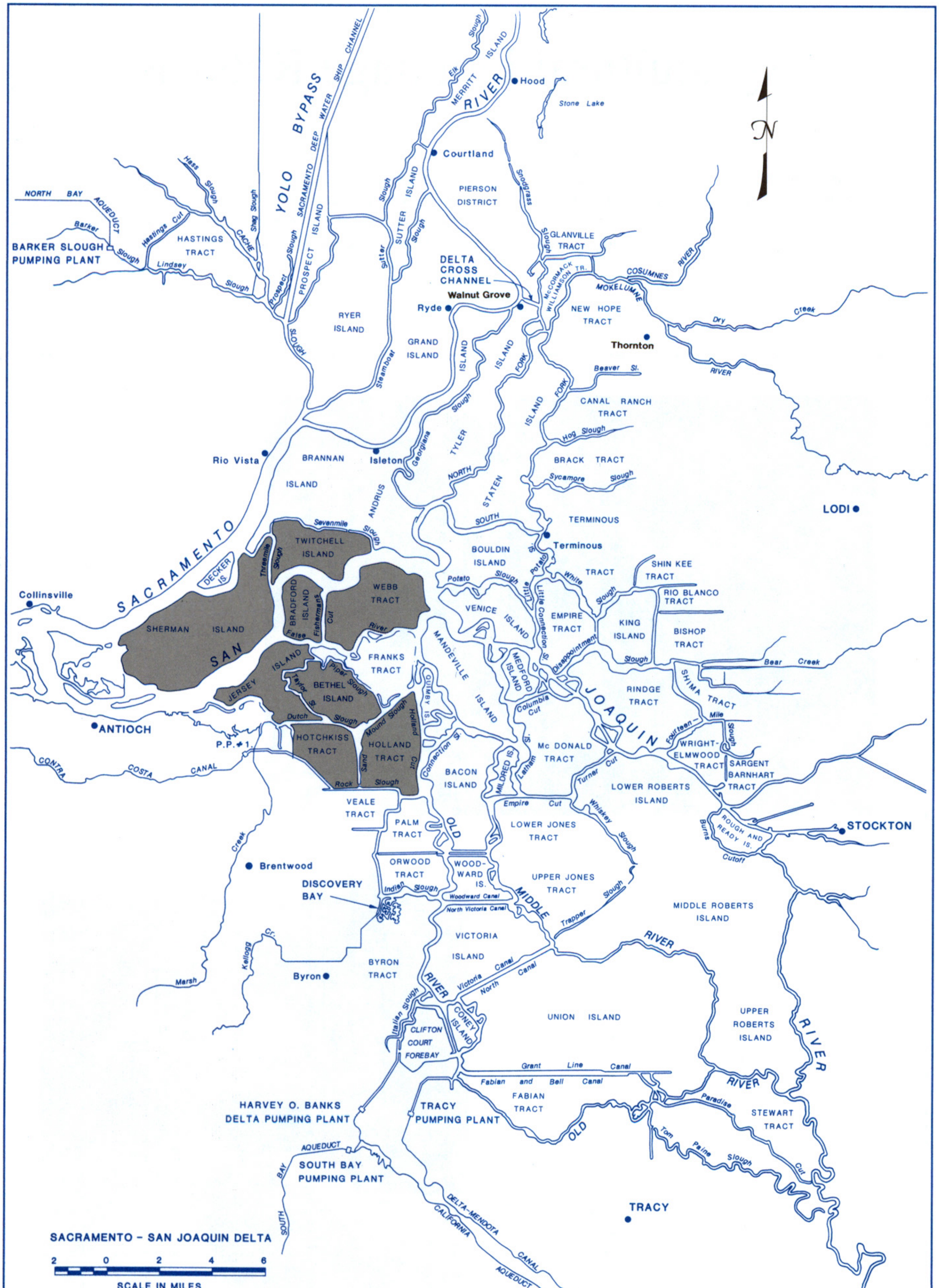
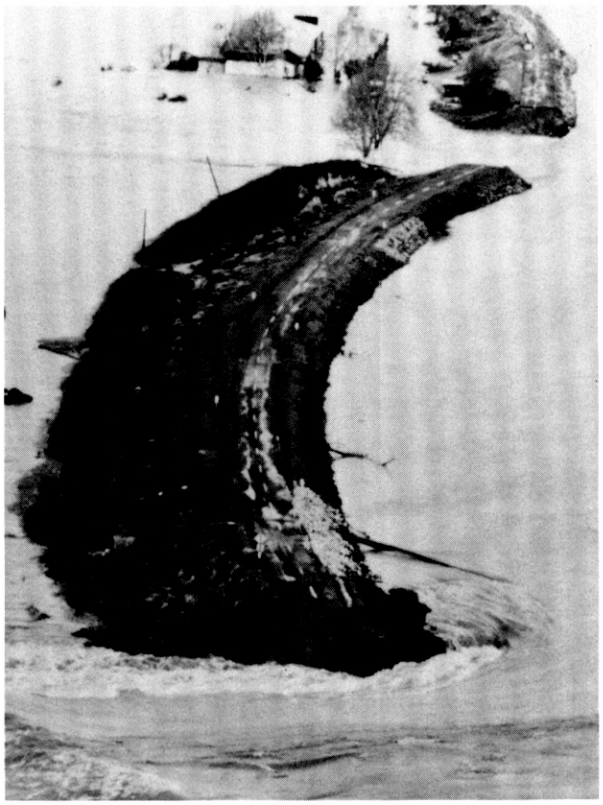


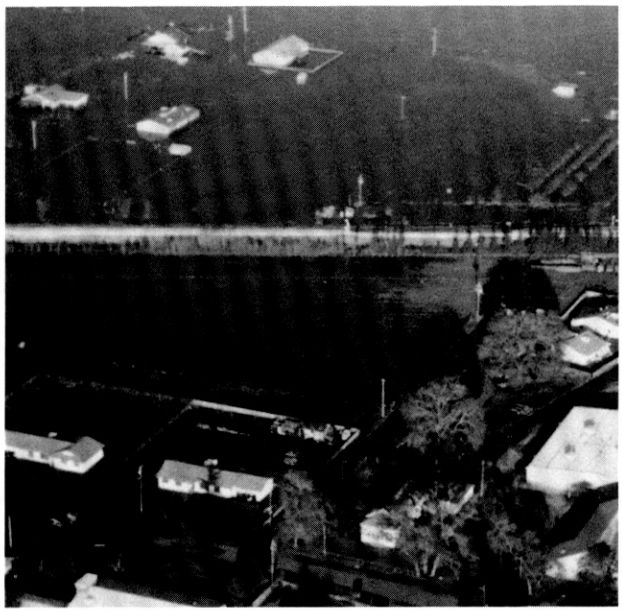
Delta Levee Programs

Delta Levee Programs

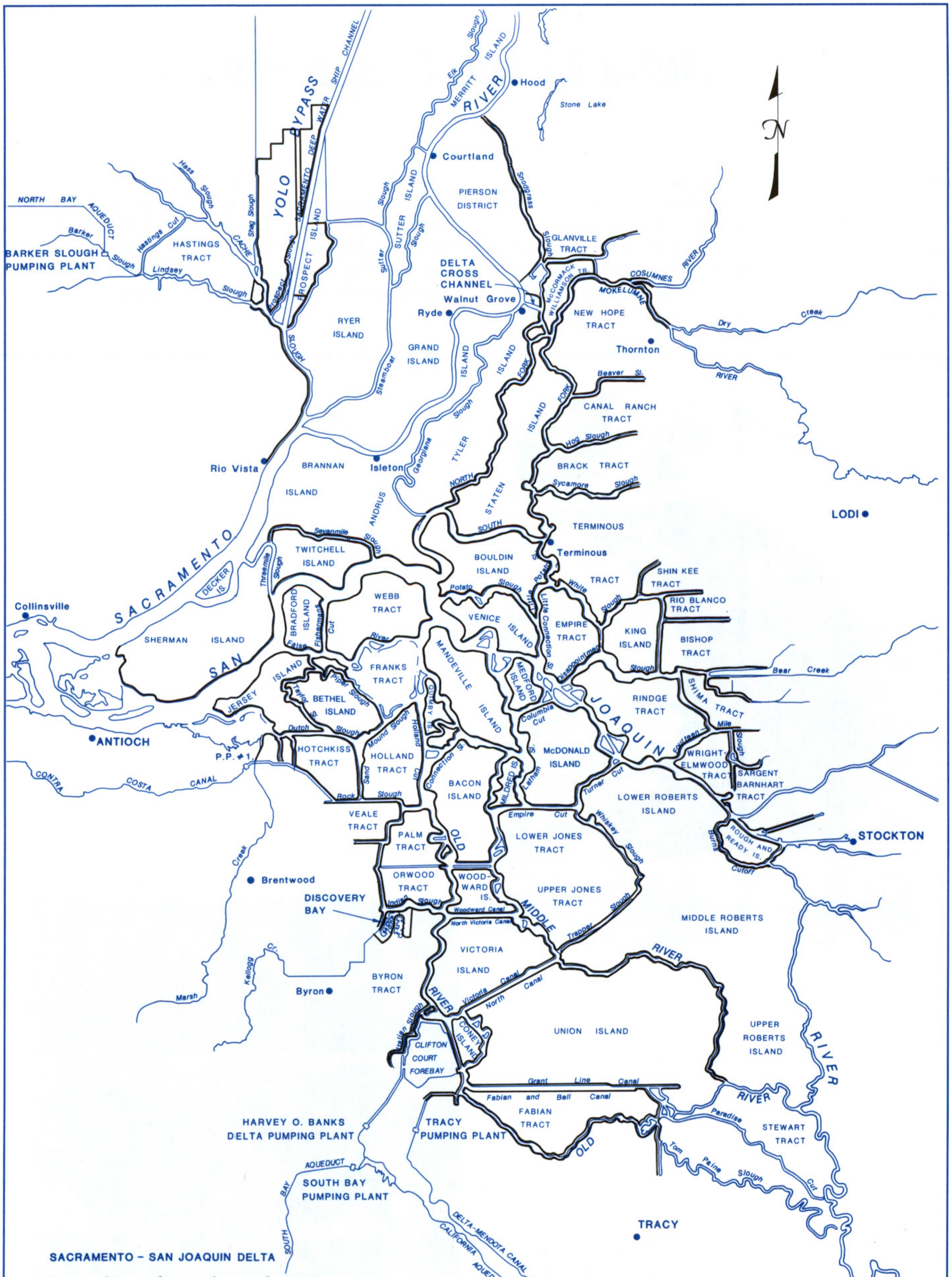
As a result of the serious flooding problems in 1986, the State Legislature passed the Delta Flood Protection Act of 1988 (SB 34). A portion of the Act provides for financial assistance for the communities of Walnut Grove and Thornton, and the eight islands of the west Delta shown on the adjacent map. These islands are critical to protecting Delta water quality because they are adjacent to major Delta channels in the area where fresh and salt waters mix. The Act also significantly increased monetary assistance to districts charged with the maintenance of local Delta levees via the Delta Levees Maintenance Subvention Program. In 1991, Senate Bill 1065 went into effect to assure that these flood protection activities result in no net loss of fish or wildlife habitat and to provide $3 million to mitigate past impacts.



1986 flooding of Tyler Island in the northern part of the Delta.



1986 flooding of the town of Thornton adjacent to the South Fork Mokelumne River.

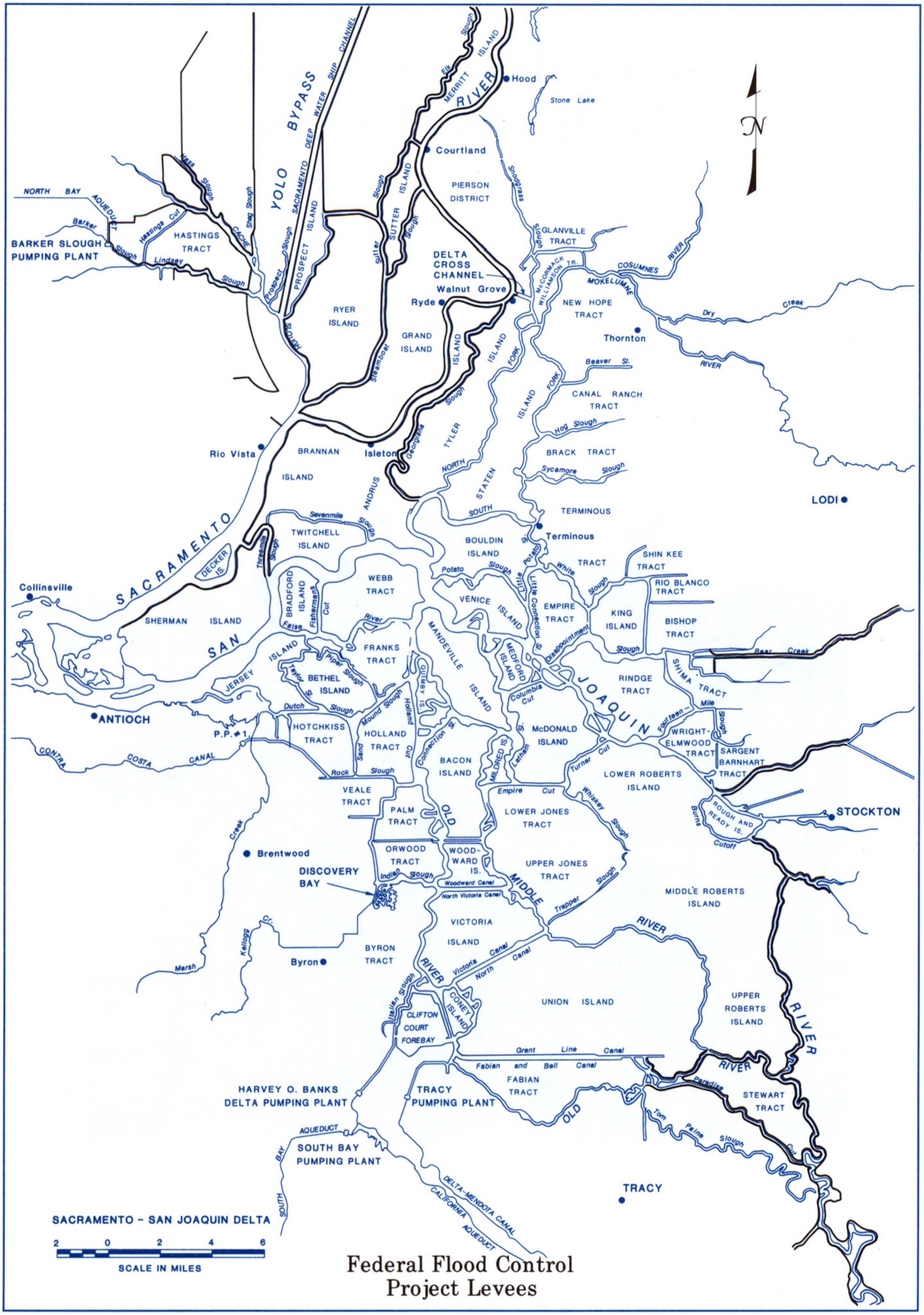


Local Flood Control Nonproject Levees

Local Flood Control Nonproject Levees

Most of the Delta lowlands are protected by nonproject levees as shown on the map at left. "Nonproject" distinguishes these levees from those that are part of federal flood control projects (see the following section). Improvement and maintenance of nonproject levees is very challenging because of poor foundations and regulations to protect levee wildlife habitat. Local districts responsible for maintaining these levees are reimbursed for a portion of the costs under the Delta Levees Subvention Program established in 1973. The Delta Flood Protection Act of 1988 significantly increased reimbursement opportunities but also added a major environmental mandate to ensure no net long-term loss of habitat. The boundaries of these maintenance districts are shown on the map on page 44.

Eroded nonproject levee protecting hundreds of acres of agricultural land and wildlife habitat.

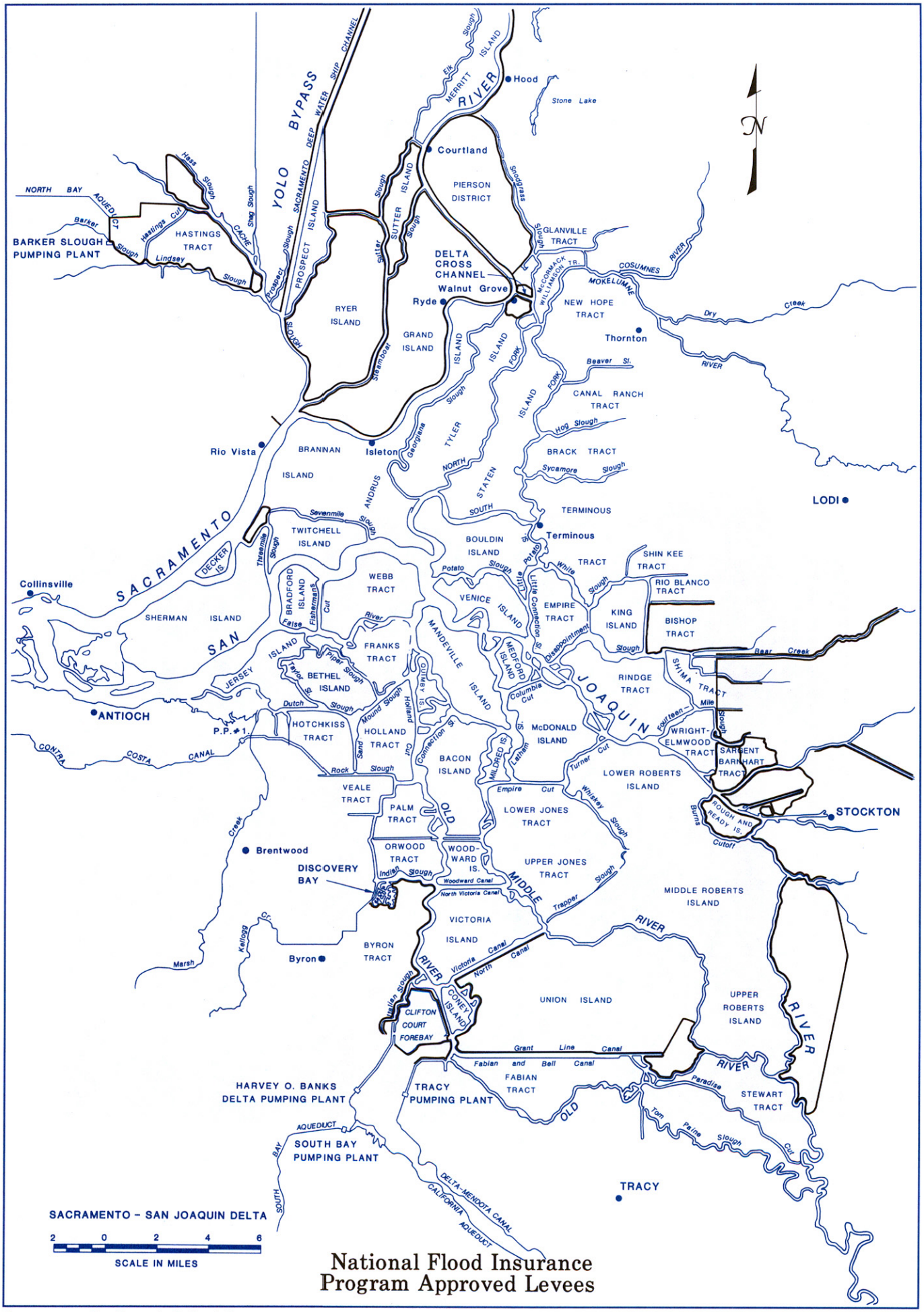


Federal Flood Control Project Levees

Federal Flood Control Project Levees

In 1880, the State Engineer designed a flood control plan for the Sacramento Valley. This plan included a system of levees and bypasses for transporting floodwaters away from protected areas. In 1917 Congress authorized the Sacramento Flood Control Project, which was completed by the U. S. Army Corps of Engineers in 1960. Storage reservoirs and similar protective measures have been provided on the San Joaquin River. As shown on the map at left, these systems, denoted "project levees" to distinguish them from other levees, provide effective flood control for a portion of the Delta.

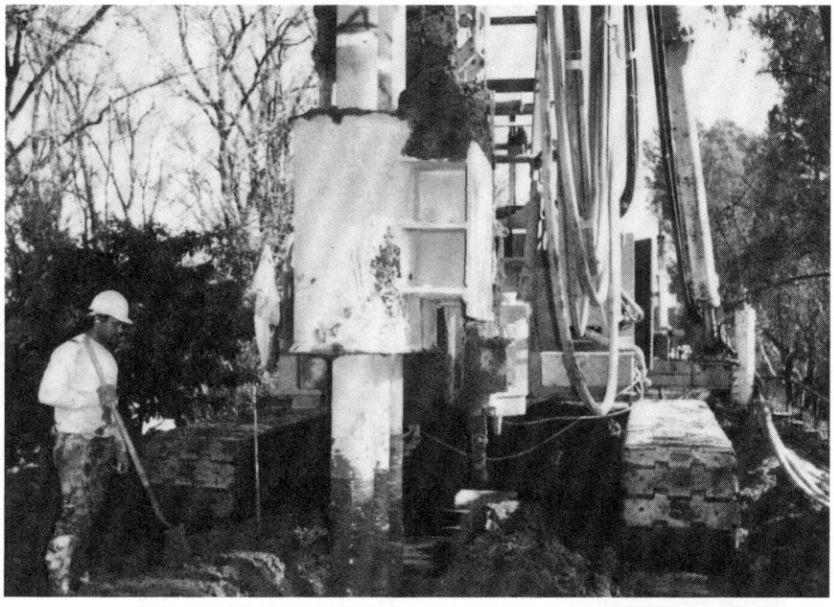
Experimental levee maintenance programs are being conducted at various locations in the Delta to determine better ways to protect the environment while maintaining proper safety for flood control. This photo shows a project to develop a berm that will provide for environmentally important shaded aquatic habitat.


SACRAMENTO – SAN JOAQUIN DELTA
2 0 2 4 6
SCALE IN MILES
National Flood Insurance Program Approved Levees
N
BARKER SLOUGH PUMPING PLANT
NORTH BAY AQUEDUCT
HASTINGS TRACT
YOLO BYPASS
SACRAMENTO DEEP WATER SHIP CHANNEL
PROSPECT ISLAND
RYER ISLAND
GRAND ISLAND
SUTTER ISLAND
MERRITT ISLAND
Hood
Courtland
PIERSON DISTRICT
Stone Lake
GLANVILLE TRACT
DELTA CROSS CHANNEL
Walnut Grove
Ryde
McCORMACK WILLIAMSON TR.
COSUMNES RIVER
MOKELUMNE RIVER
NEW HOPE TRACT
Thornton
Dry Creek
CANAL RANCH TRACT
BRACK TRACT
Rio Vista
BRANNAN ISLAND
Isleton
TERMINOUS
Terminous
LODI
TWITCHELL ISLAND
BOULDIN ISLAND
SHIN KEE TRACT
RIO BLANCO TRACT
BISHOP TRACT
Collinsville
SHERMAN ISLAND
WEBB TRACT
VENICE ISLAND
EMPIRE TRACT
KING ISLAND
FRANKS TRACT
MANDEVILLE ISLAND
MEDFORD ISLAND
RINDGE TRACT
SHIMA TRACT
BETHEL ISLAND
ANTIOCH
P.P.#1
HOTCHKISS TRACT
HOLLAND TRACT
McDONALD ISLAND
WRIGHT-ELMWOOD TRACT
SARGENT BARNHART TRACT
CONTRA COSTA CANAL
BACON ISLAND
LOWER ROBERTS ISLAND
VEALE TRACT
PALM TRACT
LOWER JONES TRACT
STOCKTON
ROUGH AND READY IS.
Brentwood
ORWOOD TRACT
WOODWARD IS.
DISCOVERY BAY
UPPER JONES TRACT
MIDDLE ROBERTS ISLAND
VICTORIA ISLAND
BYRON TRACT
Byron
UNION ISLAND
CLIFTON COURT FOREBAY
CONEY ISLAND
UPPER ROBERTS ISLAND
HARVEY O. BANKS DELTA PUMPING PLANT
TRACY PUMPING PLANT
FABIAN TRACT
STEWART TRACT
SOUTH BAY PUMPING PLANT
TRACY
DELTA-MENDOTA CANAL
CALIFORNIA AQUEDUCT

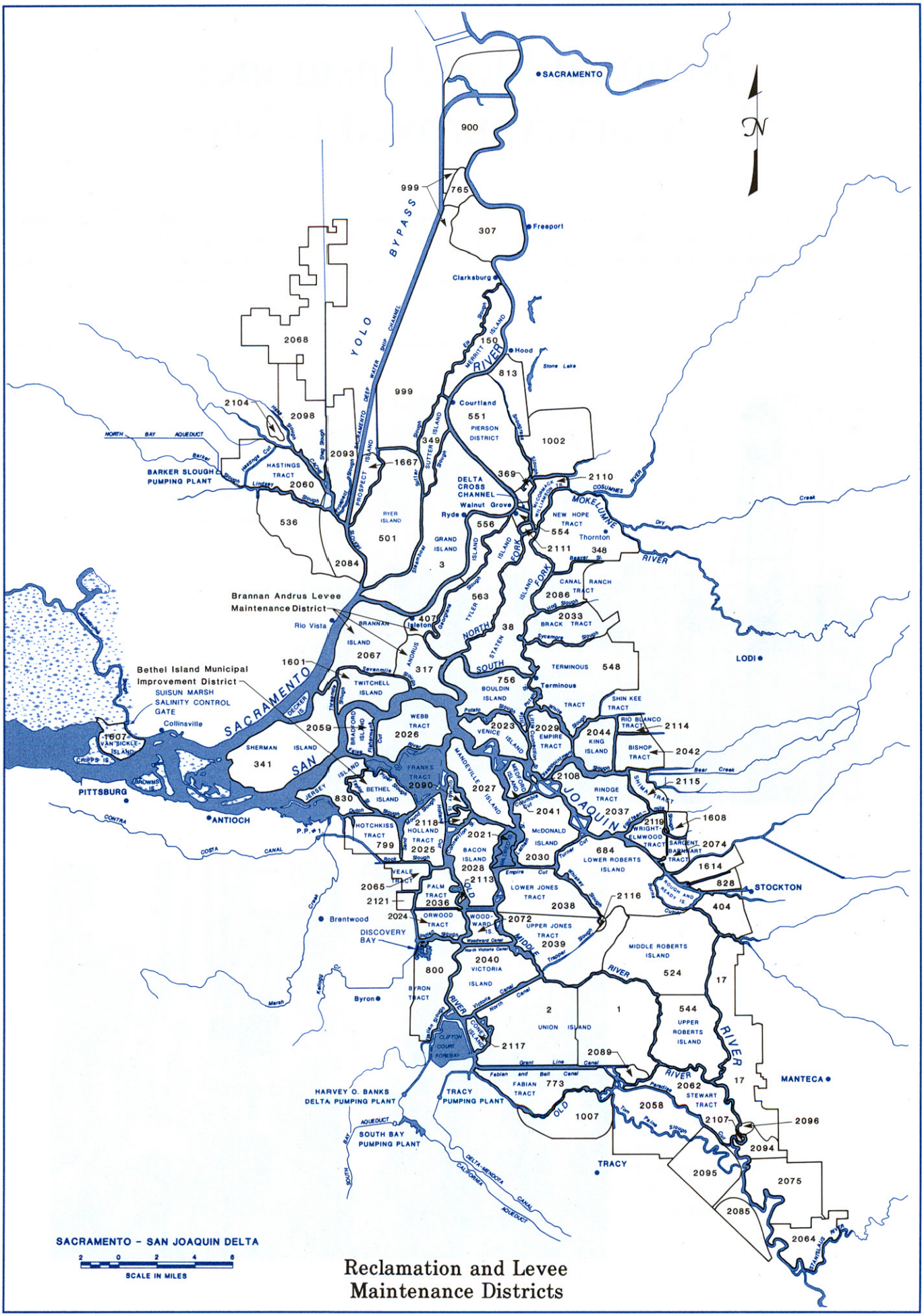
National Flood Insurance Program Approved Levees

Some levee systems within the Delta are certified to meet the minimum requirements for providing 100-year flood protection. This certification entitles property owners within the area protected by the levee system to purchase flood insurance at reduced rates through the National Flood Insurance Program. The community of Walnut Grove, which was threatened by the flooding on Tyler Island in 1986, is now surrounded by an improved levee system which was recently certified by the NFIP.

The town of Ryde is one of many communities protected from flooding by project levees.



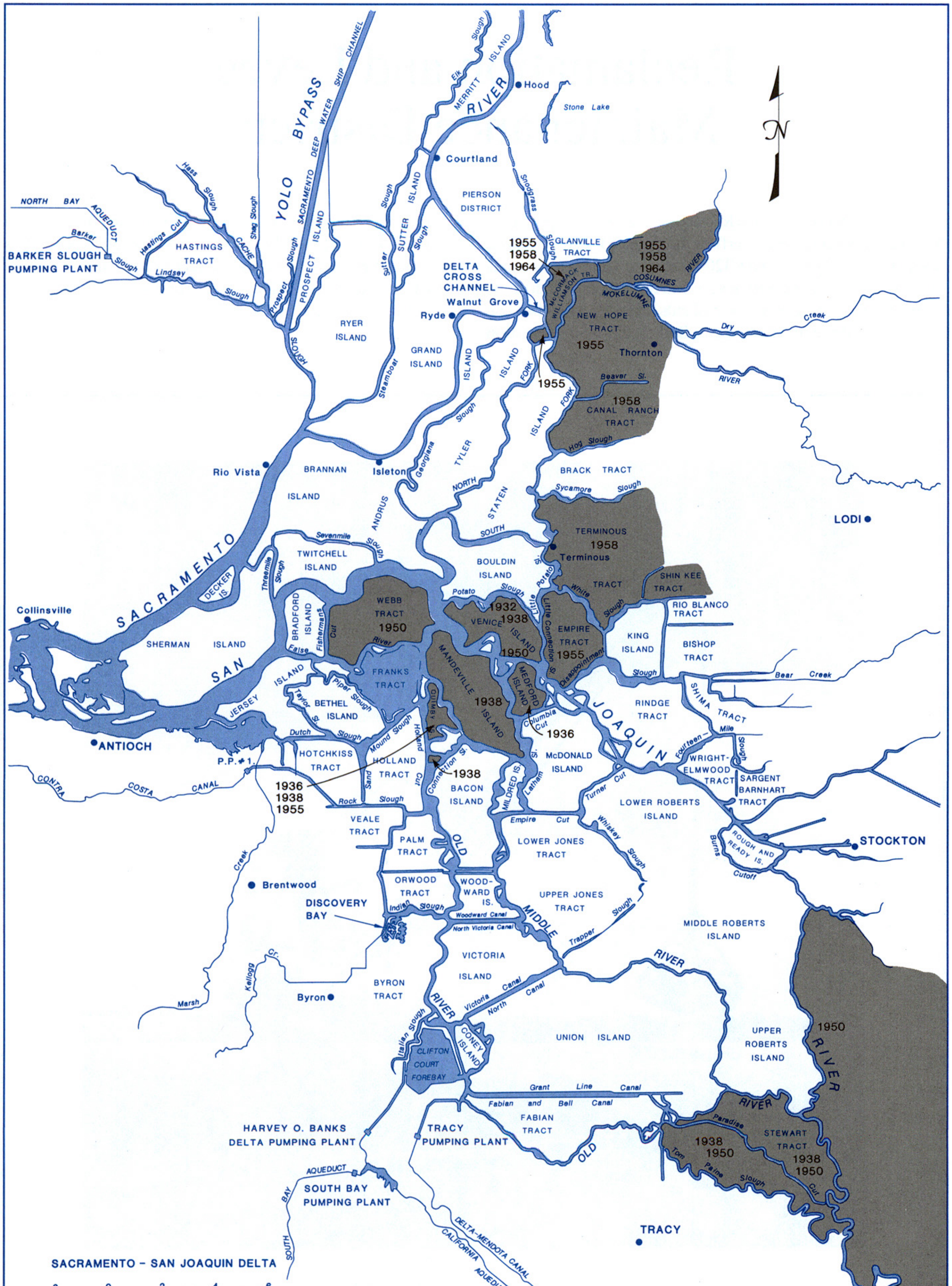
The U.S. Army Corps of Engineers working to increase the strength of project levees along the Sacramento River.


SACRAMENTO
Freeport
Clarksburg
Hood
Courtland
Walnut Grove
Ryde
Thornton
Rio Vista
Isleton
Collinsville
PITTSBURG
ANTIOCH
Brentwood
DISCOVERY BAY
Byron
LODI
STOCKTON
MANTECA
TRACY
Brannan Andrus Levee Maintenance District
Bethel Island Municipal Improvement District
SUISUN MARSH SALINITY CONTROL GATE
BARKER SLOUGH PUMPING PLANT
HARVEY O. BANKS DELTA PUMPING PLANT
TRACY PUMPING PLANT
SOUTH BAY PUMPING PLANT
DELTA CROSS CHANNEL
YOLO BYPASS
SACRAMENTO RIVER
SAN JOAQUIN RIVER
MOKELUMNE RIVER
OLD RIVER
MIDDLE RIVER
NORTH FORK MOKELUMNE RIVER
SOUTH FORK MOKELUMNE RIVER
MERRITT ISLAND
RYER ISLAND
GRAND ISLAND
BRANNAN ISLAND
TWITCHELL ISLAND
SHERMAN ISLAND
BRADFORD ISLAND
WEBB TRACT
FRANKS TRACT
BETHEL ISLAND
HOTCHKISS TRACT
HOLLAND TRACT
VEALE TRACT
PALM TRACT
ORWOOD TRACT
BACON ISLAND
VENICE ISLAND
MANDEVILLE ISLAND
MEDFORD ISLAND
McDONALD ISLAND
LOWER JONES TRACT
UPPER JONES TRACT
VICTORIA ISLAND
BYRON TRACT
CLIFTON COURT FOREBAY
UNION ISLAND
FABIAN TRACT
BOULDIN ISLAND
TERMINOUS TRACT
EMPIRE TRACT
KING ISLAND
RINDGE TRACT
WRIGHT-ELMWOOD TRACT
SARGENT-BARNHART TRACT
LOWER ROBERTS ISLAND
MIDDLE ROBERTS ISLAND
UPPER ROBERTS ISLAND
STEWART TRACT
HASTINGS TRACT
PIERSON DISTRICT
NEW HOPE TRACT
CANAL RANCH TRACT
BRACK TRACT
SHIN KEE TRACT
RIO BLANCO TRACT
BISHOP TRACT
SHIMA TRACT
SACRAMENTO - SAN JOAQUIN DELTA
SCALE IN MILES
Reclamation and Levee Maintenance Districts

Reclamation and Levee Maintenance Districts

In 1855, California passed the Reclamation District Act providing for sale of swamp and overflow lands at $1 per acre with payments over 5 years, and a 320-acre limit. Today, these lands in the Delta are ringed with levees and have their own districts for maintaining the levees. Some islands belong to more than one district. A more populated island, Bethel, has an organization with broader responsibilities which is known as the Bethel Island Municipal Improvement District. Information on expenditures for levee emergency work and annual maintenance for these districts is contained in Tables 1 and 2 (pages 81 - 84) along with values for acreage and miles of levee.

Levee rehabilitation on Twitchell Island.

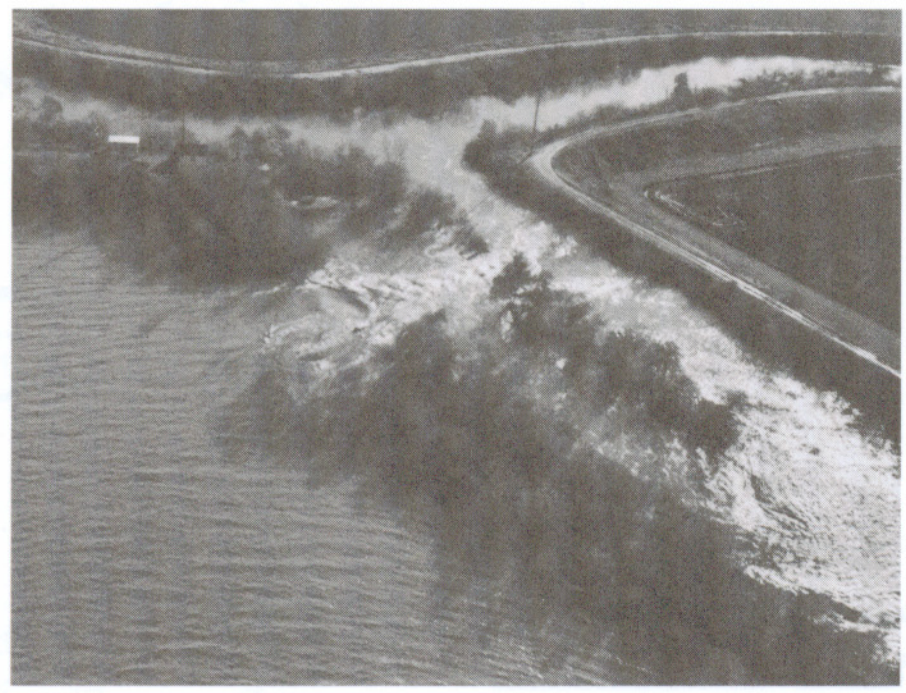


Historical Flooding
1930 - 1966

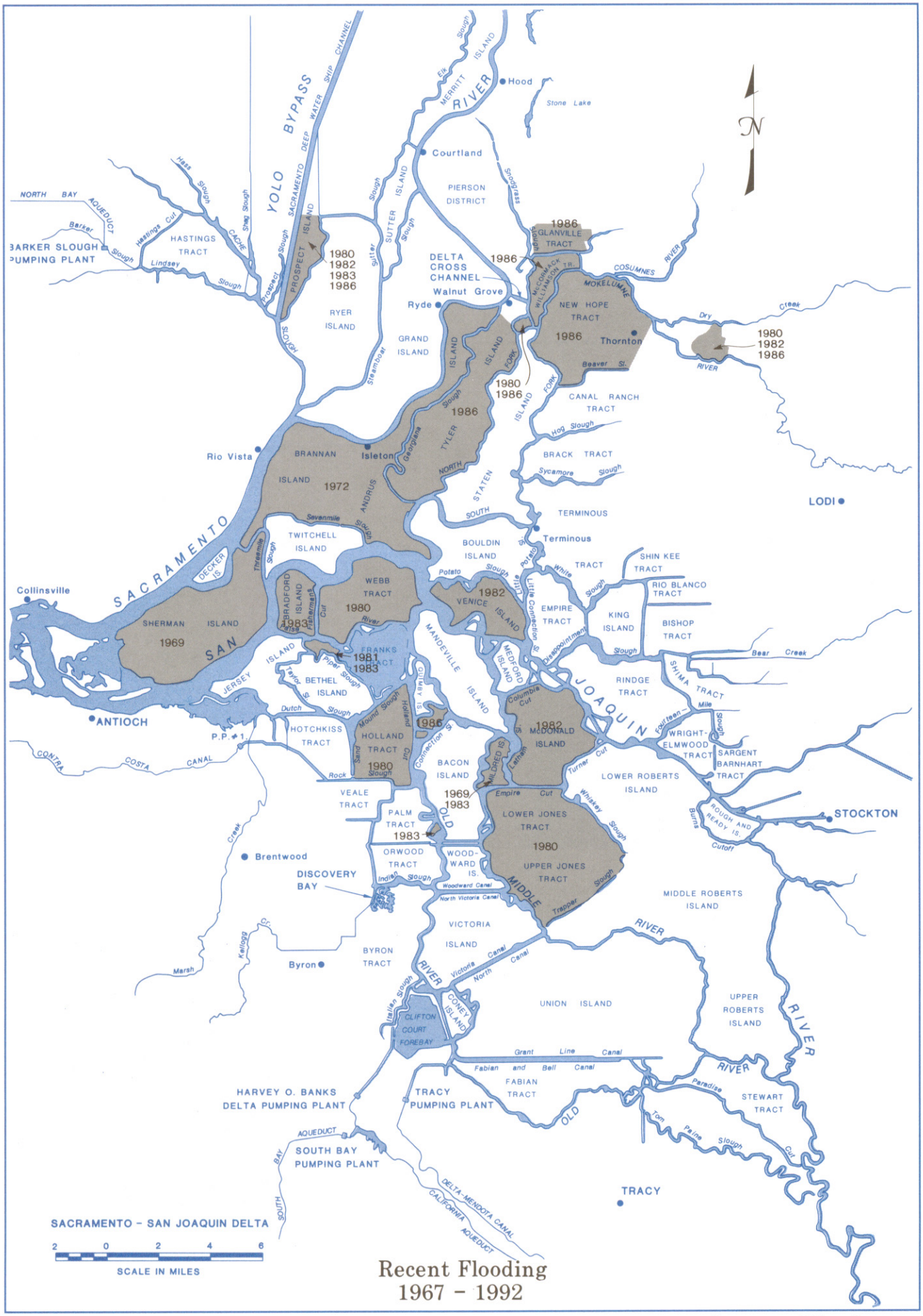
Historical Flooding 1930-1966

Levee failures are not rare occurrences in the Delta. Since original reclamation, each of the 70 islands or tracts has flooded at least once. The map at left shows those islands that flooded one or more times between 1930 and 1966. In some cases, the cost of repairs exceeded the appraised value of the land.

The Sacramento River north of Walnut Grove, December 1964.

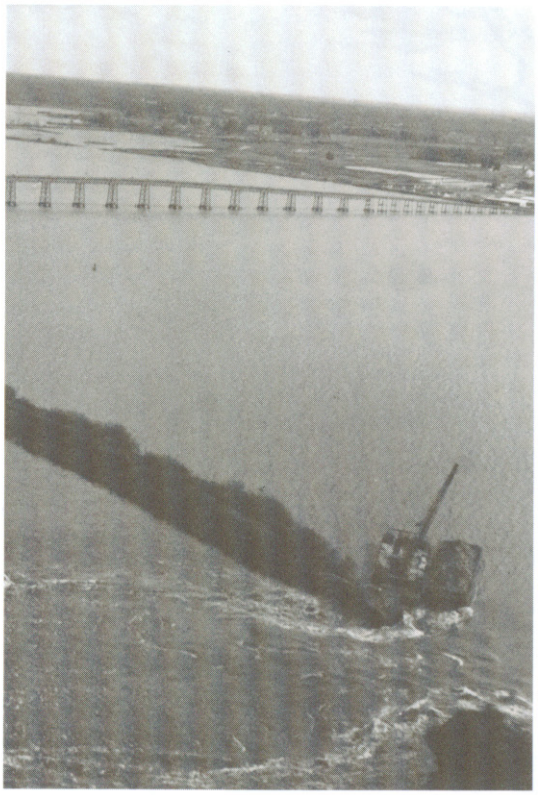


McCormack and Williamson Tract flooded, January 1965.


SACRAMENTO - SAN JOAQUIN DELTA
2 0 2 4 6
SCALE IN MILES
Recent Flooding
1967 - 1992
N
Hood
Courtland
Stone Lake
PIERSON DISTRICT
GLANVILLE TRACT
1986
DELTA CROSS CHANNEL
Walnut Grove
Ryde
RYER ISLAND
GRAND ISLAND
NEW HOPE TRACT
Thornton
1980 1982 1986
1980 1986
CANAL RANCH TRACT
BRACK TRACT
LODI
Rio Vista
BRANNAN ISLAND
1972
Isleton
TERMINOUS
Terminous
TWITCHELL ISLAND
BOULDIN ISLAND
SHIN KEE TRACT
RIO BLANCO TRACT
Collinsville
SHERMAN ISLAND
1969
WEBB TRACT
1980
BRADFORD ISLAND
1983
VENICE ISLAND
1982
EMPIRE TRACT
KING ISLAND
BISHOP TRACT
FRANKS TRACT
1981 1983
BETHEL ISLAND
MANDEVILLE ISLAND
MEDFORD ISLAND
RINDGE TRACT
SHIMA TRACT
ANTIOCH
P.P. #1
HOTCHKISS TRACT
HOLLAND TRACT
1980
1986
McDONALD ISLAND
1982
WRIGHT-ELMWOOD TRACT
SARGENT BARNHART TRACT
BACON ISLAND
1969 1983
LOWER ROBERTS ISLAND
VEALE TRACT
PALM TRACT
1983
LOWER JONES TRACT
1980
STOCKTON
Brentwood
DISCOVERY BAY
ORWOOD TRACT
WOOD-WARD IS.
UPPER JONES TRACT
MIDDLE ROBERTS ISLAND
VICTORIA ISLAND
BYRON TRACT
Byron
UNION ISLAND
CLIFTON COURT FOREBAY
CONEY ISLAND
UPPER ROBERTS ISLAND
HARVEY O. BANKS DELTA PUMPING PLANT
TRACY PUMPING PLANT
FABIAN TRACT
STEWART TRACT
SOUTH BAY PUMPING PLANT
TRACY
BARKER SLOUGH PUMPING PLANT
HASTINGS TRACT
1980 1982 1983 1986
1986
1980 1982 1986
SACRAMENTO
SAN JOAQUIN
YOLO BYPASS
SACRAMENTO DEEP WATER SHIP CHANNEL
MERRITT ISLAND
RIVER
COSUMNES RIVER
MOKELUMNE RIVER
DELTA-MENDOTA CANAL
CALIFORNIA AQUEDUCT
CONTRA COSTA CANAL
NORTH BAY AQUEDUCT

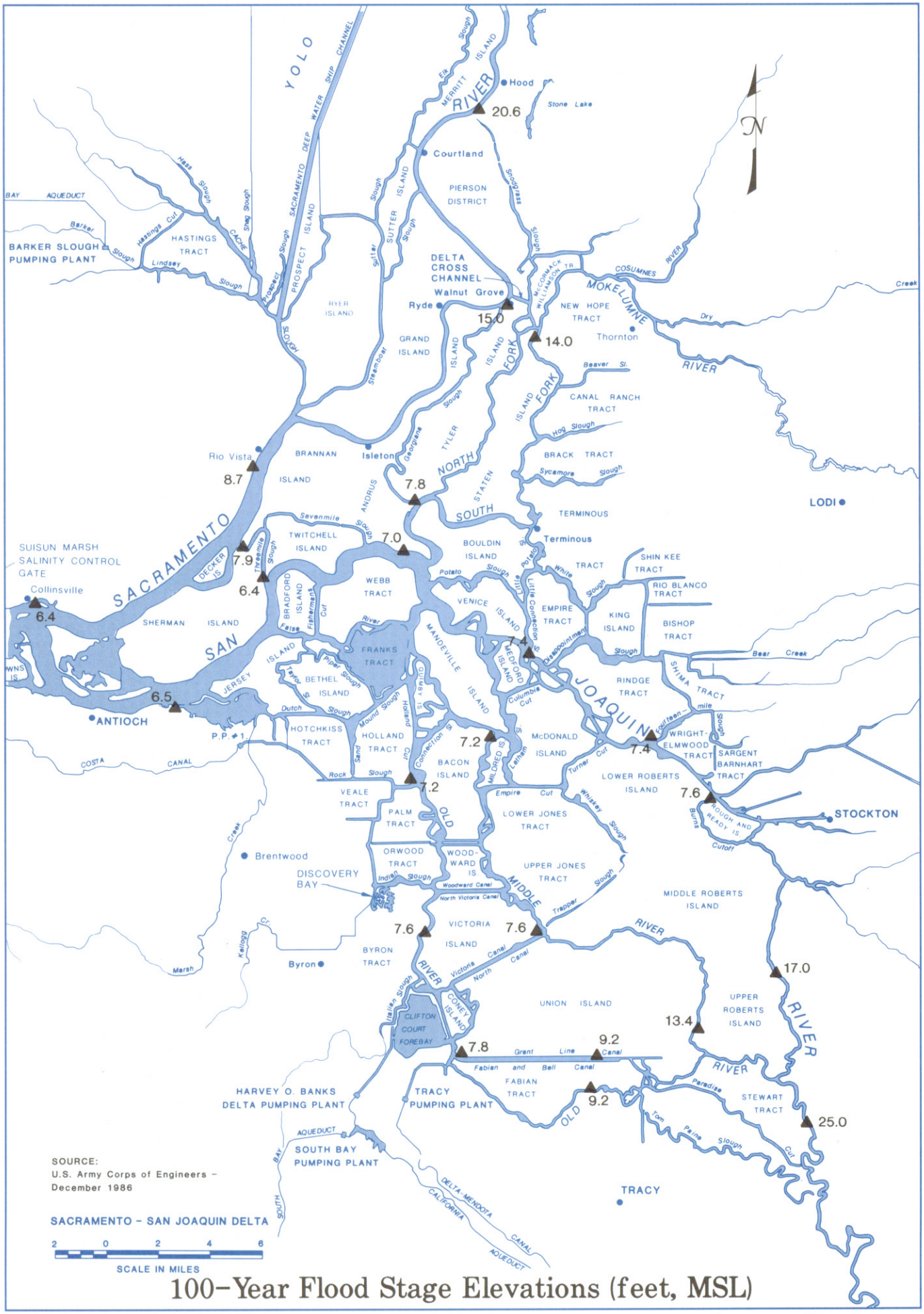
Recent Flooding 1967-1992

Flood flows reaching the Delta have been estimated to exceed 600,000 cubic feet per second. The most recent flood in the Delta occurred in 1986 when several islands in the north Delta flooded. This resulted in millions of dollars in damages, particularly in the town of Thornton.



Levee break on Sherman Island in 1969.

Islands flooded in the northern Delta, February 1986.



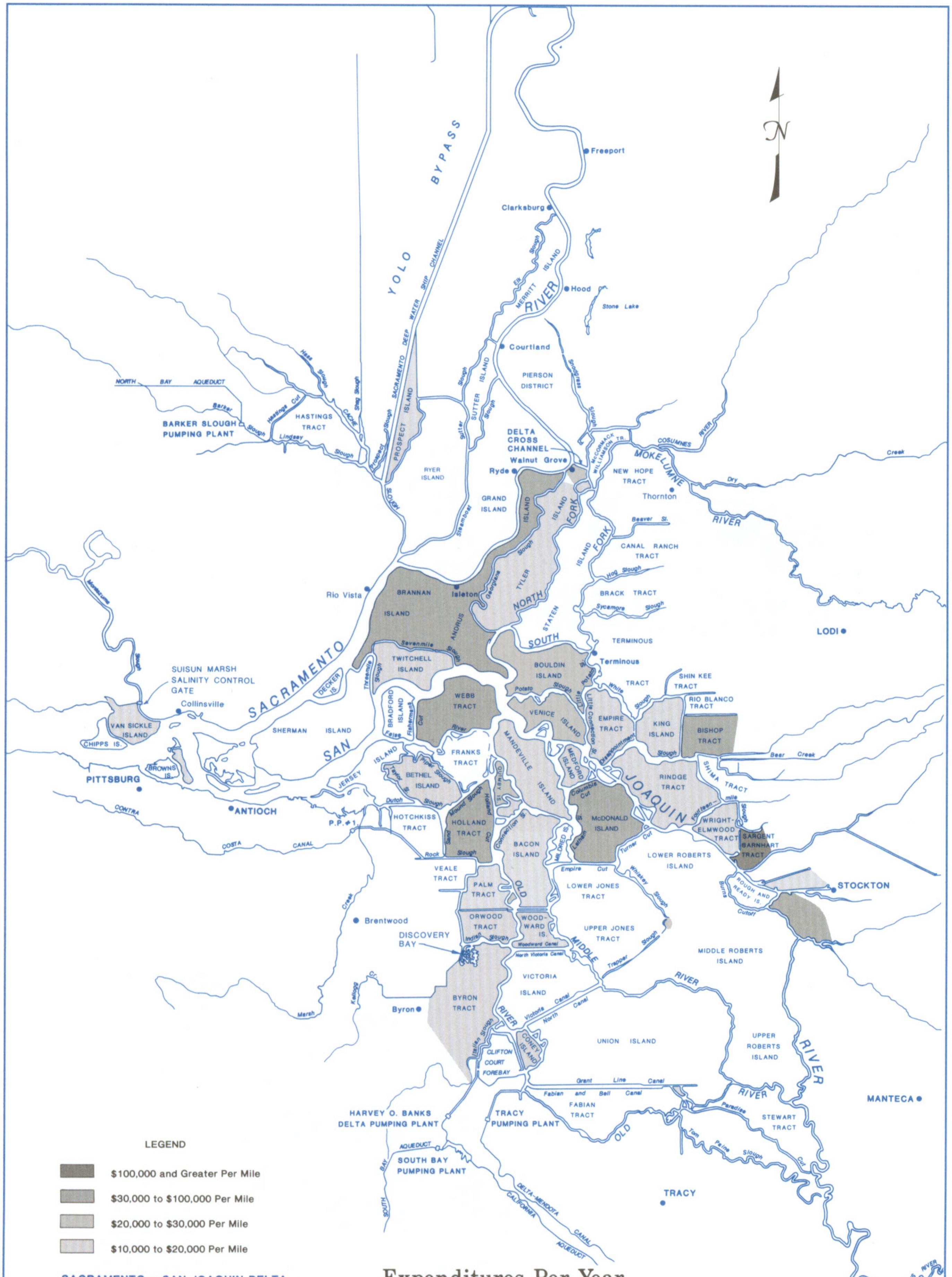
100-Year Flood Stage Elevations (feet, MSL)

Flood Stage Elevations

Rivers and channels surrounding the central and western Delta have a limited ability for carrying flood flows. For example, a flood causing water levels in the north Delta to increase by 10 feet may only cause a 1-foot increase in water levels in the central and western Delta. Sedimentation, which limits the flood-carrying capacity of the channels, has occurred in various places throughout the Delta, particularly along the South Fork of the Mokelumne River. In 1986, the U. S. Army Corps of Engineers estimated the 100-year flood stages to be as shown on the map at left.

Sedimentation in the Mokelumne River encourages vegetative growth which limits flood-carrying capacity.

A combination of high tides, winter floodflows, and poor levees can result in flooded islands.

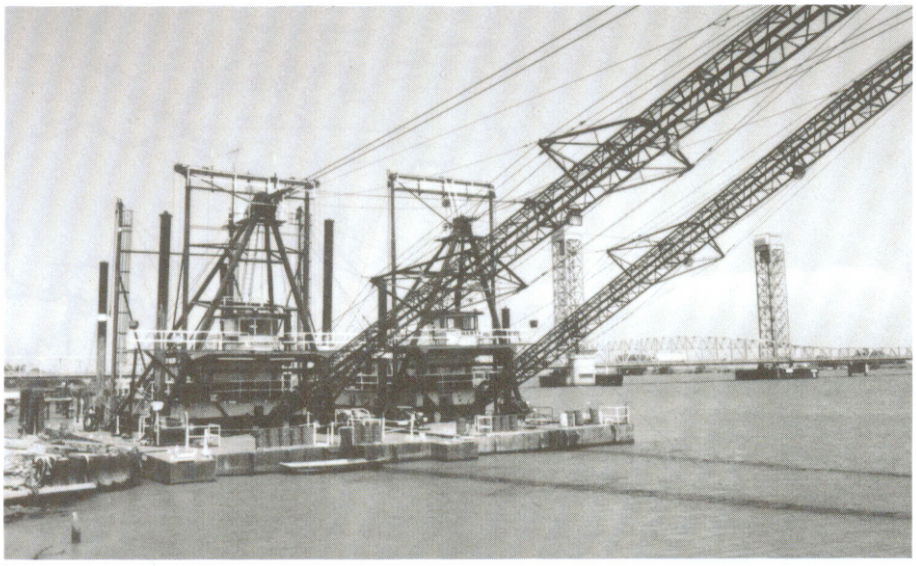


Expenditures Per Year in Delta Levees Maintenance Subvention Program 1981 – 1993

Delta Levee Maintenance Subvention Program Expenditures 1981-1993

Waterside slopes of levees are subject to erosion from wind-generated waves, boat wakes, and water flowing at high velocity. State and local governments have invested millions of dollars in the past 10 years to maintain and repair eroded levees. In some instances, the expenditures exceeded the appraised value of the island or tract being protected. The map at left shows the average amount of State money spent per year of participation in the State cost-sharing program (Delta Levees Maintenance Subvention Program) for the period 1981-1991. This, along with other related information, is contained in Table 2 on page 83.

Some levees are protected from erosion by riprap.



Typical barge-mounted crane used for levee maintenance.