

**Department of Water Resources**

**Division of Flood Management**

# **Integrated Sustainable Water Management In California**

**National Conference on Ecosystem Restoration 2011**

**PUBLIC SAFETY**

**ENVIRONMENTAL STEWARDSHIP**

**ECONOMIC STABILITY**

# What Is It?

- Integrated
  - Flood Risk Reduction
  - Ecosystem Restoration
  - Water Supply
- Sustainable
  - Viable now and in the future
- Water Management
  - Where and when water flows

# Historical Flooding



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# Responding to Flood Hazards in California

## RESPONSE & COORDINATION

In general, emergency response starts with local response agencies. As the ability of local agencies to deal with any emergency are exceeded, they call upon other county, regional, State, and finally Federal agencies to provide assistance. For flood related emergencies in California, the California Department of Water Resources's State-Federal Flood Operations Center (FOC) is legally responsible for coordinating all State level flood response activities.

The following are some of the key agencies that work together to prepare for and respond to flood emergencies in California:

Flood Response Agency	Federal	State	Local
National Weather Service (NWS)	✓		
US Army Corps of Engineers (USACE)	✓		
US Bureau of Reclamation (USBR)	✓		
Governor's Office of Emergency Services (OES)		✓	
California Department of Water Resources (DWR)		✓	
County Offices of Emergency Services			✓
Reclamation Districts (RDs) or Levee Districts (LDs)			✓

## PLANNING BASED ON FLOOD HAZARD-TYPE

California population centers are principally threatened by 4 types of flood hazards. Each of these hazard-types has a different duration and spatial extent. Similar hazard types can benefit from similar preparedness and response strategies. While the legal authority for DWR and the basic resources at its disposal will be the same for any event, type-specific plans will improve DWR's role in coordinating large-scale emergency response efforts.

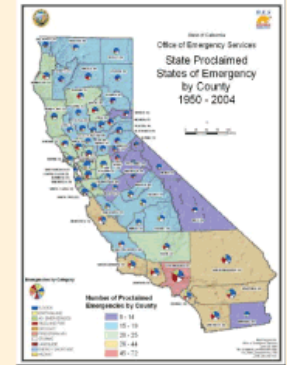
## DIFFERENCES OF FLOOD HAZARD-TYPES

Characteristic	Alluvial Fans	Banked Rivers / Headwaters	Coastal / Tidal Estuaries	Deep Floodplains
Time to Peak	Hours	Hours	Days	Days
Duration of Flood	Hours	Weeks	Seasonal	Weeks
Area Flooded	Small	Small	Medium	Large
Drainage Area	Small	Medium	Variable	Large
Characteristic Storm	Thunderstorm	Winter	Winter & Spring Tide	Winter & Spring Melt
High Sediment Load	Yes	No	No	No
Man-Made Levees	Rare	Rare	Variable	Common



### Example Locations of Local Flood Hazards

- A** Alluvial Fan
- B** Banked Rivers / Headwater Regions
- C** Coastal / Tidal Estuary
- D** Deep Floodplain

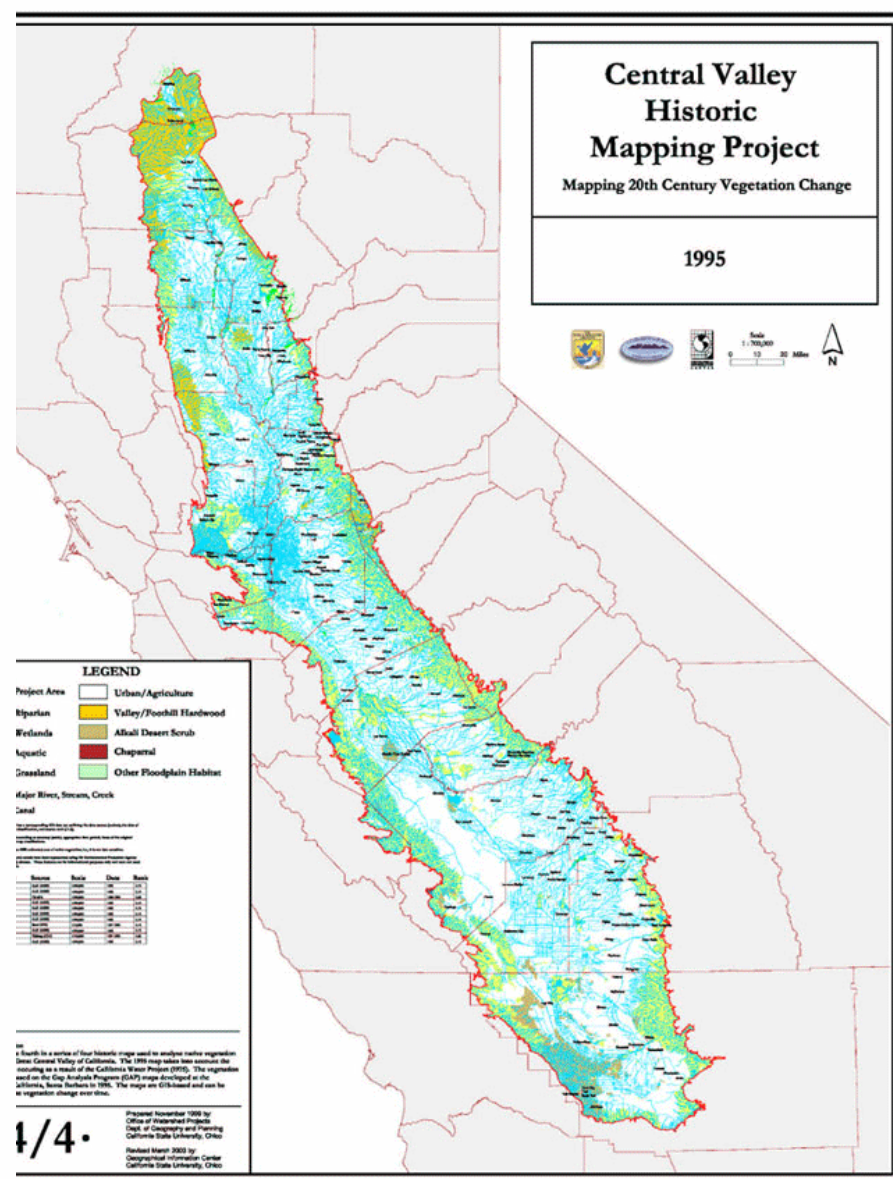
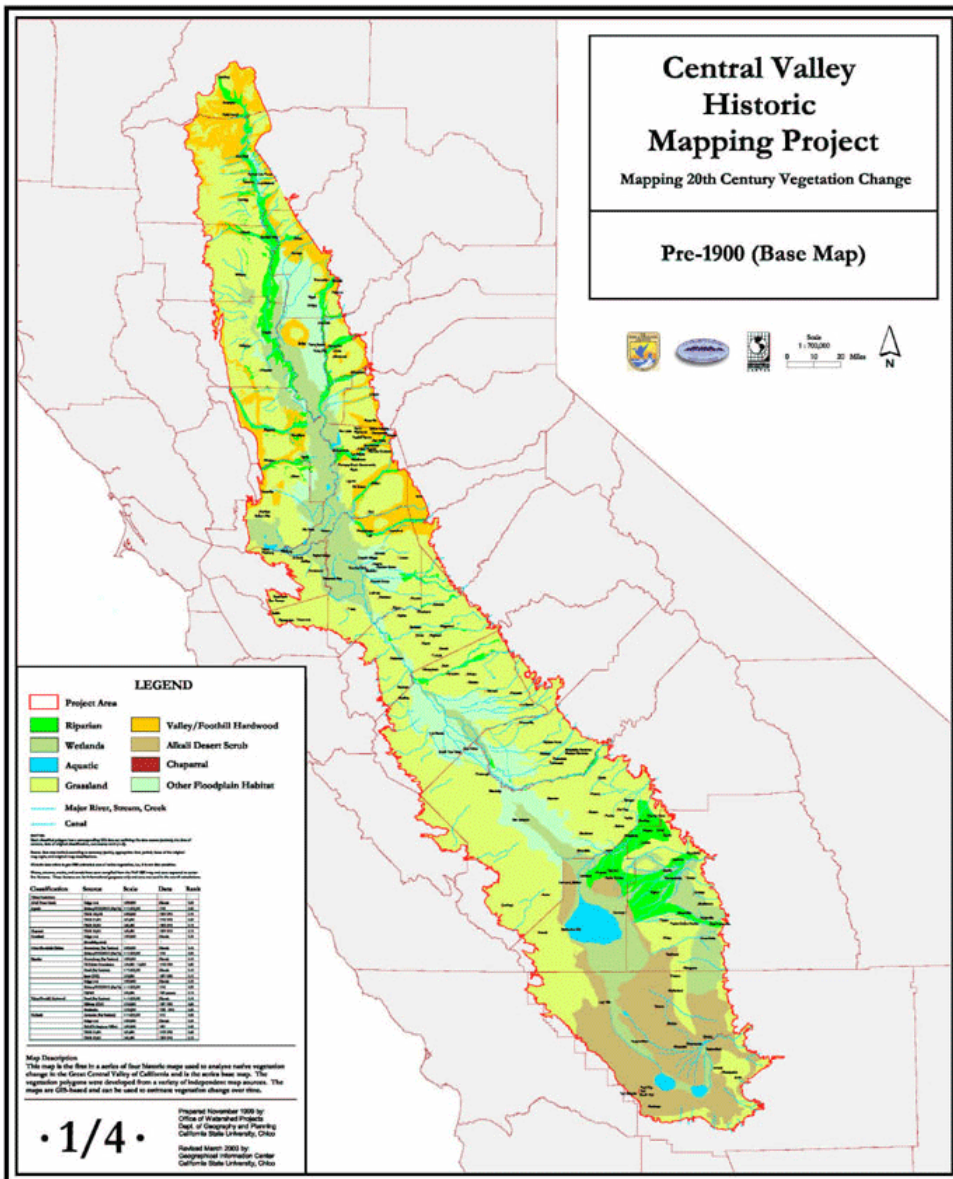


## FLOOD HAZARD-TYPES

The duration and spatial extent of flooding in different hazard types is a function of both the local geography and hydrology.

- A** Alluvial Fans have no defined river channel. They are formed when fast moving mountain streams slow down on flatter plains.
- B** Banked Rivers and Headwater Regions typically are located in mountainous and hilly terrain. They have defined natural banks that quickly pass flood waters.
- C** Coastal and Tidal Estuaries are formed where rivers meet the ocean. They are subject to daily tidal action and often have a complex network of braided channels that form small flood prone islands.
- D** Deep floodplains are located in flatlands that are prone to seasonal flooding. Flood waters travel slowly through these areas. These areas are often protected by levees.

# Central Valley Habitat Loss

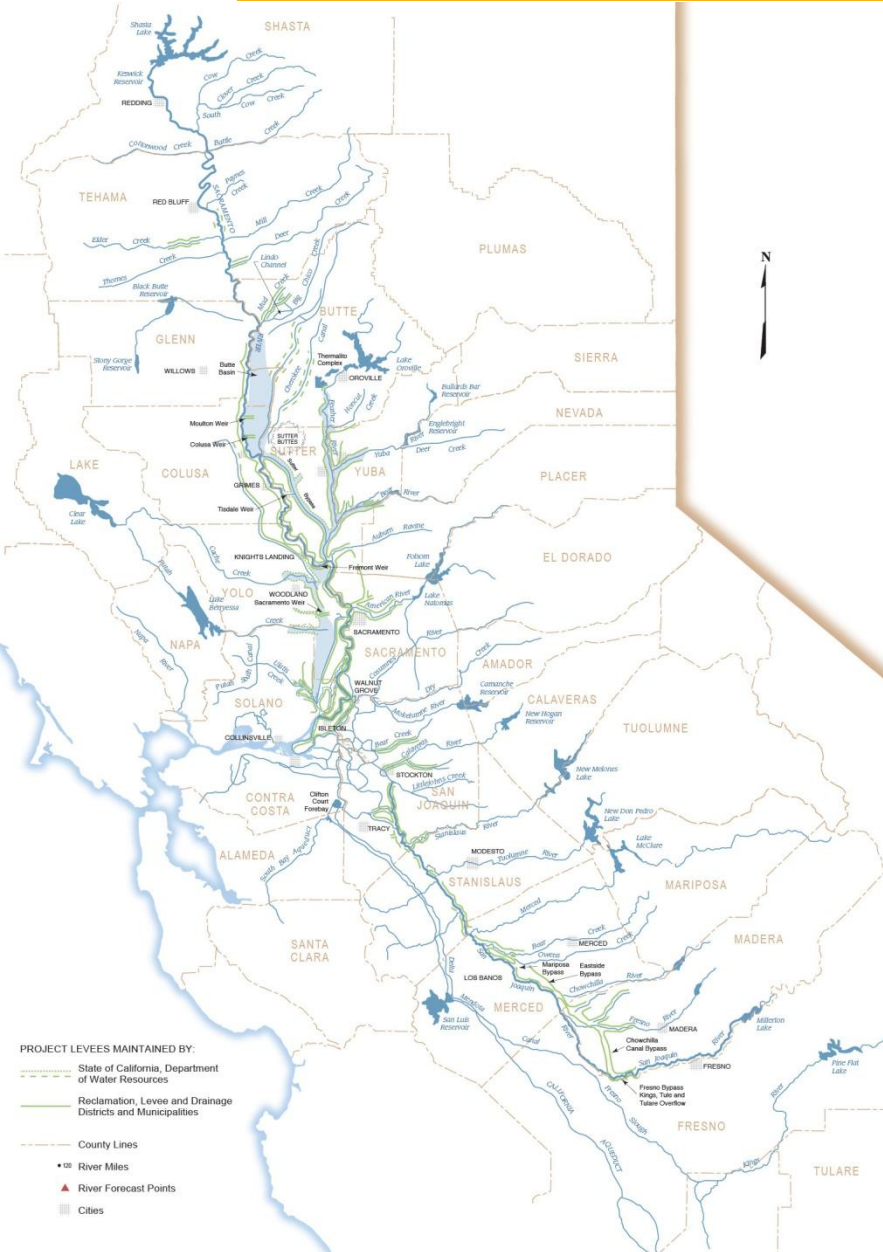


# Systemwide

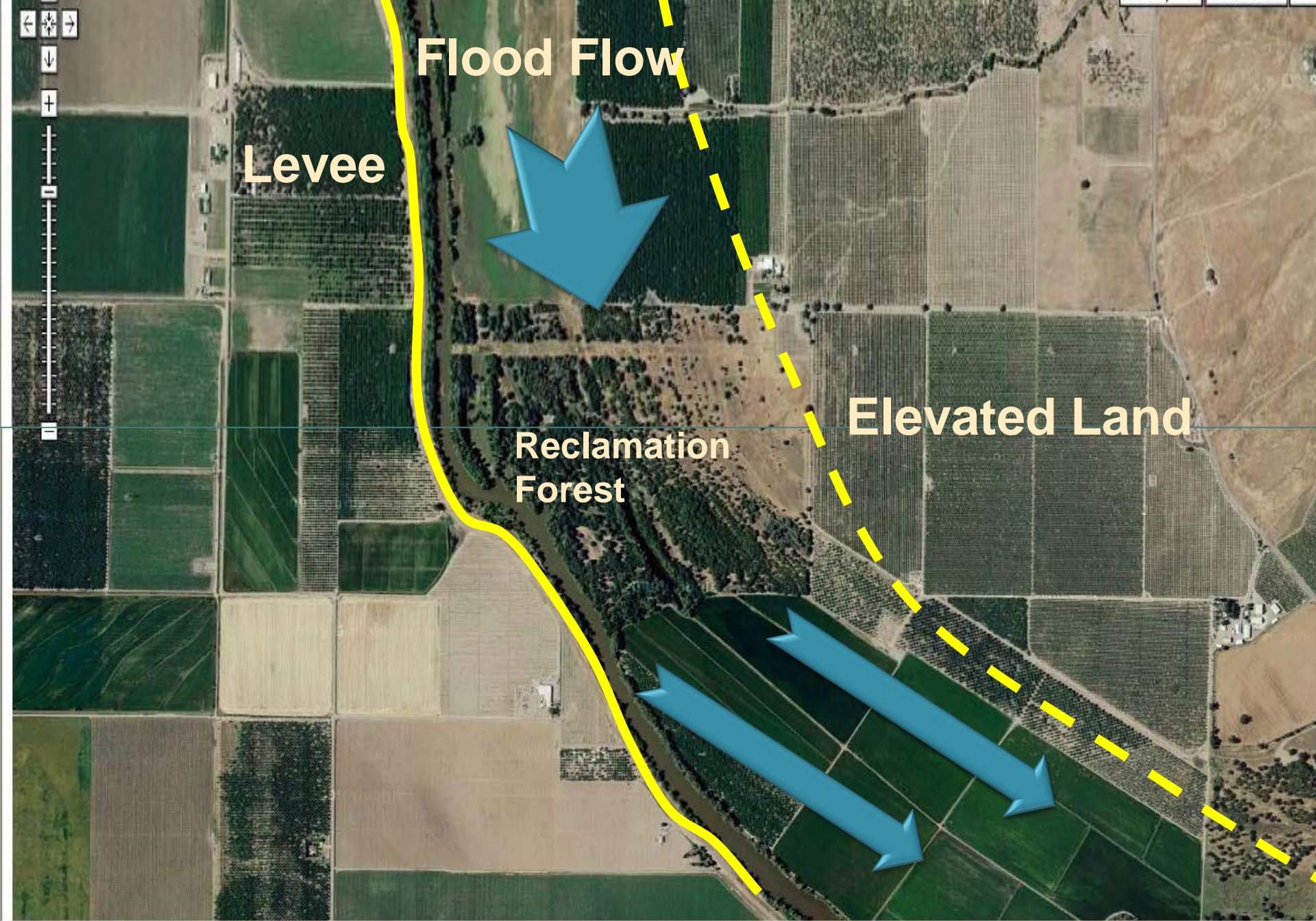
Coupling Flood Protection, Water Supply, and Ecosystem Restoration leads to multiple benefits

- Analyzing the entire system for cost efficient projects
- Identifying Flood Risk Reduction measures with habitat and or water supply benefits
- Planning to implement those projects best suited to benefit integrated water management

# Integration is Not New



RONMENT



Flood Flow

Levee

Reclamation  
Forest

Elevated Land

Done



# Combined Benefits (concept)

- 2.5 miles less levee maintenance
- More riparian habitat

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Image © 2011 GeoEye

38°54'28.92" N 121°48'38.68" W elev 42 ft

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Eye alt 14010 ft

Imagery Date: 3/11/2009

CALIFORNIA

STATE OF CALIFORNIA

# Species Needs

## Conceptual Models

- **Habitat**
  - Foraging
  - Reproduction
- **Pollution**
- **Invasive Species**



# Sustainable

Sustainable: Viable now and in the future

- Economic
  - Making the system maintainable
- Environmental
  - Contributing to species thriving existence
- Efficacy
  - Keeping its function in a changing future

# Summary

- Integration:
  - Flood Protection
  - T&E Species
  - Water Supply
- Extensive Systemwide Optimization Modeling
- Sustainable habitats, flood facilities, water supply
- This is California's Definition of Water Management

# Questions?

