Constraints in the Sacramento-San Joaquin Delta

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Bay Delta Office
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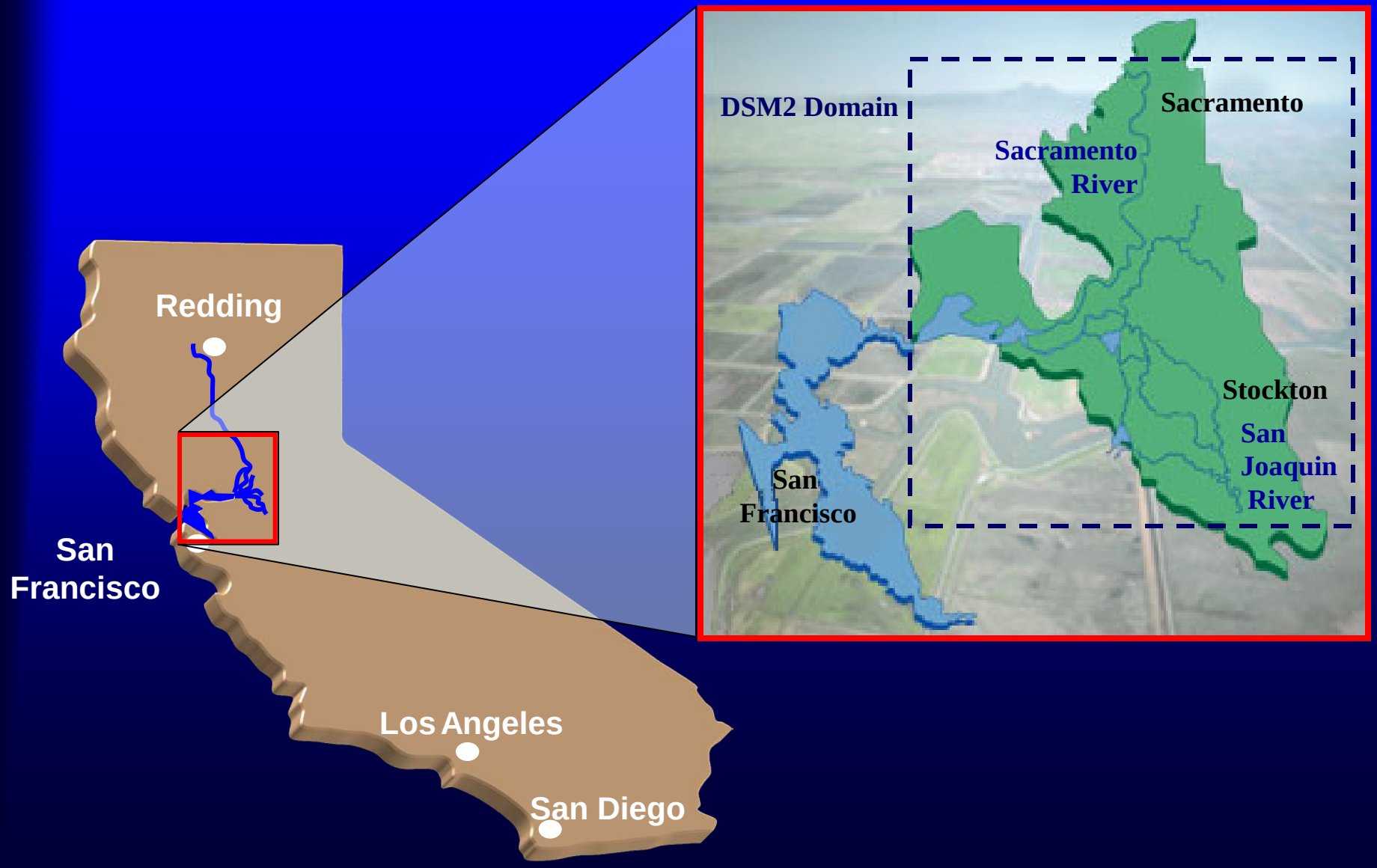
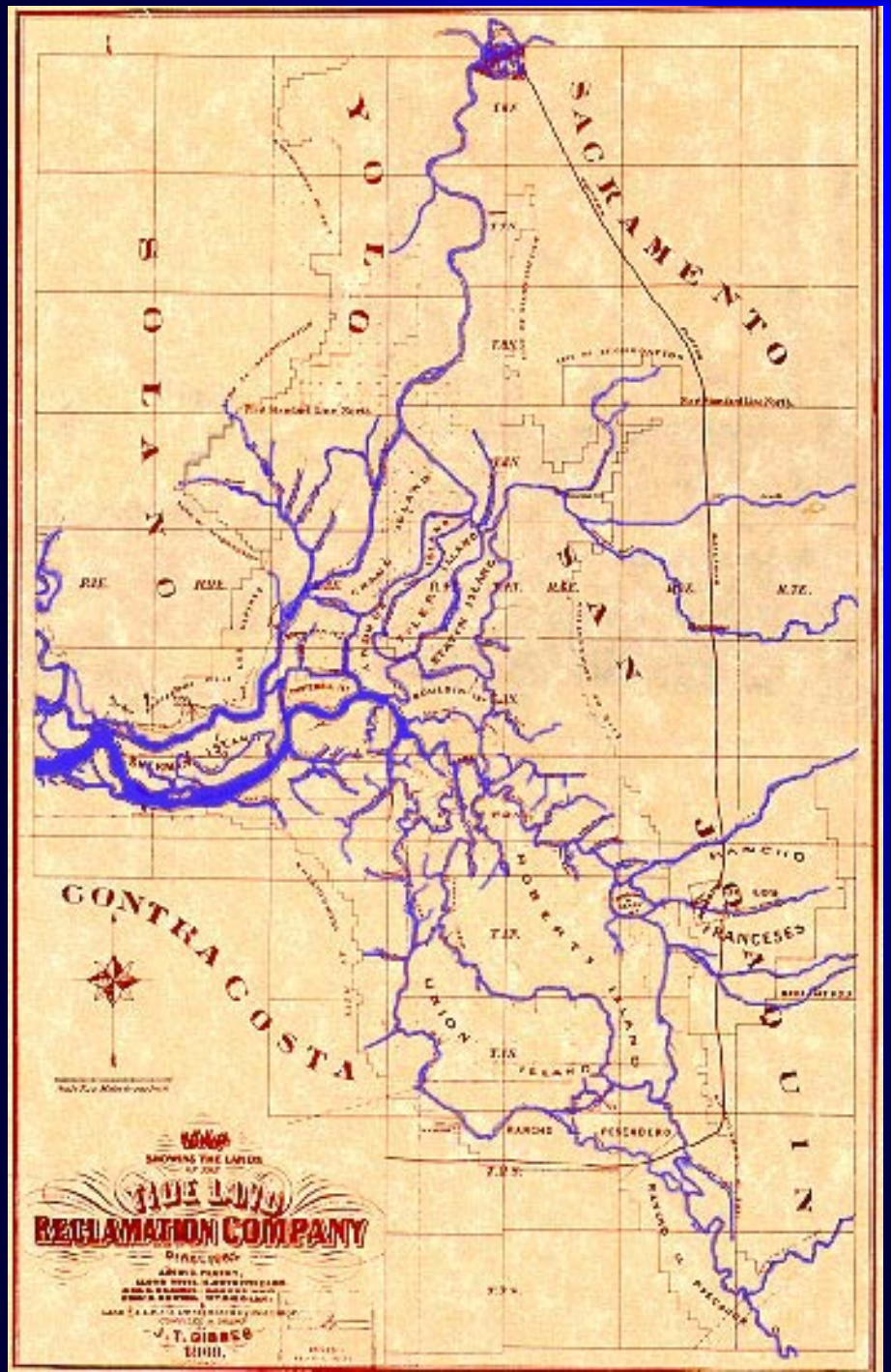
Adapted from Jaime Anderson, PhD, PE
Bay Delta Office

Bay-Delta System



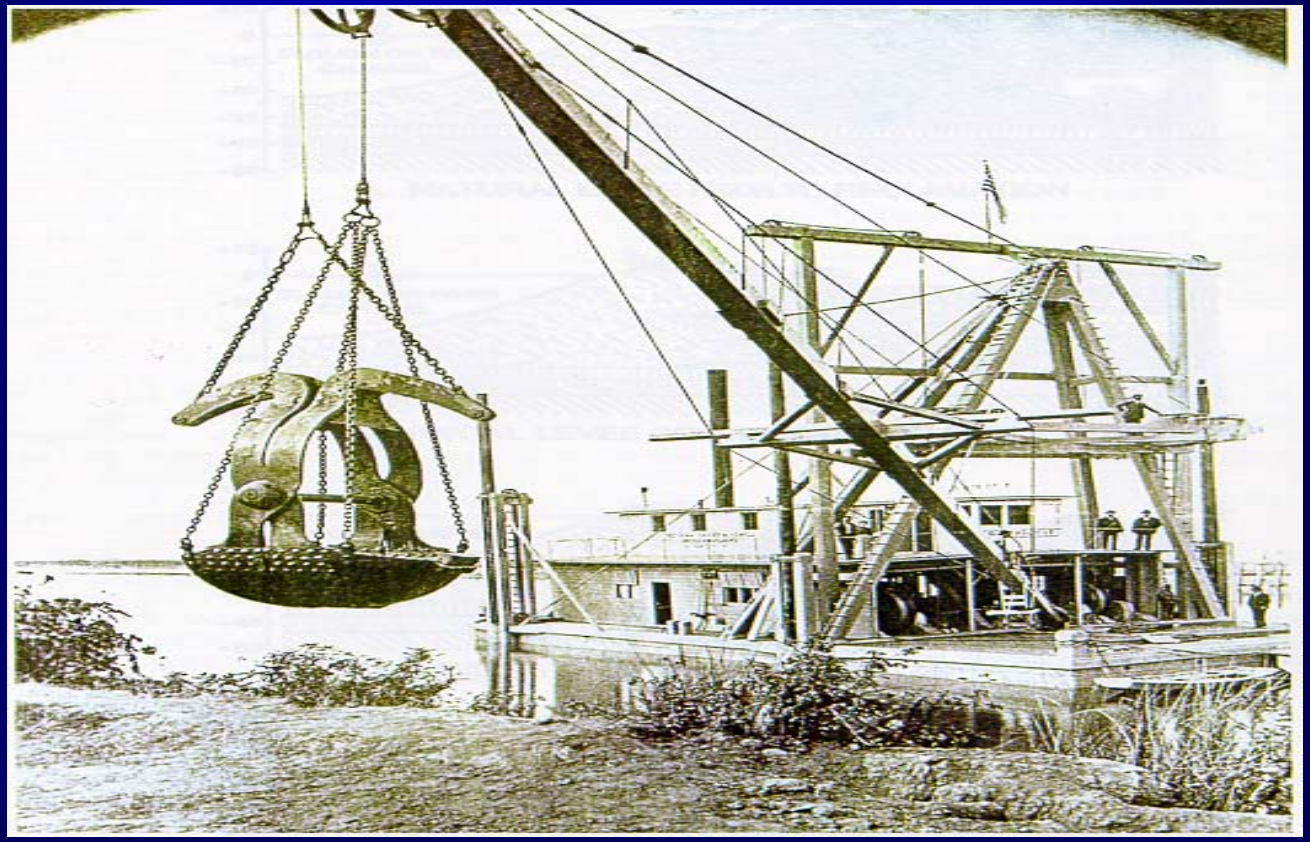
Bay-Delta detail image from CALFED



Natural State

- Series of dendritic "branching" channels
- Seasonal wetland
  - Winter flooded fresh water
  - Summer shallow channels saline water
- Native species adapted to seasonal salinity, flow, and temperature changes

1850’s Levee Construction

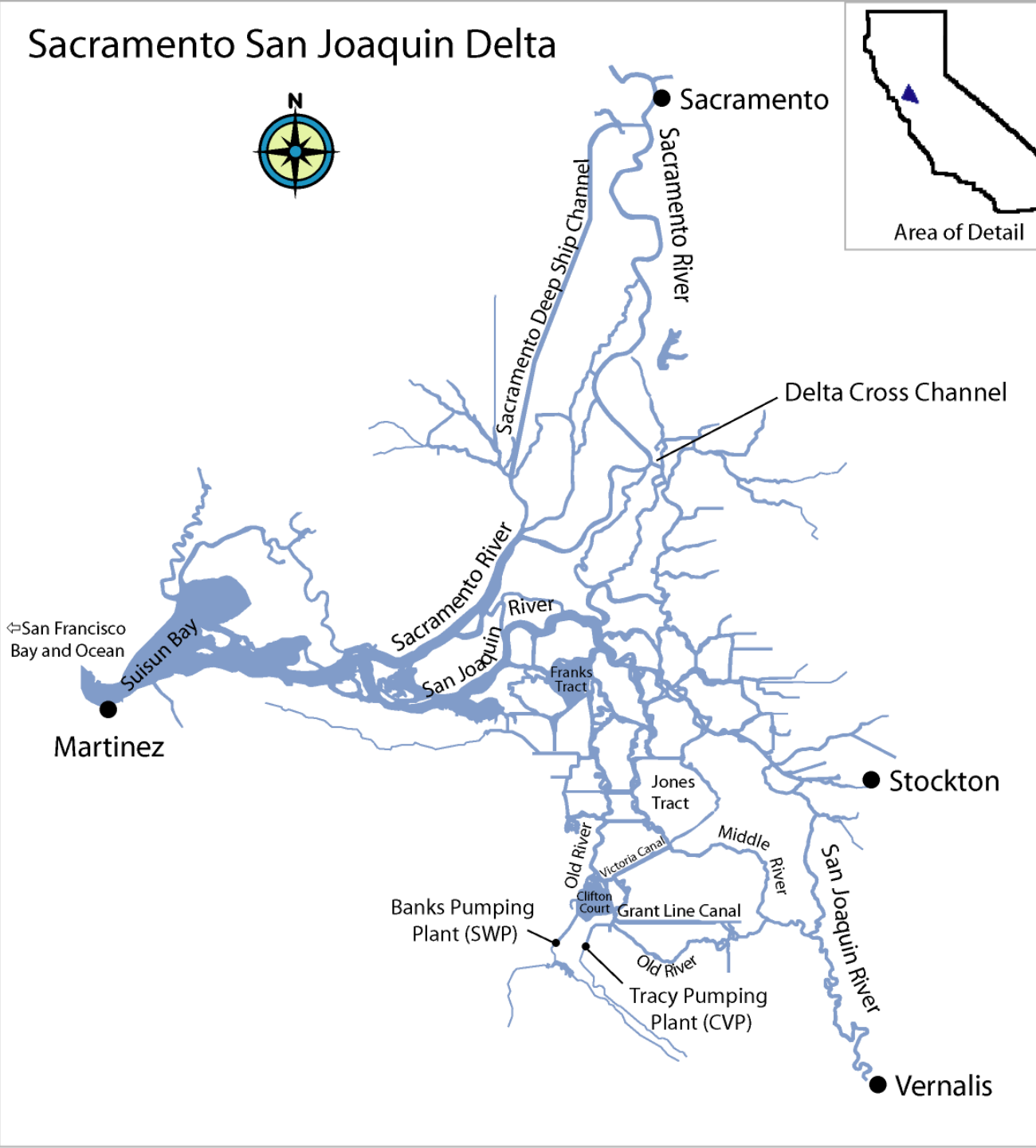


Physical modifications (dredging, levees, pumps, gates, resevoirs, etc)

Modern Delta

Highly managed

- Reservoirs
- Gates & barriers
- Pumps
- Levees



Human Influences

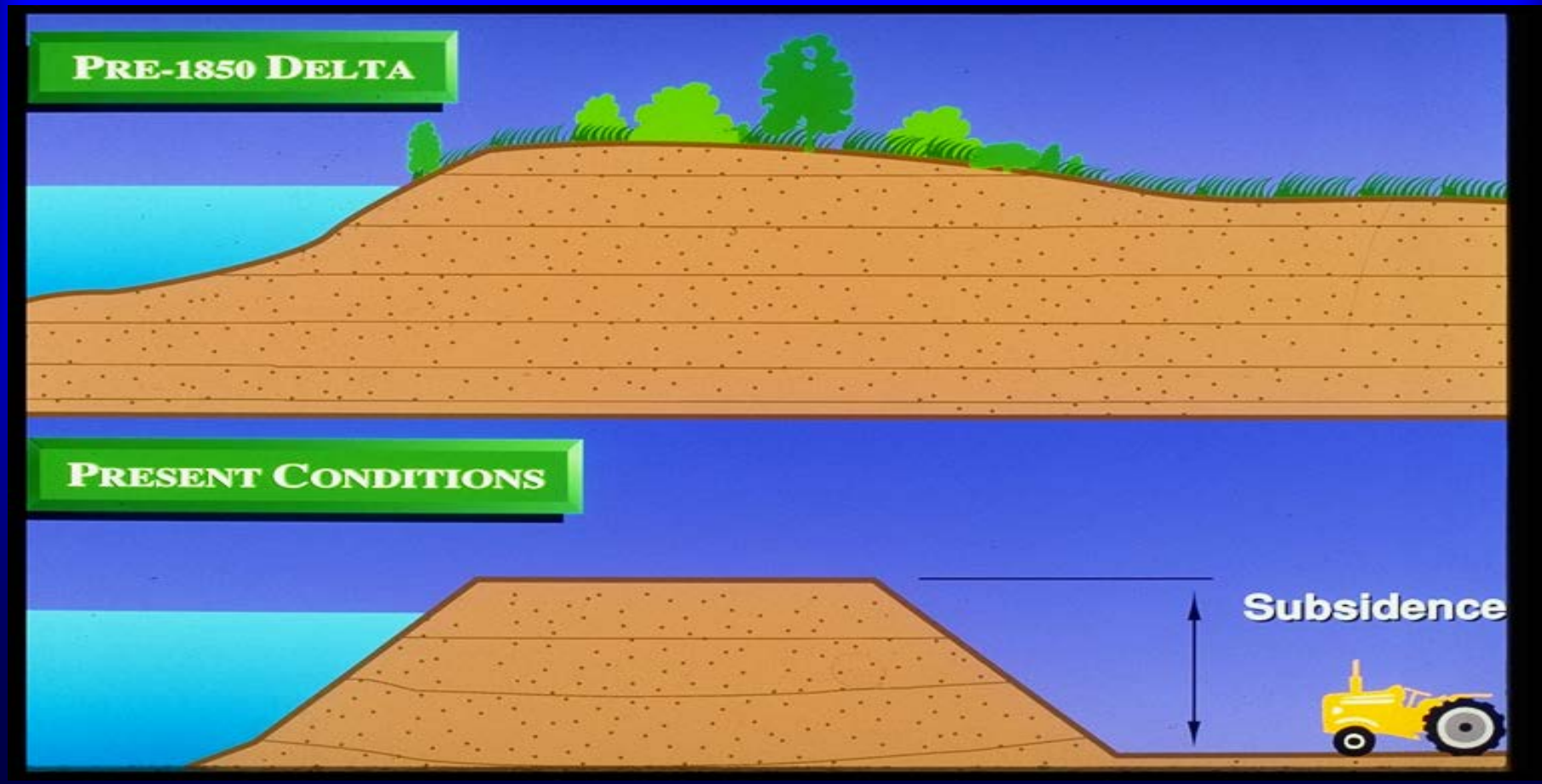
Commercial shipping:

Sacramento and San-Joaquin Deepwater Ship Channels

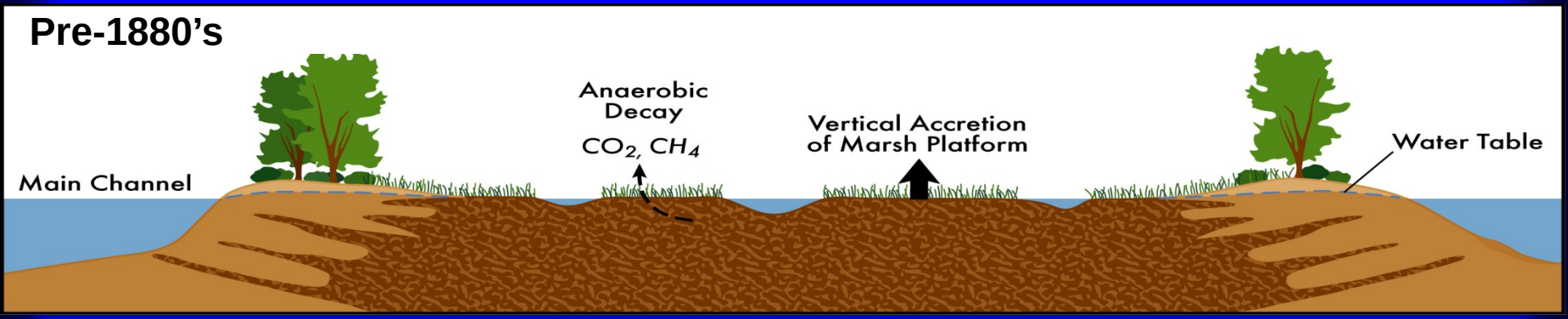
Recreation:

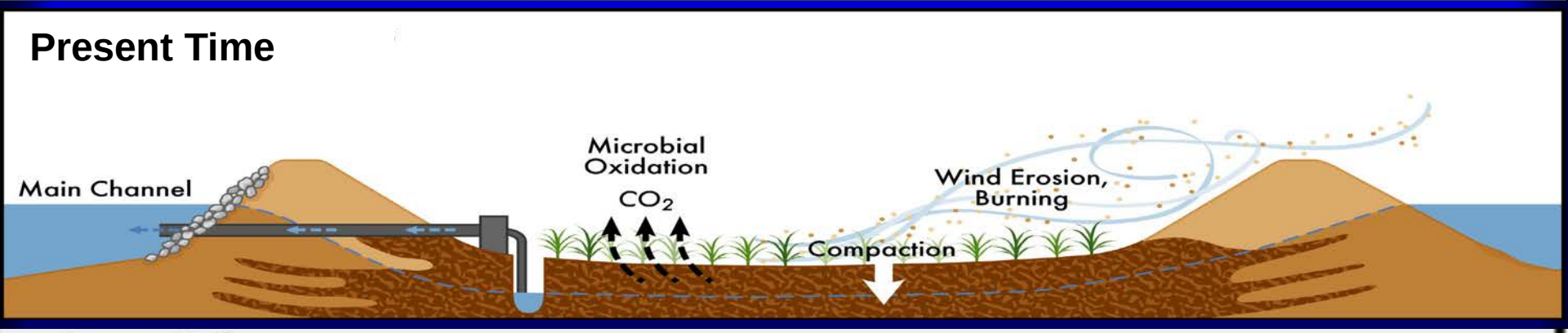
fishing, hunting, boating, passive enjoyment

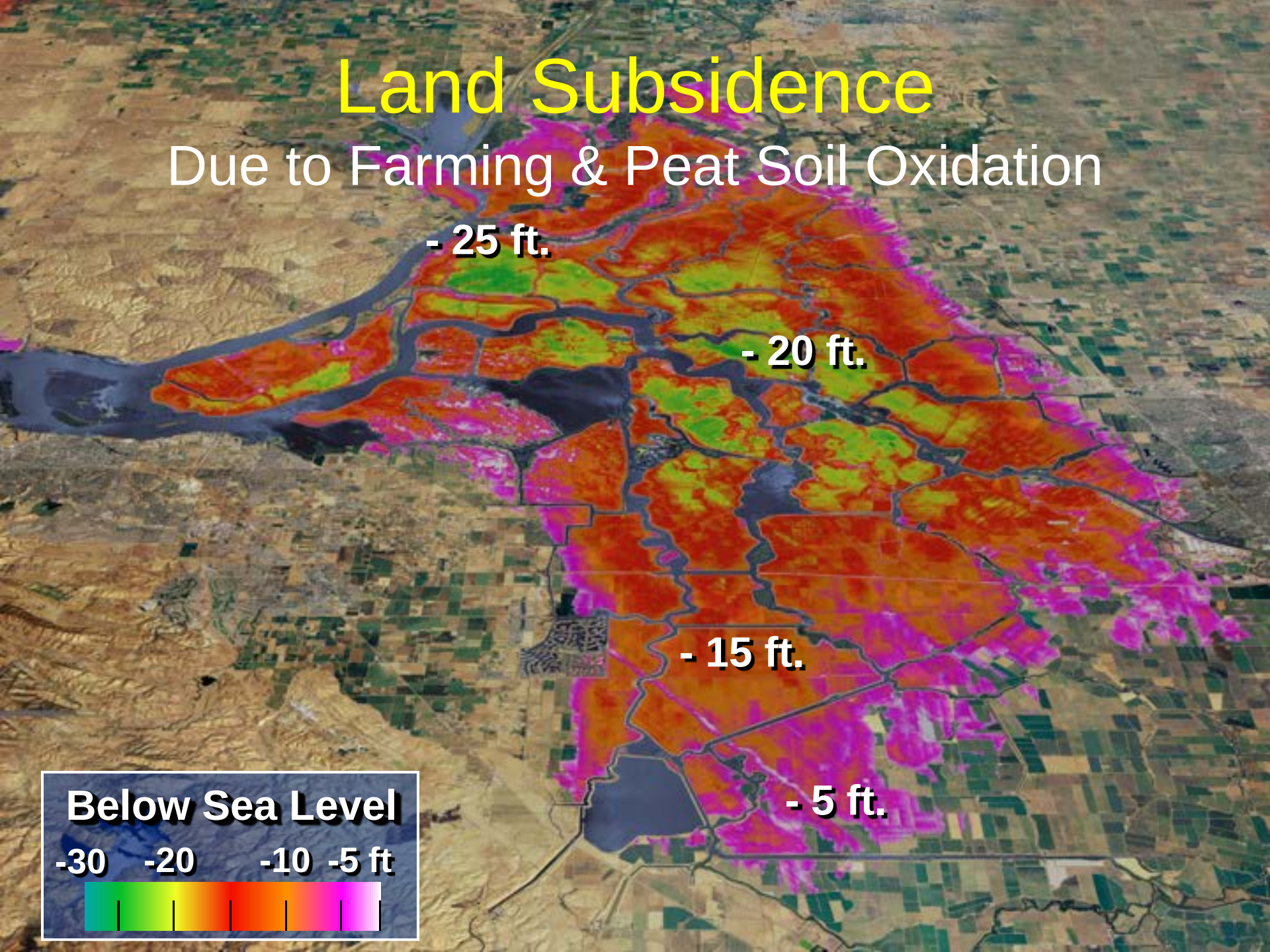
Subsidence



Land Subsidence: a historical fact






Land Subsidence
Due to Farming & Peat Soil Oxidation
- 25 ft.
- 20 ft.
- 15 ft.
- 5 ft.
Below Sea Level
-30 -20 -10 -5 ft

Physical Processes

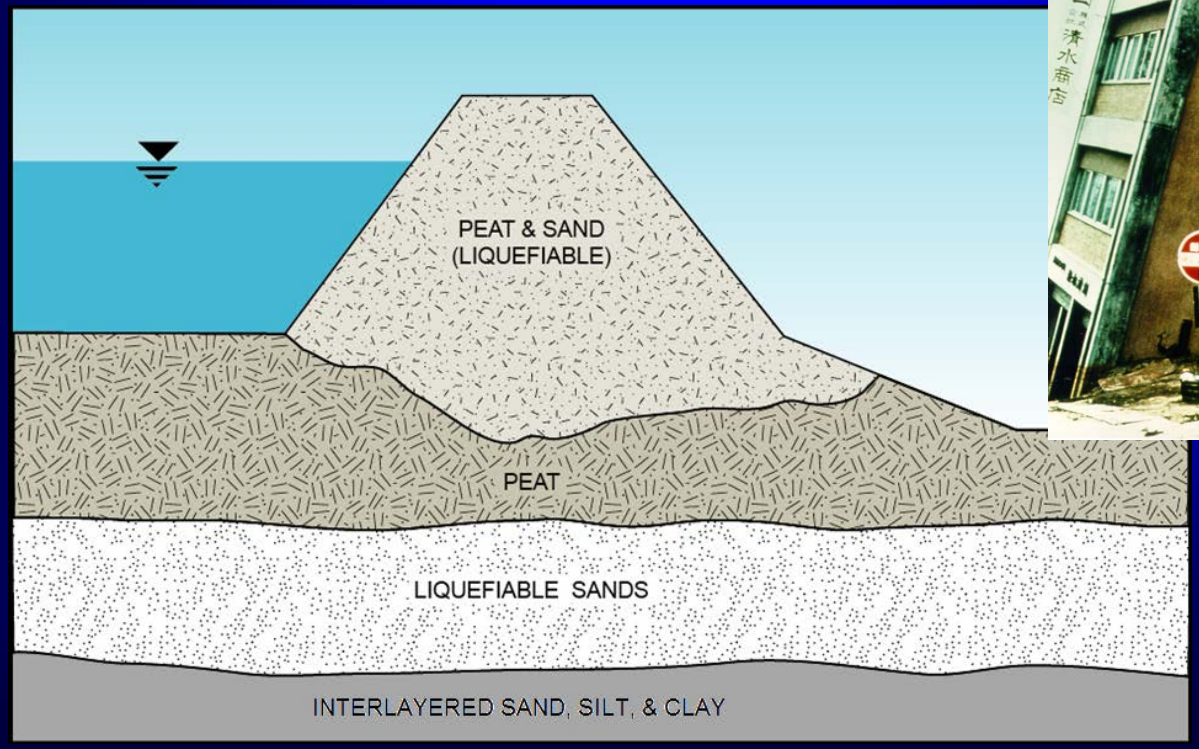
- **Hydrodynamics**
  - **Hydraulics: flood flows, tidal action**
  - **Sedimentation**
  - **Erosion**

Seismic Risk

Bay Delta Region Major Faults

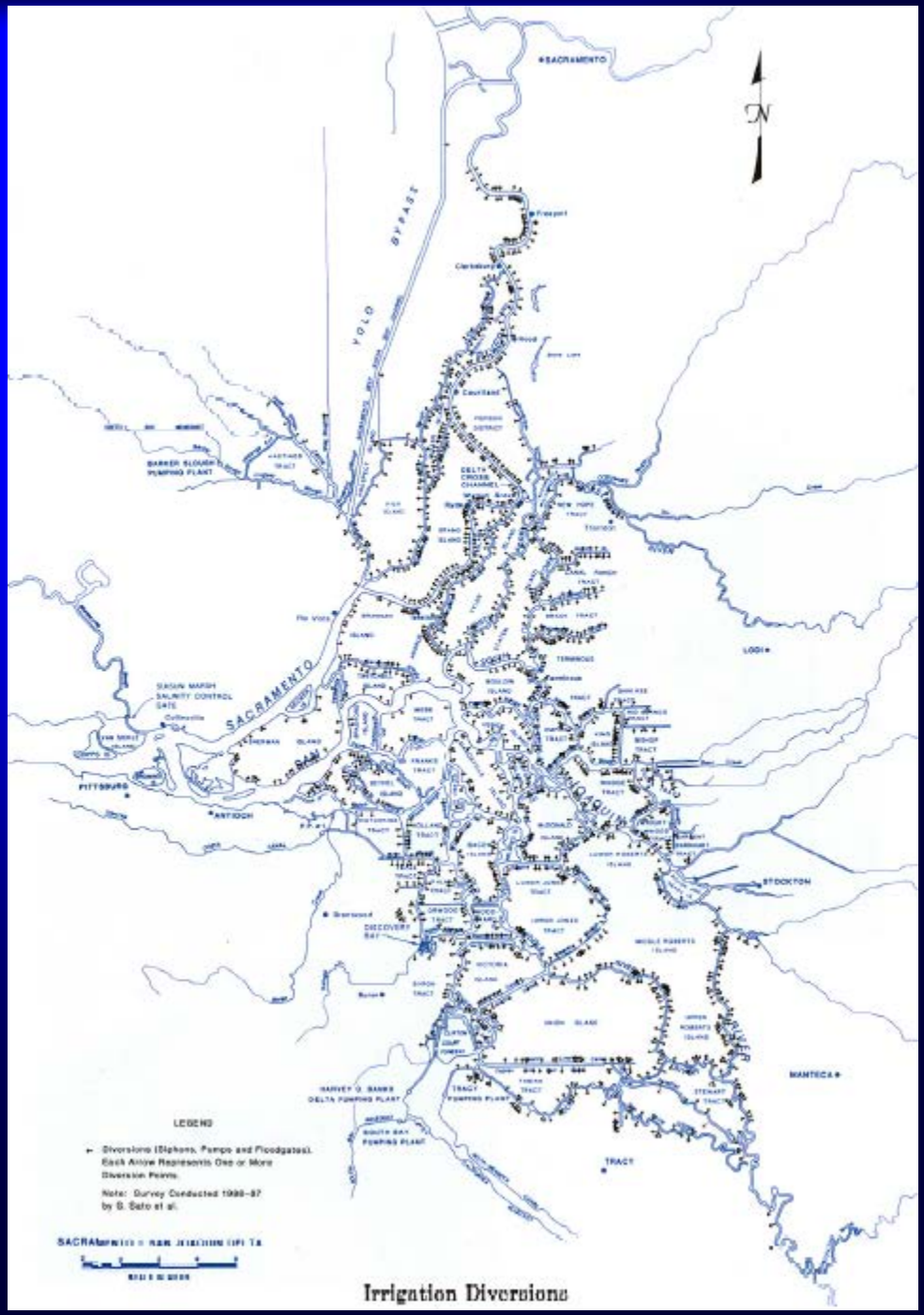
Levees have risk of failure during a seismic event

- Levees remain susceptible to earthquakes even after PL84-99 improvements are made

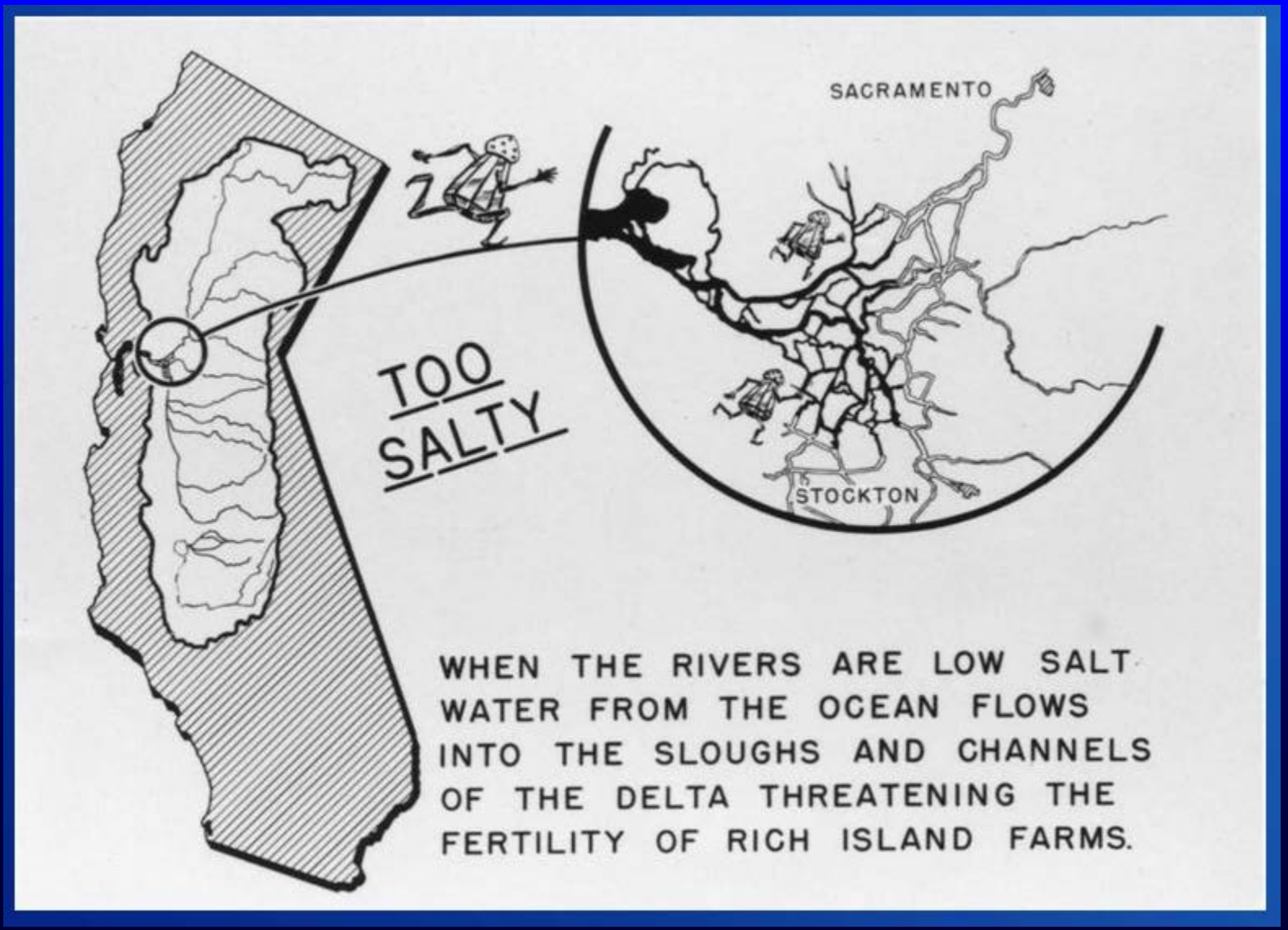


Agricultural Diversions

- Since the 1850's
- Economy
- Water Quality



1930's Propaganda for CVP

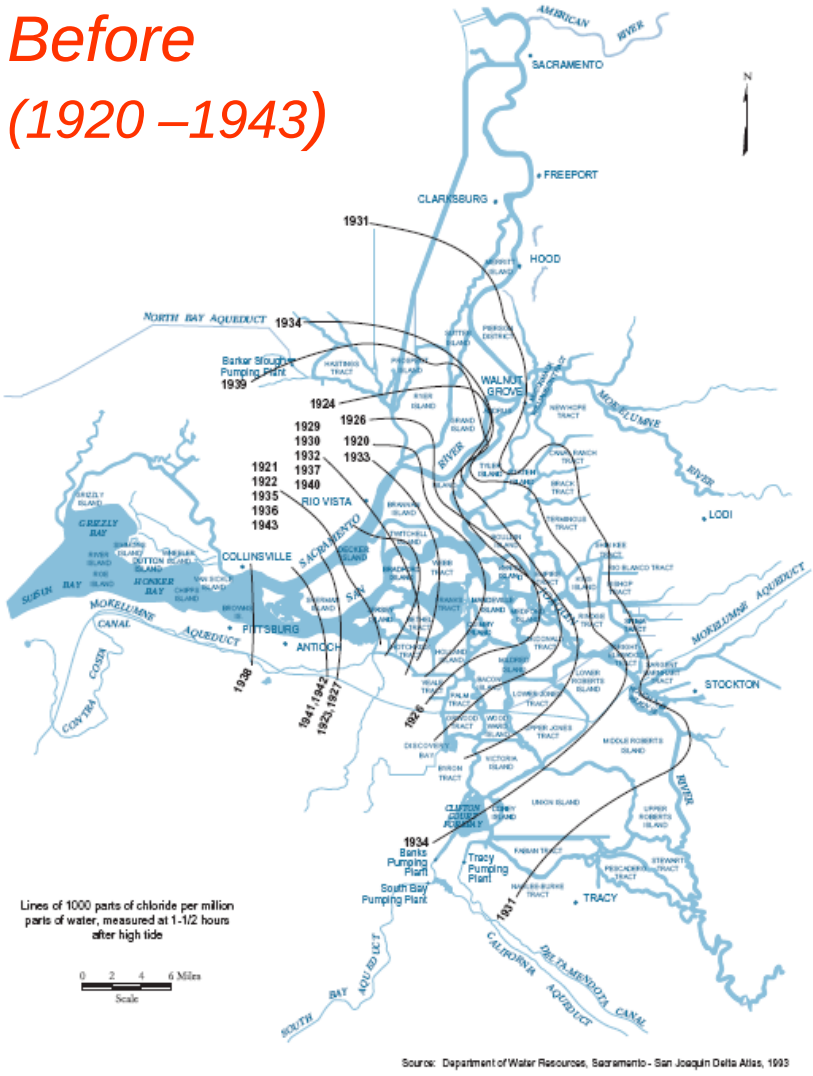


Salinity Intrusion Before and After Managed Upstream Reservoirs

Figure 4-26 Maximum Salinity Intrusion, 1921-1943

Before

(1920 –1943)

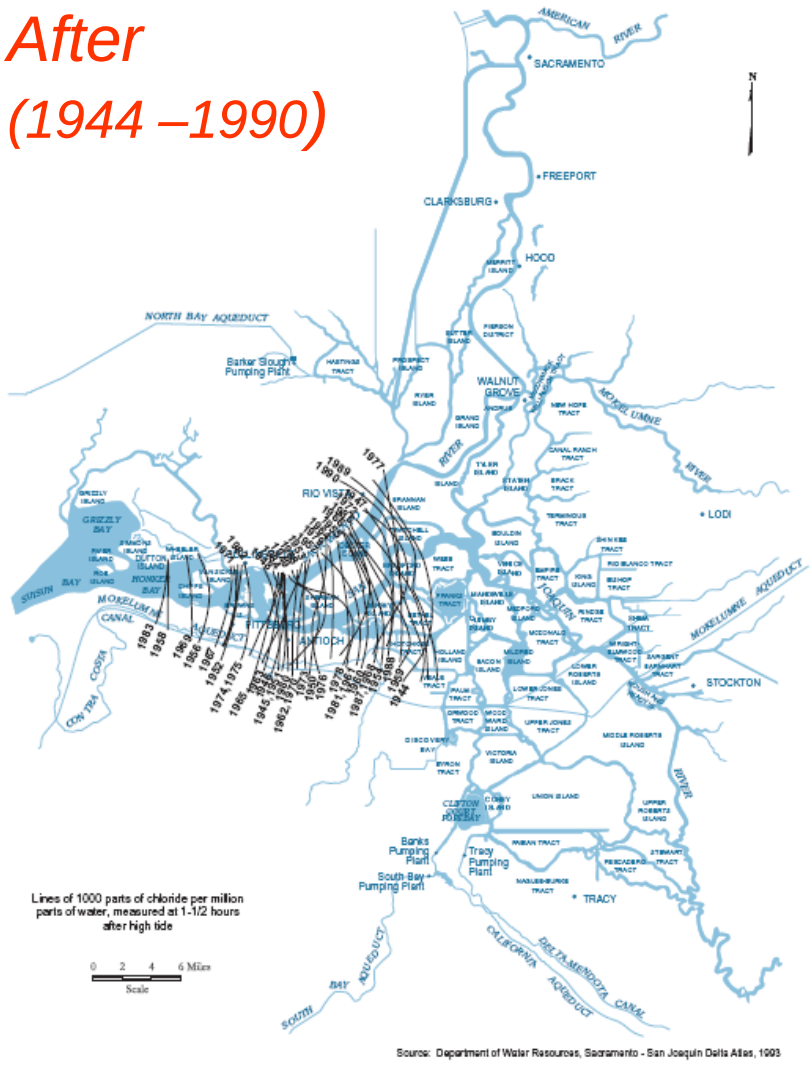


Source: Department of Water Resources, Sacramento - San Joaquin Delta Atlas, 1993

Figure 4-27 Maximum Salinity Intrusion, 1944-1990

After

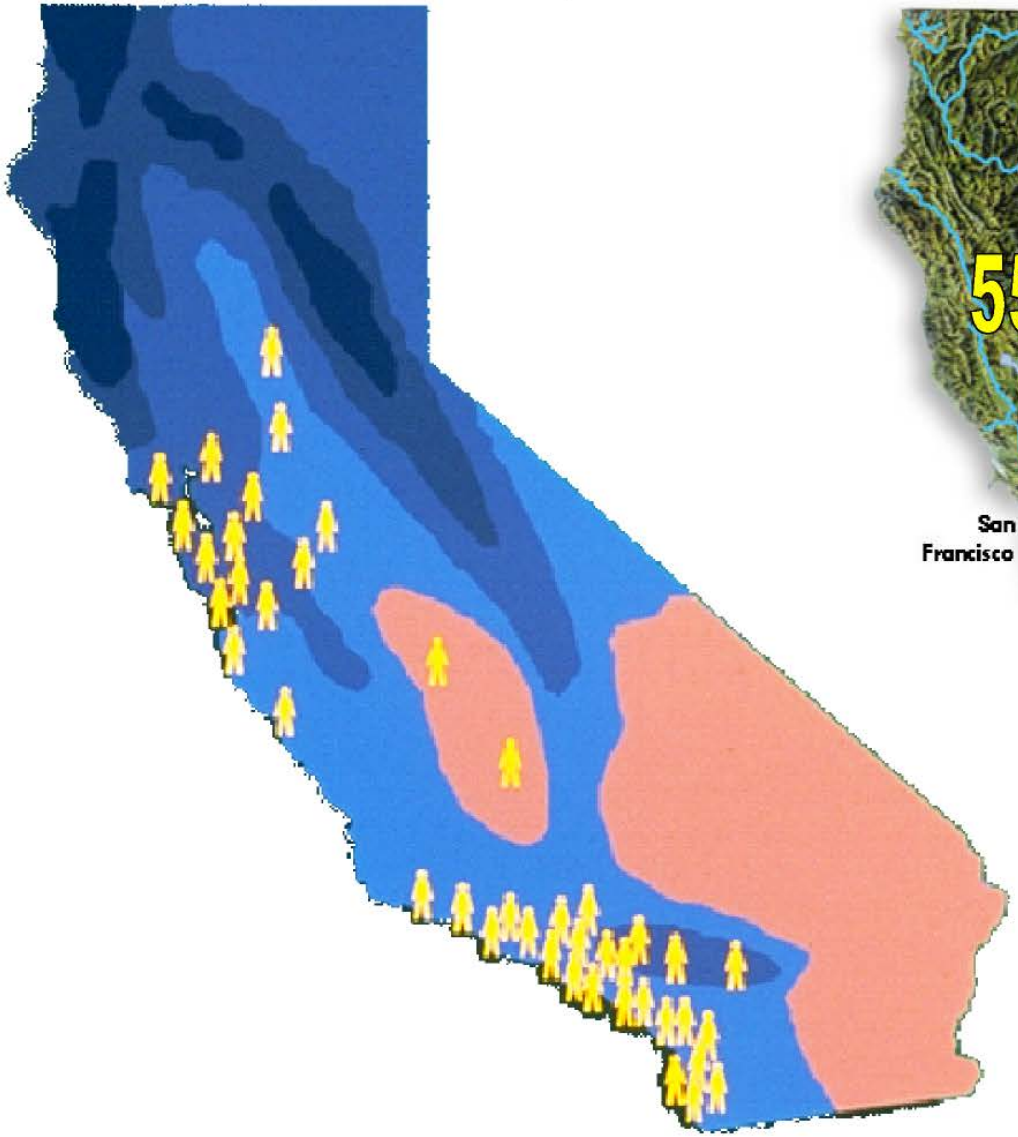
(1944 –1990)



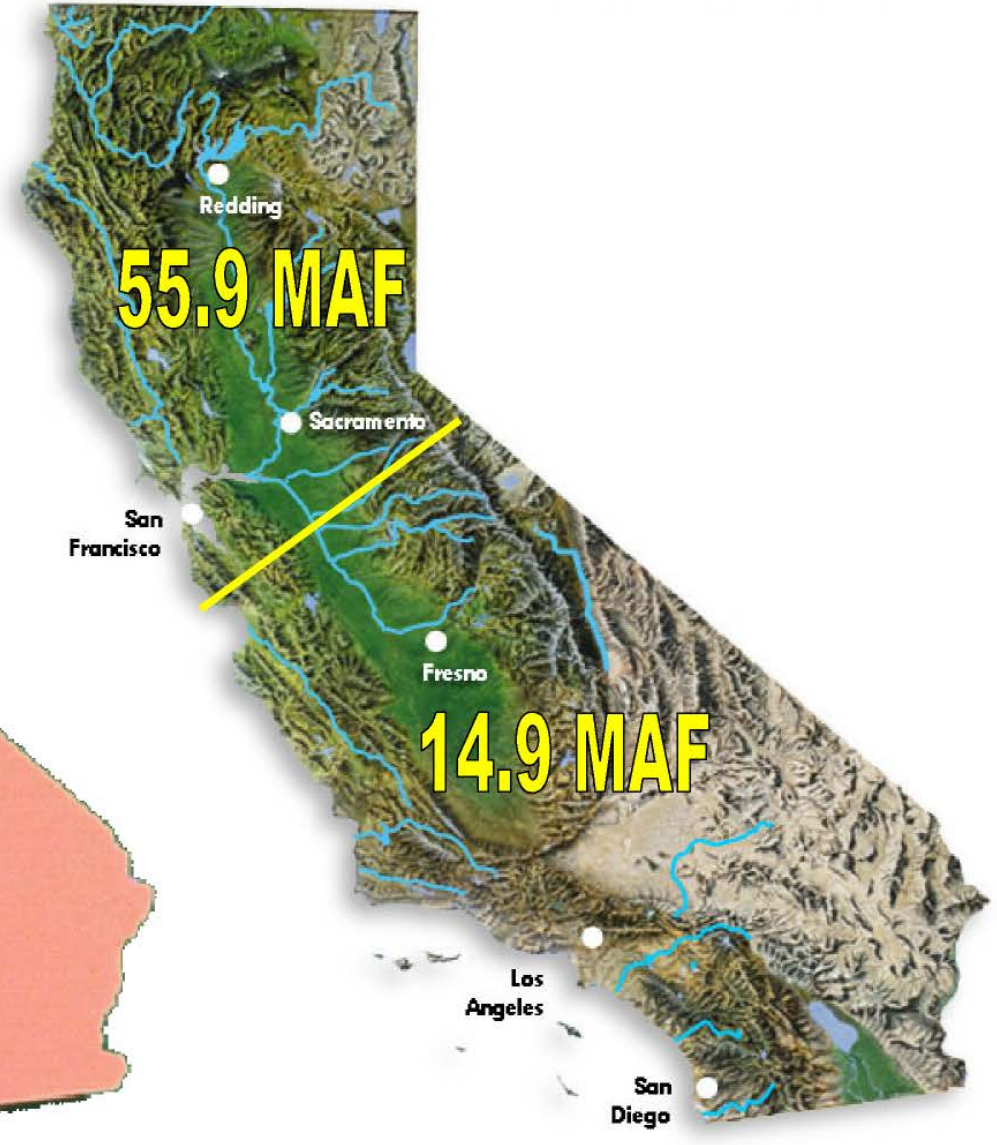
Source: Department of Water Resources, Sacramento - San Joaquin Delta Atlas, 1993

California's Water Resources

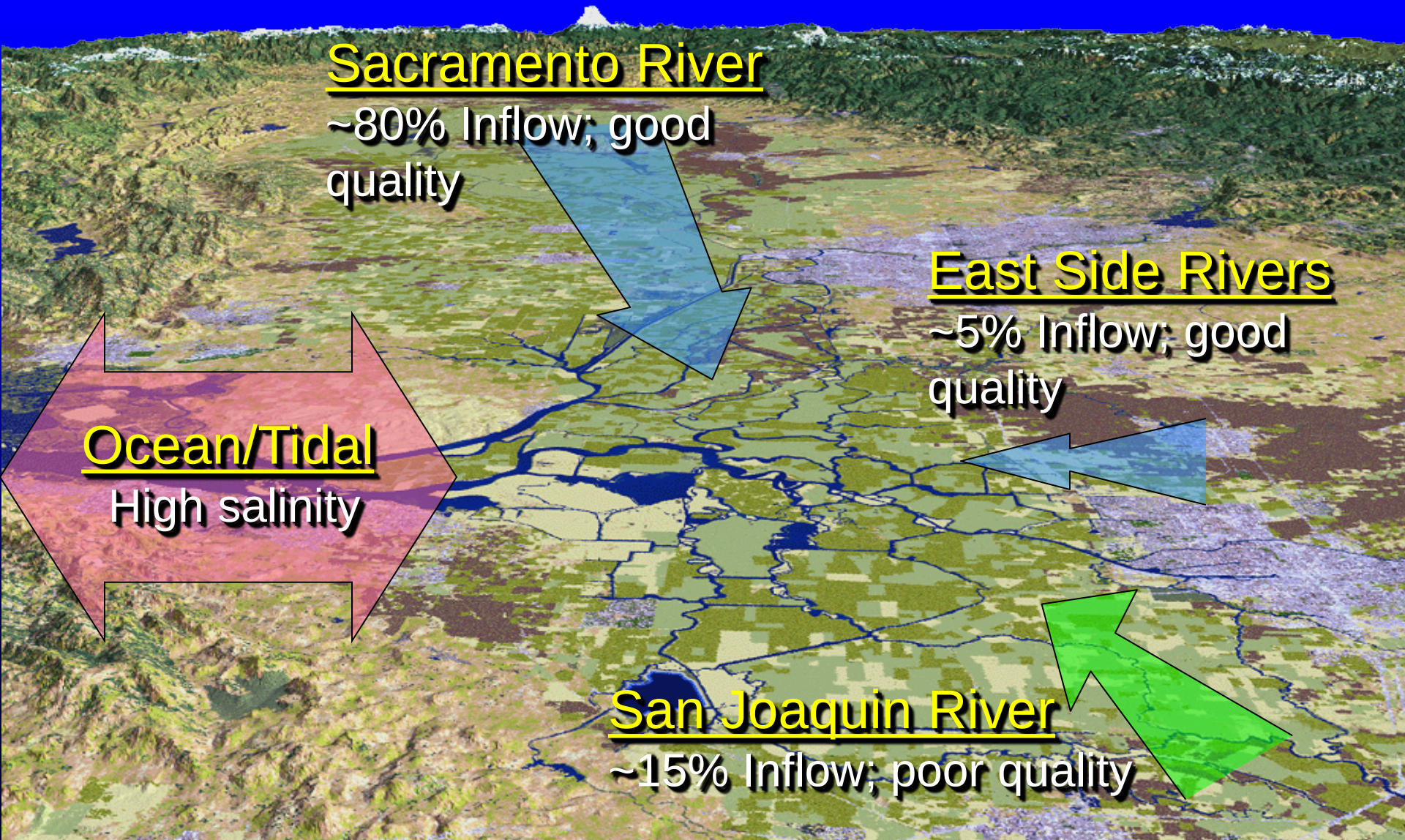
Precipitation (blue contours)
vs Population (yellow icons)

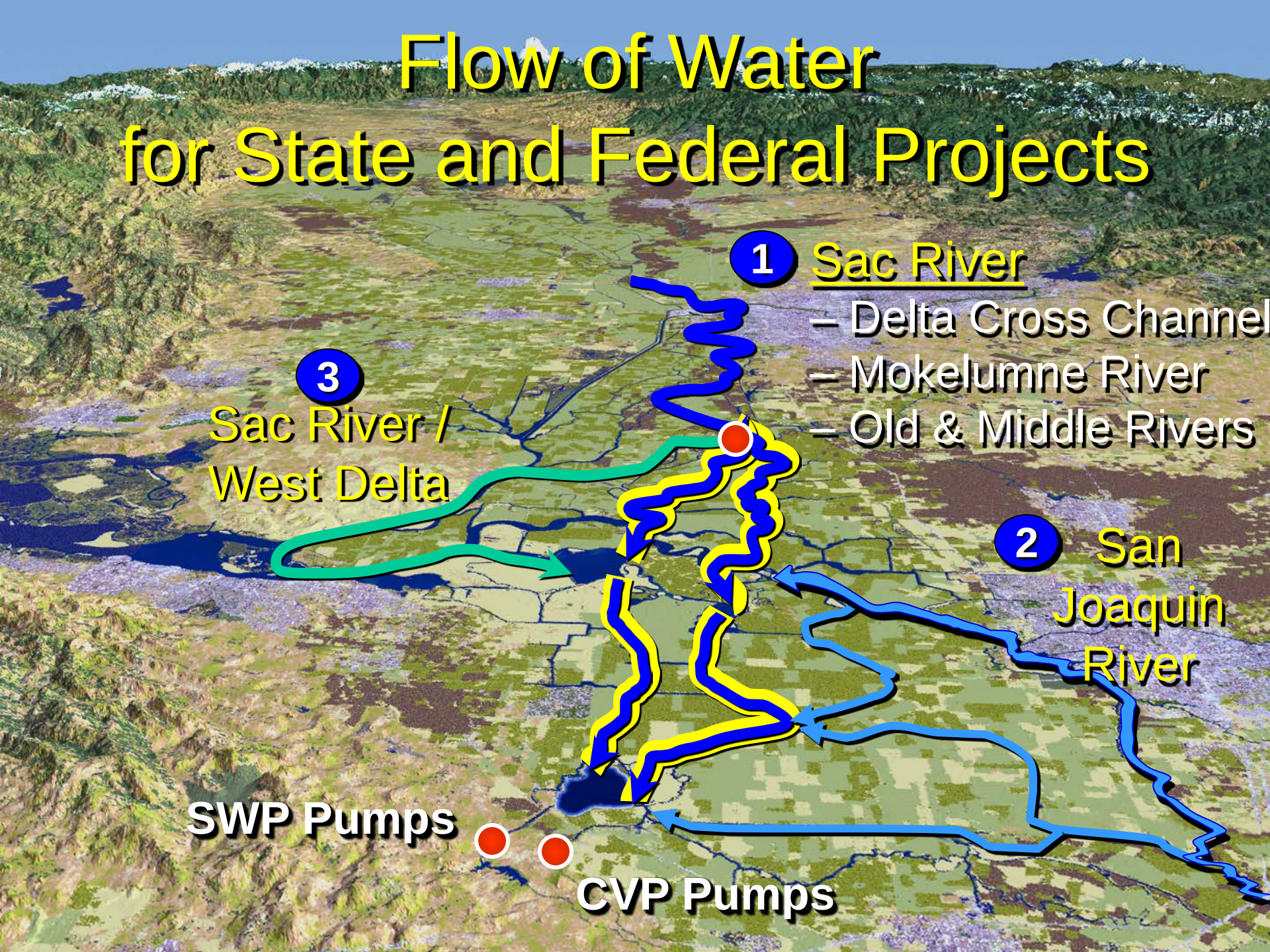


Total Annual
Runoff = 70.8 MAF

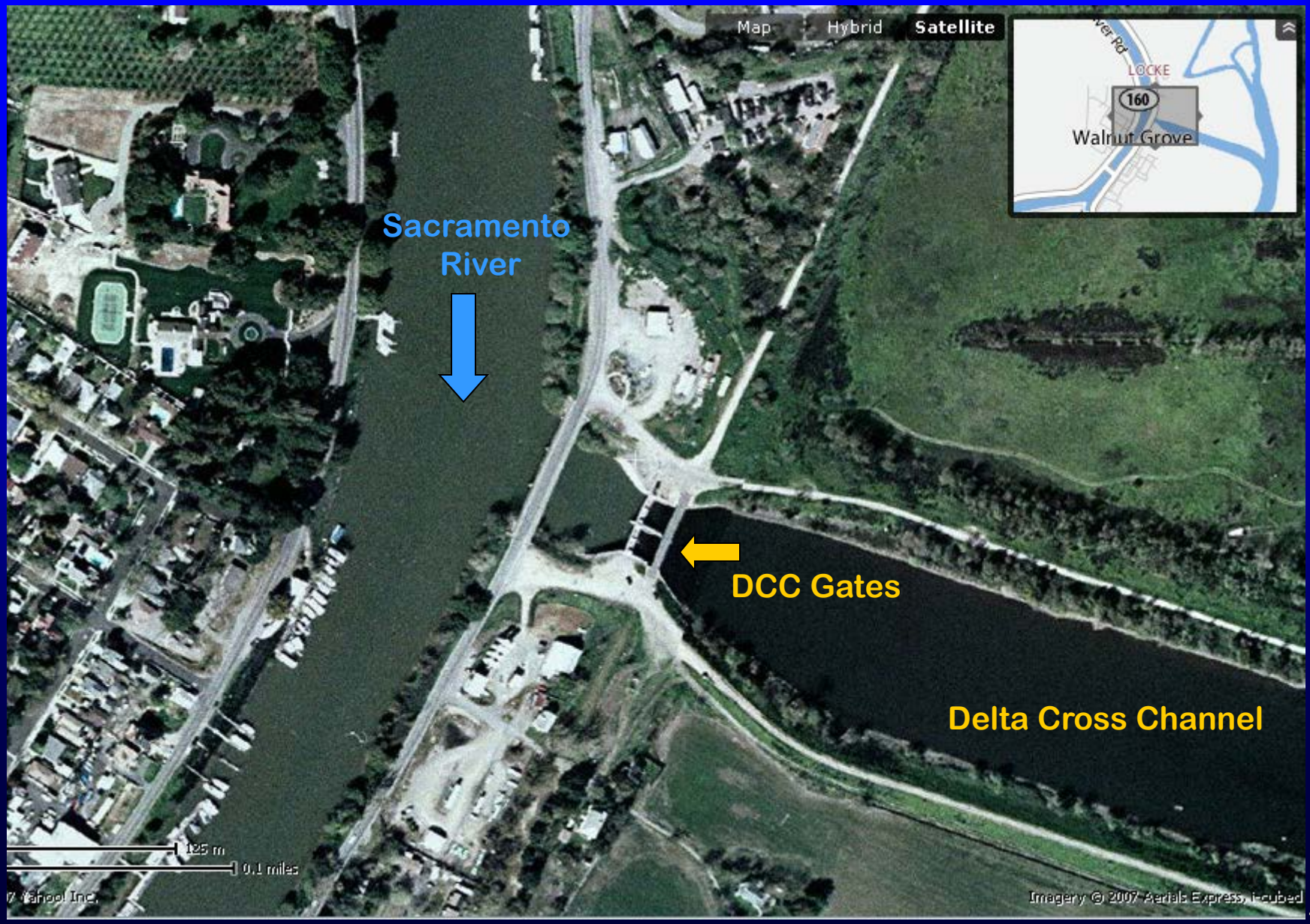


Delta Inflow Refresher




Flow of Water
for State and Federal Projects
1
Sac River
– Delta Cross Channel
– Mokelumne River
– Old & Middle Rivers
3
Sac River /
West Delta
2
San
Joaquin
River
SWP Pumps
CVP Pumps

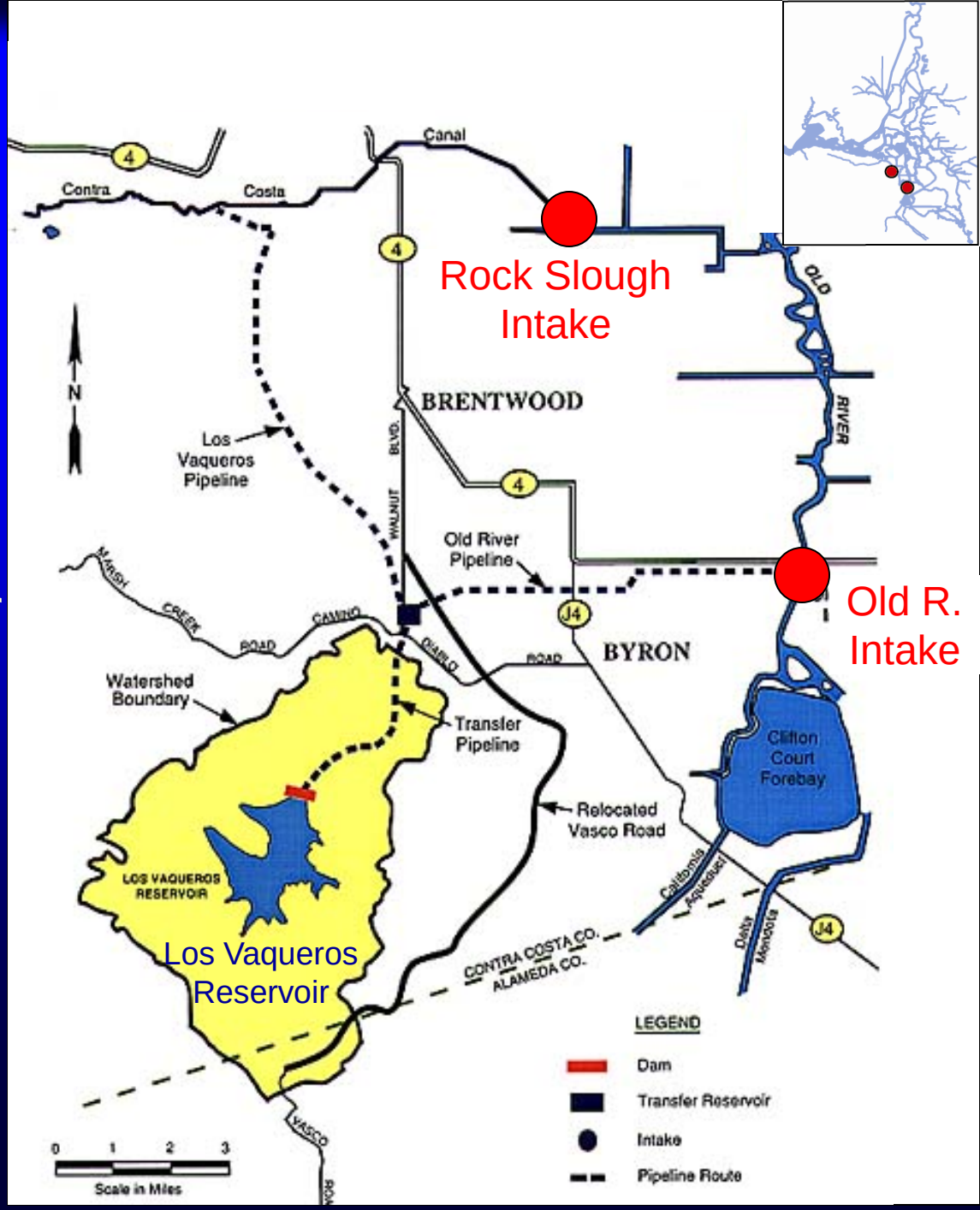
Delta Cross Channel

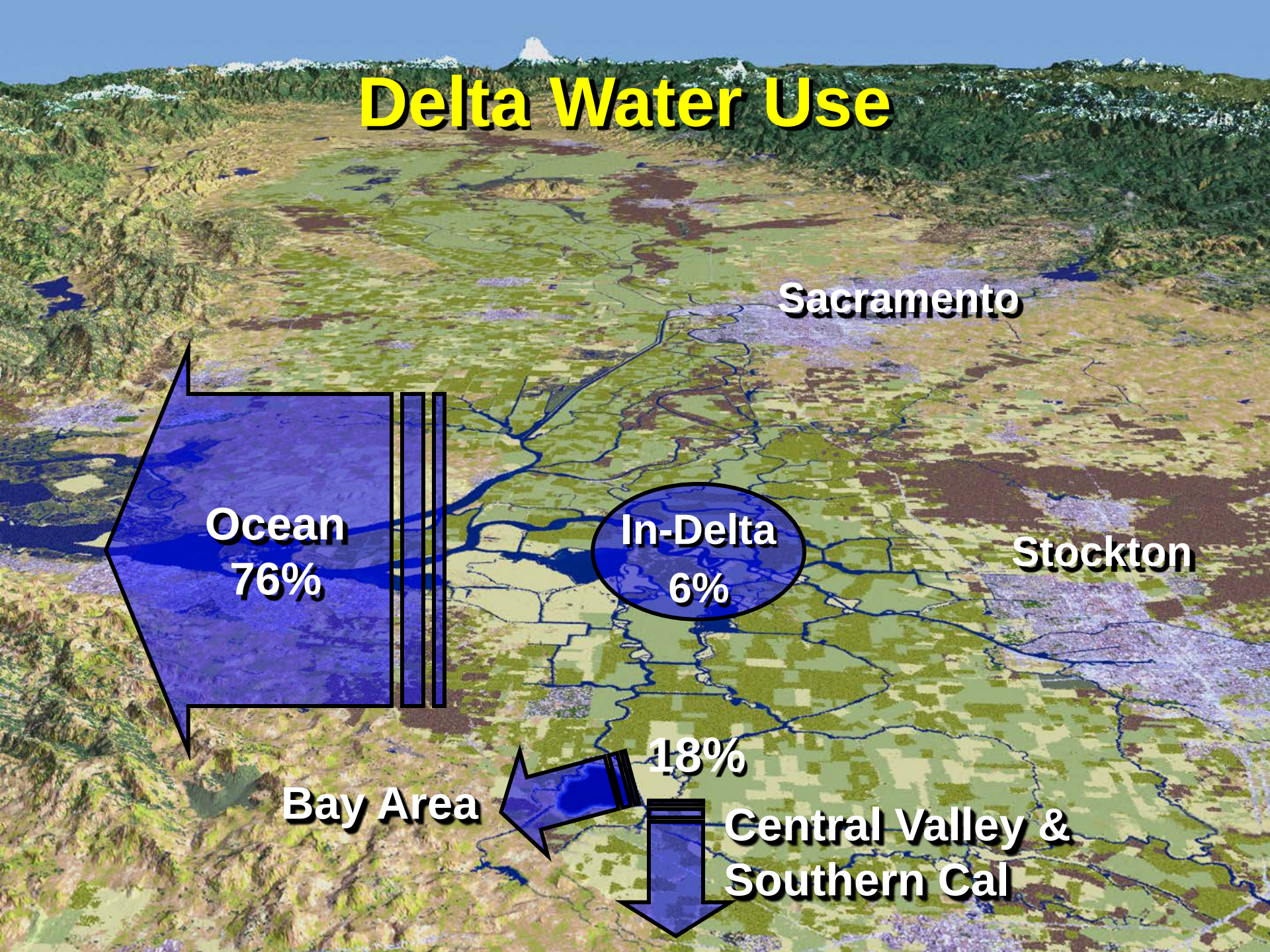



Skinner FF
Clifton Court Forebay
CCF Intake
Banks PP
Tracy PP
Tracy Fish Collection Facility

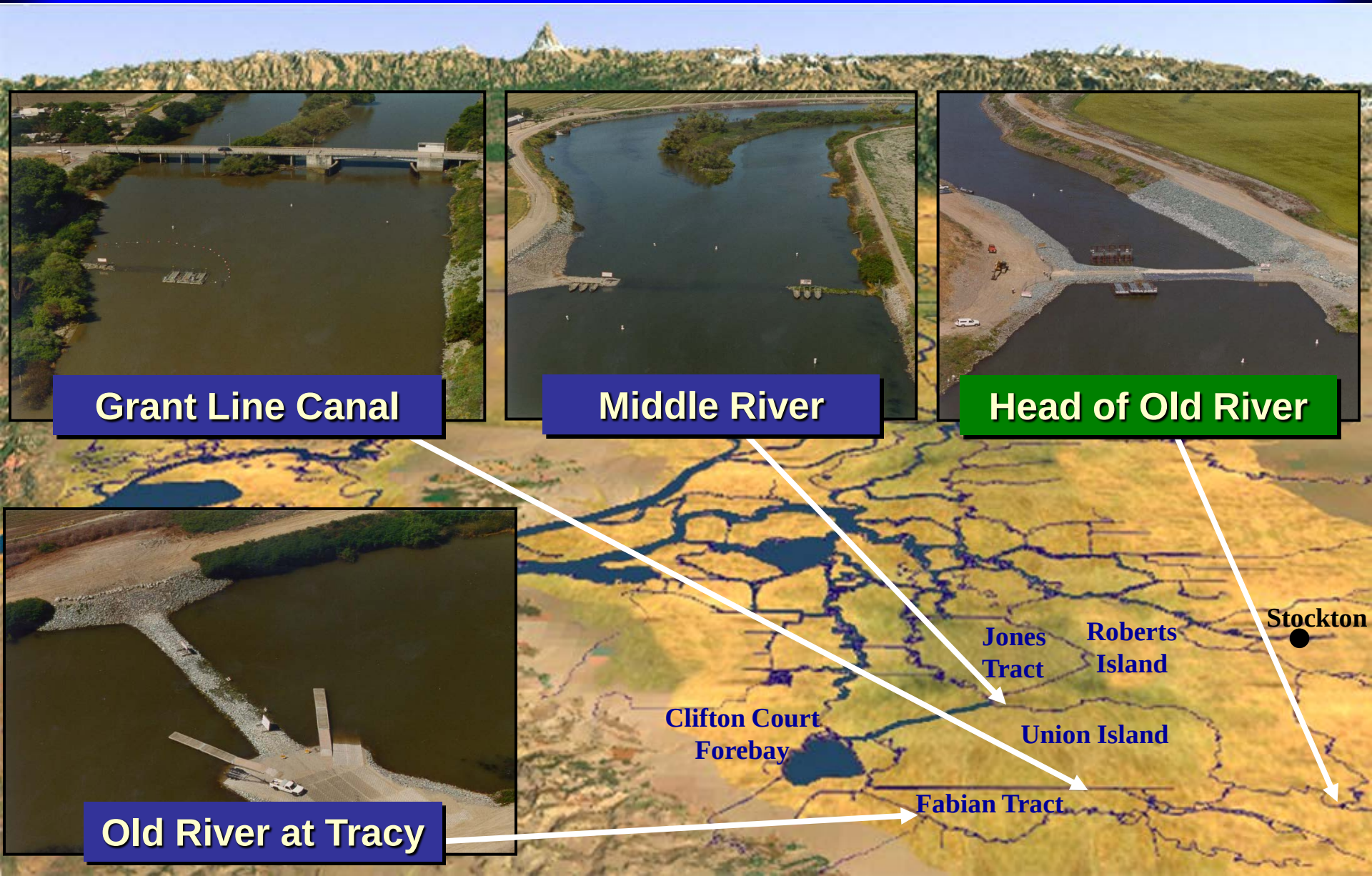
Contra Costa Water District

- 550,000 customers
- Contra Costa Canal
  - Rock Slough Intake (350 cfs)
- Los Vaqueros Reservoir
  - Old River Intake (250 cfs)
  - 100,000 ac-ft storage
  - Completed 1997



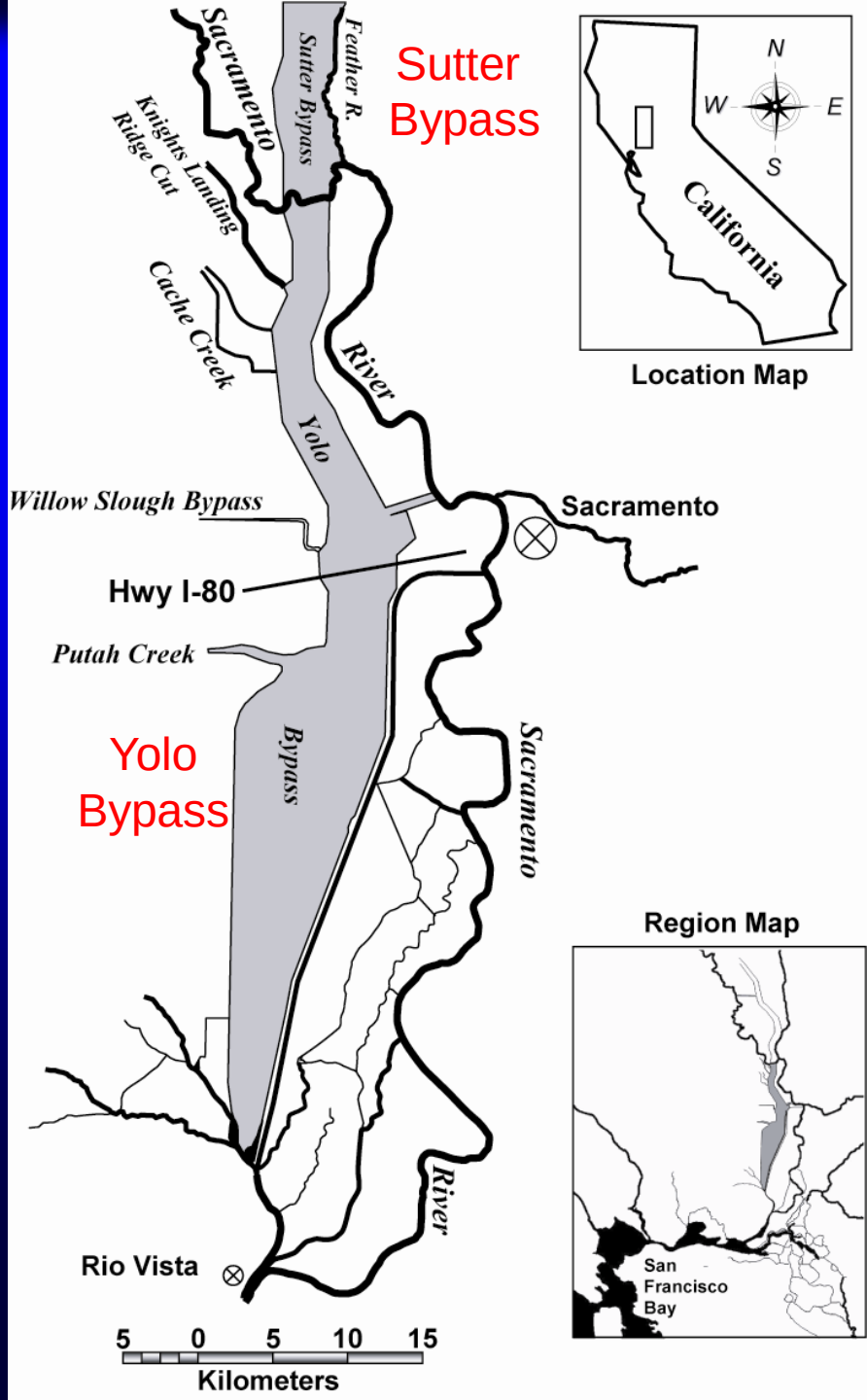

Delta Water Use
Sacramento
Ocean
76%
In-Delta
6%
Stockton
18%
Bay Area
Central Valley &
Southern Cal

South Delta Temporary Barriers

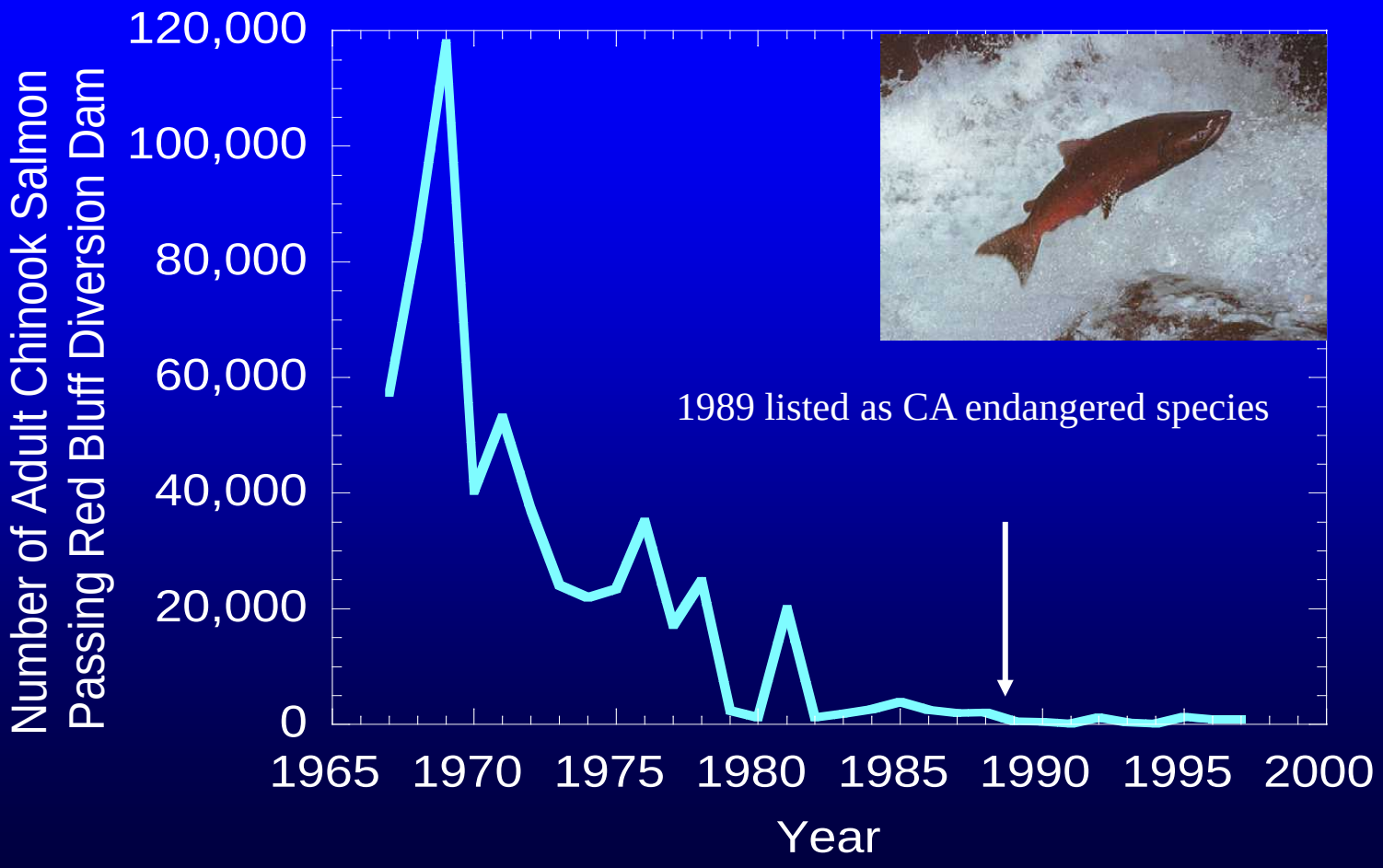


Flood Control and Fish

- Sutter Bypass
  - Tisdale Weir
- Yolo Bypass
  - 59,000 acres
  - Fremont Weir
    33.5 ft crest elev.
  - Vic Fazio Yolo Wildlife Area



Winter Run Chinook Salmon



Habitat (water, food, spawning)

- Fish listed under Endangered Species Act
  - Chinook Salmon
  - Delta Smelt

- Protecting listed fish
  - Take limits at SWP pumps
  - Reverse Flow controls
  - Biological opinions restrict other DWR activities

Bay-Delta Standards

Contained in D-1641

DRAFT

CRITERIA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FLOW/OPERATIONAL												
• **Fish and Wildlife**												
SWP/CVP Export Limits					1,500cfs [1]							
Export/Inflow Ratio [2]	65%		35% of Delta Inflow [3]				65% of Delta Inflow					
Minimum Delta Outflow	[4]						3,000 - 8,000 cfs [4]					
Habitat Protection Outflow			7,100 - 29,200 cfs [5]									
Salinity Starting Condition [6]		[6]										
River Flows:												
@ Rio Vista									3,000 - 4,500 cfs [7]			
@ Vernalis - Base		710 - 3,420 cfs [8]				[8]						
- Pulse					[9]					+28TAF		
Delta Cross Channel Gates	[10]		Closed			[11]					Conditional [10]	
WATER QUALITY STANDARDS												
• **Municipal and Industrial**												
All Export Locations					≤ 250 mg/l Cl							
Contra Costa Canal				150 mg/l Cl for the required number of days [12]								
• **Agriculture**												
Western/Interior Delta				Max.14-day average EC mmhos/cm [13]								
Southern Delta [14]		1.0 mS		30 day running avg EC 0.7 mS						1.0 mS		
• **Fish and Wildlife**												
San Joaquin River Salinity [15]				14-day avg; 0.44 EC								
Suisun Marsh Salinity [16]	12.5 EC		8.0 EC		11.0 EC					19.0 EC	[17]	15.5 EC