

CENTRAL DELTA WATER AGENCY

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August 8, 2014

Barbara L. Evoy, Deputy Director
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1001 I Street
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bevoy@waterboards.ca.gov

Re: July 23, 2014 Letter from Mark Cowin, Director, Department of Water Resources
and David G. Murillo, Regional Director, Bureau of Reclamation

Dear Ms. Evoy:

As you know, we believe the SWP and CVP have been engaged in a pattern and practice of violating the D-1641 water quality objectives to facilitate greater exports from the Delta. They fail to make a good faith effort to operate the projects to meet the water quality objectives in the event of a six year drought such as 1929-1934 or 1987-1992. They store natural flow in violation of the terms of their permits and licenses. They store and divert during the winter and spring when such water would naturally flush the Delta pool and then seek to avoid the legally required offsetting water quality protection in the summer. They facilitate and manipulate water for transfers to export service areas including transfers which provide for groundwater substitution without regard to the reduction of groundwater accretions to the natural flow and increased natural surface flow losses to the lowered groundwater. They ignore their obligation to provide salinity control and an adequate water supply for the Delta and the solemn promise that underlies the authorization for both the SWP and CVP that only water which is truly surplus to the present and future needs including fish and wildlife needs of the Delta and other areas of origin would be exported. The projects' unlawful actions have gone unchecked by their sister State and Federal agencies. This is due in great part to the conflict of interest of having one agency of the State enforcing against another agency of the State and similarly for the Federal agencies.

The subject request is just another example of the SWP and CVP operator efforts to circumvent rather than act in good faith to fulfill their obligations to the Delta. Their actions are of course driven by their respective export contractors.

The claimed lack of information for the SWRCB to carry out its responsibilities is

unfounded. While fixing a quantification is not appropriate for riparian use, the consumptive use of delta diversions is well understood and reporting has been quite good. The projects have a very comprehensive model for Delta consumption use and numerous supporting studies, including comprehensive Delta water right investigations dating back to the 1950s. A next step which the DWR considered in 2007, but was not pursued is the use of satellite data to get real time water consumption in the Delta and throughout the State, thereby eliminating the need for cumbersome and unnecessary reporting. Attached hereto as Exhibit 1 are excerpts from the September 2013 Center for Watershed Sciences University of California, Davis study Comparing Consumptive Agricultural Water Use in the Sacramento-San Joaquin Delta - A Proof of Concept Using Remote Sensing. The study shows that the variations in the different methods for determining consumptive use is not great and the Satellite data can be used to provide real time information on consumptive use. The time and expense of pursuing the suggested demand for information would best be directed at perfecting the use of satellite data to provide real time information. In the Delta all water not consumed is recycled back to the Delta channels and because of seepage and artesian flow measuring the diversion serves little purpose.

As to quantification of water rights a basin wide adjudication is required. For the Delta the connection to the Bay and thence to the ocean renders the question of quantity a non-issue. The projects recognized this fact in the past but now seek to confuse the issue by putting forth without support that the quality of water (allegedly ocean water) limits the right of Delta landowners to divert.

The Delta Pool is somewhat like a lake. The volume of water in the channels constitutes the pool or lake which actually extends westerly beyond the legally defined Delta. There are inflows from the tributary rivers to the North, South, East and West, there is inflow from the Bay, there is precipitation and there are local sources such as accretions from groundwater and artesian flows. The water quality in the pool will vary depending upon conditions and there will be changes in volume due to tides and flood flow but absent project operations there will be no lack of water. Even without river flow, the lands within the tidal range are riparian to the pool. It is generally understood that the Delta Pool has an outlet at Carquinez for the inflow from the multitude of tributaries flowing into and through the Delta. For most of the time in most years there is river flow into and out of the Delta Pool. Even without river flow, the tides move water into and out of the Delta pool. On the ebb tides, water flows out of the pool through Suisun Bay and the Carquinez Strait. On the flood tides, water from the ocean flows into San Francisco Bay mixing with the blend of fresh and salt water in the bay and then flows inland through Carquinez Strait. The mix varies and at times fresh water extends to the west and at times of flood even into the ocean. Absent export project operations, most of the time there is a net outflow. The tidal cycle includes two ebb tides and two flood tides about every 25 hours. Tidal effects extend inland to about West Sacramento on the Sacramento River and to Vernalis on the San Joaquin River.

The law is crystal clear that riparian rights extend to lands contiguous to lakes and ponds and similar waterbodies just as they do to lands contiguous to flowing rivers and streams.

“It is not essential to a watercourse that the banks shall be unchangeable, or that there shall be everywhere a visible change in the angle of ascent, marking the line between bed and banks. The law cannot fix the limits of variation in these and other particulars. As was said, in effect, by Curtis, J. (*Howard v. Ingersoll*, 13 How. 428), the bed and banks or the channel is in all cases a natural object, to be sought after not merely by the application of any abstract rules, but, ‘like other natural objects, to be sought for and bound by the distinctive appearances it presents.’ Whether, however, worn deep by the action of the water, or following a natural depression without any marked erosion of soil or rock; whether distinguished by a difference of vegetation or otherwise rendered preceptible, a channel is necessary to the constitution of a watercourse.

. . . We can conceive that along the course of a stream there may be shallow places where the water spreads and where there is no distinct ravine or gully. Two ascending surfaces may rise from the line of meeting very gradually for an indefinite distance on each side. In such case, if water flowed periodically at the portion of the depression, it flowed in a channel, notwithstanding the fact that, the water being *withdrawn*, the ‘distinctive appearances’ that it had ever flowed there would soon disappear.” *Lux v. Haggin* (1886) 69 Cal. 255, 418 and 419.

The Delta Pool is wide where the tidal influence intersects the flow from the numerous tributaries and generally narrows as flow moves west becoming a very distinct single channel at Carquinez Strait.

Even without flow, the Delta pool is a water body to which riparian rights attach. In the case of *Turner v. James Canal Co.* (1909) 155 Cal. 82, the California Supreme Court addressed the question of riparian rights to Fresno Slough during the very considerable period of each year when there was no flow from the Kings River. At page 87, the Court states:

“The right of a riparian owner to the use of water bordering upon his land does not, as plaintiffs content, arise from the fact that the water is flowing, and that any part thereof taken from the stream is immediately replaced by water from the current above it. It comes from the situation of the land with respect to the water, the opportunity afforded thereby to divert and use the water upon the land, the natural advantages and benefits resulting from the relative positions, and the presumption that the owner of the land acquired it with a view to the use and enjoyment of those opportunities,

advantages, and benefits. *Duckworth v. Watsonville, etc., Co.*, 150 Cal. 526, 89 Pac. 338. Out of regard to the equal rights of others whose lands may abut upon the same water, the law has declared, as will hereafter be more fully shown, that the use of the water for irrigation, so far as it affects the right of others similarly situated, must be reasonable, and must be confined to a reasonable share thereof; but, with this common limitation, the right to use water upon adjoining land applies as well to the water of a lake, pond, slough, or any natural body of water, by whatever name it may be called, as to a running stream.”

At page 88, the Court concludes:

“As we have concluded that riparian rights do exist in a body of water not flowing, it is unnecessary to discuss the question of the things essential to a water course.”

Beginning at page 88 the court went on to include numerous citations of authority including a citation to (1 Farnham on Waters, Sec. 62, p. 278) as follows: “The principle upon which these rights are founded is equally applicable to all bodies of water, whether large or small, tidal or non-tidal.”

For the Delta, the water available for diversion from the Delta pool by pre-1914 and riparian water right holders includes water from the Bay and (in turn the Pacific Ocean) natural surface flow from the tributaries, the accretions from groundwater, artesian flows into Delta islands and channels, precipitation, return flow from upstream use of natural surface flow and below ground flow, return flow from power diversions, physical solution flows, water provided pursuant to agreements and water provided by reason of statutory entitlements.

Except perhaps in limited areas along the edges of the Delta due to siltation, the Delta channels are of sufficient depth and size that in the absence of river flow water would always be available for diversion in sufficient quantities.

The Delta as defined in 12220 of the Water Code encompasses the tidal zone. With rising sea levels, the extent of the tidal zone is expected to increase. There are two high (flood) tides and two low (ebb) tides about every 25 hours. (See attached Exhibit 2 - Representative reflection of tides)

The tidal exchange in the Delta at the western edge is typically in the range of 330,000 cfs which can be contrasted to summer inflows in the range of 10,000 cfs and net Delta outflows in the range of 5,000 cfs. (See Exhibit 3 page 21 from DWR 1993 Delta Atlas.)

In the June 1969 DWR Memorandum Report - the "Delta and the State Water Project" in describing the purpose and history of negotiations with Delta interests the Department explained:

"During the 1950's the Department of Water Resources cooperated with the Bureau of Reclamation and the local Delta water users in studies to identify individual entitlements to the waters of the Sacramento River and the Delta. These studies, using the classical approach to solution of water rights problems, considered priority of rights to quantity of water rather than quality. No resolution was reached in the Delta using this approach. Actually, in the Delta, the question of quantity is of little concern, since the Delta is never short of water. If flow from the tributary streams were insufficient to meet Delta use, water from the Pacific Ocean would flow through the San Francisco Bay system and fill the Delta channels." (Emphasis added)

"Since water shortage in the Delta is not a problem, it was necessary to develop a quality "yardstick" to guide project operation in the Delta."

(See Exhibit 4, pages 35 and 36 of excerpts from DWR Memorandum Report June 1969 titled *The Delta and The State Water Project*.)

The contract between the State of California Department of Water Resources and North Delta Water Agency for the Assurance of a Dependable Water Supply of Suitable Quality dated January 28, 1981, provides further confirmation of the unique physical setting of the Delta in that it has additional natural flow from the bay and ocean. The Contract provides agreement that:

"(e) Water problems within the Delta are unique within the State of California. As a result of the geographical location of the lands of the Delta and tidal influences, there is no physical shortage of water. Intrusion of saline ocean water and municipal, industrial and agricultural discharges and return flows, tend, however, to deteriorate the quality." (See Exhibit 5 - excerpt from said NDWA Contract.)

The projects fail to recognize the natural flows of water from the west which are comprised of Bay water which is a mixture of ocean water, precipitation, fresh water from tributaries flowing into the Bays, groundwater accretions, artesian flows and flow from other sources.

The argument that absent project operations water would not be present in the Delta channels is unsupported. Similarly unsupported is the contention that absent project operation Sacramento River water would not naturally be available in south Delta channels. Even today Georgiana Slough and Three Mile Slough directly contribute to Sacramento River flow to the south Delta in addition to the mix of Sacramento and other tributary water which enters the south Delta from the west

through tidal action.

Prior to levee construction along the Sacramento River flow also appears to have entered the south Delta directly from the Sacramento River from what is now called Snodgrass Slough and what appears to have been another natural connection in the vicinity of the present Delta cross-channel. Additionally, Water Code section 12931 (Part of California Water Resources Development Bond Act) provides:

“For the purpose of this chapter the Sacramento-San Joaquin Delta shall be deemed to be within the watershed of the Sacramento River.”
(emphasis added)

Surely there can be no debate that the Delta consumed more water in its natural swamp and overflowed land state than is consumed by way of farming of the Delta today.

Other than harassment, what is gained by the projects and their export contractors? Diversion of water is critical to sustaining farming in the Delta. Farming is the engine driving the Delta economy. With few exceptions, maintenance of levees and continuous drainage of the lands relies on funding from farming.

Without such drainage, the lands would become inundated by reason of seepage and rising groundwater or would experience substantially raised groundwater. The resulting condition would be a body of water or a highly vegetated area served by a high water table.

Evaporative losses from an open body of water and from riparian vegetation are much higher than from the same area subjected to farming.

Attached hereto as Exhibit 6 is Table A-5 from DWR Bulletin 168 - October 1978, page A-10 showing the 1976-77 Estimated Crop Et Value for the Delta Service Area. For October 1976 through September 1977 the data shows:

Alfalfa	45.8 inches
Tomatoes	34.3 inches
Field Corn	33.8 inches
Riparian Veg and Water Surface	67.8 inches

California Water Plan Update 2009, Vol. 4 Reference Guide - Topic Crop Water Use, Article 19, contains the “Historical Estimates of Agricultural and Wetland Water Use in the San Joaquin-Sacramento River Delta” by Morteza N. Orang, Richard L. Snyder, Sara Sarreshteh.

The study included both uplands and lowlands and concluded:

“For the entire Delta, the Etc for the wetlands, cattails and tules was

about 16% (1998), 20% (2000) and 22% (2001) higher than the agriculture-crop land-use group, which included irrigated pasture, alfalfa, all field crops, sugar beets, irrigated grain, rice, truck crops, tomato, orchard, vineyard and non-irrigated grain (Figure 7-9).”

See Exhibit 7 which is page 7 from said study.

Curtailment of water diversions in the Delta will decrease or eliminate farming thereby resulting in substantially increased water loss due to evaporation.

The Department of Water Resources Investigation of the Sacramento-San Joaquin Delta Report No. 4 Quantity and Quality of Waters Applied To And Drained From the Delta Lowlands - July 1956 concluded as follows:

“The Delta Lowlands act as a salt reservoir, storing salts obtained largely from the channels during the summer, when water quality in such channels is most critical and returning such accumulated salts to the channels during the winter when water quality there is least important. Therefore agricultural practices in that area enhanced rather than degraded the good quality Sacramento river water en route to the Tracy Pumping Plant.”

The Delta is unique. It would appear that curtailment of Delta diversions could result in salinity degradation at the export pumps thereby adding to the negative impact to the projects and others that would result from their efforts.

The water projects and their export contractors make assertions that water to which they are entitled may be unlawfully diverted by Delta diverters yet they ignore the statutory obligations of the projects, including that:

“In 1959 the State Legislature directed that water shall not be diverted from the Delta for use elsewhere unless adequate supplies for the Delta are first provided.” (emphasis added) (See Water Code section 12200 et seq. and December 1960 DWR Report to the Legislature Bulletin 76 Excerpt in Exhibit 8.)

The water projects and their export contractors claim water which is commingled with water to which Delta diverters are entitled yet they make no attempt to meet their burden as required by law and rather seek to shift the burden onto those users of water in the Delta.

The applicable law which is most relevant is reflected in Water Code Section 7075 which provides:

“§ 7075. Reclamation of water

Water which has been appropriated may be turned into the channel of another stream, mingled with its water, and then reclaimed; but in reclaiming it the water already appropriated by another shall not be diminished. (Stats. 1943, c. 368, p. 1669, § 7075.)”

In Butte Canal & Ditch Co. v. Vaughn, 11 Cal. 143, the California Supreme Court made it clear that in cases of the commingling of water where it is difficult to determine with exactness the quantity of water which parties are entitled to divert:

“The burden of proof rests with the party causing the mixture. He must show clearly to what portion he is entitled. He can claim only such portion as is established by decisive proof. The enforcement of his right must leave the opposite party in the use of the full quantity to which he was originally entitled.”

The threshold question should be whether or not the projects and their export water contractors have any water in the Delta to which they are entitled which is being diverted by Delta diverters?

The next question is can such water to which the projects and their export contractors are entitled be reclaimed without diminution of the entitlement of Delta users?

Delta users entitlement includes statutory rights as against the projects which are in addition to the traditional water rights.

Water stored or diverted in violation of the terms and conditions of permits and licenses or statutory requirements is not water to which the projects or their contractors are entitled.

Water is commingled throughout the system and exports from the Delta are surely a mix of water naturally in the Delta pool and numerous other sources, including natural flow from Suisun Bay.

In most reservoirs stored water is commingled with natural flow in the reservoir itself. Segregation of stored water from natural flow is complex. The already commingled stored water released from the originating reservoir must travel many miles to reach the Delta. As water passes down the river channels it is exposed to numerous diversions. Along the way water seeps, percolates and accretes between the river channels, adjoining lands and groundwater basins. Contributing flows occur from major and minor tributaries, from drainage systems, from precipitation and from groundwater. If the commingled water released from the originating reservoir reaches the Delta, it could go out as outflow or it may be dispersed through portions of the Delta depending greatly upon how the Delta cross channel and export pumps are being operated.

There are a number of statutes both State and Federal intended to protect and benefit Delta diverters as related to the federal Central Valley Project and State Water Project.

The Delta Protection Act of 1959 (WC 12200-12205) requires that the water needs of the Delta be given priority over exports by the SWP and CVP. The Act has been interpreted by DWR to provide: “In 1959 the State Legislature directed that water shall not be diverted from the Delta for use elsewhere unless adequate supplies for the Delta are first provided.” (See Exhibit 8.) The Delta Protection Act of 1959 requires the SWP and CVP to provide salinity control and “an adequate water supply in the Delta sufficient to maintain and expand agriculture, industry, urban and recreational development in the Delta area as set forth in Section 12220, Chapter 2, of this part, and to provide a common source of fresh water for export to areas of water deficiency . . .” (See WC 12201 and 12202.) In 1959 fishing was the predominant recreational use of the Delta. Since the commencement of SWP operation in the late 1960’s, fish populations in the Delta have plummeted. The Water Quality Objectives define what is an adequate supply.

The contract between the State of California Department of Water Resources and the North Delta Water Agency For the Assurance of a Dependable Water Supply of Suitable Quality dated January 28, 1981, provides:

“(d) The construction and operation of the FCVP and SWP at times have changed and will further change the regimen of rivers tributary to the Sacramento-San Joaquin Delta (Delta) and the regimen of the Delta channels from unregulated flow to regulated flow. This regulation at times improves the quality of water in the Delta and at times diminishes the quality from that which would exist in the absence of the FCVP and SWP. The regulation at times also alters the elevation of water in some Delta channels.”

“(f) The general welfare, as well as the rights and requirements of the water users in the Delta, require that there be maintained in the Delta an adequate supply of good quality water for agricultural, municipal and industrial uses.”

“(g) The law of the State of California requires protection of the areas within which water originates and the watersheds in which water is developed. The Delta is such an area and within such a watershed. Part 4.5 of Division 6 of the California Water Code affords a first priority to provision of salinity control and maintenance of an adequate water supply in the Delta for reasonable and beneficial uses of water and relegates to lesser priority all exports of water from the Delta to other areas for any purpose.”

The Watershed Protection Act (WC 11460 et seq.) prohibits the projects from directly or indirectly depriving the Delta and other areas of origin of an adequate supply. In pertinent part the Act provides:

“§ 11460. Prior right to watershed water

In the construction and operation by the department of any project under the provisions of this part a watershed or area wherein water originates, or an area immediately adjacent thereto which can conveniently be supplied with water therefrom, shall not be deprived by the department directly or indirectly of the prior right to all of the water reasonably required to adequately supply the beneficial needs of the watershed, area, or any of the inhabitants or property owners therein. *(Added by Stats.1943, C. 370, p. 1896. Amended by Stats.1957, c. 1932, p. 3410, § 296.)*

The Act also applies to the United States Department of Interior, Bureau of Reclamation. (See WC 11128.)

The interpretation of WC 11460 was explained in a letter dated February 17, 1945 to the Joint Committee on Rivers and Flood Control of the California State Legislature from the Acting Regional Director of the Bureau of Reclamation. The letter provided:

“The committee had asked the question: What is your policy in connection with the amount of water that can be diverted from one watershed to another in proposed diversions?” In stating the Bureau’s policy, Mr. Calland quoted section 11460 of the State water code, which is sometimes referred to as the county of origin act, and then he said: ‘As viewed by the Bureau, it is the intent of this statute that no water shall be diverted from any watershed which is or will be needed for beneficial uses within that watershed. The Bureau of Reclamation, in its studies for water resources development in the Central Valley, consistently has given full recognition to the policy expressed in this statute by the legislature and the people. The Bureau has attempted to estimate in these studies, and will continue to do so in future studies, what the present and future needs of each watershed will be. The Bureau will not divert from any watershed any water which is needed to satisfy the existing or potential needs within that watershed. For example, no water will be diverted which will be needed for the full development of all of the irrigable lands within the watershed, nor would there be water needed for municipal and industrial purposes or future maintenance of fish and wildlife resources. (emphasis added) (See Exhibit 9.)

An adequate supply for the Delta is minimally provided by the Water Quality Control Plan Critical Year Objectives. If exports from the Delta are to take place, especially those beyond the real needs for health and safety, then the SWP and CVP must meet the D-1641 Water Quality Objectives to satisfy their statutory obligations even if it requires stored water.

The SWP and CVP have failed to properly operate the projects so as to assure that water quality objectives, senior water rights and other senior obligations will be met in the expected reoccurrence of critically dry years and multiple years of drought. Instead, the projects have been operated to maximize exports from the Delta. The likely occurrence of multiple years of drought has been well documented and the basic planning for the SWP and CVP focused on the six years of drought during the period of 1929 through 1934. Climate change has for many years been predicted to increase the frequency of droughts. The reduced availability of surplus water to serve export needs has been known for many years and yet the projects have exported water knowing that the ability to meet water quality objectives would be jeopardized.

The Delta Protection Act of 1959 in WC 12200 specifically provides: "It is, therefore, hereby declared that a general law cannot be made applicable to said Delta and that the enactment of this law is necessary for the protection, conservation, development, control and use of the waters in the Delta for the public good." The emergency authority shall not be used for favoring exports over needs within the Delta and other areas of origin except to meet true health and safety needs.

The degradation of water quality in the Delta adversely impacts agricultural, industrial, urban and recreational (including fish and wildlife) uses in the Delta and surrounding areas as well as areas served with exports from the Delta. The Delta Protection Act of 1959 was passed to prohibit the very wrongdoing which is now underway. Neither the Executive Director, the Deputy Director nor the State Water Resources Control Board has the authority to prefer export needs over those in the Bay-Delta except for true health and safety.

PL99-546 (HR3113) specifically provides:

"(b)(1) Unless the Secretary of the interior determines that operation of the Central Valley project in conformity with State water quality standards for the San Francisco Bay/Sacramento-San Joaquin Delta and Estuary is not consistent with the congressional directives applicable to the project, the Secretary is authorized and directed to operate the project, in conjunction with the State of California water project, in conformity with such standards. Should the Secretary of the Interior so determine, then the Secretary shall promptly request the Attorney General to bring an action in the court of proper jurisdiction for the purposes of determining the applicability of such standards to the project.

(2) The Secretary is further directed to operate the Central Valley project, in conjunction with the State water project, so that water

supplied at the intake of the Contra Costa Canal is of a quality equal to the water quality standards contained in the Water Right Decision 1485 of the State of California Water Resources Control Board, dated August 16, 1978, except under drought emergency water conditions pursuant to a declaration by the Governor of California. Nothing in the previous sentence shall authorize or require the relocation of the Contra Costa Canal intake.”

Section (b)(1) does not allow for the Bureau of Reclamation to operate the CVP without conforming to the State water quality standards for the San Francisco Bay/Sacramento-San Joaquin Delta and Estuary even if the Executive Director and SWRCB is willing to look the other way. (See Exhibit 10.)

There are specific processes and procedures for changes to Water Quality Control Plans including review by the United States EPA, which are not a part of the current emergency process.

Section (b)(1) is thus applicable and requires USBR and USF&WS compliance unless the Secretary of Interior makes a determination that compliance is inconsistent with congressional directives applicable to the project and then the Attorney General is to be requested to bring a legal action for a court determination of the applicability of the standards. There is no such court determination that would allow the CVP to operate without conforming to the standards.

Section (b)(2) provides an additional constraint with regard to the water quality at the intake to the Contra Costa Canal. Even if the standards were determined by the court to not be applicable to the CVP, then the D-1485 water quality standards would be applicable to the intake of the Contra Costa Canal except under drought emergency water conditions pursuant to a declaration by the Governor of California. There is nothing in the Governor’s drought declaration specific to the water quality standard at the intake to the Contra Costa Canal.

In 2004 Congress passed another law to ensure that Delta water quality standards and objectives would be met.

PL 108-361 (HR 2828) in pertinent part provides:

“(D) Program to Meet Standards. -

- (i) In General. - Prior to increasing export limits from the Delta for the purposes of conveying water to south-of-Delta Central Valley Project contractors or increasing deliveries through an intertie, the Secretary shall, not later than 1 year after the date of enactment of this Act, in consultation with the Governor, develop and initiate implementation of a project to meet all existing water quality standards and objectives for which the

Central Valley Project has responsibility.” (See Exhibit 11.)

The proposed emergency actions are clearly for the purpose of increasing exports from the Delta which to the extent such are for serving south-of-Delta Central Valley Project contractors would be directly contrary to the direction of Congress which was to assure that all existing (October 25, 2004) water quality standards and objectives would first be met.

Water storage projects typically store natural flow in the winter and spring. The winter and spring natural flows, except in wetter years, would provide flushing of salts from the rivers flowing into the Delta and from the Delta into the Bay such that salt balance in the soil can be maintained and adequate protection can be provided to fish and wildlife and other Delta water uses. This flushing action drives saline water farther out into the Bay thereby prolonging the availability of good water quality in the Delta pool. When the stored water is used within the watershed, the return flow is basically delayed return of natural flow. The improved summer flow is an offset or mitigation for reduced winter and spring flows. The balance is in effect a physical solution that advances the beneficial use of water.

The equity of such a physical solution is reflected in the statutory obligations of the SWP and CVP to the Delta and in the conditions imposed on the water rights for such projects. Such statutory obligations require both mitigation and improvement.

The adverse impacts to Delta water supply and quality from State and Federal actions were clearly recognized. The near complete re-diversion of the Upper San Joaquin River to the south by way of the Friant Dam and Friant Kern canal deprived the Delta of the late spring and summer natural flow from the high Sierra snowmelt; the reverse flows and induced Bay salinity intrusion caused by export diversions; the increased salinity entering the San Joaquin River by reason of delivery of water to the west side of the San Joaquin River without a valley drain with an outlet to the ocean; the induced salinity intrusion from the Bay caused by channel enlargement for the Stockton and Sacramento ship channels, the reduced late spring and summer natural flows resulting from the State and Federal flood control projects; inducement of salinity intrusion by reason of planned permanent flooding of areas such as Lower Liberty island which increases the tidal prism and the project inducement of upstream development are examples. All of the above have the result of degradation of water quality in the Delta for which the projects are responsible.

In addition to the mitigation or physical solution aspects driving the statutory commitments of the SWP and CVP to provide stored water to the Delta was the purpose of providing such salinity control to benefit a broad range of purposes. Such purposes include protection of water quality at the CVP Tracy export pumps, the SWP export pumping facilities at Clifton Court, the Contra Costa Water District intakes, the Montezuma Slough gates to serve the Suisun Marsh, and the North Bay Aqueduct. Protection of fish and wildlife, water quality in the bays and meeting project contractual commitments are also served.

There should be no dispute that the Delta Protection Act (Water Code Section 12200 et seq.)

prohibits project exports from the Delta unless the Delta is first provided an adequate supply.

DWR Bulletin 76, December 1960, report to the Legislature provided:

“In 1959 the State Legislature directed that water shall not be diverted from the Delta for use elsewhere unless adequate supplies for the Delta are first provided.” (See Exhibit 8)

The DWR and NDWA Contract provides:

“(f) The general welfare, as well as the rights and requirements of the water users in the Delta, require that there be maintained in the Delta an adequate supply of good quality water for agricultural, municipal and industrial uses.”

“(g) The law of the State of California requires protection of the areas within which water originates and the watersheds in which water is developed. The Delta is such an area and within such a watershed. Part 4.5 of Division 6 of the California Water Code affords a first priority to provision of salinity control and maintenance of an adequate water supply in the Delta for reasonable and beneficial uses of water and relegates to lesser priority all exports of water from the Delta to other areas for any purpose.”

United States vs State Water Resources Control Board 182 Cal.App.3d 82 (1986) at page 139 provides:

“In 1959, when the SWP was authorized, the Legislature enacted the Delta Protection Act. (§§ 12200-12220.) The Legislature recognized the unique water problems in the Delta, particularly ‘salinity intrusion,’ which mandates the need for such special legislation ‘for the protection, conservation, development, control and use of the waters in the Delta for the public good.’ (§ 12200.) The act prohibits project exports from the Delta of water necessary to provide water to which the Delta users are ‘entitled’ and water which is needed for salinity control and an adequate supply for Delta users. (§§ 12202, 12203, 12204.)

But the crucial question left unanswered by the protective legislation is exactly *what* level of salinity control the projects must provide . .

”

SWRCB D-1485 at page 9 provides:

”

SWRCB D-1485 at page 9 provides:

“The Delta Protection Act accords first priority to satisfaction of vested rights and public interest needs for water in the Delta and relegates to lesser priority all exports of water from the Delta to other areas for any purpose.”

The level of salinity control the projects must provide is now set by federal statute, SWRCB water quality standards and contracts such as those for export and the contract with the North Delta Water Agency.

PL-99-546 (HR 3113) October 27, 1986, put to rest as to the CVP the question of the level of salinity control and the question as to any related payment. For meeting water quality standards in D-1485 the cost is to be allocated among the project purposes in accordance with existing reclamation law and policy - water and power contractors. The costs for complying with State water quality standards above those standards is to be non-reimbursable. (See Exhibit 10)

CONCLUSION

We are willing to help with meaningful efforts to improve and streamline reporting and request that use of the emergency procedures for data gathering not be implemented at this time.

Yours very truly,

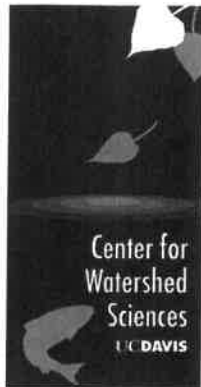


DANTE JOHN NOMELLINI, SR.
Secretary and Co-counsel

DJN:ka

Enclosures

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Steven Moore
Dorene D'Adamo
Tom Howard
Craig Wilson



Center for Watershed Sciences
University of California, Davis

Comparing Consumptive Agricultural Water Use in the Sacramento-San Joaquin Delta

A Proof of Concept Using Remote Sensing

Josué Medellín-Azuara and Richard E. Howitt

Final Report to the Delta Protection Commission. September 2013

Chapter 5 Conclusions

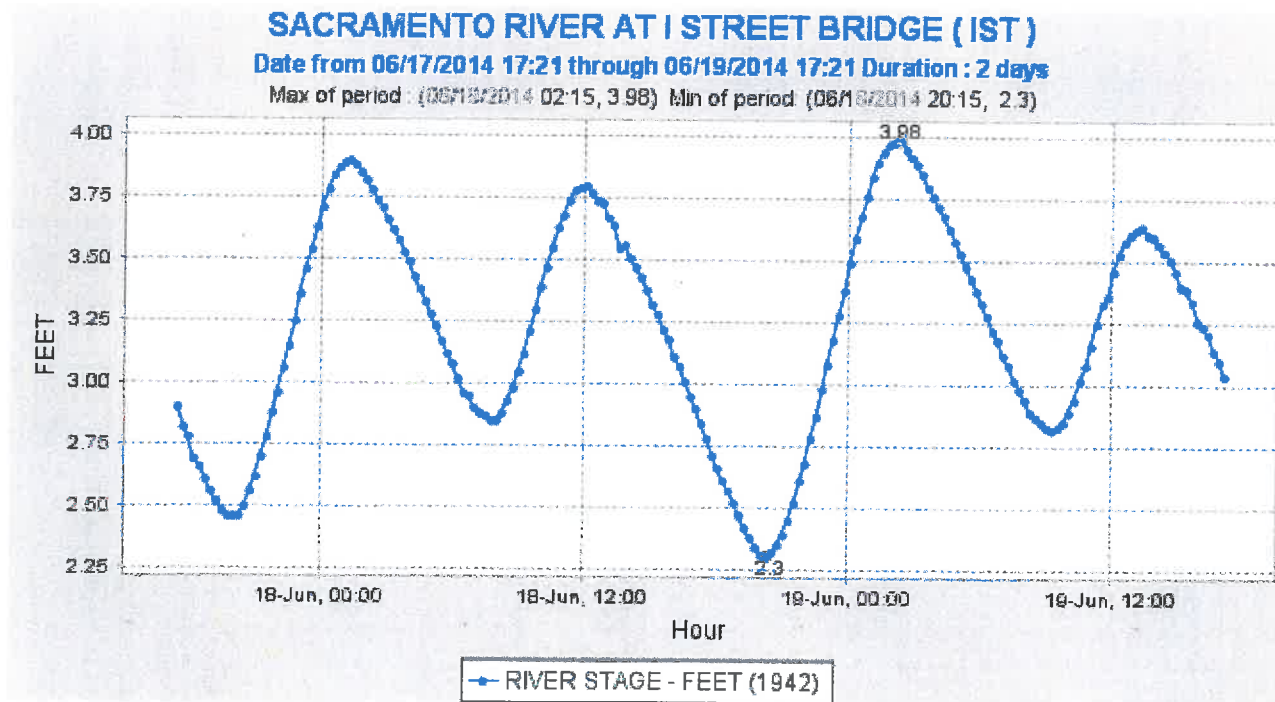
This study concludes that evapotranspiration estimates of applied water for crops in the Delta using ITRC-based spreadsheet methods is close to estimates using remote sensing and SEBAL. Conversely, the Cal-SIMETAW customized model proves to be overall closer to SEBAL than the ITRC-based spreadsheet method. However, periodic updates of climatic data to better account for reference evapotranspiration in crops are necessary for Cal-SIMETAW. SEBAL can replace current methods accurately without reference to ET crop signatures. In addition, the SEBAL method can be used to measure water efficiency, crop stress, water balances and differences in management and technology as reflected in ET.

Remotely-sensed evapotranspiration measurements provide an independent and detailed record of actual water use, and as such can provide timely and consistent data sources for a wide range of water management problems. While the system setup costs are not trivial, the system has substantial economies of scale that make a statewide interagency approach attractive.

Future work recommended for the Delta Protection Commission is to complete a comparison for the entire Legal Delta. To improve this comparison more, the use of other models to estimate evapotranspiration in crops, such as DETAW and IDC/IWFM that have a finer resolution than CalSIMETAW and ITRC, would be helpful. Data programs to support land use and irrigation efficiency surveys as well as remote-sensing information in partnership with other state and federal agencies is also encouraged.

Acknowledgements

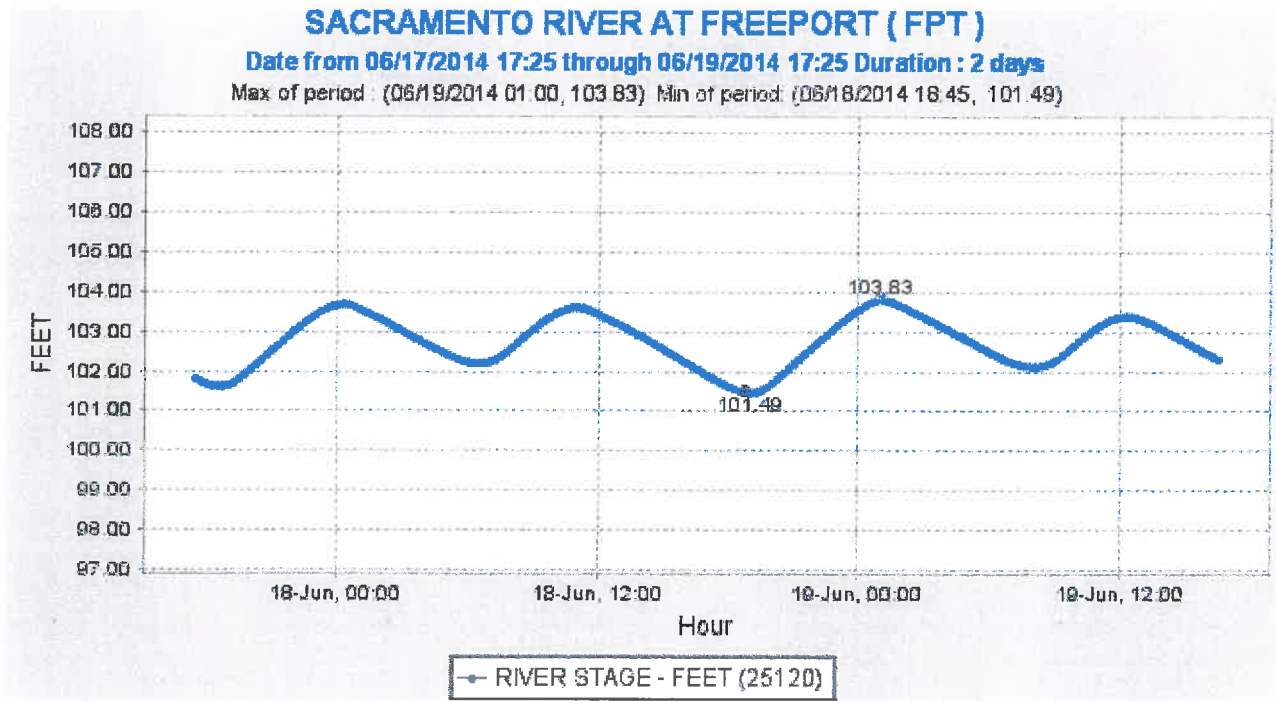
This research was funded by the Delta Protection Commission. Data including land use, SIMETAW, Cal-SIMETAW, DETAW, IWFM, SEBAL datasets and technical support from the Delta Modeling Office of the California Department of Water Resources and other departments was appreciated. In particular, we thank Tariq Kadir, Lan Liang, Tara Smith, Orang Morteza and Can Dogrul for their invaluable inputs. We also thank Davids Engineering and SEBAL of America for providing technical assistance in interpreting SEBAL estimates provided to us by DWR. Research support from Andrew Bell and Paula Torres from the Center for Watershed Sciences of UC Davis for preparing this report is also acknowledged.



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[Plot all IST Sensors](#) | [Real-Time IST Data](#) | [IST Data](#) | [Daily IST Data](#) | [Show IST Map](#) | [IST Info](#)

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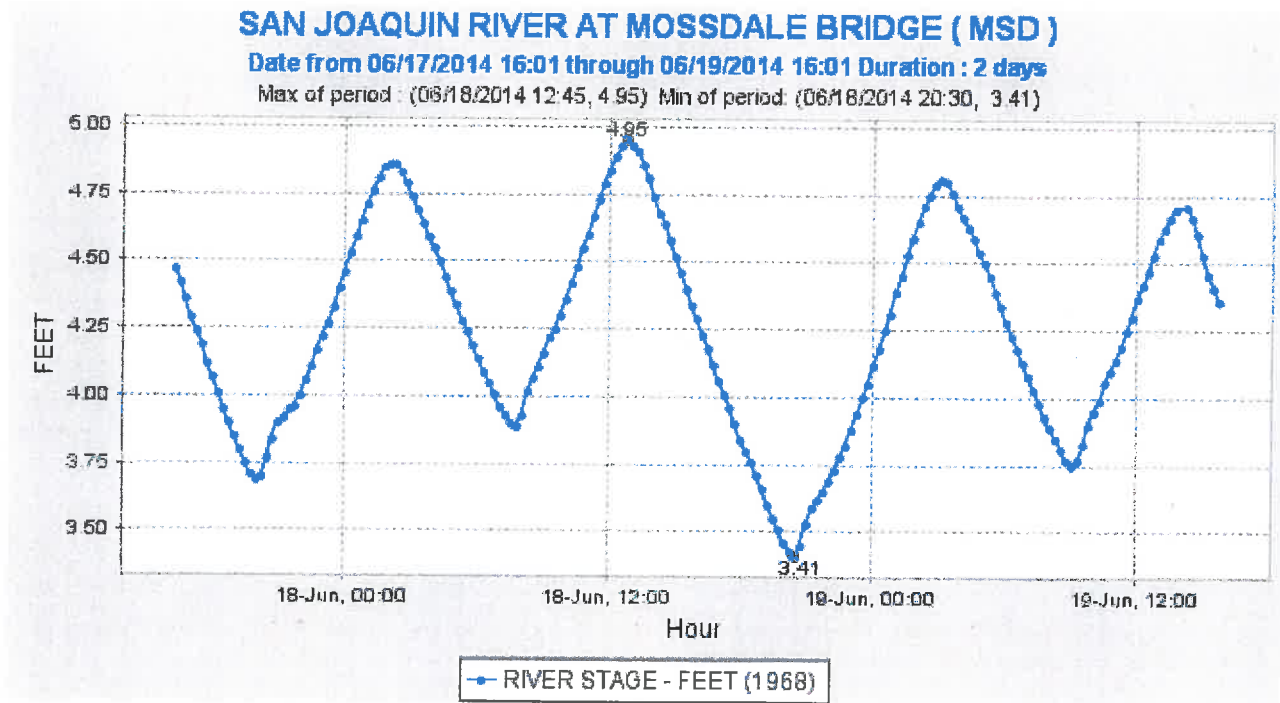
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Plot from ending date: 06/19/2014 17:25 Span: 2 days

Station Comments:

- 09/06/2005** Freeport data back on-line as of 8/31/2005.
- 06/01/2005** Daily streamflow is estimate by USGS. From 5/4/2005 to present
- 05/06/2005** New equipment is being installed. Data not valid. At this time, we do not have an estimated return to serv
- 11/01/2004** Data is now valid. Data is transmitted via satellite instead of modem.
- 10/05/2004** Freeport data is not valid since 9-24-04. A new station will be coming on-line soon.



Generated on Thu Jun 19 16:01:35 PDT 2014

[Plot all MSD Sensors](#) | [Real-Time MSD Data](#) | [MSD Data](#) | [Daily MSD Data](#) | [Show MSD Map](#) | [MSD Info](#)

Plot from ending date: 06/19/2014 16:01 Span: 2 days

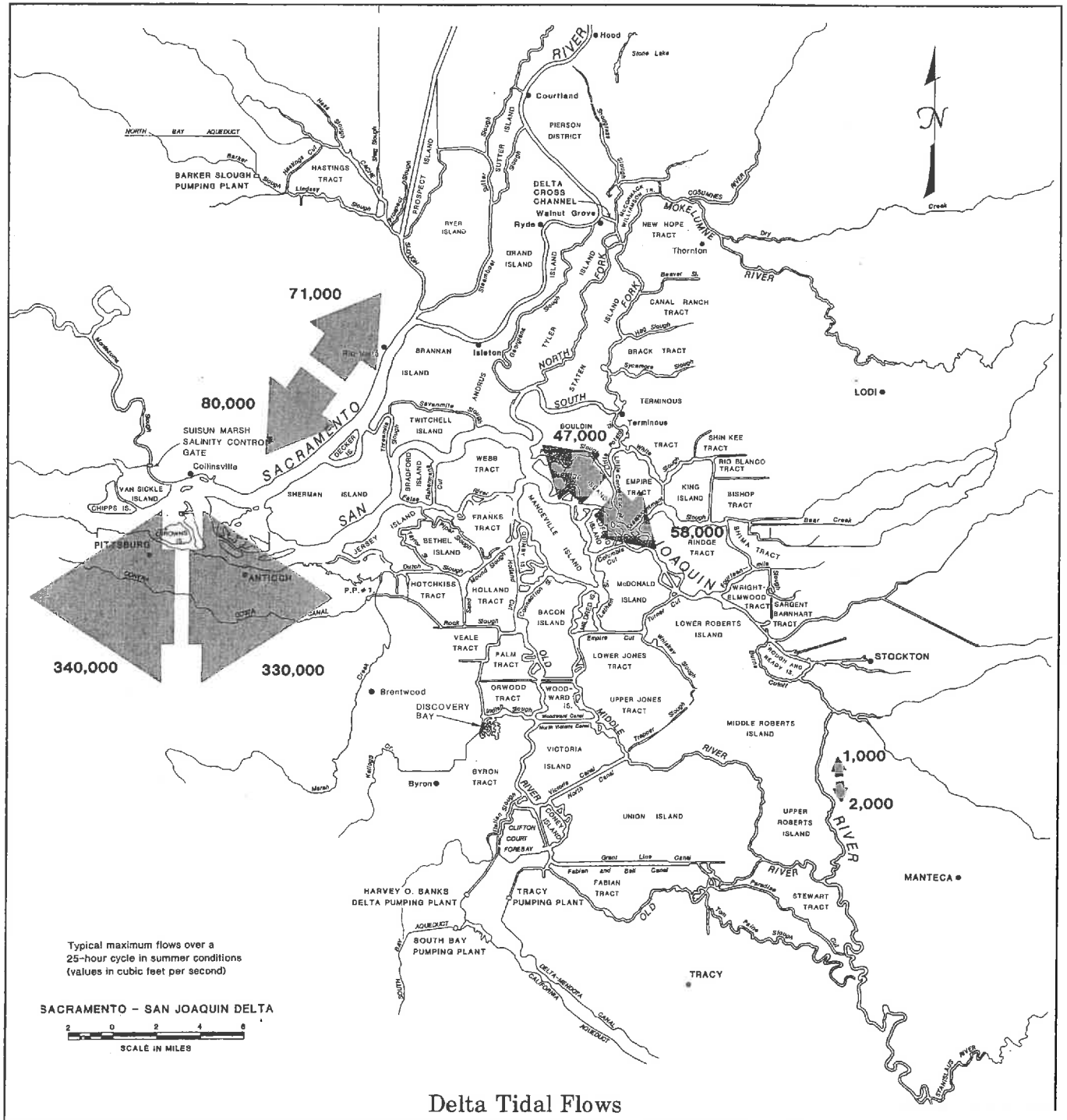
Station Comments:

- 11/05/2013** QC'd flow and velocity data are available on the Water Data Library (WDL) at: <http://www.water.ca.gov/waterdatalibrary/docs/Hydstra/index.cfm>. Select "Surface Water" for the Data Type station's WDL code: B95820Q. Contact Dave Huston of the North Central Region Office for further inquiry (Dave.Huston@water.ca.gov).
- 01/01/2013** For QA/QC'd data, contact the Division of Environmental Services (Karen.Gehrts@water.ca.gov).
- 12/16/2011** ADCP unit replaced with bubbler gage December 13, 2011
- 10/22/2008** Data collection for these sensors 1 (stage), 20 (flow) and 21 (w velocity) have been switched from satellite from DWR DES in October 2008. The rest of the hourly sensors were switched as well.
- 02/05/2007** Power to the station was vandalized Saturday night (2/3/07) and will be repaired ASAP
- 09/30/2006** The vertical datum has changed for this station as of October 1, 2006. Please see [[Datum Change 2006](#)]
- 01/09/2006** Modified stage correction value to -2.38 to account for the datum change.
- 06/01/2005** Stage datum set to NAD 88 (new staff at bridge).

Delta Tidal Flows and Levels

The Sacramento-San Joaquin Delta is at sea level. Water levels vary greatly during each tidal cycle, from less than a foot on the San Joaquin River near Interstate 5 to more than five feet near Pittsburg. During the tidal cycle, flows can also vary in direction and amount. For example and as shown on the map below, the

flow near Pittsburg during a typical summer tidal cycle can vary from 330,000 cfs upstream to 340,000 cfs downstream. The "net" summer Delta outflow is a very small amount of the total water movement, generally 5,000 to 10,000 cfs.



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STATE OF CALIFORNIA
The Resources Agency
Department of Water Resources

THE DELTA
AND THE STATE WATER PROJECT

Memorandum Report

JUNE 1969

DELTA WATER ENTITLEMENT NEGOTIATIONS

Water entitlements in the Delta have been the subject of intense study and discussion for several years. Considerable progress has been made toward agreements to protect these entitlements.

With construction and operation of the State Water Project under way, and with works being proposed for the Delta Water Facilities, considerable concern is being expressed by some Delta interests over the effects of this development on Delta water rights, water supplies, and environment.

The Delta and Delta water users are protected by law. Provisions in the California Water Code governing the construction and operation of the State Water Project are quite explicit. Protection is based upon the fundamental law of riparian and appropriate water rights, the County of Origin Act, the Area of Origin Law (sometimes referred to as the Watershed Protection Act), the Delta Protection Act, and the Burns-Porter Act. Such protection, however, is limited to the reasonable and beneficial use of water.

Purpose and History of Negotiations

The Department is negotiating with Delta interests for two basic reasons:

(1) To meet department responsibilities pursuant to the California Constitution and various laws protecting the Delta; and

(2) To avoid a complete, costly, and time-consuming adjudication of water rights of the entire Central Valley.

During the 1950's the Department of Water Resources cooperated with the Bureau of Reclamation and the local Delta water users in studies to identify individual entitlements to the waters of the Sacramento River and the Delta. These studies, using the classical approach to solution of water rights problems, considered priority of rights to quantity of water rather than quality. No resolution was reached in the Delta using this approach. Actually, in the Delta, the question of quantity is of little concern, since the Delta is never short of water. If flow from the tributary streams were insufficient to meet Delta use, water from the Pacific Ocean would flow through the San Francisco Bay system and fill the Delta channels.

Beginning in 1963, the Department of Water Resources, the Bureau of Reclamation, and representatives of two local Delta water users' organizations began negotiations specifically to resolve the Delta water entitlement problem. The local organizations are:

(1) The Sacramento River and Delta Water Association (SRDWA), representing Delta water users in Sacramento, Yolo, and Solano Counties, and parts of Contra Costa and San Joaquin Counties.

(2) The Delta Water Users Association (DWUA), acting as the San Joaquin Water Rights Committee (SJWRC) and representing water users in San Joaquin County and part of Contra Costa County.

Together, these 2 Associations represent about 90 percent of the Delta agricultural area, including about 40 percent of the agricultural lands in Contra Costa County.

In 1964, separate negotiations among the Bureau of Reclamation, the Department of Water Resources, and the Negotiating Committee for Contra Costa County's Water Requirements (NCCCCWR) were initiated. This Committee attempted to include representation of all water users in Contra Costa County interested in offshore quality -- municipal, industrial, agricultural, recreational, fish and wildlife, esthetics, etc. In the many months of discussions that followed, little progress was made with this Committee due primarily to its large size (about 50 people), and to the complex and diverse requirements and problems of the many interests involved. Consequently, at the request of individual interests within the group and with committee concurrence, some of those represented on the Committee began independent negotiations with the Department.

In essence, negotiations fall into two areas -- the main Delta, that area that will be protected by the November 19, 1965 Delta Water Quality Criteria and thereby provide irrigators an inchannel water supply of acceptable quality through such protection; and the western Delta, that area where overland water conveyance facilities or other alternative solutions will be required to provide an adequate water supply.

Main Delta Negotiations

Since water shortage in the Delta is not a problem, it was necessary to develop a quality "yardstick" to guide project operation in the Delta. This "yardstick" was established on November 19, 1965, when negotiations among the Sacramento River and Delta Water Association, the Delta Water Users Association, the Bureau of Reclamation, and the Department of Water Resources reached the first concrete achievement with agreement to the "Delta Water Quality Criteria". These criteria, summarized earlier and contained in full in Appendix A, set forth quality limits for inchannel Delta waters and specify the locations of stations to monitor conformance. Under provisions of the criteria, saltwater intrusion will continue to be repelled to approximately the same point as it has been in the summertime by the Federal Central Valley Project.

**CONTRACT BETWEEN THE STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES
AND THE NORTH DELTA WATER AGENCY
FOR THE ASSURANCE OF A DEPENDABLE WATER SUPPLY OF SUITABLE QUALITY**

THIS CONTRACT, made this 28th day of Jan, 1981, between the STATE OF CALIFORNIA, acting by and through its DEPARTMENT OF WATER RESOURCES (State), and the NORTH DELTA WATER AGENCY (Agency), a political subdivision of the State of California, duly organized and existing pursuant to the laws thereof, with its principal place of business in Sacramento, California.

RECITALS

(a) The purpose of this contract is to assure that the State will maintain within the Agency a dependable water supply of adequate quantity and quality for agricultural uses and, consistent with the water quality standards of Attachment A, for municipal and industrial uses, that the State will recognize the right to the use of water for agricultural, municipal, and industrial uses within the Agency, and that the Agency will pay compensation for any reimbursable benefits allocated to water users within the Agency resulting from the Federal Central Valley Project and the State Water Project, and offset by any detriments caused thereby.

(b) The United States, acting through its Department of the Interior, has under construction and is operating the Federal Central Valley Project (FCVP).

(c) The State has under construction and is operating the State Water Project (SWP).

(d) The construction and operation of the FCVP and SWP at times have changed and will further change the regimen of rivers tributary to the Sacramento-San Joaquin Delta (Delta) and the regimen of the Delta channels from unregulated flow to regulated flow. This regulation at times improves the quality of water in the Delta and at times diminishes the quality from that which would exist in the absence of the FCVP and SWP. The regulation at times also alters the elevation of water in some Delta channels.

(e) Water problems within the Delta are unique within the State of California. As a result of the geographical location of the lands of the Delta and tidal influences, there is no physical shortage of water. Intrusion of saline ocean water and municipal, industrial and agricultural discharges and return flows, tend, however, to deteriorate the quality.

(f) The general welfare, as well as the rights and requirements of the water users in the Delta, require that there be maintained in the Delta an adequate supply of good quality water for agricultural, municipal and industrial uses.

(g) The law of the State of California requires protection of the areas within which water originates and the watersheds in which water is developed. The Delta is such an area and within such a watershed. Part 4.5 of Division 6 of the California Water Code affords a first priority to provision of salinity control and maintenance of an adequate water supply in the Delta for reasonable and beneficial uses of water and relegates to lesser priority all exports of water from the Delta to other areas for any purpose.

(h) The Agency asserts that water users within the Agency have the right to divert, are diverting, and will continue to divert, for reasonable beneficial use, water from the Delta that would have been available therein if the FCVP and SWP were not in existence, together with the right to enjoy or acquire such benefits to which the water users may be entitled as a result of the FCVP and SWP.

(i) Section 4.4 of the North Delta Water Agency Act, Chapter 283, Statutes of 1973, as amended, provides that the Agency has no authority or power to affect, bind, prejudice, impair, restrict, or limit vested water rights within the Agency.

(j) The State asserts that it has the right to divert, is diverting, and will continue to divert water from the Delta in connection with the operation of the SWP.

(k) Operation of SWP to provide the water quality and quantity described in this contract constitutes a reasonable and beneficial use of water.

(l) The Delta has an existing gradient or relationship in quality between the westerly portion most seriously affected by ocean salinity intrusion and the interior portions of the Delta where the effect of ocean salinity intrusion is diminished. The water quality criteria set forth in this contract establishes minimum water qualities at various monitoring locations. Although the water quality criteria at upstream locations is shown as equal in some periods of some years to the water quality at the downstream locations, a better quality will in fact exist at the upstream locations at almost all times. Similarly, a better water quality than that shown for any given monitoring location will also exist at interior points upstream from that location at almost all times.

(m) It is not the intention of the State to acquire by purchase or by proceeding in eminent domain or by any other manner the water rights of water users within the Agency, including rights acquired under this contract.

(n) The parties desire that the United States become an additional party to this contract.

AGREEMENTS

1. **Definitions.** When used herein, the term:

(a) "Agency" shall mean the North Delta Water Agency and shall include all of the lands within the boundaries at the time the contract is executed as described in Section 9.1 of the North Delta Water Agency Act, Chapter 283, Statutes of 1973, as amended.

(b) "Calendar year" shall mean the period January 1 through December 31.

(c) "Delta" shall mean the Sacramento-San Joaquin Delta as defined in Section 12220 of the California Water Code as of the date of the execution of the contract.

(d) "Electrical Conductivity" (EC) shall mean the electrical conductivity of a water sample measured in millimhos per centimeter per square centimeter corrected to a standard temperature of 25° Celsius determined in accordance with procedures set forth in the publication entitled "Standard Methods of Examination of Water and Waste Water", published jointly by the American Public Health Association, the American Water Works Association, and the Water Pollution Control Federation, 13th Edition, 1971, including such revisions thereof as may be made subsequent to the date of this contract which are approved in writing by the State and the Agency.

(e) "Federal Central Valley Project" (FCVP) shall mean the Central Valley Project of the United States.

(f) "Four-River Basin Index" shall mean the most current forecast of Sacramento Valley unimpaired runoff as presently published in the California Department of Water Resources Bulletin 120 for the sum of the flows of the following: Sacramento River above Bend Bridge near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River at Smartville; American River, total inflow to Folsom Reservoir. The May 1 forecast shall continue in effect until the February 1 forecast of the next succeeding year.

(g) "State Water Project" (SWP) shall mean the State Water Resources Development System as defined in Section 12931 of the Water Code of the State of California.

(h) "SWRCB" shall mean the State Water Resources Control Board.

(i) "Water year" shall mean t

TABLE A-5
1976-77 Estimated Crop Et Values
Delta Service Area
(in inches)

Land Use Category	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Total		
															Oct. 76-Sep. 77	Oct. 77	Nov. 77-Oct. 77
Sacramento-San Joaquin Delta																	
Irrigated Pasture	3.2	1.5	1.0	0.7	1.5	3.6	5.4	4.8	6.9	7.7	6.4	4.7	47.4	3.4	47.6		
Alfalfa	3.2	1.5	1.0	0.7	1.5	3.2	4.9	4.4	6.5	7.5	6.5	4.9	45.8	3.4	46.0		
Deciduous Orchard (Fruits & Nuts)	2.6	1.5	1.0	0.7	1.5	2.7	3.8	4.0	6.1	7.4	6.1	4.3	41.7	2.6	41.7		
Tomatoes	2.4	1.5	1.0	0.7	1.5	1.9	2.2	2.6	4.0	8.2	6.0	2.3	34.3	1.9	33.8		
Sugar Beets	2.4	1.5	1.0	0.7	1.5	1.9	2.2	3.7	7.6	8.3	6.4	4.4	41.6	2.4	41.6		
Grain Sorghum (Milo)	2.4	1.5	1.0	0.7	1.5	1.9	2.2	2.0	5.9	7.3	4.3	2.5	33.2	1.9	32.7		
Field Corn	2.4	1.5	1.0	0.7	1.5	1.9	2.2	2.3	5.7	6.9	5.1	2.6	33.8	1.9	33.3		
Dry Beans	2.4	1.5	1.0	0.7	1.5	1.9	2.2	1.7	5.7	6.2	2.7	2.5	30.0	1.9	29.5		
Safflower	2.4	1.5	1.0	0.7	1.5	1.9	2.5	4.8	8.7	7.7	4.4	2.5	39.6	1.9	39.1		
Asparagus	2.4	1.5	1.0	0.7	1.5	1.9	2.2	1.0	3.5	7.7	6.4	4.7	34.5	2.4	34.5		
Potatoes	2.4	1.5	1.0	0.7	1.5	1.9	2.2	1.7	4.3	7.4	5.5	2.8	32.9	1.9	32.4		
Irrigated Grain	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	1.8	1.0	1.0	1.6	26.1	1.6	24.7		
Vineyard	2.4	1.5	1.0	0.7	1.5	1.9	2.2	2.8	5.3	6.5	5.3	3.4	34.5	2.4	34.5		
Rice	3.2	1.5	1.0	0.7	1.5	1.9	2.8	5.6	8.8	9.8	8.1	5.5	50.4	3.4	50.6		
Sudan	2.4	1.5	1.0	0.7	2.0	4.3	5.7	4.8	6.9	7.7	4.9	4.7	46.6	2.4	46.6		
Misc. Truck	2.4	1.5	1.0	0.7	1.5	1.9	3.2	4.6	6.7	7.4	5.2	3.7	39.8	1.9	39.3		
Misc. Field	2.4	1.5	1.0	0.7	1.5	1.9	2.2	2.4	6.1	7.4	5.0	1.9	34.0	1.9	33.5		
Double Cropped with Grain	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	1.8	4.2	5.2	5.8	37.7	3.4	38.7		
Sugar Beets	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	1.8	4.3	6.3	6.1	39.2	2.7	39.5		
Field Corn	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	1.8	2.7	6.1	5.2	36.5	1.9	36.0		
Grain Sorghum (Milo)	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	3.6	7.7	4.9	4.7	41.6	1.9	41.1		
Sudan	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	3.1	7.6	3.5	1.5	36.4	1.9	35.9		
Dry Beans	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	2.3	6.6	6.0	5.2	40.8	1.9	40.3		
Tomatoes	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	4.1	7.4	5.3	4.9	42.4	2.4	42.4		
Lettuce	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	2.3	6.6	6.0	5.2	40.8	2.4	40.8		
Misc. Truck	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	4.1	7.4	5.3	4.9	42.4	2.4	42.4		
Misc. Field	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	4.1	7.4	5.3	4.9	42.4	3.4	43.4		
Fallow Lands 1/	2.4	1.5	1.0	0.7	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	14.0	1.0	12.6		
Native Vegetation 2/	2.4	1.5	1.0	0.7	1.4	3.7	3.8	2.1	2.3	2.6	2.3	2.0	25.8	1.6	25.0		
Riparian Veg. & Water Surface	4.6	2.4	1.4	0.8	1.9	4.5	7.4	6.6	9.7	11.8	9.7	7.0	67.8	4.3	67.5		
Urban	1.6	0.8	0.6	0.7	1.0	1.0	1.9	2.4	2.4	2.5	2.4	1.9	19.2	1.6	19.2		

1/ Applies also to nonirrigated grain.
2/ Applies also to nonirrigated orchards and vineyards
Metric conversion: inches times 25.4 equals millimetres.

Historical Estimates of Agricultural and Wetland Water Use in the San Joaquin-Sacramento River Delta

By

Morteza N. Orang, Richard L. Snyder, Sara Sarreshteh

This report presents the results of a study comparing the water requirements (ET_c) of irrigated crops and wetland vegetation (tules and cattails) in the San Joaquin-Sacramento River Delta for different water years 1998 (wet), 2000 (average), and 2001 (dry). These are the most recent dry, normal, and wet years, which were used in the California Water Plan Update 2005. The main purpose of this project was to specifically customize the daily water balance program “Delta Evapotranspiration of Applied Water” or “DETAW” to analyze historical climate data to compute the water requirements of wetland vegetation that change from year-to-year. To do the analysis, DETAW was modified to sum the number of hectares of irrigated land for each of the 168 sub-areas within the Delta from 1921 to 2003. DETAW uses the product of reference evapotranspiration (ET_o) and a crop coefficient (K_c) factor to estimate well-watered evapotranspiration ($ET_c = ET_o \times K_c$). Using the surface areas, volumes of water corresponding to ET_c were computed for wetland vegetation on each the sub-areas over the period of record. The K_c values, crop type, and the percentages of the season to identifiable growth dates b, c, and d were changed to K_c factors and dates for tules and cattails to estimate daily and monthly ET data for wetland vegetation. The growth dates were b (10% ground cover), c (75% ground cover), and d (the onset of senescence). The model K_c values for tules and cattails, grown in standing water, were reported by Drexler et al. (2006). Since it is unlikely that the entire Delta area would have standing water for a full season, and the K_c factors are likely to be lower without the water, the standing-water K_c values provide an upper-limit boundary for estimating ET_c , and lower values are likely in most years. In drought years, the soil may dry out sufficiently to cause evapotranspiration (ET) reducing water stress, and a stress (K_s) coefficient might be needed to reduce the actual ET (ET_a) to a level lower than ET_c .

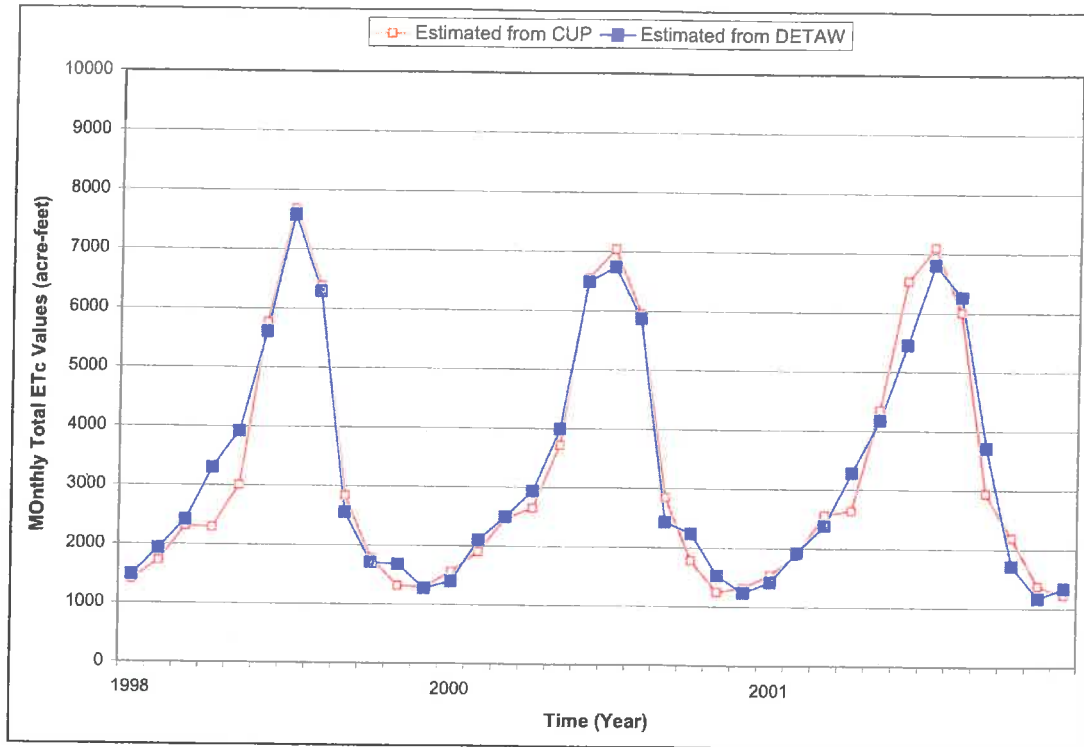


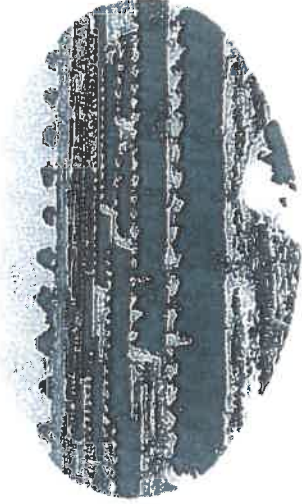
Figure 3- Comparison of monthly total estimates of evapotranspiration for agriculture from CUP and DETAW in sub-area 1 in the Delta during 1998 (wet), 2000 (average), and 2001 (dry) periods.

Results and Discussion:

The monthly cumulative values of agricultural and wetland ET_c estimated by DETAW were plotted against time (months) for 1998, 2000, and 2001 in Figures 4-6 for the Lowlands, in Figures 7-9 for the Uplands, and in Figures 10-12 for the entire Delta. For the entire Delta, the ET_c for the wetland cattails and tules was about 16% (1998), 20% (2000), and 22% (2001) higher than the agriculture-crop land-use group, which included irrigated pasture, alfalfa, all field crops, sugar beets, irrigated grain, rice, truck crops, tomato, orchard, vineyard, and non-irrigated grain (Figures 10-12). The results were similar for the Lowlands (Figures 4-6) and for the Uplands (Figures 7-9). When irrigated winter cereal and grapevine croppped areas are not converted to wetland vegetation in the Delta, the cattails and tules could increase evapotranspiration (ET_c) by about 13% in 1988 and 16% in 2000 and 2001, respectively.

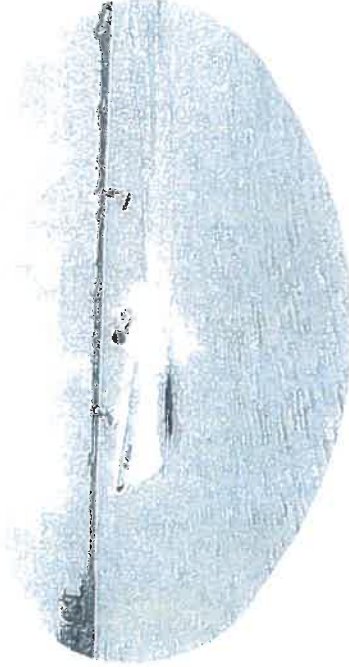
Preliminary Edition

John A. Williams



Bulletin No. 76

DELTA WATER FACILITIES



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Governor
State of California

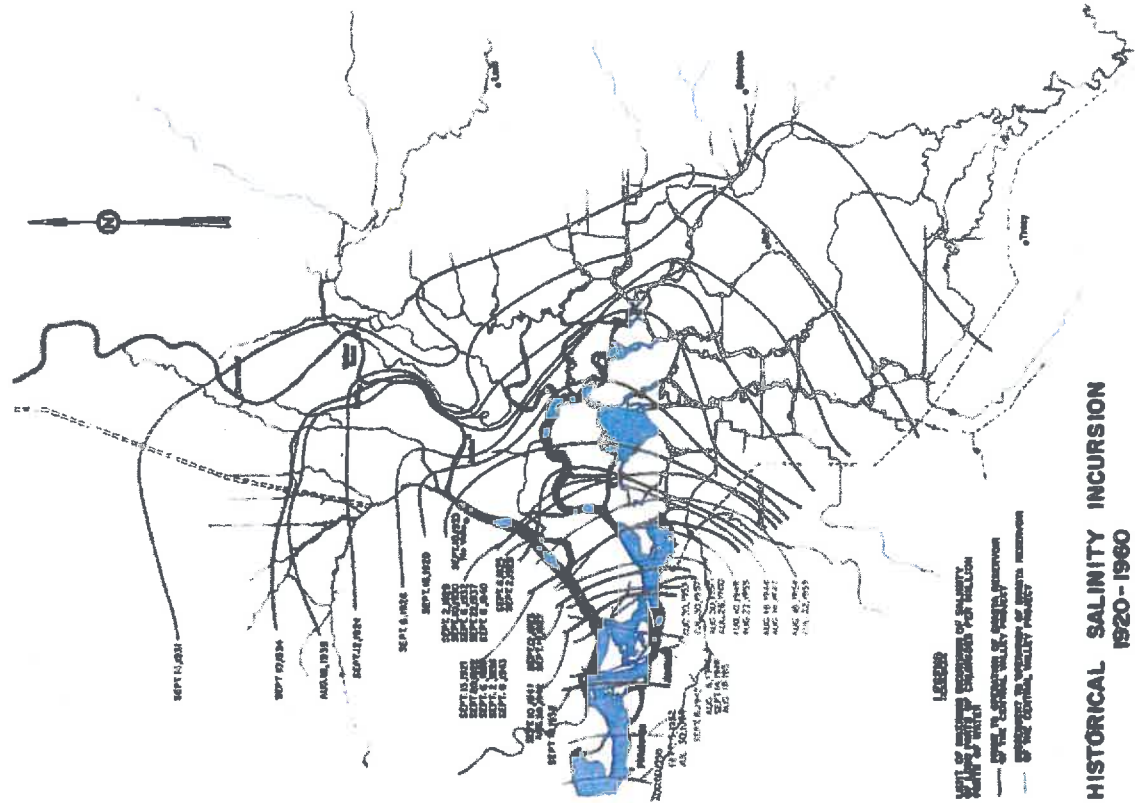
HARVEY O. BANKS
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Department of Water Resources

December, 1960

Delta Problems — salinity incursion and water supplies

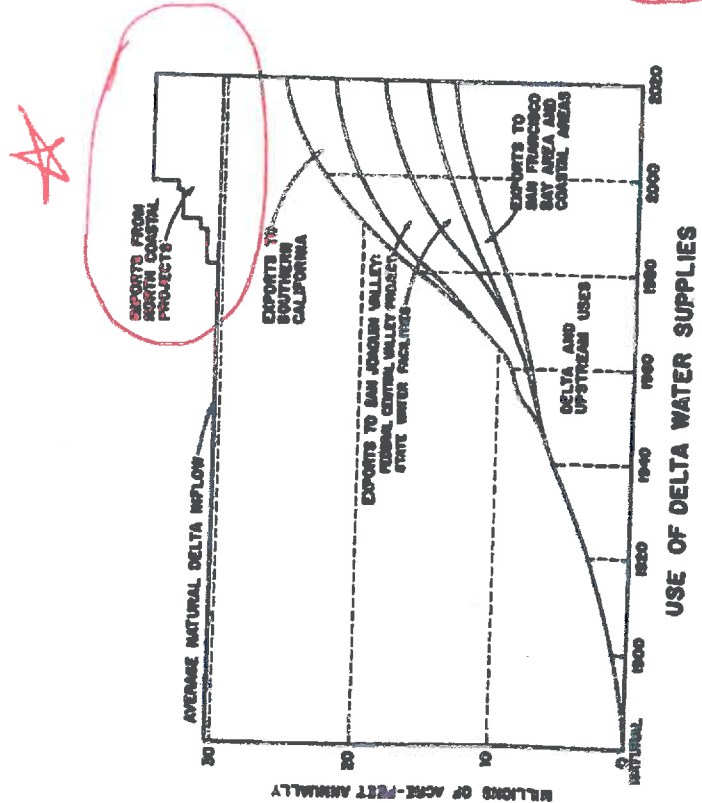
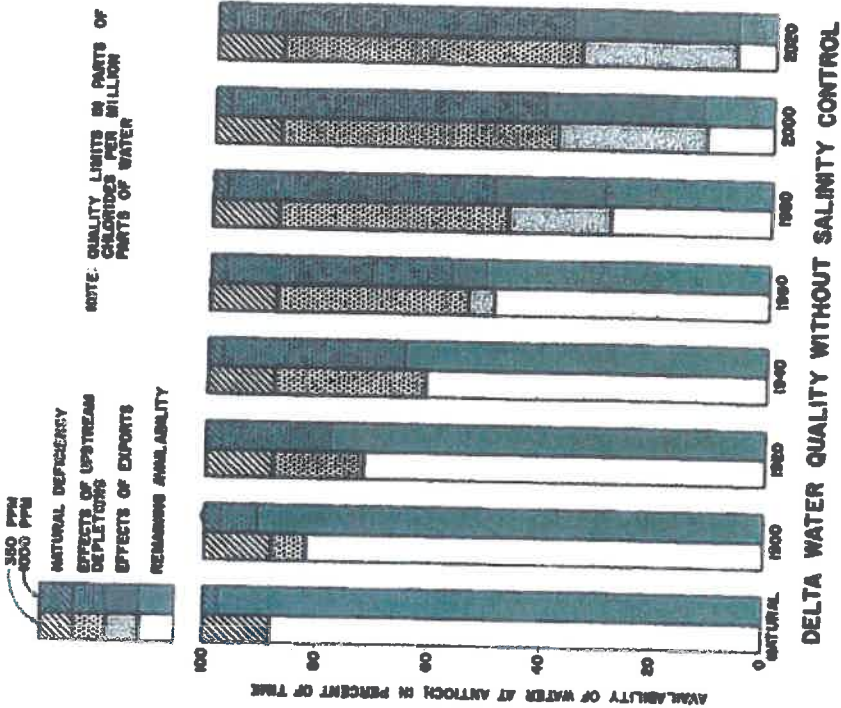
Salinity incursion into the Delta results from the flooding and ebbing of ocean tides through the San Francisco Bay and Delta system during periods when the fresh water outflow from the Delta is insufficient to repel the saline water. The natural fresh water outflow from the Central Valley was historically inadequate to repel salinity during summer months of some years. The first known record of salinity encroachment into the Delta was reported by Cmdr. Ringgold, U. S. Navy, in August 1841, whose party found the water at the site of the present city of Antioch very brackish and unfit for drinking. Since that time, and particularly after the turn of the century, with expanding upstream water use salinity incursion has become an increasingly greater problem in Delta water supplies. The maximum recorded extent of salinity incursion happened in 1931, when ocean salts reached Stockton. Since 1944 extensive incursion has been repulsed much of the time by fresh water releases from Central Valley Project storage in Shasta and Folsom Reservoirs. Without such releases, saline water would have spread through about 90 percent of the Delta channels in 1955 and 1959. Although upstream uses might not have reached present levels in the absence of the Central Valley Project, salinity problems would still have been very serious during most years.

Further increase in water use in areas tributary to the Delta will worsen the salinity incursion problem and complicate the already complex water rights situation. To maintain and expand the economy of the Delta, it will be necessary to provide an adequate supply of good quality water and protect the lands from the effects of salinity incursion. In 1959 the State Legislature directed that water shall not be diverted from the Delta for use elsewhere unless adequate supplies for the Delta are first provided.



HISTORICAL SALINITY INCURSION 1920-1960

The natural availability of good quality water in the Delta is directly related to the amount of surplus water which flows to the ocean. The graph to the right indicates the historic and projected availability of water in the San Joaquin River at Antioch containing less than 350 and 1,000 parts chlorides per million parts water, under long-term average runoff and *without* specific releases for salinity control. It may be noted that even under natural conditions, before any significant upstream water developments, there was a deficiency of water supplies within the specified quality limits. It is anticipated that, without salinity control releases, upstream depletions by the year 2020 will have reduced the availability of water containing less than 1,000 ppm chlorides by about 60 percent, and that exports will have caused an additional 30 percent reduction.



The magnitude of the past and anticipated future uses of water in areas tributary to the Delta, except the Tulare Lake Basin, is indicated in the diagram to the left. It may be noted that, while the present upstream use accounts for reduction of natural inflow to the Delta by almost 25 percent, upstream development during the next 60 years will deplete the inflow by an additional 20 percent. By that date about 22 percent of the natural water supply reaching the Delta will be exported to areas of deficiency by local, state, and federal projects. In addition, economical development of water supplies will necessitate importation of about 5,000,000 acre-feet of water seasonally to the Delta from north coastal streams for transfer to areas of deficiency.

DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Sacramento, Calif., November 15, 1949.

HON. CLAIR ENGLE,
Red Bluff, Calif.

MY DEAR MR. ENGLE: In response to your request to Mr. Carr, we have assembled excerpts from various statements by Bureau and Department officials relating to the subject of diversion of water from the Sacramento Valley to the San Joaquin Valley through the operation of the Central Valley project.

A factual review of available water supplies over a period of more than 40 years of record and the estimates of future water requirements made by State and Federal agencies makes it clear that there is no reason for concern about the problem at this time.

For your convenience, I have summarized policy statements that have been made by Bureau of Reclamation and Department of the Interior officials. These excerpts are in the following paragraphs:

On February 20, 1942, in announcing the capacity for the Delta-Mendota Canal, Commissioner John C. Page said, as a part of his Washington, D. C., press release:

"The capacity of 4,800 cubic feet per second was approved, with the understanding that the quantity in excess of basic requirements mainly for replacement at Mendota Pool, will not be used to serve new lands in the San Joaquin Valley if the water is necessary for development in the Sacramento Valley below Shasta Dam and in the counties of origin of such waters."

On July 18, 1944, Regional Director Charles E. Carey wrote a letter to Mr. Harry Barnes, chairman of a committee of the Irrigation Districts Association of California. In that letter, speaking on the Bureau's recognition and respect for State laws, he said:

"They [Bureau officials] are proud of the historic fact that the reclamation program includes as one of its basic tenets that the irrigation development in the West by the Federal Government under the Federal reclamation laws is carried forward in conformity with State water laws."

On February 17, 1945, a more direct answer was made to the question of diversion of water in a letter by Acting Regional Director R. C. Calland, of the Bureau, to the Joint Committee on Rivers and Flood Control of the California State Legislature. The committee had asked the question, "What is your policy in connection with the amount

of water that can be diverted from one watershed to another in proposed diversions?" In stating the Bureau's policy, Mr. Calland quoted section 11460 of the State water code, which is sometimes referred to as the county of origin act, and then he said:

"As viewed by the Bureau, it is the intent of this statute that no water shall be diverted from any watershed which is or will be needed for beneficial uses within that watershed. The Bureau of Reclamation, in its studies for water resources development in the Central Valley, consistently has given full recognition to the policy expressed in this statute by the legislature and the people. The Bureau has attempted to estimate in these studies, and will continue to do so in future studies, what the present and future needs of each watershed will be. The Bureau will not divert from any watershed any water which is needed to satisfy the existing or potential needs within that watershed. For example, no water will be diverted which will be needed for the full development of all of the irrigable lands within the watershed, nor would there be water needed for municipal and industrial purposes or future maintenance of fish and wildlife resources."

On February 12, 1948, Acting Commissioner Wesley R. Nelson sent a letter to Representative Clarence F. Lea, in which he said:

"You asked whether section 10505 of the California Water Code, also sometimes referred to as the county of origin law, would be applicable to the Department of the Interior, Bureau of Reclamation. The answer to this question is: No, except insofar as the Bureau of Reclamation has taken or may take assignments of applications which have been filed for the appropriation of water under the California Statutes of 1927, chapter 286, in which assignments reservations have been made in favor of the county of origin.

The policy of the Department of the Interior, Bureau of Reclamation, is evidenced in its proposed report on a Comprehensive Plan for Water Resources Development—Central Valley Basin, Calif., wherein the Department of the Interior takes the position that "In addition to respecting all existing water rights, the Bureau has complied with California's 'county of origin' legislation, which requires that water shall be reserved for the presently unirrigated lands of the areas in which the water originates, to the end that only surplus water will be exported elsewhere."

On March 1, 1948, Regional Director Richard L. Boke wrote to Mr. A. L. Burkholder, secretary of the Live Oak Subordinate Grange No. 494, Live Oak, Calif., on the same subject, and said:

"I can agree fully with the statement in your letter that it would be grossly unjust to 'take water from the watersheds of one region to supply another region until all present and all possible future needs of the first region have been fully determined and completely and adequately provided for.' That is established Bureau of Reclamation policy and, I believe, it is consistent with the water laws of the State of California under which we must operate."

On May 17, 1948, Assistant Secretary of the Interior William E. Warne wrote a letter to Representative Lea on the same subject, in which he said:

"The excess water made available by Shasta Reservoir would go first to such Sacramento Valley lands as now have no rights to water."

Assistant Secretary Warne goes on to say, in the same letter:

"As you know, the Sacramento Valley water rights are protected by: (1) Reclamation law which recognizes State water law and rights thereunder; (2) the State's counties of origin act, which is recognized by the Bureau in principle; and (3) the fact that Bureau filings on water are subject to State approval. I can assure you that the Bureau will determine the amounts of water required in the Sacramento Valley drainage basin to the best of its ability so that only surplus waters would be exported to the San Joaquin. We are proceeding toward a determination and settlement of Sacramento Valley waters which will fully protect the rights of present users; we are determining the water needs of the Sacramento Valley; and it will be the Bureau's policy to export from that valley only such waters as are in excess of its needs."

On October 12, 1948, Secretary of the Interior Krug substantiated former statements of policy in a speech given at Oroville, Calif. Secretary Krug said, with respect to diversion of water:

"Let me state, clearly and finally, the Interior Department is fully and completely committed to the policy that no water which is needed in the Sacramento Valley will be sent out of it."

He added:

"There is no intent on the part of the Bureau of Reclamation ever to divert from the Sacramento Valley a single acre-foot of water which might be used in the valley now or later."

We believe the foregoing is a summary of the main policy statements by Government officials on the subject of importation of Sacramento Valley water to the San Joaquin Valley. Please inform me if you wish additional information.

Sincerely yours,

RICHARD L. BOKE,
Regional Director.

EXHIBIT No. 12

STATEMENT BY DONALD M. SMITH, SECRETARY, SACRAMENTO VALLEY IRRIGATION COMMITTEE, BEFORE THE JOINT HEARINGS OF SUBCOMMITTEE ON IRRIGATION AND RECLAMATION, HOUSE OF REPRESENTATIVES, AND THE JOINT INTERIM COMMITTEE ON WATER PROBLEMS, CALIFORNIA LEGISLATURE, OCTOBER 30, 1951, SACRAMENTO, CALIF.

Members of Congress, members of the State legislature, the Sacramento Valley Irrigation Committee is a four-county organization of

PL 99-546, October 27, 1986, 100 Stat 3050

UNITED STATES PUBLIC LAWS
99th Congress - Second Session
Convening January 21, 1986

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DATA SUPPLIED BY THE U.S. DEPARTMENT OF JUSTICE. (SEE SCOPE)
Additions and Deletions are not identified in this document.

PL 99-546 (HR 3113)
October 27, 1986

An Act to implement the Coordinated Operations Agreement, the Suisun Marsh Preservation Agreement, and to amend the Small Reclamation Projects Act of 1956, as amended, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

**TITLE I -- COORDINATED OPERATIONS
PROJECT OPERATION POLICY**

SEC. 101. Section 2 of the Act of August 26, 1937 (50 Stat. 850) is amended by --

- (a) inserting at the beginning "(a)"; and
- (b) inserting the following new subsection:

"(b)(1) Unless the Secretary of the Interior determines that operation of the Central Valley project in conformity with State water quality standards for the San Francisco Bay/Sacramento-San Joaquin Delta and Estuary is not consistent with the congressional directives applicable to the project, the Secretary is authorized and directed to operate the project, in conjunction with the State of California water project, in conformity with such standards. Should the Secretary of the Interior so determine, then the Secretary shall promptly request the Attorney General to bring an action in the court of proper jurisdiction for the purposes of determining the applicability of such standards to the project.

"(2) The Secretary is further directed to operate the Central Valley project, in conjunction with the State water project, so that water supplied at the intake of the Contra Costa Canal is of a quality equal to the water quality standards contained in the Water Right Decision 1485 of the State of California Water Resources Control Board, dated August 16, 1978, except under drought emergency water conditions pursuant to a declaration by the Governor of California. Nothing in the previous sentence shall authorize or require the relocation of the Contra Costa Canal intake."

REIMBURSABLE COSTS

SEC. 102. Section 2 of the Act of August 26, 1937 (50 Stat. 850) is amended by inserting the following new subsection:

"(c)(1) The costs associated with providing Central Valley project water supplies for the purpose of salinity control and for complying with State water quality standards identified in exhibit A of the 'Agreement Between the United States of America and the Department of Water Resources of the State of California for Coordinated Operation of the Central Valley Project and the State Water Project' dated May 20, 1985, shall be allocated among the project purposes and shall be reimbursed in accordance with existing Reclamation law and policy. The costs of providing water for salinity control and for complying with State water quality standards above those standards identified in the previous sentence shall be nonreimbursable.

"(2) The Secretary of the Interior is authorized and directed to undertake a cost allocation study of the Central Valley project, including the provisions of this Act, and to implement such allocations no later than January 1, 1988."

COORDINATED OPERATIONS AGREEMENT

(iii) evaluation of lower Mokelumne River floodway improvements.

(C) INTERTIES.—Activities under this subparagraph consist of—

(i) evaluation and construction of an intertie between the State Water Project California Aqueduct and the Central Valley Project Delta Mendota Canal, near the City of Tracy, as an operation and maintenance activity, except that the Secretary shall design and construct the intertie in a manner consistent with a possible future expansion of the intertie capacity (as described in subsection (f)(1)(B)); and

(ii) assessment of a connection of the Central Valley Project to the Clifton Court Forebay of the State Water Project, with a corresponding increase in the screened intake of the Forebay.

(D) PROGRAM TO MEET STANDARDS.—

(i) IN GENERAL.—Prior to increasing export limits from the Delta for the purposes of conveying water to south-of-Delta Central Valley Project contractors or increasing deliveries through an intertie, the Secretary shall, not later than 1 year after the date of enactment of this Act, in consultation with the Governor, develop and initiate implementation of a program to meet all existing water quality standards and objectives for which the Central Valley Project has responsibility.

(ii) MEASURES.—In developing and implementing the program, the Secretary shall include, to the maximum extent feasible, the measures described in clauses (iii) through (vii).

(iii) RECIRCULATION PROGRAM.—The Secretary shall incorporate into the program a recirculation program to provide flow, reduce salinity concentrations in the San Joaquin River, and reduce the reliance on the New Melones Reservoir for meeting water quality and fishery flow objectives through the use of excess capacity in export pumping and conveyance facilities.

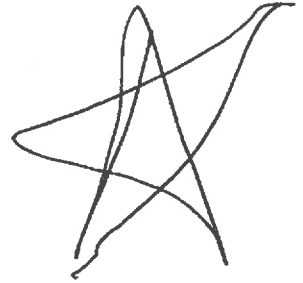
(iv) BEST MANAGEMENT PRACTICES PLAN.—

(I) IN GENERAL.—The Secretary shall develop and implement, in coordination with the State's programs to improve water quality in the San Joaquin River, a best management practices plan to reduce the water quality impacts of the discharges from wildlife refuges that receive water from the Federal Government and discharge salt or other constituents into the San Joaquin River.

(II) COORDINATION WITH INTERESTED PARTIES.—The plan shall be developed in coordination with interested parties in the San Joaquin Valley and the Delta.

(III) COORDINATION WITH ENTITIES THAT DISCHARGE WATER.—The Secretary shall also coordinate activities under this clause with other entities that discharge water into the San Joaquin River to reduce salinity concentrations discharged into

Deadline.



the River, including the timing of discharges to optimize their assimilation.

(v) ACQUISITION OF WATER.—The Secretary shall incorporate into the program the acquisition from willing sellers of water from streams tributary to the San Joaquin River or other sources to provide flow, dilute discharges of salt or other constituents, and to improve water quality in the San Joaquin River below the confluence of the Merced and San Joaquin Rivers, and to reduce the reliance on New Melones Reservoir for meeting water quality and fishery flow objectives.

(vi) PURPOSE.—The purpose of the authority and direction provided to the Secretary under this subparagraph is to provide greater flexibility in meeting the existing water quality standards and objectives for which the Central Valley Project has responsibility so as to reduce the demand on water from New Melones Reservoir used for that purpose and to assist the Secretary in meeting any obligations to Central Valley Project contractors from the New Melones Project.

(vii) UPDATING OF NEW MELONES OPERATING PLAN.—The Secretary shall update the New Melones operating plan to take into account, among other things, the actions described in this title that are designed to reduce the reliance on New Melones Reservoir for meeting water quality and fishery flow objectives, and to ensure that actions to enhance fisheries in the Stanislaus River are based on the best available science.

(3) WATER USE EFFICIENCY.—

(A) WATER CONSERVATION PROJECTS.—Activities under this paragraph include water conservation projects that provide water supply reliability, water quality, and ecosystem benefits to the California Bay-Delta system.

(B) TECHNICAL ASSISTANCE.—Activities under this paragraph include technical assistance for urban and agricultural water conservation projects.

(C) WATER RECYCLING AND DESALINATION PROJECTS.—Activities under this paragraph include water recycling and desalination projects, including groundwater remediation projects and projects identified in the Bay Area Water Plan and the Southern California Comprehensive Water Reclamation and Reuse Study and other projects, giving priority to projects that include regional solutions to benefit regional water supply and reliability needs.

(D) WATER MEASUREMENT AND TRANSFER ACTIONS.—Activities under this paragraph include water measurement and transfer actions.

(E) URBAN WATER CONSERVATION.—Activities under this paragraph include implementation of best management practices for urban water conservation.

(F) RECLAMATION AND RECYCLING PROJECTS.—

(i) PROJECTS.—This subparagraph applies to—

(I) projects identified in the Southern California Comprehensive Water Reclamation and Reuse Study, dated April 2001 and authorized by

Applicability.