

Beyond the Peripheral Canal



ENVISIONING FUTURES
FOR THE SACRAMENTO-SAN JOAQUIN DELTA

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Envisioning Futures for the Sacramento-San Joaquin Delta - Report and Project

- **Delta possibilities and alternatives through a technical/scientific process**
- **Non-partisan and non-stakeholder effort**
- **Content developed in year-long collaboration among authors, with broader discussions**
- **Initiated and published by the Public Policy Institute of California (PPIC)**
- **Co-sponsored by UC Davis and PPIC**

Major Themes

- **Current Delta is unsustainable for almost all stakeholders**
- **Improved understanding of the Delta provides opportunities for new solutions**
- **Promising alternatives exist**
- **Most Delta users have ability to adapt**
- **Promising solutions are unlikely to arise from a stakeholder-only process**

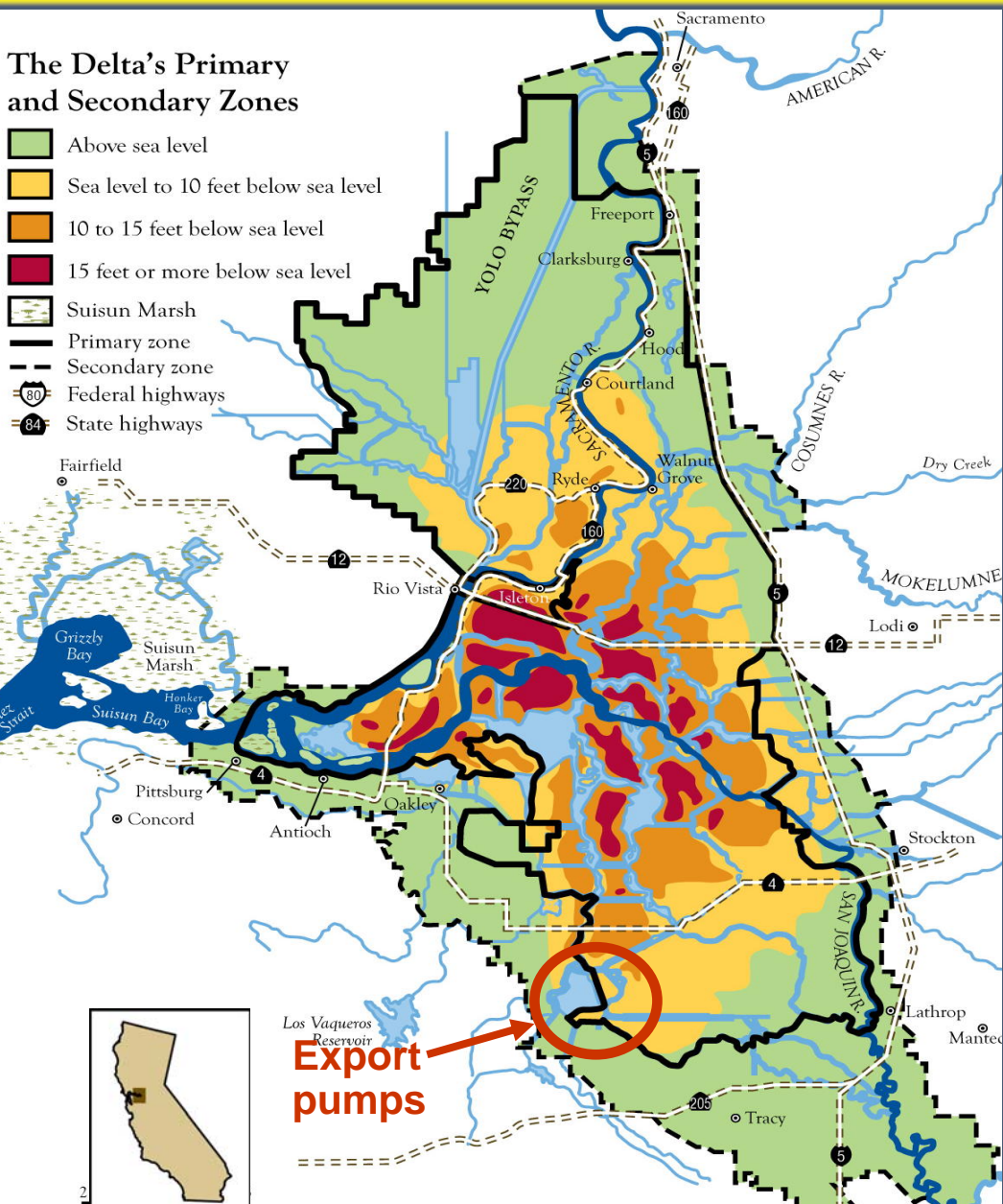
Outline

- Why the Delta matters
- California's Delta crisis
- New thinking: ecosystem and adaptation
- Some long-term alternatives
- Screening of alternatives
- Recommendations

The Sacramento-San Joaquin Delta

The Delta's Primary and Secondary Zones

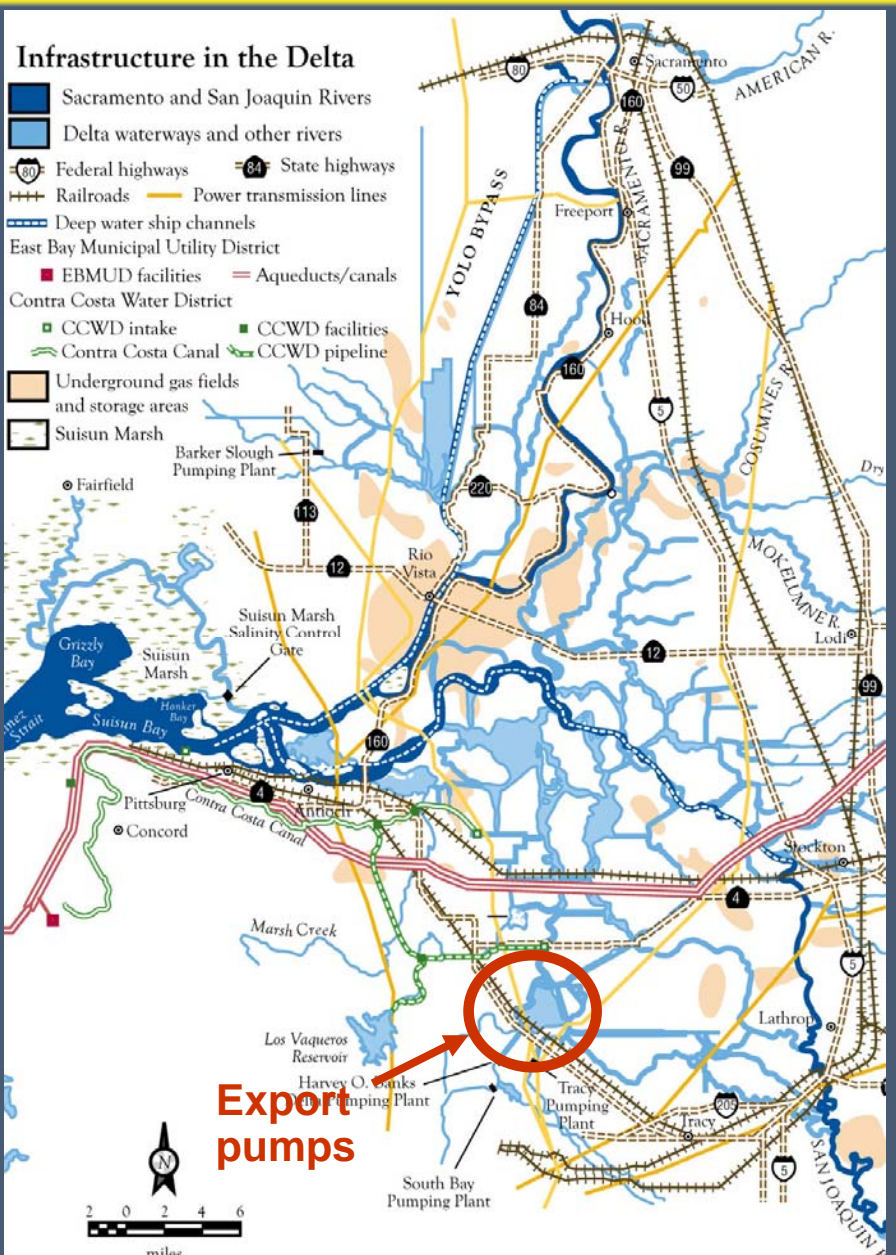
- Above sea level
- Sea level to 10 feet below sea level
- 10 to 15 feet below sea level
- 15 feet or more below sea level
- Suisun Marsh
- Primary zone
- Secondary zone
- Federal highways
- State highways



Export pumps

Infrastructure in the Delta

- Sacramento and San Joaquin Rivers
- Delta waterways and other rivers
- Federal highways
- State highways
- Railroads
- Power transmission lines
- Deep water ship channels
- East Bay Municipal Utility District facilities
- Contra Costa Water District facilities
- CCWD intake
- CCWD facilities
- Contra Costa Canal
- CCWD pipeline
- Underground gas fields and storage areas
- Suisun Marsh



Export pumps



Why the Delta Matters to Californians



Water Supply



Agriculture



Ecosystem



Infrastructure



Recreation



Housing

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- Conclusions and recommendations

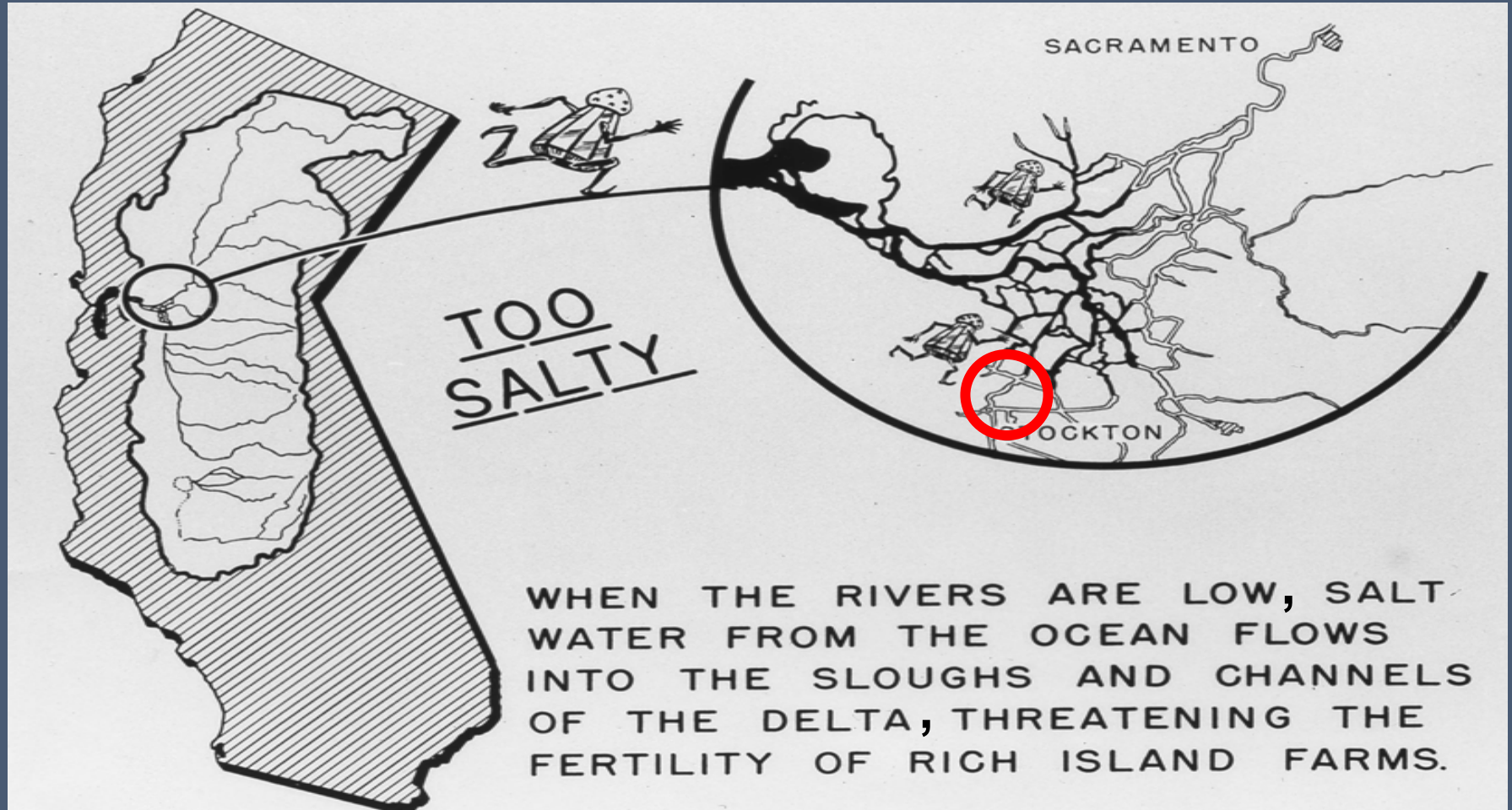
A Three-pronged Crisis

- **Levees at increasing risk**
 - Sea level rise and sinking land
 - Floods and earthquakes
- **Steep declines in many fish species**
 - Many are “listed”
 - Culprits: invasive species, habitat loss, pumps
- **Governing institutions lacking**
 - Resurgence of legal actions

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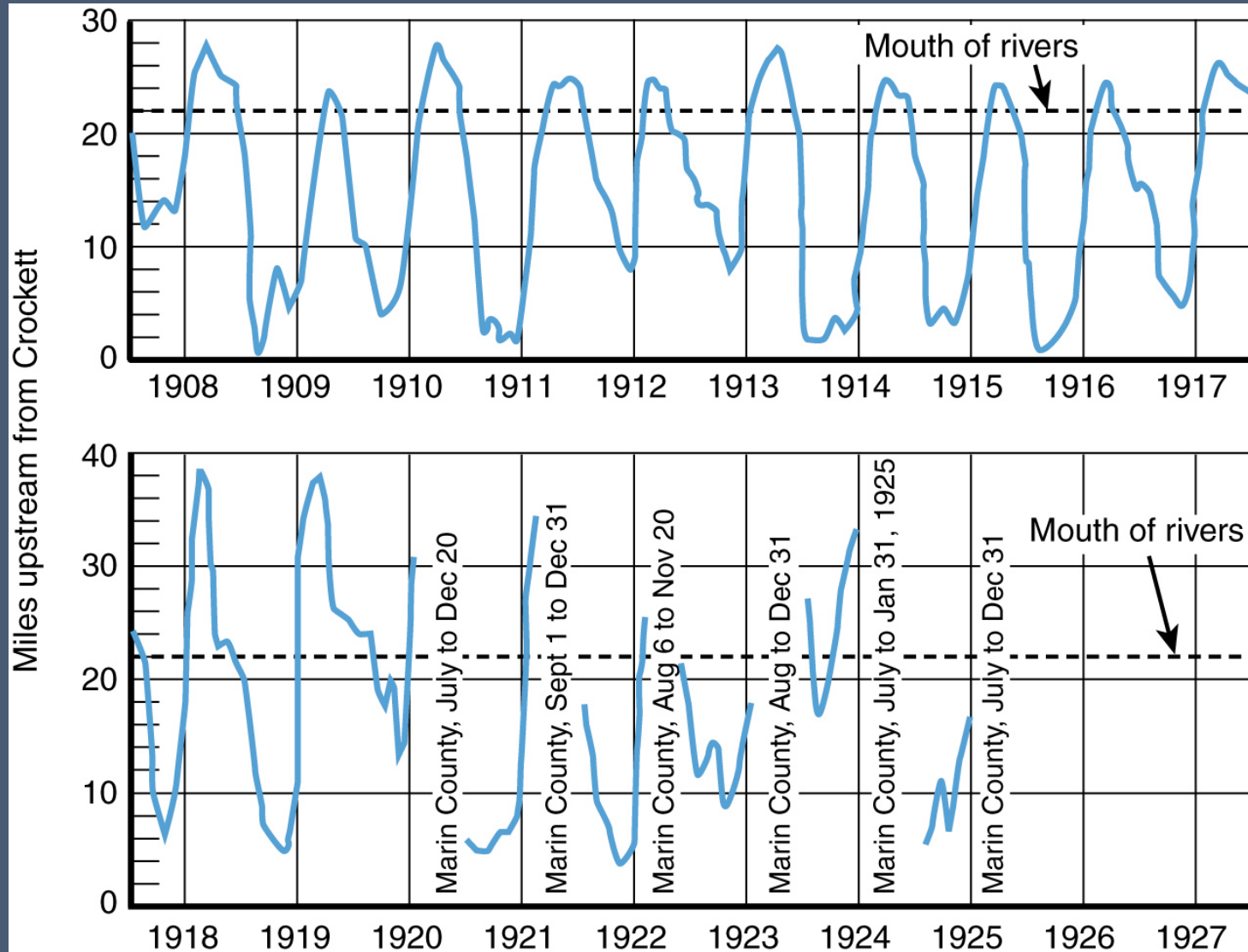
Since 1920s, California Policy Has Aimed to Keep the Delta Fresh



1945 USBR report

- Delta farmers and water exporters benefit from low salinity

Historically, Delta Salinity Fluctuated



SOURCE: Young (1929), Plate 9-1.

Static, Freshwater Delta Not Good for Native Species

- Native species evolved in a fluctuating Delta
- Alien species have taken hold and harm native species
- Alien species do best with constant salinity (fresh or saline)
- Restoring fluctuating conditions may be key to native species' survival



Asiatic clam



Brazilian waterweed



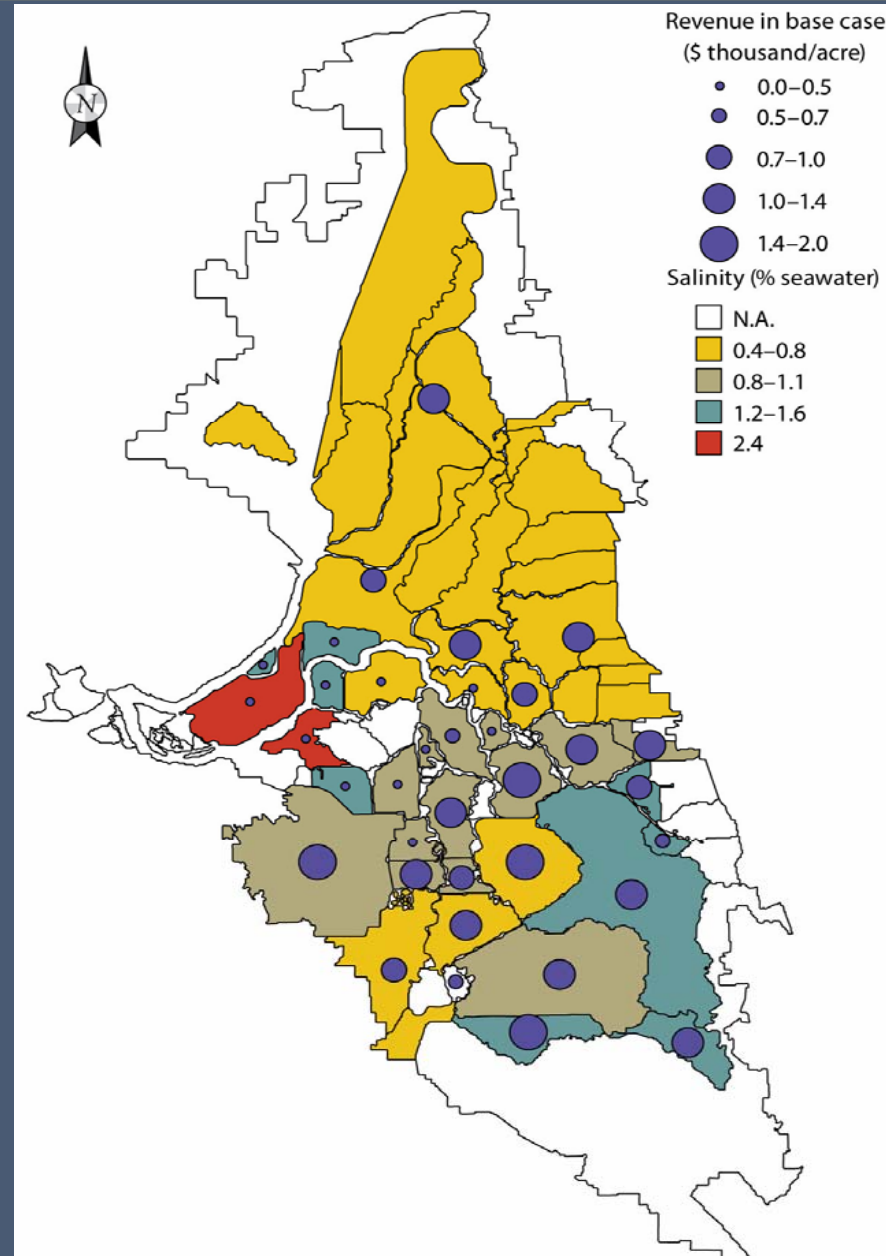
Overbite clam

Adaptation Will Occur

- **Adaptation is unavoidable, since the current Delta is unsustainable**
- **All interests can adapt to some changes in Delta policy**
- **Available tools for urban and farm sectors**
 - **New interties, water marketing, conservation**
 - **Conjunctive use of SW and GW, recycling and desalination**
 - **Shifting crop mixes**
- **Economic costs are finite, but can be large for some water users**

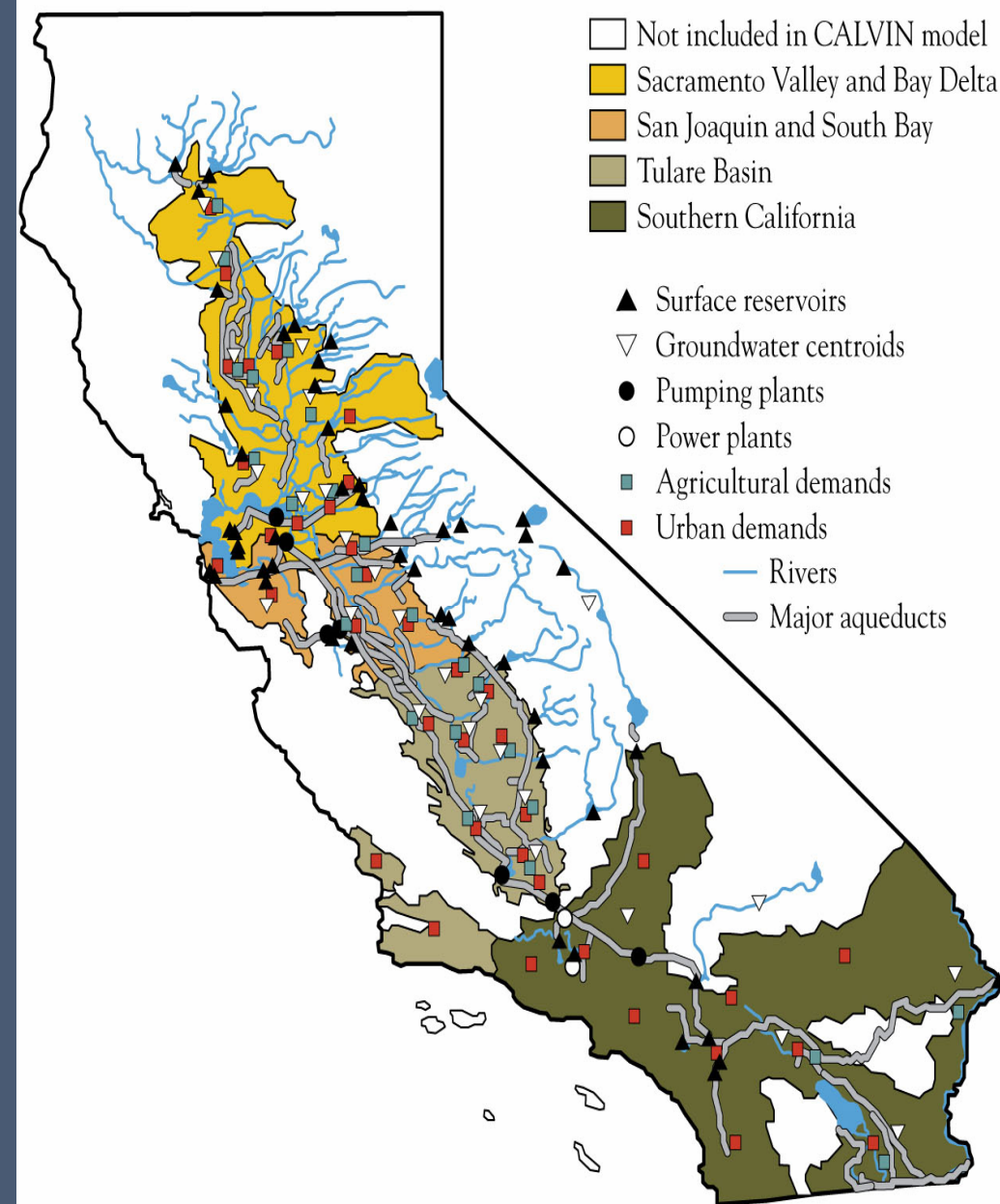
Adaptation Potential of Delta Agriculture to Changes in Salinity

- New tool: Delta agricultural production model (DAP)
- Currently: Low productivity in western and central Delta
- Salinity increases would reduce profits, but large areas of Delta not likely to be affected



Statewide Costs of Changing Delta Water Management

- Statewide integrated engineering-optimization model (CALVIN)
- Integrates hydrology, infrastructure, operations, economic performance, and environmental flows
- Models economical adaptations to changed conditions



Why We Need a New Delta Policy

- Existing Delta policy is unsustainable
 - All interests are getting worse together
- Delta failure would be disastrous for state, regional, and local interests
- Better ecosystem understanding points to promising new solutions
- Stakeholders can better adapt to new solutions than continue with the current high-risk policy
- Promising alternatives exist

Outline

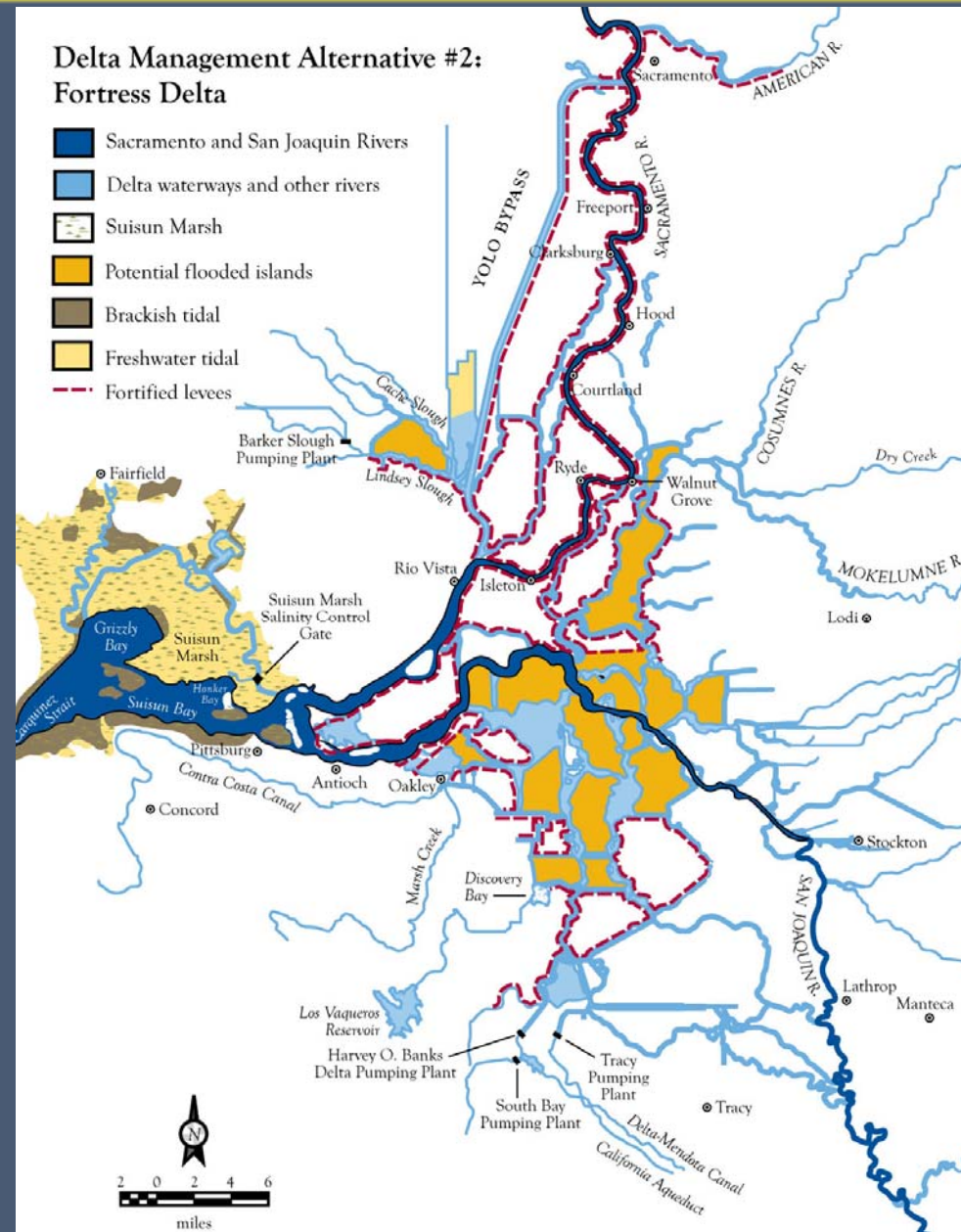
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Nine Delta Alternatives

- **Freshwater Delta**
 - Two levee-based alternatives
 - Physical salinity barrier
- **Fluctuating Delta**
 - Two peripheral canal alternatives
 - Armored-island aqueduct
- **Reduced-exports Delta (*also fluctuating)**
 - Opportunistic Delta*
 - Eco-Delta*
 - Abandoned Delta

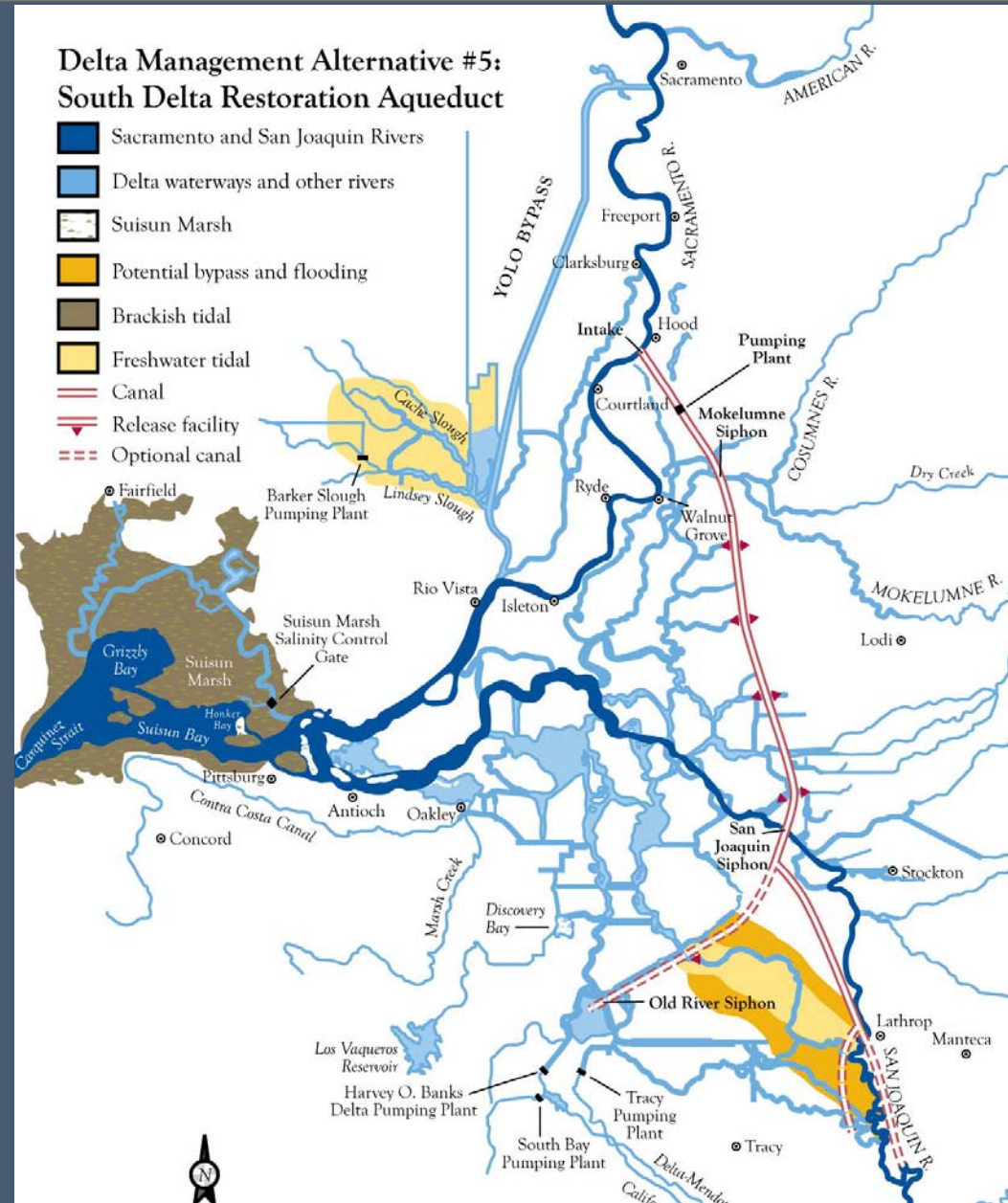
2) Fortress Delta: Dutch Standards of Flood Protection – A Big Jump

- Keeps Delta fresh
- Strategic levees become much more reliable...
- Aids urbanization
- ...but many islands lose protection



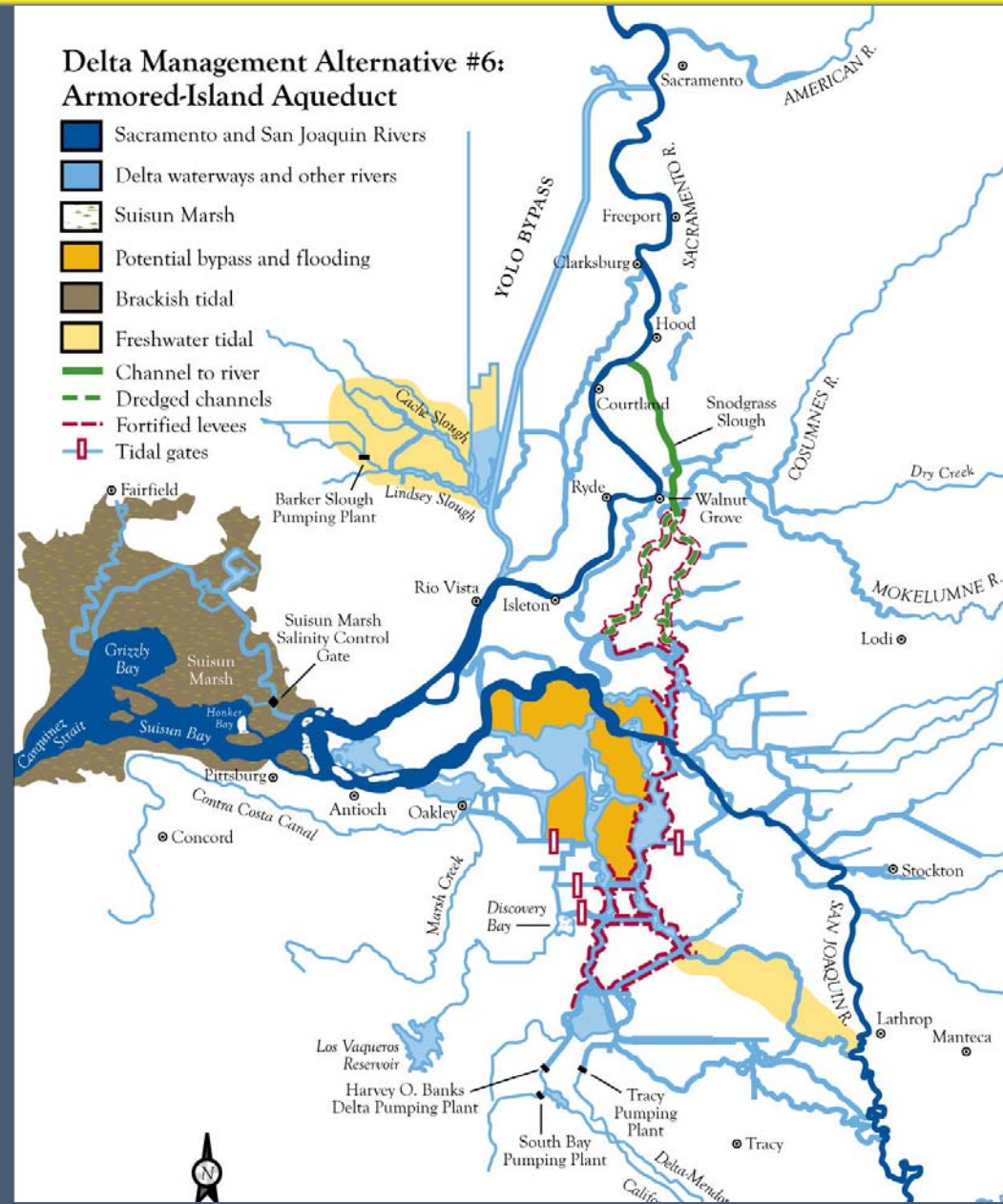
5) South Delta Restoration Aqueduct: A New Peripheral Canal Idea

- Improves S. Delta and lower San Joaquin River water quality
- Ends VAMP, S. Delta Barriers, Stockton Ship Channel programs
- Lower San Joaquin flood bypass for flood control and ecosystem benefits



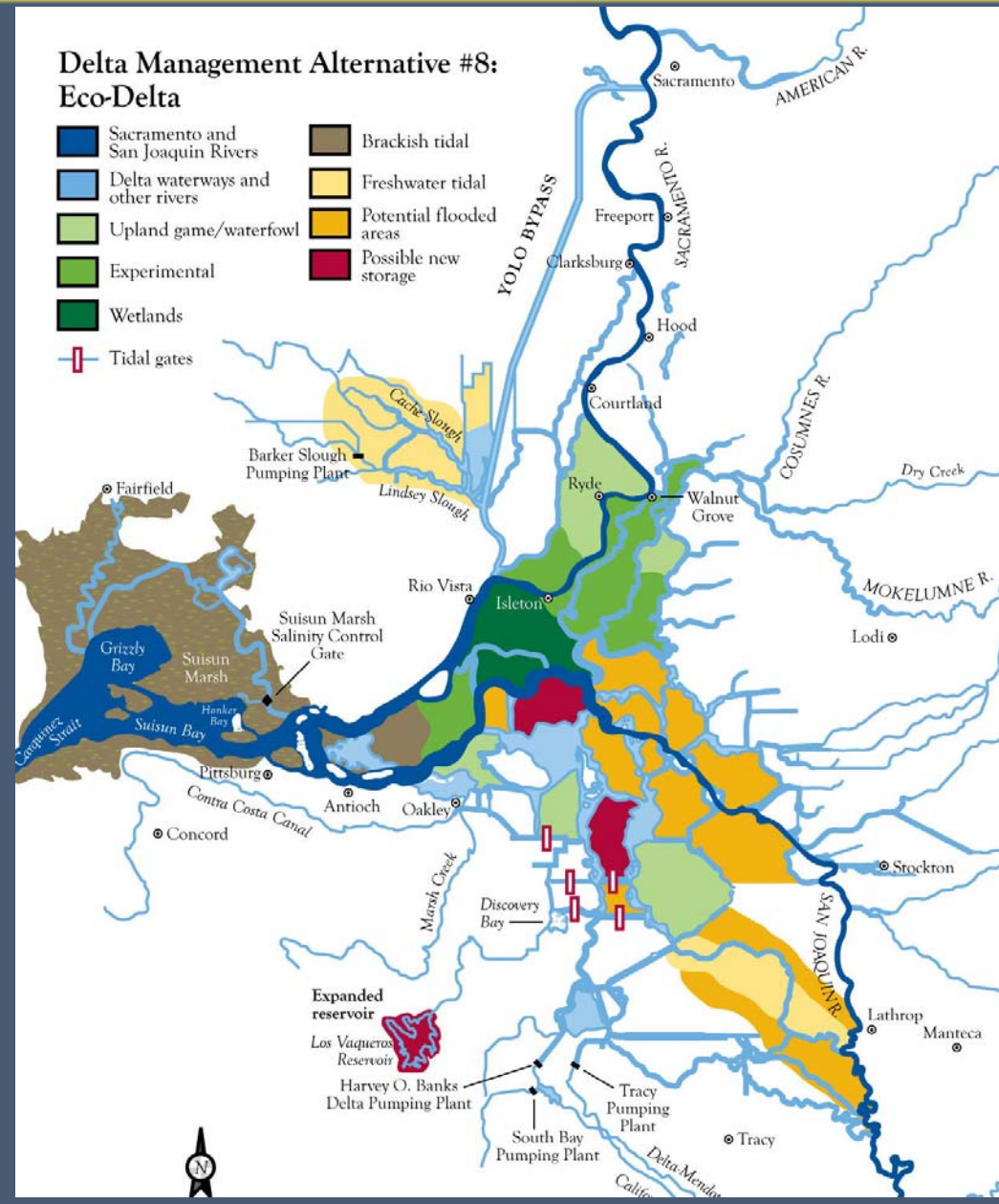
6) Armored-Island Aqueduct: A Through-Delta Solution

- Armor main channels, close others to maintain conveyance
- Keeps eastern Delta fresh
- Allows western and central Delta to fluctuate



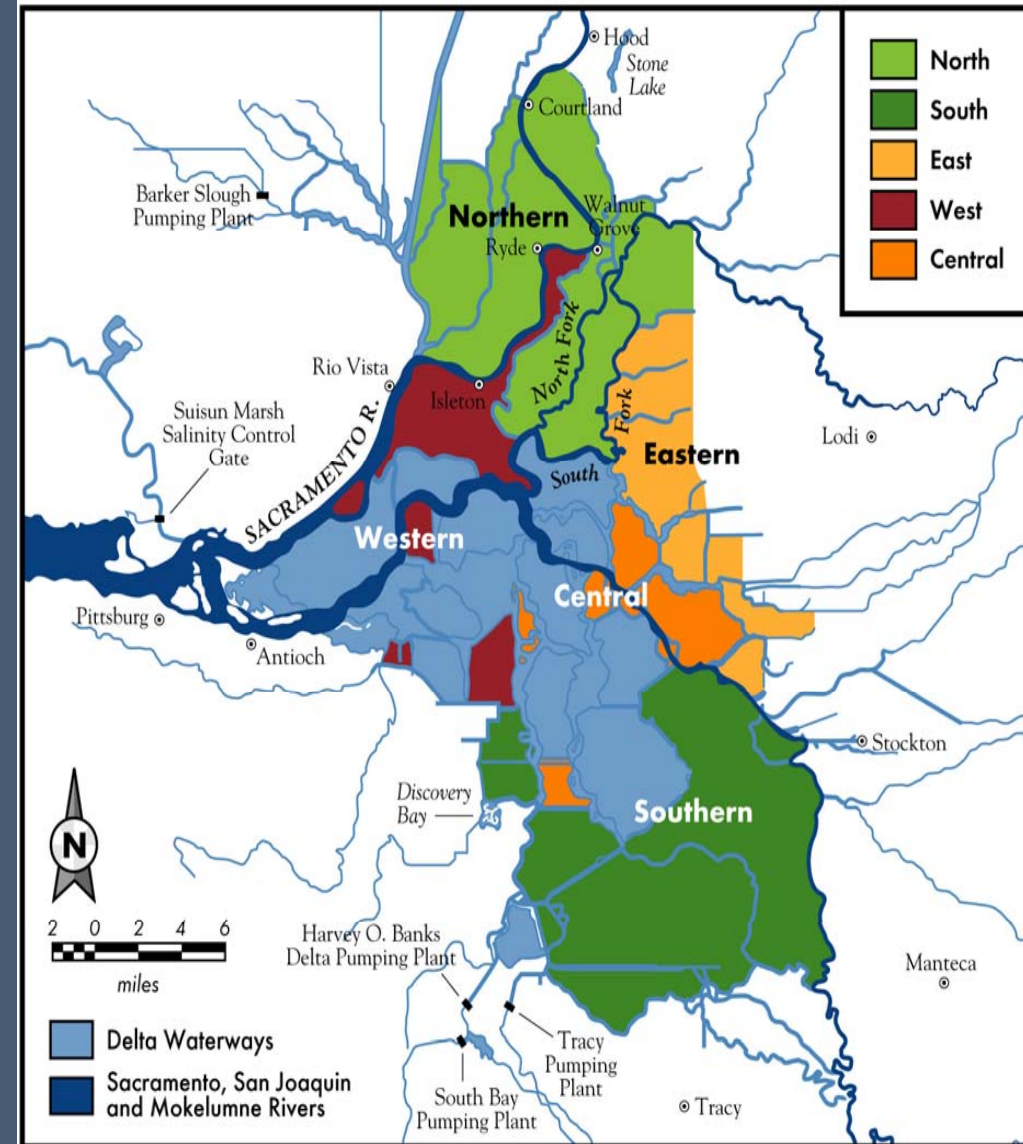
8) Eco-Delta: An Example of Local Specialization

- Allows opportunistic pumping, but at lower levels
- Promotes fluctuating western Delta
- Specialized restoration of islands, bypasses



9) Abandoned Delta: Letting Nature Take its Course

- Abandon an unreliable resource
- 2-in-3 probability of abrupt change from earthquake or flooding
- End of water exports
- Salinity fluctuations in western Delta



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Fluctuating Delta Alternatives Are Most Promising

Alternatives	Environmental Performance	Annual Water Exports	Economic and Financial Costs
1. Levees as Usual	Poor	0 – 6+ maf	~\$2 Billion + failures
2. Fortress Delta	Poor	6+ maf	> \$4 Billion + lost islands
3. Saltwater Barrier	Poor		\$2 – 3 Billion + lost islands
4. Peripheral Canal Plus	Promising - allows Delta to fluctuate		\$2 – 3 Billion + < \$70 M/year
5. South Delta Aqueduct			\$2 – 3 Billion + < \$41 M/year
6. Armored-Island Aqueduct	Mixed		\$1 – 2 Billion + < \$30 M/year
7. Opportunistic Delta	Promising	2 – 8 maf	\$0.7 – 2.2 Billion + < \$170 M/year
8. Eco-Delta	Best?	1 – 5 maf	Several \$ Billion + < \$600 M/year
9. Abandoned Delta	Poor	0	\$500 Million + ~\$1.2 Billion/year

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Steps Needed for a Long-term Solution

- Focus on promising alternatives
- Create technical track to explore solutions with problem-solving R&D
- Enhance regional and statewide representation in Delta land use decisions (e.g. SF BCDC)
- Implement “beneficiaries pay” financing
- Establish mitigation mechanisms – everyone will **not** “get better together”

“No Regrets” Short-term Actions

- **Emergency preparedness**
- **“Do not resuscitate” list for some islands**
- **Delta land use**
 - **Flood control guidelines for urbanization**
 - **Habitat protection**
- **Restoration projects for pelagic fish habitat**

Questions?

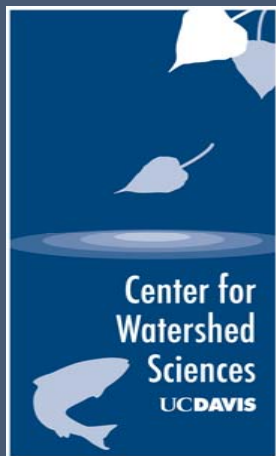
- Full report, research brief, and other materials at: www.ppic.org and watershed.ucdavis.edu



Abandoned Delta



Dutch North Sea Levee



Eco-Delta

**Public Policy
Institute of
California**

Begin Delta Solutions Program

- **Develop a solution-oriented scientific and technical program**
- **Relatively quick study examples**
 - **Biological habitat objectives**
 - **Hydrodynamics of salinity fluctuation**
 - **Institutions for guarantees and beneficiary pays**
 - **Island economics and risks**
 - **Initial water operations and economics**
- **Technical support to policy process**