stepped up one year.

Program Output Data

1969-70 Verified model of the ground water basin.
1970-71 Report on hydrology and geology.
1971-72 Report on operations studies.

Work Program for 1968-69

A PROMT network will be completed. Data and reports on hydrology, geology, and water quality will be reviewed. Base maps will be prepared. The Kern County ground water level and ground water quality monitoring system will be evaluated and revised where necessary. A limited number of monitoring wells may be constructed in areas where no data are available. Preparation of geologic and hydrologic data for use in a mathematical model of the ground water basin will begin.

CONVERSION OF ELECTRONIC DATA PROCESSING PROGRAMS TO CDC 3300

NEED

To increase the worth of water related data and especially hydrologic data, they should be stored for ready retrieval in a logical manner at a minimum cost. It has been shown in the many studies by independent organizations that data stored for use by electronic data processing machines are recoverable for use by the many state agencies at a minimum cost.

The Department, in 1966, converted from the IBM 1620 electronic computer and card handling machines system to the Control Data Corporation 3300 computer and magnetic tape equipment. This conversion of equipment also required that computer programs and card handling procedures for the IBM 1620 be converted for use by the CDC 3300 system. These computer programs need to be converted because the IBM 1620 costs $32 per hour and the CDC 3300 which operates 30 times faster than the 1620 costs $150 per hour.

AUTHORITY

Section 225, 226, and 228 of the Water Code.

OBJECTIVES

Convert or develop electronic computer programs which are used to process, store and list for publication, water related data. These include data on climate, stream flows, ground water levels, well logs, surface and ground water quality, waste water, sedimentation and water use for agriculture, and municipalities and industry.

GENERAL DESCRIPTION

By use of flow diagrams, review will be made of the system of collection, processing, storage, retrieval, and publication of each type of water related data to determine if it is fully and logically described. When the system is fully described, a machine programmer will convert the existing programs or develop required new programs. The program will be tested to determine if it is workable and procedures will be written covering the requirements in submitting data to be processed.

After the individual programs have been converted or developed, the cost of operating the computer to process data will be borne by the unit requesting the work.

DATE WORK STARTED

July 1967

ESTIMATED COMPLETION DATE

June 1970

A. L. Winslow, Jr.
4/25/67

CONVERSION OF ELECTRONIC DATA PROCESSING PROGRAMS TO CDC 3300

PART II

RESOURCES INPUT DATA

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	0	0	88	1.0	128	1.5	53*	0.6	0	0	0	0	0	0

* An augmentation for $88,000 will be requested for 1967-68. If this augmentation is not made, 1969-70 budget will need to be increased to $146,000.

PROGRAM OUTPUT DATA

The following programs will be converted:

I. 1967-68

1. Surface Water Quality
2. Stream Flow Rating Table
3. Monthly Stream Flow Table
4. Climatology Daily Summary
5. Stream Flow Output Revision
6. Gage Height Computation - Tidal
7. Annual Discharge Tabulation
8. Ground Water Quality List
9. Current Meter Measurement
10. Index of Climatological Stations
11. Land Use and Land Class

II. 1968-69

1. Ground Water Level Data
2. Precipitation Index Averages
3. Unimpaired Monthly Stream Flow
4. Hydrologic Correlation Procedure: Mean Totals
   Round
   Impairment
   Two Variable Least Squares
   Percent Deviation of Monthly Runoff
5. Area Capacity Table

The following programs will be developed:

III. 1969-70

1. Water Use Data
2. Water Quality Trace Elements
3. Pesticides and Bacteria Samples
4. Waste Water Resources
5. Sedimentation Data

WORK PROGRAM FOR 1968-69

Each of the programs scheduled for conversion during 1968-69 will be reviewed to determine if the program is still functioning as it was originally developed to function. For those programs not properly functioning, changes in the flow diagram and modifications in the system's procedure will be made, and the programs will then be converted.

This program will accomplish the conversion of programs and the programming of new computer programs. Individuals in the various data programs will assist in the work of modifying the system procedures.

A. L. Winslow, Jr.
4/25/67

HONEY LAKE BASIN INVESTIGATION

Part I

A. NEED

Honey Lake Basin, a closed drainage basin of 580 square miles in the Lahontan area in Lassen County, is an area of high potential water requirements and low natural water supply. The Department has received inquiries during the past several years regarding possibilities of investigating additional water development in this area. At present about 22,000 acres are irrigated out of a total of 90,000 irrigable acres. Most irrigators now operate with inadequate water supplies and are unable to improve or expand the agricultural economy without new water developments. There is a need for a comprehensive water development plan for maximum utilization of available water supplies.

Opportunities exist for additional storage of water on the Susan River and on Long Valley Creek as well as utilization of water from these and other watersheds that flow to the highly mineralized Honey Lake. Detailed studies of such developments will be of value to local interests by presenting to them proposals for maximum water development.

There is a need for the Department to maintain its contact with local interests in water-short areas such as this in Lassen, Modoc, and Siskiyou Counties. Since cessation of the Northeastern Counties Ground Water Investigation in 1961-62, the Department has had no planning activities in these areas. Such planning should be resumed in 1968-69.

B. AUTHORITY

Water Code, Part 6, Chapter 1, Article 5, Sections 12616 and 12617.

C. OBJECTIVES

The objectives of this investigation are to prepare and evaluate reconnaissance water development plans which could provide for maximum utilization of available local water supplies and the importation of new water from outside the basin.

D. GENERAL DESCRIPTION

The Department has studied the water problems of this area to limited degrees in Bulletin No. 2, "Water Utilization and Requirements in California", and in Bulletin No. 98, "Northeastern Counties Ground Water Investigation". However, only a brief reconnaissance has been given to possible plans for water development in this basin in Bulletin No. 3, "The California Water Plan".

Data regarding land use, water requirements, and present water utilization will be compiled, reviewed, and up-dated. The hydrology of water supplies will be investigated in detail. Preliminary plans for water supply development will be formulated to effect the maximum conservation and utilization of available water. Consideration will be given to full development of surface and underground supplies, improvement of the use of existing supplies, prevention of degradation of mineral water quality, and the salvage of waters of impaired quality. All possible methods of utilizing advanced technology for water development will be studied, and planning will include numerous alternatives to achieve maximum water utilization. The engineering feasibility of all works studied will be evaluated, and economic justification will be determined at the reconnaissance level of selected works.

E. PROPOSED STARTING DATE

July 1, 1968

F. ESTIMATED COMPLETION DATE

June 30, 1972

HONEY LAKE BASIN INVESTIGATION

Part II

G. RESOURCES INPUT DATA (Costs in thousands of dollars and personnel in man-years) All Northern District

Start						End	
1968-69		1969-70		1970-71		1971-72	
$	M.Y	$	M.Y.	$	M.Y.	$	M.Y.
25	1.5	75	3.5	75	3.5	25	1.0

H. PROGRAM OUTPUT DATA

Department of Water Resources Bulletin

Preliminary Edition to printer July 1971
Final Edition to printer January 1972

I. WORK PROGRAM FOR 1968-69

1. Review and analyze available data
2. Outline possible developments
3. Define future work program in detail

PRELIMINARY EXAMINATION OF LOCAL PROJECTS
PART I

NEED

For the Department to maintain a balanced planning program, there is a need to increase the level of planning activities concerned with smaller water development projects which could be implemented by local agencies as an adjunct to the major federal-state water development system.

Studies by the Department under the Coordinated Statewide Planning Program will provide information concerning water supply and water requirements useful in the conduct of these local project planning studies. Also provided will be the forecasts of economic demands for project services by hydrologic units and service areas and a broad identification of alternative means available to meet projected needs for water project services.

Project planning studies for both local and major projects are the necessary companion activities for the preparation of long-range plans for water development and the identification of alternative project possibilities. This program will contribute to the Department's overall water planning efforts by providing information on possible future local projects for use in developing a statewide plan for staged water project development and for the scheduling of more intensive investigative activities for specific local development possibilities of merit.

AUTHORITY

Water Codes Sections 227, 10005, 12616, 12617, and others.

OBJECTIVES

Program objectives are the preliminary examination and appraisal of potential water projects throughout the State which would develop and utilize more fully local sources of supply, and to recommend the desirable scope and scheduling of more detailed studies for specific local project possibilities which appear promising on the basis of this cursory reconnaissance analysis.

GENERAL DESCRIPTION

In each of the areas to be studied the preliminary examinations for local project development will review available data, determine additional data requirements, identify specific problems of the area, determine the intensity of further study required, if any, and develop a work program for a more intensive study, as appropriate.

Consideration will be given to the following project purposes: water supply for urban, agricultural, recreational, and fish and wildlife enhancement purposes; flood control; and conjunctive operation of surface and ground water reservoirs.

The sequence of areas to be investigated within each District of the Department will be based upon priorities established by the District Engineers, coordinated with the Statewide Planning Program. This will be accomplished through observations of needs for local water services, requests and support of local entities for the studies, and receipt of legislative resolutions requesting sub-reconnaissance appraisals of local water development possibilities.

DATE WORK STARTED

Proposed for July 1968.

ESTIMATED COMPLETION DATE

Continuing.

5/12/67

PRELIMINARY EXAMINATION OF LOCAL PROJECTS
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY
SPO										
ND	15	0.7	15	0.7	15	0.7	15	0.7	15	0.7
SFBD	15	0.7	15	0.7	15	0.7	15	0.7	15	0.7
SAC	15	0.7	15	0.7	15	0.7	15	0.7	15	0.7
SJD	15	0.7	15	0.7	15	0.7	15	0.7	15	0.7
SD	15	0.7	15	0.7	15	0.7	15	0.7	15	0.7
Total	75	3.5	75	3.5	75	3.5	75	3.5	75	3.5

PROGRAM OUTPUT DATA

Annual memorandum reports will be prepared on local project possibilities and apparent needs for further studies in all areas of the State.

WORK PROGRAM FOR 1968-69

A review of known local project possibilities in selected priority areas be made in view of updated present and future water requirements and recreation development potential. This review will include discussion with local interests. The one or two most promising projects within each District will be selected for preliminary examination of economic justification.

Northern District: Upper Sacramento Valley
San Francisco Bay District: Coastal Sonoma-Marin County
Sacramento District: Lower Sacramento Valley
San Joaquin District: Lower San Joaquin Valley
Southern District: Central Coastal Area

ECONOMIC IMPACT STUDY - WATER PROJECTS

PART I

NEED

During the past years, the State and other public agencies have expended huge amounts of capital for water resources activities. When these projects were planned, evaluations were made of primary benefits and costs. Since the development of the projects, economic effects upon the local economy have not been analyzed nor evaluated. It is prudent to determine the extent of program objective attainment and appraise the effect of public expenditures on the local economy.

AUTHORITY

California Water Plan requires "plans for the orderly and coordinated control, protection, conservation, development and utilization of the water resources of the State..."

Water Code states that such developments be of public interest, convenience and necessity for the welfare and benefit of the State and for the improvement of properties of living.

Program originally proposed by Mr. R. Price, Deputy Director Policy, to Mr. A. Golze', Chief Engineer, in memorandum of February 11, 1964.

OBJECTIVES

Program to provide guidelines and analyses to assay attainment of project objectives.

To measure the contribution of such expenditures to the local economy.

To evaluate primary and secondary impacts of water projects on counties.

To provide information to local interests on economic impact of water projects in their county.

GENERAL DESCRIPTION

A detailed work outline will be prepared delineating the scope of the study. Methodology for analysis will be contingent upon availability of data. As a pilot study an area within the Sacramento District will be chosen; i.e. Butte County. Following are examples of data which will be utilized in the study.

1. Changes in population (past, present, future).
2. Changes in retail sales.
3. Changes in wholesale sales (if available).
4. Changes in the assessment and levies upon real property.
5. Changes in the level of prices.
6. Changes in expenditures outside the county (imports); changes in expenditures inside the county by nonresidents (exports).
7. Changes in the level and characteristics of employment.
8. Increases in industrial development.

DATE WORK STARTED

This is a new program, and work will commence July 1, 1968.

ESTIMATED COMPLETION DATE

Initial program will be completed in nine months. If, after appraisal, it is shown that the study contributes to the analysis of the effect of public expenditures for water projects to the local economy, other areas within the State will be undertaken.

ECONOMIC IMPACT STUDY - WATER PROJECTS

PART II

RESOURCES INPUT DATA

Sacramento District, Special Investigations Section

Fiscal Year	Inputs	
	$	MY
1966-67	0	0
1967-68	0	0
1968-69	12,000	.75
1969-70	16,000	1.0
1970-71	0	0
1971-72	0	0
1972-73	0	0

PROGRAM OUTPUT DATA

State assumptions underlying the output data.

Establish a method to quantify output data or benefits based upon the total inputs of water projects.

Apply research methods and quantify economic impact of primary and secondary benefits upon the local economy.

WORK PROGRAM FOR BUDGET YEAR 1968-69

Evaluate and prepare guidelines for conducting economic impact studies.

Collect, compile and analyze data to determine applicability of data to the study.

Begin quantification of economic impact on the various sectors of the county economy.

The initial years work will be concerned with the economic impact on Butte County.

A preliminary report will be prepared setting forth the findings.

FRESNO-SIERRA FOOTHILL WATER RESOURCES INVESTIGATION
PART I

NEED

Fresno County and local agencies within the county are confronted with problems associated with urban developments which are rapidly taking place in the Fresno-Sierra Foothills. The Fresno County Department of Planning is preparing a comprehensive long-range general plan for the portion of Fresno County lying east of the Friant-Kern Canal, but present information concerning available water supplies, future requirements for water, and means of water development for this area is inadequate. The County is being pressed to approve subdivisions for rural developments in areas of uncertain water supply, and the proposed comprehensive water resources investigation is urgently needed to provide a rational basis for evaluation of such development.

Furthermore, Fresno County has suggested the study of methods for reclamation of waste water from mountain communities for uses such as the irrigation of golf course, scenic improvements through irrigation, and fire protection through irrigation of fire control strips. The results of the proposed investigation would aid in the evaluation of proposed water resource developments from an areawide point of view, and would make possible the optimum use of a limited resource.

The Fresno County Board of Supervisors has presented resolutions, dated June 30, 1964, and April 26, 1966, urging the Department of Water Resources to conduct a comprehensive water resource investigation in order to assist the Fresno County Departments of Health, Public Works, and Planning in the carrying out of their studies.

AUTHORITY

A. Comprehensive Water Resource Investigations

1. Authority for the Department to conduct the investigation is obtained in Water Code Sections 12616 and 12617.

OBJECTIVE

The objective of the investigation is to (1) evaluate the occurence, quantity and quality of water supplies in the Fresno-Sierra Foothill Area, (2) estimate the present and future water requirements of the area, (3) define specific areas where solutions to water supply and quality problems are urgently needed and, (4) formulate an area-wide plan for the development and utilization of the water resources of the area.

Plans for development would consider:

I. Water Supply

   a. Municipal and Industrial
   b. Domestic and Agricultural

II. Water Quality

III. Recreation

IV. Fish and Wildlife Enhancement

V. Flood Control

VI. Erosion, sedimentation, and other possible purposes.

GENERAL DESCRIPTION

The investigation conducted by the San Joaquin District will include studies of water supply, water quality and the means of conservation and utilization of water within the Fresno-Sierra foothill area.

The area of investigation shown on the attached map will include that portion of Fresno County lying east of the Friant-Kern Canal and adjoining areas within the Sierra foothills.

Studies of water supplies will include measurement of rainfall, snowfall, temperature, evaporation and wind, as well as the measurement of the flow of water in streams and an evaluation of ground water. Water quality studies will consider both surface and subsurface supplies.

Fresno County has indicated that their participation will consist of furnishing manpower in the collection and compilation of ground water data and participating in ground water investigations of the foothill areas.

Studies of possible project construction within local areas will include geological and topographical surveys. Alternative proposals will be studied to determine the most economical means of providing the water needs of local areas. Water rights will be considered, and when

found to be appropriate exchanges of water rights will be studied as a possible method for implementing projects. Recreation and fish and wildlife will be fully considered. A report will be prepared setting forth the findings and presenting recommendations.

DATE WORK STARTED

The Fresno-Sierra Foothill Water Resources Investigation will commence July 1, 1968.

ESTIMATED COMPLETION DATE

The duration of this program is scheduled for three years including full investigations and a fourth year in which to finalize the drafting of office reports and preparation of final report. A PROMT network will be completed during the first three months of initial year (1968-69) and an estimated completion date can better be determined at that time.

FRESNO-SIERRA FOOTHILL WATER RESOURCES INVESTIGATION
PART II

RESOURCES INPUT DATA (Costs in thousands of dollars and personnel in man years)

1968 - 69		1969 - 70		1970 - 71		1971 - 72	
$	MY	$	MY	$	MY	$	MY
50	3.0	130	7.0	110	6.0		

RESOURCES OUTPUT DATA

A. Detailed inventory of historical and estimated potential surface and subsurface water resources of the area (quantity and quality).

B. Detailed inventory of present and future water requirements for (1) municipal and industrial, (2) domestic, and (3) agricultural purposes.

C. Engineering (Geologic, Structural Design and Costs) inventory of potential water resource development sites and projects.

D. Inventory of present and future recreation uses and potentials.

E. Inventory of fish and wildlife resources and potentials.

F. Comprehensive Report on Investigation.

WORK PROGRAM FOR BUDGET YEAR 1968-69

A. Implement the program on the PROMT system.

B. Compile and review data and outline need for additional data.

C. Evaluate data.

D. Commence the preliminary activities of the investigation.

STATE PARTICIPATION IN FEDERAL COMPREHENSIVE TYPE I FRAMEWORK STUDIES

PART I

NEED

The United States, through the federal Water Resources Council has initiated studies to provide a broad guide for future development of water and related land resources in 18 regions of the Nation. These studies will identify areas in which resource problems are incipient and will sketch short and long range solutions to needs through the timely development and management of those resources. This federal investigation for the California region was initiated in the latter part of fiscal year 1966-67.

The State of California has in the past and is presently accomplishing much work within its borders along the lines contemplated by the federal studies. This includes preparation and adoption of the California Water Plan in 1957, after ten years of extensive study under the Statewide Water Resources Investigation; and the continuing studies under the Department of Water Resources' Coordinated Statewide Planning and other investigative programs.

It is essential in the interests of the State and the Nation that the federal and state investigative activities be complimentary and provide the greatest benefit from expenditure of funds at each governmental level. It is necessary that the federal studies embrace those investigative phases which cannot be adequately pursued by the State under currently envisioned funding limitations. The need for state participation and direction in the federal Framework Study Program is therefore manifest.

AUTHORITY

Authority for participation by the Department of Water Resources, is contained in Sections 12580, 12617, and related Sections of the Water Code.

OBJECTIVES

Objectives of State participation are to monitor and guide the investigative activities of the federal agencies such as to achieve maximum possible benefit from the federal study program in the furtherance of State interests.

GENERAL DESCRIPTION

General direction for the Type I Framework Studies in California is provided by the existing State-Federal Interagency Group. The Framework Study Committee with a Framework Study Staff have been constituted under that group for purposes of the detailed coordination of the studies. Representatives on this committee include 18 federal agencies and 9 agencies of the State of California.

The Staff provides direct coordination for eight technical subcommittees comprised of federal and state agency representatives. At state level these include staff members of the Department of Water Resources' Coordinated Statewide Planning Program and representatives from the Departments of Fish and Game, Parks and Recreation, Harbors and Watercraft, Conservation, and the State Water Quality Control Board. Due to the close relationship of the federal framework studies with the Coordinated Statewide Planning Program, Department of Water Resources' representatives serve as chairmen of the Framework Study Committee, Framework Study Staff, and two of the technical subcommittees. The Department of Water Resources has been named by the Administrator of the Resources Agency as the coordinating agency for state participation in the federal framework study program.

Participation by representatives of California in the federal framework studies is funded from federal grants under the provisions of Title III of the Water Resources Planning Act of 1965 (P.L. 89-80). The grant funds are devoted first to support one engineering and one stenographic position within the Department of Water Resources. The engineer assigned to this position serves as chairman of the Framework Study Committee and performs other coordinating functions on a full time basis to keep the California Region studies moving smoothly.

To the extent Title III funds are available to California, they are used to finance additional framework study expenses of the Department of Water Resources and other concerned Departments of the Resources Agency.

DATE WORK STARTED

January 1967

ESTIMATED COMPLETION DATE

The Federal Framework Studies are scheduled for completion in fiscal year 1970.

Wayne MacRostie
5/11/67

1968-69 F.Y.
Planning I-04
SPO W.A. ____

STATE PARTICIPATION IN FEDERAL COMPREHENSIVE TYPE I FRAMEWORK STUDIES

PART II

RESOURCES INPUT DATA in $1,000 - Reimbursable - and man-years

	1966-67		1967-68		1968-69		1969-70	
	$	MY	$	MY	$	MY	$	MY
SPO	63.3	3	75.0	4	75.0	4	75.0	4
Total[1/]	63.3	3	75.0	4	75.0	4	75.0	4

1/ Total forecasted funds to be made available to California under the provisions of Title III of the Water Resources Planning Act of 1965 (P.L. 89-80). Includes funds to be suballocated through Service Agreements by DWR to other Departments of the Resources Agency.

PROGRAM OUTPUT DATA

1. Participation in, and coordination of, the Federal Comprehensive Type I Framework Studies for the California Region.

2. Interassociation of interim results and findings of the Framework Studies within both the California and other study regions of direct concern to California with related investigative activities in progress under the Coordinated Statewide Planning Program and Western States Water Planning Program of the Department of Water Resources.

WORK PROGRAM FOR 1968-69

First drafts of major appendices in the areas of Economics, Water Resources and Requirements, Flood Control, Watershed Management, Power, Land Resources and others will be completed during this fiscal year. Framework study emphasis during 1968-69 will be directed toward developing the comprehensive plan and alternatives for the management, use and development of regional water and related land resources utilizing input data from the earlier study phases and other sources. Preparation of a final draft of the Comprehensive Plans appendix will be in progress and work on the main report will be initiated.

Resolution of conflicts and incompatible proposals for resource utilization and development among the various functional purposes will represent a major effect in coordination during this third year of the four year framework study program.

Wayne MacRostie
5/11/67

A

INYO-MONO AREA INVESTIGATION

PART I

A. Need. The easterly slopes of the Sierra Nevada Mountains within the Mono and Inyo Counties are sparsely developed and devoted primarily to cattle raising, recreation, and mining. Small urban centers are located at Bishop, Lone Pine, Lee Vining, Big Pine, and Independence. The annual precipitation varies from three inches of rain on the valley floor to forty inches of snow near the crest of the Sierra Nevadas on the west. The watershed is utilized by the City of Los Angeles to obtain a water supply that is exported from the Inyo-Mono area by means of the Los Angeles Aqueduct. Excellent areas for extensive recreation activities exist throughout the region. The primary recreational activities include fishing, hunting, hiking, camping and picnicking. Numerous mountain streams, and the meandering Owens River provide ideal sites for trout fishing. The major portion of the developable lands and the water rights are controlled by the City of Los Angeles and, therefore, the economic growth of the area is closely affected by the actions of the City. The recreational potential of the area has been developed to a limited extent. The City of Los A Angeles is proceeding with plans to increase the quantity of water exported from the Inyo-Mono area, which may restrict economic development. Expansion of recreational activities can produce a larger impact on the economic growth of the area than any other form of activity; therefore, a comprehensive investigation of development of recreation and fish and wildlife enhancement is needed. From this investigation a plan would be developed that would maximize the use of waters available for recreational and fish and wildlife development which will promote the economic development and social structure of the area.

B. Authority. The Department of Water Resources is authorized under Section 12616 of the Water Code to make such studies. The Department is also authorized under Section 10004 of the Water Code to plan for the orderly and coordinated control, protection, conservation, development, and utilization of the water resources of the State as set forth and described in "The California Water Plan".

C. Objectives. The objectives of this program are to: 1. determine the opportunity for optimum recreation use of water supplies in the area. 2. identify recreational and fish and wildlife projects which are, at the reconnaissance level of investigation, considered feasible. 3. develop plans of development at the detailed feasibility study level that are considered to be engineeringly feasible and economically justified. 4. determine financial and institutional means to implement recommended projects.

D. General Description. The initial work on the program will commence in the fiscal year 1968-69 and extend over a 3-year period. In recognition of previous studies, the first year of this investigation will be on a project reconnaissance level extending and using the knowledge developed during previous investigations. Alternative plans for recreational and fish and wildlife developments will be considered. The availability of project water will be evaluated. Preliminary plans will be developed along with estimates of costs and benefits. Each plan will be evaluated and the maximum net benefits will be determined, considering the effect the plan will have on providing recreational activities and on the economic development of the surrounding area. At the end of the first year of the investigation, findings will be presented in an interim report and the need for the subsequent feasibility study will be discussed.

A coordinating committee composed of representatives of federal, state, and local agencies will be established to contribute toward the investigation. Public hearings will be conducted where appropriate.

The project feasibility level study plans will be formulated, necessary geological explorations will be made, and detailed costs and benefits will be evaluated for the alternative projects selected for further consideration as a result of the reconnaissance study. A final report on the investigation will be completed by June 30, 1971.

Organizational aspects of implementing each plan will be reviewed, together with the methods of financing project construction and operation.

The services of the State Departments of Fish and Game and Parks and Recreation will be obtained under contract to plan facilities and estimate visitation and benefits associated with recreation and fish and wildlife.

E. Date Work Started. July 1, 1968

F. Estimated Completion Date. June 30, 1971.

1968-69 F.Y.
Planning I-0[illegible]
SD WA New

INYO-MONO AREA INVESTIGATION

PART II

G. Resources Input Data (costs in thousands of dollars and DWR personnel in man-years)

1966 - 67		1967 - 68		1968 - 69		1969 - 70		1970 - 71		1971 - 72		1972 - 73	
$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
0	0	0	0	90	2.5	110	3.5	50	2.0	0	0	0	0

H. Program Output Data

1. Reconnaissance report on June 30, 1969.
2. Bulletin at the detail feasibility level of investigation recommending recreation and fish and wildlife projects that are engineeringly feasible and economically justified with recommendations for implementation.

I. Work Program for Budget Year

1. Evaluation of the existing data
2. Review feasibility at the reconnaissance level of all possible recreational sites including recreational sites considered in previous studies by public agencies
3. Extensive coordination with other federal, state, and local agencies participating in the study
4. Evaluation of recreation in fish and wildlife demand and potential of the area
5. Reconnaissance report of findings

Revised April 17, 1967

WATER RESOURCES MANAGEMENT OF THE SANTEE, LAKESIDE, EL MONTE AREAS PROJECT FEASIBILITY

PART I

1. Need. The City of San Diego has grown from the small settlement to a thriving commercial, industrial and military complex with a present population of more than three-quarters of a million. The phenomenal growth of this coastal city has significantly affected the development of a number of adjacent areas. One such area is the valley formed by the San Diego River which traverses the northerly edge of the San Diego metropolitan area.

Initially, water requirements of the communities located along this narrow river valley were satisfied by local surface and ground water supplies. The regimen of natural recharge has been altered by the construction of upstream dams. However, cultural and economic developments in the river valley have greatly increased the water requirements. The increased demand for water has been accompanied by a parallel problem of increasing sources and volumes of wastes of both domestic and industrial origin. As a step to meet some of the water needs economically, Santee County Water District has constructed and is successfully operating a waste water reclamation plant.

The prevailing low ground water table condition may result in connate water from surrounding hills flowing into the ground water basin. The continued inflow of connate water may render useless a significant part of the natural ground water storage basin. In order to minimize the effects of a falling water table, evaluate the significance of connate water invasion, and to more fully utilize the ground water basin, an understanding must be reached of the geologic, hydraulic, hydrologic, water quality, and economic characteristics of the basin.

There may be significant economic advantage in utilizing the ground water resources in the study area in coordination with surface water resources to regulate and distribute both surface and imported water supplies. The basin may also be economically utilized in coordination with reclamation of water from wastes.

A DWR report to the San Diego Regional Water Quality Control Board recommended the establishment of ground water quality objectives together with a water quality monitoring program.

It is anticipated that a feasible project or plan of operation of the ground water basin can be developed. However, a preliminary level study must be made to confirm this expectation. Local agencies must soon make decisions regarding construction of storage and distribution works, and it is urgent that definite conclusions be made regarding the apparent economic role of the ground water basin in these works. Therefore, a complete feasibility study is presented herein but a decision will be made at the end of the first year regarding continuation to full feasibility findings.

B. Authority

1. Statutory authority to conduct this investigation is contained in Section 226 of the California Water Code.

C. Objective

1. General

a. To develop engineering and economic information over a range of plans that permit maximum utilization of the ground water resources by local agencies to meet the increasing water demands and affect the maximum conservation and optimum use of available surface and ground water supplies.

b. To develop legal, political, and organization information related to implementation of a plan of operation.

2. Specific

a. To formulate an early decision on the justification of continuing the investigation, after a preliminary level examination.

b. To develop information on the geologic, hydrologic, and water quality characteristics of the basin.

c. To provide a mathematical tool for simulating the physical responses of the ground water basin.

d. To develop a prediction tool for the water quality aspects of the basin.

e. To develop cost data over a wide range of alternative plans for surface and ground water facilities and waters from various sources.

f. To develop legal, political and organizational information related to the implementation of the alternative plans of basin operation.

D. General Description

This investigation will be generally separated into five phases one of which will be conducted concurrently:

Geology--determine nature and extent of water-bearing materials, depth of ground water, and annual change in ground water in storage; develop a nodal network for a mathematical model and necessary physical parameters, and assist in the verification of the quantity model.

Hydrology--determine the study period, historic water supply and disposal and deep percolation; develop hydrologic parameters for the mathematical model and assist in the models verification; determine future water demands and deep percolation criteria.

Water Quality--determine historic water quality conditions, continue data collection throughout the investigation; determine the nature and extent of the connate problem; determine waste water quality; develop a water quality prediction rool.

Operational-Economics--evaluate operational and economic information as provided by local agencies; determine alternative plans of operation and evaluate them economically; lay out the facilities and cost of facilities required.

Legal, Political and Organizational--develop information for implementation of plans of operation.

E. Date Work to Start. Work will begin on this program in July 1968.

F. Estimated Completion Date. The estimated date of completion is June 1969 for the decision of continuation of the study and June 1973 for the complete feasibility level study.

Rev. 4/17/67

1968-69 F.Y.
Planning I-03
SD WA New

WATER RESOURCES MANAGEMENT OF THE SANTEE,
LAKESIDE, EL CAJON AREAS
PROJECT FEASIBILITY

PART II

G. Resources Input Data[1] (cost in thousands of dollars and personnel in man-years)

1966-67		1967-68[2]		1968-69		1969-70		1970-71		1971-72		1972-73[3]	
$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
0	0	0	0	32	1.8	96	3.8	119	5.2	87	3.0	62	2.5

H. Program Output Data[4]. The investigation will result in a report to include the following:

1. Geologic Study--determination of extent, nature, depth and distribution of water-bearing materials; cross sections indicating shape of the underground reservoir; storage characteristics of sediments comprising the basin; historical water level maps.

2. Hydrologic Study--determination of historical water supply, use and disposal data needed to check mathematical model and achieve best approximation of basin hydrodynamics.

3. Water Quality--determination of water quality in the basin and the magnitude of quality problems including connate water invasion; determination of a water quality predictive tool.

4. Mathematical Model--construct and verify a mathematical model of a size and type justified by the available data to predict ground water reservoir performance.

5. Legal, Political and Organizational--develop information as related to the alternative operational plans.

1/ Approximately half the total cost to be contributed in manpower or funds by local agencies in San Diego County.
2/ If local agencies secure a state budget augmentation for 1967-68, the study will be commenced that year.
3/ The total cost of the study is approximated at $396,000; however, the scope and costs of the study would be reevaluated at the end of the first year.
4/ In the cooperative study the information will be made available to the local agencies as it is developed.

A

I. Work Program for Budget Year

a. Collection of geohydrologic, water quality and operational economic data.

b. Evaluation of available data.

c. Preparation of a progress report.

After the first year the project will be evaluated in the light of geologic, hydrologic water quality, and economic information developed in preliminary reconnaissance study and a decision made as to the justification for initiation of a feasibility level study.

INDEX

PROGRAM STATEMENTS

Water Development Implementation
(General Fund)

WATER RIGHTS MANAGEMENT*
PART I

NEED

Section 105 of the Water Code states as follows: "It is hereby declared that the public interest in the development of the water resources of the State is of vital concern to the people of the State and that the State shall determine in what way the water of the State, both surface and underground, should be developed for the greatest public benefit".

The State's interests in water must be developed, and defended, in all actions and in particular in water rights actions before the State Water Rights Board. The basic need for this program is to fulfill this responsibility.

Information on water rights is needed by the Department so that proper consideration can be given to the effect of existing and proposed water rights on project planning and the yield of water that can be developed after prior viested rights have been satisfied.

The Department files applications for unappropriated water, which in its judgment is or may be required in the development and completion of the whole or any part of a general or coordinated plan looking toward the development, utilization, and conservation of the water resources of the State.

AUTHORITY

Sections 184, 1256, and 10500 of the Water Code.

OBJECTIVES

Develop, defend, and protect the public interest in water right actions. Direct and administer the water right functions of the Department associated with project planning.

GENERAL DESCRIPTION

Program objectives of the Department's water right functions will be achieved by:

1. Developing a statewide water rights study showing the amounts and seasons when unappropriated water occurs so that direction and administration may be given water right matters.

2. Modifying existing water rights studies to include future water development projects, and the yet to be established water quality control requirements for the Sacramento-San Joaquin Delta. These modifications will demonstrate the effects future projects and water quality requirements will have on the availability of water in streams tributary to the Delta and in the Delta Channels.

*"Management of State Water Rights Filings"

3. Monitoring and analyzing water rights to be acquired under provision of the Water Code for operation of major water projects for the development of the State's water resources.

4. Preparing maps, charts, and other exhibits, and presenting to the State Water Rights Board the Department's views and recommendations on major projects and assignments or releases from priority of State applications.

5. Filing state applications at the request of governmental agencies for newly planned water development projects.

DATE WORK STARTED

July 1956.

ESTIMATED COMPLETION DATE

Continuing.

Ted M. Tsuruda 3/30/67

WATER RIGHTS MANAGEMENT
PART II

RESOURCES INPUT DATA (in $1,000 - GF - and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	42	1.8	44	1.9	51	2.2	55	2.4	60	2.6	60	2.6	60	2.6

PROGRAM OUTPUT DATA

An investigation will be completed and published in 1973 which will define the amounts and periods when unappropriated water occurs in the rivers and streams of the State. The end product of this investigation will demonstrate the constraints that must be applied toward future project planning.

This program will develop, defend, and protect the public interest in water rights actions.

WORK PROGRAM FOR 1968-69

Statewide Planning Office. In order to provide information on water rights throughout the State, particularly with regard to the amounts and seasons when unappropriated water occurs in all the streams and rivers of the State, a comprehensive water rights study will be undertaken. This study will include and utilize not only appropriative rights as filed with the State Water Rights Board but also, where information is available, riparian and pre-1914 appropriative rights.

Information for this study will be gleaned from the Board's files, particularly with regard to the new water use inventory law, and when necessary from the records and files of the various counties.

This will be a study of water conditions throughout the year since in many streams unappropriated water exists only during the winter and spring months. Also, a year-round study will allow proper evaluation of present and proposed storage projects.

Due to the magnitude and volume of computations involved it will be necessary to program the Central Valley portion of this study for electronic data processing equipment.

Due to budgetary limitations this study will be conducted on areas where the greater water rights activities occur. This study will show the constraints that must be applied to historic stream flow for the satisfaction of prior vested rights.

At the request of governmental agencies, applications will be filed for newly planned water development projects with the State Water Rights Board. Recommendations giving the Department's views on requests for assignments or releases from priority of state applications will be presented to planning groups in the Department and to the State Water Rights Board. Exhibits, maps, and charts will be prepared for presentation to the State Water Rights Board during hearings in support of the Department's objectives in relation to applications of other agencies or individuals. Testimony will be presented to both the State Water Rights Board during hearings involving the various activities of the Department which are related to state applications. The testimony will represent a coordinated effort between the Water Rights Engineering Section, the legal staff, and the district offices.

Ted M. Tsuruda 3/30/67

ADVICE TO WATER QUALITY CONTROL BOARDS
PART I

NEED

The control and regulation of waste discharges to prevent pollution is a responsibility of the water quality control boards, which are required by law to seek the advice and technical guidance of the Department of Water Resources as well as other state agencies. The boards are also required to take cognizance of the California Water Plan in formulating policies preliminary to prescribing requirements. Consequently, the Department provides considerable technical advice and assistance on municipal and industrial waste discharges to the water quality control boards. In light of the predicted growth of the State, the increasing need for the development of the State's water resources, and the increasing complexity of waste disposal problems, the need for the Department's services in providing consultation and guidance to the boards in promulgating water quality objectives is constantly expanding.

AUTHORITY

Section 13052(c) of the Water Code and Title 23 of the Administrative Code, Sections 2153 and 2167.

OBJECTIVES

Assure the protection of the quality of the waters of the State by (1) acting as consultants to the boards and (2) furnishing technical information and advice to the water quality control boards regarding municipal and industrial waste discharges in support of the board's regulatory activities.

GENERAL DESCRIPTION

The Department submits comments and recommendations regarding specific municipal and industrial waste discharges. In addition, it notifies water quality control boards regarding applications to this Department for construction and enlargement of dams, and forwards information on water quality, water rights, beneficial water uses, and known or suspected pollution hazards.

In preparing such information and advisory comments, the following are considered:

a. Quality of surface and ground waters adjacent to the disposal site.

b. Hydrology of streams receiving waste waters.

c. Existing and probable future ground water conditions.

d. Effects of a waste discharge upon surface or ground waters with respect to their present or planned uses.

e. Concentration limits for specific waste constituents.

f. Water quality criteria for specific beneficial uses.

g. Coordinated plans for the development of state or local water resources.

h. Other factors determined from field inspections.

Personnel attend and participate in meetings with water quality control boards, and other public agencies, regarding water quality and waste disposal problems.

DATE WORK STARTED

1950

ESTIMATED COMPLETION DATE

Continuing

E. A. Ritchie
3/30/67

1968-69 F.Y.
Implementation II-02

SPO	W.A. New
ND	2319
SFBD	2321
SAC	2320
SJD	2322
SD	2323

ADVICE TO WATER QUALITY CONTROL BOARDS
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	0	0	0	0	3	0.1	3	0.1	3	0.1	3	0.1	3	0.1
ND	35	2.2	30	1.4	37	2.1	39	2.2	39	2.2	40	2.2	40	2.3
SFBD	42	2.2	44	2.3	53	2.3	58	2.3	63	2.3	69	2.3	75	2.3
SAC	24	0.9	32	1.2	36	1.5	40	1.6	42	1.6	45	1.7	47	1.7
SJD	33	2.0	35	2.2	48	2.6	50	2.6	50	2.6	50	2.6	50	2.6
SD	101	6.0	110	6.0	129	7.0	139	7.0	150	7.0	162	7.0	175	16.0
Totals	235	13.3	251	13.1	306	15.6	329	15.8	347	15.8	369	15.9	390	16.0

PROGRAM OUTPUT DATA

1. Regional Water Quality Control Boards provided with data summaries and recommendations for establishment of water quality standards and development of water quality control policies.

2. Data and advice in support of Board's regulatory activities to Board staffs at work groups or coordinating meetings.

3. Formal (written) comments and recommendations given on all waste discharge requirements.

4. Appearances at Board meetings to present Department's viewpoint and answer questions which may be raised by the Board during such meeting.

WORK PROGRAM FOR 1968-69

Statewide Planning Office

Coordination of district activities will be maintained.

Northern District

1. Provide data for establishment of standards on major streams and on any interstate waters not previously completed or for review of existing standards.

2. Recommend and comment on water quality objectives or standards to be established or amended.

3. Provide data on water resources which may be affected by waste discharges. Data includes: water quality, water quantity, and present and planned water use.

4. Information provided on planned local and state projects and related beneficial uses.

5. Notification given of any dam construction or alteration.

6. Submit comments and make recommendations on waste discharge requirements.

If this program remains at the 1967-68 level and does not return to that of 1966-67, our activities related to establishment of water quality objectives and standards will be significantly limited. All the accumlative knowledge of our water resources and their quality as well as planned development and use should be reviewed, evaluated, and summarized to provide a basis for standards, if they are to be appropriate and usable. As this information is often solely available from our Department, these activities can most efficiently and practically be accomplished by our personnel. The limiting of these activities could lead to incomplete or inadequate standards particularly in our undeveloped areas which must be developed to meet our future water needs.

San Francisco Bay District

Attend and participate in regular and special board meetings, coordinating meetings, and task force committees.

Make site inspections and engineering evaluations of existing and proposed waste discharges.

Under the 1/20/67 level, many comments and recommendations would have to be made without a site inspection and a thorough analysis by an engineer.

Sacramento District

It is anticipated that during 1968-69 the same type of activities will be carried on as for previous fiscal years but will increase in number, due to increasing undustrial and population growth.

Assistance will be provided to the three water quality control boards having jurisdiction in the Sacramento District area in developing water quality control policies for individual watersheds or units (the Central Valley Board alone contemplates establishment of over 200 such policies).

Assistance will be provided for the implementation of the several water quality control policies concerning interstate waters in the Lake Tahoe, Truckee River, west fork Carson River, east fork Carson River, west fork Walker River, and east fork Walker River basins. The implementation of these policies will require establishment of a significant number of new, and revision of virtually all existing waste discharge requirements.

Comments and recommendations regarding requirements for domestic, municipal and industrial waste discharges, long-range or specific water quality control activities and policies will be furnished to the Water Quality Control Boards. Specific engineering investigations, studies and reconnaissance activities will be conducted, data collected, developed, and evaluated. Results will be transmitted and disseminated through reports, correspondence, meetings, and conferences. In addition, Water Quality Control Boards will be notified regarding applications to this District for contruction and enlargement of dams. Information on water quality, water rights, beneficial uses, and known or suspected pollution hazards will be forwarded.

Personnel will attend and participate in meetings and conferences with Water Quality Control Boards, other state and local agencies, public and private organizations regarding water quality and waste disposal problems. Field inspections of proposed waste disposal sites and facilities will be made if deemed necessary.

Information and technical advice will be furnished to Water Quality Control Boards in support of their regulatory activities and enforcement of waste discharge requirements. Proposed and existing waste discharges will be evaluated to assure that the quality of the surface and ground waters of the State will not be adversely affected for their present and planned beneficial uses.

San Joaquin District

1. Comments and recommendations regarding requirements for municipal and industrial waste discharges. Long range plans and policies will be furnished to the Central Valley Regional Water Quality Control Board through reports, correspondence, and meetings.

2. Engineers will attend meetings and conferences of the Boards, conduct field investigations, and prepare technical reports.

Southern District

Advice and provision of technical information are expected to be at increased level above 1966-67 or 1967-68 because of population growth, more complex technology, and increased necessity for evaluation as interrelationships between dishcarges

in densified areas become more important. These factors in turn will necessitate greater number of field inspections and lengthier processing of each discharge report.

In addition, the Boards's activities in water quality control policy formulation will demand increased attention.

E. A. Ritchie
4/18/67

REVIEW OF REPORTS OF OTHER AGENCIES
PART I

NEED

It is the policy of Congress of the United States to recognize the interests and rights of the states in the development of federal water projects within their borders. Pursuant to federal public law, plans, proposals, or reports by certain federal agencies are forwarded to the State so that written views and recommendations of the State may be submitted. These views and recommendations express the State's position in order that such allocations and appropriations as are made by the State Legislature for such purposes will be expended upon those projects which are most beneficial to the State, and which will bring maximum benefits to the people of the State from the expenditure of public funds.

AUTHORITY

Section 12580 and subsequent sections of the California Water Code. Additional authority delegated by Executive Order 66-12, Governor's Administrative Order, dated March 25, 1964, and by Agency Order No.'s 19, 20, 23, 27, and 28.

OBJECTIVES

Review and comment on projects proposed by federal agencies to achieve the most effective and economical development and utilization of the water resources in and affecting the State.

GENERAL DESCRIPTION

There are four categories of reports with which this program is concerned: (1) Federal Projects by U. S. Corps of Engineers and U. S. Bureau of Reclamation; (2) Public Law 566 Projects; (3) Public Law 984 Projects; and (4) Federal Power Commission activities.

Proposed federal projects, and local projects for which federal financial assistance is requested, are analyzed and comments reflecting the official views of the Department are included in the State's comments submitted to the federal agency, or agencies, involved. Projects are reviewed with respect to engineering and economic feasibility and their relationship to the California Water Plan. These views may bear significantly on the authorization of the project or could result in significant modification of the proposed plan.

The detail included in review of reports may vary from brief letter reports to comprehensive analyses, depending upon the planning stage of the proposed project and the degree of the State's interest in the project. Proposed projects are ordinarily reviewed twice prior to authorization, first in the preliminary stage, and later in the final stage, immediately prior to submission to Congress. In its review reports, the Department makes recommendations with respect to such aspects as project service areas, upstream development and protection, capacities of project facilities, water rights, sequence of construction, and other subjects; all with the objective of encouraging the optimum, timely, and coordinated development of the State's water resources.

Comments of other state agencies are requested and incorporated to form the official views and recommendations of the State of California when the Department is requested to do so by the Administrator of the Resources Agency. The reports are delivered to the appropriate federal agency by the Administrator prior to the time the projects are submitted to the Congress for authorization. The State's views are printed in the congressional documents pertaining to the project, and are transmitted also to the Bureau of the Budget.

State interest on activities of the Federal Power Commission is considered under this program. The State is interested in the relationship between hydroelectric projects and the resources policies and programs for utilization of the State's natural resources. The State takes appropriate steps, including but not necessarily limited to, expressing comments and views to the Federal Power Commission concerning such projects.

The Department performs the necessary staff work in preparing the State's comments and position on proposed changes in rules, orders or procedures of the Federal Power Commission relating to projects administered under the Federal Power Act.

DATE WORK STARTED

1944.

ESTIMATED COMPLETION DATE

Continuing.

Robert R. Stuart 3/30/67

1968-69 F. Y.
Implementation II-02

	W.A.
SPO	2324
ND	2325
SAC	2326
SFBD	2327
SJD	2328
SD	2329

REVIEW OF REPORTS OF OTHER AGENCIES
PART II

RESOURCES INPUT DATA (in $1,000 - GF - and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	44	2.1	38	1.6	39	1.6	40	1.6	41	1.6	42	1.6	43	1.6
ND	35	1.7	28	1.2	45	2.2	40	2.0	41	2.0	42	2.0	43	2.0
SAC	63	3.4	84	4.4	87	4.4	90	4.4	93	4.4	96	4.4	99	4.4
SFBD	55	2.8	52	2.6	53	2.6	54	2.6	55	2.6	55	2.6	55	2.6
SJD	41	1.7	34	1.3	38	1.5	39	1.5	40	1.5	41	1.5	42	1.5
SD	58	4.0	73	5.5	75	5.5	78	5.5	80	5.5	82	5.5	85	5.5
TOT.	296	15.7	309	16.6	337	17.8	341	17.6	350	17.6	358	17.6	367	17.6

PROGRAM OUTPUT DATA

For fiscal year 1968-69 it is estimated that approximately 45 to 50 reports will be reviewed and commented on. In accordance with prior established procedures with other agencies, each district has estimated that the following number of reports would be submitted. The number of Federal Power Commission projects subjected to recapture and relicensing are also indicated. Northern District, 10 reports and three FPC; Sacramento District, nine and three; San Francisco Bay District, 10 and 0; San Joaquin District, six and five; Southern District 28 and 1. For fiscal years 1969-70 through 1972-73, it is anticipated that approximately 40 to 50 reports will be reviewed each year. The Department will also initiate review on an additional eight Federal Power Commission projects and carry over initiated action on other projects.

WORK PROGRAM FOR 1968-69

Statewide Planning Office. The services provided by the Statewide Planning Office consist of (1) coordination of line and staff activities in preparing comments of the Department for inclusion in the State's comments, (2) coordination between participating agencies in compiling the State's comments when

delegated this responsibility by the Administrator of the Resources Agency, (3) development of procedures and guidelines for continuity of the statewide program in cooperation with the districts, (4) coordination of correspondence and comments on matters of general statewide interest.

Northern District

1. Work for 1968-69 will involve reviewing 10 to 13 reports and preparing State's comments thereon.

2. Carry out all necessary coordination with federal, state, and local agencies engaged in the preparation of water development project reports.

3. Prepare replies and other correspondence to letters and notices from these agencies regarding proposed water resources project studies in the District area.

The agencies preparing reports inform us that the following reports are expected to be submitted for review during 1968-69:

Corps of Engineers

Eel River, Main Stem Project (Preliminary)
Mad River, Upper Reaches Project (Preliminary)
Cottonwood Creek Project(Preliminary)
Sacramento River and Butte Basin Project (Preliminary)
Smith River Project (Preliminary)
Churn Creek Project (Preliminary)
Coastal Harbors of Northern California (Preliminary)
Sacramento Valley Navigation Report (Final)

Bureau of Reclamation

Klamath River Basin (Preliminary)
English Ridge Unit (Preliminary)
Paskenta - Newville Project (Final)

Soil Conservation Service

Willow Creek Watershed (Preliminary)
Upper Stony Creek Watershed (Preliminary)

Sacramento District - This is a continuing program carried on by each district with overall coordination by the Statewide Planning Office.

Proposed federal projects and local projects for which federal financial assistance is requested are reviewed at the district level and comments reflecting the view of the State are

submitted to the agency or agencies involved. Projects are reviewed with respect to engineering financial feasibility, economic justification, and relationship to the California Water Plan. Comments of other state agencies are requested and incorporated when formal comments of the State are prepared.

It is estimated that the Sacramento District workload will continue essentially at the same level during 1968-69 as in 1967-68.

There are four categories of reports with which the Sacramento District is concerned under this program: (1) Federal Projects proposed by U. S. Corps of Engineers and U. S. Bureau of Reclamation, (2) Public Law 566 Projects, (3) Public Law 984 Projects, and (4) Federal Power Commission activities.

Agencies responsible for preparation of reports inform us that the following reports are expected to be submitted to the Sacramento District during 1968-69. Reports of major federal projects will be reviewed in both preliminary and final forms.

Corps of Engineers

Coon Creek Stream Group (Preliminary)
Morrison Creek Project (Preliminary)
Sacramento Valley Navigation Project (Preliminary)
Truckee Meadows Project (Preliminary)

Bureau of Reclamation

Fairplay Unit (Preliminary)
Hope Valley Division (Preliminary)
Peripheral Canal Unit (Final)

Public Law 566

American Valley, Plumas County (Final)
Rock Creek, Plumas County (Final)

San Francisco District - Contact with federal agencies indicates that there will be no appreciable change in the program activity in fiscal year 1968-69, and that about 20 reports will be submitted to the State for review and comment. Based on past experience which has shown that federal agencies often fail to meet scheduled publishing dates, it can reasonably be expected that about 10 reports will actually be received.

The review of permit applications for the State Lands Commission, San Francisco Bay Conservation and Development Commission, U. S. Army Corps of Engineers, etc., will be continued.

The general program liaison functions such as attending public hearings, meetings, conferences, etc., will be continued.

San Joaquin District

1. Review and prepare comments on an estimated six reports submitted by such agencies as the U. S. Corps of Engineers, U. S. Bureau of Reclamation, and the Division of Soil Conservation.

2. Assist in the review of and the preparation of the State's comments on the recapture or relicensing of hydroelectric projects licensed by the Federal Power Commission.

Southern District

1. Correspondence in conjunction with review of reports: memoranda and letters, 500 total.

2. Reports anticipated to be received and to be reviewed in 1968-69 under provisions of:

a. Public Law 534
   (1) U. S. Army Corps of Engineers Reports: 5 informal; 5 formal.

   (2) U. S. Department of the Interior, Bureau of Reclamation Reports: 4 informal; 4 formal

b. Public Law 566
   (1) U. S. Department of Agriculture Reports: 6 informal.

c. Public Law 858
   (1) U. S. Army Corps of Engineers Reports: 2 formal

d. Public Law 984
   (1) U. S. Department of the Interior, Bureau of Reclamation Reports: 2 formal.

Robert R. Stuart 4/15/67

PUBLIC WATER DISTRICTS ACTIVITIES
PART I

NEED

The Department has responsibilities in connection with the formation, supervision, and operation of certain public water districts. In addition to these responsibilities, it is necessary to provide a vehicle of communication by which this Department can keep apprised of local viewpoints with regards to planning and development of their resources. As the State becomes more and more active as operators of the State Water Project, the coordination with local districts becomes increasingly important.

Information must be provided the Director to assist him in his duties as a member of the Districts Securities Commission.

AUTHORITY

Water Code Section Nos. 12609-12610, 20083, 20085, 20625-20627, 20820-20824, 22335-22338, 39400-40103, 39080-39082, 43159, 40500, 41307, 42300, 42500, 60060-60061, 60096-60102.

OBJECTIVE

Carry out duties relating to public water districts assigned this Department as prescribed in the Water Code; support the Director in his capacity as a member of the California Districts Securities Commission; provide data in the form of maps and directory-type information relating to public water districts; compile information to be utilized in the presentation of new and review of legislation; assist local districts by providing information relating to the status of water development.

GENERAL DESCRIPTION

Inspections of projects are carried out on behalf of the Districts Securities Commission to insure conformance with the plans and specifications for projects funded through issuance of General Obligation Bonds coming within the jurisdiction of the Commission. Reports of these inspections are submitted to the Commission. Because of the recent accelerated rate of water development, the need for these inspections has increased steadily over the last few years.

Requests for information and assistance are furnished to persons proposing formation of certain type of districts. Some of the duties include determination of engineering feasibility, statewide interests, conduct hearings and elections. The Department appoints directors of water storage districts as well as assessment commissioners.

The staff assists the Director in his capacity as a member of the California Districts Securities Commission. This includes briefing of the Director and attendance at monthly meetings.

The Department is involved in numerous other ways with public water agencies. Miscellaneous items of information are provided, such as mapping and directory-type information. Review of proposed legislation to assist legislative committees is also undertaken.

DATE WORK STARTED

1887.

ESTIMATED COMPLETION DATE

Continuing.

Jan L. Warnshuis 3/30/67

1968-69 F.Y.
Implementation II-02
SPO W.A. 2367
ND 2368
SFBD 2370
SAC 2369
SJD 2371
SD 2372

PUBLIC WATER DISTRICTS ACTIVITIES
PART II

RESOURCES INPUT DATA (in $1,000 - GF - and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	55.2	2.3	34	1.5	34	1.5	57	2.3	58	2.3	60	2.3	62	2.3
ND	15	0.7	14	0.7	14	0.7	15	0.7	15	0.7	15	0.7	15	0.7
SFBD	5.5	0.3	6	0.3	6	0.3	6	0.3	6	0.3	6	0.3	6	0.3
SAC*	25	1.5	25	1.5	29	1.6	30	1.6	31	1.6	32	1.6	33	1.6
SJD	26.6	1.0	26	1.0	27	1.0	28	1.0	29	1.0	30	1.0	31	1.0
SD	15	1.2	18	1.2	19	1.2	20	1.2	21	1.2	22	1.2	23	1.2
Totals	142.3	7.0	123.0	6.2	129.0	6.3	156.0	7.1	160.0	7.1	165.0	7.1	170.0	7.1

*Includes Reimbursable.

PROGRAM OUTPUT DATA

Maintenance of directory type information and updating of maps of California, County, Irrigation, Water Storage, and Special Act Districts.

Reports on construction progress inspections and final inspections as required, prepared for the California Districts Securities Commission for the following:

Richvale Irrigation District
Calaveras County Water District
Vista Irrigation District
Moulton-Niguel Improvement Districts
Los Alisos Water District
El Toro Water District
Palo Verde Irrigation District
Salton Sea Water District
Irvine Ranch Water District
Walnut Valley Water District
San Dieguito Irrigation District
Palm Ranch Irrigation District
Rancho California Water District

Reports on district formation as required. Letters in reply to public inquiries.

WORK PROGRAM FOR 1968-69

Statewide Planning Office. Maintain current directory information and maps of public water districts. Assist Director in his Districts Securities Commission duties. Review and assist in preparation of legislation affecting public water districts.

Coordinate activities of program and furnish guidelines for same.

Monitor the inspection of projects made on behalf of the Districts Securities Commission.

Establish and maintain contacts with local agencies to ensure a close working relationship.

Northern District. Maintain all statutory activities. Contact local agencies to obtain current data to maintain an up-to-date file on their activities, water plans, and construction programs. Promote mutually beneficial working relationships with local agencies. Update directory information and maps. Share data and effort with other programs.

San Francisco Bay District. The gathering of data on various districts to be used in preparation of a directory of districts will continue. Close contact will be maintained with the Local Agency Formation Commissions in gathering this information. Maps of the various water agencies will be distributed to the agencies concerned.

Sacramento District. Construction inspections of the Calaveras County Water Districts Water Development Project are anticipated for the California Districts Securities Commission. Final inspection of construction of the Richvale Irrigation District's Improvement project will be made and an engineering report prepared.

San Joaquin District. Appointment of Directors as needed. Process records, acts, and transactions of public water districts for maintenance of public files. Perform construction progress and final inspections on behalf of the Districts Securities Commission on four separate construction projects. Obtain, compile, and make available as needed, current plans for development by water districts as well as district maps and directory type information.

Southern District. Conduct 40 progress inspections and prepare reports on districts listed under Program Output Data. Conduct final inspections and prepare reports as requested by the California Districts Securities Commission for:

a. Walnut Valley Water District
b. Palm Ranch Irrigation District
c. Moulton-Niguel Improvement Districts
d. El Toro Water District

Prepare reports on district formations as required. Secure data from water agencies and submit to Statewide Planning Office for purpose of maintaining water service agency directory, and maps of water agencies. Perform liaison and public service regarding water agencies when requested.

ADMINISTRATION OF FLOOD CONTROL FUNDS
PART I

NEED

The Federal Government's program of flood control requires local interests to (a) provide lands, easements, and rights-of-way, (b) provide assurance to hold and save the United States free from damages due to construction of the project, and (c) agree to maintain and operate the projects after construction. The Legislature in 1945 adopted a policy to reimburse local agencies for rights-of-way costs to assure that the State would obtain the maximum benefit from the federal flood control program. Administration of this activity is necessary.

AUTHORITY

State Water Resources Law of 1945 and the Flood Control Law of 1946; Part 6 of Division 6 of the Water Code. Projects are described by Chapters 2 and 4 of Part 6.

OBJECTIVES

To implement the policy of state participation in federal flood control projects by administering funds appropriated by the Legislature. Review claims and reimburse eligible costs.

GENERAL DESCRIPTION

Local agencies initiate requests for flood control projects under federal programs administered by the U. S. Army, Corps of Engineers, or the U. S. Department of Agriculture, Soil Conservation Service. Reports are prepared by the local offices of the federal agency and are forwarded to higher authority for approval. Assurances are required from a responsible

local agency before authorization of the project, either by the Congress or under other administrative authority granted by Congress. The State Legislature, on advice of the Department of Water Resources, can adopt and authorize a project for financial assistance through the Flood Control Law of 1946.

Proposed federal flood control projects are reviewed to check the estimated state cost at the time of the State's general review. This involves a field investigation of existing developments, and an office report of findings with recommendations. Rights-of-Way Acquisition Division personnel may be used to evaluate rights-of-way costs.

A report is prepared for the Regular Session of the Legislature in accordance with Sections 12830 and 12875 of the Water Code. An informal report is prepared semiannually.

DATE WORK STARTED

1945.

ESTIMATED COMPLETION DATE

Continuing.

K. W. McClellan 3/30/67

1968-69 F.Y.
Implementation II-02
SPO WA 2357
ND 2397
SFBD 2358
SAC 2398
SJD New
SD 2359

ADMINISTRATION OF FLOOD CONTROL FUNDS
PART II

RESOURCES INPUT DATA (in $1,000 and man years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	70	3.0	62	3.0	64	3.0	66	3.0	68	3.0	70	3.0	72	3.0
ND	7	0.3	13	0.5	14	0.5	25	1.0	26	1.0	27	1.0	28	1.0
SFBD	44	2.0	51	2.3	60	2.7	62	2.7	64	2.7	66	2.7	68	2.7
SAC	36	1.9	29	1.5	38	1.9	39	1.9	40	1.9	41	1.9	42	1.9
SJD	0	0	0	0 [1/]	10	0.5	11	0.5	11	0.5	12	0.5	12	0.5
SD	87	6.0	108	6.0	113	6.0	119	6.0	125	6.0	131	6.0	137	6.0
Tot.	244	13.2	263	13.3	299	14.6	322	15.1	334	15.1	347	15.1	359	15.1

1/ Claims activity is expected to begin and an augmentation may be necessary.

PROGRAM OUTPUT DATA

One hundred thirty claims per year will be paid and disbursements will increase from $12 million in 1967-68 to about $15 million in 1972-73.

An annual report of expenditures will be made to the Legislature each January.

Brief final project reports will be prepared as projects are completed.

WORK PROGRAM 1968-69

Statewide Planning Office - Federal flood control project reports will be briefly reviewed to determine potential state costs. Recommendations will be prepared regarding project authorizations, and budget requests will be coordinated to determine fund requirements for reimbursement of claims. Program policies and procedures will be reviewed and revisions recommended. Engineering reports on claims will be reviewed to determine whether consistent policies

are being followed statewide. Final reports will be reviewed and expenditures monitored. Advice and assistance will be given the districts.

Northern District - Prepare final engineering reports on the Redwood Creek and East Weaver Creek flood control projects.

Review project plans and specifications for the Eel River Delta and Klamath Flood Control Projects.

Review and process 10 claims for funds in connection with the Eel River Delta and Klamath Flood Control Projects.

Provide assistance and advice to local agencies on the policies and procedures of program operation.

San Francisco Bay District - The District will process claims, review plans, prepare reports regarding construction of facilities and acquisition of necessary rights-of-way for the Alameda Creek Flood Control Project in Alameda County; the Russian River Project in Sonoma and Mendocino Counties; the Walnut Creek Flood Control Project, the Walnut Creek Watershed Project, and the Marsh-Kellogg Watershed Project in Contra Costa County; the Central Sonoma Watershed Project in Sonoma County; the Napa River Watershed Project in Napa County; the Rodeo Creek and Pinole Creek Small Flood Control Projects in Contra Costa County; the Corte Madera Creek Flood Control Project in Marin County.

Final project reports will be written on: San Lorenzo Creek in Alameda County, San Lorenzo River in Santa Cruz County, and Coyote Creek Small Flood Control Project in Marin County.

Sacramento District - The program activity of the Sacramento District during 1968-69 will increase over 1967-68. This will consist of reviewing construction plans, inspecting construction progress, preparing memorandum engineering reports, and processing claims for the Adobe Creek Watershed Project in Lake County, Ulatis Creek Watershed Project in Solano County, Willow Slough Watershed Project in Yolo County, and the Mosher Creek Watershed Project in San Joaquin County.

The Duck Creek Flood Control Project in San Joaquin County will have been completed during 1967-68. A final project report will be prepared.

San Joaquin District - During fiscal year 1968-69, claims activity is expected to continue on Mustang Creek as well as commence on the Stone Corral Project in Tulare County.

Preliminary work is expected to begin on a number of watershed protection and flood prevention projects within the San Joaquin District which can be expected to move from planning into the construction phase after 1968-69.

Southern District - The expected work program for 1968-69 is as follows:

Estimated number of advance reimbursability reports to be prepared during the year	5
Estimated number of claims to be received	50
Estimated number of claims to be processed	50

John L. Hyde 3/30/67

ADMINISTRATION OF BEACH EROSION CONTROL FUNDS
PART I

NEED

In areas where serious erosion is occurring along the California coastline, it is necessary to construct projects to reduce this erosion. In order to construct these projects state funds must be made available.

AUTHORITY

Chapter 2378, Statutes of 1957, codified as Section 335-339 of the State Water Code.

OBJECTIVES

Administer funds for state participation and undertake - in cooperation with the Federal Government and other agencies - construction of federally authorized beach erosion control projects for the protection and preservation of California's shoreline.

GENERAL DESCRIPTION

Upon completion of project oriented studies under the program - Beach Erosion Investigations - the Department recommends state financial participation in federally authorized beach erosion and shore protection projects after favorable review of federal project reports. This participation includes one-half of the cost of lands, easements, and rights-of-way necessary for the project.

After appropriation of funds by the Legislature, Cooperative Agreements are prepared and executed between the Corps of Engineers, local agency, and the Department for financing and constructing a project. Local assurances required by federal law are obtained. The final plans and specifications are reviewed and approved by the Department prior to disbursement of the State's share of construction funds.

Progress and final completion inspections are made. After a final accounting, unexpended funds are returned to the local agency and the State General Fund.

Information is provided to local agencies regarding the Department's responsibilities for beach erosion as authorized in the Water Code, and in implementing federal studies of needed shore protection works.

Reviews of reports and field inspections are made of shoreline projects which may adversely affect adjacent shoreline areas.

Recommendations for state financial participation in beach erosion control projects are made by the Department.

DATE WORK STARTED

1957.

ESTIMATED COMPLETION DATE

Continuing.

Tom Y. Fujimoto 3/30/67

1968-69 F.Y.
Implementation II-12
SPO W.A. 2360
ND 2436
SFBD 2437
SD 2420

ADMINISTRATION OF BEACH EROSION CONTROL FUNDS
PART II

RESOURCES INPUT DATA (in $1,000 - GF - and man-years)

	1966-67		1967-68[a]		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	16	0.6	15	0.6	16	0.6	17	0.6	18	0.6	19	0.6	20	0.6
ND	3	0.1	0	0.0	0	0.0	0	0.0	2	0.1	2	0.1	2	0.1
SFBD	22	1.1	5	0.3	5	0.3	5	0.3	5	0.3	5	0.3	5	0.3
SD	57	3.2	5	0.3	15	1.0	16	1.0	17	1.0	18	1.0	19	1.0
Totals	98	5.0	25	1.2	36	1.9	38	1.9	42	2.0	44	2.0	47	2.0

a/ Starting in 1967-68 the program was realigned with Beach Erosion Investigations.

PROGRAM OUTPUT DATA

Administration of capital outlay funds for the following beach erosion projects.

1. Beach Protection and Widening, Redondo Beach to Malaga Cove-Los Angeles County
   Tentative Start - May 1967.
   Estimated Completion - November 1967.
   Estimated Total Cost - $2,400,000.
   Estimated Federal Advance - $1,200,000.
   Estimated State Share - $600,000.
   Final Accounting - December 1969.

2. Orange County, California, Anaheim Bay to Newport Harbor, Phase 2
   Tentative Start - 1967-68.
   Estimated Completion - 1968-69.
   Estimated Total Cost - $1,200,000.
   Estimated Federal Advance - $804,000.
   Estimated State Share - $219,945.
   Final Accounting - December 1970.

WORK PROGRAM FOR 1968-69

The general departmental administrative activities for authorized projects will continue.

Funds will be administered for the construction of the shore protection project at Sunset Cliffs, San Diego, estimated at $1,800,000 of which the State

share is estimated at $450,000. Agreements to finance and construct this project will be drafted, reviews of final plans and specification will be coordinated, construction progress and final completion inspections will be made and final acceptance of the completed project will be coordinated.

Disbursement of unexpended funds will be recommended for the following completed projects.

a. Pierpont Bay, Phase 3, Ventura County.
b. Pierpont Bay, Phase 1, Rehabilitation, Ventura County.
c. Imperial Beach, Groins 1 and 2, San Diego County.
d. Doheny Beach, Phase 2, Orange County.
e. City of San Diego (Bird Rock).

The return of federal advances made by the State will be requested for the following projects:

a. Pierpont Bay, Phase 3, Ventura County.
b. Pierpont Bay, Phase 1, Rehabilitation, Ventura County.

Final accounting will be requested for the following projects:

a. City of San Diego (Bird Rock)
b. Imperial Beach, Groins 1 and 2, San Diego County.

Information on the Department's responsibilities and the federal role in beach erosion control will be provided to interested local agencies.

Additional projects at Capitola, Santa Cruz County, and Pacifica and El Granada Beach, San Mateo County may be authorized in late 1967 for construction in 1968-69.

T. Y. Fujimoto 4/15/67

INVESTIGATIONS FOR OTHER STATE AGENCIES
PART I

NEED

In the performance of their responsibilities, other state agencies frequently require engineering information and advice on questions regarding water resources and related subjects. The agencies most frequently requesting such information and advice of the Department have been the California Districts Securities Commission, Department of General Services, Division of Forestry, and Attorney General's Office.

AUTHORITY

Water Code Section 226 and Government Code Section 11256.

OBJECTIVES

Render technical assistance and perform investigations of water resources for other state agencies as requested.

GENERAL DESCRIPTION

The Department makes engineering investigations on proposed water projects for the California Districts Securities Commission upon request. The investigations usually involve checking the construction cost estimates and determining the engineering feasibility of the proposed projects. Studies to determine power accomplishments and values are occasionally requested.

Investigations for state agencies, other than the Districts Securities Commission, usually concern the water problems of existing or proposed state institutions. In the case of proposed state installations, the investigations by the Department may provide a basis for selection of one of a number of alternative sites so far as water supply, flood hazards, sewage disposal, snow hazards, drainage, water quality, and water rights are concerned. With respect to existing state institutions, the Department makes investigations generally leading to recommendations for improving and increasing a water supply.

During the past ten years, the Department has furnished engineering assistance to the Attorney General's Office in connection with flood damage suits filed against the State. This assistance, in general, consists of securing detailed engineering information on hydrology, investigating allegations stated in complaints, drafting and answering of interrogatories, providing maps, diagrams, and drawings for use as court exhibits, assisting the attorney during trial and serving as witness when needed.

DATE WORK STARTED

1930.

ESTIMATED COMPLETION DATE

Continuing.

Charles K. Fellows 3/30/67

INVESTIGATIONS FOR OTHER STATE AGENCIES
PART II

RESOURCES INPUT DATA (In $1,000 - Reinbursable and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	37	1.5	40	1.5	40	1.5	30	1.2	0	0	0	0	0	0
ND	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SFBD	150	7.5	141	7.0	58 3/	3.0	13	0.7	13	0.7	14	0.7	14	0.7
SAC	36	0.8	25	0.6	30	1.0	10	0.5	10	0.5	11	0.5	11	0.5
SJD	10	0.4	11	0.4	11	0.4	11	0.4	12	0.4	12	0.4	12	0.4
SD	3 1/	0.2	16	1.1	16	1.1	17	1.1	17	1.1	18	1.1	18	1.1
TOTAL	236 2/	10.4	233	10.6	155	7.0	81	3.9	52	2.7	55	2.7	55	2.7

1/ This amount reduced due to less service agreements with other agencies than originally anticipated.

2/ Originally budgeted for $108,000

3/ In 1966-67, 1967-68, and 1968-69 additional money is contained for S. F. Bay Delta Water Quality Control Program. Portions of this work will be accomplished by other districts of the Department as requested by S.F.B.D.

PROGRAM OUTPUT DATA

The results of each investigation will be reported to the agency requesting the report in the form of a letter report, engineering report, or office report, depending on the nature and magnitude of the investigation. Program costs are fully reimbursable by the agency requesting the investigation.

WORK PROGRAM FOR 1968-69

Statewide Planning Office. The statewide program for the fiscal year 1968-69 is estimated to consist of from 8 to 10 investigations for which coordination will be provided.

The program for the 1968-69 fiscal year is estimated to consist of from one to two engineers for the purpose of providing services to the Attorney General's Office and its consultants. The preparations of material for defense of the State in connection with the 1964 flood damage suits will continue, and that suits will be brought to trial as early as possible.

San Francisco Bay District. The State Water Quality Control Board will request DWR assistance on the San Francisco Bay Delta Water Quality Control Program in assembling and processing data, and in evaluating incremental benefits and alternative economic systems for water quality control.

Several small water quality and biological studies will be made for determining the locations of outfall sewers, determining present qualities, and the nature and extent of pollution.

Sacramento District. It is expected that the Deuel Vocational Institution will request some water quality studies at a cost of $5,000. Additional $5,000 is expected from other state agencies, such as Division of Highways, Division of Architecture, or others. The State Division of Soil Conservation plans to request an investigation of the Lahontan area for $10,000.

San Joaquin District. A small water supply investigation will probably be made for the Division of Forestry in eastern Madera County. Although additional work will likely be performed, no other specific jobs are anticipated during the year.

Southern District. Prepare reports for four state agencies (based on average for past nine years) on water supply, waste disposal, drainage and flood control problems.

C. K. Fellows 5/10/67

SPECIAL INVESTIGATIONS FOR WATER QUALITY CONTROL BOARDS
PART I

NEED

To accomplish their regulatory tasks, the various Regional Water Quality Control Boards and the State Water Quality Control Board require comprehensive information pertaining to water pollution or water quality problems related to specific areas and to possible statewide effects of the interbasin exchange of waters. This Department, upon request, provides much of this information to the boards through special investigations.

AUTHORITY

Section 13020 (g) of the Water Code.

OBJECTIVES

Conduct special investigations at the request, and at the full expense, of the water quality control boards.

GENERAL DESCRIPTION

These investigations are based upon specifications prepared by the boards, normally after consultation with Department personnel.

The special investigations range from relatively simple water quality studies to comprehensive investigations of quality and quantities of surface, ground, and waste waters, including geology, hydrology, sedimentation, and probable future development.

DATE WORK STARTED

1951

ESTIMATED COMPLETION DATE

Continuing

E. A. Ritchie
3/30/67

1968-69 F.Y.
Implementation II-02
SFBD W.A. 2202
SAC
SD 2200
TSO

SPECIAL INVESTIGATIONS FOR WATER QUALITY CONTROL BOARDS
PART II

RESOURCES INPUT DATA (In $1,000 -reimbursable- and man-years)

	1966-67		** 1967-68		*** 1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SFBD	12	0.4	11	0.4	11	0.4								
SAC	7	*	0	0	0	0								
SD	49	2.0	26	1.5	27	1.5								
TSO	2	0.1	4	0.1	4	0.1								
Totals	70	2.5	41	2.0	42	2.0	43	2.0	44	2.0	45	2.0	46	2.0

PROGRAM OUTPUT DATA

Reports with contents based on specifications prepared by the Boards are transmitted to the respective Boards.

WORK PROGRAM FOR 1968-69

San Francisco Bay and Southern Districts, and TSO

Preliminary information from the Water Quality Control Boards regarding planned investigations for the 1968-69 fiscal year will not be available until 1968. It is anticipated, however, that the program will be maintained at about the same level as during 1967-68.

Work done for San Francisco Bay-Delta Water Quality Control Program not included here (See Investigations for Other State Agencies Program).

* Work planned for Sacramento District area not undertaken.

** Final dollar amounts for 1967-68 will not be available until May or June, 1967.

*** Work program for fiscal year 1968-69 will not be determined by Boards until late fiscal year 1967-68. Level program assumed for succeeding years.

E. A. Ritchie
4/18/67

SUPERVISION OF SAFETY OF DAMS
Part I

Need

This program is a continuing statutory activity initiated by Chapter 766, Statutes of 1929, now codified as Division 3 of the Water Code, to safeguard life and property against dam failures.

During 1967-68 there will be approximately 1,180 dams and reservoirs under California jurisdiction. This number will increase at a rate of about 40 dams per year, based on the construction volume in recent years and the estimated starts of known proposed dams and reservoirs.

With current population being three times the 1929 count, the program is needed more than ever now because the exposure of life and property to injury from failure of dams has increased ten times during this period. This exposure will increase at a rapid rate with the expected development of water resources, population growth, and encroachment upon potential flood areas.

Continuous surveillance against deterioration of existing dams is necessary to assure that they remain in safe condition. Of the nearly 500 dams constructed before 1929, many were built without benefit of modern-day design and construction techniques and therefore do not meet modern criteria for stability, discharge capacity, or strength.

The program is needed to evaluate the true safety of dams and reservoirs considered substandard in the light of present-day technology and increasing hazard, and to obtain rehabilitation where necessary.

Authority

Division 3, California Water Code.

Objectives

Prevent dam failures by enforcing safe design, construction, operation, and preventive maintenance of dams and reservoirs. Compel owners to recognize and fulfill their responsibilities concerning their dams.

General Description

The activity includes the following in relation to all dams and reservoirs in the State, except those excluded by law:

1. Independent analysis of geology, hydrology, dam and site suitability, and structural and hydraulic design of proposed dams and reservoirs.

2. Continuous reevaluation of the design and performance of existing dams, based on up-to-date principles and criteria.

3. Engineering evaluation and supervision of methods and materials used in construction of new dams and reservoirs and in enlargement or alteration of dams.

4. Periodic engineering examination and evaluation for deterioration and dangerous operation of dams and reservoirs, based on a system of hazard classification of dams.

5. Surveillance and analysis of predictive performance instrumentation of dams and reservoirs.

6. Preparation, issuance, and upkeep of guidelines to dam owners on the safe construction, operation, and preventive maintenance of dams and reservoirs.

Date Work Started

August 1929.

Estimated Completion Time

This work program will continue indefinitely.

Robert B. Jansen 4/1/67

SUPERVISION OF SAFETY OF DAMS
Part II

Resources Input Data

1966-67		1967-68		1968-69		1969-70	
$	MY	$	MY	$	MY	$	MY
947	48.3	1,123	59.9	1,188	62.9	1,236	64.4

1970-71		1971-72		1972-73	
$	MY	$	MY	$	MY
1,236	64.4	1,236	64.4	1,236	64.4

Program Output Data

Enforce safe design, construction, operation, and preventive maintenance of dams and reservoirs. Compel owners to recognize and fulfill their responsibilities in all of these considerations.

These basic program objectives are accomplished as a result of the following annual units of output.

a. Analyses of designs and specifications, and supervision of construction of about 40 new dams and enlargement of existing dams.

b. Analyses of plans and specifications, and supervision of repairs, alterations, and removal of about 30 dams and reservoirs.

c. Engineering examination and evaluation for deterioration and dangerous operation of more than 1,100 existing dams and reservoirs. The scheduled number of examinations of the respective dams and reservoirs, during the year, is based on a hazard classification which takes into consideration the storage capacity, height of dam, seismic location, downstream development, etc.

d. Reevaluation of the adequacy of the structural designs and spillway capacities of about 50 existing facilities using modern criteria, design analysis techniques, and data.

e. Control surveillance programs and predictive instrumentation of more than 1,100 dams and reservoirs. This entails independent analysis and evaluation of the data obtained by owners, appraisal of the owners' findings, and the sufficiency of existing instrumentation.

Work Program for 1968-69

1. Investigate and analyze applications, including plans and specifications, for construction of new dams and reservoirs, and enlargement of dams and reservoirs.

2. Investigate and analyze existing offstream dams and reservoirs coming within jurisdiction for the first time.

3. Investigate reported physical changes in dams and reservoirs; require corrective measures where needed.

4. Examine and appraise existing dams and reservoirs for deterioration and dangerous operation.

5. Prepare guidelines to owners on safe construction, operation, and preventive maintenance of their dams and reservoirs.

6. Analyze and evaluate owners' surveillance programs including data obtained by the owners, appraisal of the owners' findings, and the need for additional monitoring.

7. Investigate geological conditions of existing dams, reservoirs, and proposed damsites.

8. Analyze investigation reports and plans for alterations, repairs, and reconstruction, and supervise the proposed work.

9. Reevaluate the adequacy of spillway capacities and designs of existing dams and reservoirs using modern criteria, design analysis techniques, and data.

Robert B. Jansen 4/1/67

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

PROGRAM STATEMENT

Cover and Approval Form - 1968 - 69

Program Title Map Information Office

It is recommended that the program statement for this program be approved.

SIGNATURE	TITLE	DATE
	Program Manager(s)	
Dwight L. Wong	Chief, Map Info Office	April 7, 1967
C E R D	Area Branch Chief or District Engineer	April 7, 1967
	Assistant Chief Engineer	
	Division Engineer (Line)	
	Division Engineer (Staff)	

DWR 1921 (3/65)

MAP INFORMATION OFFICE

Part I

A. Need

The need for a central agency to collect, review and disseminate information of mapping and surveying activities throughout the State was recognized by the 1949 Legislature in Sections 8016 and 8017 of the Public Resources Code.

This need has become increasingly apparent during the last year when considerable time was spent in searching for all available data in connection with other agencies' mapping, control activities or aerial photography in specific areas. The Map Information Office provides better coordination of State mapping and surveying agencies, prevents duplication and provides channels for exchange of mapping and surveying. The Map Information Office also prepares and assembles collateral data on subsidence and earth movement information for distribution.

B. Authority

This program is a statutory requirement of the Public Resources Code, Sections 8016 and 8017.

C. Objectives

The objective of this program is to continue a Map Information Office to obtain, evaluate and, upon request, to disseminate all available information on control, aerial photography, mapping and surveying coverage in the State of California.

D. General Description

Sections 8016 and 8017 of the Public Resources Code are quoted as the description of this activity.

> "Section 8016. To enable the coordination of the programs of the several map-making agencies, the department shall cause data to be assembled covering the various types of maps produced or being produced by federal, state or other agencies, their uses and estimated cost of production, the mapping facilities of all departments engaged in the preparation of maps and/or of duplication of mapping by state departments. All state agencies making and using maps shall cooperate in furnishing the necessary information covering all mapping procedures. These assembled data may be used by the department for all state mapping or map-making."

"Section 8017. The department shall collect information relative to maps and surveys of the State of California or parts thereof and provide a public information service for public and private persons and agencies relative to maps and surveys of the State. Such information services shall be maintained at Sacramento and may be maintained at Los Angeles and San Francisco."

This program is administered by the Map Information Office in the Maps and Surveys Branch.

E. Date Work Started

July, 1961

F. Estimated Completion Date

Continuing program.

MAP INFORMATION OFFICE

Part II

G. Resources Input Data (costs in thousands of dollars and personnel in man-years)

1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$
1	18	1	21	1	21	1	25	1	22	1	22	1	22

H. Program Output Data

U. S. Geological Survey quadrangle maps, special maps by the U. S. Coast and Geodetic Survey, aerial topography maps and maps prepared by the department are obtained and filed. Information regarding maps is available upon request from this or other government agencies. The triangulation and level data of the U. S. Coast and Geodetic Survey and other agencies are filed and are available for dissemination. Unpublished reports on subsidence and seismological data are obtained, reviewed and filed.

I. Work Program for Budget Year

U. S. Geological Survey quadrangle maps, special maps by the U. S. Coast and Geodetic Survey, aerial topography maps and maps prepared by the department are obtained and filed. Information regarding maps is available upon request from this or other government agencies. The triangulation and level data of the U. S. Coast and Geodetic Survey and other agencies are filed and are available for dissemination. Unpublished reports on subsidence and seismological data are obtained, reviewed and filed.

ADMINISTRATION OF FLOOD PLAIN MANAGEMENT
PART I

NEED

Accelerated growth in California during the post-war period has resulted in extensive development of the flood plains of the State. Recurrent floods are subjecting these developments to intense damage. Although flood control works have been constructed to protect many areas, local development within flood plains has increased at a faster pace than the construction of protective works.

AUTHORITY

The Cobey-Alquist Flood Plain Management Act, Chapter 506, Statutes of 1965, and Water Code Sections 8400 through 8415.

OBJECTIVES

Encourage sound development of flood plain lands to the end that this will prevent loss of life, prevent economic loss caused by excessive flooding, and prevent encroachment on floodways.

GENERAL DESCRIPTION

This program includes the review of flood plain information studies prepared by the U. S. Army Corps of Engineers, the provision of assistance to local agencies regarding flood plain problems, the preparation of flood plain engineering studies, the preparation of rules and regulations for enforcement of the Act, and a general monitoring of proposed flood control programs to insure adequate flood plain regulations.

The bulk of the work in connection with this program is done in the Statewide Planning Office. The work in the district offices will be done under the Administration of Flood Control Funds Program as in the past.

DATE WORK STARTED

July 1, 1966.

ESTIMATED COMPLETION DATE

Continuing.

Eldon E. Rinehart 3/30/67

ADMINISTRATION OF FLOOD PLAIN MANAGEMENT
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	25.0	1.2	26.5	1.2	28.0	1.2	29.5	1.2	31.0	1.2	32.5	1.2	34.0	1.2
ND	-		-		-		2.0	0.1	2.0	0.1	2.5	0.1	2.5	0.1
SFBD	-		-		4.0	0.1	4.0	0.1	5.0	0.2	5.0	0.2	5.0	0.2
SAC	-		-		-		2.0	0.1	2.0	0.1	2.5	0.1	2.5	0.1
SJD	-		-		-		2.0	0.1	2.0	0.1	2.5	0.1	2.5	0.1
SD	-		-		6.0	0.2	6.0	0.2	7.0	0.2	8.0	0.3	8.5	0.3
Tot.	25.0	1.2	26.5	1.2	38.0	1.5	45.5	1.8	49.0	1.9	53.0	2.0	55.0	2.0

PROGRAM OUTPUT DATA

Annual review of approximately six flood plain information studies. Monitoring of approximately 30 federal flood control projects to assure compliance with the Cobey-Alquist Act, including guidance in preparation of and review of regulations prepared by participating local agencies.

WORK PROGRAM FOR 1968-69

This program includes assistance to local agencies in their adoption of flood plain regulations required by the Cobey-Alquist Flood Plain Management Act; the preparation of flood plain engineering studies; and a general monitoring of proposed flood control programs to insure adequate flood plain regulations. The program also includes coordination of the federally financed U. S. Army Corps of Engineers flood plain information studies in California. With the recent increase in allocation of federal funds to the flood plain information study program, and the recently approved statewide application submitted by the Department, it is anticipated that these studies will be accelerated during the next several years.

As more projects come under the Cobey-Alquist Act, and as more flood plain information studies are initiated by the Corps of Engineers, it is anticipated that an increase in funds will be necessary. During fiscal year 1967-68, funds are budgeted in the Statewide Planning Office. Such work as is done in the

district offices is charged to the closely related Administration of Flood Control Funds Program. As the workload increases, it will be necessary to augment these funds. It is, therefore, recommended that an increase in the amount of $10,000 be budgeted for fiscal year 1968-69. This amount was originally budgeted for fiscal year 1967-68, but was deleted in the Governor's Budget.

Eldon E. Rinehart 3/30/67

RADIOLOGICAL APPLICATIONS PROGRAM

Part I

A. NEED

Atomic energy in its various forms has a number of applications to water resources development which offer present and potential benefits. The Radiological Applications program includes those applications other than generation of electrical power for the State Water Project which is covered in Power Management Program.

Application of radioisotopes to measurement of soil moisture and density has proved to be a valuable aid to water demand and soil subsidence studies. Other useful applications include tracing and measurement of water flow. Knowledge concerning radioactivity is useful in several aspects of water quality monitoring also. As an energy source, potential applications include saline water conversion and explosives for heavy excavation which warrant consideration in department planning.

B. AUTHORITY

The Department's radiological applications program had its origin in 1957, with the recognition that this expanding technological field held a great deal of promise in water resources development.

C. OBJECTIVES

1. To develop or improve methods of employing radioisotopes for beneficial uses in water resources applications.

2. To provide staff assistance, consultation, and training in all aspects of the use of radioactive materials for existing and planned Departmental investigations.

3. To investigate applications of nuclear and less conventional forms of energy for purposes distinct from the generation of electrical power for the Water Project.

C. GENERAL DESCRIPTION

Activities in the radiological applications program are: to keep thoroughly informed on developments in isotopes; to study applications of nuclear explosives to water purposes; to study, experiment with, and utilize applications of isotopes

to water resources investigations; to cooperate with the Atomic Energy Commission, University of California, and other agencies; to assist and to further the State's interests in the nuclear field.

E. DATE WORK STARTED

October 1957

F. ESTIMATED COMPLETION DATE

This is a continuing program.

RADIOLOGICAL APPLICATIONS PROGRAM

Part II

G. RESOURCES INPUT DATA (Costs in Thousands of Dollars and Personnel in man-years)

1968-69		1969-70		1970-71		1971-72		1972-73	
$	MY	$	MY	$	MY	$	MY	$	MY
27.5	1.1	29.0	1.1	30.5	1.1	32.0	1.1	33.5	1.1

H. PROGRAM OUTPUT DATA

1. Radiological applications in statewide water utilization program will lead to further refinements in techniques for measuring water use by crops, and greater accuracy in determination of ultimate water deliveries.

2. Aqueduct preconsolidation program will continue to benefit through radioisotope measurement program, which is used to control water application.

3. Earthwork construction program at various features of the State Water Project will benefit from more extensive use of radiation gauging devices, which provide better and more accurate control of soil compaction.

4. Biological control and surveillance program to be undertaken for Project water will make use of radiotracer technique for determination of water quality with regard to biological productivity.

5. Radiotracer applications hold great promise for improved methods of measuring water flow, for rating pumps and turbines, and in geological foundation work.

6. Monitoring of environmental radioactivity is a continuing function of the Department's water quality program.

7. As an energy source, radioactive materials may be used in saline water conversion and as explosives for heavy excavation.

I. WORK PROGRAM FOR 1968-69

1. Provide technical direction of radioisotope applications and promote development of new uses of isotopes in Department operations.

2. Provide consultative services in specific radioisotope applications, e.g., flow tracing, pump and turbine calibration, soil moisture and density determination, compaction and consolidation control, age dating, and algae productivity studies.

CAL-PAKISTAN CONTRACT

RECREATION AND FISH AND WILDLIFE ENHANCEMENT
POSTLAND ACQUISITION
PART I

NEED

The rapid increase in population of the State has created a tremendous demand for outdoor recreation, particularly water-oriented recreation. Historically, people of California have been attracted to water in the pursuit of recreation and it is evident that the large reservoirs and open canals of the State Water Facilities being constructed will be particularly attractive as centers for recreational activities, whether or not any plans are made or facilities provided to handle the activities. To meet this anticipated demand, the Department is required by law to plan in advance, and to integrate recreation and fish and wildlife enhancement with the other purposes of State Water Facilities.

Because recreation and fish and wildlife enhancement are among the purposes of the State Water Facilities, the Department is responsible for competent planning for those purposes for the following reasons:

1. to ensure that adequate and usable lands are acquired;

2. to assure that the greatest benefits are afforded from recreation and fish and wildlife, as project purposes, consistent with the other project purposes (project formulation); and

3. to enable the equitable allocation of costs among the various project purposes and beneficiaries.

AUTHORITY

Sections 11900-11925 of the California Water Code.

OBJECTIVES

Ensure adequate planning of recreation use and fish and wildlife enhancement features to affect the fullest conservation and use of California's water resources.

GENERAL DESCRIPTION

This program provides for recreation and fish and wildlife planning subsequent to land acquisition, and includes studies leading to the completion of recreation development plans which will be submitted to the Legislature for consideration in appropriating funds for implementing the recommended plans. These reports will include schematic recreation development plans for construction of recreation facilities, and recommended procedures for optimum fish and wildlife environment. Cost estimates and cost allocations will be prepared.

Another phase of the postland acquisition recreation planning is the preparation of tree planting plans. These plans will be prepared for the major reservoirs of the State Water Facilities in the Southern District and for features of the several divisions of the California Aqueduct.

The postland acquisition work programs are supported by the General Fund but the planting and maintenance of trees are capital outlay funds budgeted for by the Division of Beaches and Parks.

DATE WORK STARTED

1962.

ESTIMATED COMPLETION DATE

1972.

E. H. Gunderson 3/30/67

1968-69 F.Y.
Implementation II-01
SPO W.A. ----
SFBD 2418
SAC 2402
SJD 2393
SD 2457

RECREATION AND FISH AND WILDLIFE ENHANCEMENT
POSTLAND ACQUISITION
PART II

RESOURCES INPUT DATA (in $1,000- GF - and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	0	0.0	14	0.7	14	0.7	14	0.7	15	0.7	15	0.7	15	0.7
SFBD	4	0.2	2	0.1	3	0.5	4	0.2	3	0.2	2	0.2	2	0.2
SAC	57	0.6	48	0.5	5	0.2	0	0.0	0	0.0	0	0.0	0	0.0
SJD	89	2.0	76	2.3	78	2.3	80	2.3	50	1.5	30	1.0	10	0.5
SD	68	4.0	68	4.0	114	6.9	100	6.0	70	4.2	30	1.8	20	1.3
Totals*	218	6.8	208	7.6	214	10.6	198	9.2	138	6.6	77	3.7	47	2.7

PROGRAM OUTPUT DATA

Integrate recreation development with water supply purpose to obtain maximum benefits to recreation consummate with proper project operation.

WORK PROGRAM FOR 1968-69

Statewide Planning Office. The Statewide Planning Office will coordinate the services to be performed by Contract Services Units from the Departments of Parks and Recreation and Fish and Game. After consulting with the districts, the office will establish the (1) projects or problems to be studied, (2) staff services required, (3) priority of work, (4) type of report to be prepared, and (5) completion dates for work assigned. The office will review completed reports and prepare a reporting schedule.

The Statewide Planning Office will coordinate the budgeting of funds to be expended on recreation and fish and wildlife for specific investigations by the Contract Services Units. The office will endeavor to maintain workloads at reasonably constant levels so changes in the number of contract positions can be minimized.

San Francisco Bay District. Coordination of the detailed design and construction with the approved development plan for initial recreation facilities will be provided for the recreation development at Del Valle Reservoir. If recreation report for Bethany Reservoir is completed in fiscal year 1967-68, coordination will be maintained with the Department of Parks and Recreation concerning implementation of the approved report.

* Totals include contract funds and manpower for Departments of Fish and Game and Parks and Recreation.

Sacramento District. The District will continue necessary coordination with the U. S. Forest Service, Plumas County, Butte County, concerning development, operation, and maintenance of recreation facilities. Continue coordination and liaison with the Divisions of Design and Construction and Right-of-Way Acquisition; the Department of Parks and Recreation and Fish and Game; and others associated with the development, design, construction, operation, and maintenance of recreation facilities in the Oroville and Upper Feather Divisions of the State Water Project.

San Joaquin District. Complete a development plan for Buena Vista Aquatic Recreation Area. Complete a development plan for Orestimba Creek Fishing Access Site and for Three Rocks Fishing Access Site. Guide and direct recreation and fish and wildlife development plans in conjunction with the State Water Project.

Southern District. Complete recreation development reports for Perris Reservoir, Cedar Springs Lake, Peace Valley Aquatic Recreation Area, Frenchmans Flat-Piru Creek Fishery Enhancement, Trout Hatchery, and Warmwater Fish Hatchery. Continue preparation of various recreation development reports for aquatic recreation areas, fishing accesses, wildlife enhancement areas and the California Aqueduct trails system. Commence preparation of recreation development reports for Pyramid Reservoir and Castaic Reservoir, Phase II. Maintain liaison within the Department and with interested federal, state, and local agencies. Attend public meetings, hearings, briefings, and legislative meetings, as required. Prepare correspondence, briefing aids and information reports pertaining to recreation development at the State Water Project. Prepare and maintain control schedules, management networks, and progress reports necessary for orderly implementation of work program.

E. H. Gunderson 4/15/67

ADMINISTRATION OF FLOOD DAMAGE REPAIR FUNDS
PART I

NEED

From time to time portions of the State of California have been ravaged by natural disasters in the form of storm and floods. These disasters have caused widespread damage or destruction to property and improvements affecting the health, safety, and welfare of the general public of the State. These damages are of such magnitude that they far exceed the financial capability of local agencies to repair.

AUTHORITY

Chapter 1511, Statutes of 1959, known as the Emergency Flood Relief Law (Government Code Sections 54150-54164).

OBJECTIVES

Financially assist local public agencies to repair damaged public facilities as soon as possible. Enable state and other local public agencies in Major Disaster Areas to obtain federal assistance under Public Law 875 for debris clearance and temporary emergency repairs.

GENERAL DESCRIPTION

The Emergency Flood Relief Law provides assistance to eligible local public agencies for the permanent repair or restoration, or both, other than normal maintenance, or the replacement of public real property damaged or destroyed by storm, or flood, or flood conditions, on a cost sharing basis, when funds are appropriated by the Legislature for this purpose.

The Department of Water Resources is responsible for the administration of the flood relief funds for damages to levees, flood control works, channels, irrigation works and other related water facilities, subject to the approval of the Department of Finance. The Department of Finance allocates support funds for program administration costs as needed. The Statewide Planning Office is responsible for coordination of this program within the Department and provides staff guidance. Line responsibilities to carry out the purposes of this law are assigned to the appropriate district offices.

In addition to the State Emergency Flood Relief Program, the Department also provides engineering services to the California Disaster Office by making field investigations and in preparing engineering reports of recommendations to permit state and other local public agencies in designated Major Disaster Areas to obtain supplemental federal financial assistance under Public Law 875 for debris clearance and temporary emergency repairs. The Department may be requested to make damage evaluation surveys to assist in the declaration of a Major Disaster.

DATE WORK STARTED

1938.

ESTIMATED COMPLETION DATE

This is a continuing program.

T. Y. Fujimoto 3/30/67

1968-69 F.Y.
Implementation II-02
SPO W.A. 2349

ADMINISTRATION OF FLOOD DAMAGE REPAIR FUNDS
PART II

RESOURCES INPUT DATA (in $1,000 - Reimbursable - and man-years)

	1966-67		1967-68		1968-69*		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	70	3.0	70	3.0	25	1.0	0	0	0	0	0	0	0	0

* This program is reimbursed by the Department of Finance. Necessary support funds for conducting this activity are allocated by the Department of Finance from a specific appropriation made by the Legislature to authorize a flood relief program. Personnel from other functions are utilized as the need for this activity occurs.

Based on current workload, it is anticipated that the authorized program will extend into F.Y. 1968-69 on a limited basis.

PROGRAM OUTPUT DATA, 1968

The Department will review and approve 22 applications from state and local public agencies requesting $2,682,000 in supplemental federal disaster assistance under Public Law 81-875 from storms of December 1966.

WORK PROGRAM 1968-69

Limited activity will be continued comprising final completion inspections and completion reports for those applications for federal financial assistance under Public Law 875.

It is further anticipated that a State Emergency Flood Relief Program will be authorized by the Legislature and the Department will be participating in this program. Applications under the permanent repair program will probably equal the number received under the Public Law 875 Program. The work comprises review of applications, preparation of engineering reports, preparation of cooperative work agreements, review of plans and specifications, claim processing and construction and final completion inspections.

T. Y. Fujimoto 3/30/67

CALIFORNIA-NEVADA
INTERSTATE STUDIES

PART I

NEED

The California-Nevada Interstate Compact Commission utilizes the services of the Department in conducting its activities. The Commission was created by Chapter 1810, Statutes of 1955 to cooperate with a similar commission representing the State of Nevada to formulate for submission to the Legislatures of both States for approval, an interstate compact relating to the distribution and use of the waters of Lake Tahoe and the Truckee, Carson, and Walker Rivers.

The Commission requires the services of the Department to conduct technical studies and to perform administrative, fiscal, and other activities necessary to formulate a compact and secure the necessary approvals. As provided in the Government Code, the Department provides these essential services.

There is not sufficient water in Lake Tahoe and the Truckee, Carson, and Walker Rivers to satisfy all potential future demands. Therefore, in addition to the studies being conducted for the Commission, the Department must keep informed of studies being conducted by other agencies such as the Bureau of Reclamation's studies of Pickel Meadows Reservoir on the West Walker River and Hope Valley Reservoir on the West Fork Carson River, and take action to assure that California receives a fair share of the available supplies.

It is a fast growing area wherein two states depend upon a very limited common source of water supply. California must be in a position to provide analyses of problems which come up from time to time but which are difficult to foresee in advance.

The U. S. Bureau of Reclamation is developing features of the authorized Washoe Project. Stampede Reservoir currently is under construction. It is essential that California contract for water from this project or it will lose its right to this water. Water agencies of El Dorado, Placer, Nevada, and Sierra Counties have adopted resolutions requesting that the State negotiate a master contract for California's share of available water. It is expected that similar contract negotiations will be required as other features of the Washoe Project and other federal projects in this area are developed.

The Secretary of the Interior recently issued Truckee and Carson River rules and regulations. These require the Regional Director of the Bureau of Reclamation to establish operating criteria and procedures for the reservoirs on the Truckee and Carson Rivers. He is required to seek the advice of California agencies. The Department will have an important role in developing the final operating criteria and procedures.

The Department has been assigned responsibility of monitoring and coordinating the State's activities in constructing sewage export facilities from Lake Tahoe. Facilities located at the south end of the lake are under construction. Construction of those facilities to serve the north end of the lake will be initiated in the near future.

In 1925 the United States initiated the case known as The United States v Alpine Land and Reservoir Company, et al, in Equity Number D-183 in the United States District Court for the District of Nevada (U. S. v Alpine). This action involves water rights held by the State of California as well as by Alpine County interests. The court may schedule hearings on the proposed decree in the near future in which case, the Department will be required to provide necessary technical assistance to the Attorney General's Office.

AUTHORITY

Section 8138 of the Government Code. Annual service agreements are executed between the Department of Water Resources and the California-Nevada Interstate Compact Commission.

1. Negotiations for water from the Washoe Project are authorized by Part 4.3 of Division 6 of the Water Code, which was enacted as an emergency measure by the 1966 California Legislature. El Dorado, Placer, Nevada, and Sierra Counties have adopted resolutions requesting that the State contract for the available water (copies attached).

2. Water Code Sections 225-227, 8300, 12578-12580, and 12616-12618 authorize the Department of Water Resources to conduct investigations of water resource development and flood control on its own or in cooperation with local, other state and federal agencies.

3. Senate Concurrent Resolution No. 11 (Res. Ch. 20 Statutes 1952) requests the Department to assist Alpine County in the case of U. S. v Alpine in the Federal District Court for Nevada.

OBJECTIVES

1. Conduct technical studies and perform administrative, fiscal, and other activities for the California-Nevada Interstate Compact Commission necessary to formulate a compact and secure necessary approvals.

2. Keep informed of water resource studies being conducted by all agencies and take action to assure that California receives its fair share of available water supplies.

3. Contract for California's share of water from the Washoe and other federal projects sub-contract with water agencies of El Dorado, Placer, Nevada, and Sierra Counties.

4. Advise the Regional Director of the Bureau of Reclamation on the State's position regarding the Truckee and Carson River rules and regulations.

5. Monitor and coordinate the State's activities in constructing sewage export facilities from Lake Tahoe.

6. Provide the Attorney General with necessary technical services in the case of U. S. v Alpine.

GENERAL DESCRIPTION

The following services are provided the California-Nevada Interstate Compact Commission:

1. Proposed compact terms are reviewed to determine their effect on the present economy and future development in the compact area.

2. Engineering data and reports presented to the Commission from other sources are analyzed and summarized for the Commission.

3. Administrative, clerical, fiscal, and related services are provided to the Commission including arranging for meetings; preparation of agenda, minutes, and other information; handling of correspondence; and preparation of budgets and service agreements.

4. The Executive Director of the California Commission, a Department employee, provides coordination between the Commission and the staff of the Department of Water Resources, provides liaison between the California Commission and other public agencies and works closely with the administrative staff of Nevada.

Other activities to be conducted under this program include:

1. Contract negotiations with the Bureau of Reclamation and local water agencies to obtain California's share of Washoe Project water.

2. Review and comment on information on water resource development possibilities being compiled by all agencies.

3. Keep informed of and coordinate the State's activities associated with the actions of all agencies involved in developing sewage export facilities from Lake Tahoe.

4. Develop the State's position on the Truckee and Carson River rules and regulations.

5. Prior to hearings in the case of U. S. v Alpine, briefs and exhibits by the other parties will be reviewed and technical briefs and exhibits will be prepared for submission by the California Attorney General. During hearings, the foregoing activities will be supplemented with provisions of monitoring the testimony and provisions of expert witnesses.

DATE WORK STARTED

1. The first service agreement for conducting work for the California-Nevada Compact Commission was authorized on November 17, 1955. The Department has been continuously involved in this work since that date.

2. The remainder of the program will be initiated July 1, 1968.

ESTIMATED COMPLETION DATE

Activities of the California-Nevada Interstate Compact Commission will be completed upon approval of a

compact by the Federal Government. This approval could occur in 1969 if the two states ratify the compact at their 1969 legislative sessions. Services will be required by the Commission up to the time the compact becomes effective.

Contract negotiations will be conducted as each unit of the Washoe Project moves into the development stage.

Review and analysis of the water resource studies of other agencies and of the export of sewage from Lake Tahoe should be completed by fiscal year 1972-73.

Technical assistance to the Attorney General's Office in the case of U. S. v Alpine will continue until a final decree is entered or the case dismissed.

CALIFORNIA-NEVADA
INTERSTATE STUDIES

PART II

RESOURCE IMPUT DATA

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
Director's Office														
Item 1*	$8	0.3	$6	0.2	$15	0.5								
Item 2**														
Sacramento District														
Item 1*	$	0.7	$7	0.6	$13	0.6								
Item 2					$15	0.7	$28	1.3	$28	1.3	$28	1.3	$28	1.3

* Item 1. Services for California-Nevada Interstate Compact Commission. Expenditures are fully reimbursable by the Commission. Schedule based on approval of compact by the Federal Government in 1969.

**Item 2. Remainder of investigation.

PROGRAM OUTPUT DATA

Program product for the Commission will be services requested. Physical output includes reports, minutes of meetings, etc.

Output data for the remainder of the investigation will include:

1. Repayment contracts with the Bureau of Reclamation and subcontracts with water agencies of Sierra, Nevada, Placer, and El Dorado Counties.

2. Review and coordination of water resource studies of other agencies and of sewage export from Lake Tahoe.

3. Briefs and exhibits to be entered in the case of U. S. v Alpine.

WORK PROGRAM FOR 1968-69

The following activities will be conducted under this program.

1. Technical studies and administrative, stenographic, fiscal, and related services requested by the Commission.

2. Negotiations with the Bureau of Reclamation and with water agencies of Sierra, Nevada, Placer, and El Dorado Counties for water from Stampede Reservoir of the Washoe Project.

3. Review and coordination of water resource studies of other agencies and of export of sewage from Lake Tahoe.

4. Technical assistance as required by the Attorney General's Office to analyze briefs of other parties and prepare briefs for the State prior to hearings in the case of U. S. v Alpine.

ADMINISTRATION OF WATER WELL REPORTS ACT
PART I

NEED

The Department has been given the responsibility for receiving and filing reports concerning the construction of water wells. To assure that the law is complied with and that the reports received are useful, a follow-up program is necessary. Many of the reports filed in the past have been poorly identified and incomplete and inaccurate from a geologic and engineering standpoint. Obviously, unless the information contained on the reports can be used, the reports have little value.

Under certain conditions, it will be necessary to advise those who construct wells of precautions to be taken in order to protect the ground water basin in question. This can only be accomplished when advance notice of construction is given and can be followed up.

The geologic and engineering information contained in the water well reports are used in all department programs or activities dealing with the underground water system. This information is also used by the Department of Conservation and the State and Regional Water Quality Control Boards in the Resources Agency and the Department of Public Health in the Health and Welfare Agency in their planning activities and in support of their regulatory functions.

AUTHORITY

Chapter 1088, Statutes of 1965, now Sections 7076 - 7038 of the Water Code.

OBJECTIVES

(1) Ensure that the process of filing and reporting of water well construction functions properly, (2) assure that the information submitted is usable, and (3) maintain an up-to-date file of reports for use within the Department and by other agencies authorized to use them.

GENERAL DESCRIPTION

Activity under this program consists of:

1. Filing the Notices of Intent and Water Well Drillers Reports as they are received.

2. Examine the Notices of Intent to determine whether or not the Department may wish to advise the well driller regarding ground water conditions at the proposed site.

3. Distribute forms as requested.

4. Check Water Well Drillers Reports received against Notices of Intent to ensure compliance with the Code.

5. Review the information submitted for accuracy and completeness and adequacy of location.

6. Where there is doubt as to the adequacy of the locations described in the reports, the locations are field checked.

7. All reports are assigned a well location number.

8. Reports are retrieved from the file and made available to authorized agencies or persons (the law has a "confidentiality" clause) on request.

9. Answer inquiries and requests for information.

The work is carried out in the five district offices. The Statewide Planning Office provides coordination and handles inquiries of a general, statewide nature.

DATE WORK STARTED

September 1965

ESTIMATED COMPLETION DATE

Continuing

E. A. Ritchie
3/30/67

1968-69 F.Y.
Implementation II-02
SPO W.A. New
ND
SFBD
SAC
SJD
SD

ADMINISTRATION OF WATER WELL REPORTS ACT
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	-	-	-	-	2	0.1	2	0.1	3	0.1	3	0.1	3	0.1
ND	-	-	-	-	15	0.9	15	0.9	18	1.0	18	1.0	18	1.0
SFBD	-	-	-	-	20	1.0	21	1.0	22	1.0	23	1.0	25	1.0
SAC	-	-	-	-	25	1.5	35	1.9	36	1.9	38	2.0	40	2.0
SJD	-	-	-	-	27	2.0	28	2.0	29	2.0	30	2.0	31	2.0
SD	-	-	-	-	16	1.0	17	1.0	18	1.0	18	1.0	19	1.0
Total					105	6.5	118	6.9	126	7.0	130	7.1	136	7.1

PROGRAM OUTPUT DATA

1. A reasonably complete, accurate, identifiable, and usable file of water well information.

2. Supply information as requested to authorized agencies.

3. Advise water well drillers if known problems or hazards exist at proposed well sites.

WORK PROGRAM FOR 1968-69

Statewide Planning Office

The Office will maintain coordination of district activities and handle inquiries of a general, statewide nature.

Northern District

1. File Notices of Intent and Water Well Drillers Reports as received.

2. Processing correspondence and answering inquiries.

3. Working with drillers on improving location descriptions.

4. Make available material classification information to drillers so that information contained in log will be valuable and not misleading.

5. Protect confidential nature of the reports, but make reports available to all qualified public agencies who request to use them.

San Francisco Bay District

1. File of "Notices of Intent" and "Water Well Drillers Reports" maintained current.

2. "Notices of Intent" examined; action taken as necessary.

3. Forms distributed.

4. "Water Well Drillers Reports" checked against "Notices of Intent" to ensure compliance with the Code.

5. Reports reviewed for accuracy, completeness, and adequacy of location; action taken as necessary.

6. All reports assigned well location numbers.

7. Authorized requests filled.

Sacramento District

This program can be undertaken as a minimum expenditure project under which we would essentially receive and file information as listed in "Program Output Data" above.

The budget request of $25,000 would provide a more meaningful program enabling us to undertake the following:

Notice of Intent forms and Water Well Drillers Reports filed with the Sacramento District will be reviewed for compliance, completeness, accuracy, and action required. Working and suspense files will be established and maintained. Reports, when necessary, will be field checked and located, constructed wells inspected, and inspection reports (forms) prepared.

All newly constructed wells will be identified, official state well numbers assigned, and an up-to-date inventory of wells maintained. A listing and filing system of the reports will be developed and maintained. Suitable charts showing location of newly constructed wells will be laid out and kept current in order that type of activity, intensity of well construction, areal distribution of wells, etc., may be monitored (to aid decisions for field checking, inspection, and to enable correlation of activity with known problems and areas of concern).

Well drillers and other agencies, organizations, or individuals will be advised about known adverse conditions and hazards which may affect the quality of ground waters. Local enforcement agencies will be contacted when necessary to protect the health or other public interests.

Coordination of activities with the other Districts will be established, methods and procedures for necessary exchange of information developed and maintained. Cooperation with other state and local agencies will be established and carried on for the mutual benefit of the agencies involved and for the protection of ground water resources. Information on wells providing municipal water supply will be sent to the Department of Public Health for necessary action.

Efficient information storing and retrieval system will be developed and maintained in order that the essential information from the reports may be readily available, within the provisions of the law, for conducting water quality, geologic, hydrologic, economic, and land and water use studies, and for aiding and improving ground water quality monitoring and measurement programs.

Requests and inquiries will be answered, necessary correspondence or action to correct deficiencies in compliance, with legislation, will be initiated and followed up. Drillers will be encouraged and assisted so that full compliance with the law may be accomplished and the quality of information available from well logs improved.

Forms will be ordered, printed, and continuously distributed to drillers and other organizations or individuals according to their needs. Listings of drillers and other interested parties will be kept current. The present backlog of work will be gradually eliminated.

San Joaquin District

Notices of Intent and Water Well Drillers Reports will be checked for completeness. Incomplete forms will be returned to the driller, and completed forms will be tabulated, located, assigned a location number, indexed, and filed. The backlog of unfiled reports will be gradually eliminated.

Data from these files will be furnished to Department units and authorized agencies on request. Requests for forms and information will be answered.

Drillers will be contacted to encourage compliance with the law. After 18 months under the new law, 53 percent of the licensed drillers in the District have not filed any forms.

Southern District

a. File intent forms, alphabetically and chronologically.

b. Notify appropriate health departments.

c. Prepare bimonthly in house list of notices.

d. Check intent notices against completion forms semimonthly.

e. Locate wells and assign state well numbers.

f. Notify local agencies.

g. Advise owner and driller when special water well construction standards are required.

E. A. Ritchie
4/18/67

ADMINISTRATION OF WEATHER MODIFICATION ACT
PART I

NEED

Currently, an upsurge of interest in weather modification research with a view toward development of water resources is taking place. On national and international levels, as well as statewide levels, weather modification programs are being expanded in response to the need for weather modification research. In 1950 the National Science Foundation was enabled to conduct a nationwide program in weather modification research under the National Science Foundation Act, amended in 1958. This program was enlarged and strengthened by federal regulations which became effective on January 1, 1966. During the past session Congress appropriated $2,980,000 for weather modification research during 1966 through the Atmospheric Water Resources Research Program of the U. S. Bureau of Reclamation.

In view of current developments, a need exists to strengthen the Department's program for administration of the present Water Code provisions on weather modification operations in California, and to explore the potentialities of development of water resources. Because the weather modification activities in the past have been included under the unrelated Water Rights Management Program, it is proposed to continue the weather modification activities under a separate program.

AUTHORITY

Chapter 4, Division 1, Sections 235 and 400 through 415 of the Water Code.

OBJECTIVES

To protect the public interest and safety through proper administration of procedures outlined in the Water Code.

To develop, conserve, and protect the natural water resources of California by weather modification processes.

GENERAL DESCRIPTION

Water Code provisions indicate three general functions which involve data, research, and control.

The control function provides that persons intending to engage in weather modification operations in California must secure a license and establishes a procedure for the notification of the Department and the public prior to the initiation of a weather modification project. A handbook entitled "Statutes and Procedures Pertaining to Weather Modification Projects in California" has been published as a part of the control function. This handbook will be revised and updated when necessary.

ADMINISTRATION OF WEATHER MODIFICATION ACT
PART II

RESOURCES INPUT DATA (in $1,000 - GF - and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	10	0.5	11	0.5	11	0.5	20	1	20	1	22	1	23	1

PROGRAM OUTPUT DATA

Annual Bulletin No. 16 series "Weather Modification Operations in California".

WORK PROGRAM FOR 1968-69

Administration will continue under a systematized program.

Liaison developed during the past with individual licensees and weather modification professional organizations will be maintained. The efforts of professional organizations to institute professional and project safety standards will be given encouragement, consistent with the public interest, and safety. Compilations of data collected prior to the institution of the systematic program will be made to facilitate the State's ability to respond to the increasing number of requests for information on weather modification operations received from universities and private organizations.

Bulletin 16-68, together with a preliminary report, will be published. Processes for data collection for these publications will be standardized.

Thais U. Johnson 3/30/67

The data function involves the collection, tabulation, and publication of operational data on weather modification projects submitted to the Department. Data is published in the Bulletin 16 series.

The research function involves the investigation of evaluation techniques and the encouragement of weather modification agencies to conduct evaluation studies. The research function activities are derived from weather modification project evaluations which the Department is empowered to request. A summary of evaluation techniques will be published in sections of the Bulletin 16. Activities will be expanded through cooperative agreement with the Federal Government under authority of the Water Code to include:

1. Investigation of the development of water resources through weather modification such as increasing the yield of the State Water Project.

2. Determination of the economic feasibility of weather modification operations.

3. Encouragement of weather modification research and increased compilation of operational weather modification data.

DATE WORK STARTED

1951.

ESTIMATED COMPLETION DATE

Continuing.

Thais U. Johnson 3/30/67

INDEX

PROGRAM STATEMENTS

Water Development Planning
(Project-Oriented)

EARTHQUAKE DATA COLLECTION
PART I

NEED

The Department of Water Resources has the responsibility to ensure that the State Water Project will be safe and reliable when shaken or disrupted by any earthquake or ground movement, which may reasonably be expected during the life of the Project. This responsibility extends not only to the design of the Project but to its continuing safety and integrity as well. The Department is responsible for rechecking its design in the light of rapidly expanding advances in technology, taking necessary corrective measures where indicated.

Not only must the Department ensure the integrity of Project facilities from a monetary standpoint and from the standpoint of its delivery obligations, but it must also consider the potential hazards to adjacent populations posed by structures holding back 6.8 million acre-feet of water. The combined earthquake and ground movement programs of the Department bring modern technology to bear in attempting to preclude the disastrous failure of Project reservoirs and aqueducts with consequent tragedies such as at Vaiont and Baldwin Hills.

Expenditure of Project Funds is required for the foregoing.

General Funds are required to enable the Department to meet responsibilities:

a. for advance planning in the North Coastal area where almost no historical data are available and a maximum of lead time is necessary to provide data for design of projected facilities; and

b. for the Division of Dam Safety which has had its responsibilities expanded by the Legislature and is committed to send field inspection teams into areas where earthquakes have occurred to determine whether dams under State supervision have been damaged. This requires that they be rapidly informed of accurate epicenters anywhere in the State for shocks over Magnitude 4.

AUTHORITY

The Department's programs to investigate the potential effects of earthquakes and ground movements and to monitor these to ensure the safety of the State Water Project were first authorized in the Budget Act of 1959. The Department also has statutory authority to investigate the effects of ground movement and other

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natural phenomena on the safety of hydraulic structures under its jurisdiction which are not part of the State Water Project (Water Code Sections 225, 227, 6075, 6081 and 12616).

OBJECTIVES

The broad continuing objective of the Earthquake Data Collection program is to provide the data necessary to permit the Department to discharge its responsibilities of ensuring the continued safety and reliability of the State Water Project and other water facilities under its jurisdiction against the hazards of:

a. Crustal strain change.
b. Fault creep.
c. Earthquakes and phenomena preceding them.
d. Regional tilting.
e. Subsidence.

GENERAL DESCRIPTION

The Earthquake Data Collection program involves the operation of seismologic, geodetic, and other geophysical instrumentation, and the collection of geologic, seismologic, geodetic, and engineering data relative to the possible and potential effects of earthquakes and crustal movements on the safety of hydraulic structures and continuity of water service.

The Department's Consulting Board for Earthquake Analysis recognized in their report in 1966 that some of the Department's earthquake programs are of general value to the State as well as to the Water Project. The Department's data collection activities can be augmented to provide statewide service at relatively little additional cost. General Funds are therefore requested in 1968-69 to extend the Department's environmental monitoring capability beyond the State Water Project in other critical areas throughout the State to provide data of statewide value in addition to that required for the Water Project.

Work is accomplished by the unit staff, under cooperative agreements, service agreements, and contracts.

DATE WORK STARTED

Work was initiated in 1959. Participation in the Federal-State Cooperative Leveling in Subsidence Areas began in July 1960. The Federal-State Cooperative Seismologic and Geodetic Programs for Earthquake Engineering and Additional Horizontal and Vertical Geodetic Control were initiated in July 1963.

The three Federal-State ccoperative studies were combined under the title, "Federal-State Cooperative Earthquake and Engineering Surveys" in the 1965-66 budget.

Centralization of Departmental and cooperative seismic and geodetic programs and regrouping of the activities into three programs, of which this is one, was implemented in July 1966.

ESTIMATED COMPLETION DATE

This is a continuing program.

R. B. Hofmann, 5/12/67

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EARTHQUAKE DATA COLLECTION
PART II

RESOURCES INPUT DATA

(Costs in thousands of dollars, personnel in man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
WF	373	9	317	11	331	11	347	11	329	11	306	11	282	11
GF	0	0	0	0	131	6	130	6	130	6	130	6	130	6

PROGRAM OUTPUT DATA

1. Installation and operation of seismic instrumentation including strong-motion seismographs, seismoscopes, portable sensitive seismographs, permanent seismograph stations, and mobile seismic laboratories to monitor seismic activity throughout the State Water Project facilities.

2. Accomplishment of precise geodetic surveys for the purpose of: monitoring movements along principal fault zones which constitute a hazard to State Water Project facilities; monitoring subsidence along the California Aqueduct; and monitoring of landslides constituting a hazard to existing or proposed State Water Project facilities.

3. Installation and operation of related geophysical instrumentation to monitor the physical environment and factors which could constitute hazards to critical structures.

WORK PROGRAM FOR 1968-69

A. Monitor Seismic Activity and Regional Tilting at Locations Critical to Design, Construction, Operation and Maintenance of State Water Project, and in Non-Project Areas as Noted.

1. Install, operate, and maintain the following types of instruments:

a. Sensitive Permanent Seismograph Stations--Operate equipment installed to date at Oroville, Jamestown and Cedar Springs; begin installations at Perris and Castaic, including central recording at Sacramento to reduce capital outlay and operating costs compared to individual recording observatories at each dam. Provide links to Sacramento from selected Cal Tech and Berkeley recording stations near State Water Project facilities as a cooperative program to supplement Department seismographs to provide more accurate epicenters of earthquakes which affect the aqueduct system but which are not covered by the damsite networks. (Project Fund activity.)

Link other university stations with Sacramento to exchange data providing the accuracies required to locate epicenters for dam safety investigation and future water development projects.

b. Operate nine portable seismic stations at State Water Project facility sites to determine local seismicity from small shocks. (Project Fund activity.)

c. Strong-Motion Seismographs (Federal-State Cooperative Program)--Continue operation of 33 seismographs; install and operate six additional instruments at or in major Project facilities. (Project Fund activity.)

d. Seismoscopes (Federal-State Cooperative Program)--Maintain 108 seismoscopes. (Project Fund activity.)

e. Sensitive Mobile Seismographs (Federal-State Cooperative Program)--Operate two mobile seismograph stations to provide ground spectral amplification data at sites of proposed hydraulic structures in the Upper Eel River Development area. (Project Fund activity.)

f. Tiltmeters--Purchase and install one and operate up to eight tiltmeters at sites where regional tilting could be damaging to State Water Project facilities. (Project Fund activity.)

2. Publish seismic records as memorandum reports and office reports, as appropriate.

B. Monitor Fault Creep, Tectonic Movements, and Land Subsidence in Vicinity of State Water Project.

1. Conduct the following types of precise surveys:

a. Geodimeter Fault Monitoring--Repeat surveys along the San Andreas and other major active faults to determine movement rates indicative of potentially damaging fault creep and/or accumulating regional earth strains. (General Fund activity.)

b. Fault Strain Quadrilaterals (Federal-State Cooperative Program)--Reobserve to detect fault creep at aqueduct crossings of active faults. (Project Fund activity.)

c. Subsidence Leveling (Federal-State Cooperative Program)--Releveling of subsidence networks in the San Joaquin Valley in areas traversed by the California Aqueduct. (Project Fund activity.)

d. Additional Geodetic Control (Federal-State Cooperative Program)--Establish additional geodetic control as required for Project purposes. (Project Fund activity.)

2. Publish geodetic records as memorandum reports and office reports, as appropriate.

R. B. Hofmann, 5/12/67

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LOWER SACRAMENTO VALLEY SEEPAGE MONITORING

PART I

NEED

Construction and operation of Oroville Reservoir will modify the regimen of flow of the Feather and Sacramento Rivers downstream from Oroville. This change will influence the occurrence, extent, and magnitude of seepage in the Lower Sacramento Valley, where seepage is already a serious problem. It is state policy, as codified in Section 12627.3 of the California Water Code, that the cost of solving seepage problems which result from the construction and operation of a water project must be borne by the project.

In order to establish the effect of the operation of Oroville Reservoir on seepage, it is necessary to obtain seepage measurements both prior to and after reservoir operations are initiated. Seepage data for the entire Sacramento Valley floor was collected under the Sacramento Valley Seepage Investigation. Sufficient information was obtained under that program prior to June 30, 1966, when data collection activities were completed, to obtain general relationships between channel flows and the occurrence and magnitude of seepage and seepage damage on the Sacramento Valley floor. There is need, however, since Oroville Reservoir will begin to store water in the near future, to obtain additional data to determine the effect of its operation on seepage. Surveillance was initiated in October, 1966, and will be continued for a period of time sufficient to obtain data over a wide range of conditions so that an accurate evaluation of the effect of the reservoir operations on seepage can be obtained.

Information obtained in this program can also be used to (1) establish the authenticity of possible future claims against the State for seepage damage supposedly induced by the operation of Oroville Reservoir and the Sacramento River Flood Control Project, and (2) assist in minimizing any claimed state liability for seepage damage in such litigation.

AUTHORITY

Authorization for this investigation is contained in the California Water Code, Section 12627.3.

OBJECTIVES

The objectives of this program are to:

1. Collect seepage and seepage damage data downstream from Oroville Reservoir prior to and during the operation of the facility.

2. Estimate the effect of reservoir operations on

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seepage and seepage damages adjacent to the Feather and lower Sacramento Rivers.

GENERAL DESCRIPTION

The Lower Sacramento Valley Seepage Monitoring program will extend over a five-year period. Data on seepage and seepage damage along the Feather River downstream from Oroville and downstream along the Sacramento River to Hood, which is the approximate location of the intake for the Peripheral Canal, will be obtained. This investigation is a two-part program, (1) a minimum program to install monitoring equipment and collect minimum seepage data, and (2) an augmented program to monitor seepage when it occurs and if monitoring is justified. The minimum program is required each year and is budgeted. The augmented program is not budgeted as it may or may not be needed. If seepage occurs, then it is necessary to decide whether to implement the augmented program. If, after field review, monitoring appears justified, then authorization and funds for the augmented program will be requested.

Work activities included in the budgeted program include constinuous monitoring of ground water levels in selected observation wells in the study area, instantaneous measurements of ground water levels in other wells in the study area, limited seepage observations, and a memorandum report incorporating the data collected.

Work activities conducted under the augmented program include field observations of seepage, additional ground water level measurements, infrared aerial photographs of seepage, delineation of seepage areas on these photographs and on base maps, collection and compilation of economic information on the effect of seepage, and an office report of findings.

DATE WORK STARTED

The program began July 1, 1966.

ESTIMATED COMPLETION DATE

It is expected that the program can be terminated June 30, 1971.

GAA:RFF 3/10/67

LOWER SACRAMENTO VALLEY SEEPAGE MONITORING

PART II

RESOURCES INPUT DATA

	1966-67		1967-68		1968-69		1969-70		1970-71	
	$	MY	$	MY	$	MY	$	MY	$	MY
Sacramento Dist.	14	0.9	14	0.9	14	0.9	14	0.9	15	0.9

PROGRAM OUTPUT DATA (Budgeted Program)

1. Yearly memorandum report on seepage conditions including:

   a. Areas affected by seepage

   b. Data compiled from field observations

WORK PROGRAM FOR 1968-69 (Budgeted Program)

1. Continuous recordings of ground water fluctuations in selected wells will be obtained during the seepage season.

2. Water levels in other ground water wells used during 1967-68 will be measured monthly during the seepage season.

3. Seepage observations will be conducted on a limited basis to determine the extent of land inundated by seepage and the need for implementing the augmented program.

4. A memorandum report of the findings will be prepared.

GAA:RFF 3/10/67

EARTHQUAKE DATA ANALYSIS
PART I

NEED

The Department of Water Resources has the responsibility to ensure that the State Water Project will be as safe and reliable as is economically feasible when shaken or disrupted by any earthquake or ground movement which may reasonably be expected during the life of the Project. The Department must consider the potential hazards to adjacent populations posed by 6.8 million acre-feet of water held back by Project structures. It must also consider the potential losses to water users and to the State if delivery of Project water were cut off for a prolonged period.

To ensure the continuing integrity of the State Water Project, and to fulfill its responsibility for the safe operation of Project facilities, the Department needs to continue monitoring such potentially damaging phenomena as:

1. Earthquakes which may: trigger landslides into facilities, represent fault displacements beneath facilities, or otherwise damage Project facilities.

2. Subsidence, which may adversely alter the hydraulic gradient of the California Aqueduct.

3. Tectonic tilting, which may tilt Project pumps and generators out of plumb and which may be the precursor of damaging earthquakes.

4. Fault creep, which may slowly offset aqueducts at fault crossings.

5. Crustal strain, which accumulates slowly only to be released in damaging earthquakes and sudden fault displacements.

The Department also has statutory responsibility for the safety of over 1,000 non-Project dams and reservoirs in California, and is responsible for advance planning of future water development facilities in the North Coastal and other areas of the State. To fulfill these responsibilities, the Department needs to know when and where potentially damaging earthquakes occur near such facilities and what earthquake or ground movement hazards should be considered in the design and operation of those facilities.

AUTHORITY

The Department's programs to investigate the potential effects of earthquakes and ground movements and to monitor these to ensure the safety of the State Water Project were first authorized in the Budget Act of 1959. The Department also has statutory authority to investigate the effects of ground movement and other natural phenomena on the safety of hydraulic

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structures under its jurisdiction which are not part of the State Water Project (Water Code Sections 225, 227, 6075, 6081 and 12616).

OBJECTIVES

Analyze data obtained from the Earthquake Data Collection program:

1. To determine how foundations of State Water Project structures will react to real earthquake forces.

2. To determine regional and local seismicity, tilt, strain, subsidence, and fault creep rates.

3. To warn of increased probability of hazard or damage by monitoring:

   a. Crustral strain changes.
   b. Fault creep.
   c. Earthquakes and phenomena preceding them.
   d. Regional tilting.
   e. Subsidence.

4. To provide warning of impending earthquakes or crustal displacements which may damage State Water Project facilities.

GENERAL DESCRIPTION

Activities to achieve the foregoing objectives include the analysis of geologic, geodetic, and seismologic data as a basis for hazard reports; development of maps of intensity, seismicity, and fault dynamics; computation of spectral amplitude ratios for various water facility sites; definition of areas where crustal deformation is occurring and analysis of the deformation; and development of sufficient information to make reasonable estimates of probable location, frequency, and time of occurrence of major earthquakes and fault displacements which would affect the operation and safety of any part of the State Water Project (Project Funds) and other dams and reservoirs under Department jurisdiction (General Fund).

Work is accomplished under cooperative agreements, service agreements, contracts, and by the unit staff.

DATE WORK STARTED

Work was initiated in January 1959. Participation in the Federal-State Cooperative Seismologic and Geodetic Programs for Earthquake Engineering and Additional Horizontal and Vertical Geodetic Control were initiated in July 1963.

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The three Federal-State cooperative studies were combined under the title "Federal-State Cooperative Earthquake Engineering Surveys" in the 1965-66 budget.

Centralization of Departmental and cooperative seismic and geodetic programs and regrouping of the activities into three programs, of which this is one, was implemented in July 1966.

ESTIMATED COMPLETION DATE

This is a continuing program.

R. B. Hofmann, 5/12/67

EARTHQUAKE DATA ANALYSIS
PART II

RESOURCES INPUT DATA

(Costs in thousands of dollars, personnel in man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
PF	185	6	135	7	203	7	200	7	200	8	180	8	170	8
GF	0	0	0	0	54	2	61	3	63	3	65	3	67	3

PROGRAM OUTPUT DATA

Output of the Earthquake Data Analysis program for Fiscal Year 1968-69 will include:

1. Memorandum reports--These are unscheduled and are prepared as warranted by new information and in response to requests from the Division of Design and Construction, and Operations. These include results of analyses of fault creep, seismicity, tilting, subsidence, and earthquake ground motions at State Water Project sites.

2. Lists of analyzed data--Routine transfer of earthquake and ground movement data and analyses to the Earthquake Hazard and Engineering Criteria program as required.

3. Seismograms--Process and analyze seismograms from the analysis center and portable magnetic tape units from up to 40 sensitive permanent or movable seismic stations on a daily basis.

4. Seismic alerts--Appropriate Departmental units are alerted immediately when potentially damaging seismic events are detected near State Water Project facilities.

5. Department bulletins in the 116 series for 1968-69:

   "Progress Report"
   "Seismic Monitoring Systems of the California State Water Project"

WORK PROGRAM FOR 1968-69

A. Geodimeter Fault Monitoring. (General Fund activity.)

1. Use and refinement of the Length Computation and Accuracy Statistics Program, which handles 17 input variables, will continue. Program requires 27,000 decimal words of core.

2. Continue Geodimeter line behavior analysis program to identify changes in patterns of strain accumulation. This program shows promise in earthquake prediction.

3. Computer programs for trilateration analysis will be continued to improve accuracy of Geodimeter measurement data where closed figures are available.

B. Aqueduct Fault-Crossing Surveys (Project Fund activity.)

Analysis of reduced field data provided by the U S. Coast and Geodetic Survey will be continued. The purpose is to detect and determine the rate of fault creep at aqueduct crossings.

C. State Water Project Facilities: Seismic Monitoring (Largely Project Fund activity. Some General Funds needed to provide data for Division of Dam Safety and North Coastal area.)

1. Jamestown, Oroville, and Cedar Springs, plus Perris and Castaic after installation--Additional components required for processing and analysis of seismic data will be acquired. Data from the Department network will be analyzed to provide immediate epicentral locations. All data from permanent stations will be analyzed and combined with other data to provide summaries of seismic activity near all State Water Project facilities including distances, magnitudes, and epicenters.

2. Portable Magnetic Tape Seismograph Systems--Provide analysis for requested seismicity studies prior to installation of permanent equipment.

D. Strong-Motion Seismograph Program (Project Fund activity. Coop in part.)

Data analysis will include analog-to-digital conversion of strong-motion seismograph records, machine processing of data, and interpretation of ground motion characteristics. Seismoscope records will also be processed and analyzed.

E. Mobile Seismograph Laboratories (Project Fund activity. Coop in part.)

Data analysis will include collation and scaling of pairs of records, analog-to-digital conversion, machine processing, and analysis of data to provide relative spectral ratios between bedrock and DWR facility foundations.

F. Tiltmeters (Project Fund activity.)

Analog-to-digital conversion where necessary and analysis of data will yield direction and rate of tilting of foundations of pumping and powerplants and other facilities or sites being tested.

G. Preparation of Reports (Project Funds or General Funds, as appropriate.)

Memorandum reports and bulletins will be prepared on the results of each data analysis activity as appropriate.

R. B. Hofmann, 5/12/67

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ADVANCE PLANNING PROGRAM
UPPER EEL RIVER DEVELOPMENT

Part I

NEED

The State Water Project is contracturally obligated to provide the minimum project yield of 4,230,000 acre-feet; a portion of this yield is derived from surplus flows in the Sacramento-San Joaquin Delta. As future development takes place, the surplus flows will be reduced in the Delta and the project will be unable to meet its obligations.

The primary purpose of the Upper Eel River Development will be to augment water supplies in the Delta and prevent any reduction in the project yield. The Upper Eel River Development can also provide supplemental water for growing statewide needs.

AUTHORITY

1. The Burns-Porter Act (Water Code Sections 12932 - 12944)

2. Contractural commitments in the water supply contracts.

3. Project Order No. 7 executed on March 9, 1964 by the Director of Water Resources, which authorized the Upper Eel River Development as an additional facility to the State Water Project.

OBJECTIVES

The overall objectives of the program are: (1) identify the specific project features which will comprise the Upper Eel River Development; (2) define the nominal capacities, sizes, and the parameters of the selected features; (3) identify local needs which could be served from the development and define the appurtenant works necessary to supply these needs; (4) determine the relationship between projected benefits and estimated costs of the project as a whole and for individual project purposes, in order to provide a cost allocation and a project service allocation among the various purposes; (5) provide comprehensive recommendations for the subsequent programs and action which will be necessary to design, construct, and operate this facility.

The initial phase of the program, July 1964 to June 1967, was directed toward selection of the conveyance route from the Middle Fork Eel River Basin to the Sacramento-San Joaquin Delta. The route selection results are published

in Bulletin No. 171-1 "Upper Eel River Development Interim Report". The results of the final phase of the program will be published in Bulletin No. 171 in 1971.

GENERAL DESCRIPTION

The Upper Eel River Development consists of conservation features on the Middle Fork Eel River, conveyance works to the Sacramento Valley, and reregulatory reservoirs on the westside of the Sacramento Valley. Water from the Middle Fork Eel River will be diverted to the valley either via Stony Creek and the Glenn Complex or via Clear Lake and Cache Creek.

The planning program will be directed towards definition of specific features of the Upper Eel River Development. Evaluations will be comprehensive and detailed and will embrace all phases of water development. They will be used to specifically define the location and nominal capacities of the major features including dams, reservoirs, tunnels, pumping plants, and hydroelectric powerplants.

Comprehensive geological studies, including surface and subsurface explorations will be conducted to evaluate the structural adequacy of dam and plant foundations, projected tunnel conditions, and the availability and characteristics of construction materials. A major portion of the program funds will be spent on this aspect.

Detailed design and cost estimates will be made for features on the Middle Fork Eel River, and on the selected conveyance route. These studies will also include cost estimates on tunnels, powerplants, and costs associated with the fish, wildlife, and recreational aspects.

The program will include comprehensive investigation and analysis regarding the following aspects of water development: flood control, fish and wildlife resources, recreational potential, water quality and sedimentation, watershed management, and land acquisition.

Economic studies will be undertaken to determine benefits, economic cost, and repayment considerations in order to ascertain that the developments to be recommended for construction are economically justified and financially feasible.

This development is being planned as a joint undertaking between state and federal agencies. The Department is the primary action agency for the State; the Corps of Engineers, Bureau of Reclamation, and Soil Conservation Service are the principle federal participants. Coordination of the joint activities is accomplished by the California State-Federal Interagency Group, with the Department acting as "Program Manager".

DATE WORK STARTED

The Advance Planning Program for the Upper Eel River Development began July 1, 1964.

ESTIMATED COMPLETION DATE

The preliminary edition of the report is scheduled for completion June 30, 1971. The final edition will be published in the fiscal year 1971-72.

ADVANCE PLANNING PROGRAM
UPPER EEL RIVER DEVELOPMENT

Part II

RESOURCES INPUT DATA

Following is the program cost in thousands of dollars, and personnel in man-years.

1966-67		1967-68		1968-69		1969-70		1970-71		1971-72	
$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.	$	M.Y.
1,378	42	1,392	47	1,400	47	1,382	51	1,366	52	30	1

PROGRAM OUTPUT DATA

Bulletin No. 171 and appendixes on Design and Cost Estimates, Geology, Planning Considerations. Rights-of-Way, Recreation, Fish and Wildlife, Water Quality, and on special studies.

WORK PROGRAM FOR BUDGET YEAR (1968-69)

1. Preliminary determination of required yield and size of features necessary to provide this yield will be made.

2. Preliminary design and cost estimates necessary for project sizing will be completed.

3. Geologic work, including landslides and seismological studies, will be continued on the Middle Fork Eel features, the conveyance tunnel, and on features on selected route.

4. Individual studies involving collection and analysis of basic data for the advance planning studies will be continued. These include hydrology, operations, water quality, water rights, rights-of-way, economic, recreation, fish and wildlife, and watershed management.

5. Coordination relative to agreements on joint state-federal participation in the Upper Eel River Development will be continued.

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PROGRAM STATEMENTS

Water Development Implementation
(Project-Oriented)

ADMINISTRATION OF STATE FINANCIAL ASSISTANCE FOR LOCAL PROJECTS (Davis-Grunsky Program) PART I

NEED

The financing of water projects by local agencies is frequently difficult, if not impossible, even though such projects may be entirely feasible from an engineering and economic standpoint. This is particularly true in the case of projects proposed to supply irrigation or domestic water in areas where the present development and assessed valuations are small.

Although there is a growing demand for outdoor recreational opportunities associated with water conservation projects, in many cases public agencies have been reluctant to provide for adequate public recreational use of reservoirs because of added costs involved.

The Legislature has directed the Department of Water Resources to administer the program of "State Financial Assistance for Local Projects" to provide financial assistance to public agencies for the construction of water projects to meet local requirements in which there is statewide interest. With the State's assistance, local agencies are able to construct projects that develop new water supplies, provide recreation and enhance fish and wildlife. In making loans or grants, the Department imposes terms and conditions necessary to protect the State's interest and insure coordinated development of the water program.

AUTHORITY

Sections 12880-12891.1 of the California Water Code.

OBJECTIVES

Further the development of needed and economically justified local water projects, and encourage public agencies to develop the public recreational and fish and wildlife enhancement potential of such projects.

GENERAL DESCRIPTION

The statewide program provides loans for feasibility studies and the construction costs of local projects. Grants are provided for certain recreation, fish and wildlife enhancement, and initial water supply and sanitary facilities costs. The State may also participate with an applicant as a partner under certain circumstances.

Projects approved for assistance must be found by the Department to be in substantial conformance with the California Water Plan, be engineeringly feasible, economically justified, and, if a loan is proposed, there must be reasonable assurance that the public agency can repay it. Loans may be made

only for that portion of the project cost which is beyond the reasonable ability of the public agency to obtain from other sources. The Department must impose such terms and conditions as are necessary to protect the State's investment and carry out the objectives of the program.

In administering the program, the Department prescribes procedures, gives information to interested agencies, receives and processes applications, makes findings of feasibility based on complete engineering, economic, and financial analyses of project reports prepared by applicants, and prepares reports to the Legislature on each application. The Department, with prior approval of the California Water Commission, may make construction loans up to $4,000,000, grants up to $400,000, and may expend up to $1,000,000 by participating as a partner with a local agency. Larger amounts must be approved by the Legislature.

When a loan or grant is approved, the Department negotiates a contract with the applicant specifying the terms and conditions of the loan or grant. Following evaluation of the contract, and pursuant to its terms, the Department reviews construction plans and specifications, makes periodic inspections of the construction work, reviews and authorizes requests for disbursement of state funds, and makes annual inspections of completed projects throughout the contractual period. An annual report is made to the Legislature at the beginning of each legislative session.

DATE WORK STARTED

September 1957.

ESTIMATED COMPLETION DATE

Continuing.

Arthur J. Walters 4/15/67

1968-69 F.Y.
Implementation II-02

SPO	W.A. 2351
ND	2352
SFBD	2354
SAC	2353
SJD	2355
SD	2356

ADMINISTRATION OF STATE FINANCIAL ASSISTANCE FOR LOCAL PROJECTS (Davis-Grunsky Program) PART II

RESOURCES INPUT DATA (in $1,000 - PF - and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	85	4.2*	78	3.9*	86	4.2*	89	4.2*	92	4.2*	95	4.2*	98	4.2*
ND	92	5.0	95	5.0	98	5.0	105	5.3	110	5.5	115	5.8	120	6.0
SFBD	74	3.7	78	4.0	80	4.0	82	4.0	85	4.0	88	4.0	91	4.0
SAC	161	8.7	131	6.5	133	6.5	137	6.5	141	6.5	145	6.5	150	6.5
SJD	113	5.7	126	6.0	127	6.0	128	6.0	128	6.0	130	6.0	130	6.0
SD	87	5.2	124	7.7	129	7.7	133	7.7	137	7.7	142	7.7	147	7.7
Contracts	(74)	(4.5)	(75)	(4.6)	(78)	(4.6)	(80)	(4.6)	(83)	(4.6)	(86)	(4.6)	(89)	(4.6)
Totals	612	32.5	632	33.3	653	33.6	674	33.9	693	33.9	715	34.2	736	34.4

* One man-year budgeted under contract with Department of Fish and Game. The fisheries biologist works for the districts. Contract personnel of Parks and Recreation assigned to the districts are budgeted by them.

PROGRAM OUTPUT DATA

In administering the program over the next five fiscal years Department personnel will (1) meet with and give information to numerous interested local agencies; (2) receive and process for determination of eligibility about 80 preliminary applications; (3) make findings on engineering, economic, and financial analyses presented in about 50 formal applications prepared by applicants, and prepare reports to the Legislature on each application.

The work described above will lead to the approval of about 45 loan or grant projects that will require (1) negotiating contracts with the applicants specifying the terms and conditions of the loan or grant; (2) reviewing project construction plans and specification; (3) making periodic inspections during construction of the work; and (4) reviewing claims and authorizing the disbursement of about $50 million of State project funds. In addition, personnel will make annual inspections of as many as 60 completed projects.

Policies and procedures will be adopted and revised to impose such terms and conditions as are necessary to protect the State's investment and carry out the objectives of the program. An annual report will be made to the Legislature at the beginning of each legislative session.

WORK PROGRAM FOR 1968-69

Statewide Planning Office. The Statewide Planning Office will continue to provide guidance and assistance to the districts in processing applications for local assistance. The office will (1) draft procedures and administrative policy statements, (2) study other assistance programs and methods of allocating costs when grants are made from two or more programs, (3) coordinate work performed in the districts with staff specialists and the legal staff, (4) work with the legal staff on proposed contracts and legislation, (5) prepare an annual report to the Legislature, (6) revise the informational brochure and carry on such other activities as may be necessary to monitor the program.

During 1968-69 most districts anticipate receiving about the same number of preliminary requests and formal applications for assistance as in the past fiscal year. While the districts anticipated reviewing about 21 preliminary and 19 formal applications, experience indicates that only an average of about 16 preliminary and 10 formal applications have been received in the past.

Specifically, each district anticipates the following workload during 1968-69.

Northern District. Based on activity during prior years, program activity for 1968-69 is expected to consist of the following:

a. Process eight requests for preliminary determination of eligibility from local agencies.
b. Process five formal applications for loans and grants from local agencies.
c. Negotiate five contracts setting gorth the terms and conditions of the loans and grants.
d. Review in detail the construction plans and specifications for three projects.
e. Administer 12 completed contracts.
f. Review and process 20 claims for funds from local agencies.
g. Perform annual inspections of seven completed projects.
h. Perform 20 engineering inspections of projects under construction.
i. Assist and advise local agencies in preparing applications and feasibility reports.

San Francisco Bay District. The District expects to process the following applications:

Preliminary

1. Three applications expected.

Formal

1. Alameda County Flood Control and Water Conservation District
2. Lake County Flood Control and Water Conservation District
3. Contra Costa County Flood Control and Water Conservation District
4. City of Salinas and County of Monterey
5. Santa Clara County Flood Control and Water Conservation District
6. Bolinas Public Utilities District.

In addition to processing applications, the District will continue administering one loan contract (American Canyon County Water District) and three grant contracts (Alameda County Flood Control and Water Conservation District, Monterey County Flood Control and Water Conservation District, and City of Santa Cruz). The District expects to administer two additional loan contracts (American Canyon County Water District and Muir Beach Community Services District) and two additional grant contracts (Sonoma County Flood Control and Water Conservation District and Napa County Flood Control and Water Conservation District).

Sacramento District. The District will continue to receive and process preliminary and formal applications for assistance, negotiate contracts with applicants for approved loans and grants, review construction plans, inspect construction of approved projects, and administer loan and grant contracts.

1. Preliminary applications for determination of eligibility for financial assistance during 1968-69 are expected from the following agencies:
   - Yolo County (Capay Valley)
   - Placer County (North Auburn)
   - Community of Clio
   - Pioneer Community Services District

2. Formal applications for financial assistance during 1968-69 are expected from the following agencies:
   - Calaveras County Water District
   - Yuba County Water Agency (New York Flat)
   - Downieville Public Utilities District
   - Magalia County Water District
   - Yolo County (Willow Slough)

3. Negotiations for grant and loan contracts with five agencies listed under Item 2 are expected to be conducted.

4. General administration of contracts including the processing of claims for approved projects will also be conducted by the Sacramento District.

5. Review of construction plans and/or inspection of project construction including recreation development will be required in connection with approved projects of the following agencies:
   - Oroville-Wyandotte Irrigation District
   - South Tahoe Public Utilities District
   - Calaveras Public Utilities District
   - Yuba County Water Agency (Bullards Bar)
   - Applegate-Clipper Gap County Water District
   - Georgetown Public Utilities District

6. Formal and informal meetings will be conducted with various local agencies to provide information regarding financial assistance under the Davis-Grunsky Act.

San Joaquin District. The District expects to process the following workload during 1968-69.

a. Process two requests for preliminary determination of eligibility.
b. Prepare one report of findings on formal application.
c. Negotiate one contract.
d. Administer six contracts.
e. Review plans and specifications for one project.
f. Make field inspections on one project under construction.

Southern District. Program activity for 1968-69 is expected to consist of the following:

1. Complete reviews of:
   a. Requests for preliminary determination of eligibility for four proposed projects.
   b. Formal applications for construction grants for projects being proposed by:
      (1) Antelope Valley-East Kern Water Agency
      (2) Twentynine Palms County Water District.
2. Contract administration:
   a. Negotiate contracts with:
      (1) San Gorgonio Pass Water Agency
      (2) Ventura County Flood Control District
      (3) Antelope Valley-East Kern Water Agency
      (4) Twentynine Palms County Water District
      (5) City of Escondido
   b. Administer nine executed contracts with:
      (1) Helix Irrigation District
      (2) City of San Diego
      (3) San Luis Obispo County Flood Control and Water Conservation District
      (4) San Bernardino Valley Municipal Water District
      (5) San Bernardino County
      (6) Los Angeles County
      (7) Mounton-Niguel Water District
      (8) Poway Municipal Water District
      (9) Las Virgenes Municipal Water District
   c. Review of nine project plans and specifications.

A. J. Walters 4/15/67

RECREATION AND FISH AND WILDLIFE ENHANCEMENT, SWF
PRELAND ACQUISITION
PART I

NEED

The rapid increase in population of the State has created a tremendous demand for outdoor recreation, particularly water-oriented recreation. Historically, people of California have been attracted to water in the pursuit of recreation, and it is evident that the large reservoirs and open canals of the State Water Facilities being constructed will be particularly attractive as centers for recreational activities, whether or not any plans are made or facilities provided to handle the activities. To meet this anticipated demand, the Department is required by law to plan in advance, and to integrate recreation and fish and wildlife enhancement with the other purposes of State Water Facilities.

Because recreation and fish and wildlife enhancement are among the purposes of the State Water Facilities, the Department is responsible for competent planning for those purposes for the following reasons:

1. to ensure that adequate and usable lands are acquired;

2. to assure that the greatest benefits are afforded from recreation and fish and wildlife, as project purposes, consistent with the other project purposes (project formulation); and

3. to enable the equitable allocation of costs among the various project purposes and beneficiaries.

AUTHORITY

Sections 11900-11925 of the California Water Code.

OBJECTIVES

Plan for the acquisition of land to ensure adequate recreation use and fish and wildlife enhancement planning to affect the fullest conservation and use of California's water resources.

GENERAL DESCRIPTION

Preland acquisition planning includes all work leading to the completion of the recreation land use and acquisition plan reports at major units of the State Water Project. The recreation land use and acquisition plan is prepared for the Director's approval and is based upon the types of recreation uses expected and upon the capacity of the land to accommodate various types of recreation use. Insofar as suitable land is available, this recommendation will include all lands necessary to completely handle predicted use and to

protect this use from encroachment by incompatible or undesirable activities and development. The preland acquisition work program is financed by the California Water Fund.

DATE WORK STARTED

Pre-1959.

ESTIMATED COMPLETION DATE

Completion of State Water Project.

E. H. Gunderson 3/30/67

1968-69 F.Y.
Implementation II-01
SPO W.A. ----
SFBD 2419
SJD 2448
SD 2456

RECREATION AND FISH AND WILDLIFE ENHANCEMENT, SWF
PRELAND ACQUISITION
PART II

RESOURCES INPUT DATA (in $1,000 - WF - and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	0	0.0	16	0.8	16	0.8	14	0.4	10	0.3	6	0.2	3	0.1
SFBD	2	0.1	3	0.1	3	0.1	3	0.1	2	0.1	1	0.1	1	0.1
SJD	25	0.5	18	0.5	27	0.5	18	0.5	0	0.0	0	0.0	0	0.0
SD	88	5.4	71	3.5	47	3.0	30	1.9	5	0.4	5	0.4	0	0.0
Totals*	115	6.0	108	4.9	93	4.4	65	2.9	17	0.8	12	0.7	4	0.2

PROGRAM OUTPUT DATA

Parks and Recreation land use and acquisition plans. Department of Water Resources land use and acquisition plans. Coordination of local agencies with acquired recreation land.

WORK PROGRAM FOR 1968-69

Statewide Planning Office. The Statewide Planning Office will corrdinate the services to be performed by Contract Services Units from the Departments of Parks and Recreation and Fish and Game. After consulting with the districts, the office will establish the (1) projects or problems to be studied, (2) staff services required, (3) priority of work, (4) type of report to be prepared, and (5) completion dates for work assigned. The office will review completed reports and prepare a reporting schedule.

The Statewide Planning Office will coordinate the budgeting of funds to be expended on recreation and fish and wildlife for specific investigations by the Contract Services Units. The office will endeavor to maintain workloads at reasonably constant levels so changes in the number of contract positions can be minimized.

San Francisco Bay District. Coordination will be continued during right-of-way acquisition. Liaison will be maintained with the Division of Design and Construction concerning recreation, fish and wildlife enhancement on the North Bay Aqueduct. A recreation land use and acquisition plan will be completed if forwarded by the Department of Parks and Recreation in 1967-68.

San Joaquin District. Prepare a land use and acquisition plan for Tupman Aquatic Recreation Area. Guide and direct the acquisition of recreation land in conjunction with the State Water Project.

* Totals include contract funds and manpower for Departments of Fish and Game and Parks and Recreation.

Southern District. Initiate Recreation Report for California Riding and Hiking Trails. Complete Recreation Report on Fairmont Buttes Reservoir. Continue development of land use and acquisition plans for wildlife enhancement and management. Continue liaison and coordination for recreation planning within Department and with interested federal, state, and local agencies. Prepare correspondence, briefing aids, and information reports in connection with recreation facilities at the State Water Project. Attend public meetings, hearings, and legislative meetings as required. Prepare and maintain control schedules, management networks and progress reports necessary for orderly implementation of work program.

E. H. Gunderson 4/15/67

VISITOR FACILITIES PLANNING
PART I

NEED

The Department must control the visiting public at State water project facilities in a safe and orderly manner so that people will not interfere with construction or operation of the project.

AUTHORITY

The Director, on May 8, 1963, approved a policy statement setting forth the full scope of the Department's interest in visitor facilities.

OBJECTIVES

To plan facilities for the guidance, information, safety, and convenience of visitors at the main features of the State Water Project.

GENERAL DESCRIPTION

Visitor centers are contemplated at major dams and other works of the State Water Project where appropriate. The scope, level, and variety of facilities and services to be provided will be commensurate with the magnitude of the water project works and the public interest therein. Visitor facilities will include a means of access to and parking at an appropriate location and, consistent with acceptable standards, may include buildings, landscaping, sanitary facilities and water, audio-visual displays, refreshment concessions, guide or interpretive services, tours, and other conveniences or services.

The Department's primary interest is in presenting the water project to the public. Consideration is given, however, to other resource programs in the project area. Where appropriate, plans are made to present such programs (i.e., forestry, soil conservation, fish and wildlife, etc.) to the public at water project visitor facilities.

Coordination will be maintained with other departments of the Resources Agency. In addition, coordination with the U. S. Bureau of Reclamation will be maintained for features included in the San Luis Division.

DATE WORK STARTED

January 1964.

ESTIMATED COMPLETION DATE

June 1969, for all presently authorized features of the State Water Project except those in the North Coastal area.

E. H. Gunderson 3/30/67

1968-69 F.Y.
Implementation II-01

	W.A.
SPO	----
SAC	2454
SJD	2453
SD	2302

VISITOR FACILITIES PLANNING
PART II

RESOURCES INPUT DATA (in $1,000 - WF - and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	0	0.0	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2
SAC	27	1.0	38	1.6	32	1.5	11	0.5	0	0.0	0	0.0	0	0.0
SJD	13	0.6	9	0.5	10	0.5	0	0.0	0	0.0	0	0.0	0	0.0
SD	49	3.3	50	3.3	52	3.5	30	2.0	10	0.7	5	0.3	5	0.3
Totals	89	4.9	99	5.6	96	5.7	43	2.7	12	0.9	7	0.5	7	0.5

PROGRAM OUTPUT DATA

Provision of visitor centers is contemplated at the sites of major dams and other works of the State Water Project where appropriate. The scope, level, and variety of facilities and services to be provided will be commensurate with the magnitude of the water project works and the public interest therein. Visitor facilities will include a means of access to and parking at an appropriate location, and, consistent with acceptable standards, may include buildings, landscaping, sanitary facilities and water, audio-visual displays, refreshment concessions, guide or interpretive services, tours, and other conveniences or services.

Coordination will be maintained with the Division of Design and Construction, Division of Right-of-Way Acquisition and with other departments of the Resources Agency. In addition, coordination with the U. S. Bureau of Reclamation will be maintained for features included in the San Luis Division.

WORK PROGRAM FOR 1968-69

Statewide Planning Office. The Statewide Planning Office will coordinate the work in the districts and develop and maintain an overall schedule for the planning of visitor facilities projects for the Deputy Director.

The Statewide Planning Office will coordinate the budgeting of funds to be expended on visitor facilities planning.

Sacramento District. Prepare contracts and supervise final design of exhibits to be located within the visitor center building at the upper overlook and in the underground powerhouse and control building. Develop final plans for the transportation of visitors from the overlook to the switchyard and into the Oroville Dam underground powerhouse. Coordinate with Department of Parks and Recreation the concession activities to be included at the visitor center. Coordinate with the various divisions of the Department, Butte County, the City of Oroville, and other departments of the Resources Agency concerning the development of facilities for visitors in the Oroville area.

San Joaquin District. Complete Romero Overlook permanent visitor center at San Luis. Prepare plans and specifications for models and displays for Romero Overlook at San Luis and the Tehachapi Pumping Plant and visitor center. Submit advance planning reports on visitor facilities at Wheeler Ridge and Tehachapi Pumping Plants and aid in the design of facilities.

Southern District. Continued preparation of proposals for establishment of exhibits at visitor facilities for Perris Dam, Pyramid Dam, Pyramid Powerplant, Castaic Powerplant, Devil Canyon Powerplant, Pearblossom Pumping Plant. Continue development of operating proposals, negotiate with local agencies and prepare agreements for permanent operation of visitor facilities. Monitor construction contracts to assure adequacy of facilities and to develop use data. Maintain liaison activiries with Design and Construction and Operations Branches program managers and local agencies to ensure compatability of the various components. Prepare correspondence pertaining to visitor facilities. Attend public meetings, hearings, and legislative meetings, as required. Prepare and maintain control schedules, management networks, and progress reports necessary for orderly implementation of work programs.

E. H. Gunderson 4/15/67

WATER RIGHTS FOR STATE WATER FACILITIES
PART I

NEED

In the project planning, stage development, and water delivery operations of the State Water Resources Development System, it is essential that the extent and priority of existing water rights be determined as related to tributary water supply. Without appropriate water rights, the State Water Facilities could not be operated and, therefore, the contracts entered into between the State of California and local water users could not be legally fulfilled. The Department must, therefore, exercise vigilance in the acquisition and the maintenance and protection of their water rights consistent with the Water Code. This would remove the State from numerous extensive and costly litigation and result in significant savings to the water contractors and taxpayers of the State.

The development of a water rights study format or methodology (Sacramento-San Joaquin Delta Water Rights Study) would enable the Department to evaluate the effects of future projects on the State Water Facilities. Early determination of a methodology which offers simplicity and flexibility is necessary. It is essential, also, that this methodology be established prior to the need for decisions regarding project staging, and for the protection of the State's rights from later applicants. In obtaining water rights for the operation of the State Water Resources Development System numerous conflicts with existing water rights and uses develop. This program will determine equitable and reasonable solutions to these conflicts and to manage the agreements setting forth such solutions.

This program is directly involved with the State Water Rights Board during the hearings on the state applications for the State Water Facilities. In addition, there is a concomitant relationship based on the State Filings which were held by the California Water Commission and which have been transferred to the State Water Rights Board.

AUTHORITY

Burns-Porter Act of 1960, Section 12934 of the State Water Code.

OBJECTIVES

Obtain, perfect, and protect the water rights permits for operation of the State Water Facilities.

GENERAL DESCRIPTION

Applications filed with the State Water Rights Board for the State Water Project will be processed and supporting engineering documentation will be prepared in conjunction with the Department's legal staff at hearing presentations, protests, and negotiations. These water rights engineering studies will be prepared, evaluated, analyzed, and recommendations will be made based on these studies.

Guidelines and support will be exchanged with the districts to develop criteria to maximize efficiency and cooperation with the Department and among the Department, state, federal, and local agencies focusing on water rights and their effects on the State Water Project. In addition, engineering data will be assembled and studies continued which will reflect new projects with the purpose in mind to maintain the integrity of the State Water Project. This aspect will be closely coordinated with the Coordinated Statewide Planning Program. As additional local projects are considered, this program foresees expanding the basic format to include individual project water rights.

This is a continuing program requiring periodic updating of the Sacramento-San Joaquin Delta Water Rights Study reflecting the effects of new water supply projects relative to the State Water Project. These new supplies might include North Coast -- Eel River imports or regional imports and their effects. Participants of this program will prepare and present as expert witnesses studies, maps, charts, exhibits, testimony, and other information supporting the State's applications for permits for these facilities during presentation to the State Water Rights Board in order to obtain permit terms under the most favorable conditions for the operation of the State Water Facilities. In addition, the execution of appropriate documents dealing with water right entitlement and operating agreements between the State and water users will require the collection and analysis of data. The negotiated terms of the water rights agreements will determine the water accounting required.

DATE WORK STARTED

July 1959.

DATE WORK COMPLETED

Continuing.

Melvin M. Schwartz 3/30/67

1968-69 F.Y.
Implementation II-01
SPO W.A. 2346
ND
SAC 2347

WATER RIGHTS FOR STATE WATER FACILITIES
PART II

RESOURCES INPUT DATA (in $1,000 - PF - and man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SPO	73	3.7	76	3.8	100	5.0	110	5.5	120	6.0	120	6.0	120	6.0
ND	--	---	20	1.0	30	1.5	40	2.0	40	2.0	60	3.0	70	3.5
SAC	175	7.3	150	7.0	150	7.0	130	6.5	120	6.0	100	5.0	90	4.5
Totals	248	11.0	246	11.8	280	13.5	280	14.0	280	14.0	280	14.0	280	14.0

PROGRAM OUTPUT DATA

Complete the water rights study in 1972-73 for the Sacramento-San Joaquin Delta and provide the means for protecting the integrity of the State Water Project by permitting rapid determination of the effects of existing and future water rights applicants upon the water supplies of the basin. Secondly, the Water Rights Program will provide a tool to aid in the forecast of the effect increased local in-basin water development has upon the export potential of the State Water Project and for project staging. Concurrently, water entitlement agreements, and contracts will be managed and monitored to insure fulfillment of contractual commitments.

WORK PROGRAM FOR 1968-69

Statewide Planning Office. Efforts in this year will primarily be directed towards achieving preliminary results for the test basins chosen for "debugging" the EDP Water Rights Program. Collection and compilation of water rights data will continue in connection with the Central Valley Basin study.

Guidance and assistance will continue to be made available to the districts attempting to connect the local programs, negotiations and problems in water rights to the overall engineering studies pertaining to state and federal water projects. Water rights determinations will be made for Davis-Grunsky and other local projects that will develop under projected legislation and advice, guidelines and technical support will be available to area management and the legal staff relating to operation, and protection of the water rights, for the State Water Facilities.

Northern District. It is anticipated that the initial program set up in 1967-68 will begin to establish water rights records of entitlements and diversions. This work would be in conjunction with the Basic Data, Surface

Water Measurements Program with the intention to formulate a basis for future water rights negotiations in new project areas.

Sacramento District. Negotiations will continue in the Delta involving water quality and salinity considerations as well as monitoring contractual commitments on the Feather River. Operational criteria will be under scrutiny to see that they conform to agreements. Streamflow, diversion and water temperature data collection will continue as interest in controlled flows and temperature will still be under study.

The management of negotiated agreements relating to the State Water Project between the State and other entities will be continued. Such agreements include the continuing exchanges of any money, water, and operational services and information.

Melvin M. Schwartz, 3/30/67

DELTA WATER PROJECT
FISH AND WILDLIFE PROTECTION STUDY

Part I

NEED

The Delta Fish and Wildlife Protection Study was established to assure adequate protection of the fish and wildlife resources of the Delta area with construction and operation of the State Water Project and a Delta Water Facility. This study is needed to collect and evaluate biological information, to clearly define the potential effects of a Delta water project on the fish and wildlife of the area, and to integrate necessary measures in the Delta water project design and operating criteria to protect and where possible enhance these resources.

AUTHORITY

California Water Code, Division 6, Part 3, Chapter 10, Article 1, Sections 11900-11901; Article 4, Sections 11910, 11911, 11913; and Part 4.6, Section 12230.

Established: Contract Interagency Agreement No. 251497, June 1961.

Expanded: Contract Interagency Agreement No. 251497, Amendment V, April 1965.

Extended: Contract Interagency Agreement No. 455326, April 1966.

OBJECTIVES

1. Develop functional design criteria for a Delta Water Facility, and
2. Establish Delta Water Facility operating criteria for the protection and possible enhancement of fish and wildlife resources.

GENERAL DESCRIPTION

This is a cooperative study being directed and conducted jointly by the Departments of Water Resources and Fish and Game. Biological studies are being made by the Department of Fish and Game. Engineering support is provided by the Department of Water Resources.

The activities needed to insure the protection of the fish and wildlife resources of the Delta can be divided into two types: (1) investigations of the changes in the environment which will result from the construction and operation of Delta Water Facilities; and (2) investigations of the methods to protect fish and wildlife from direct damage due to project facilities and operation.

Activities include the following: (1) determine present conditions of Delta fish and wildlife in relation to the physical environment; (2) determine biological parameters necessary for design, construction, and operation of the Delta Water Facilities to protect fish and wildlife resources and their use; (3) recommend means for compensation of any unavoidable losses to fish and wildlife resulting from construction or operation of Delta Water Facilities; (4) develop an understanding of the relationship between nutrients, phytoplankton, and dissolved oxygen in order to recommend design and operating criteria needed to meet water quality requirements of the fisheries resource; (5) recommend measures which are compatible with the protection studies and which may be taken

to enhance the fish and wildlife resources in connection with the development, construction, and operation of Delta Water Facilities; and (6) recommend measures to protect the fish and wildlife resources of the Delta during the interim period between the initial diversion of water at the head of the California Aqueduct and the completion of the Delta Water Facilities.

DATE WORK STARTED

Initial Contract: August 10, 1961.

Expansion Agreement: April 5, 1965.

Present Contract: July 1, 1966.

ESTIMATED COMPLETION DATE

June 30, 1971.

DELTA WATER PROJECT
FISH AND WILDLIFE PROTECTION STUDY

SAC W.A. 2382

Part II

RESOURCES INPUT DATA

COSTS IN THOUSANDS OF DOLLARS AND PERSONNEL IN MAN-YEARS

	1966-67		1967-68		1968-69*		1969-70*		1970-71*	
	$	MY	$	MY	$	MY	$	MY	$	MY
SAC	574	38.3	498	32.6	427	27.6	333	19.6	292	17.4
SFB[1/]	13	0.8	12	0.8	12	0.8	12	0.8		
TOTAL	587	39.1	510	33.4	439	28.4	345	20.4	292	17.4

* Increase in estimates are due to increase in administrative costs in Department of Fish and Game.

PROGRAM OUTPUT DATA

October 1968: 7th Annual Report

July 1969: Final Dissolved Oxygen-Nutrient Study Report

October 1969: 8th Annual Report

July 1970: Final Striped Bass Report

July 1970: Final Suisun Marsh Report

October 1970: Neomysis Evaluation Report

October 1970: 9th Annual Report

June 1971: Final Delta Fish and Wildlife Study Report

WORK PROGRAM FOR BUDGET YEAR 1968-69 (Sacramento District)

1. Data evaluation of Delta water project influences
2. Development of functional design criteria for intake facilities and fish return facilities
3. Recommend size and location of Delta release facilities
4. Recommend project operating criteria for striped bass
5. Define relationships between channel salinities, soil salinities, and productivity of water fowl food in Suisun Marsh

D

1/ Act as participants to the Sacramento District

6. Data evaluation on flow and quality relationships and water quality requirements of the fisheries resource

7. Recommend measures to protect fish and wildlife resources during the interim period of project operation

IMPLEMENTATION OF DELTA WATER FACILITIES

Part I

NEED

The Peripheral Canal concept has been selected for the Delta Water Facilities of the State Water Project, and for the Delta water transfer feature of the Central Valley Project. This concept is outlined in an Interagency Delta Committee report, "Plan of Development, Sacramento-San Joaquin Delta", January 1965.

A peripheral canal is needed to convey high quality surplus waters of the Sacramento River, from below Sacramento to the state and federal export pumps in the southern Delta; and to serve Delta needs of water supply, salinity repulsion, fish and wildlife, and other uses. Of the many plans studied for the Delta, the Peripheral Canal concept accomplishes these purposes in the most effective and acceptable manner.

Completion of the Canal in the 1970's is needed to guarantee the State's export quality objectives, protect the Delta fishery, reduce damage to Delta channels, tie in with the Westside Freeway, and reduce the need for expenditures on interim works in the Delta channels.

The Implementation of Delta Water Facilities Program is needed to implement the Peripheral Canal concept and associated features, as the Delta Water Facilities of the State Water Project. Studies are required to fully define the timing, the physical work, the size, and the exact location of the general features outlined in the Interagency Delta Committee's concept. The specific works and the Canal's final alignment must be compatible with local

development, and acceptable to local, state, and federal interests. Close coordination with all interests is required. Operating criteria must be formulated for the Canal itself, and for the Delta. Detailed studies are needed to more completely determine the effects of the Canal construction and its operation on the channels, environment, and uses in the Delta, to serve and protect these.

Federal authorization for participation by the U. S. Bureau of Reclamation must be sought through local and statewide support, and a State course of action must be formulated and followed to serve the State's needs until this federal authorization is achieved.

AUTHORITY

A. Implementation Memorandum approved by Director on May 11, 1965.

B. Project Order No. 12, on Peripheral Canal, issued by Director on March 16, 1966.

C. Project Order No. 13 on Clifton Court Forebay, issued by Director on March 21, 1966.

OBJECTIVES

To implement features of the Plan of Development for Sacramento-San Joaquin Delta, including:

1. Clifton Court Forebay.
2. Peripheral Canal.
3. Development of criteria for project operation.
4. Other components as needed to satisfy state obligation in the Delta.

GENERAL DESCRIPTION

The components of the plan of development, recommended in the Interagency Delta Committee's report, are:

COMPONENT	ESTIMATED CAPITAL COSTS (In Millions of Dollars)
Peripheral Canal and Appurtenances*	133.5
Recreation Facilities Associated with Peripheral Canal	13.0
Navigation Access Facilities Associated with Peripheral Canal	2.0
Kellogg Project	54.4
Western Delta Agricultural Water Facilities	6.8
Southern Solano County Water Facilities	6.8
Delta Levee and Bank Protection Project	30.0
Recreation Features Associated with Levee Improvements	10.0
Stockton Deep-Water Channel Improvement Project	34.5
Recreation Features Associated with Navigation Improvement	1.0
Suisun Marsh Management Water Supply Facilities	1.5
Suisun Marsh Recreation Features	1.0
Game Management Areas	3.0
Environmental Control Facilities for Nonwater Project Associated Recreation	2.0
TOTAL	299.5

*Includes Clifton Court Forebay

The Committee's report listed the Department of Water Resources as the agency having direct or joint responsibility for implementation of 3 of the 14 components: (1) Peripheral Canal; (2) Western Delta Agricultural Water Facilities; and (3) Southern Solano County Water Facilities. As the state agency responsible for overall coordination of water development in California, the Department has a vital interest in the successful implementation of the entire Delta plan. The Department's interest in other components of the Plan of Development is discussed in a memorandum from Carl A. Werner to W. E. Warne, dated October 6, 1965, entitled:

"Implementation of the Plan of Development, Sacramento-San Joaquin Delta", and approved by the Director on October 27, 1965.

The work program to implement the Peripheral Canal Plan will require Basic Operation Investigations and Advanced Planning Studies. Extensive coordination will be required with concerned local,state, and federal agencies, and the Department's Division of Design and Construction.

Basic Operating Investigations - W.A. 2463 - Definite operational criteria will be developed and control systems will be implemented for the Delta Water Facilities. The studies needed to size the features of the Peripheral Canal Plan and to determine Delta operating criteria can be categorized as: (1) Delta Operating Criteria Studies; (2) Water Quality Surveillance Studies; (3) Soil Salinity Monitoring Studies; (4) Scour Monitoring Studies; and (5) Technical Support Studies.

Studies for developing Delta operating criteria must take into account the needs of all interests concerned with the Delta. A Delta Operations Manual will be prepared to assist designers and operators of the Delta Water Facilities in meeting export commitments, Delta fishery requirements, and in meeting contractual water quality agreements negotiated with local interests, both after the Peripheral Canal is complete and during the interim period before the Canal is complete.

A water quality surveillance study will determine the need for a surveillance system and carry out its implementation.

The system will provide data to use in conjunction with the Delta Operations Manual to operate the Delta Water Facilities.

A soil salinity monitoring study will provide the data required to evaluate the effect on Delta island soil salinities of increasing the time high channel salinities occur.

A scour monitoring study will provide the data required to evaluate the effect of project operation, during the interim period prior to operation of the Peripheral Canal, on the channels in the southwestern Delta and will define the remedial works should any be required.

The technical support studies include all tidal hydraulic, water quality, and operation studies that are necessary to provide the basic input data required for the studies mentioned above and all other special studies requested as a result of water rights hearings, requests from local interests, and requests from other public and private study groups.

Liaison is maintained with the San Joaquin District and the San Francisco Bay District to assure that the Peripheral Canal and Delta water quality surveillance system and the San Joaquin Valley Drain Surveillance System will complement each other. Coordination is achieved by the Delta-Bay Committee and Delta-Bay Surveillance Task Force.

Advanced Planning Studies for W.A. 2464 - The advanced planning studies will define the alignment and principal features of the Peripheral Canal; define a state course of action program should

D

federal authorization for the Peripheral Canal be delayed; define the State's participation in the joint federal-state Peripheral Canal project; define the State's participation in the other components in the "Plan of Development" recommended by the Interagency Delta Committee; and provide coordination of studies with other agencies of local interests.

The Delta Implementation Unit (under W.A. 2464) will specify to the Division of Design and Construction the principal features of the Peripheral Canal as advanced planning proceeds, including functional requirements and factors which will influence the final alignment and sizing.

Close coordination is maintained with the Canal Alignment Program of the Division of Design and Construction (W.A. 4746) and with the Bureau of Reclamation, through an Interagency Alignment Work Group.

As alignment studies progress on each reach of the canal, the Division of Design and Construction will rely on the Sacramento District to insure that functional and policy requirements are met. Take lines will be adopted upon mutual agreement between the Sacramento District, the Division of Design and Construction, and the U. S. Bureau of Reclamation.

The implementation of the Peripheral Canal is a complex process requiring multiagency committee work and extensive coordination. The Delta Studies Section provides staff and leadership for this work.

An Interagency Alignment Work Group, composed of members from the Department and the U. S. Bureau of Reclamation provides cooperation for the selection of the final alignment. A Recreation and Fish and Wildlife Committee, composed of members from concerned state and federal agencies, provides guidelines for fish and wildlife planning and development. The Delta Studies Section contributes staff in connection with the work of these committees.

In addition to the work on the Peripheral Canal component of the Delta plan, advanced planning studies will be made to: (1) provide replacement water to Contra Costa County; (2) determine the need for, size and extent of western Delta agricultural water facilities; and (3) establish the extent of state participation on the Delta Levee and Bank Protection Program. Items 1 and 2 are dependent upon the outcome of water entitlement negotiations being conducted by the Department, local interests, and the U. S. Bureau of Reclamation.

Advanced planning and coordination activities will continue toward implementaiton of the Clifton Court Forebay by 1969. The Coordination Unit under W.A. 2464 will be responsible for this coordination.

In addition to the Clifton Court work, the Coordination Unit will undertake and coordinate numerous special assignments. These include: review of U. S. Bureau of Reclamation's feasibility reports for the Peripheral Canal; studies to identify, evaluate, and recommend interim course of action for the Department of Water

Resources in the event federal participation in the Peripheral Canal is delayed; answer correspondence, prepare speeches, conduct Delta tours; and review reports of others on Delta projects.

DATE WORK STARTED

July 1, 1965

ESTIMATED COMPLETION DATE

A. Clifton Court Forebay, 1969.

B. Peripheral Canal, 1975.

C. Implementation of other Delta components will depend on present studies and negotiations.

IMPLEMENTATION OF DELTA WATER FACILITIES

Part II

Resources Input Data

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
SAC W. A. 2463	192	9.2	310	12.0	350	13.1	350	13.1	300	12.0	250	10.5	245	10.0
SAC W. A. 2464	572	20.2	416	21.4	400	21.2	250	14.1	200	11.3	150	8.5	145	8.2
Totals	764	29.4	726	33.4	750	34.3	600	27.2	500	23.3	400	19.0	390	18.2

Program Output Data

A. Basic Operation Investigations - W. A. 2463.

1. Operations Manual for the Delta Water Facilities.
   a. Pre-Peripheral Canal.
   b. Post-Peripheral Canal.
2. Water Quality Surveillance System.
   a. Determine system needs.
   b. Install system.
3. Implement Soil Salinity Monitoring Study.
4. Implement Scour Monitoring Study and define remedial works if required.
5. Technical Support Studies, as required.

B. Advanced Planning Studies - W. A. 2464.

1. Clifton Court Forebay will be implemented.
2. Peripheral Canal Plan will be sized and alignment established.
3. A State Course of Action will be recommended in staging the project.
4. Other components of Delta Plan of Development defined.

Work Program (1968-69)

A. Basic Operation Investigations - W. A. 2463.

1. Delta Operating Criteria Studies.

a. Issue draft of Operations Manual for Pre-Peripheral Canal period.

b. Continue studies for Post-Peripheral Canal Operating Criteria.

2. Water Quality Surveillance Studies.

a. Define surveillance system needs.

b. Implement recommended system.

3. Soil Salinity Monitoring Study.

a. Data collection and evaluation.

4. Scour Monitoring Study.

a. Data collection and evaluation.

b. Define remedial works if required.

5. Technical Support Studies as assigned.

B. Advanced Planning Studies - W. A. 2464.

1. Fish Protective Facility.

a. Complete debris study of fine mesh fish screen.

b. Select fish protective facility for Peripheral Canal.

2. Joint Project Agreements.

a. Complete joint project agreements with U.S.B.R.

b. Complete agreements with Highways for borrow material.

c. Complete agreements with counties for road and bridge relocations.

3. Define Peripheral Canal Facilities.

   a. Select, size and locate all facilities.

   b. Hold public hearings.

   c. Complete hydrology studies.

   d. Complete recreation land-use and acquisition plans.

4. State Only Action Program.

   a. Implement course of action for staging of Delta Water Facilities.

5. Western Delta Water Supply.

   a. Studies will continue to define States role in Kellogg Project.

   b. Studies will continue to evaluate impact of State Water Project on Western Delta.

6. General Coordination.

   a. General coordination of studies will continue.

   b. Special assignments will be completed as required.

SAN JOAQUIN VALLEY DRAINAGE INVESTIGATION

PART I

A. Need -

The quality of the surface and ground water resources in many areas of the San Joaquin Valley is being degraded because of the increased intensity of land utilization and the accompanying increase in water use. There is a need to implement a plan for waste water disposal facilities in the Valley to reduce the increasing degradation, to protect the quality of the surface and ground water supplies, and to preserve the agricultural economic structure of this Valley. The areas on the valley floor which required the disposal of waste waters extend throughout the length of the Valley.

As a first step in implementing this plan, the Federal Government will build the San Luis Interceptor Drain to serve principally the San Luis Unit of the Central Valley Project in western Fresno County and other users in the northern part of the Valley who will contract with the Federal Government for disposal service. The Interceptor Drain will be a federal-only facility and will be the first step in the development of sufficient facilities needed to dispose of the Valley's waste waters. There is a need to develop a plan for the state-only San Joaquin Drainage Facilities that can be integrated in the future with the federal-only San Luis Interceptor Drain.

There will be a need to continue the joint federal-state study of denitrification of waste waters by biological treatment, desalting or other means as an alternative to the extension of the disposal system from the interim discharge point near Antioch Bridge to the ocean. This joint study is being initiated in 1966-67 and will continue through 1969-70. The Federal Government will provide 70 percent of the funds for the joint study. The results of this study will be essential for the design of a state-only drain in the future.

B. Authority -

San Joaquin Valley Drainage Investigation authorized by the 1957 Budget Act. Reauthorized annually by succeeding budget acts. Investigation initially authorized by recommendation in the Tenth Partial Report by the Joint Committee on Water Problems of the California Legislature in March 1957, - "Drainage Problems in the San Joaquin Valley of California".

C. Objectives -

To formulate a plan to provide for disposal of waste waters in the portion of the San Joaquin Valley not served by the San Luis Interceptor Drain, to determine beneficial reuse of these waste waters, to determine feasibility of treatment to remove nutrients in waste waters before their discharge from the Drain, and to determine fair and equitable method for recovery of project costs.

D. General Description -

The initial purpose of this investigation, as authorized by the Legislature, was to study the need for a Master Drain that would provide protection for the agricultural economic structure of the San Joaquin Valley. As investigation progressed, it became apparent that to accomplish this goal, the prime purpose of the investigation should be to develop a plan that would protect the quality of the surface and ground water supplies of the Valley. Of all of the alternatives studied, the best means to accomplish this purpose is to transport valley waste waters to a safe point of disposal in brackish tidal waters. Since the passage of the Burns-Porter and the San Luis Authorizing Acts in 1960, an additional purpose has been to implement a combined federal-state Master Drain for the Valley.

In 1967 it became apparent that the beneficiaries of the State's share of the capacity in the first stage of the Master Drain were not willing to repay the State's share of the project cost. It was decided that the Federal Government should construct the San Luis Interceptor Drain as the first stage of a larger waste water disposal system. At this time the State would acquire only the necessary additional right-of-way to provide for a future state-only facility that could be integrated with the federal-only facility. The state-only facility would be constructed on the State's right-of-way when the reimbursable costs for this facility can be equitably recovered.

Past and present studies in this investigation include: the determination of the present and future quantity and quality of agricultural waste waters requiring disposal from the Valley, the need for the disposal of other waste waters, delineation of valley areas having a present and future need for waste water disposal, development and evaluation of a flexible basic disposal plan and alternatives, engineering feasibility--economic justification--financial feasibility of the plan, coordination with U. S. Bureau of Reclamation in joint planning studies to develop a combined-use Master Drain instead of two separate drains, to determine the best methods to repay project costs, to determine the effect of the drain discharge on the Delta-San Francisco Bay and Pacific Ocean, and a preliminary study of feasible means to remove or reduce concentration of nutrients in the drain waters before their discharge from the Drain.

The removal of nutrients from the waste waters before they are discharged is an alternative to extending or rerouting the Drain to the Pacific Ocean. During 1968-69, joint studies of nutrient removal will be continued in the San Joaquin Valley with the Federal Water Pollution Control Administration and the Bureau of Reclamation, respectively, providing 25 and 45 percent of the cost. Anaerobic and aerobic biological treatment methods will be studied in addition to desalting by electrodialysis and reverse osmosis methods.

The advance planning will be completed for the state-only San Joaquin Drainage Facilities which can be integrated with the federal-only San Luis Interceptor Drain.

E. Date Work Started -

Initiated in July 1957. General advance planning in July 1962. Biological treatment study, July 1963. Project implementation, January 1965. Final advance planning for state-only plan, March 1967.

F. Estimated Completion Date -

Final advance planning for state-only plan, complete June 1969. Treatment studies, complete June 1970.

SAN JOAQUIN VALLEY DRAINAGE INVESTIGATION
PART II

RESOURCES INPUT DATA (in $1,000 and man-years)

	1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY
Proj. Impl.	105	4.7	--	--	--	--	--	--	--	--
Qual. and Treat.	365*	10.0	210**	7.5	--	--	--	--	--	--
Totals	470	14.7	210	7.5	--	--	--	--	--	--

* $192,500 will be refunded by U.S. Bureau of Reclamation and Federal Water Pollution Control Administration.
**$105,000 will be refunded by U.S. Bureau of Reclamation and Federal Water Pollution Control Administration.

PROGRAM OUTPUT DATA

A plan for the state-only San Joaquin Drainage Facilities, including capacity, staging, dates of construction, plan of operation, and a feasible method to recover project costs. Final report and appendices on those phases of investigation scheduled to be completed in June 1969. Public hearings on report and presentation to Legislature.

Definition of treatment method. Costs, efficiencies, and design criteria of recommended method of treatment. Final report on these phases to be completed June 1970.

WORK PROGRAM FOR 1968-69.

Completion of all studies related to the planning of the state-only San Joaquin Drainage Facilities. Preparation of a final report and appendices on those phases of investigation scheduled to be completed June 1969. To prepare for and hold public hearings on this report and to present copies to the Legislature during 1969.

Refine quality prediction of waters in Master Drain. Operate prepilot biological treatment plan during 1968 irrigation season. Evaluate data from 1968 operation, and if necessary, modify prepilot plant for 1969 irrigation season operation.

EARTHQUAKE HAZARD AND ENGINEERING CRITERIA PROGRAM
PART I

NEED

The Department of Water Resources has the responsibility to ensure that the State Water Project will be as safe and reliable as is economically feasible when shaken or disrupted by any earthquake or ground movement which may reasonably be expected during the life of the Project. The Department must consider the potential hazards to adjacent populations posed by 6.8 million acre-feet of water held back by Project structures. It must also consider the potential losses to water users and to the State if delivery of Project water were cut off for a prolonged period.

To ensure the continuing integrity of the State Water Project, and to fulfill its responsibility for the safe operation of Project facilities the Department needs the following.

1. Quantitative evaluations of the earthquake and ground movement hazards at sites of State Water Project facilities.

2. Appraisals of earthquake and ground movement damage to hydraulic structures throughout the world so that potential damage to Project facilities may be more realistically assessed and corrective measures applied in advance to minimize or preclude damage.

AUTHORITY

The Department's programs to investigate the potential effects of earthquakes and ground movements and to monitor these to ensure the safety of the Project were first authorized in the Budget Act of 1959. The Department also has statutory authority to investigate the effects of ground movement and other natural phenomena on the safety of hydraulic structures under its jurisdiction which are not part of the State Water Project (Water Code Sections 225, 227, 6075, 6081, 6100, and 12616).

OBJECTIVES

The program's current objectives are:

1. Evaluate and report on earthquake and ground movement hazards at sites of State Water Project facilities with respect to their planning, design, operation, and safety utilizing data provided by Earthquake Data Collection and Data Analysis programs.

2. Make engineering appraisals of damage to hydraulic structures caused by earthquakes and ground movements so as to more realistically assess the types of damage which might be sustained by facilities of the State Water Project.

GENERAL DESCRIPTION

Reports on earthquake and ground movement hazards are prepared for specific water project sites. These reports will include estimates of maximum accelerations and amplitudes of ground motions; effective number of pulsations; maximum fault displacement; and hazards related to secondary seismic effects such as landslides, mudflows, ground settlement, tsunamis, and seiches.

When hydraulic structures are damaged by earthquakes, the damage and causative factors are studied to develop criteria applicable to the design, operation, and safety of State Water Project facilities.

Contact will be maintained with State, federal, and private agencies and universities to provide coordination and cooperation on dynamic analysis and design studies, and to keep informed about the latest and best techniques, procedures, etc. in this rapidly advancing technological field. A library of reports and data is kept up to date so that the latest information will be readily available to design engineers in the Division of Design and Construction and elsewhere in the Department.

DATE WORK STARTED

Work was initiated in January 1959. Participation in Federal-State Cooperative Leveling in Subsidence Areas began in July 1960. The Federal-State Cooperative Seismologic and Geodetic Programs for Earthquake Engineering and Additional Horizontal and Vertical Geodetic Control were initiated in July 1963.

The three Federal-State cooperative studies were combined under the title, "Federal-State Cooperative Earthquake Engineering Surveys" in the 1965-66 budget.

Centralization of Departmental and cooperative seismic and geodetic programs and regrouping of the activities into three programs, of which this is one, was implemented in July 1966.

ESTIMATED COMPLETION DATE

This is a continuing program.

R. B. Hofmann, 5/12/67

EARTHQUAKE HAZARD AND ENGINEERING CRITERIA PROGRAM
PART II

RESOURCES INPUT DATA

(Costs in thousands of dollars and personnel in man-years)

	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY
PF	157	4	30	1.5	25	1.0	25	1.0	25	1.0	20	0.8	15	0.5

RESOURCES OUTPUT DATA

Program output includes the following.

1. Hazard memorandum reports--Reports on evaluations of earthquake and ground movement hazards at individual State Water Project sites are prepared in accordance with schedules developed by the Divisions of Design and Construction and Operations for State Water Project facilities, and by the Northern Branch for advanced planning studies in the Upper Eel River Development area.

2. Memorandum reports on earthquake damage--When damaging earthquakes occur, reports will be prepared which will summarize the results of investigations of earthquake damage to hydraulic structures, contributing geologic factors, and application of the information toward improved design, operation, maintenance, and safety procedures for State Water Project facilities.

WORK PROGRAM FOR 1968-69

1. Preparation of reports on earthquake and ground movement hazards at State Water Project sites will be continued to provide the most advanced data available from Departmental earthquake engineering programs and from other sources. Hazard reports will be prepared in accordance with schedules developed by the Divisions of Design and Construction and Operations for State Water Project facilities, and by the Northern Branch for advanced planning studies in the Upper Eel River Development area. Each report will include:

a. Map of epicenters in area.

b. List of damage and maximum intensities of record.

c. Estimate of expected maximum acceleration.

d. List of major faults in area and history of their activity from published observations or geological studies.

The reports will be augmented with pertinent data from:

a. Geodimeter Fault Monitoring Program.

b. Strong-motion data including theoretical estimates.

c. Earthquake damage probability maps.

d. Relative spectral ratios.

e. Summary of potential secondary effects, e.g. landslides, mudflows, seiches, tsunamis.

2. Investigations to evaluate the damaging effects of earthquakes and ground movements on hydraulic structures will be continued using the team concept by deploying engineers, geologists, seismologists, and other specialists into earthquake-stricken areas when and as appropriate. Because much of the technology pertaining to large hydraulic structures is new, knowledge of the types of earthquake damage that can occur to these structures, singly or in a complex system, is limited. Thus every opportunity must be taken to learn from actual damage, whether it occurs within the area of the State Water Project or distant from it.

R. B. Hofmann, 5/12/67