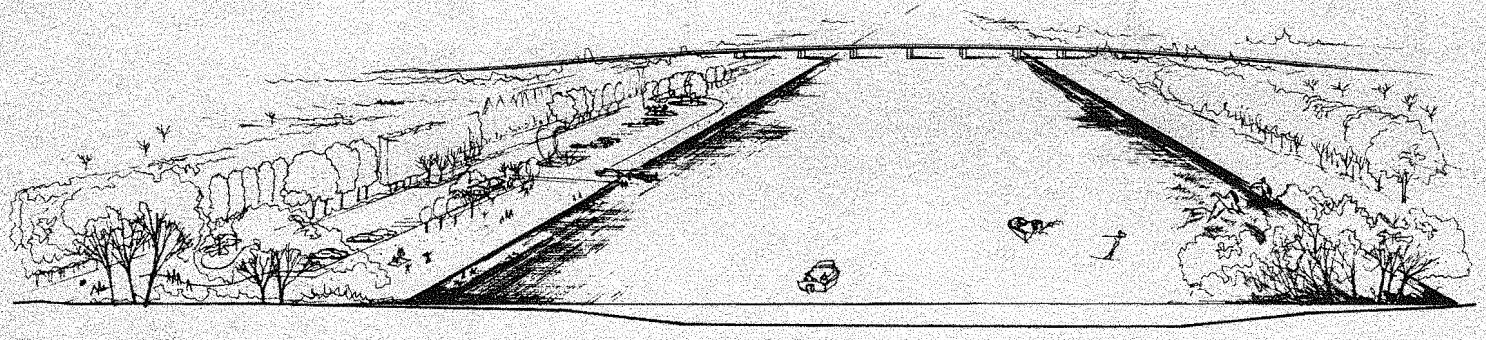
PRESS

SUMMARY OF

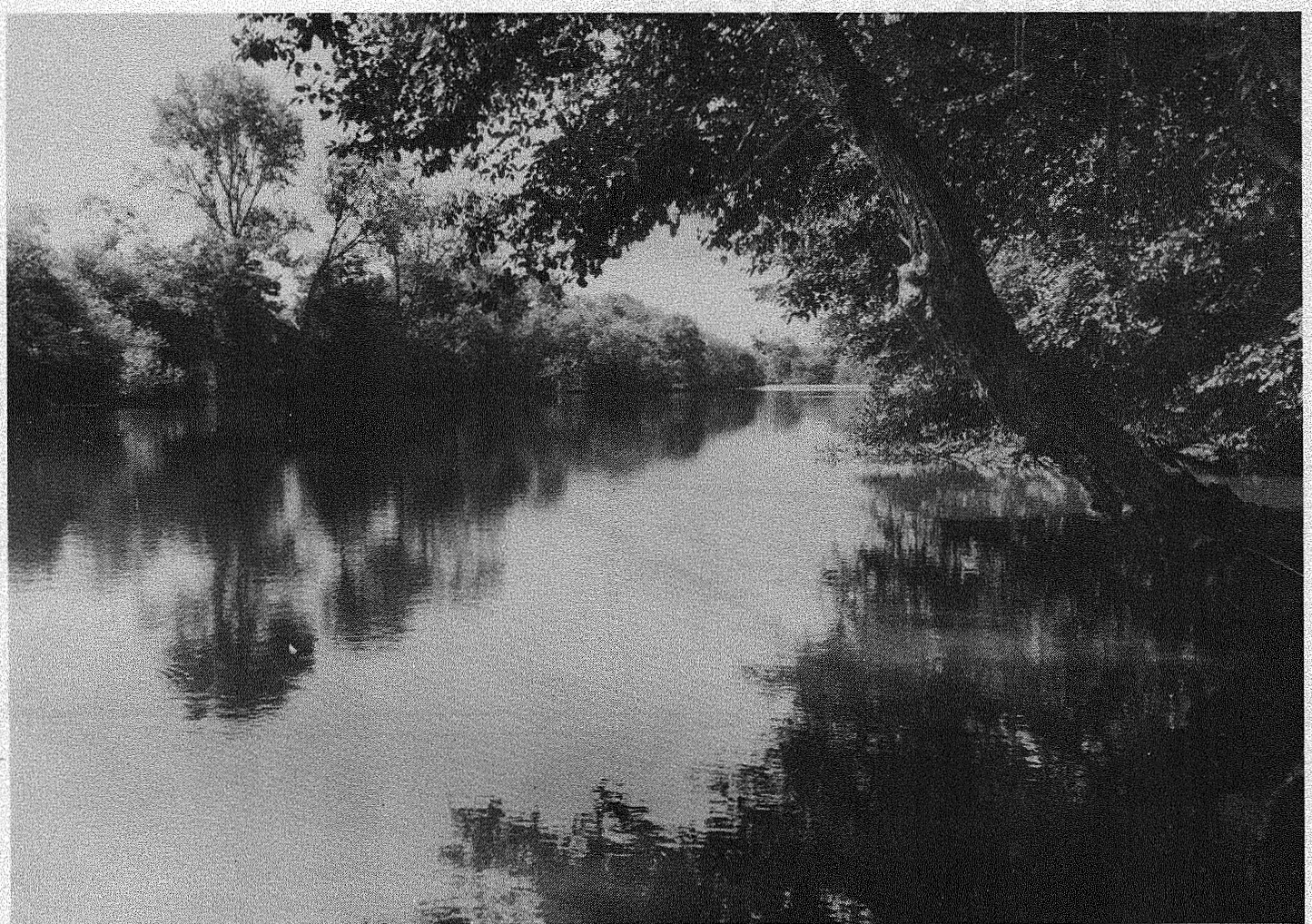
DRAFT ENVIRONMENTAL IMPACT REPORT

PERIPHERAL CANAL PROJECT



State of California
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

AUGUST 1974



In this secluded slough of the Delta Meadows Area, some of the characteristics of the early Delta are still evident.

FOREWORD

The California Department of Water Resources (DWR) proposes to construct the Peripheral Canal as an integral feature of the California State Water Project (SWP). The canal would be a major link of the authorized State Water Project. It is planned as a joint-use facility of the SWP and the federal Central Valley Project (CVP). It is needed by 1980, to convey water across the Sacramento-San Joaquin Delta to the aqueducts of the SWP and CVP without undue reduction in supply or deterioration in quality, to correct certain adverse environmental conditions in the Delta, and to facilitate water management in the Delta. A program of staged construction by the State is planned under which federal participation would be feasible at any time.

This brief summary of highlights of the Draft Environmental Impact Report (EIR) for the Peripheral Canal was compiled with assistance from the firm of Jones and Stokes Associates, Inc., under contract to DWR, from detailed material contained in the full Draft EIR on the project. It is published both as an integral part of the full report and under separate cover. As a part of the full report, it is intended to give the reader an overview and summary of the full report. As a separate document, it is intended to give the reader, who does not require or want the extensive detail, general information on the nature of the project and the environmental impacts involved. For those reviewing only the summary who find they need more detail, the full report can be obtained for a fee to cover the cost of printing and mailing by contacting DWR, P. O. Box 388, Sacramento, or phoning 916+445-8228.

Robin R. Reynolds
District Engineer
Central District
Department of Water Resources

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AN OVERVIEW

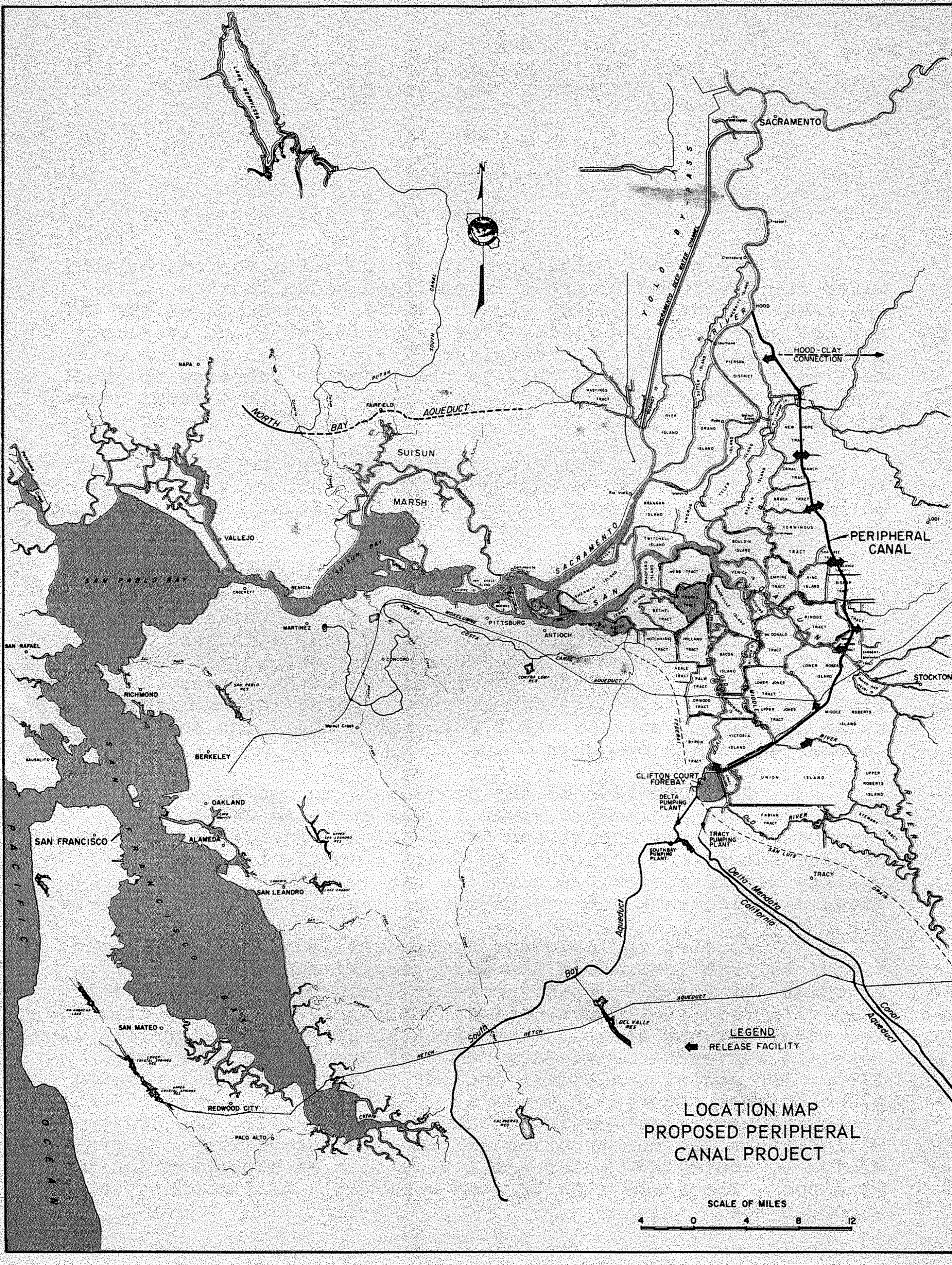
The use of Delta channels as conduits for conveying water for diversion to areas of shortage began in 1940, with the federal Central Valley Project (CVP). Expansion of the CVP and the advent of the State Water Project (SWP) have increased these diversions to a current level (1973) of 3.5 million acre-feet annually. By 2020, this is projected to increase to about 8 million acre-feet annually. This compares with a total average annual inflow to the Delta by 2020 of about 19 million acre-feet.

Even at current diversion rates, the Delta is subjected to altered flow patterns and water quality problems in some areas. Without intelligent water management, the situation will deteriorate as export diversions increase.

The concept of a hydraulically isolated Peripheral Canal around the Delta to improve the quality of export supplies and provide for the environmental needs of the Delta culminates years of study and numerous proposals by many agencies. The plan was officially adopted as a feature of the SWP by the Department of Water Resources in 1966. In 1969, the U. S. Bureau of Reclamation issued a feasibility report recommending the Peripheral Canal as an additional unit of the CVP to serve the joint needs of the federal and state projects.

The objective of the project is to convey good quality water from the Sacramento River to the existing SWP and CVP pumping plants for export and to 12 release facilities to distribute water from the canal to Delta channels to maintain water quality within prescribed criteria and to improve the Delta aquatic environment and the resources and economies it supports.

Studies indicate the Peripheral Canal must be operational by 1980 to protect the water supply and water quality functions of the SWP during years of below normal precipitation. This will require a construction start in 1975. Construction of the canal will be staged. The first stage will be a gravity flow canal to serve the conveyance needs of the SWP and CVP until 1985. The second stage will include construction of a pumping plant to meet conveyance needs after 1985. In the event federal financial participation is not authorized by 1975, the State will finance the construction of the first stage with the provision to convey CVP water until such time as authorization is obtained. The State also has the capability of financing the second stage.



LOCATION MAP
PROPOSED PERIPHERAL
CANAL PROJECT
LEGEND
RELEASE FACILITY
SCALE OF MILES
4 0 4 8 12
PERIPHERAL
CANAL
HOOD-CLAY
CONNECTION
SACRAMENTO
STOCKTON
CLIFTON COURT
FOREBAY
DELTA
PUMPING
PLANT
TRACY
PUMPING
PLANT
SOUTH BAY
PUMPING
PLANT
NORTH BAY AQUEDUCT
SUISUN
MARSH
SAN PABLO BAY
SUISUN BAY
SAN FRANCISCO BAY
PACIFIC OCEAN
SAN FRANCISCO
OAKLAND
BERKELEY
RICHMOND
ALAMEDA
SAN LEANDRO
SAN MATEO
REDWOOD CITY
PALO ALTO
VALLEJO
NAPA
FAIRFIELD
BENICIA
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
SAN RAFAEL
TRACY
CONTRA COSTA CANAL
South Bay Aqueduct
Delta-Mendota Canal
California Aqueduct
HETCH HETCHY AQUEDUCT
DEL VALLE RES.
SACRAMENTO RIVER
SAN JOAQUIN RIVER
YOLO BY-PASS
OLD RIVER
SAN LUIS DRAIN
UNION ISLAND

ENVIRONMENTAL SETTING

The influence of the Peripheral Canal will extend beyond the confines of the land through which the canal will pass. The environmental setting has, therefore, been divided into the five major areas which would be affected: Local Vicinity, Sacramento-San Joaquin Delta Region, Suisun Marsh, San Francisco Bay Complex, and State Water Project and Central Valley Project Export Service Areas. Related projects are also discussed. The summary tabulation, which follows the brief narrative descriptions, lists the major environmental and socio-economic attributes of these six subjects.

Local Vicinity

Ninety-five percent of the land within the proposed canal right-of-way is farmland. Land elevations in some areas are below sea level and an extensive levee system protects the area from flooding by normal tidal water, as well as winter high water.

Although agriculture has altered much of the native landscape, the area sustains a number of important natural resources. Resident and migratory wildlife rely on the area for food and cover. Anadromous and resident fish occur in the waterways which the canal would abut and cross.

Urban and industrial development are nonexistent within the canal right-of-way. The economy of the area relies primarily on agriculture.

Although no recreational facilities lie within the local vicinity area, some recreation use is made of the tidal rivers and sloughs adjacent to and within portions of the canal right-of-way.

Sacramento-San Joaquin Delta Region

The 738,000 acres, which constitute the statutory Delta, make up part of the largest estuary in the State. Over half of the land area lies at elevations ranging from 5 feet above sea level to 20 feet below sea level. Man's tireless efforts to reclaim this land from flooding by high runoff and tides are evident from the hundreds of miles of levees criss-crossing the Delta.

The aquatic environment of the Delta is complex. The flow of water in its numerous channels is influenced by tidal action, streamflow, and diversions in and exports from the Delta.

Although land reclamation of the former marshlands has removed much of the once lush expanses of native vegetation, the Delta remains a habitat for a multitude of fish and wildlife species. Salmon, shad, and steelhead migrate through the Delta. The estuary provides an important nursery area for striped bass. The Delta contributes 20 percent of the pheasants harvested in the State. Ten rare and endangered vertebrate species are known to occur in the Delta, none of which are exclusively confined to that area.

The estimated 550,000 acres of cultivated land within the Delta produce an average gross farm income of $195 million per year.

The Sacramento-San Joaquin Delta region is within the area bordered by the cities of Sacramento, Stockton, Tracy, and Pittsburg. Although the total population of the region reached 1.7 million in 1970, the Delta islands, themselves, remain sparsely populated. Upland areas, particularly in the western Delta have undergone steady industrialization and urbanization. Recreation and second home developments have begun to encroach on the edges of the peat land.

The Delta, with its vast waterways and picturesque settings, constitutes one of the major recreation attractions in California.

Because of its great resources, the uses of the Delta must be wisely managed to provide a balance between man's use of the area and the need to maintain environmental values.

Suisun Marsh

Suisun Marsh is located approximately 40 miles east of the Golden Gate. This marsh is an important segment of the Pacific Flyway for waterfowl. Its southern corner is west of the confluence of the Sacramento and San Joaquin Rivers. Freshwater outflow from the Delta directly affects the salt balance of the marsh.

Most of the 55,000 acres of marshland and small waterways are enclosed within a levee system. Approximately 45,000 acres (82 percent) are privately owned and used primarily for duck clubs. The remainder (18 percent) is owned by the State, and includes waterfowl management and refuge areas, and public recreation areas.

The expanses of unbroken native habitat and the wide diversity of vegetation and aquatic conditions that prevail, make the marsh a valuable wildlife habitat.

Man's primary use of the marsh is for duck hunting. The diverse resources of the marsh also provide opportunity for a broad spectrum of public recreation uses.

San Francisco Bay Complex

The San Francisco Bay Complex comprises portions of all of nine surrounding counties and includes San Francisco, San Pablo, Suisun, Grizzly and Honker Bays. The entire estuarine complex covers almost 435 square miles and is rimmed by 275 miles of shoreline. The habitat afforded by the Bay and surrounding lands supports a multiplicity of fish and wildlife species. The Bay complex is among the most urbanized areas in the State, with a total 1970 population of 4.6 million.

The largest surface water inflow to the Bay is provided by runoff from the Central Valley (Delta outflow). Flushing of pollutants from the upper Bays is affected to varying degrees by operation of the CVP and SWP. In general, the projects provide greater summer inflow and somewhat lesser winter inflow than would otherwise occur. The effectiveness of summer Delta outflow for flushing pollutants is most noticeable in the western Delta and Suisun Bay. However, a threefold increase in summer outflow from 1,800 cfs to 5,000 cfs has only a 25 percent effect on flushing in that area. The effectiveness of summer outflow flushing diminishes in San Pablo Bay to about 6 percent and becomes insignificant in the central and south Bays. The flushing effects of winter floodflows passing through the Delta into the Bay are more significant and extend throughout most of the Bay system; but the intermittent and unpredictable nature of winter floodflows make them unreliable as a dependable pollution control measure. The exchange of fresh sea water through the Golden Gate by tidal action, compared to Delta outflow, is in the order of 50 to 1 in summer and 5 to 1 in the winter and, thus, is the more significant factor in flushing pollutants from the Bay.

With continued population and industrial growth, a primary concern is the effect of increased waste discharges on Bay water quality, regardless of project operation.

State Water Project-Central Valley Project Export Service Areas

The Peripheral Canal will convey water across the Delta for delivery to portions of the San Francisco Bay Area, San Joaquin Valley, Central Coastal Area, and Southern California. About two-thirds of the State's population resides in these areas.

A listing of the major environmental features and problems of these areas and data on water supply and demands are included in the following summary:

ENVIRONMENTAL SETTING INFLUENCED BY PERIPHERAL CANAL

Local Vicinity (Canal Right-of-Way)

Major Environmental Features

Vegetation/Wildlife Habitat. Permanent pasture, corn and sorghum, grain and hay, marsh and riparian lands used by migrant and resident wildlife species.

Resident Fish. Catfish, bullheads, bass and crappie in channels to be intersected by canal.

Birds. 135 known species -- including upland game and sandhill cranes.

Mammals. 14 known species.

Historic/Archaeological. 8 archaeological sites within canal right-of-way. The value of one was destroyed in the 1950's by leveling.

Agriculture. 6,100 acres within right-of-way.

Urban Development. None within right-of-way. Six unincorporated towns nearby. Four farmsteads and two residences within right-of-way.

Industry. None within right-of-way.

Recreation. Some shore and boat fishing, pleasure boating, overnight camping and duck hunting where canal will cross Delta channels.

Transportation. Highways, railroads, deep water channels and waterways. All channels considered navigable and most accessible to small craft.

Utilities. Electrical, gas and drainage lines within right-of-way.

Sacramento-San Joaquin Delta Region

Major Environmental Features

Vegetation/Wildlife Habitat. Scattered areas which support tules and other natural vegetation. Trees on levees and higher ground. 500,000 acres of varied crops also support wildlife.

Anadromous and Resident Game Fish. Striped bass, King salmon, steelhead, American shad, sturgeon, catfish and sunfish are the principal species.

Nongame Fish. 10 identified species.

Waterfowl. Numerous ducks, geese, swans and cranes.

Upland Game. Pheasant most abundant.

Nongame Birds. 200 species -- most migrant.

Mammals. 39 species.

Reptiles. 19 species.

Amphibians. 8 species.

Rare and Endangered Species. A number of rare and endangered species: 1 fish, 7 birds, 1 mammal, 2 reptiles, 3 plants.

Agriculture. 550,000 acres in agriculture. Important to local, state and national economy.

Urban Development. Regional population growth strong, particularly Stockton and Sacramento. Delta islands sparsely populated. Some suburban and summer home encroachment on edges of peat land.

Industry. Large industrial complexes at Pittsburg and Antioch. Industrial growth and diversification in all 5 counties of region. Natural gas production important within Delta.

Recreation. Sports fishing, water skiing, pleasure boating, overnight camping and hunting major activities. 125 marinas and 2 state parks.

Transportation. Network of good highways on periphery, one north-south and two east-west highways across the Delta, and numerous unimproved roads in central Delta. Extensive ferry system. One railroad crosses Delta. Metropolitan airports in Sacramento and Stockton. 700 miles navigable waterways. 2 deep water ports.

Major Environmental Problems

Wildlife Habitat. Disappearance of critical marsh and riparian lands.

Land Subsidence. Causes seepage and levee failure.

Export Diversions. Cause flow reversal problems which increase ocean salinity intrusion and adversely affect fish.

Water Quality. High concentrations of mineral salts in southern Delta. Dissolved oxygen problems in San Joaquin River Deep Water Channel near Stockton, and in dead-end sloughs. Waste discharge from subdivisions, houseboats, marinas, municipalities, and industries. Increased salinity from irrigation return flows.

Fish. Diversions and localized poor water quality adversely affecting striped bass, salmon, and resident fish, and their food organisms.

Agriculture. Major problems with drainage, soil conditions and poor water quality in some areas.

Recreation. Access, parking and sandy beaches critically short. Reduction of aesthetic values due to levee maintenance. Lack of adequate facilities. Conflicts of use between fishermen, boaters, and aquatic sports.

Suisun Marsh

Major Environmental Features

Vegetation/Wildlife Habitat. 55,000 acres constitute 10 percent of California's remaining natural wetlands on the Pacific Flyway. Shallow bays and mudflats, fallow uplands, grain fields and heavily vegetated levees.

Resident and Anadromous Fish. Striped bass, King salmon, sturgeon, steelhead, catfish, numerous nongame fish.

Waterfowl. Supports up to 20 percent of California's wintering duck population.

Birds. 202 species use as nesting or wintering grounds.

Mammals. 36 species.

Reptiles and Amphibians. 20 species.

Rare and Endangered Species. 7 species.

Industry. Modest local trapping industry for fur-bearers.

Recreation. Duck hunting on public and private lands, marginal pheasant hunting, fishing, bird watching, sightseeing, aesthetic enjoyment, field trails, picnicking, bicycling and miscellaneous others.

San Francisco Bay Complex

The Bay Complex includes San Francisco, San Pablo, Suisun, Grizzly and Honker Bays. Man's uses include municipal and industrial sewage

disposal, industrial water supply, recreation, commerce, fishing and aesthetic pleasure.

Major Environmental Features

Vegetation/Wildlife Habitat. 4 major wildlife habitats in and around bay. Many species dependent on habitat for continued existence.

Fish and Invertebrates. Population of marine species number in millions. Striped bass, surfperch, jacksmelt, and topsmelt are popular sport fishes. Shellfish include mussels, oysters, clams, crab and shrimp.

Birds. 76 species of water birds winter in bay, numerous shorebirds, 100 species of song birds, wading birds, hawks and owls. Several heron rookeries.

Mammals. Sea lions, seals and porpoises inhabit bay. Furbearers and rodents occupy marshes.

Rare and Endangered Species. 8 bird species and 2 mammal species are considered rare or endangered.

Urban Development. Population increases and urbanization rapid in 9 Bay Area counties. San Francisco functions as center of commerce, tourism and culture for region.

Industry. Industrial development important throughout region. Use of bay water important to number of industries.

Recreation. Water-oriented recreation activities include picnicking, boating, nature walking, camping, hunting and fishing. Swimming and water skiing, where water quality permits.

Fishery. Commercial fishery, much of it for bait.

Major Environmental Problems

Water Quality. Municipal and industrial waste discharges causing: adverse effects on fish and invertebrates; reduced diversity of benthic organisms; and low dissolved oxygen in shallow areas of bay, reaches of Napa and Petaluma Rivers, and southernmost part of bay. Excessive algal concentration in localized areas of South and Suisun Bays. Odor and floating materials. Numerous oil spills.

State Water Project-Central Valley Project Export Service Areas

San Francisco Bay Service Area

Major Environmental Features. Discussed in preceding section.

Water Supply and Demands. Most freshwater sources developed to capacity, including ground water overdraft in some areas. Peripheral Canal will convey 30 percent of water supply anticipated by year 2020.

San Joaquin Valley Service Area

Vegetation/Wildlife Habitat. 100,000 acres fish and wildlife habitat.

Wildlife. Waterfowl of Pacific Flyway, upland game and many nongame birds and mammals.

Agriculture. Top agricultural producing area in state. 7,500,000 acres of irrigated and potentially irrigable land. Gross farm receipts in excess of $2 billion annually.

Industry. Generally agriculturally related, but also has major oil producing areas.

Urban. 200,000 acres urban land.

Recreation. Considerable hunting on public and private lands and bird watching. Aqueducts and reservoirs provide water-related recreation including fishing, bikeways, boating, camping and swimming.

Water Supply and Demand. Most surface water supplies from streams in Sierra and its foothills and diversions from Delta. Ground water used extensively with overdraft occurring in some areas. Peripheral Canal will convey 35 percent of anticipated water supply by year 2020.

Central Coastal Service Area

Fish and Wildlife. Salmon, steelhead and trout. Deer and upland game common to abundant.

Agriculture. Economy based primarily on agriculture.

Industry. Agricultural related industries. Extractions and refining of petroleum, mining, commercial fishing and lumbering. Military installations important to local economy.

Recreation. Pacific Ocean center of recreational activities. Fishing and hunting important.

Water Supply and Demand. The Peripheral Canal will convey 18 percent of estimated water supply by the year 2020.

Southern California Service Area

Vegetation/Wildlife Habitat. 350,000 acres.

Wildlife. Fish and wildlife extensive in South Lahontan and Colorado Desert hydrologic areas.

Agriculture. 5,530,000 acres of irrigated or potentially irrigable land within all hydrographic areas.

Industry. Industrial development extensive in south coastal area. Much less so in more typically desert areas.

Urban Development. 1,170,000 acres in urban use. South coastal area has over half State's population. Population sparse in South Lahontan hydrologic area and increasing in Colorado Desert hydrologic area.

Water Quality. Ranges from excellent to poor. Problem with sea water intrusion and man's activities in coastal plains. High levels of mineral salts in Colorado River water and ground water in some areas.

Water Supply and Demand. Local surface and ground water supplies almost fully developed in south coastal area. Colorado River and Mono-Owens Valley provide imported water. 48 percent of projected water supplies of entire area will be conveyed by the Peripheral Canal.

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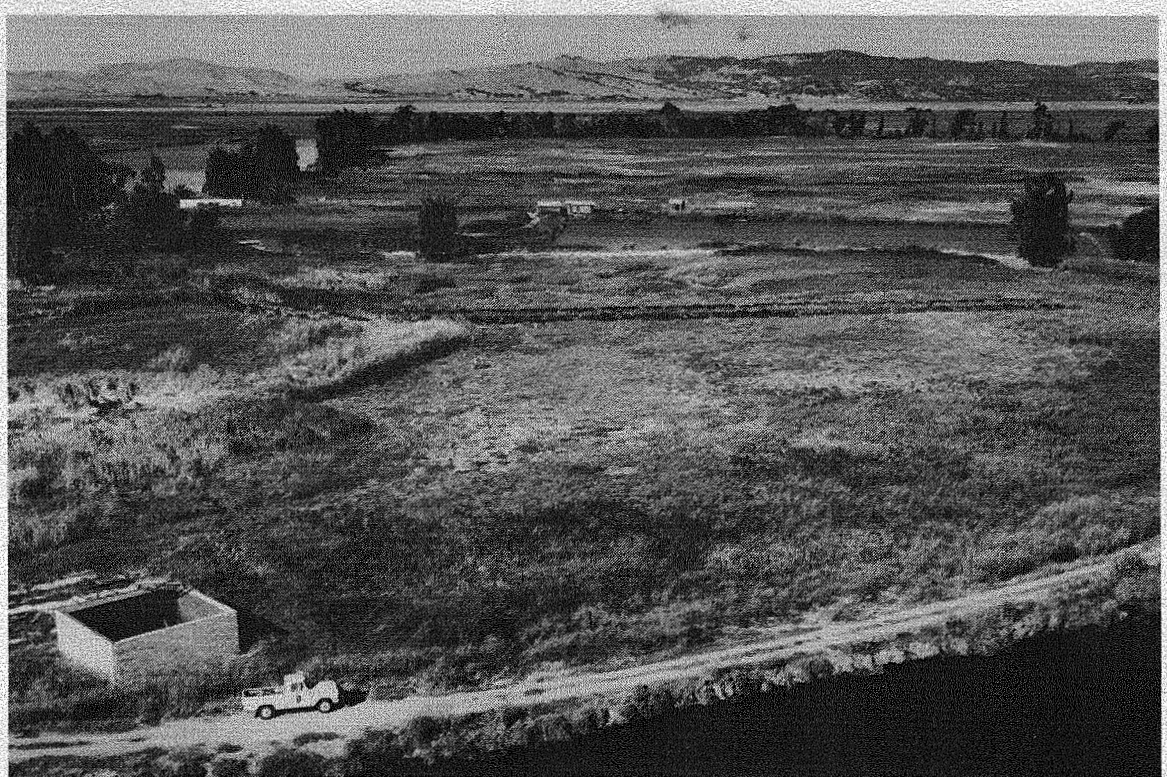


Wildlife habitat of the Suisun Marsh – a major waterfowl wintering area along the Pacific Flyway.

Related Projects

Numerous public and private projects in the Sacramento and San Joaquin River systems have modified natural streamflows into the Delta. At the present level of development, net water use in or above the Delta averages about 8,000,000 acre-feet annually, and is projected to increase in the future.

Described in Table 1 are the present and planned major projects which affect the water supply in the Delta. Projects which affect Delta water quality or would have an effect on the design of the Peripheral Canal are also described.

TABLE 1

RELATED PROJECTS

Project	Status	Project Operator	Project Purposes	Relationship to Delta/or Peripheral Canal
Shasta Division (CVP)	Existing	USBR	Flood Control, Irrigation, Fishery and Power, Navigation, Recreation, Municipal and Industrial	Provide Delta exports and augment low summer and fall flows in Delta in coordination with other CVP units.
Trinity Division (CVP)	Existing	USBR	Power and Irrigation	" "
Folsom Unit (CVP)	Existing	USBR	Irrigation, Power, Flood Control, Municipal and Industrial, Fishery and Wildlife, Recreation	" "
Oroville Division (SWP)	Existing	DWR	Irrigation, Municipal and Industrial, Power, Flood Control, Fish and Wildlife	Provides water supply for diversion from Delta and salinity control in Delta.
Friant Division (CVP)	Existing	USBR	Flood Control, Irrigation	Diverts water in Upper San Joaquin River which is replaced by Delta-Mendota Canal water diverted from Delta.
Solano Project	Existing	USBR	Water Conservation, Irrigation	Development on Putah Creek, a tributary to the Delta.
Mokelumne Project	Existing	East Bay Municipal Utility District (EBMUD)	Municipal and Industrial	Transports Mokelumne water across Delta for use in Contra Costa and Alameda Counties. Export of tributary supply to Delta.
Hetch Hetchy Project	Existing	San Francisco City and County	Municipal and Industrial	Export of Tuolumne River, a tributary supply to Delta.
North Bay Aqueduct (SWP)	Partial Operation	DWR	Municipal and Industrial	Will divert up to 67,000 acre-feet annually from Delta.
Contra Costa Canal (CVP)	Existing	CCCWD	Municipal and Industrial, Irrigation	Diverts water from Delta when water quality unsuitable offshore in western Delta. Water would be conveyed by Peripheral Canal.
Kellogg Project (CVP)	Proposed	CCCWD or USBR	Municipal and Industrial, Irrigation, Water Quality, Recreation, Fish and Wildlife	Could pump additional water supplies from Delta to augment Contra Costa Canal. Water would be conveyed by Peripheral Canal.
Auburn-Folsom South Unit (CVP)	Under Construction	USBR	Municipal and Industrial, Power, Flood Control, Recreation, Fishery	Coordinated operation with Shasta and Folsom for CVP inflow to Delta. Also related to proposed Hood-Clay Connection.
Hood-Clay Connection (CVP)	Proposed	USBR	To augment supply in Folsom-South Canal and redirect American River environmental flows.	Peripheral Canal intake will be designed to provide capacity for this facility.
New Melones Reservoir (CVP)	Under Construction	USBR	Flood Control, Irrigation, Power, Recreation, Fishery, Water Quality Control	Water quality control of San Joaquin River inflow to Delta. Could effect releases from Peripheral Canal.
East Side Division (CVP)	Proposed	USBR	Irrigation, Municipal and Industrial, Wildlife	Related to an expanded Hood-Clay Connection which would be part of Peripheral Canal intake.
Cross Valley Canal	Under Construction	Kern County Water Agency	Irrigation	Will divert additional 133,000 acre-feet annually from Delta that would be conveyed by the Peripheral Canal.
American Aqueduct	Proposed	EBMUD	Municipal and Industrial Water Supply	Export of American River tributary supply to Delta.

TABLE 1 (continued)

Project	Status	Project Operator	Project Purposes	Relationship to Delta/or Peripheral Canal
Nashville Reservoir (CVP)	Proposed	USBR	Irrigation, Municipal and Industrial, Flood Control, Recreation	Fishery releases would provide incidental water quality benefits in Delta. Development on Cosumnes River, a tributary to the Delta.
San Luis Drain (CVP)	Partial Operation	USBR	Water Quality and Irrigation Waste Water Disposal	Will eventually convey agricultural return flows to receiving waters at Antioch. Needed to maintain salt balance in San Joaquin Valley.
San Joaquin Master Drain (SWP)	Authorized	DWR	" "	" "
Sacramento Canal Units (CVP)	Partial Operation	USBR	Irrigation	Reduces Delta inflow. Diverts water from upper Sacramento River.
Morrison Creek Flood Control	Proposed	Corps of Engineers	Flood Control, Recreation, Fish and Wildlife	Outflow would enter Peripheral Canal below intake facilities.
Hidden Reservoir	Under Construction	Corps of Engineers	Flood Control, Irrigation, Recreation, Fish and Wildlife	Will contribute to depletion of annual inflow to Delta. Storage on Fresno River, a tributary to San Joaquin River.
Buchanan Reservoir	"	"	" "	Will contribute to depletion of annual inflow to Delta. Storage on Chowchilla River, a tributary to San Joaquin River.
Allen Camp Reservoir	Proposed	USBR	Flood Control, Irrigation, Recreation, Fish and Wildlife	Would contribute to depletion of annual inflow to Delta. Storage on Pit River, a tributary to Sacramento River.
Indian Valley Reservoir	Under Construction	Yolo County Flood Control & Water Conservation District	Flood Control, Irrigation, Fish and Wildlife	Will contribute to depletion of annual inflow to Delta. Storage on tributary to Cache Creek.
Western Delta Overland Agricultural Water Facilities	SWP Authorized	SWP and CVP	Water Quality for Irrigation	Substitute water supply for Western Delta in lieu of large releases to repulse salt water intrusion.
Baldwin Ship Channel	Authorized	Corps of Engineers	Navigation	Would deepen San Joaquin River navigation channel and affect placement of Peripheral Canal siphon.
Interstate Highway 5	Under Construction	Caltrans	Transportation	Will utilize spoil from canal for highway embankment. Borrow sites will be used for fishery, recreation or sanitary landfill disposal sites if Peripheral Canal is not built.
Delta-Mendota Canal (CVP)	Existing	USBR	Irrigation, Municipal and Industrial	Supply to be conveyed by Peripheral Canal.
California Aqueduct (SWP)	Existing	DWR	Irrigation, Municipal and Industrial, Recreation	Supply to be conveyed by Peripheral Canal.
South Bay Aqueduct (SWP)	Existing	DWR	Irrigation, Municipal and Industrial, Recreation, Flood Control	Supply to be conveyed by Peripheral Canal.
San Luis Reservoir (SWP-CVP)	Existing	DWR	SWP-CVP Offstream Storage, Recreation, Power, Fish and Wildlife	Supply to be conveyed by Peripheral Canal.
San Felipe Division (CVP)	Authorized	USBR	Irrigation, Municipal and Industrial	Supply to be conveyed by Peripheral Canal.
Upper Eel River Development (SWP)	Authorized (Moratorium)	DWR	Augment Delta Supply, Power, Flood Control, Recreation, Fish and Wildlife	Would provide new water supply for diversion from the Delta.

PROJECT FACILITIES AND OPERATION

The Peripheral Canal will begin at the Sacramento River near the community of Hood, extend in a southeasterly direction along the eastern perimeter of the Delta, cross the San Joaquin River west of Stockton, and terminate at Clifton Court Forebay of the SWP. A connection between the Forebay and Tracy Pumping Plant of the CVP will be provided. The unlined canal will resemble a Delta channel or a natural river, except with flatter side slopes. The 43-mile long earth channel will be 400 or more feet wide and about 30 feet deep, with gently sloping levees on both sides. Trees and shrubs will be established on the slopes for recreation and wildlife.

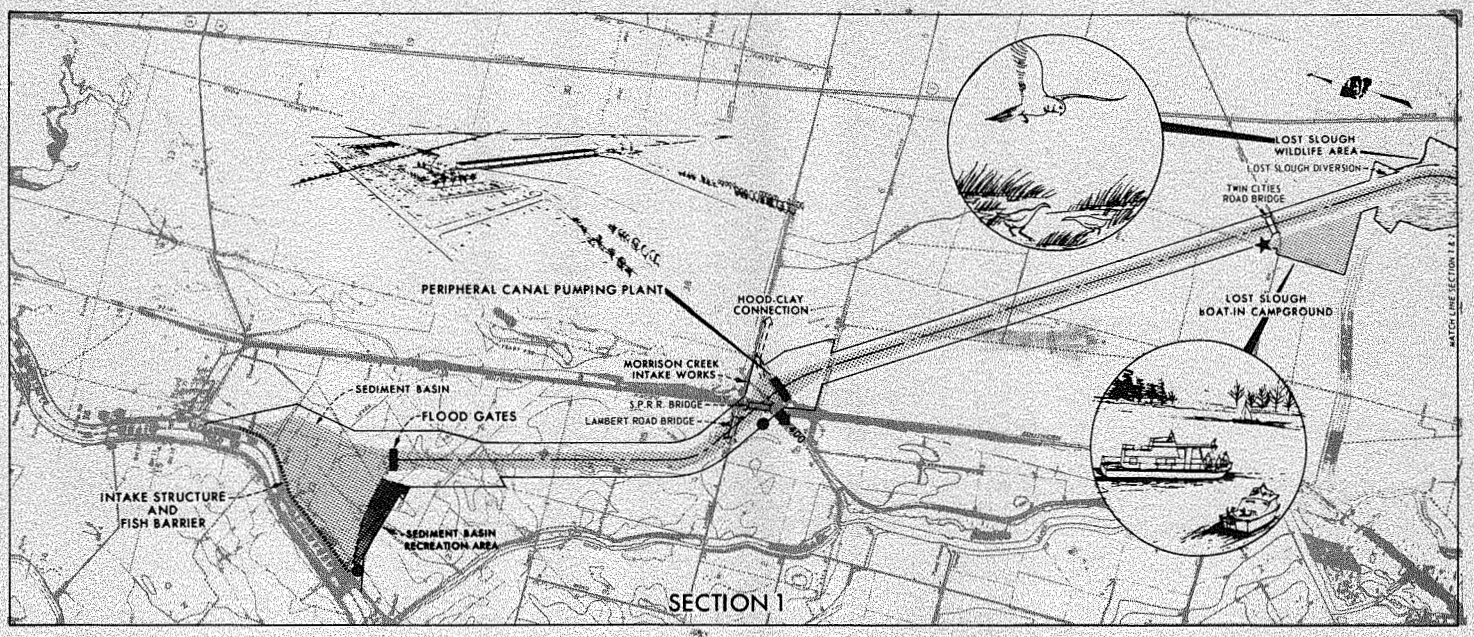
The objective of the project will be accomplished by: (1) providing a conveyance for export water without undue reduction in supply or degradation in quality; (2) changing the point of export diversion from near Clifton Court Forebay to the vicinity of Hood via the Sacramento River, thereby isolating export water and eliminating the adverse effects on Delta channels; (3) providing controlled releases of water into the Delta at 12 locations where the canal intersects Delta channels to facilitate year-round water quality management in the Delta and assure positive downstream flows in all main fish migration channels; (4) accepting floodflows from Morrison Creek Basin and Middle River into the canal to reduce the pressure of flow on the natural channels downstream; (5) incorporating suitable recreation and fish and wildlife facilities and operational considerations so as to retain fish and wildlife resources at present levels and to increase these resources to the degree compatible with other project purposes; and (6) designing the canal to add a new recreation use, building new recreation facilities, and improving public access to this area of the Delta.

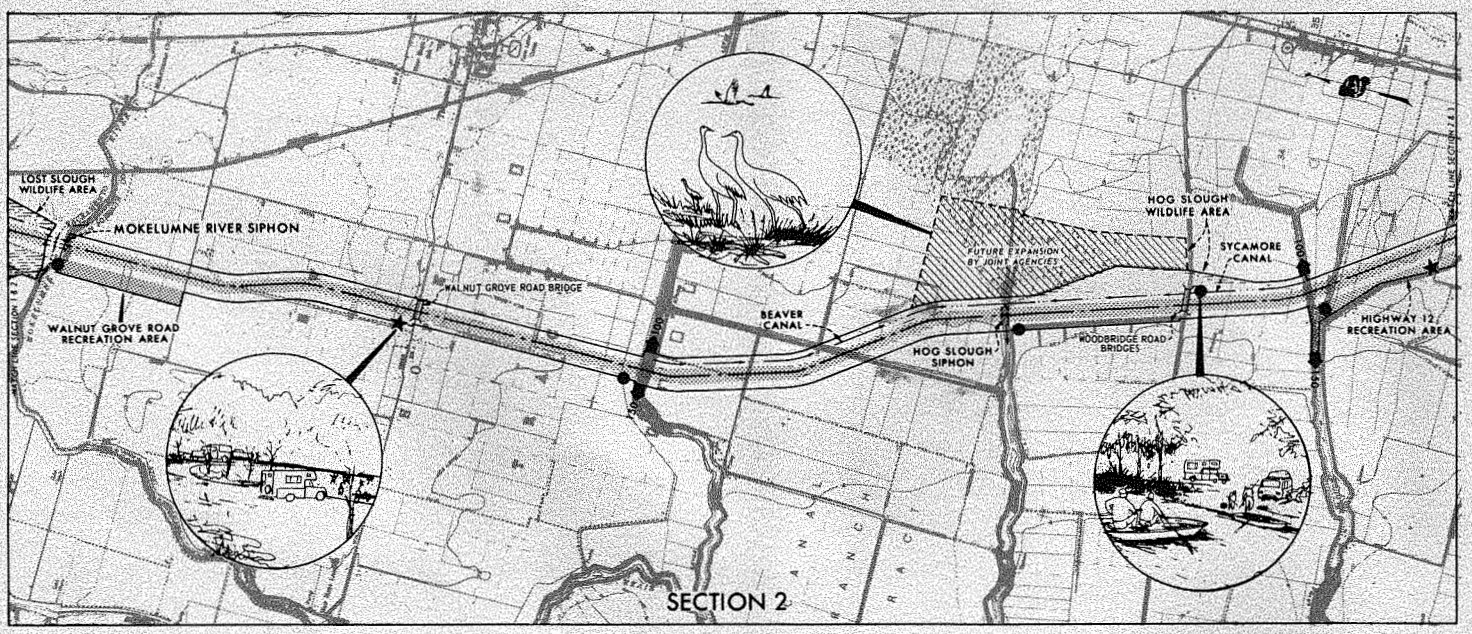
The sizing, configuration and appurtenant works of the canal would be applicable to both the first and second stages of construction. The major facilities and a description of their operation are summarized in Table 2. Several of the project features; namely, the Peripheral Canal pumping plant, the southeastern Delta water control facilities and Georgiana Slough facilities will be constructed as Stage II features. These have been identified as such in Table 2.

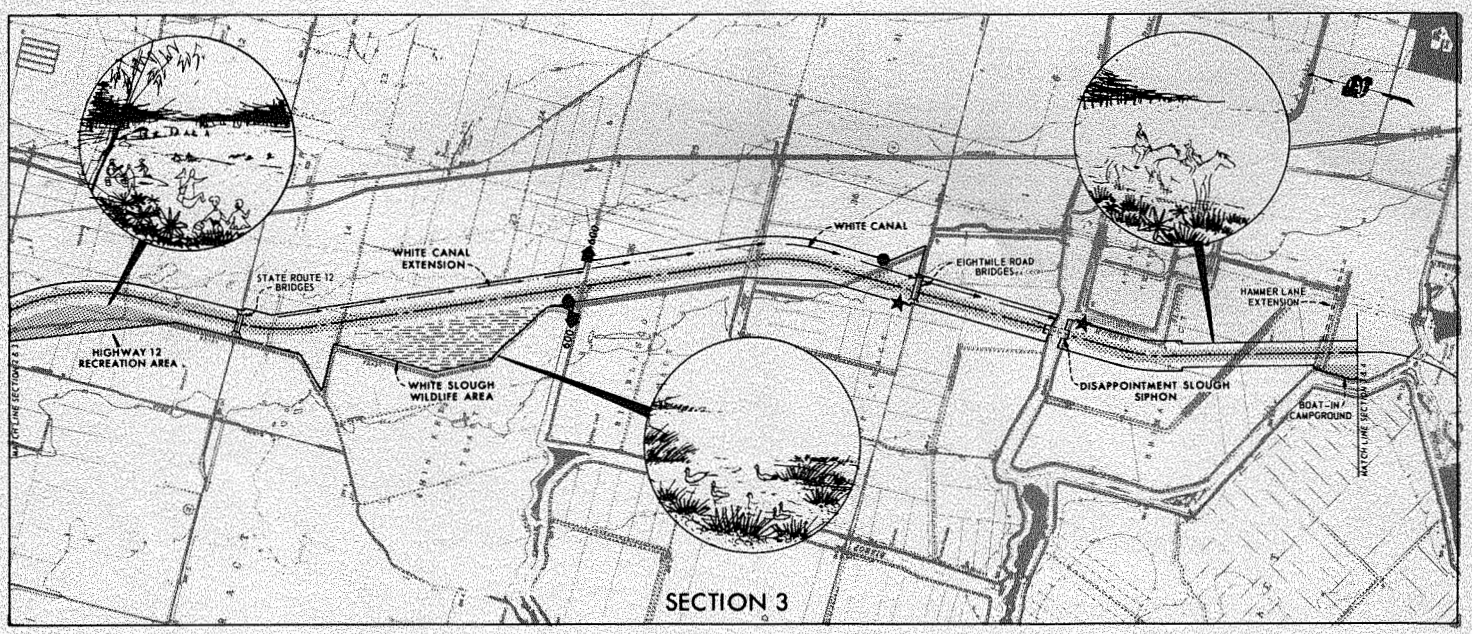
TABLE 2

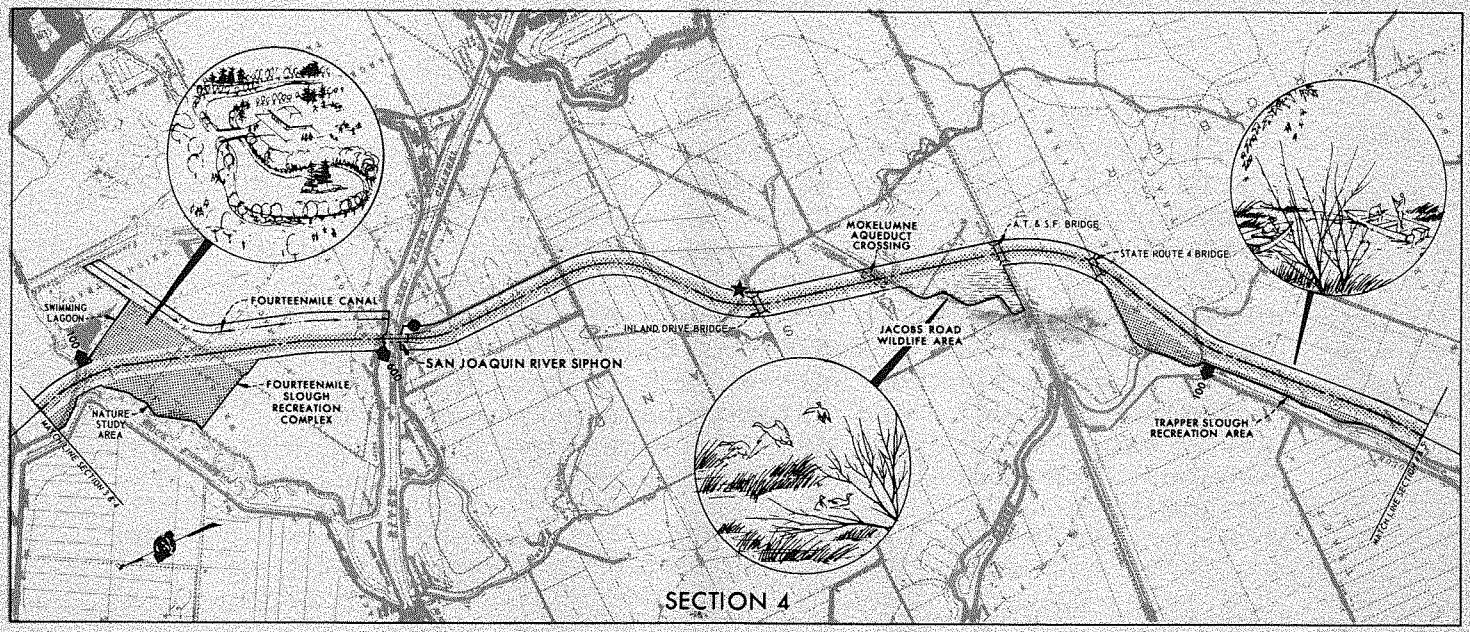
PHYSICAL AND OPERATIONAL FEATURES OF THE PERIPHERAL CANAL

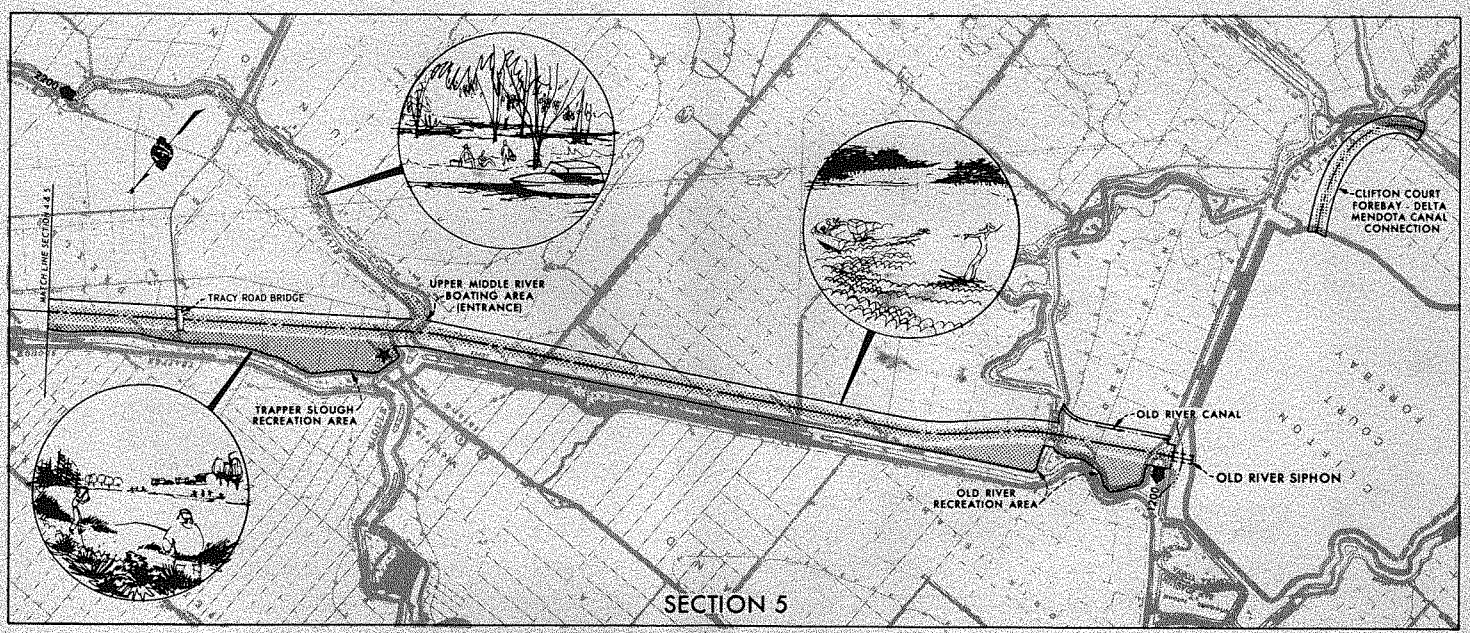
Facility	Description	Operation
Peripheral Canal	43-mile-long leveed earth channel.	Export by gravity flow during Stage I; by pumping during Stage II.
Canal Intake	23,300 cfs design capacity including 1,500 cfs for proposed Hood-Clay connection, decreasing to 18,300 cfs at Clifton Court Forebay.	Intakes water from Sacramento River into Canal. Gravity flow less than design and dependent on river stage.
Intake Facilities	Trashrack, sediment basin, flood gates, and fish protection facility.	Screens fish and debris, minimizes sediment entering canal, and controls diversions.
Siphons	Four siphons placed under major sloughs and rivers crossed by canal.	Conveys canal water under major rivers and sloughs so as not to impede floodflow capacities of existing channels, navigation, and fish migration.
Fish Protective Facility	Perforated plates at entrance to intake facilities or rotating drums downstream of entrance. (Type to be determined from studies.)	Screens juvenile fish from export water and keeps them in or returns them to Sacramento River.
Delta Release Facilities	12 water release points along canal with total capacity of 6,300 cfs.	Releases to Delta channels to replace severed water supplies, meet consumptive needs, control water quality, and maintain positive flows in channels. Releases minimal during Stage I and increasing during Stage II.
Drainage and Irrigation Facilities	Substitute or modified channels to replace minor irrigation and drainage systems severed by canal.	Will continue current functions.
Morrison Creek Flood Control	Drainage enters Peripheral Canal forebay between floodgates and Stage II pumping plant over a weir structure.	Floodflows from Morrison Creek Drainage diverted into enlarged section of canal. Flows released through release facilities or exported.
Middle River Facilities	Pumping plant and control structure on Middle River. Location dependent on alternative selected. (See Southeastern Delta Water Control Facility.)	Provides releases for water quality control and controls floodflows taken into Peripheral Canal.
Fourteen Mile Slough Facilities	Combination water quality control channel and boat access channel. Provides boat access to Lincoln Village Marina from San Joaquin River.	Increased releases and elimination of effluent disposal to improve water quality. Boaters will be provided a more direct route to San Joaquin River.
Utilities	Replacements for those in canal right-of-way.	Will continue current operation.
Bridges	12 crossings to current standards.	Will carry 10 roads and 2 railroads over the canal.
Roads	Alternate public access road and service road on Peripheral Canal levee embankments.	Public access road for vehicular traffic and off shoulder parking. Service road will double as recreational trail.
Recreational Facilities	Recreation trails, auto-aquatic parks, fishing areas, nature study areas, picnic and camping areas, beaches, boat-in development, and swimming lagoons.	Operated by Department of Parks and Recreation or local agencies.
Wildlife Areas	4 major preserve and habitat areas. Also along canal berms and outside of canal embankments.	State Department of Fish and Game will operate, regulating use and access to specified areas.
Control for Delta Cross Channel	Gates would be automated by remote control. Boat lock and bypass canal would be constructed to compensate for increased duration of closure.	Would permit gates to be open, either fully or partially, on varying schedule to meet environmental requirements in Mokelumne River not met by canal releases.
Peripheral Canal Pumping Plant	3 miles south of intake. Capacity of 21,800 cfs at 10-foot lift. Could pass floodwater from Morrison Creek by gravity flow.	Will provide additional capacity to convey joint SWP and CVP export flows. (Stage II facility.)
Southeastern Delta Water Control Facility	3 alternate plans under consideration for water quality improvement and water control facilities for southeastern Delta.	Two plans will use Middle River release facilities to distribute flows to Old and San Joaquin Rivers. Third will release water from Delta-Mendota Canal to San Joaquin River. (Stage II facilities.)
Georgiana Slough Facilities	Series of rock weirs.	Will prevent excess transfer from Sacramento River to Mokelumne River caused by tidal action. (Stage II facility.)

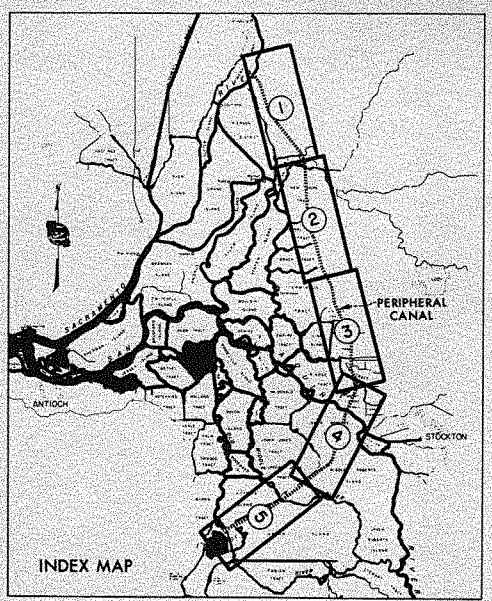

LOST SLOUGH WILDLIFE AREA
LOST SLOUGH DIVERSION
TWIN CITIES ROAD BRIDGE
PERIPHERAL CANAL PUMPING PLANT
HOOD-CLAY CONNECTION
LOST SLOUGH BOAT-IN CAMPGROUND
MORRISON CREEK INTAKE WORKS
SEDIMENT BASIN
FLOOD GATES
S.P.R.R. BRIDGE
LAMBERT ROAD BRIDGE
INTAKE STRUCTURE AND FISH BARRIER
SEDIMENT BASIN RECREATION AREA
MATCH LINE SECTION 1 & 2
SECTION 1


LOST SLOUGH WILDLIFE AREA
MOKELUMNE RIVER SIPHON
WALNUT GROVE ROAD RECREATION AREA
WALNUT GROVE ROAD BRIDGE
BEAVER CANAL
HOG SLOUGH SIPHON
FUTURE EXPANSION BY JOINT AGENCIES
HOG SLOUGH WILDLIFE AREA
SYCAMORE CANAL
WOODBRIDGE ROAD BRIDGES
HIGHWAY 12 RECREATION AREA
MATCH LINE SECTION 1 & 2
MATCH LINE SECTION 2 & 3
SECTION 2


WHITE CANAL
WHITE CANAL EXTENSION
STATE ROUTE 12 BRIDGES
EIGHTMILE ROAD BRIDGES
HAMMER LANE EXTENSION
HIGHWAY 12 RECREATION AREA
WHITE SLOUGH WILDLIFE AREA
DISAPPOINTMENT SLOUGH SIPHON
BOAT-IN CAMPGROUND
MATCH LINE SECTION 2 & 3
MATCH LINE SECTION 3 & 4
SECTION 3







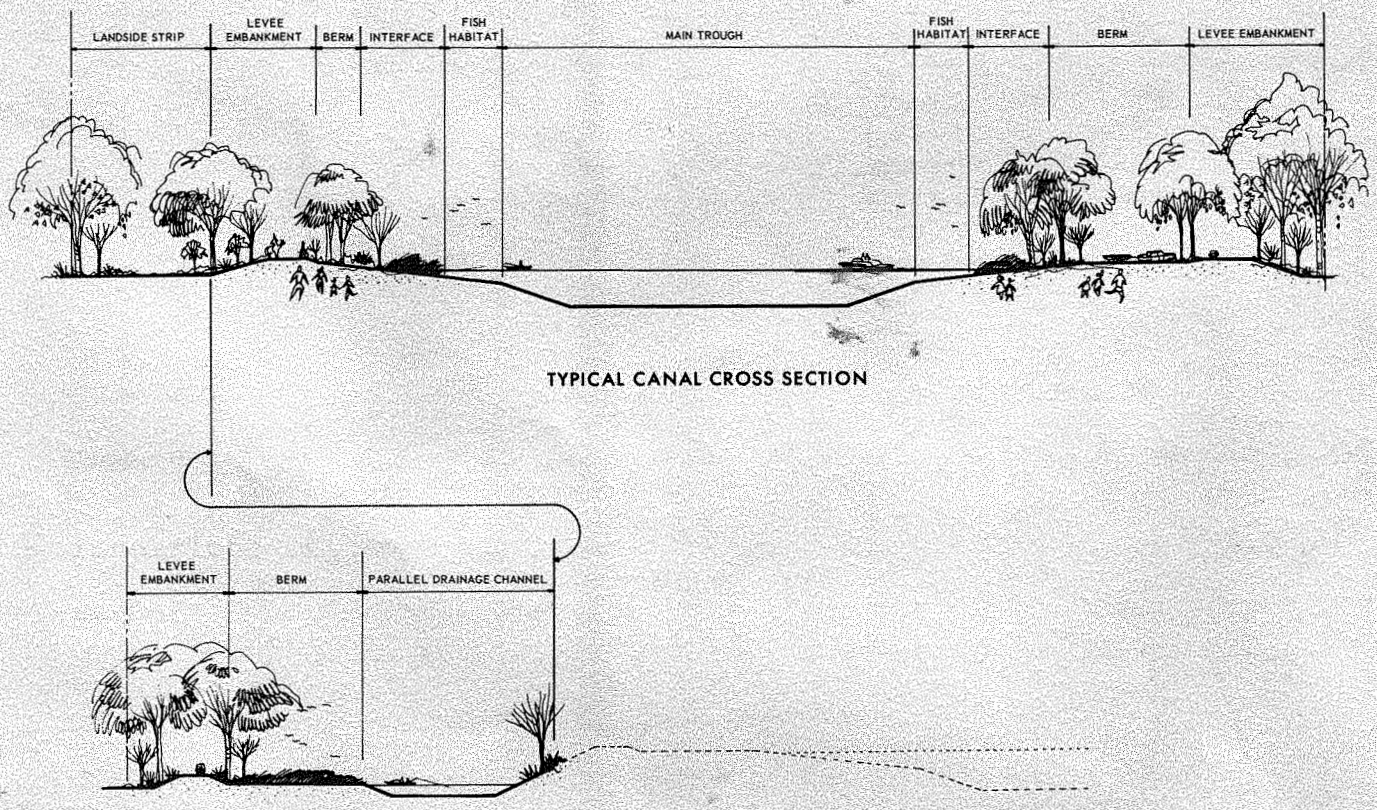
LEGEND

- MAJOR RECREATION AREA
- MAJOR WILDLIFE AREA
- ★ AUTO-AQUATIC PARK
- ● FISHING ACCESS SITE
- 600 RELEASE FACILITY (CFS)
- WATER SURFACE AREA

DETAIL MAP
PERIPHERAL CANAL ALIGNMENT AND MAJOR FEATURES

SCALE OF MILES
0

The levee embankments along both sides of the Peripheral Canal would be designed for the purpose of recreation and wildlife uses and a fishery would be established. A number of recreation facilities would be constructed along the canal levees, on excess lands, or on parcels adjacent to the canal and purchased specifically for recreation and/or wildlife. The facilities being planned include auto-aquatic parks, fishing areas, a visitor facility and interpretation center, a nature study area, picnic and camping areas, beaches, swimming lagoons, and boat-in developments from adjacent Delta channels.



Typical Peripheral Canal Cross Section, Recreation and Wildlife Plan.

Operation plans of the canal will be governed by the water supply available to and requirements of the Delta and the requirements of the export service areas. The operating criteria for releases from the canal will be flexible pending a determination of requirements resulting from interagency environmental studies, contract negotiations with Delta water users, permanent water quality standards to be set by the control agencies, and adjusted by actual operation of the Peripheral Canal to assure that the desired results are achieved.

For the interim period until 1985, the first stage gravity canal would be operated primarily to meet SWP and CVP export needs. Minimal releases would be made to the Delta to replace severed water supplies and meet consumptive needs in the southern Delta, with the principal requirement being met by the flows down the natural channels of the Sacramento River and Delta. Although smaller releases will be made from the canal under interim gravity operation, more water will be available in the Delta than in later years, and the magnitude and direction of flows will be quite similar to those with the full canal in operation. A major aspect of the interim operation would be the isolation of the export pumps from southern Delta channels and the elimination of existing adverse effects of this pumping.

Future increased demands, new projects, and changes in land use in the Central Valley will reduce surplus water presently available in the Delta. Even with allowances for curtailing deliveries to agriculture in critically dry years as permitted in the contracting principles of the SWP and CVP, additional sources of water will eventually be required during critically dry periods with or without the Peripheral Canal if all contracted deliveries and the assumed flows for Delta water quality are to be met. To meet these demands, additional water sources would have to be developed, either in northern California or in the export service areas. Waste water reclamation and sea water conversion are examples of supplemental sources of additional supply that could be developed for the service areas. It is estimated that under the 2020 level of development, the requirement for additional water from northern California sources during a critically dry period would be increased by about 1.8 million acre-feet per year without the canal. Additional water supplies would be needed by 1980 without the canal, and by 1990 or later, with the canal.

Operational Flexibility

The Peripheral Canal will be operated in coordination with the reservoirs of the CVP and SWP. While the storage in

these upstream reservoirs will be regulated to control the high winter and spring runoff from these watersheds and augment low flows in the summer and fall in the Delta, the canal will provide the means of distributing this inflow throughout the Delta. Each hydrologic year is different; hence, the exact amount and timing of releases from the canal to provide the desired environmental conditions in the Delta will differ from year to year, month to month, and possibly within shorter periods. The total capability of the project to distribute water to the interior Delta will include releases from 12 release facilities along the canal and Clifton Court Forebay, and controlled flows through the Delta Cross Channel and Georgiana Slough, and a facility to regulate the flow from San Joaquin River into Old River.

During the early spring months, the operational plan is to improve water quality in the Old, Middle, and Mokelumne Rivers for the start of the agricultural season, and to provide proper conditions for striped bass spawning in the Delta. Later in the spring, during the bass spawning period (approximately 5 weeks), diversions into the canal for export will be minimized to permit the free-floating eggs and larvae spawned in the Sacramento River to drift past the intake into the western Delta.

In the early summer, following striped bass spawning, channel velocities will be reduced, particularly in the Mokelumne River system, to improve production of fish food. This will be accomplished by closing the Delta Cross Channel and releasing enough water from the canal to meet consumptive use and in-channel requirements. This mode of operation will continue throughout the summer, although canal releases will increase as consumptive use requirements within the Delta rise and inflow from tributary streams decrease.

During the fall, the plan is to reduce releases from the canal consistent with consumptive use needs to assure a high proportion of homestream water in the migrating channels of the Sacramento and San Joaquin River for King salmon runs, and to prevent attraction of Sacramento River salmon to canal release sites. This will be accomplished by stopping canal releases to the northern Delta, meeting northern Delta requirements via the Delta Cross Channel, reducing canal releases into the southern Delta, and increasing the flow in the Sacramento River.

Winter operation envisions no canal releases in the northern Delta during the extended salmon runs of the Sacramento River and increasing releases again in the southern Delta.

Additional canal operational flexibility will include the ability to make releases of up to 1,500 cfs from the Clifton Court Forebay to the southern Delta, when necessary, and short-term flow changes elsewhere when occasional unpredictable

situations occur. These might include increases in winter releases to provide leaching water in the southern Delta agricultural lands, redistribution of flows to eliminate localized pollution blocks, and further cutbacks in canal diversions at certain times to protect the Delta fishery by allowing additional flow down the Sacramento River.

Economics and Financing

The total estimated capital cost of the full Peripheral Canal is $286 million. The estimated cost of Stage I facilities, including initial recreation facilities, is $211 million and Stage II facilities is $75 million. The estimated annual operation, maintenance and replacement cost under full operation, exclusive of CVP power costs and operational costs for recreation, is $2.4 million.

Cost sharing is planned on a 50-50 basis if and when the Federal Government is authorized to participate. Pending that time, the entire project will be funded by monies available to the Department of Water Resources for construction of the State Water Project. Should federal authorization be delayed, the Department expects that the U. S. Bureau of Reclamation will pay a transportation charge, or other form of interim compensation, for the conveyance of federal CVP water through the canal.

Delta Monitoring Programs

Associated with the operation of the Peripheral Canal will be a number of monitoring programs designed to confirm or adjust operational criteria relating to the effects on water quality, ground water adjacent to the canal and the environmental requirements for the Delta fishery. These programs will be:

1. Water quality monitoring program based on the State Water Resources Control Board Decision 1379.

2. Seepage Monitoring - This is an ongoing program of DWR, begun in 1966, and is to continue after the canal is operational in order to determine effects of the canal on adjacent ground water and mitigation, if necessary.

3. A cooperative program between the Departments of Fish and Game and Water Resources: (a) to establish

water management terms and criteria for maintaining fish and wildlife resources at present levels, and for increasing these levels where feasible; (b) to monitor the terms and criteria and modify water operations as necessary for evaluation purposes; and (c) to revise the terms and criteria consistent with the results of the evaluation.

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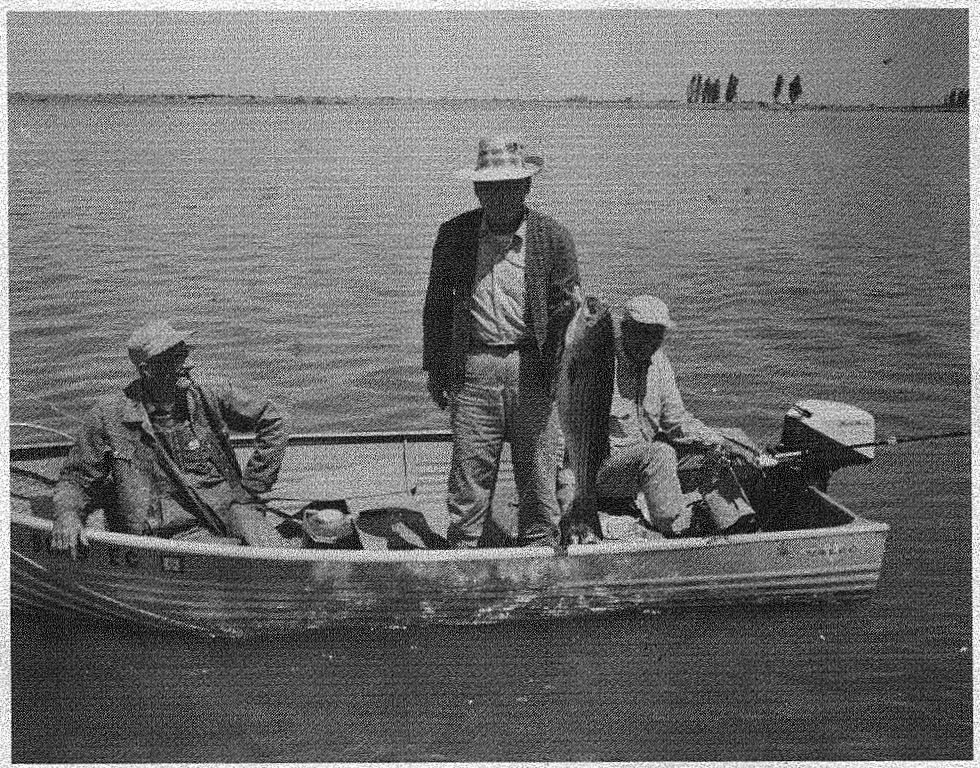


Fishing for striped bass – the principal game fish caught in the Delta estuary.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Environmental impacts attributable to the Peripheral Canal are divided into these major headings -- Local Vicinity, Sacramento-San Joaquin Delta Region, Suisun Marsh, San Francisco Bay Complex, SWP and CVP Export Service Areas, Northern California Water Sources, and Related Projects. Emphasis is placed on the long-term effects of the canal under conditions of full operation, although short-term effects are also discussed. For each of the six headings, impacts and mitigation measures designed to prevent or minimize the adverse impacts are briefly discussed. Table 3, which is a Summary of Major Impacts and Mitigation Measures, follows this discussion.

Local Vicinity

The impacted area lies primarily within the canal right-of-way between Hood and Clifton Court Forebay. It also includes the area along the connection between Clifton Court Forebay and the Delta Mendota Canal. Local vicinity is defined as the area encompassing the canal and physical facilities along the canal.

Impacts on the local vicinity are primarily due to the physical presence of the canal and short-term effects during construction. The extensive recreation, fish and wildife areas, and improved access to the Delta to be established in conjunction with the canal, rate as environmental pluses. On the negative side, existing wildlife habitat will be destroyed, including agricultural lands and portions of marsh and riparian lands.

A number of environmental features have been incorporated into the design and operation of the canal and appurtenant facilities which should substantially mitigate most environmental losses.

The Delta, Suisun Marsh, and San Francisco Bay

Most impacts of the canal on the Delta, Suisun Marsh and San Francisco Bay would be due to the operational effects of the canal. Although much is known about the ecology of the area, limitations in complex environments such as these require that some actual environmental effects can be defined only after actual operation of the canal has begun. Monitoring environmental conditions for modification of operation, together with flexibility for operation incorporated in the design of the facilities will permit a wide enough range to adjust to those conditions.

Restoring natural flow regimes in all major channels of the Delta and eliminating other adverse conditions associated with direct export pumping from the southern Delta channels will be the primary benefits of canal operation. The greatest potential for experiencing environmental problems will come in the dry and critical water supply years. Over the 45 years used in operation studies, dry and critical years occurred one-third of the time.

The design of protective facilities and mitigation features, along with an environmentally sound plan of operation, will ultimately determine the net impact on the Delta environment. The focus of the mitigation measures planned is aimed at preventing adverse conditions in relation to fish migration and maturation, recreation and local water supply.

All water use above and diversions from the Delta diminishes annual Delta outflow. Releases of water from upstream CVP and SWP storage reservoirs provide water for Delta outflow during periods of the year when the natural flows would be nonexistent or inadequate to control salinity intrusion. The Peripheral Canal will provide the means to distribute this water to the best advantage of the Delta, as it flows to the western Delta and into the Bay system to control salinity intrusion.

The Suisun Marsh environment is determined in part by the timing, rate, and volume of Delta outflow, and in part by water management practices in the marsh. Increased soil salinity due to a lack of adequate offshore water quality will increasingly plague the marsh with or without the Peripheral Canal, although salinity in Suisun Bay will be somewhat higher with the canal than without, primarily in dry and critical years. The impacts on the marsh listed on Table 3 are anticipated, regardless of canal operation. To the extent that the SWP, of which the Peripheral Canal is a part, diminishes Delta outflow, the Department of Water Resources will participate financially in its fair share of the responsibility to preserve the marsh.

With the exception of Suisun Bay, changes in Delta outflow due to canal operation are not expected to have any significant effect on the Bay environment. With or without the canal, reduced outflow to Suisun Bay will increase the duration of salinity intrusion into that Bay, and will subsequently alter habitat and the distribution of certain aquatic fish food species, such as Neomysis.

Export Service Areas

Impacts on the SWP and CVP service areas are primarily due to a more dependable water supply and an improvement in water quality of the SWP and CVP systems. It is estimated that

for the 2020 level of development, the requirements for disposing of agricultural waste water from San Joaquin Valley will be reduced by half with the Peripheral Canal due to improved water quality. The economy, environment, and social well-being of several million people will be enhanced. As all known impacts are beneficial, no mitigation measures are required.

Northern California Water Sources

With or without the Peripheral Canal, it will be necessary to develop additional northern California water sources if all authorized and contractual water deliveries and the Delta water quality criteria are to be met. The Peripheral Canal, however, reduces the quantity of water required due to the reduced flows needed for salinity repulsion. It also delays the time when additional supplies would be needed. Potential sources of water supply are development of surface water in the Sacramento Valley, upper Eel River Basin, and possibly the Trinity River. Such developments would have a substantial impact on the northern California environment. It is assumed that an environmentally acceptable project could be formulated in the valley, with increasing environmental and legal problems encountered with the other developments.

Related Projects

The Peripheral Canal would also affect several authorized or proposed projects in and around the Delta as shown in Table 3. These impacts would generally be classified as beneficial from an environmental and/or economic standpoint.

TABLE 3

SUMMARY OF MAJOR IMPACTS AND MITIGATION MEASURES

Local Vicinity (Canal Right-of-Way)

Category	Type[a]	Impacts	Mitigation Measures Proposed
Agriculture	-	Loss of agricultural land and production.	Spoil used as embankment for I-5 will reduce agricultural land needed for spoil areas.
	-	Possible increased urban encroachment if county zoning regulations permit.	
Local Government Finance	-	Loss of existing tax base.	Expansion of recreation support industries will tend to offset.
Wildlife	+	Canal side habitat and wildlife preserves.	
	-	Losses due to destruction of present habitat.	Implement recreation and wildlife plan to maintain wildlife resources at present levels and increase where possible. Establish 4 major wildlife areas. Design canal for wildlife use. Alignments avoid particularly valuable wildlife areas where possible. Recreation and wildlife plan includes developmental controls for maintaining a high quality recreational environment.
	-	Wildlife disruption due to recreational activities.	Control conflicts between recreation and wildlife needs.
	-	Possible wildlife displacement and loss due to possible urban encroachment if county zoning regulations permit.	
Fishery	+	Moderately productive warmwater fishery with establishment of fishery habitat throughout length of canal.	
Recreation	+	Increased recreation access, facilities, services and use.	
Archeological Areas	-	8 sites affected - 7 of which have cultural value; one previously destroyed.	Excavate 7 sites having cultural value - preserve samples of what is found.
Seepage	-	Short-term increase and possible additional drainage costs.	Ground water monitoring program to determine remedial measures required or amount of compensation due adjacent landowners.
Drainage and Irrigation	-	Severing of minor sloughs and channels. Blocked access to some.	Drainage and irrigation facilities severed by canal replaced for individual landowners.
Facilities and Waterways	-	Individual drains and irrigation facilities severed.	Relocation or channel modifications of sloughs intersected. Relocated channels sized to provide for tidal flows, runoff, drainage and flood protection. Fresh water releases into relocated channels. Substitute navigational access for Fourteen Mile Slough via new channel and release facility for improved water quality. Siphons under major sloughs and rivers so as not to impair flow carrying capacity, passage of migratory fish or travel by boats. Improved water quality in southeastern Delta due to water control facilities.
Transportation	-	Short-term disruption of transportation networks.	Bridges provided over all existing through roads where cross canal.
	-	Blockage of some county and farm roads.	Rerouting of blocked roads or routing into public road on canal embankment. Bridge access to McCormack-Williamson Tract.
Utilities	-	Short-term disruption during construction.	All utilities disrupted by canal replaced or relocated at project expense.
Spoil Disposal	-	Short-term aesthetic impact during construction.	Spoil placed on levees or berm areas and leveled, sloped and planted. Also see "Agriculture".
Aesthetics	Δ	Changes in existing farmland to a waterway. Also, short-term impact during construction.	Incorporate natural environmental assets where they occur. Gently sloped and planted or naturally revegetated levees using linear greenbelt concept. Two free-flowing lagoons and landscaped islands on main canal. Recreation areas designed to blend with natural surroundings.
Intake Facilities	Δ	Reduced sediment transport down Sacramento River.	Entry of bed load sediments into canal minimized by locating canal entrance on outside of bend and elevating bottom of intake channel so that most sediment is retained within river channel.

[a] Legend: + Beneficial Impact
- Adverse Impact
Δ Problematical Impact

Short-Term Construction Impacts		Delays due to traffic detours, noise, dust, turbidity of water, delay of boats during siphon construction, disruption of irrigation and drainage facilities and utility lines, destruction of vegetation.	Special environmental control provisions in construction contracts. Dust control measures. Canal excavated in three passes and turbid water below water table excavation confined within right-of-way. Excavation controlled to minimize adverse effects. Construction of siphon across Stockton Deep Water Channel coordinated to minimize delays in shipping. Temporary disruption of irrigation or drainage on adjacent lands handled by temporary supplies or alternate arrangements. Natural revegetation and planting program along canal alignment.

Sacramento-San Joaquin Delta Region

Category	Type	Impacts	Mitigation Measures Proposed
Flow Distribution and Water Quality	+	Positive downstream flow in all major channels.	
	+	Improved water quality in several Delta channels and in dead-end sloughs.	
	-	Increased duration of salinity in Suisun Bay and western Delta with or without Peripheral Canal.	Western Delta Overland Agricultural Facilities to provide water supply in lieu of salinity control in western Delta if it is needed.
Fishery	+	Net benefit for fish migrating to and from San Joaquin River and for resident fish in Delta.	
	+	Potential for increased fish protection efficiency.	
	+	Reduced loss of eggs, larvae and young fish to export diversions.	
	-	Attraction of migratory fish to canal intake. Potential adverse effects on migratory fish of reduced velocities and flows in Sacramento River below intake.	Fish protective facility at canal intake. Reduced diversion of water into canal during May to minimize intake of striped bass eggs and larvae. For other operational measures to mitigate problems with the fishery see section on Project Facilities and Operation.
	+	Improved angler success for bass in lower Sacramento River below intake due to lower velocities.	
	-	Possible attraction of salmon and steelhead migrating upstream to Delta release facilities.	Make releases through Delta Cross Channel in lieu of canal releases to Mokelumne River system and reduce releases in southern Delta to minimum possible and still meet quality criteria for Delta agriculture. Possible alternative of making southern Delta releases via Delta-Mendota Canal to San Joaquin River in lieu of releases from Peripheral Canal.
	Δ	Possible increased predation due to increased fish concentrations in low velocity areas.	
	+	Flexibility of project operation to meet fishery needs vs. inflexibility of direct pumping via present facilities.	
	+	Increased food sources for fish.	
Endangered Species	Δ	Establishment of vegetation and protection of marshes may benefit.	
Recreation	+	Recreation along canal will relieve recreation pressure on Delta.	
	+	Improved water quality for recreation uses.	
Morrison Creek Drainage	+	Improved flood control downstream of Stone Lakes basin by accepting floodflows into canal.	
Transportation	Δ	Increased automobile traffic in Delta region due to increased recreation use along canal.	
	-	Navigation delays due to control structures in Old River and at times at the Delta Cross Channel.	Bypass canal and boat lock adjacent to Delta Cross Channel to permit boat traffic when gates closed. Also boat lock in Old River control structure if this structure is built.

Suisun Marsh[b/]

Category	Type	Impacts	Mitigation Measures Proposed
Salinity	-	Relatively small increase in duration and magnitude of salinity intrusion due to canal.	Possible use of tide gates and tidal pumping at Montezuma slough; pumping of high quality water to ponds during low tides; delivery of water via overland facilities. Alternative measures under study.
Wildlife Habitat	-	Reduced productivity of waterfowl habitat and food supply.	
	-	Reduction in habitat for puddle ducks.	
	+	Increase in diving duck habitat	
	+	Increase in shorebird and rail habitat.	
	+	Increase in habitat for 3 endangered species.	
Fishery	-	Decreases in number of freshwater species inhabiting sloughs.	Probably some shift from freshwater to saltwater species.

San Francisco Bay Complex

Category	Type	Impacts	Mitigation Measures Proposed
Suisun Bay	-	Some reduction in flushing of pollutants due to reduced Delta outflows with or without the Peripheral Canal.	No mitigation planned for San Francisco Bay Complex as part of Peripheral Canal Project. More stringent requirements on waste treatment and waste water discharge practices being imposed by SWRCB and EPA should remedy problems.
	Δ	Increased salinity. Population of marine zoobenthos should benefit while freshwater zoobenthos will be reduced.	
	Δ	Decline in fresh and brackish water zooplankton. Replaced by marine species.	
	+	Increased phytoplankton production of benefit to zooplankton species.	
	-	Reduced Neomysis habitat in dry and critical years.	May be offset due to improved habitat in Delta due to elimination of cross-Delta flows.
San Pablo Bay	Δ	Slightly increased salinity could improve production of zoobenthos, thereby benefiting diving ducks and shore birds. May also expand habitat of endangered Clapper Rail.	

State Water Project and Central Valley Project Export Areas

Category	Type	Impacts	Mitigation Measures Proposed
Export Water	+	Dependable water supply.	
	+	Improved export water quality.	
	+	Greater reuse capacity of water.	
	+	Less costly water treatment.	
	+	Consumer savings from less corrosive water.	
	+	Improved quality of ground water recharge.	
	+	Prevent agricultural losses due to water deficiencies and poor water quality.	
	+	Reduce salinity buildup.	
	+	Better quality waste water for reclamation.	
	+	Less agricultural drainage required.	

[b/] Adverse effects on Suisun Marsh will occur with or without the canal by the year 2020 due to the continued need for water in service areas to the south. This would be related more to the State Water Project and Central Valley Project rather than to the Peripheral Canal *per se*.

Northern California Water Sources[c/]

Category	Type	Impacts	Mitigation Measures Proposed
Sacramento Valley Surface Water Development, Upper Eel River Surface Water Development, Trinity River Surface Water Development	+	New reservoir fisheries.	
	+	New water supplies.	
	+	New recreation areas.	
	+	Hydroelectric power.	
	+	New jobs.	
	Δ	Increased tourism.	
	Δ	New flatwater surface areas.	
	Δ	Changing character and aesthetics of project sites.	
	-	Blockage of anadromous fish runs.	Mitigation will be developed as part of project planning. Construction of Peripheral Canal would reduce the amount of additional supply needed at the Delta by about 1.8 million acre-feet and delay the time such supplies are needed from 1980 to 1990 or later. Could use alternative sources of supply in service areas by waste water reclamation, desalination, etc.
	-	Inundation of land, streams, and archeological sites.	
	-	Displacement of people and wildlife.	

Related Projects

Category	Type	Impacts	Mitigation Measures Proposed
Kellogg Project	+	Improved quality of water from Delta and reduction of storage requirements.	
Hood-Clay Connection	+	Including capacity in Peripheral Canal would reduce adverse environmental effects of separate intake.	
Morrison Creek Flood Control Project	+	Canal reduces flowage easements required and flood peaks on downstream Delta channels.	
Interstate Highway 5	+	Using canal spoil for highway fill reduces amount of spoil disposal sites and effects of alternative highway borrow sites.	
San Luis Drain and San Joaquin Master Drain	+	Canal will reduce capacities required and quantities of drainage.	

[c/]Additional water sources will be needed at the Delta with or without the Peripheral Canal.

GROWTH-INDUCING IMPACTS OF THE PROPOSED PERIPHERAL CANAL

The growth-inducing impacts of the Peripheral Canal were evaluated by estimating changes in employment over the time period 1980-2020, attributable to the existence and operation of the canal. These changes are expected to be brought about in the export service areas by a better assurance of delivery water in dry years and a higher quality water in all years. Growth would also be induced by an increase in recreation facilities and services in the immediate vicinity of the canal and in the adjacent Delta areas.

Changes in quantity and quality of water may be expected to cause changes as diagramed below:

Increased water quality + quantity → Increased agricultural + industrial productivity → Increased employment → Increased net in-migration → Increased population

The increases in employment attributable to the water supply and recreation functions of the project have been estimated over time and are shown in Table 4.

Table 4

EMPLOYMENT GROWTH INDUCED BY PERIPHERAL CANAL
(Number of New Jobs Attributed to the Peripheral Canal)

	1980	1990	2000	2020
Immediate Vicinity[a] and Delta	120	1,100	2,300	3,300
San Joaquin Valley[b]	0	5,900	6,800	8,500
Central Coastal[b]	0	150	180	220
San Francisco Bay[b]	0	1,100	1,300	1,700
Southern California[b]	0	1,700	2,000	2,600
Total Growth	120	10,000	12,600	16,300

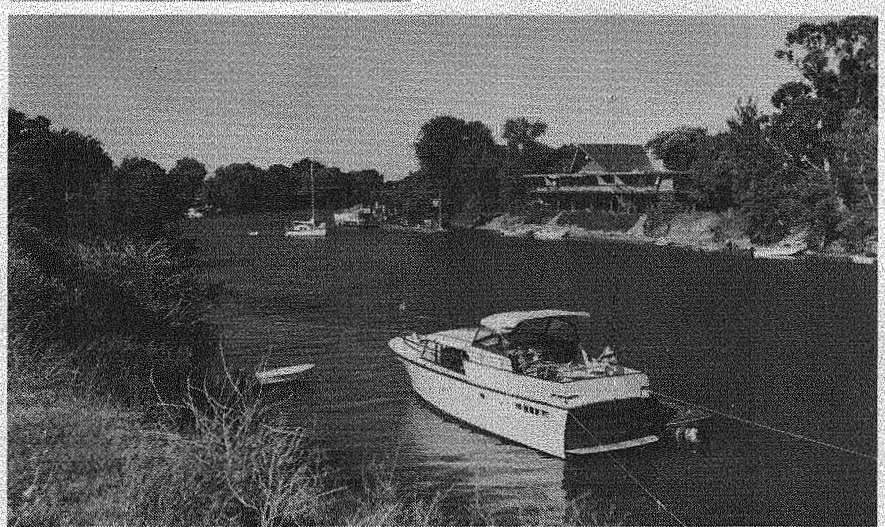
a/ Primarily recreation oriented.
b/ Primarily water oriented.

Increased employment always generates in-migration and vice versa. Increases in the 5 geographical areas were determined by multiplying the current average population per employed member of the labor force (2.46), by the predicted changes in employment. The total population growth attributable to the canal in the 5 areas will be roughly 24,600 by 1990, 30,100 by 2000, and 40,100 by 2020. San Joaquin Valley will absorb about half of this growth.

In summary, the chief water-supply-related impacts (growth inducing) will occur in the San Joaquin Valley due to the improvements in the reliability and quality of water available for agricultural use. Lesser indirect impacts will occur in southern California and the San Francisco Bay Area. The impact on the central coast and the Delta and canal area will be negligible. Increases in recreation related employment will, in contrast, be confined to the immediate vicinity of the canal.

* * * * * * *

Boating is a popular activity on many of the 700 miles of meandering waterways.



ALTERNATIVES TO THE PROPOSED ACTION

Over the years, three major water agencies have studied the Delta -- the Department of Water Resources, the U. S. Bureau of Reclamation, and the U. S. Army Corps of Engineers. To coordinate their efforts and develop a mutually acceptable plan for the Delta, the Interagency Delta Committee (IDC) was formed in 1961. In its final 1965 report recommending the Peripheral Canal, the committee classified the numerous Delta plans into four basic concepts for comparison -- Hydraulic Barrier, Physical Barrier, Delta Waterway Control Plan and Peripheral Canal Plan. Since that time, the additional concepts of State-Only Gravity Canal and Modified Folsom-South Canal have been studied as Delta alternatives.

The following engineering plans for the Delta alternatives describe the optimum projects that could be developed within the framework of each of these concepts.

State-Only Gravity Canal

This concept involves the modification of the first stage Peripheral Canal operation to meet export requirements of only the SWP. Most of the SWP export water would be conveyed around the Delta in the gravity canal, while the CVP export water would continue to be transferred through existing Delta channels. In the event that Sacramento River flow was insufficient to produce the gravity flow required to meet SWP export demands, the balance would be diverted directly from the southern Delta. Releases from the canal to the Delta would be limited to the replacement of supplies severed by the canal. Water for the remaining uses within the Delta and control of salinity intrusion would also continue to be met through existing Delta channels as it is now.

The capital costs are currently estimated at $203 million, exclusive of recreation and wildlife development. Corresponding annual costs are estimated at $1.9 million.

Waterway Control Plan

With this concept, good quality water would be diverted from the Sacramento River at Walnut Grove. It would be conveyed southward to SWP and CVP export pumps through existing Delta channels, using physical structures to maintain hydraulic separation of Delta tidal waters from transfer waters. Controlled releases through channel closures would be made for local water requirements, water quality control and for fish. A controlled freshwater outflow would protect the central Delta from salinity

intrusion, and an overland water distribution system would serve the western Delta. Fish protective facilities and flexibility of project operations to meet fishery requirements are part of this concept.

Total capital costs are currently estimated at $136 million, and annual costs at $3.7 million.

Modified Folsom-South Canal

This concept involves the construction of physical works within Delta channels to provide hydraulic control of water transferred through existing channels for local and export use. It also involves pumping Sacramento River water into the Folsom-South Canal via an enlarged Hood-Clay connection and releasing this water into southeastern Delta tributaries for water quality purposes. The concept would involve the enlargement of portions of the Folsom-South Canal, improvement of certain Delta channels, closure of certain Delta channels, and a siphon to convey the Mokelumne River under the San Joaquin River.

Such a project would be operated primarily to meet objectives for water quality in the central and southern Delta and positive downstream flow in the San Joaquin River. Overland supplies would be provided in the western Delta. As proposed by the now defunct Delta water Agency, export diversions would be limited to 6,500 cfs. This is much less than required to meet contracted commitments of the SWP and CVP. The concept incorporates no special provisions for fish or recreation other than restoring of positive downstream flow in some channels.

The costs would probably be similar to those of the Waterway Control Plan.

Physical Barrier Plan

This concept would require construction of a physical barrier to restrict commingling of fresh waters of the Delta with the saline waters of San Francisco Bay. It would also permit pumping for local water supply and export requirements from the freshwater pool formed by the barrier.

There are numerous variations of this plan, but only the Chipps Island Barrier, the most feasible, is presented here for comparison purposes. This barrier would be across the Sacramento River, about 4 miles below the confluence with the San Joaquin River.

As proposed by the Corps of Engineers and IDC, the barrier would not require releases to repel saltwater intrusion from the Delta. Export water would be conveyed in existing channels and the influence of tidal action would be excluded by the barrier. Because of the freshwater pool, a supply of fresh water for agriculture, municipal and industrial purposes would be available within the Delta channels. No changes in present methods of water application or distribution within the Delta would be required.

A fish ladder, fish screen and curtailed pumping during bass spawning would be part of this concept.

Capital costs are estimated at $413 million, and annual costs at $4.5 million.

Hydraulic Barrier/No Project

The present Delta operation of the SWP and CVP employs the concept of a hydraulic barrier. This concept requires no new physical works in the Delta and, therefore, also represents the "No Project" alternative.

The concept involves repulsion of ocean salinity by release of water from upstream storage reservoirs to provide a continuous freshwater outflow to San Francisco Bay. Water would be conveyed to the pumping plants through existing Delta channels. This is the present method of operation in the Delta.

The project would not involve any direct costs for Delta facilities. However, future modifications to existing facilities to compensate for increased pumping and the additional upstream reservoir storage required to protect water quality, if fully contracted and authorized water supplies in the export service areas are to be met under this operation, would constitute additional costs and possible environmental impacts.

Comparison on Delta Alternatives

The following is a comparison of the effects of each of the Delta alternatives and the proposed Peripheral Canal on various individual parameters. The ranking was based on consensus of a number of engineers and biologists from the Departments of Water Resources and Fish and Game, who independently ranked each impact.

TABLE 5
COMPARISON OF DELTA ALTERNATIVES TO THE PROPOSED ACTION

IMPACT RANKING

A – BEST
B –
C –
D – LEAST
} ACCEPTABLE IMPACT

E – ACCEPTABILITY QUESTIONABLE
F – UNACCEPTABLE IMPACT
U – RELATIVE NET EFFECT UNKNOWN

Impact Parameters	Peripheral Canal	State-only Gravity Canal	Waterway Control	Modified Folsom-South	Physical Barrier	Hyd. Barrier-No Project
Export Water Supply	B	B	B	E	A	D
Export Water Quality	A	B	A	B	C	D
Local Water Quality	C	C	B	B	A	C
Water Levels	A	B	B	B	C	B
Seepage	B	A	A	A	A	A
Delta Flood Control	A	A	A	B	A	B
Channel Scour (Delta)	A	B	A	B	A	C
Navigation (Delta)	A	A	D	B	C	A
Transportation (Delta)	C	C	A	B	C	C
Land Out of Production (Delta)	C	C	B	B	A	A
Recreation	A	B	C	C	C	C
Fish						
General Factors						
1. Salinity Gradient and Dissolved Oxygen	A	B	C	C	E	B
2. Food Supply	A	C	B	C	E	D
Striped Bass						
1. Sacramento River	A	B	B	D	C	C
2. San Joaquin River	A	C	A	B	C	D
3. Nursery Area	A	C	B	C	F	D
Sacramento Salmon						
1. Upstream Migrants	B	A	B	E	C	A
2. Downstream Migrants	A	A	A	B	E	C
San Joaquin Salmon						
1. Upstream Migrants	A	D	B	C	F	E
2. Downstream Migrants	A	C	A	C	E	D
Mokelumne Salmon	A	C	C	C	E	D
Shad	U	U	U	U	D	U
Sturgeon	U	U	U	U	U	U
Resident Game Fish						
1. Dead-end Sloughs	A	B	C	C	D	C
2. Main Delta Channels	A	C	B	B	C	C
Non-Game Fish	A	C	C	B	E	C
Suisun Marsh Fish	A	A	A	A	A	A
Bay Fish	A	A	A	A	A	A
Wildlife						
Delta	A	A	B	C	C	C
Suisun Marsh	C	C	C	C	A	B
Turbidity	B	B	B	A	D	B
Water Temperature	B	A	B	A	C	A
Bay Circulation and Dispersion	B	B	B	B	C	A
Energy Requirement	B	A	A	C	A	A

Alternative Water Supply Sources Outside the Delta

Several alternatives outside the Delta conceivably could firm up water supply in the export service areas. These include: (1) northern California storage reservoirs in the Sacramento River Basin and north coast area; (2) increased diversion from the Delta during periods of high flow to off-stream storage reservoirs on the west side of the San Joaquin Valley; (3) waste water reclamation; (4) sea water conversion; and (5) desalination of geothermal brines. None of these, however, are considered true alternatives to the Peripheral Canal because they cannot improve the Delta environment by redistribution of flows within the Delta. They would simply constitute additional variations of the Hydraulic Barrier because the SWP and CVP would continue to divert water from the southern Delta, using existing channels for conveyance and regulating Delta outflow to control salinity intrusion.

While all of the alternatives outside the Delta are potential sources for meeting some of the future water demands in California, none of these are practical alternatives for the firmed-up water supply needed by 1980. It would take 12 years to complete the first unit of the northern California storage reservoirs. The offstream storage reservoirs could not be completed by 1980 and, without extensive enlargements of existing conveyance facilities, could not develop the needed yield. The greatest potential for waste water reclamation is in the coastal metropolitan areas, but its use is presently limited to nondomestic uses; therefore, more extensive conveyance systems would be required making early completion improbable. The technology required for large-scale production of usable water by sea water conversion and desalination of geothermal brine is still in the development stage; thus, these alternatives could not be completed in time to meet the 1980 water supply needs. The effective unit cost of the incremental water supply developed by these alternatives would be from 6 to 15 times higher than with the Peripheral Canal.

Environmental conditions in the Delta under each of the alternative sources would be essentially the same as shown for the Hydraulic Barrier in Table 5 because SWP and CVP would continue to divert water from the Delta. In addition, there would be direct environmental effects in the project areas outside the Delta. Some of the principal effects that could be expected are listed in Table 6.

TABLE 6
EFFECTS OF ALTERNATIVE WATER SUPPLY SOURCES OUTSIDE OF THE DELTA

	Northern California Storage Reservoirs	Offstream Storage Reservoirs	Wastewater Reclamation	Sea Water Conversion	Geothermal Brine Desalination
Delta environment and ecology would be essentially the same as for Hydraulic Barrier (see Table 5)	X	X	X	X	X
Cannot be completed by 1980, resulting in possible water shortage in project service areas	X	X	X	X	X
Inundation of land, streams, and possibly archaeological sites	X	X			
Additional land required for conveyance facilities and other features	X	X	X	X	X
Displacement of people and wildlife	X	X	X	X	X
Change in character and aesthetics of project sites	X	X	X	X	X
Blockage of anadromous fish runs	X				
New reservoir fisheries	X	X			
New flat water surface areas	X	X			
New recreation areas	X	X			
Improved flood control	X				
New hydroelectric power	X				
Uses large amount of electrical energy				X	
Reduces need for surface water development and effects thereof			X	X	X
Reduces discharge of wastes into ocean and San Francisco Bay			X		
Requires disposal of brine				X	X
Requires disposal of hot water effluent				X	
Development of advanced technology required				X	X

Conclusions

The Peripheral Canal is not perfect in all respects and each of the alternatives is possibly superior in some respects. However, it is concluded that the Peripheral Canal does have the greatest potential for obtaining desired environmental conditions in the Delta and the least interference with established and projected activities in the Delta, while meeting the water needs in the export service areas of SWP and CVP. It would reduce the amount of future additional northern California surface water needed at the Delta by about 1.8 million acre-feet per year during a critical period and delay the time such supplies would be needed from 1980 to 1990 or later. If instead, alternative sources south or west of the Delta were developed, the canal would reduce the amount needed by from 800,000 to 1,000,000 acre-feet per year and provide more time to develop technology. Taken as a whole, it comes closest to meeting the most important environmental needs at this time.

* * * * * * *

Blending of agricultural land patterns, native vegetation, and Delta waterways just west of Peripheral Canal alignment.

ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Local Vicinity

- Loss of 37,000 tons of agricultural production annually.
- Loss of $1,800,000 tax base.
- Permanent loss of 2,600 acres of existing wildlife habitat used by 191 species of birds, 36 species of mammals, 19 species of reptiles, and 8 species of amphibians. (Offsetting benefits are expected by the wildlife areas provided as part of the Canal.)
- Unknown amount of seepage; will be monitored.
- Seven existing archaeological sites destroyed after preservation of samples.
- Access by boat from Delta to small portions of several minor eastside sloughs blocked.
- Extra travel distance by some boaters via relocated channels (depends on point of origin and destination).
- Impairment of various sloughs during construction.
- Extra travel and inconvenience for some property owners with blocked-off roads.
- Without strict enforcement of zoning laws, potential for residential and commercial development of land between freeway and Peripheral Canal.

Sacramento-San Joaquin Delta Region

- Loss of anadromous fish at fish protective facility.
- Minor increased water elevations in the Mokelumne River floodplain east of the canal, due to floodflow backwater effects upstream from the Mokelumne River siphon.
- Possible attraction of some Sacramento River salmon to release sites in southern Delta.
- Some loss of suspended sediment transport by settling out in canal.
- Time delay in navigation through boat locks in Old River and possibly the Delta Cross Channel.

Suisun Marsh

- Increased duration and extent of salinity intrusion with or without Peripheral Canal, with slightly greater increase with the canal.

San Francisco Bay Complex

- Some reduction in the flushing of pollutants from Suisun Bay and slight reduction in San Pablo Bay.
- Reduced Neomysis habitat in dry and critical years.

IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD OCCUR IF THE PERIPHERAL CANAL IS IMPLEMENTED

The following irreversible environmental changes and commitments will result from construction of the Peripheral Canal.

1. Changes in land use along canal alignment.

2. Channel relocations.

3. Distribution of water into intercepted sloughs.

4. Removal of archaeological areas.

5. Expenditure of irretrievable capital funds, construction materials and labor.

If ongoing studies reveal compelling reasons for discontinuing use of the canal for its intended purposes, such a solution would be possible. Under this condition, only enough water would be diverted at Hood to maintain circulation and to supply water to intersected sloughs. In time, the canal would become similar to existing sloughs. Land would be lost to agriculture, but not fish, wildlife and recreation use. It must be recognized, however, that such a decision would be very difficult to make in view of the $286 million in irretrievable expenses it would represent.

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Short-term uses of man's environment would occur primarily during or for a short time after the construction period and would occur in the project area. Such uses will typically be disruptive or destructive to the man-made and natural environment. The results would include destruction of wildlife habitat and aesthetics, temporary disruption of road and utility uses, temporary closure of irrigation and drainage facilities, delays in navigation, etc.

The Peripheral Canal would be capable of transporting water for its intended purposes indefinitely if properly maintained. It is, therefore, considered a source of long-term productivity.

Long-term productivity of Delta agriculture and fish resources would be aided by correcting existing problems due to export pumping from the southern Delta. Flexibility of Delta operation and its release facilities will also aid Delta productivity.

The long-term capacity of the local vicinity to generate recreation opportunities will be enhanced. Recreation use will also spur employment and population growth in the local vicinity. The design of canal fishery habitat, coupled with proper management, would assure the long-term productivity of a warmwater fishery. In both the local vicinity and the surrounding Delta region, haphazard residential and commercial developments could have a long-term adverse effect on wildlife productivity if such developments are not controlled by the counties. Removal of land from agricultural production will reduce the long-term agricultural productivity of the local vicinity.

The canal capability to provide good quality water will help assure long-term productivity of the industrial area served by the Contra Costa County Water District.

Improved reliability and quality of water deliveries will help assure the long-term productivity of agricultural areas in the San Joaquin Valley and central coastal service areas.

The good quality of water provided to the South San Francisco Bay and southern California will enhance the long-term productivity of local water sources in those areas. It will provide a dependable water supply to support the activities of several million people in those areas.

STATEMENT OF INTENT

It is the intent of the California Department of Water Resources and the California Department of Fish and Game to:

I. Develop and enter into a mutually acceptable agreement, prior to the start of construction of the Peripheral Canal, defining water management objectives for the operation of the State Water Project and the Peripheral Canal in relation to the management of fish and wildlife resources in the Sacramento-San Joaquin Delta (Water Code Section 12220) and Estuary. The agreement will include: (1) the initial water management terms and criteria appropriate for achieving the goals and objectives listed in A and B below; (2) procedures for implementing the initial terms and criteria; (3) an appropriate program to evaluate the terms and criteria including environmental monitoring and studies and the modification of water operations for evaluation purposes; and (4) provisions for renegotiating terms and criteria consistent with the results of said evaluation and the goals.

A. Goals - Manage water in the Sacramento-San Joaquin Delta and Estuary to:

1. Maintain fish and wildlife resource at present levels.

2. Increase these resource values above these levels, to the extent compatible with other project purposes.

Present levels of fish and wildlife resource values are defined as the mean levels existing in the Delta Estuary from 1922 to 1970, as determined by the best information which is or may become available. Present levels as here defined are not to be construed as establishing a base condition for determination of enhancement.

B. Objectives -

1. Provide suitable water conditions for striped bass spawning and the survival of their young, including an ample food supply, to the extent that such measures are necessary to maintain the stock of adult striped bass.

2. Provide suitable water conditions for the upstream and downstream migration of King salmon, steelhead, sturgeon, striped bass and American shad through the Sacramento-San Joaquin Delta and Estuary.

3. Retain the Suisun Marsh as a brackish water marsh capable of supporting alkali bulrush and other important waterfowl food plants which are present.

4. Prevent loss of fish from the Delta in project diversions to the extent necessary to maintain stocks of adult fish using the Delta and Estuary.

5. Attain dissolved oxygen concentrations satisfactory for fish.

6. Provide net water velocities in the Delta channels of a magnitude suitable for food production for resident and migratory game fish.

7. Manage the Peripheral Canal and its right-of-way; (1) to develop fish and wildlife resources and (2) to provide for recreational use by the general public, both compatible with other objectives.

The obligations under these goals and objectives (1) are limited to the extent that the State Water Project operation in the Delta and Estuary affect fish and wildlife resources, and (2) must be consistent with state and federal law.

II. Select, prior to the start of Peripheral Canal construction, a fish screen system and operation measures, sufficient to limit the diversion of fish into the Peripheral Canal to the extent necessary to meet Objective I-B-4.

III. Complete construction of a fish screen system coincident with the initiation of canal operation. In the event of unavoidable delays in screen construction, water for export will be diverted into the canal only in years when agricultural water users of the CVP and/or the SWP are taking a deficiency in planned deliveries. In such cases (1) the maximum percentage of the Sacramento River flow taken into the canal for export will be no greater than the percentage deficiency taken by these agricultural water users, and (2) no diversions for export will be made into the canal from April 1 through June 15, unless in the opinion of the Department of Fish and Game, striped bass spawning and the spring downstream salmon migration are essentially completed prior to June 15.

/s/ G. Ray Arnett
G. Ray Arnett, Director
Department of Fish and Game

Date July 2, 1974

/s/ John R. Teerink
John R. Teerink, Director
Department of Water Resources

Date June 27, 1974