

# Reconciled Floodplains in the Central Valley: Understanding Process for Species Management

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# Floodplain: Land along a river subject to seasonal inundation



*Carson Jeffres*

Floodplain: Flat land along a river that is perfect for farms and cities



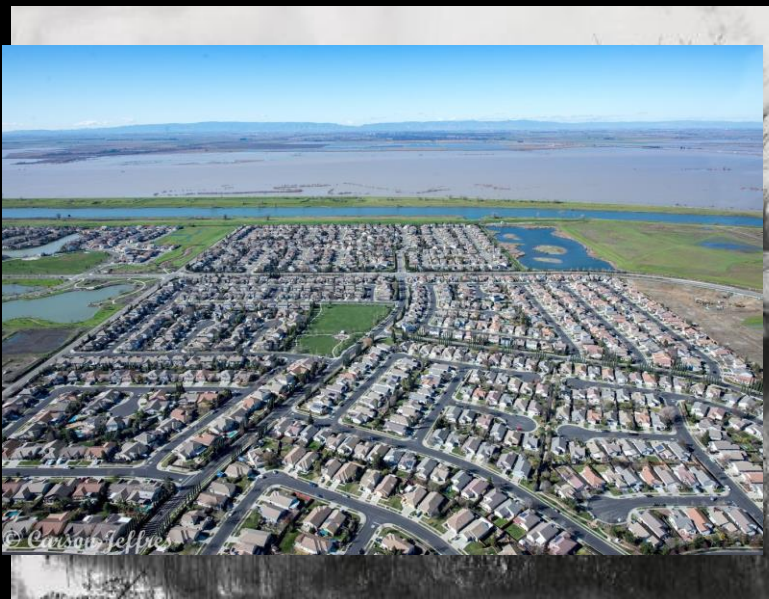
# Historic paradigm: flood **control**

Keep floods off floodplains  
engineering solutions such as levees and dams

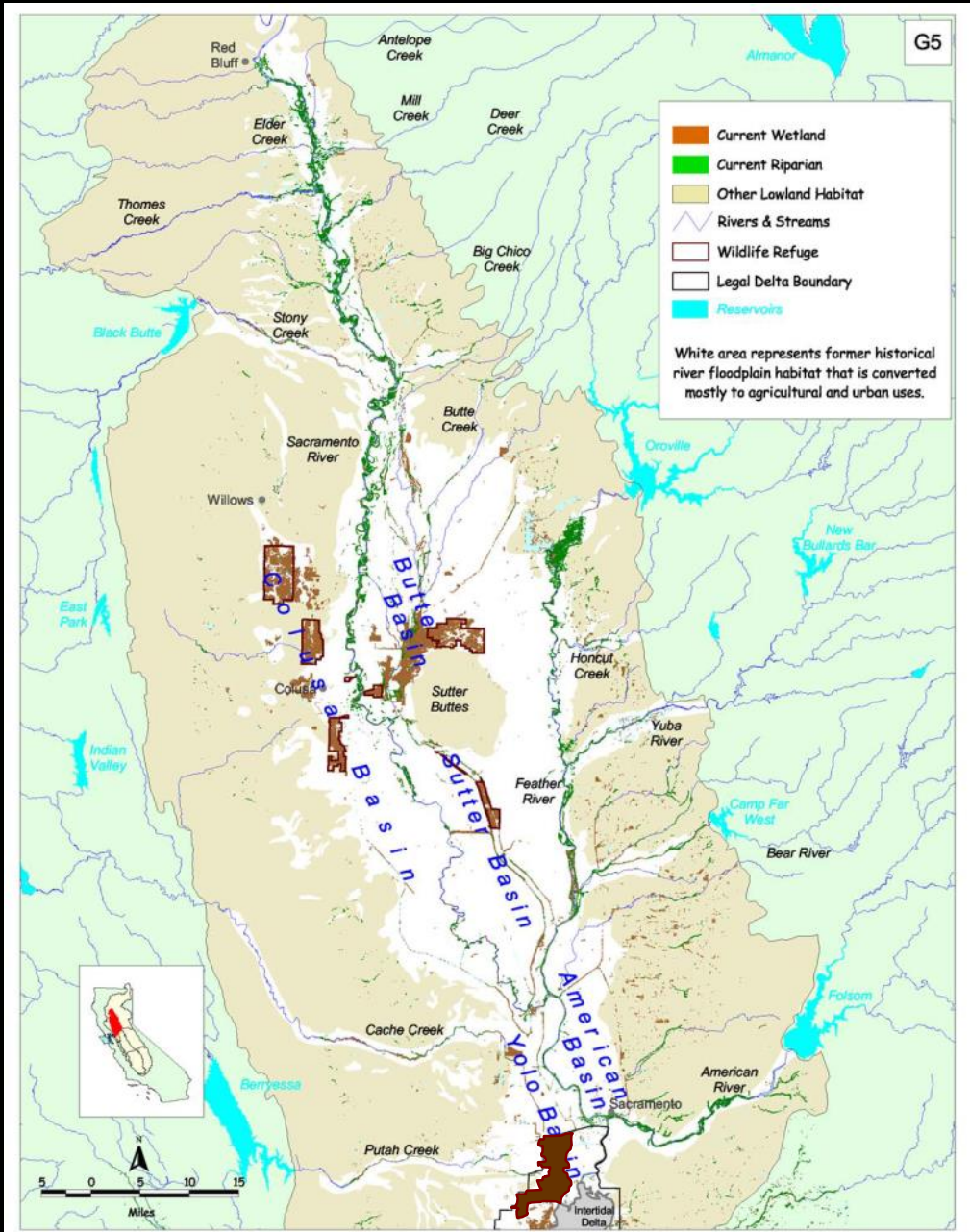


# FOOD HISTORICALLY:

- ~95% of the Central Valley was wetland and riparian habitat
- converted to agriculture and urban development.



California State Library



Sacramento Valley Current River Floodplain Ecosystem

Spring 1851



Satellite Imagery by Matt Clark

April 1, 2017



NASA.gov

# Floodplains in California

- Extent of floodplain habitat greatly reduced



# Current State of Floodplains in the CV

## Restored Floodplains



## Managed Floodplains





# Current State of Floodplains in the CV

## “Restored” Floodplains

- Breaching levees (e.g. Cosumnes River)
- Restoring floodplain geomorphic and vegetation successional processes
- Setting back levees and reconfiguring floodplain habitat (e.g. Bear River, Merced River, etc.)



# Current State of Floodplains in the CV

## Managed Floodplains

- Bypasses and floodways that function seasonally as floodplains (e.g. Yolo Bypass and Sutter Bypass)
- During the non-flood season can be used for agriculture or wildlife



# Fish and Floodplains

- Fish species in California have evolved to utilize floodplains
- Spawning (e.g. splittail)
  - Need submerged vegetation for spawning
- Rearing (e.g. Chinook salmon)
  - Utilize off channel habitat during out-migration



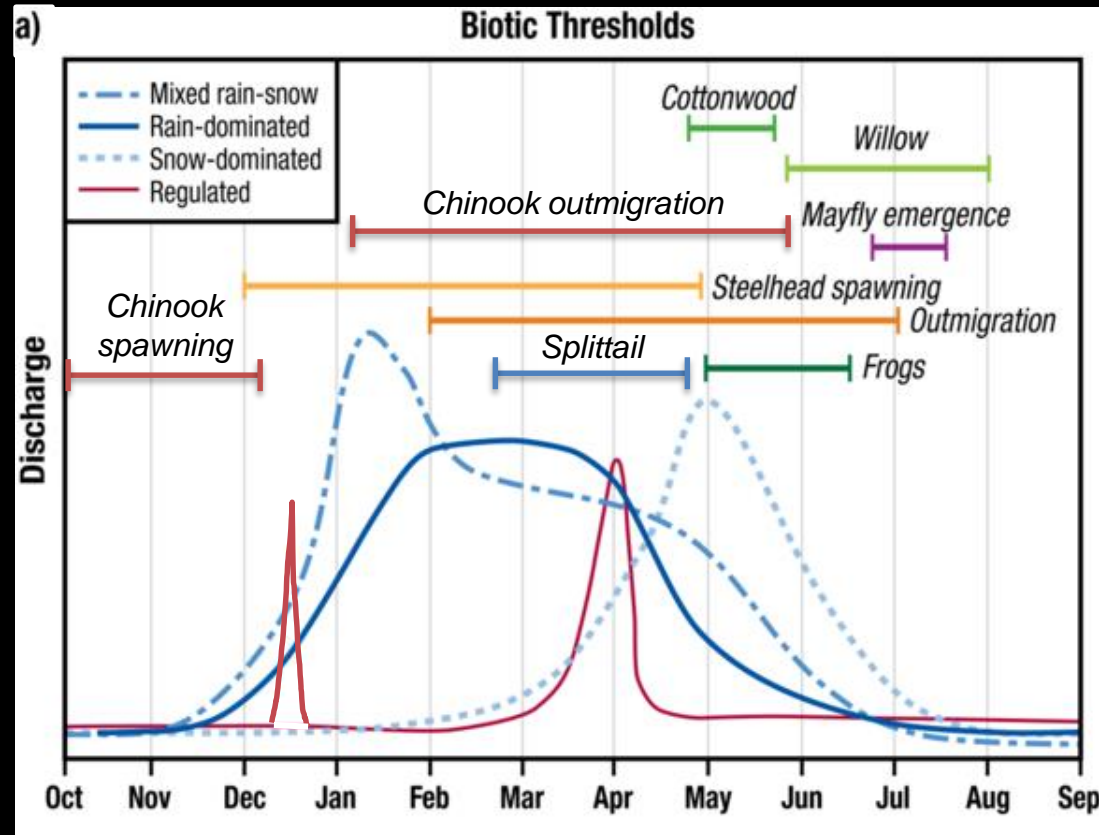
# How are Floods Important for Fish?

- Timing
  - When flooding happens
- Duration
  - How long a flood lasts
- Magnitude
  - Volume of river discharge

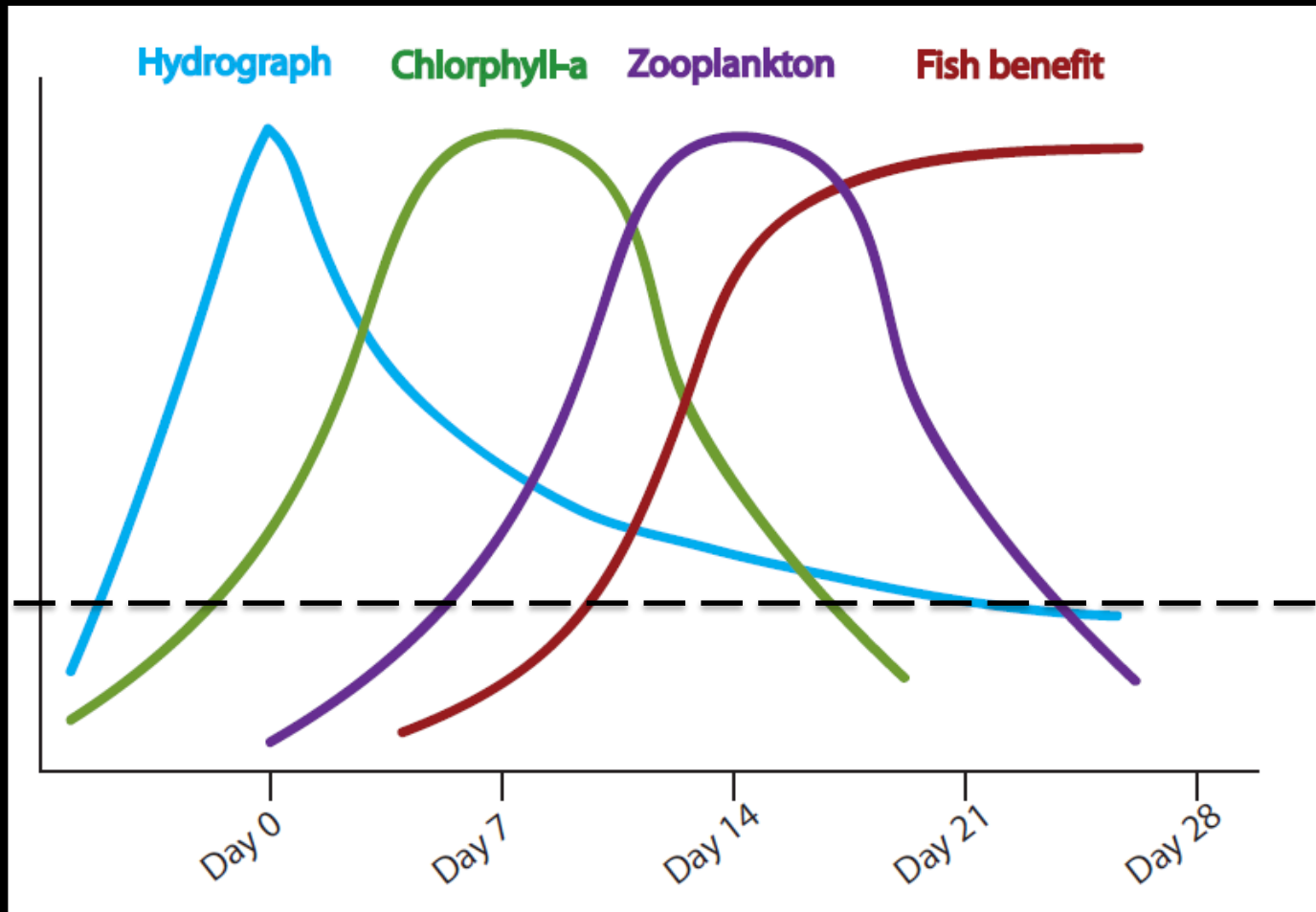


# Flood Timing

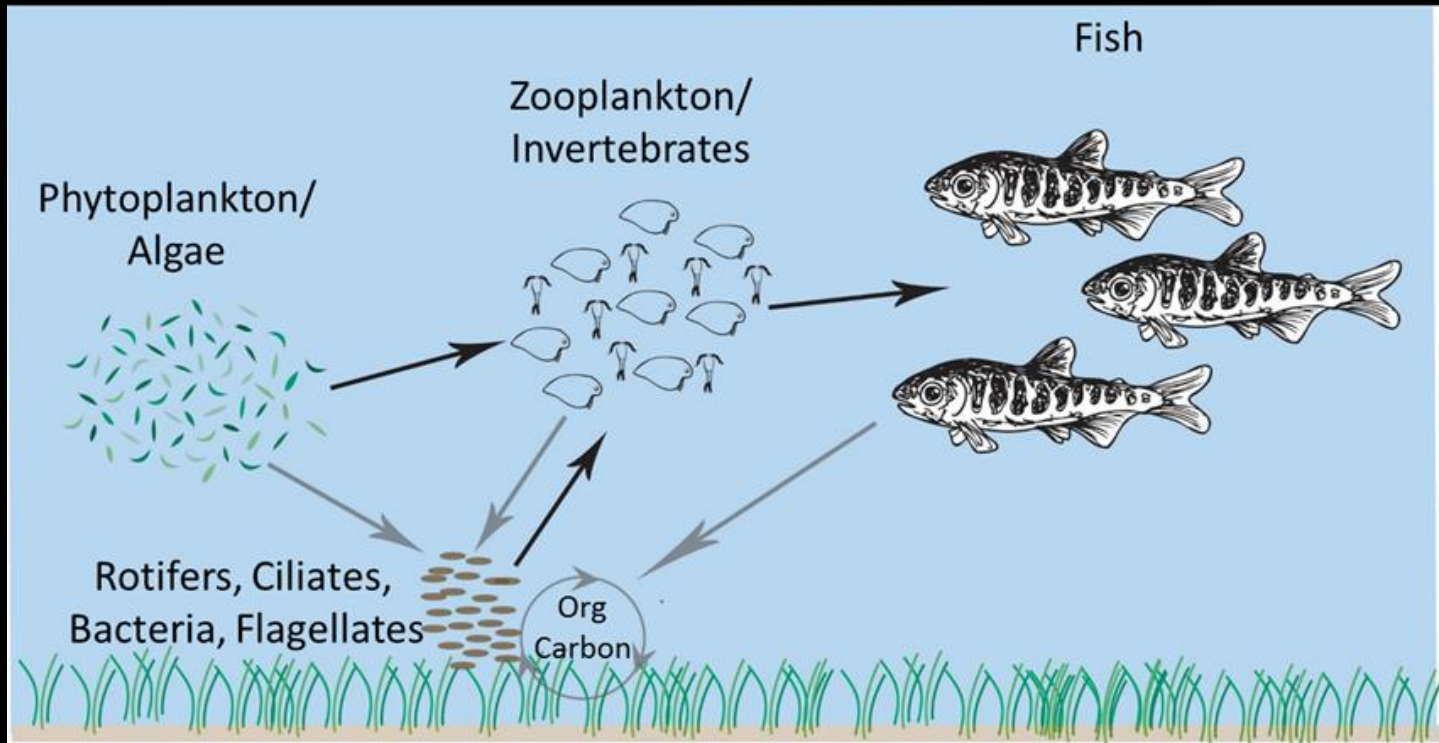
- Seasonal timing of flooding in relation to ecosystem benefit
- Different species and life histories have different timing requirement for flooding



# Food Web Duration

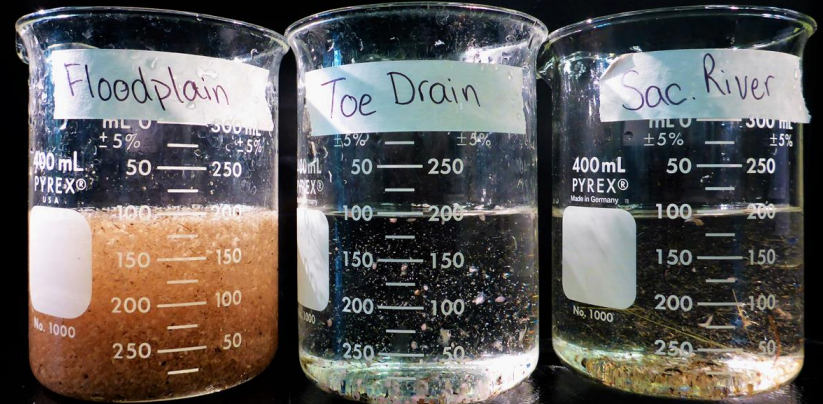


# Floodplain Food Web



# Flood Duration

- How long a flood event lasts before draining back in to the river channel
- Higher residence time of water on the floodplain results in higher ecosystem productivity



Total: 251,143/m<sup>3</sup>

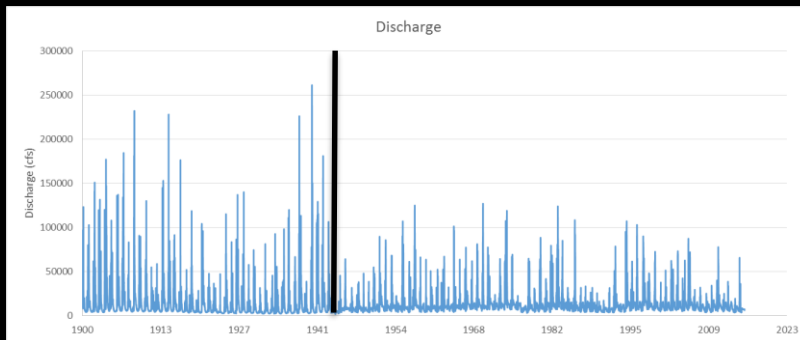
Total: 10,057/m<sup>3</sup>

Total: 1,686/m<sup>3</sup>

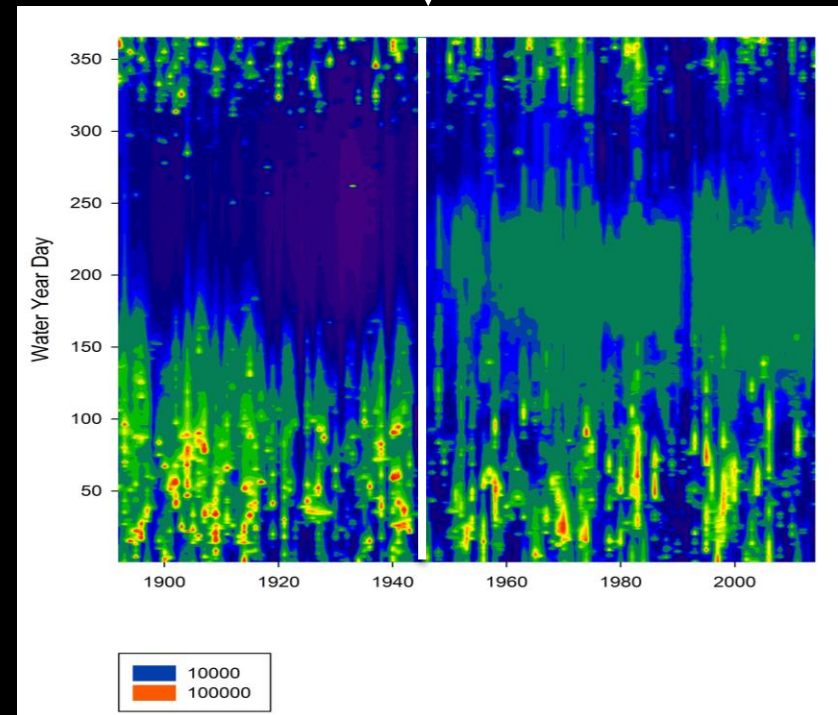


# Magnitude and Changing Flow Conditions

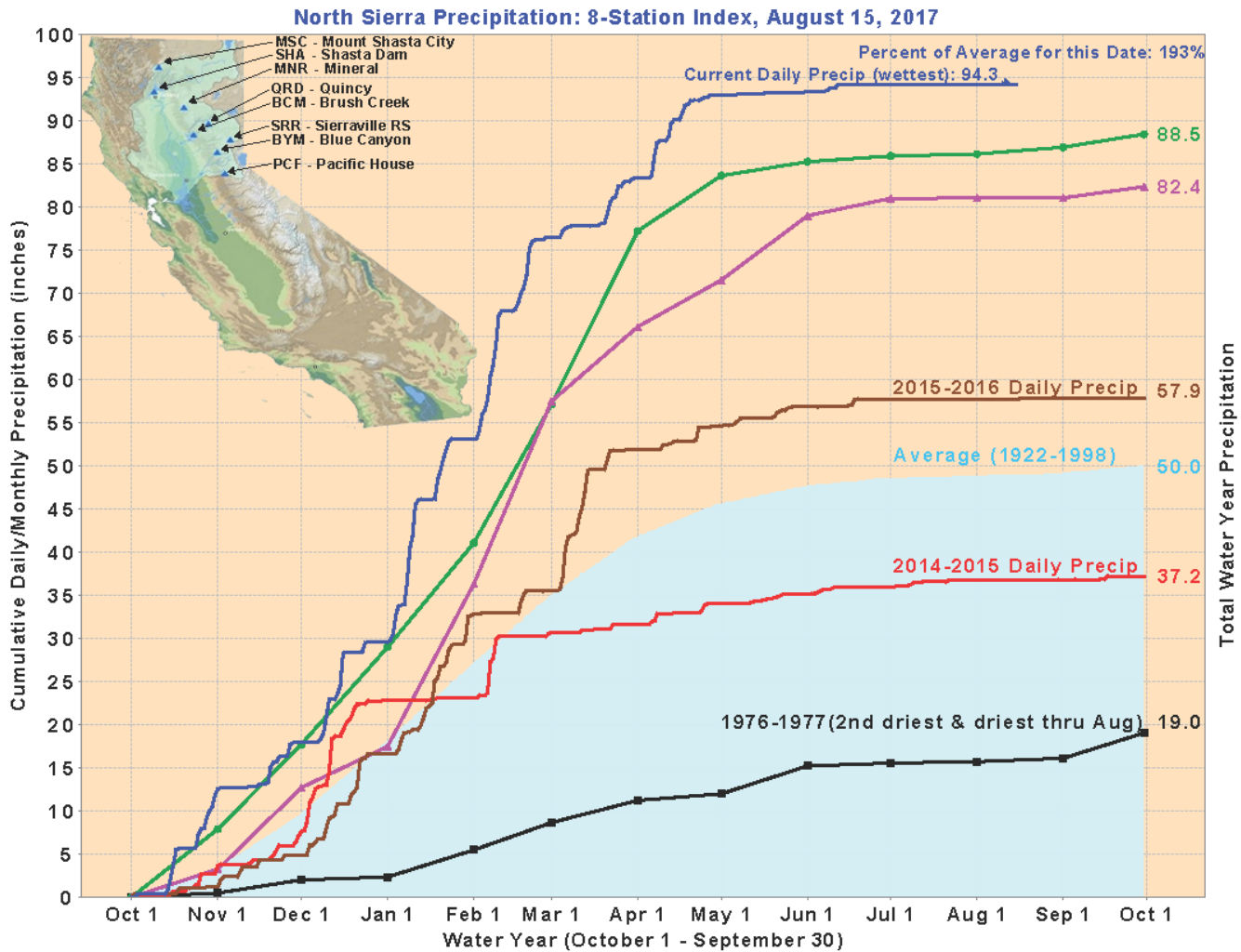
- Lower and less frequent flood flows
- No spring recession
- Higher summer flows
- Average daily flows
  - Pre-dam: 11,438 cfs
  - Post-dam: 11,938 cfs



Closure of Shata Dam

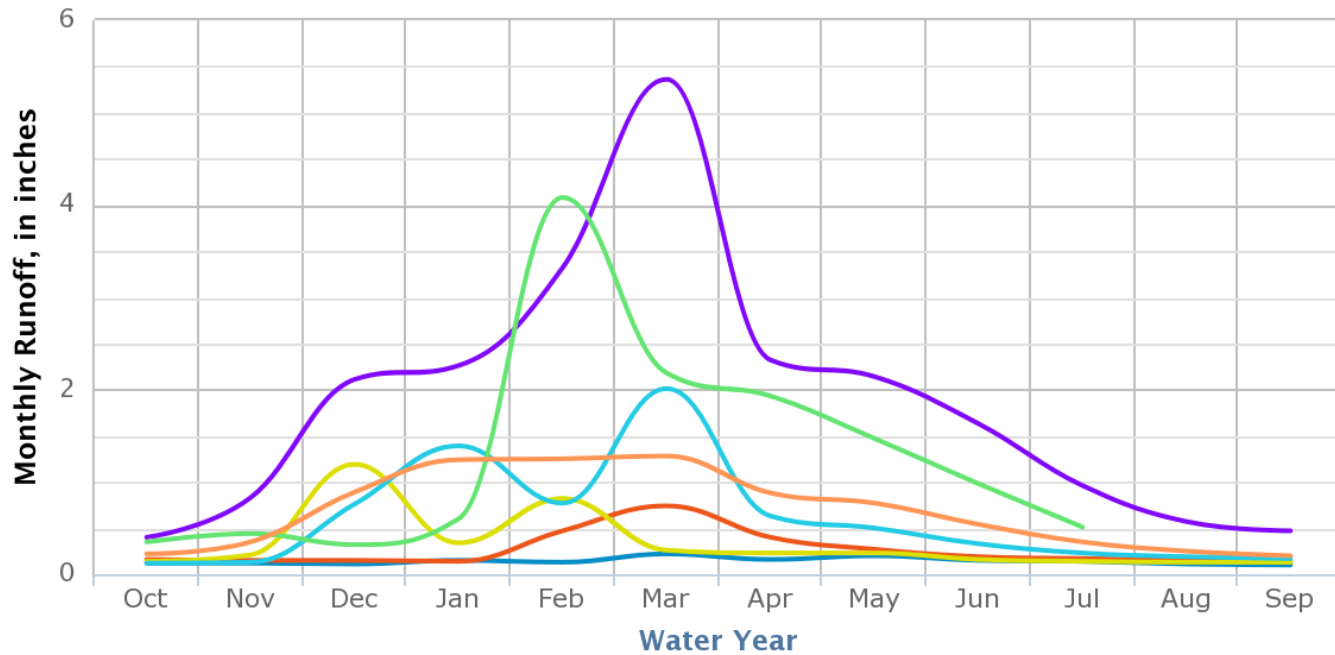


# Precipitation vs. Runoff



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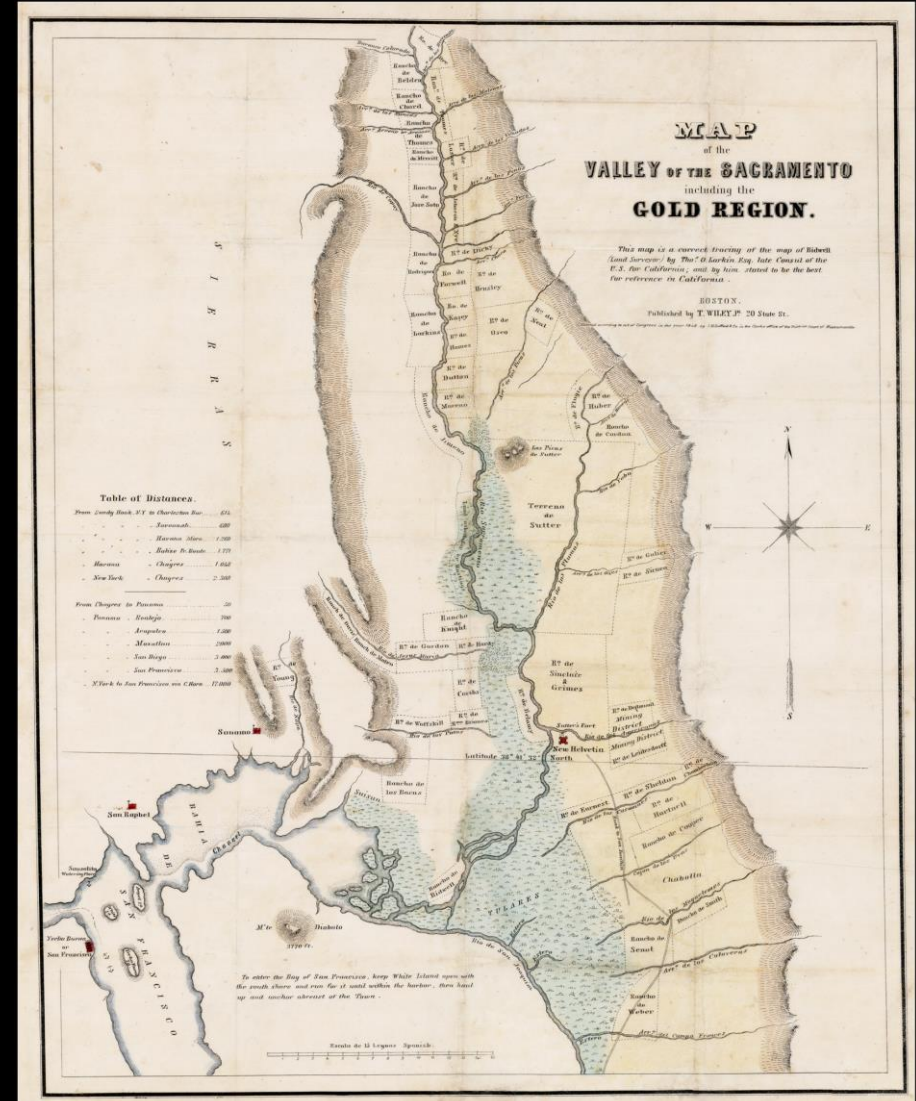
Monthly Runoff for California



— 1977 (generally dry) — 1983 (generally wet) — 2014 water year — 2015 water year  
— 2016 water year — 2017 water year — 30 water years average

# Future of CA Floodplains

- Reconciled System
  - We are not going back
  - We ultimately control the system and decide how it functions
  - Releases of water
  - Restoration of processes



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  - Multi-benefit floodplains
- String of Pearls
  - Connecting habitats throughout the system



# Questions ?



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