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"SHOULD THE PERIPHERAL CANAL BE BUILT?"

*Report and Recommendations by Members of Study
Section on Water*



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EDITORS' INTRODUCTION

The Water Study Section of the Commonwealth Club of California has examined the desirability of constructing the Peripheral Canal, commencing its study in March 1971. Information on the proposed Canal was presented to the Section by speakers who actively favor and those who actively oppose the Project. Additionally, factual information has been obtained from current publications and the governmental departments concerned.¹

Following completion of the Section's study the State Department of Water Resources (DWR), on September 3, 1974 released the "Draft Environmental Impact Report, Peripheral Canal Project" (EIR).

During the 90-day review periods which followed the release of the draft EIR, the Department received written comments from about 700 parties and conducted six public hearings at which 136 people presented oral statements. Solicitation of such comments, and the public hearings, are each part of the EIR preparation process established in official State guidelines. These facilitate public participation in the review prior to preparation and adoption of the EIR. Adoption of the final EIR, the last major step required by State law prior to advertising for bids to commence construction, has not yet been accomplished.

Final decisions regarding commencement of construction on the Canal Project were initially delayed for one year (until at least the end of 1975), by John Teerink, former Director of the DWR. This delay was then extended in January of 1975, for an additional year (through 1976), by Ronald B. Robie, present Director of DWR, shortly after taking office.

Under the circumstances the Canal, if built, could not begin operation until 1982. According to Water Resources Director, Ronald B. Robie:

"... for planning purposes I have decided to defer the completion of construction of Delta facilities until 1982, one year beyond the deferment announced earlier this year . . . by John Teerink. This deferment will appear as a matter of course in Bulletin 132-75 . . ."²

In addition, the U.S. Bureau of Reclamation has prepared a draft Environmental Impact Statement (EIS) pursuant to the requirements of *National Environmental Policy Act* (NEPA). The draft EIS has been submitted to the Secretary of Interior for approval and subsequent submission to the Council on Environmental Quality. The draft EIS

¹Most recently, and for those of you who may wish to further your knowledge in this critical area, a series of three major articles concerning the Peripheral Canal authored by Daniel J. Blackburn, former Executive Director of the Association of State Water Agencies, may be referred to. These articles were published by the San Francisco Chronicle on the second, third and fourth of July 1975. In addition, the California Journal, in its July 1975 issue, published a penetrating article by James M. Dourgarian entitled "The Peripheral Canal: Environmental Concerns Catch Up With Southern Thirst."

²Address by Ronald Robie to the California Water Commission, presented April 4, 1975.

has not yet been furnished to interested parties for review and comment nor has it been the subject of public hearings.

A variety of statistics has been published on the effect of the construction of the Canal. Those statistics prepared by the DWR appearing in the Report on page 10, derived from "Decision 1379" (See Glossary). The figures differ from those mailed to the Section in October 1974. Figures on the outflow (page 33) as claimed by the opponents of the Canal are also published in the Report as part of the Section Report Meeting. Experts do not agree on the minimum flow necessary or available out of the Delta and how much protection should be provided to maintain the integrity of the Delta.

Although "Decision 1379" has been adopted by the State Water Resources Control Board it is currently under attack in court and there is no certainty of contractual or legal limitation protecting the outflow through and from the Delta.

Changes have recently taken place, primarily in terms of personnel having responsibility for California's water resources and allocations, from those said to be in favor of the Canal to those who favor 'management' of our water resources. The full impact of these changes have yet to be experienced.

Providing adequate water for the population of Southern California, for agricultural interests in the great valleys of Central California, for the counties of the Bay Area and affording adequate protection to prevent the intrusion of salt water far into the Delta, provide singular challenge for California. This controversial Canal, as the conveyance for distributing these waters, has brought forth many viewpoints, statistics and attempts to set priorities. Members are urged to study the available facts carefully as well as the arguments of both sides, before giving their opinions on the desirability of constructing the Canal.

Chairmen T. P. Stivers, Robert Kasper and Orrin Harder, who have headed the Section during the course of this study and preparation of the Report, and the members of the Water Section have devoted much time and energy for the benefit of our Club members on this controversial subject confronting our citizens.

—*The Editors*

Objects of the Commonwealth Club: "To investigate and discuss problems affecting the welfare of the Commonwealth and to aid in their solution" . . . "To maintain itself in an impartial position as an open forum for the discussion of disputed questions."

—DURWARD S. RIGGS, Editor

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"SHOULD THE PERIPHERAL CANAL BE BUILT?"**REPORT BY MEMBERS OF STUDY SECTION ON WATER**

ORRIN H. HARDER

Chairman, Section on Water

Division Manager, Water Resources Planning Division, East Bay Municipal
Utility District

PRESIDENT KROTZ: We are here today to review the final report of the Section on Water entitled "Should The Peripheral Canal Be Built?". It is my pleasure to introduce the Section's Chairman, Orrin H. Harder, who will summarize the report.

INTRODUCTION:

The Peripheral Canal has been proposed as a means of conveying water around the Sacramento-San Joaquin Delta in Northern California. The Canal controversy over the past few years, coupled with genuine public concern for protecting the environment, has generated substantial public interest.

The Sacramento-San Joaquin Delta is a *valuable* resource comprised of rich agricultural lands and extensive waterways. It is situated in the upper portion of the San Francisco Bay-Delta Estuarine System (see map pages 18 & 19).

Approximately 130 years ago the Delta was largely a fresh water tule marsh distinguished by natural islands and meandering waterways. Over the decades this natural resource has been changed by man, primarily through land reclamation *by levees* to be used for agricultural and other purposes.

The Delta includes almost 700,000 acres of highly productive farm lands which annually produce a crop yield valued in excess of \$150 million. These farm lands are entirely dependent upon the availability of an adequate fresh water supply of good quality. Presently, this water is primarily provided by the Sacramento and San Joaquin River systems.

The original natural environment has been grossly altered by man's activities. Even the striped bass are not an indigenous species.

The Delta constitutes a major fish and wildlife habitat with approximately 40,000 to 50,000 surface acres of water and 700 miles of navigable water channels. It is a major source of water supply for the San Francisco Bay Region and much of the remainder of the State, by means of the Federal Central Valley Project (CVP) and the State Water Project authorized by constitutional amendment in 1960.

The San Francisco Bay and the Delta are interdependent hydrologically. The Kaiser Engineers prepared a report for the State Water Resources Control Board (June 1969) entitled: "San Francisco Bay Delta Water Quality Program." In the "Kaiser Report" this interrelationship of the Bay and Delta was described as follows:

"No single element of the Bay-Delta System—river, Delta, channel, Bay, or marsh—can be considered as an entity unto itself. Each is

related to the others in such a manner that the influences on one affect the others, and the benefits to be received from one depend on the condition of the others. Pollutants entering the rivers find their way through the Delta and the Bay; reductions in fresh water outflows cause the ocean salts to intrude farther into the Delta; and the anadromous fishery in the area could not survive without the presence of both the salt and fresh water and the gradient between these as they meet and mix. The Bay-Delta System is a single integrated water system which serves to carry the flows of the rivers to the ocean and to provide water-related benefits to the entire region." (p. II-2)

Presence of Both Fresh and Salt Water

Fresh water from the rivers flows into the Delta where some is consumed, some is diverted to major Federal, State and other transmission facilities serving municipal and industrial uses in the San Francisco Bay Region and Southern California, and municipal, industrial and agricultural purposes in the San Joaquin Valley, and some flows through the Delta into San Francisco Bay. The water flow, called "Delta Outflows" meets and mixes with the salt water over an extensive area. The presence of both fresh and salt water and the gradient between the two are essential features of the System.

Adequate Delta Outflows are essential to the Bay-Delta Estuarine System. They provide and maintain the salinity gradient for some of the anadromous fish to adjust to the change from salt to fresh water on their annual spawning migrations. They supply the necessary "Flushing Flows" to cleanse the Bay-Delta System of pollutants.

The water qualities necessary to preserve, protect and enhance the Bay-Delta System, including its ecological resources, thus far have not been determined but are subject to considerable scientific investigation and study.

Much of the San Francisco Bay Region is dependent on the streams tributary to the Delta and on the Delta itself for most of its fresh water supply. The City of San Francisco diverts from the Tuolumne River through its Hetch Hetchy Aqueduct to serve the City, San Mateo and Northern Santa Clara Counties. East Bay Municipal Utility District diverts from the Mokelumne River to serve the East Bay communities as far south as San Lorenzo. These export diversions have depleted the flows into the Delta.

Delta Inflows and Outflows Greatly Depleted

The urban and industrial developments in Northern Contra Costa County including the City of Concord and other nearby communities are served from the Contra Costa Canal, a federal facility diverting from Rock Slough. It is operated by the Contra Costa County Water District. The North Bay Aqueduct diverts from Lindsay Slough, in the Northern Delta, and the South Bay Aqueduct receives its water from the Southern Delta via Clifton Court Forebay. Both are units of the State Water Project. These provide water for the North Bay area and Southern Alameda and Northern Santa Clara Counties respectively.

Diversions for consumptive uses, primarily agricultural, in the Sacramento Valley and San Joaquin Basin deplete the inflows into the Delta to a significant degree. Outflow is further depleted by consumption within the Delta itself. The Delta waters receive the residual municipal, industrial and agricultural wastes generated in the tributary area as well as wastes originating in the Delta itself.

The mountain streams naturally tributary to the Delta are now almost completely regulated. Most of the releases from the Federal Reservoirs, Shasta on the Sacramento River and Folsom on the American River, and from the State's Oroville Reservoir in the Feather River, flow into the Delta for consumption there and for conveyance across the Delta through its channel for redirection by the Tracy and Delta pumping plants at the southernly edge of the Delta. Water is also diverted by their pumps from unregulated inflow into the Delta during times of heavy runoff in the winter, spring and early summer. In addition, under the Trinity Division of the Federal Central Valley Project, about one million acre feet per year of water are imported into the Sacramento Valley to flow into and across the Delta for re-division.

Augmented Inflows Beneficial to Delta

The flows into the Delta during the low flow months of summer and fall have been augmented by these releases from the upstream reservoirs which began in 1944. These augmented inflows have been greatly beneficial to the Delta in mitigating or lessening the intrusion of saline water into the western Delta. Without these releases, the salinity intrusion in 1959, for example, would have been far worse than what actually occurred, and would have affected nearly all of the Delta.

However, the large diversions and redirections by the Federal and State pumps have also caused some serious problems. Reversals of the natural currents in some of the Delta channels tend to confuse the migrating salmon. Significant numbers of fish eggs and larvae are lost through the pumps. The increased velocities in certain Delta channels have caused erosion. These problems will become worse as diversions increase unless corrective measures can be undertaken.

Passage of water through the Delta channels degrades its quality for municipal, industrial and agricultural users. Degradation will become worse with time.

The principal environmental problems of the Delta concern the maintenance of water quality, quantity and hydraulic conditions suitable for the extremely valuable fish and wildlife resources and for recreation. The problem is one of low flow months of summer and fall, and is particularly acute in dry and critical runoff years.

It is evident that the Delta is of extreme importance as a source of water supply to most of the State's urban residents, including those in the San Francisco Bay Region, and to much of the State's industrial and agricultural economics.

THE PERIPHERAL CANAL PROPOSAL

The Canal has been proposed by the U.S. Bureau of Reclamation and the State Department of Water Resources as a means to:

1. Correct the current problems in the Delta (noted in this report) and to provide and maintain better environmental conditions within the Delta through better managed fresh water releases into the Delta channels;
2. Provide a better water supply for users within the Delta;
3. Provide water supplies of better quality for municipal, industrial and agricultural users in the San Francisco Bay Region, San Joaquin Valley and Southern California;
4. Effect better conservation of unregulated inflows to the Delta not needed for Delta environmental maintenance and water supply. Without the Peripheral Canal, or other trans-Delta facility, serving the same purposes, the quality of the water supplies for much of the State will be seriously degraded at times.

SIZE AND LOCATION

The proposed Peripheral Canal would be a 43-mile unlined earth channel 25 to 30 feet deep and 400 feet wide, separated from existing Delta channels. It would start at the Sacramento River near Hood, skirt the eastern edge of the Delta near Stockton and continue south-easterly across the Southern Delta to the State and Federal pumping plants. It would have a design capacity of 19,600 cubic feet per second (cfs) giving it a theoretical capability at continuous operation of delivery of 14,200,000 acre feet per year. Actual deliveries would be less as continuous full capacity is impossible. The amount actually diverted will depend on the needs of the CVP and SWP and availability. The current estimated cost is about \$300,000,000.

The Peripheral Canal is the proposed facility of the State Water Project and the Central Valley Project to meet Delta needs and to convey "surplus" water from the Sacramento River to the existing State and Federal pumping plants near Tracy. One purpose is to send Northern California water to the San Francisco Bay Region, to Southern California and the Central Valley by transmitting water around the Delta, keeping the Canal independent of conditions within the Delta, thus protecting the quality of the water diverted.

The Canal would be siphoned under four major stream crossings—the Mokelumne, San Joaquin, Old River and Disappointment Slough—to allow for passage of flood waters, fish migration and navigation. Several turnout facilities would be installed at river and slough crossings to supply water for Delta uses, water quality improvement and environmental needs.

Fish screens would be installed near the Canal headworks and a bypass would return salvaged fish to the Sacramento River. A pumping plant would lift the water 10 feet to provide the required flow. Recreation facilities would be provided at several locations along the Canal.

In January 1965, the Interagency Delta Committee (IDC), recommended the Peripheral Canal concept as the best of four basic alternatives to meet the various water needs of the Delta and the water transport requirements of the State and Federal projects.

The Peripheral Canal has been adopted by the Department of Water Resources and the U.S. Bureau of Reclamation as a joint-use Delta facility of the SWP and CVP. Under the 1960 constitutional amendment, DWR has authority to construct the Canal alone or jointly with USBR. The USBR needs authorization from Congress to proceed with the joint project.

In November 1972, DWR announced that it was preparing to proceed alone with construction of the Peripheral Canal as a "staged joint facility" if Federal participation cannot be realized within the time schedule for the SWP. With this approach contracted commitments could be met on schedule and Federal participation would be feasible at any time.

THE DELTA DECISION

On July 28, 1971, the State Water Resources Control Board adopted "Decision 1379," which sets water quality standards for the Delta. The "Decision" was reached after more than two years of study, including 93 days of public hearings. Petitions for reconsideration were received, and an order denying reconsideration and clarifying and correcting "Decision 1379" was adopted on September 16, 1971. The Board therefore promulgated only interim water quality standards to be reviewed not later than 1978. The standards have been approved by the U.S. Environmental Protection Agency. A Federal court injunction is presently in effect against the "Decision," while the court determines whether the "Decision" is valid.

"Decision 1379" established water quality standards at Chipps Island to permit survival of neomysis shrimp, a food source for striped bass, and standards for the Suisun Marsh area to protect plant life, a major food source for migratory birds.

A mean tidal cycle value for chloride content of water at the Contra Costa Canal Intake must not exceed 100 mg/l during 65 percent of the year, and 250 mg/l (U.S. Public Health Service recommended maximum level for drinking water) at any time. This provision was a part of the 1967 Water Quality Objectives for the Delta, which were approved by the Environmental Protection Agency before issuance of "Decision 1379." Full protection of the Delta is, also assured by several state statutes including the *Delta Protection Act*. (Sec. 12200 et seq, Water Code).

Plan Now In Full Force

In April 1973, the State Water Resources Control Board, in a separate action, adopted the "Water Quality Control Plan Supplementing the State Water Quality Control Policy for the Sacramento-San Joaquin Delta" (SWRCB Resolution No. 73-16). This Plan contained essentially the same water quality standards at Antioch, Antioch Waterworks Intake, and Prisoner's Point as those in "Decision 1379." It did

not include objectives at the Contra Costa Canal Intake, since those objectives were already in force as part of the 1967 Delta Objectives. In June 1973, this Plan was approved by the Regional Administrator of the Environmental Protection Agency and now is in full force and effect under both Federal and State law. It is the State's contention that the Bureau of Reclamation is required to operate the Central Valley Project so as to assure that these standards are maintained.

In setting the standards contained in "Decision 1379," the Board cited statutory authority which provides the Board with enforcement capability. (Should there not be enough water to meet the Federal and State contractual commitments—Central Valley Project and State Water Project—then water shortages must be allocated among all the users, with the Delta having first priority to the available supply. Hearings will be reopened in the event that adverse conditions occur prior to the expiration of the seven-year interim period provided in the "Decision.")

Partly because the Board's authority under existing statutes is being disputed in the Federal court suit by agricultural interests in the San Joaquin Valley, opponents of the Peripheral Canal consider it essential that the standards set forth in "Decision 1379" be further protected by law to assure the following:

1. That there will be minimal, if any, environmental degradation within the Bay/Delta System.
2. Maximum "outflow" water levels be maintained to protect the salinity gradient from increasing in the Delta.
3. Clear definition and control of what constitutes "surplus waters" to be exported from the Delta.

Full implementation of "D-1379" would over the long term, make it impossible to completely fulfill the CVP and SWP water supply contractual commitments authorized by Congress and the 1960 constitutional amendment unless additional water supplies are developed.

THE CONTROVERSY

Since first proposed, over 100 governmental bodies, fish and wild-life and sportsman groups, water service agencies, and other entities have indicated their support for the Peripheral Canal. They feel the Canal will ensure the quantity and quality of water delivered by SWP and CVP for homes, farms, and industries in 23 counties and protection of the Delta environment.

Opponents allege that the Peripheral Canal will, by reducing Delta outflows below acceptable limits, cause massive degradation of the Delta-Bay environment in the form of increased salinity intrusion; reduce capacity to assimilate and flush wastes; and increase pollution and algae blooms. Some fear the Canal would lead to further damming of north coast rivers thus stimulating more development, and that the best way to stop this is to stop the Peripheral Canal.

The basic questions are: 1) what environmental conditions should be maintained in the Delta? 2) under what conditions should water be exported—rather than the specific means of conveying water across

the Delta? and 3) what additional sources of water can and should be developed in the future to meet Delta needs, CVP and SWP contractual commitments? A corollary question is how and from what source(s) should project costs allocated to Delta environmental protection be paid? Also in question is the assurance that, if built, the Canal will be operated to meet Delta needs as a first priority.

The amount of fresh water that flows out of the Delta toward the ocean largely controls the extent of intrusion of salt water in the estuary. The annual amounts of fresh water needed to meet Delta consumptive uses and to prevent ocean salinity from intruding any farther into the Delta, plus the amount needed to meet the needs of the authorized State and Federal projects to the south and west of the Delta, are tabulated in Table (see page 10 of this Report).

Delta inflows and outflows vary widely both seasonally and annually. Under natural conditions the average outflows are historically about 30 million acre-feet/year. However, as a result of upstream diversions, exports primarily by the City of San Francisco, East Bay Municipal Utility District, CVP and SWP, annual outflows now average about 18 to 20 million acre-feet/year (MAF/year). Annual inflows now average about 4.6 MAF/year more than Delta outflows because of water diverted to other uses—1.6 MAF/year for Delta irrigation and about 3 MAF/year for export by CVP and SWP. As previously stated, average annual values are not particularly significant—flows during low river flow periods are the significant parameters.

Prior to Shasta Reservoir, summer inflows were often so low in some years that Delta outflows were negative. In fact, for 23 years prior to completion of the Shasta project, salinity intruded deep into the interior Delta every 2 or 3 years on the average, during the dry summer and fall months.

Controlled Salinity Intrusion

For the 30 years since operation of Shasta Reservoir began, water released from storage to augment the naturally low summer and fall flows has controlled salinity intrusion to the westernmost extremity of the Delta.

According to testimony at the water rights hearing that led to State Water Resources Control Board (SWRCB) "Decision 1379," Delta outflows averaged about 23 MAF/year before beginning operation at CVP. Under present conditions, they average about 19 MAF/year. Under future conditions with full development of water rights under projects presently authorized or in operation, including CVP and SWP, outflows will average about 13 MAF/year. On an average annual basis, these are more than enough to protect the Delta estuary. (Minimum Delta outflows presently for CVP-SWP operation, the only two projects supplying water to the Delta, are estimated at 4000 cfs (2.9 MAF/year).*)

The ecological controversy stems from disagreement on what minimum flows are essential and under what conditions to provide pro-

*"D-1379"

tection, what guarantees that such flows will be provided, and who should pay for them. At times some of the Delta outflows occur naturally, but much of them would have to come from reservoir storage to meet year round needs.

The operators of the SWP and the CVP will control diversion from the Delta, subject to several constraints.

First, the water exported from the Delta must be surplus to the needs of Northern California and the Delta. This is provided in WC Secs. 10505, 11460-3, and 12200-5. The *Burns-Porter Act*, approved

Annual amounts of fresh water needed to meet Delta consumptive uses and to prevent ocean salinity from intruding any farther into Delta, plus amount needed to meet the needs of the authorized State and Federal projects to the south and west of the Delta.

TABLE 1

	Millions of acre-feet/year	
	Normal Year	Critical/Dry Year
Delta		
Net agricultural Use	1.6	1.6
Estimated minimum controlled Delta outflows to continue present protection	<u>2.9</u>	<u>2.4</u>
Subtotal—Delta	4.5	4.0
State Water Project		
South Bay Area	0.2	0.2
San Joaquin Valley	1.4	0.7
Central Coastal Area	0.1	0.1
Southern California	2.5	2.5
Unavoidable Losses	<u>0.2</u>	<u>0.2</u>
Subtotal—SWP	4.4	3.7
Central Valley Project		
Cross Valley Canal	0.1	0.1
Contra Costa County	0.2	0.2
San Joaquin Valley	3.1	2.5
Monterey Bay Area	0.3	0.3
Unavoidable Losses	<u>0.3</u>	<u>0.2</u>
Subtotal—CVP	4.0	3.3
TOTAL DELTA AND EXPORT	12.9	11.0

SOURCE: DWR

Note: Delta outflows based on "Decision 1379" State Water Resources Control Board. Export requirements include allowance for unavoidable operational and evaporation losses and reflect contract deficiencies provisions. (Source DWR.)

by the 1960 constitutional amendment, is specific in stating that the State Water Project must meet the needs of Northern California as well as the needs of the remainder of the State.

Basic Water Right Laws

Second, basic water right laws of the State require that the Department of Water Resources file for a water right through the State Water Resources Control Board (SWRCB) which has the power to require the Department to comply with any order of that Board.

Three past decisions, "D-1275," "D-1291" and "D-1379," have all provided for the needs of Northern California and the Delta. The Board has indicated that it will retain jurisdiction over the State Water Project's and the Central Valley Project's diversion permits until the needs to protect the agricultural, municipal, and industrial economy, the fish and wildlife resources, and other resources are well defined and protected.

Some claim that the laws can be changed or the Board's members realigned to fit the desires of politically powerful Southern California and the San Joaquin Valley agricultural interests. In order to protect such a situation, it has been advocated for many years that the Northern interests along the Feather River and in the Delta enter into agreements with the State and the Bureau of Reclamation as to their respective water entitlements. This would give assurances through contractual arrangements supported by the judicial system as well as the legislative and administrative systems. This would not, however, protect the Delta environment in its totality since those interests are primarily agricultural. There is no agency with authority representing all of the Delta's manifold interests.

QUESTIONS AND ARGUMENTS

1. *Would the Peripheral Canal be beneficial to:*

- A. *The Delta***
- B. *The San Francisco Bay Area***
- C. *The San Joaquin Valley***

A. *The Delta*

PRO

Benefits would accrue in several ways. Moving the point of diversion, providing fully tested and perfected fish screens, and isolating the authorized Cross-Delta flows for the SWP and CVP will: (a) eliminate flow reversals that interfere with salmon migration; (b) eliminate high velocities that diminish fish food organisms and spawning habitat in the transfer channels, and mitigate erosion; and (c) prevent the loss of Delta spawned striped bass eggs and larvae to the export pumps.

Making fresh water releases to the eastern and southern Delta channels will: (a) provide a firm supply of quality water for Delta use; (b) assure positive downstream net flow in most channels for fish migration; (c) prevent the buildup of salts and pollutants; and (d) pro-

vide much needed operational flexibility for faster and more efficient flushing of salt water during emergencies such as resulted from the recent Andrus Island levee break.

Legal measures are needed to guarantee protection of the environment and water uses of the Delta. Conditions imposed by the SWRCB in accordance with State and Federal law, and negotiated contracts with Delta water users constitute legal protection. State statutes give the Delta first priority to water supplies from projects constructed under the *Central Valley Project Act*. Statutes also give the SWRCB authority to condition water rights permits for the projects to protect the reasonable and beneficial uses in recognition of that priority in the public interest.

CON

The Peripheral Canal will enable diversion of significant flows from the Sacramento River and direct transportation to the San Francisco Bay Region, San Joaquin Valley and Southern California, resulting in a drastic reduction in fresh water flows into the Delta-Bay environment and ecology. Salt water intrusion will stretch from the Carquinez Straits to Stockton. Waste assimilation will be diminished, thus affecting San Francisco Bay. Accelerated algae growth will damage marine plants and animals by usurping dissolved oxygen in waters, killing fish and producing foul odors.

The Peripheral Canal will drastically alter the hydraulics and hydrology of the Delta fishing problems. It will merely trade today's problems for new ones. Anadromous fish will be drawn to their destruction into the Peripheral Canal Intake pumps. The USBR contends it is not bound by conditions to protect the Delta established by the SWRCB. Further it claims it has the right to "take" any waters it may desire or need from time to time to supply its water contractors.

B. The San Francisco Bay Area

PRO

The Peripheral Canal will directly benefit Bay Area residents by maintaining the reliability and improving the quality of water deliveries (prevent water rationing) from the SWP and CVP.

For example, it will convey and protect the quality of 188,000 acre-feet of water per year to be supplied via the South Bay Aqueduct (SWP) to the Santa Clara Valley Water District, the Alameda County Flood Control and Water Conservation District (Zone 7), and the Alameda County Water District. This amount constitutes over 1/3 of the total water supply available for use in these districts. Improved water quality will save consumers in these districts at least \$100,000 annually through reduction in water treatment costs by these districts. Delivery of this water will remove the threat of overdrawing their ground aquifers or suffering serious water shortages.

CON

The San Francisco Bay is directly linked to the Delta Estuarine System and although exporting water via the Peripheral Canal to the Bay Area may be beneficial, the export of this water to the San Joa-

quin Valley and Southern California can only have an adverse effect on San Francisco Bay and its residents. Water export will seriously reduce the Delta outflows which are essential for salinity control and for naturally cleansing pollution in the Delta and the Bay. San Francisco Bay and the Estuarine System are vital not only as a unique ecological system, but also as a primary source of recreation. Delta outflows maintain a salinity gradient necessary for some of the many species of anadromous fish in the area; if water is exported and these outflows are reduced, sport fishing and other recreational industries will suffer and ecological disaster will ensue. Increased pollution of San Francisco Bay will directly and adversely affect every Bay Area resident.

C. The San Joaquin Valley

PRO

The Peripheral Canal is essential to the agricultural economy of the San Joaquin Valley, where more than 200 commercial crops are grown.

Agriculture and related enterprises account for 1 of every 4 jobs in California. Maintaining our agricultural economy depends on maintaining a firm supply of water and a favorable "salt balance" to prolong the life of our farm lands.

The San Joaquin River is the natural water and salt drain from the Valley. The Peripheral Canal is needed so salts carried by the San Joaquin River to the Delta are not pumped and recycled to the Valley as they are now, but will instead, be of lesser concentration when they enter the Delta and flow through to the Bay and ocean.

Water delivered by the SWP and CVP via the Peripheral Canal will help offset the tremendous ground water overdraft where water levels in some areas are hundreds of feet lower than they were a few years ago causing severe land subsidence. Agricultural pumping from ground water increases by 3 times the natural salt concentration in water percolating back to ground water.

CON

The Peripheral Canal will increase water exports to the San Joaquin Valley which in effect will subsidize big farmers. This will be done to the probable detriment of another farming area—the Delta—as well as destroying ecological resources there.

An abundance of irrigated lands in the San Joaquin Valley—much of it subsidized and in violation of the 160 acre-limitation—will increase competition between big farming and small, and cause prices to drop, forcing marginal farms in many areas to fail.

2. Is there sufficient inflow to the Delta to protect the Delta and also meet water contract agreements regardless of a conveyance facility?

PRO

Present export by CVP and SWP is about 3 million acre-feet per year and present Delta outflow after Delta uses are met averages

from 18 to 20 million acre-feet per year. Under full development of contractual agreements and water rights under presently authorized projects, annual Delta export by CVP and SWP will be about 8.3 million acre-feet. Delta outflow will average between 7 and 11 million acre-feet per year depending on how fast demands of upstream uses and other basin exports build up, and on how many new projects are authorized.

The problem is one of providing guaranteed minimum flows.

The bond act creating SWP made provisions for meeting the future needs in and above the Delta as well as for the SWP. Funds are to be set aside for future construction of additional conservation facilities in the Sacramento Valley and north coastal streams to augment water supplies in the Delta when necessary. This provision assures that reservoirs are not built before they are needed, that water needs of the SWP can be met, and that areas of origin (including the Delta) where surplus flows originate will not be deprived of water.

CON

The SWP has been a water-short and under-financed project from the start. Even with a Delta outflow of only 1,500 to 1,800 cfs as originally proposed by DWR and USBR, the SWP would have to import 700,000 acre-feet annually of additional water from the north coast to supply its 32 customers. The amount of additional water (from 1.5 million to 3 million acre-feet/year) required by "D-1379" further reduces the surplus water available in the Delta to meet contract commitments.

3. If the Peripheral Canal is completed, will Northern Californians have adequate protection and priority in water exports?

PRO

Northern Californians including those in the Delta and Bay System have and will have full protection and priority. Under California law, the areas which are counties of origin have priority and the right to first use of the water originating in their areas. The Delta is specifically protected by the *Delta Protection Act*. They also have the protection given in the water right decisions of the State Water Resources Control Board including "Decision 1379," which gives first priority to protection of the Delta.

CON

Once the Peripheral Canal is constructed, the project operators will have their hand on the throttle. There is no assurance that they will give equal consideration to the needs of the Delta and to those of Northern California where the interests and needs of their customers are involved.

The Federal Central Valley Project does not have a legal requirement to meet Delta environmental needs as does the State Water Project through the *Delta Protection Act*, where fish and wildlife consideration is a full function of the State Water Project.

4. Have Northern Californians been provided with an adequate protection and priority in water exports?

PRO

A number of decisions and events have led to the final decision to construct the Peripheral Canal. Authorization to construct a "Delta Facility" is in the *Burns-Porter Act* which was approved by the electorate in the 1960 constitutional amendment. The decision that the Peripheral Canal would be the facility to be constructed was made following an interagency study made by the Department of Water Resources, the Bureau of Reclamation, and the Corps of Engineers. These decisions were made on a statewide basis and on statewide consideration after widespread public discussion.

The selection of the Peripheral Canal was made from several alternatives that have been proposed for a Delta water transfer facility. Although costing more than some of the alternatives, the Peripheral Canal was selected primarily because of its environmental advantages. Three public hearings were held to review this selection. Of 38 organizations represented at these hearings, 37 supported the choice of the Peripheral Canal. The Peripheral Canal Plan was presented to and reviewed before the California Water Commission and later the Senate and Assembly Water Committees. All voiced their approval.

CON

Northern Californians have expressed their opinions on the Peripheral Canal for a number of years. Many of these expressions are in opposition to the Canal. Although there have been mechanisms for those expressions, the views of the water development agencies have prevailed.

5. Should the Peripheral Canal be Built?

IN FAVOR OF THE PERIPHERAL CANAL

By Robin Reynolds

District Engineer, Central District, Department of Water Resources

PRESIDENT KROTZ: I will now introduce a speaker in support of the Section's report, Robin Reynolds.

The Peripheral Canal is not a dream of a distant future. It is imminent. It is upon us. The time for decision is now. In my mind it already has been made.

If a Peripheral Canal or a similar facility is not constructed and in operation by about 1980, our State runs a substantial risk of having a crunch of meeting priorities for water quality and water quantity. The Department of Water Resources has the responsibility to construct and operate the State Water Project, of which the Peripheral Canal would be a part under a mandate from the Legislature in 1959 and from the voters in 1960.

We are also responsible to see that contract obligations of the State of California to deliver water and power from that project and to receive revenues therefrom are carried out. To carry out these obligations, it is essential to build the Peripheral Canal. A Federal-State Interagency Committee recommended the Peripheral Canal in 1964. In 1969 both the Senate and Assembly Water Committees endorsed the Peripheral Canal. In 1970 the Governor made an official statement supporting the Peripheral Canal. The Department of Fish and Game, which you would recognize as a department with great and prime interest in this facility and in the Delta, is and always has been a strong supporter of early construction of the Peripheral Canal.

We Live In Hostile Environment

Let's take a minute and recall something we Californians in our modern society are inclined to forget, and that is that we live in a hostile environment. The environment of California, with its six month desert summer climate, is hostile to our culture. Before our culture showed up on these shores this hostile environment probably supported less than one hundred fifty thousand humans. Now it supports twenty-two million people. For twenty-two million people to live in a hostile environment requires the development of immense quantities of water.

Some say the West was won with the Winchester. In California the West was won with water. Every major stream in the Central Valley has a major reservoir on it. And those of you who think those reservoirs are not essential and the continuing construction and improving the management and operation of them not essential, are not facing reality.

Now, there is another side to the coin, and that is our culture is

hostile to the environment. It is essential that these facilities, and the Peripheral Canal particularly, be operated to protect the environment. And there is not a person in this room, including myself, who is not dedicated to that. But it must be recognized and done within the context of trying to live here in a situation that is not natural.

This water development (what we have done to the Delta), began some hundred years ago. In this hundred years, inflow in the Delta has been cut nearly in half. What happened to all the water that used to come into the Delta, flow out of the Delta into the Bay, and out of the Bay? It is impounded in reservoirs in the winter; it serves to water farmland and cities in the Central Valley and is exported to Southern California. It is evaporated (transpired), there. We must do constantly more in California with less water.

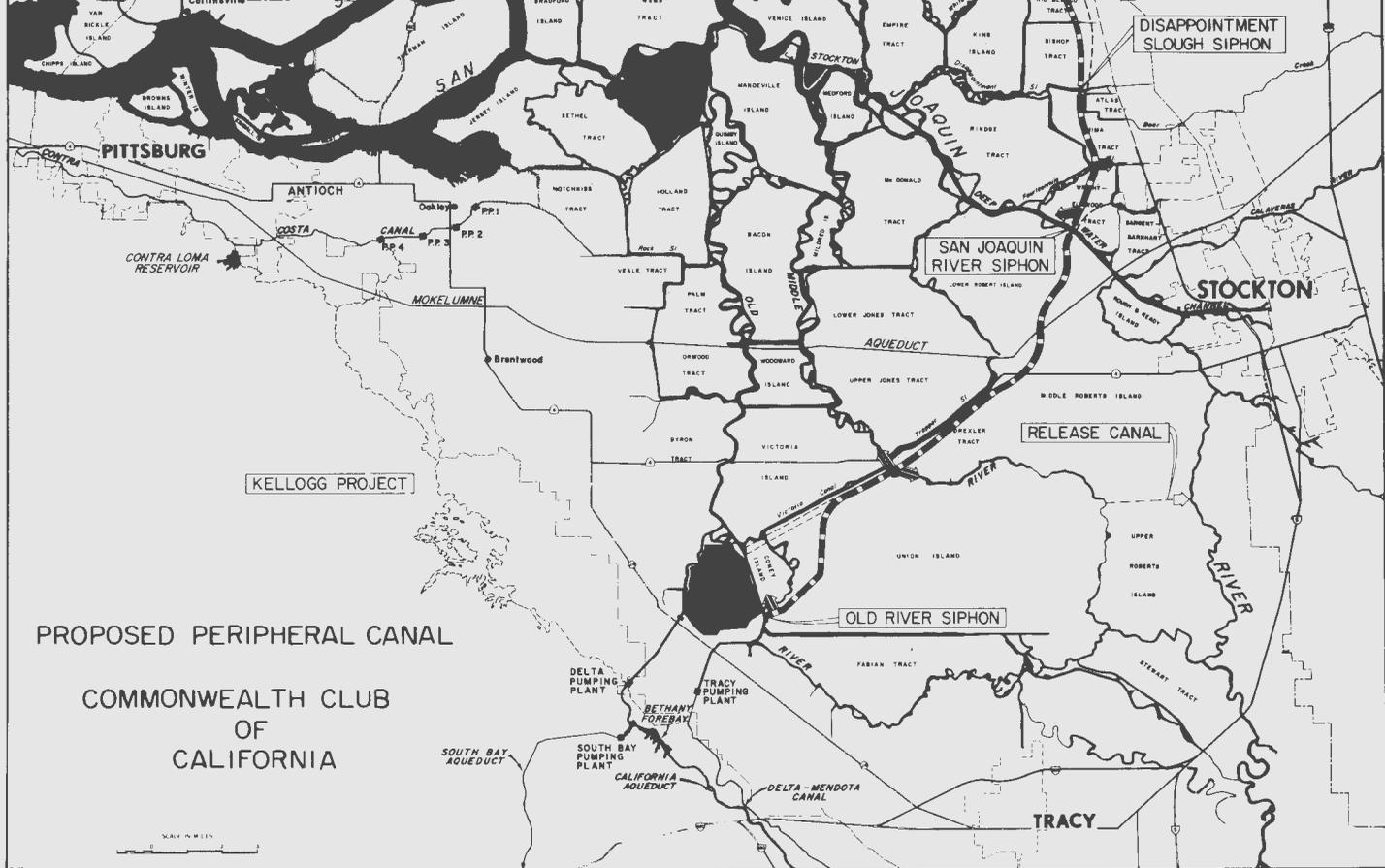
In the early part of this century up to the '20s and into the '30s and early '40s the situation of the Delta deteriorated substantially. In the late drought years of the '30s there was substantial saline intrusion, substantial damage to agricultural crops, and a very limited usefulness of water because of limited Delta inflow.

Lake Shasta, a reservoir, was completed in 1942, and this situation was remedied instantly. Since 1942 the situation has been very satisfactory. There have been substantial fresh water inflows and outflows to the Delta. But we are now again reaching a potential crunch period. As I pointed out, if we do not have a facility to better manage the flows into and through the Delta by 1980, we are going to have some problems to face.

Peripheral Canal as a Water Management Facility

We now have, because of reduced inflows, reversal of flows in the Delta because of the substantial draft of the pumping plants in the south part of the Delta. Let me refer to the map for just a minute (pp. 18-19). These two large pumping plants with substantial draft now draw water from the source, the Sacramento River, across the Delta in the natural channels. As you can see, the mid-Delta, south of about this point sets up flows in the unnatural direction. The natural direction for the flows in these channels is northerly. Now it is coming in this direction towards the pumps. These reversed flows confuse the anadromous migrating fish. They increase the velocity in the channels above what the natural velocity would be. Further, there are fish losses through these diversion pumps.

The Peripheral Canal is a water management facility. It does not utilize any water. It will distribute water in the Delta in this manner. Water released from the Canal will flow in these directions and recreate the natural directions of flows in the Delta. The Delta has ample protection in the *County of Origin Act*, the *County Protection Act*, and the *Burns-Porter Act*, and particularly in the decisions of the State Water Resources Control Board.



PROPOSED PERIPHERAL CANAL

COMMONWEALTH CLUB
OF
CALIFORNIA



It is the State Water Resources Control Board that sets the water quality criteria that must be met in the Delta, not the operators of the projects.

What are the real issues? One of the real issues is the old north-south fight against the transfer of water. Other issues are environmental concerns, legitimate ones. Other issues are that waste discharges are much better handled if there is substantial flows of water to carry the waste discharges away. Another issue is that the existing beneficiaries of fresh water in the Delta like the status quo. There are others who are social reformers and want to manage population and growth by water. That may be a possibility, but it is a tough thing to do. And there are a few to whom this provides a political bandwagon.

In summary, the Peripheral Canal is essentially and absolutely needed. It must be looked at in the context of our climate and our culture and now in context of the world food shortage and the food revenues that help our balance of payments. We have the soil, the climate, the know-how, in California. We must have the water. It must be constructed. But I agree that a key is its proper operation. It must be operated to meet all of the many requirements, not only water, but environment.

IN OPPOSITION TO THE PERIPHERAL CANAL

By CRESSEY H. NAKAGAWA

Attorney

PRESIDENT KROTZ: And now to present a view in opposition to the Section's report, I introduce Cressey H. Nakagawa.

The proposed Peripheral Canal Project would be a huge water conduit. It would have the capacity to divert *all* of the flows of the Sacramento River during eighty percent (80%) of the time of most normal water years.

This huge artificial water conduit can and would, in the opinion of many impartial and qualified scientists, drastically change the hydrology and hydraulics of the entire Bay-Delta Estuarine System with a resultant severe and irreparable injury to the water resources of this System. These water resources are an indispensable foundation of the economic, recreational, and ecological health and viability of this region.

This proposed project is a highly controversial one. It has aroused widespread opposition by many responsible organizations, groups and governmental bodies, including (but not limited to) the Boards of Supervisors of San Francisco, Sacramento, San Joaquin and Con-

tra Costa Counties; San Francisco Real Estate Board, the Sierra Club, Planning and Conservation League; the Delta Water Agency, Contra Costa County Water Agency and the Contra Costa County Water District; Trout Unlimited, and the California Striped Bass Association. Equally significant is the fact that a Task Force of the U.S. Environmental Protection Agency (EPA) has also recommended (in March, 1971) that the Peripheral Canal should not be constructed. In its lengthy report, this EPA Task Force set forth a number of severe criticisms of the proposed Peripheral Canal, as well as various recommendations. For example, its Recommendation No. 24 states: "The Peripheral Canal, as it is now conceived, should not be constructed." (p. 5)

The careful investigations, studies, and evaluations of this huge project by these various governmental and private agencies have shown that the Peripheral Canal would be very dangerous to and potentially destructive of the Bay-Delta Estuarine System. It could and would, in the opinion of many qualified and disinterested experts (e.g., such as the Task Force of the EPA, etc.) cause great and irreparable injury to this Estuarine System by degrading the quality of and greatly diminishing the quantity of its water resources.

Because of time limitations today I will only discuss, in a summary fashion, some of the major aspects of the water quality degradation which the Peripheral Canal would cause in the Delta and in other portions of the Bay-Delta Estuary.

Huge Reduction of "Delta Outflows"

From time immemorial the flows of fresh water from the Sacramento and San Joaquin River Systems into and through the Delta into San Francisco Bay have performed many important functions. These substantial flows of fresh water are commonly referred to as the "Delta Outflows." Among other salutary and vital purposes, these "Delta Outflows" have provided the so-called "hydraulic barrier" required to prevent excessive salt water intrusion into the Delta and other portions of this Estuarine System. In other words, adequate "Delta Outflows" are presently the sole feasible means of providing such "salinity control." If it were not for them, the salt water from San Francisco Bay would intrude into the Delta and literally wreck and destroy the vast agricultural and industrial economies and empires in and along this extensive Estuary.

It should be kept in mind that the farm lands in the Delta produce an annual farm income in excess of \$195,000,000. Agri-business income is also very substantial and runs into the millions of dollars. Thus any crop loss and damage to these rich farm lands because of excessive salinity intrusion would be a tremendous economic loss. In addition, I wish to point out that this great agricultural area grows food to help meet the food shortages around the world.

Water-oriented industries situated on the shores of this great Estuary would also be adversely affected by excessive salinity intrusion. Large capital investment costs would have to be borne by such industries to use such degraded water, if possible. Otherwise, an alternative would be for such manufacturing plants to be moved elsewhere. Again, a large economic loss to this region would occur if such industries left this area.

At this juncture, I wish to emphasize that the real purpose of the Peripheral Canal is to drastically reduce the aforementioned "Delta Outflows."

It is now unquestionable that the real objective and purpose of the Peripheral Canal is to drastically decimate, in the coming decades, these very beneficial "Delta Outflows." I refer you to the chart on the easel. The data comes from the "*Kaiser Report*" prepared by Kaiser Engineers for the State Water Resources Control Board. It shows that our present "Delta Outflows" are approximately seventeen million eight hundred thousand (17,800,000) acre-feet per year (on the average). If the Peripheral Canal is constructed it would drastically reduce these "Delta Outflows" to a miniscule one million three hundred thousand (1,300,000) acre-feet in a "water-short" year (i.e., a so-called "dry-critical year"). Any such drastic reduction in "Delta Outflows" would, for example, irreparably injure the ecological and environmental riches of this Estuarine System, such as the Suisun Marsh Waterfowl Habitat.

Let us review some of the ecological aspects of these "Delta Outflows."

Ecological Aspects

For the anadromous fish resources of this Estuarine System, these substantial "Delta Outflows" provide a so-called long salinity gradient. Such a suitable salinity gradient is required in order to enable the anadromous fish (e.g., salmon, striped bass, American shad, etc.) to migrate through a transition zone of salt and fresh water to spawn in their native waters. Reduced "Delta Outflows" would greatly impair and curtail the salinity gradient needed by these anadromous fishes.

The proposed drastic decimation of "Delta Outflows" by the Peripheral Canal would result in the proliferation of algal blooms in this Estuary. Such algal blooms would degrade the water quality and environment of this Estuarine System. Experts have so testified.

The danger of algal blooms spreading in this System is very real. Mr. Philip D. Bush, Vice President of Kaiser Engineers, confirmed this fact in his testimony (in 1969) before the Congressional Subcommittee on Conservation and Natural Resources.

Another problem is the lack of an efficient fish screen for the Peripheral Canal Intake. Why is a fish screen necessary? Because

without an efficient fish screen a substantial portion of our anadromous fish resources would be diverted out of this System by the Peripheral pumps. What would be the potential losses? The failure to construct an efficient fish screen for the Peripheral Canal Intake could mean the loss of larvae, fish eggs and fingerlings of 50% of our striped bass, 90% of our salmon and steelhead, almost all of the American shad and an unknown percentage of the sturgeon fishery.

It is conceded that such a fish screen does not presently exist. In fact, the best estimate of time required to develop, test and construct such a fish screen is 3 to 5 years.

"Flushing Flows" are high "Delta Outflows" which cleanse this Estuarine System of accumulated debris and natural and man-caused pollution. All qualified experts agree that these high "Delta Outflows" are of vital importance to the life and health of this System. Thus the aforementioned reductions in "Delta Outflows" by the Peripheral Canal would cause serious and irreparable harm to the environmental health of this Estuarine System.

The environmental health of this Estuarine System is important, not only from the aesthetic standpoint, but economic as well. For example, the water-related recreational industry (comprised of hunters, fishermen and boating enthusiasts) spends and thus contributes some \$70 million a year to the economy.

The Need for Many Scientific Studies and Investigations

It is crystal clear from the testimony and speeches of many knowledgeable engineers and scientists that scientific knowledge of this complex Estuarine System is a very limited one. We need many more studies and investigations before we can safely afford to permit the further reduction of "Delta Outflows" (as described on the chart).

Available scientific knowledge is limited. The need for more studies of this Estuarine System was confirmed and emphasized by the State Water Resources Control Board in its "Decision 1379."

In view of this unquestionable need for many scientific studies and investigations, the logical question is: *Why rush the construction of a Peripheral Canal?* Why not first conduct and conclude these requisite and vital studies?

The truth of the matter is that there is no need whatsoever to rush the construction of a Peripheral Canal. In recent years the projected rates of population increase in the southern areas of this State have substantially declined. As a consequence, the South's water needs in the next couple of decades will not increase as rapidly as originally projected. We have, therefore, a period of years during which we can (and should) conduct and complete many of these requisite studies before further considering the mammoth Peripheral Canal

Project. These studies would then enable all interested parties (including the State) to better evaluate and understand the need for (if any) and the dangers of a Peripheral Canal.

My written statement presented here today also briefly covers the dangers of the Peripheral Canal as revealed in the Draft Environmental Impact Report on the Canal. It also covers certain legal problems related to the Canal. Because of time limitations I will not attempt to explain these subjects to you.

To sum up, there are numerous potent and irrefutable economic, environmental and legal reasons why the Peripheral Canal should be opposed.

At the very minimum, we would urge the postponement of any early construction of Peripheral Canal. We need final answers to vital scientific problems and questions. We need final answers to several basic legal problems, issues and disputes. Furthermore, we have the time to conduct these requisite studies and to settle said legal issues. We must take the time to find the requisite sound answers. Let us, therefore, proceed on a prudent and reasonable course of action to ensure the protection and preservation of this tremendous Bay-Delta Estuarine System (and its economy and ecology) for the future generations.

DISCUSSION FROM THE FLOOR

UNDER 3-MINUTE RULE

PRESIDENT KROTZ: Now, we have under the three-minute rule comments from the floor, and we invite those comments concerning either what the speakers said or the Report itself or the questions or anything else.

Remarks by Harriet Mundy

Conservationist

It seems to me rather premature to vote on this issue before the final draft of the Environmental Impact Statement has come out and been studied. The Bay Conservation and Development Commission raised many questions about the future of the Bay if the Peripheral Canal is built. There are many, many problems, both legal and ecological. There is no really hard statement about how much water the Delta and Bay will get. The State contracts for water to Southern California and so in dry years, if Southern Californians have a contract and are paying for the water, *they* are going to get it, not the Bay.

It seems to me that in this area, our first concern should be for San Francisco Bay, which is the greatest and the only large estuary left on the West Coast.

Estuaries are extremely important for many reasons that have been pointed out, and this is something that we should be more con-

cerned about than sending our water down for the desert to be inhabited by another two or three million people. The time has come when California should begin to strike a balance between the culture of the people that are here and the environment and not try to change things further, because our problems only worsen; more smog and highways, more water pollution and solid waste disposal, overcrowding and less open space.

I don't see how anybody that looks at this map can say that the Delta will be protected under this plan. The voting on this issue on the part of the Commonwealth Club is extremely contradictory. By a majority vote they say that the Delta will be helped and San Francisco Bay will be helped by the Peripheral Canal. Then comes question No. 2: "Is there sufficient inflow to the Delta to protect the Delta and also meet water contract agreements regardless of a conveyance facility?" The vote is "No" and on question No. 4: "Have Northern Californians been provided with an adequate protection and priority in water exports?" The vote is "No."

How can one vote for the Canal and say it is beneficial to Bay and Delta and then turn around and say there is not sufficient nor adequate protection and priority for Northern Californians?

Remarks by Grant Burton

Burton Farm Services, Inc.; Farmer, Nursery, Lumber.

I would like to point out a little bit of the past. The Delta and the San Francisco Bay down into San Pablo Bay was fresh water twelve months of the year. That is why industry located there. The C&H and the Union Oil Company located at the positions that they occupy down on San Pablo Bay because there was fresh water there twelve months of the year. Fortunately we have the log of the barge captain of the water barge as they began about 1908, beginning to run out of fresh water and as he proceeded up the river farther and farther for fresh water.

Now, this taking of water was legitimate and legal by the riparian owners of the Sacramento River. And there was a case fought on this, the *City of Antioch vs. Williams Irrigation District*, and these people have the right to take this water. I don't know whether the people south of us have. They have certain rights that have been granted to them, but they don't have riparian rights to this water as they are not on the river.

I want to point out to you also in the *Burns-Porter Act* every county in Northern California north of Tehachapi with the exception of Butte County, who stood to benefit from the dam, voted against this project. Every county. And the thing went over by a small majority by the heavy vote in Los Angeles and San Diego and San Bernardino Counties and counties south of Tehachapi. So there wasn't any great support for this thing, in the first place.

This matter of turbidity is most important to our Bay. Mr. Robin Reynolds says it would change two per cent as between the Peripheral Canal and non-use of the Canal, in his report, but what he doesn't say is that both of them would change at 67 or 68 per cent. They very carefully leave that part out. And that would affect our Bay. And if you get algal blooms coming in our Bay, and we have the nutrients in our Bay now to create that except for the turbidity, you wouldn't want to live around the Bay or very close to the Bay from the stench it will cause. And it will kill most of the fish.

I think we have other matters that affect us much more than the Peripheral Canal. I think we are going to build a canal from the north and bring the water to Sacramento because they are beginning to suffer already from the high flow of water in the Sacramento River.

Remarks by Jack Port

Executive Secretary of the Contra Costa County Water Agency

This Report being prepared in the main before the Environmental Impact Report on the Peripheral Canal (EIR) was issued to the public for comment, is "slanted," misleading, and remains completely silent on many shortcomings of the proposed Peripheral Canal Project.

The Peripheral Canal Project is predicated upon a number of wholly unsubstantiated and unwarranted assumptions. These assumptions are designed to lend support to a project which the EIR confirms will do great damage to the San Francisco Bay-Delta System. The many comments received from organizations throughout the State criticising the EIR bring home the fact that what is ostensibly presented as a viable project is not a project at all.

For example, proposed Peripheral Canal operation is based upon standards of Delta Water Quality which are lower than those set by the State Water Resources Control Board (SWRCB) in their landmark "*Delta Decision*." What must be borne in mind is that these SWRCB standards are only "interim" in nature. Permanent water quality standards designed to protect the Bay-Delta System cannot be established now, because the knowledge required to do this is still being developed. Pending studies may very well show that higher standards are needed. The stark reality that faces both the Federal Central Valley Project (CVP) and the State Water Project (SWP) is the fact that even if the "Delta Decision" standards are lowered after, say 1980, there simply is not enough water left in the Sacramento-San Joaquin Basin to satisfy the water demands of the San Joaquin Valley and Southern California, even if additional storage facilities are constructed in the North Coast and in the Upper Sacramento Valley.

This final Report neglects to state that the Peripheral Canal Project is highly dependent upon the development of these storage

projects on the North Coast and the Upper Sacramento Valley and thereby ignores the hard reality of the moratorium on development of the Wild Rivers and in effect actually endorses the construction of North Coast projects. In short, the Report does not point out that the theoretical foundation of the so-called benefits attributed to the Peripheral Canal are based on vague, unauthorized, and unfounded projects, and that the entire concept of the Peripheral Canal Project rests on a shifting bed of sand. (Refer to page 33.)

Remarks by Mary Anne Mark

Civil Engineer with the Corps of Engineers

Speaking today as an individual and a member of the Water Committee of the Commonwealth Club, I disclaim my comments as representing the views of the Corps of Engineers. I have recently moved back to this area after having lived in Los Angeles for two years. During the past two years or so I have participated in committees of the American Society of Civil Engineers that have been studying the Peripheral Canal, and have done much research.

I would like to urge that a vote at this time is really inappropriate, since an operating schedule has not been set up and you really don't know what you are voting on. This is an exercise in futility. I disagree with the form and coverage of this report.

Remarks by Harry S. Dixon, Ph.D.

Engineer, Harry S. Dixon, Ph.D., Engineers

I have been in conflict for some fifteen years in the courts of Sutter County, with the Bureau of Reclamation and State Water Board, over water rights. Their constant theme was that there was no surplus water in Northern California.

For a small Colusa County almond orchard water was pumped from a well through the middle of the 1960s. Then through salt water encroachment or salt coming in, in this case boron, the well pumping had to be stopped. Water was brought in, re-used water, water from the Colusa drain, by a district that was formed. This had to be done in 1968 in Northern California.

In 1973 the Agricultural Commissioner of Colusa County recommended that we now go to what is called trickle irrigation because of impending water shortages. And that was done on this small orchard at a cost of something like \$500 per acre. You already have water available on your land; you now spend \$500 per acre to cover this field with plastic pipes with little miniscule orifices that will trickle water to the individual trees. This speaks to the shortage of water in Northern California.

In Santa Clara Valley there was a major percolation project back in the '30s because of salt water encroachment into the wells. Cali-

ifornia has been riding for many years, on a great reservoir of underground water which is now disappearing. As a boy (1920s), I saw water springs on the banks of the Sacramento River throughout the summer. Long ago these springs disappeared. I could cite the failure of the artesian wells in the Sacramento Valley.

I simply want to leave you with this major fact: there is no surplus water in the Sacramento Valley. Rather, there is an impending shortage.

Remarks by George Scheer

Retired Engineer

The present method of operation of transporting water across the Delta is the same as though we had a partially closed valve. We can presently only get so much water through the Delta. The question is do we want to export more water. If we do we shall have to build the Peripheral Canal or we have to have a substitute for it. If we spend two or three hundred million dollars, and probably half a billion by the time it is built, then in order to have it pay for itself we shall have to get more water. And I don't think I have to tell you where the new water will come from. It will involve damming the rivers in Northern California.

There is another item, energy conservation. To raise two million acre feet of water three thousand feet theoretically takes the energy generated from eight and a half million barrels of oil (six billion KWH). We have an ever-worsening energy shortage. And what is going to happen if we increase this export of water and we need more energy as the energy shortage worsens? Are we then going to stop exporting water to the south?

Remarks by Robert J. Pafford

Retired; Regional Director of the Bureau of Reclamation

There seems to be an illusion that without the Peripheral Canal there cannot be sufficient water diverted to the south from the two existing export pumping plants near Tracy . . . to infringe seriously on conditions in the Delta. There also seems to be a fear that if the Peripheral Canal is built, these politically strong people in Southern California and the San Joaquin Valley will go ahead and grab the water from the Delta. If that latter should be true, don't ever think that they couldn't grab the water and cause adverse conditions to the Delta anyway. Some people seem to feel if water is pumped without the Canal the salt water will come up in the Delta and any water pumped would be too salty for use. Has anybody been to Los Angeles lately? Their drinking water there is five times saltier than the average conditions that are maintained around these Tracy export pumps now . . . I can assure you from their last ten years of taking water from the Colorado River, Southern Californians have demonstrated their desire for wet water, even if very salty. The reason they

could use water from the Delta even without the Peripheral Canal is because in certain times of the year very good water could be pumped and taken into the San Luis Reservoir down to the south here, a two million acre foot reservoir, and then when water is scarce they can pump some Delta water that is undesirably salty, perhaps a thousand parts per million, down here and blend it in that reservoir and then still send better water on south than they are getting from the Colorado River now. So don't kid yourself that if there is no Peripheral Canal there is still no possibility of using the already existing export pumps and adversely affecting conditions in the Delta.

Relative to the Report the Club turned out . . . I thought there was more in favor of the Canal side of the story that could have been told, and I am quite sure opponents feel there is more that could be said on the other side. I think it is a good middle-of-the-road report, considering the requirements of brevity.

Remarks by C. D. Allen

Chairman of the Board, Natural Resources Corporation.

Our new Governor Brown is reported to have told newsmen that just spending more dollars to chase a problem doesn't necessarily solve it. We hope that the Governor had in mind that the chasing and the money-spending on the controversial Peripheral Canal and that steps will be taken to suspend further action by the Department of Water Resources and other proponents of the Canal.

The proposed \$286,000,000 Canal would route water around San Francisco Bay's Delta and dump it into the State Water Project aqueducts for shipment to Southern California. However, unless the Federal government agrees to meet California's water quality standards for the Delta, the proposed Peripheral Canal may never be built.

Opposition to the Peripheral Canal was notably evident by those attending the Impact Report hearing held at Sacramento on December 11. W. W. Adams, Chairman of the State Water Quality Control Board, told the Committee that California could not handle the project alone and stated that "we do not believe the Delta interests can be protected with DWR operating the Peripheral Canal."

Following Chairman Adams, the press reported Congressman George Miller III, who represents the Delta, as having said, "I am against authorization until we are assured the environment of the Delta is guaranteed protection," adding he hopes to win the support of all Northern California Congressmen to present a unified front on the issue.

In spite of California Water Resources Director John R. Teerink, defending at length the support of the Canal, Chairman John A. Nejedly of Walnut Creek failed to extract a hard guarantee from Teerink that the Delta water quality would be the first priority over exporting water to the south.

It is the studied opinion of the Natural Resources Corporation that any attempt to solve the Delta problem and furnish water for southern demand, as proposed by the Canal advocates, will end in a costly failure for the State.

First—The Canal Project expense, if attempted, will reach three times the proposed cost in building, seasonal flood problems and legal damages.

Second—The splitting of the available water will allow an increase in salt water intrusion beyond control. It may go clear up the Sacramento in the interest of getting into the intake of our Peripheral Canal, as proposed, and certainly the seepage of salt water intrusion will come into the head of the pump.

Third—Ample settling basins or ponds are not provided near pumps to prevent silt from Canal walls or salt water seepage from entering pumps and contaminating the southern flow of water polluting same to an extent that the southern demand cannot be satisfied.

Fourth—No provision for drains for removal of the heavy polluted water from the Delta or other area.

Fifth—The Peripheral Canal as proposed, destroys every natural condition and movement of the Delta water flow, not excluding the all important question of our fish and the unworkable fish screens.

Sixth—Thinking of the Peripheral Canal as a sound engineering project should be abandoned.

Seventh—Considering the need of saving a good portion of the fresh water that is now wasted to the sea and the control of the salt water intrusion into the upper Delta as well as the furnishing of a reasonable share of good fresh water for the south, I am pleased to state that an alternative is available that will meet all of the requirements at a lower cost.

Remarks by James W. Halley

Chairman, Executive Committee, Commonwealth Club of California;
Attorney, Halley, Cornell, and Lynch

Question? We would like to hear the proponent's response to the point made by opponents in connection with the bar chart presented. (Refer to page 33.)

Remarks by Robin Reynolds

Chief of the Central Division, Department of Water Resources

This chart shows under various levels of development, 1970, 1990, 2020, average outflows from the Delta and exportations. That is the future of California and it has nothing to do with the Peripheral Canal. If those exports are found to be necessary and are made, the Peripheral Canal will make it much easier on all of us to make them. But water management is only a tiny bit of this answer. The answer, if you

really want to reduce those pink bars, is population control and land use management. That represents future projections of water use in California and they have nothing to do with the Peripheral Canal except they could be met easier with it.

ALTERNATIVES

APPENDIX

There are 4 basic alternatives to the Peripheral Canal:

1. Hydraulic Barrier

Large releases of water from upstream storage reservoirs and imports from the north coast for salinity control to provide for Delta water needs and permit the transfer of good quality water through existing Delta Channels to the existing Federal and State diversion facilities. (The alternative would expand the present mode to transferring water through existing Delta Channels. It would require extensive additional upstream storage and/or import projects.)

2. Physical Barrier

Construction of a large single barrier (low level dam in the Bay System west of the Delta) for a salinity control to provide Delta water needs and permit the transfer of good quality water through existing Delta Channels to the State and Federal diversion facilities. Boat locks and fish passage facilities would be included. *There would be extensive damage to the fish resources even with fish passage facilities.*

3. Water Control Plan

A series of control structures (low dams) and channel improvements within the Delta, together with fresh water releases from upstream storage reservoirs for salinity control. This would permit a more efficient transfer of water through existing Delta Channels and provide for local water needs in the interior Delta. Boat locks and fish passage facilities would be provided. Water supply in the extreme western Delta would be provided through overland distribution facilities.

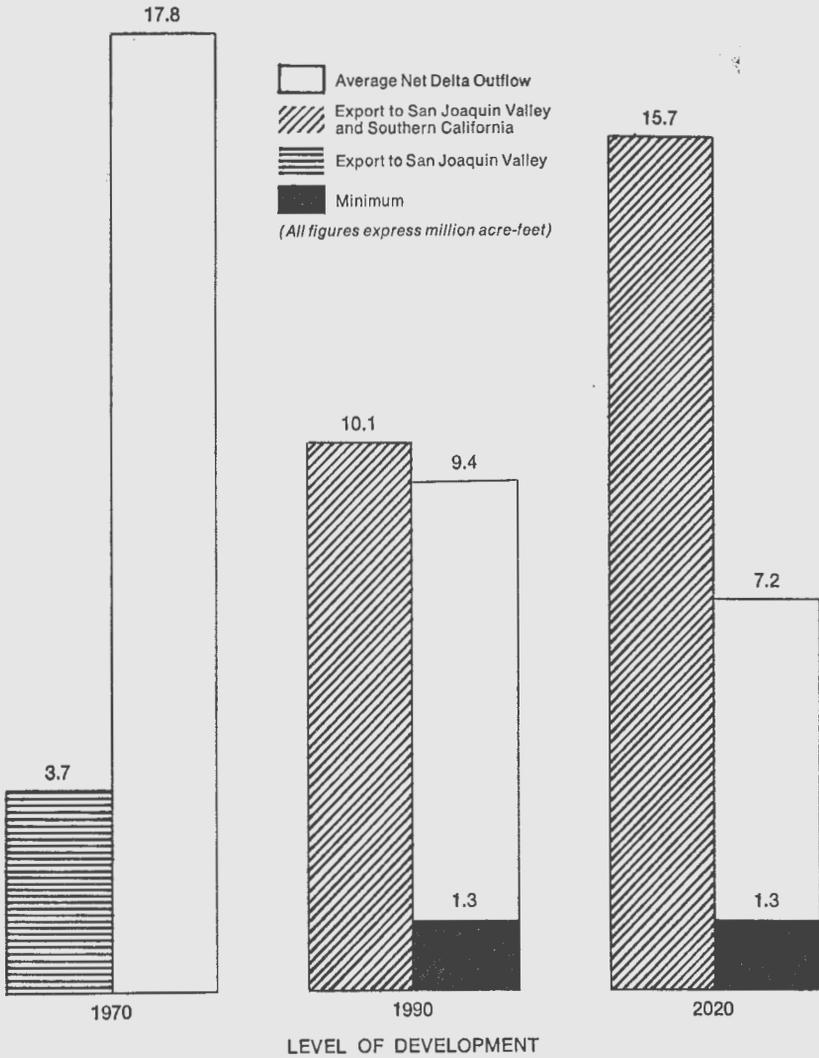
4. Modified Folsom South Canal Plan

It would involve enlarging the Folsom South Canal to carry water for release into rivers flowing into the eastern Delta as far south as the Stanislaus River, and would include some of the control structures required for the Waterway Control Plan. The releases would provide water quality control in the eastern Delta and would transport some, but not all, of the export water around the northern Delta, but all of the export water would have to flow through southern Delta Channels.

GLOSSARY

- Acre Foot**—That quantity of water which would flood one acre to a depth of one foot; equivalent to 43,500 cubic feet or 326,000 gallons.
- Anadromous Fish**—Salt water fish which enter inland rivers (fresh water) to spawn.
- Burns-Porter Act**—The Act of the Legislature which started the State Water Project (SWP) and which authorized the bond election to pay for it.
- CFS**—Cubic feet per second: a rate of flow equivalent to 448.8 gallons per minute.
- CVP**—Central Valley Project: U.S. Bureau of Reclamation's project, begun in the mid-1930's, which primarily provides irrigation water to California's Sacramento and San Joaquin Valleys.
- Decision 1379**—"The Decision" issued July 1971 by SWRCB which enunciated the notion that the Delta comes first and that no water can be exported until after Delta needs are met.
- Delta Outflows**—Water flowing naturally from the Delta region into San Francisco Bay (as distinguished from water pumped from the Delta for local use or export).
- Delta Protection Act**—State Water Code Section 12201-12204. This was the primary authority referenced and interpreted by the SWRCB in its "Decision 1379" "to give first priority to satisfying all needs for water in the Delta and to relegate to second priority all exports from the Delta to other areas for any purpose."
- DWR**—The State of California's Department of Water Resources.
- Estuarine System Estuary**—The mouth of a river, subject to tides.
- Hydraulics**—That branch of science which deals with practical applications of fluid flow.
- Hydrology**—The study of the natural distribution and circulation of water through its perennial cycle of evaporation, precipitation, and run off.
- IDC**—Interagency Delta Committee. A committee consisting of the Bureau of Reclamation, the U.S. Army Corps of Engineers, and the State Department of Water Resources. The Committee was set up to study Delta water problems and make recommendations, one of which has been to build the Peripheral Canal.
- MAF**—Million acre feet; equivalent to 326 billion gallons.
- Salinity gradient**—Rate of change of salt concentration in an estuary with distance from the sea. This gradient is steepest in narrow estuarine systems with large fresh water inflows.
- SWP**—State Water Project: State project which diverts northern California water for use in the south; authorized by the *Burns-Porter Act*, and initially financed by a \$1.75 billion bond issue in 1960.
- SWRCB**—State Water Resources Control Board, a five member panel created by the California Legislature to manage the State's water resources (both quality and quantity). Members are appointed by the Governor.
- USBR**—U.S. Bureau of Reclamation, a Federal agency principally responsible for providing irrigation water for land reclamation in the 17 Western states.

DELTA OUTFLOW COMPARED TO EXPORTATIONS TO SAN JOAQUIN VALLEY AND SOUTHERN CALIFORNIA



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HEARINGS BY STUDY SECTION ON WATER PROBLEMS "SHOULD THE PERIPHERAL CANAL BE BUILT?"

Chairmen: T. P. Stivers, Robert J. Kasper, Orrin H. Harder
Vice Chairmen: Robert J. Kasper, D. G. Larkin, Charles G. Wolfe
Secretaries: Robert E. Jackson, Ransom A. Pierce

1971

March 25—"Discussion of Proposed Study Outline of New Study Topic: 'Should the Peripheral Canal Be Constructed?'"

April 8—**Jake Osofsky**, Chief of Water and Power Control Division, Central Valley Project Operations: "The Effect of Central Valley Project Upon the Delta Water Quality."

May 13—**Harvey O. Banks**, Consulting Engineer; Former Director, State Department of Water Resources: "Early Delta and State Water Project Studies."

May 27—**Amalio Gomez**, Consulting Engineer; Former Chief Engineer, U.S. Corps of Engineers, Sacramento District; and Member of Interagency Delta Committee: "Delta Interagency Studies for the State Water Project."

June 10—**William E. Warne**, Consultant in Water Resource Development and Former Director of the State Department of Water Resources: "The Formulation of the State Water Project."

July 8—**Robert L. Jones**, Consultant in Environmental and Natural Resource Planning; Former Deputy Director, State Department of Fish and Game: "What the Peripheral Canal Means to Fish and Wildlife."

June 22—**Robert J. Pafford, Jr.**, Regional Director, U.S. Bureau of Reclamation, Region 2: "Who Needs the Peripheral Canal?"

Sept. 23—**Jerome B. Gilbert**, Executive Officer, Water Resources Control Board: "The Delta Decision—What It Means for the Future."

Oct. 14—**Colonel H. George Gerdes**, Consulting Engineer: "A Modern Chipps Island Barrier as an Alternative to the Peripheral Canal."

Oct. 28—**William H. Fairbank, Jr.**, Legislative Representative, The Metropolitan Water District of Southern California: "What the Peripheral Canal Means to Southern California."

Nov. 11—**William G. Bryant**, Engineer-Manager, Kern County Water Agency: "The Importance of the Peripheral Canal to Kern County."

Dec. 7—**Jack Port**, Executive Director, Contra Costa County Water Agency: "Federal and State Water Planning as it Affects the Bay-Delta System with Particular Reference to the Peripheral Canal."

1972

Jan. 27—**Harold K. Chadwick**, Program Manager, Delta Fish & Wildlife Protection Study: "The Peripheral Canal—Effects on Delta Fish and Wildlife."

Feb. 10—**Gerald T. Orlob, Ph.D.**, President, Water Resources Engineers, Incorporated: "A Modified Folsom South Project—An Alternative For Delta Water Management."

Mar. 9—**Dr. Joel F. Gustafson**, Professor of Ecology, Systematics and Marine Biology, San Francisco State College: "The Peripheral Canal and Some of the Problems."

Mar. 23—**Peter H. Zars**, Member, Sierra Club: "The Peripheral Canal—The Sierra Club's Position."

Apr. 6—**Jerry Meral**, Local Representative of the Environmental Defense Fund: "The Bureau of Reclamation's East Side Division: Is It the Next Water Grab From the Delta?"

Apr. 20—**Lloyd C. Fowler**, Member, ASCE Task Force on Peripheral Canal: "The Peripheral Canal—Good or Bad?"

May 18—**David N. Kennedy**, Senior Engineer, Metropolitan Water District of Southern California: "The Proposed Delta Environmental Protection Facility."

June 22—**Ronald B. Roble**, Member, California State Water Resources Control Board: "The Delta and the American River Decisions: Water Rights in the 1970's."

July 13—**William P. Moses**, Member, California Water Commission: "The Peripheral Canal Minority View: Contra Costa Style."

Aug. 10—**Langdon W. Owen**: "Who Needs the Peripheral Canal?"

Sept. 14—**Colonel J. C. Donovan**, District Engineer, U.S. Army Engineer Division, Sacramento: "Andrus Island Failure."

Sept. 28—**John H. Lauten**, General Counsel, Metropolitan Water District of Southern California: "Southern California Water Conference Study of the Delta."

Oct. 26—**William R. Gianelli**, Director, Department of Water Resources, State of California: "The Peripheral Canal—A New Dimension."

Nov. 16—**Hon. Jerome Waldie**, Member of Congress, 14th District, California: "Latest Developments on the Delta-Peripheral Canal Problems."

Dec. 14—**John S. Harnett**, General Manager, East Bay Municipal Utility District: "East Bay Municipal District Water Management Plan."

HEARINGS BY STUDY SECTION ON WATER PROBLEMS "SHOULD THE PERIPHERAL CANAL BE BUILT?"

1973

Jan. 11—**Bernard Smith**, Consulting Engineer: "The Peripheral Canal—What Will It Cause to Happen?"

Jan. 25—**Hans H. Doe**, Director Metropolitan Water District of Southern California: "Metropolitan Water District Roles—In-State and Inter-State."

Mar. 29—**The Hon. B. F. Sisk**, Member of Congress, 16th District, California: "California Water Development for the Next Quarter of a Century."

Apr. 12—**James Sorenson**, Consulting Engineer: "Washington Developments Relating to Water Problems in Central California."

Apr. 26—**Roy Dodson**, Member, State Water Resources Control Board: "A Newcomer's View of the Delta."

May 10—**Harvey O. Banks**, Consulting Engineer: "National Water Commission Impact on the Peripheral Canal."

June 7—**C. W. Bates**, Secretary-Manager, Central California Irrigation District: "San Joaquin Valley Water vs. The 'Environmentalists'."

July 12—**John De Vito**, General Manager, Contra Costa County Water District: "Magna Carta of the Delta."

July 26—**Walter M. Gleason**, Attorney: "Real Reason for the Promotion by DWR and USBR of the Peripheral Canal."

Aug. 9—**Ellis L. Armstrong**, Vice President, URS Systems Corporation: "Water Resources Husbandry."

Sept. 20—"Discussion of Preliminary Draft on Study Topic: 'Should the Peripheral Canal Be Built?'"

Sept. 27—"Discussion of Preliminary Draft on Study Topic: 'Should the Peripheral Canal Be Built?'"

Oct. 4—"Discussion of Preliminary Draft on Study Topic: 'Should the Peripheral Canal Be Built?'"

Oct. 11—"Discussion of Preliminary Draft on Study Topic: 'Should the Peripheral Canal Be Built?'"

Oct. 25—"Discussion of Preliminary Draft on Study Topic: 'Should the Peripheral Canal Be Built?'"

1974

Jan. 9—Report Meeting on the Study Topic: "Should the Peripheral Canal Be Built?"

Mar. 21—Review of Section's Report: "Should the Peripheral Canal Be Built?"

May 15—Draft on the Study Topic: "Should the Peripheral Canal Be Built?"

May 28—Meeting to consider draft on the Study Topic: "Should the Peripheral Canal Be Built?"

June 6—Review of Section's Report: "Should the Peripheral Canal Be Built?"

Oct. 4—Report on the Study Topic: "Should the Peripheral Canal Be Built?"

Oct. 22—BALLOT ON SECTION CONCLUSIONS AND RECOMMENDATIONS TO THE CLUB STUDY TOPIC: "SHOULD THE PERIPHERAL CANAL BE BUILT?"